

**LAND DIVISION and**  
**ENGINEERING DESIGN STANDARDS**



**CITY OF RED BLUFF**

**Revised 2016**



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**SECTION 1: GENERAL**

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**1.01 PURPOSE**

The City of Red Bluff presents these Standard Specifications and Details in an effort to improve clarity and consistency in the development, design, construction and operation of public and private facilities. These Standards establish minimum requirements and serve as mandatory guidance, ensuring equitable application of ordinances, rules and regulations as they impact city-wide infrastructure. Developers and designers shall review applicable sections on Design Standards, Standard Details, and Materials and Construction Methods to ensure City requirements are addressed and incorporated in all applicable projects. As you utilize this guidance, we would greatly appreciate your comments as we strive to continuously improve its clarity and functionality. Thank you for your contribution to our community through your project endeavors.

At the City's professional discretion, these minimum standards may be modified anytime these criteria or methods do not appear to be in the best interest of the City or as new techniques are developed. On a case-by-case basis, and for sound engineering reasons, designers and consulting engineers may request minor modifications to these standards. The decision of the Technical Advisory Committee and Building / Planning Department shall in all cases be final.

Situations not covered by these Standards shall be in accordance with the latest editions of the Standard Specifications for Public Works Construction ("Green Book") and the accompanying Standard Plans for Public Works Construction, City of Red Bluff General Plan Elements, Subdivision and Zoning Ordinances, or as directed by the Technical Advisory Committee.

**1.02 DEFINITIONS**

- A. **APPROVALS BY THE PUBLIC WORKS DIRECTOR & BUILDING OFFICIAL / PLANNING DIRECTOR:** All approvals by the Public Works Director and Building / Planning referenced in these Standard Specifications shall be in writing.
- B. **CITY:** The City of Red Bluff, a municipal corporation.
- C. **CITY BUILDING DIRECTOR / OFFICIAL:** The Building Official acting directly or through an authorized representative to perform building plan review and field inspection.
- D. **PUBLIC WORKS DIRECTOR:** The Public Works Director of the City of Red Bluff, California, acting directly or through an authorized representative.

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- E. **CONSTRUCTION PLANS:** Plans for the construction of street alignment, grade, geometric section, structural section; sanitary sewer alignment, grade, size; water system alignment, size, valve locations, fire hydrants; storm drain alignment, grade, size and other improvements as required by the Public Works Director.
- F. **CONSULTING ENGINEER:** Any persons, firm, partnership, or corporation authorized to practice Civil Engineering in the State of California who prepares or submits improvement plans and specifications to the Public Works Director for approval.
- G. **DEPARTMENT:** Department of Public Works, City of Red Bluff.
- H. **DEVELOPER:** Any person, firm, corporation, partnership or association engaged in the development of property in part or in whole by the placing of any improvements thereon, whether the property was previously developed in whole, in part, or at all.
- I. **EASEMENT:** An easement dedicated to the City or Public Utility which shall be continuing and irrevocable unless legally abandoned.
- J. **ELECTRONIC MEDIA:** Refers to drawings in AutoCAD most current version, saved on CD ROM.
- K. **FIRE MARSHALL:** Fire Department Official responsible for the City's review of buildings and development plans and field inspections for fire protection requirements.
- L. **GENERAL PLAN:** The adopted general Plan of the City of Red Bluff administered by the Planning Director.
- M. **GEOTECH:** Geologic and soils testing for building and development projects.
- N. **IMPROVEMENTS:** Refers to street work, sidewalk, curb, gutter, driveways, water mains & laterals, sanitary sewer mains & laterals, storm drainage lines, fire hydrants, streetlights, traffic signals, public utilities, landscaping, and fences to be installed on public or private land.
- O. **MANUAL OF TRAFFIC CONTROLS:** The "Manual of Traffic Controls for Construction and Maintenance Work Zones" of the State of California, Department of Transportation - current edition.
- P. **PLANNING DIRECTOR:** The principal land use Planner directly or through an authorized representative responsible for administering the building and development plan reviews and field inspections of projects for compliance with the General Plan.
- Q. **PUE & TPM:** A public utilities easement and a tree planting and maintenance easement granted to the City of Red Bluff.

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- R. **RECORD DRAWINGS:** The final “as-built” plans as submitted to the City of Red Bluff by the developer upon completion of construction
- S. **SOILS REPORT:** A report as prepared by any person or persons, firm, partnership or corporation legally authorized and licensed to practice Soils Engineering in the State of California.
- T. **STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION:** The “Green Book” Standard Specifications for Public Works Construction, latest edition.
- U. **STANDARD SPECIFICATIONS AND DETAILS:** The Standard Specifications and Details of the City of Red Bluff.
- V. **STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION:** The “Green Book” companion Standard Plans for Public Works Construction, latest edition.
- W. **STATE MATERIALS MANUAL:** The Materials Manual of Testing and Control Procedures of the State of California, Department of Public Works, Department of Transportation, latest edition.
- X. **STATE SPECIFICATIONS:** The Standard Specifications of the State of California Department of Transportation.
- Y. **SUBDIVISION ORDINANCE:** Chapter 20 RBCC; Ordinance No. 683 as adopted by the City Council of the City of Red Bluff, dated March 2, 1982, and as amended.
- Z. **TECHNICAL ADVISORY COMMITTEE (TAC):** Technical committee consisting of Public Works Director, Planning Director, Fire Chief, Building Official, Police Chief, Parks & Recreation Director, and City Manager.
- AA. **ZONING ORDINANCE:** Chapter 25 RBCC; Ordinance No. 945 as adopted by the City Council of the City of Red Bluff, dated September 2, 2003, and as amended.

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**SECTION 2: DEVELOPMENT MAPS AND CONSTRUCTION  
PLANS**

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**2.01 GENERAL**

Complete plans and specifications for all proposed improvements, including any necessary dedications and easements, shall be submitted to the Engineering Division of the Department of Public Works. They must receive approval by the Public Works Director prior to the beginning of construction of any portion of such improvements within the public right-of-way. Such plans shall be prepared by or certified by a Registered Civil Engineer in accordance with the provisions of "Civil Engineer's Act", Chapter 7 - Division 3 of the Business and Professions Code, relating to the practice of Civil Engineering. Exceptions from approval are any features of the plans that are contrary to, in conflict with, or do not conform to any California State Law, City of Red Bluff Ordinance or Resolution, or generally accepted good engineering practice in keeping with the standards of the profession; even though such errors, omissions or conflicts may have been overlooked in the Department of Public Works review of the plans.

**2.02 PREPARATION OF MAPS**

Final and Parcel Maps shall be prepared in conformance with the Subdivision Map Act, the City of Red Bluff Subdivision Ordinance, and as follows.

- A. Dimensions: Maps shall be clearly and legibly drawn on 18-inch by 26-inch (18" x 26") sheets with a one-inch (1") margin on all sides.
- B. Scale: Map scale shall not exceed 1" = 100' unless otherwise approved by the City Surveyor.
- C. Form: The statement sheet shall be drafted so that the statements (as applicable) will appear in the form and location as depicted in Section 2.05 and on Figure 2a.

Statements shall be appropriately completed and signed in the following order:

- 1. Owner
- 2. Notary
- 3. Trustee (if applicable)
- 4. Trustee's Notary
- 5. Dedication
- 6. Engineer (or Surveyor)
- 7. City Surveyor / Engineer

- 8. City Clerk
- 9. County Tax Collector
- 10. County Recorder

D. Closure: The maximum error of closure shall not exceed 1 part in ten thousand (1/10,000).

### **2.03 PREPARATION OF IMPROVEMENT PLANS**

Construction plans and specifications shall be prepared in accordance with the following:

- A. Dimensions: Construction plans shall be clearly and legibly drawn on 24 inch by 36 inch (24" x 36") sheets with a 1-1/2 inch (1½") clear margin on the left edge and 1/2 inch (½") margins on all other edges.
- B. Scale: Horizontal scale shall be 1" = 40'; vertical scale shall be 1" = 4' or as approved. Numeric & graphic scale shall appear on each sheet.
- C. Form:
  - 1. Title Sheet.
    - a. Name and Number of Subdivision.
    - b. Plan view showing the entire street right-of-way layout (Scale: 1" = 100'), proposed water and sewer mains, storm drainage system, lot numbers and other miscellaneous improvements to be installed.
    - c. Complete Legend. (See Figure 2b)
    - d. Typical Street Section.
    - e. Vicinity Map with North Arrow.
    - f. Title Block shall be the City of Red Bluff standard located across the bottom edge of the sheet. This is typical of each and every sheet. (See Figure 2c.) An electronic version of the standard Title Block in AutoCAD 2000 formats is available from the City of Red Bluff Engineering Division.
    - g. Temporary and permanent bench marks and descriptions.
    - h. General and Construction Specification notes relating to project.
  - 2. Street Plan and Profile Sheets.

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- a. Plan view of each street to be improved shall be shown on separate sheets indicating existing improvements, proposed improvements and future improvements, if known. Proposed improvements shall include sidewalk, curb, gutter, driveways, sewer mains, water mains, water service and sewer lateral locations, storm drains, manholes, valves, fire hydrants, fencing, barricades, monuments, survey stationing and other data as required by the Public Works Director. Survey stationing shall normally read left to right with the north arrow pointing to the top or left edge of the sheet. All stationing shall be a continuation of existing improvements where possible.
  - b. A profile view of each street shall be shown immediately above its plan view. The profile shall include existing grade lines, sewer mains, storm drains, water mains, public utility mains, all utility crossings, finish grade at centerline, and gutter flow line. Elevations shall be shown for the gutter flow line at grade break points, manhole and catch basin inverts, and water main crossings with other utilities.
  - c. All line work must be clean, sharp and heavy. Letters and numerals must be 1/8-inch minimum and well formed. Numerals showing profile elevations shall not be bisected by station grid lines.
3. Grading Plan. Grading Plans shall be separate from Construction Plans. Grading plans shall clearly show each lot, how each lot drains, pad elevation of each lot, street high and low points along with street slopes, and elevations of adjacent properties. The plan shall conform to Section 11 and Appendix A of these Engineering Design Standards and current Edition of the city Municipal Code.
  4. Erosion Control Plan. An Erosion Control Plan shall be prepared in conformance with Section 11 of these Engineering Design Standards.
  5. Commercial or Industrial Site Development Plan. Site development plans shall include building pad, finished floor and garage elevations, individual lot drainage pattern, adjacent land drainage, driveway locations, fencing, existing contours, existing trees, wells, ditches and other landmarks important in the construction of the improvements. In addition, adjacent lot grading shall be shown. An Engineer's Cost Estimate for the entire project shall also be provided.
  6. Submit completed Subdivision Map Plan Checklist, figure 2d.

**2.04 REVIEW AND APPROVAL PROCEDURE (IN ORDER) FOR FINAL MAPS AND IMPROVEMENT PLANS**

- A. Prior to preparation of the final map or improvement plans, the Consulting Engineer shall submit a Street Site Plan showing any roadway improvements identified in the City Street Master Plan or the City Bikeway Master Plan and a Utility Site Plan showing any utility improvements identified in the current Storm Drainage Master Plan, Wastewater Facilities Master Plan, and Water System Master Plan, as applicable. The Site Plans may be included with an Initial Study, EIR, Tentative Map or Conditional Use Permit Application.

No work shall be started on any detailed Improvement Plan until the Public Works Director has approved in writing any Street Site Plan or Utility Site Plan.

- B. Consulting Engineer prepares and submits Final Map or Parcel Map, and Improvement Plans to the Public Works Department.

The following items must be presented with the original submittal:

1. All information required by California Subdivision Map Act, City Subdivision Ordinance, and Public Works Engineering Design Standards.
2. Four (4) sets of Improvement Plans, including design calculations.
3. Final Map Application including:
  - a. Four (4) Blueprint copies of the map.
  - b. Vesting Deed, Preliminary Title Report (dated within 30 days of submittal of Final Map for checking), copies of surveys referenced, copies of deeds referenced.
  - c. Closure calculations with parcel acreage.
  - d. Soils report.
  - e. City of Red Bluff City Council conditions of approval.
  - f. Final Map Checklist, figure 2e.
4. Fees for map checking and plan checking.
5. Cost estimate for Public Improvements.

In the event that the above items are not complete, or if a significant number of items listed on the "Final Map (figure 2e) and Improvement Plan Checklist (figure 2d)" are incomplete, the Public Works Director may

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determine that the project is not suitable for review. The project will not be "Logged In" until such time as the Map, Plans and other required submittal items are at an acceptable stage of completion for City review.

- C. City checks data in Step B and returns to Consulting Engineer for changes and/or corrections.
- D. Consulting Engineer makes all changes and/or corrections and submits corrected Final Map and Improvement Plans.
- E. Steps "C" and "D" are repeated until Map and Plans are acceptable. After two Map/Plan checks an additional fee will be charged.
- F. Upon request by the City, Consulting Engineer submits originals of Improvement Plans and/or Final Map on mylar and electronic media (AutoCAD 2000 on Compact Disk or DVD Disk) for Council approval of the Map and certification of plans by the Public Works Director. Developer delivers executed agreement, and all items required by said agreement (i.e.; fees, insurance, securities, deeds, etc.) to the Public Works Department.
- G. Public Works Director signs the Improvement Plans and the Final Map.
- H. Submit Final Map and Parcel Filing Checklist, Figure 2f.
- I. The Map is not scheduled for City Council action unless there are offerings of dedications of lands, easements, or rights-of-way, which require the City Council's acceptance.
- J. Signed Improvement Plans are released to the Consulting Engineer.
- K. Prior to start of construction, Developer shall coordinate pre-construction meeting. At, or prior to this meeting, Consulting Engineer shall supply City with three full size 24" X 36" blueprints and three reduced size 11" X 17" paper copies of the complete set of approved Improvement Plans.
- L. During construction, the Contractor shall maintain one set of record drawings readily available to the Public Works Director. Upon request for final inspection, a set shall be supplied to the City for use by City personnel during final inspection.
- M. Prior to final inspection of the improvements, the developer's engineer shall submit a complete set of Record Drawings on reproducible mylar and electronic media to the City as follows:
  - 1. Record Drawings. All modifications as shown on the record drawings maintained by the Contractor shall be conveyed on the original mylar construction plans signed by the Public Works Director. The original information on the plans is to be lined out and the new information

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shall be added in ink. No erasures are to be made. The plans are to be stamped "RECORD DRAWING". All modifications are to be approved by the Public Works Director prior to project acceptance.

2. **Electronic Media.** All modifications as shown on the record drawings maintained by the Contractor shall be changed on the original Auto Cad file. The developer's engineer shall submit a complete set of Record Drawings in AutoCAD current version on CD ROM.
- N. Acceptance of the improvements may be scheduled for City Council approval upon completion of construction to the satisfaction of the Public Works Director if there are additional dedications requiring City Council acceptance by resolution.
- O. **BOND FOR COMPLETION OF IMPROVEMENTS.** Before consideration of a final map of a subdivision, the Public Works Director must be satisfied that all improvements have been constructed. In lieu of the completion of the improvements, a bond executed by a surety company or a letter of credit executed by a bank based on an estimate prepared by the engineer of work and approved by the Public Works Director shall be furnished by the subdivider in an amount equal to the cost of construction and inspection of such improvements. The guarantee will be subject to the condition that the improvements will be completed within twelve months after approval of the final map, or within such additional time as the Council may prescribe, and in the event they are not completed, the City shall proceed with the work and hold the owner and the bonding company or bank issuing the letter of credit, jointly responsible for the costs thereof. The subdivider may deposit a certified check with and payable to the City Treasurer, in place of the above-mentioned guarantees. The developer shall be responsible for providing a one-year guarantee and warranty bond per Section 66499 of the Government Code. Said bond or surety shall be in the amount of 10% of the improvements. When bonding is used, the City must approve all payments made to contractors. Checking and construction inspection cost shall be in accordance with the current fee schedule.

### **2.05 MAP STATEMENTS**

The following statements shall be used on all maps submitted to the City of Red Bluff.

NOTE: Language in brackets [ ] indicate optional or alternate wording when applicable.

**Engineering Design Standards**

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**OWNER'S STATEMENT**

We, the undersigned, do hereby consent to the preparation and filing of this map of Subdivision No. \_\_\_\_\_ for record; and we do hereby state that in order to pass clear title to the land delineated within the exterior boundary of this map the consent of no other persons is necessary.

[We do hereby offer for dedication to the City of Red Bluff for public use, public thoroughfares, all streets, drives, courts and ways, as shown thereon; and we also hereby offer to dedicate for specific purposes the following rights-of-way and easements for drainage, water, sewer, gas pipes, power, lights and telephone and television cables; and any and all other utility services together with any and all necessary appurtenances in each case, in, over and across those strips of land shown or designated as Public Utility Easement (P.U.E.); and rights-of-way and easements for tree planting and maintenance over those strips shown as "Tree Planting, Maintenance and Public Utility Easement" (T.P.M. and P.U.E.).]

[We do hereby relinquish all abutters rights to ingress and egress as delineated hereon (//////) as non-access easements.]

BY: \_\_\_\_\_  
(Name) (Title)

---

**NOTARY ACKNOWLEDGMENT**

State Of California )  
 )§.  
County Of \_\_\_\_\_)

On \_\_\_\_\_ before me, \_\_\_\_\_, Notary Public, personally appeared \_\_\_\_\_  
Name(s) of Signer(s)

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

WITNESS my hand and official seal.

\_\_\_\_\_  
Signature of Notary Public Place Notary Seal Above

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## Engineering Design Standards

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### TRUSTEE'S STATEMENT

\_\_\_\_\_, as trustee under deed of trust recorded \_\_\_\_\_, instrument number \_\_\_\_\_, of Official Records, Tehama County Records, hereby consents to the preparation and filing of this map.

By: \_\_\_\_\_

Print Name: \_\_\_\_\_

Title: \_\_\_\_\_

---

### DEDICATION STATEMENT

Pursuant to Section 66477.5 of the Subdivision Map Act the name and address of the grantor of the dedicated property is as follows:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

The legal description of the property dedicated is as follows:

1. All roads, avenues, drives, ways, courts and \_\_\_\_\_ shown hereon.
  2. Parcels \_\_\_\_\_ as shown hereon. The City of Red Bluff shall reconvey the property to the grantor, or the successor(s) in interest, if it determines pursuant to Section 66477.5 of the Subdivision Map Act that the same public purpose for which the property was dedicated does not exist except for all or any portion of the property that is required for that same public purpose or for public utilities.
- 

### ENGINEER'S OR SURVEYOR'S STATEMENT (Final Maps Only)

I do hereby state that I am the Registered Civil Engineer [Land Surveyor] responsible for the survey of the lands, and preparation of the final map and that the said survey was made by me or under my direction on \_\_\_\_\_

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## Engineering Design Standards

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and the same is true and complete as shown. All monuments are of the character and occupy the positions indicated or will be set in such position on or before \_\_\_\_\_ and that the monuments are, or will be, sufficient to enable the survey to be retraced.

\_\_\_\_\_  
Date

\_\_\_\_\_  
Name

\_\_\_\_\_  
RCE (LS) Number

---

### ENGINEER'S OR SURVEYOR'S STATEMENT (Parcel Maps Only)

This map was prepared by me or under my direction [and was compiled from record data] [and is based upon a field survey] in conformance with the requirements of the Subdivision Map Act and local ordinance at the request of \_\_\_\_\_ on \_\_\_\_\_. I hereby state that this parcel map substantially conforms to the approved or conditionally approved tentative map, if any. [All monuments are of the character and occupy the positions indicated or will be set in such position on or before \_\_\_\_\_ and that the monuments are, or will be, sufficient to enable the survey to be retraced.]

(Signed) \_\_\_\_\_

R.C.E. (or L.S.) No. \_\_\_\_\_

---

### CITY CONSULTANT'S STATEMENT (If Applicable)

I hereby state that I have examined this Plat of [Final Map] [Parcel Map] entitled "[Subdivision No. \_\_\_\_\_] [Parcel Map No. \_\_\_\_\_]" and I am satisfied that said Plat is technically correct in accordance with Section 66442 of the Subdivision Map Act.

Dated: \_\_\_\_\_

License: \_\_\_\_\_

Expires: \_\_\_\_\_

---

### CITY ENGINEER'S STATEMENT

I hereby state that I have examined this Plat of [Final Map] [Parcel Map] entitled "[Subdivision No. \_\_\_\_\_] [Parcel Map No. \_\_\_\_\_]" and find it to be substantially the same as the Tentative Map submitted to the Planning Commission of the City of Red Bluff, and that all provisions of the Subdivision Map Act and all applicable City ordinances have been complied with.

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## **Engineering Design Standards**

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Dated: \_\_\_\_\_

\_\_\_\_\_, City Engineer

LICENSE: R.C.E. # \_\_\_\_\_

EXPIRES: \_\_\_\_\_

---

### **PLANNING DIRECTOR'S STATEMENT**

I hereby state that I have examined this map and have found it to be substantially the same as it appeared on the tentative map, and any approved alterations thereof, and that it complies with all applicable City ordinances, California Building Codes, and conditions of approval.

\_\_\_\_\_  
Date

\_\_\_\_\_  
Planning Director, City of Red Bluff

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### **BUILDING DIRECTOR'S / OFFICIAL'S STATEMENT**

I hereby state that I have examined this map and have found it to be substantially the same as it appeared on the tentative map, and any approved alterations thereof, and that it complies with all applicable City ordinances, California Building Codes, and conditions of approval.

\_\_\_\_\_  
Date

\_\_\_\_\_  
Building Director / Official, City of Red Bluff

---

### **CITY CLERK'S STATEMENT (Final Maps Only)**

I hereby state that at its regularly scheduled meeting of \_\_\_\_\_, the City Council of the City of Red Bluff approved this Final Map of Subdivision No. \_\_\_\_\_ [and has accepted on behalf of the public all land, rights of way, and easements hereon offered for dedication (to be used only if there are dedications).]

Dated: \_\_\_\_\_

\_\_\_\_\_  
Deputy City Clerk, City of Red Bluff

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**Engineering Design Standards**

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CITY CLERK'S STATEMENT (Parcel Maps that include dedications only)

The undersigned City Clerk / Deputy City Clerk of the City of Red Bluff does hereby state that the rights-of-way and easements hereon offered for dedication are accepted on behalf of the City of Red Bluff, on \_\_\_\_\_ (Date).

In witness thereof, I have hereunto set my hand this \_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_.

Dated: \_\_\_\_\_  
City Clerk / Deputy City Clerk, City of Red Bluff

---

COUNTY RECORDER'S STATEMENT

Filed this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_, at \_\_\_\_\_ .M.

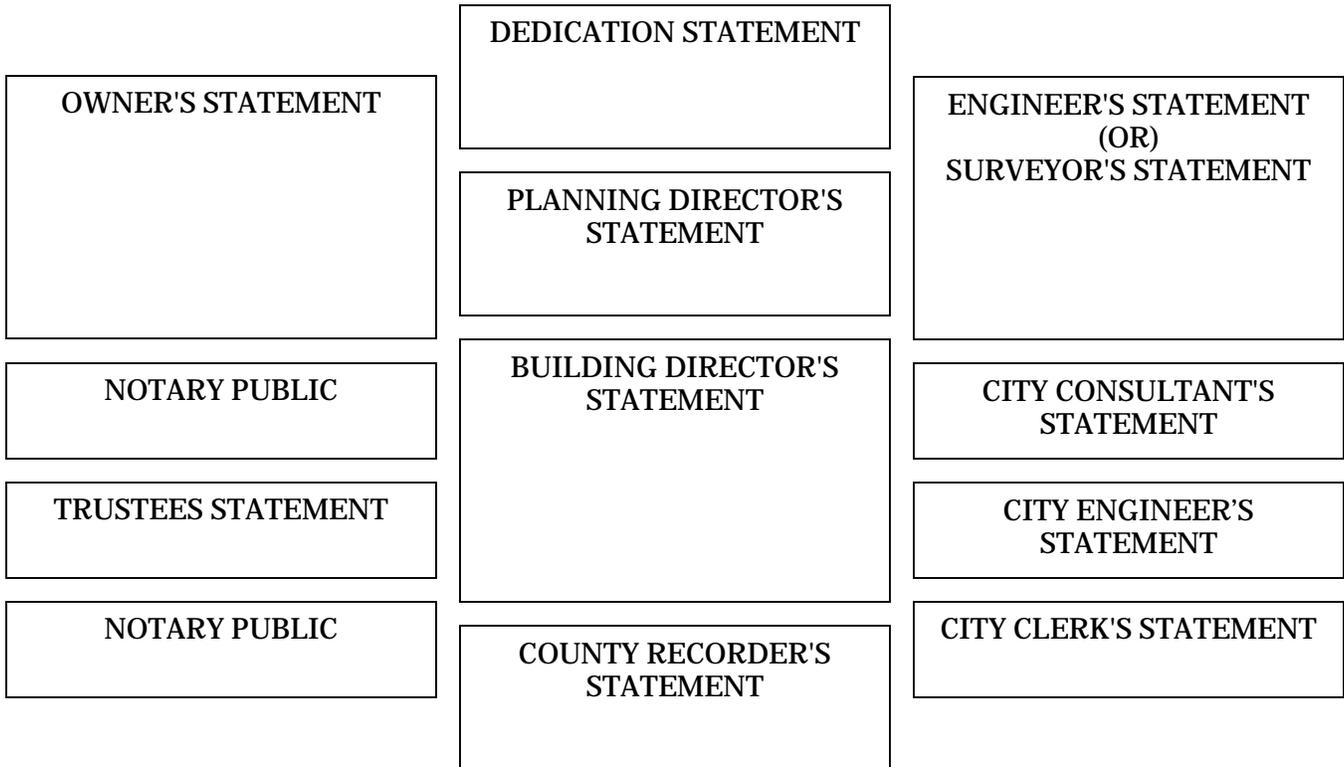
In Book \_\_\_\_\_ of Parcel Maps, Page \_\_\_\_\_, at the request of

\_\_\_\_\_  
Mary Alice George  
Tehama County Recorder

By: \_\_\_\_\_  
Deputy

**FIGURE 2a**

TYPICAL MAP STATEMENT SHEET LAYOUT



# Engineering Design Standards

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**FIGURE 2b**

## IMPROVEMENT PLAN LEGEND

PROPOSED LINES/SYMBOLS TO BE CONTINUOUS LINETYPE W/.50 mm/.0197in LINE WEIGHT  
 EXISTING LINES/SYMBOLS TO BE HIDDEN LINETYPE/SHADED 50% W/.35mm/.0138in LINE WEIGHT

	8" WATER LINE PROPOSED (SIZE)
	6" AC WATER LINE EXISTING (SIZE & TYPE)
	SINGLE WATER SERVICE
	FIRE HYDRANT PROPOSED
	FIRE HYDRANT EXISTING
	WATER VALVE PROPOSED
	WATER VALVE EXISTING
	PLUG IN END OF LINE
	B.O. BLOW OFF ASSEMBLY
	CATCH BASIN (SIZE & TYPE AS NOTED)
	CATCH BASIN W/LD (LOCAL DEPRESSION)
	DROP INLET
	STORM DRAIN MANHOLE PROPOSED
	STORM DRAIN MANHOLE EXISTING
	UTILITY POLE
	8" PVC SEWER LINE PROPOSED (SIZE & TYPE, USE CONTINUOUS LINETYPE)
	6" AC SEWER LINE EXISTING (SIZE & TYPE)
	SEWER MANHOLE PROPOSED
	SEWER MANHOLE EXISTING
	SEWER CLEANOUT
	SEWER HOUSE CONNECTION
	F.M. SEWER FORCE MAIN
	STREET LIGHT
	HEADWALL
	15" CMP STORM DRAIN PIPE PROPOSED (SIZE & TYPE, USE CONTINUOUS LINETYPE)
	12" CMP STORM DRAIN PIPE EXISTING (SIZE & TYPE)
	SIGN POST
	C&G NEW
	C&G EXISTING
	CENTERLINE (USE CL LINETYPE)
	PL (PROPERTY LINE USE DASHEDX2 LINETYPE)
	DRIVEWAY OPENINGS PROPOSED
	DRIVEWAY OPENINGS EXISTING

**FIGURE 2c**

TITLE BLOCK

		STANDARD PLAN		SHEET NO.
		SAMPLE DRAWING SHEET		
		 CITY OF RED BLUFF _____ _____ _____		APPROVED BY _____ GARY M. GORDON, CITY ENGINEER DATE: _____
NO.	REVISION	BY		

**FIGURE 2d**

**SUBDIVISION IMPROVEMENT  
PLAN CHECK LIST**

Map No. _____
Name: _____
1 <sup>st</sup> Check Date: _____
2 <sup>nd</sup> Check Date: _____

**Grading Plan Form**

- \_\_\_\_\_ Show all cut and fill slopes
- \_\_\_\_\_ Show original contours and spot elevations throughout
- \_\_\_\_\_ Finished grade elevation shown at lot corners, house pads and along boundary of subdivision
- \_\_\_\_\_ Direction of flow on finished lots gutters, conduits, ditches and etc.
- \_\_\_\_\_ Locate retaining walls
- \_\_\_\_\_ Check Periphery of subdivision for drainage conflicts and downstream effect
- \_\_\_\_\_ Minimum 2% Lot Slope

**Drainage Map and Calculations**

- \_\_\_\_\_ Hydrologic and hydraulic calculations based on rational method in tabular form, covering ultimate development of any contributing watershed area and extension of in-tract improvements to the subdivision boundary
- \_\_\_\_\_ Head loss calculations at all drainage structures
- \_\_\_\_\_ Drainage map must show the boundary of all contributing areas, including off-site
- \_\_\_\_\_ Locations of all catch basins, curb inlets, valley gutters, junction boxes and other drainage structures
- \_\_\_\_\_ Slope of curb and gutter
- \_\_\_\_\_ Location, size and slope of all drainage conduits, ditches, channels, etc.
- \_\_\_\_\_ Letter of approval from proper authority or drainage release before increasing or redirecting drainage upon downstream properties
- \_\_\_\_\_ In-ground detention (if required)

**Improvement Plans**

- \_\_\_\_\_ 24" x 36" or 22" x 34" Plan and profile sheets
- \_\_\_\_\_ Name of sub., scale, north arrow, lot nos., easement and property lines
- \_\_\_\_\_ Single plan and profile paper – preferred scale 20' to the inch horizontal and 4' to the inch vertical
- \_\_\_\_\_ Engineer's signature and license number and seal
- \_\_\_\_\_ Approval block for Public Works Director
- \_\_\_\_\_ Reference to City Standards and any drawings that apply
- \_\_\_\_\_ Check entire subdivision for adequate discharge and pickup points. Particular care taken with street profiles at subdivision boundary where streets will be extended in future
- \_\_\_\_\_ Show plan and profile of all storm drainage facilities, including length, type, size, and slope – also existing ground profiles and invert elevations at structures, etc.
- \_\_\_\_\_ Show complete detailed drawings of all drainage facilities, such as headwalls or endwalls, retaining walls, junction boxes, swales, ditches, etc. Structural calculations may be required for complicated structures
- \_\_\_\_\_ Check for minimum cover of all drainage lines
- \_\_\_\_\_ All necessary easements shown on both plan and final map

## **Engineering Design Standards**

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- \_\_\_\_\_ Where steep grades exist, special inlets should be designed for adequate pickup with no overshooting
- \_\_\_\_\_ When allowed, provide a 0.4% minimum slope on valley gutters and indicate flow line elevations at flow line intersections
- \_\_\_\_\_ Provide sub-drains and filter material in locations having excessive ground water – check with soils engineer if in doubt
- \_\_\_\_\_ Show typical cross section of all streets. Include curb and gutter sidewalk drainage conduit, pavement section and any other improvements within public right-of-way
- \_\_\_\_\_ Show property lines, easements and lot numbers along the street
- \_\_\_\_\_ On plan, show curb lines, drainage facilities, sanitary sewers, water lines, and other structures, sidewalks, details of sidewalk at returns, ped. way improvements, if required.
- \_\_\_\_\_ Show street widths
- \_\_\_\_\_ Show curve data (radius, delta, length)
- \_\_\_\_\_ Show stationing at 100 ft. Intervals, at all B.C. and E.C. points in Plan – at B.V.C and E.V.C. points, and at grade breaks in profile
- \_\_\_\_\_ Show top of curb elevations at curb return points, at intermediate points around returns, grade breaks, and at vertical curves
- \_\_\_\_\_ Show centerline grades and elevations at intersections, vertical and horizontal curves and grade breaks
- \_\_\_\_\_ Check curb returns for smooth curves in profile
- \_\_\_\_\_ Show existing ground and finished grade centerline profiles
- \_\_\_\_\_ Show adequate vertical curve data – vertical curves required where difference in grade exceeds 1.0%
- \_\_\_\_\_ Profiles of minor streets should be subordinated to the crown of major street
- \_\_\_\_\_ Check outboard curbs on curves for flat grade
- \_\_\_\_\_ Show established permanent benchmark in area – datum preferred USC & GS
- \_\_\_\_\_ Where improvements are made within existing improved streets or plans vary from typical section, show sufficient cross sections and profiles to assure proper conformance with improvements
- \_\_\_\_\_ Where improvements are made within County or State right-of-way, a letter of approval is necessary
- \_\_\_\_\_ Check proposed improvements for conformance with existing improvements on adjacent property with respect to elevation, grade, and width of sidewalks, pavements, etc.
- \_\_\_\_\_ Show locations of all street signs, monuments, barricades, street lights, fire hydrants, and postal units
- \_\_\_\_\_ Show sanitary sewer in plan and profile
- \_\_\_\_\_ Typical trench to show bedding and backfill for sewer and water
- \_\_\_\_\_ Show water in plan with thrust block details
- \_\_\_\_\_ Location of sewer and water services
- \_\_\_\_\_ Location of sanitary sewer Y's
- \_\_\_\_\_ Wheelchair ramps and returns
- \_\_\_\_\_ Street Lights
- \_\_\_\_\_ Location of street legends and pavement marking and striping

### **Engineer's Cost Estimate**

- \_\_\_\_\_ Submitted for purposes of establishing improvement bond amount.
- \_\_\_\_\_ Should include all streets constructions items, filling and grading, all drainage items, street name signs, monuments, water and sewer items, and all other construction items necessary to produce completed subdivision.

**Figure 2e**

**PRELIMINARY MAP CHECKLIST**

**Subdivision or Parcel Division**

\_\_\_\_\_ Total area of proposed subdivision

Do the dimension, scale, and content show in reasonable detail the following:

\_\_\_\_\_ Street and lot pattern uses proposed

\_\_\_\_\_ Topography and drainage, watercourses, water features, area subject to inundation or flooding

\_\_\_\_\_ Geology, soil types, vegetation

\_\_\_\_\_ Proposed water supply, sewerage, fire protection

\_\_\_\_\_ Proposed street section and improvements

\_\_\_\_\_ Other features required to adequately represent a comprehensive total development plan

**Figure 2f**

**TENTATIVE MAP CHECKLIST**

**Subdivision or Parcel Division**

\_\_\_\_\_ Size of sheet 18" x 26", submit 12 copies

The following information – except such information which the T. A. C. determines not necessary:

- \_\_\_\_\_ Site location sketch
- \_\_\_\_\_ Tract Number and date, north arrow, scale, location, and boundary of proposed tract
- \_\_\_\_\_ Name and address of record owner and statement of authorization to subdivide
- \_\_\_\_\_ Name and address of subdivider
- \_\_\_\_\_ Name and number of the registered civil engineer or licensed surveyor who prepared the map
- \_\_\_\_\_ Location, names, width, approximate grade and curve radii of all streets, highways, and ways within the property and immediate vicinity
- \_\_\_\_\_ Contour lines having the following intervals: two feet for ground slopes exceeding five percent. Datum shall be sea level.
- \_\_\_\_\_ The location, character, and identification of all existing and proposed public utility facilities on the property or adjoining property
- \_\_\_\_\_ Approximate lot layout and dimensions each lot shall be numbered and setback shown
- \_\_\_\_\_ Preliminary grading plan
- \_\_\_\_\_ Outline of existing buildings, identification of those to remain in place and their location in relation to existing or proposed streets
- \_\_\_\_\_ Approximate location and species of trees or groups of trees on the property, and general identification of those to be removed
- \_\_\_\_\_ Approximate locations of existing and proposed water control features and bodies of water, all areas which are subject to inundation or storm water overflow, and the location, width, and direction of flow of all watercourses, including base flood elevation per F. E. M. A.
- \_\_\_\_\_ Approximate locations of existing wells, springs, and sewage disposal systems
- \_\_\_\_\_ The location, identification and description of known or found survey monuments on or adjacent to the site
- \_\_\_\_\_ The names of owners of adjacent properties or refer to recorded subdivision map
- \_\_\_\_\_ Cord lengths @ front yard setback

# Engineering Design Standards

**NOTE: MARKUPS MUST BE RETURNED WITH CORRECTED MAP**

## Figure 2g

### FINAL MAP CHECKLIST

#### Subdivision and Parcel Division

**Prepared in accordance with the Approved Tentative Map. First sheets shall contain all affidavits, acknowledgements, certifications, etc.**

- \_\_\_\_\_ 18"x26" original
- \_\_\_\_\_ 1" Margin
- \_\_\_\_\_ City Engineer's Certificate
- \_\_\_\_\_ Owners Certificate (including dedications)
- \_\_\_\_\_ Engineer's/Surveyor's Statement
- \_\_\_\_\_ City Clerk Certificate
- \_\_\_\_\_ Trustee's Statement
- \_\_\_\_\_ Notary Acknowledgements
- \_\_\_\_\_ Recorder's Certificate
- \_\_\_\_\_ Book \_\_\_\_\_ of Parcel Maps Page \_\_\_\_ or Book \_\_\_\_ of Maps, Page (outside margin top right)
- \_\_\_\_\_ Legend
- \_\_\_\_\_ North Arrow
- \_\_\_\_\_ Basis of Bearings (between round. mon. of record)
- \_\_\_\_\_ Vicinity Map
- \_\_\_\_\_ Signatures Omitted and Other Notes
- \_\_\_\_\_ Condition of Approval
- \_\_\_\_\_ Each Parcel Lettered (P.M.) or Numbered (Sub'd.) Consecutively
- \_\_\_\_\_ Area to Hundredth Acre (if over one acre)
- \_\_\_\_\_ Bearing and Distance on Each Line (no ditto marks)
- \_\_\_\_\_ Increment and Total Distance to the Hundredth
- \_\_\_\_\_ Curve Data (radius, delta, length)
- \_\_\_\_\_ Adjacent Owner: parcel or lot if in a sub'd. or owner & \_\_\_\_\_ O.R. \_\_\_\_\_
- \_\_\_\_\_ Heavy Border Around Parcel Being Split
- \_\_\_\_\_ Location, Width and Identification of all Streets, Easements or Dedications
- \_\_\_\_\_ Ties to Centerline
- \_\_\_\_\_ Delineate Areas Subject to Inundation

#### Title Block to Contain:

- \_\_\_\_\_ Parcel Map No. or Tract No.
- \_\_\_\_\_ Sectional Reference
- \_\_\_\_\_ Subdivision with Record Data
- \_\_\_\_\_ In the Incorporated City of Red Bluff, Tehama Co., CA
- \_\_\_\_\_ Owner & \_\_\_\_\_ O.R. \_\_\_\_\_
- \_\_\_\_\_ Scale
- \_\_\_\_\_ Date
- \_\_\_\_\_ Sheet No. (key map if more than 2 sheets)
- \_\_\_\_\_ Name of Engineer or Surveyor
- \_\_\_\_\_ Verify Reference (parcel map – record maps)

## Engineering Design Standards

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### Submit for Initial Checking Final Map:

- \_\_\_\_\_ 4 Check Prints – (1<sup>ST</sup> submittal)
- \_\_\_\_\_ Subdivision Guarantee
- \_\_\_\_\_ Closure Sheets
- \_\_\_\_\_ Adjoining Deeds
- \_\_\_\_\_ Vesting Deeds
- \_\_\_\_\_ 2 Check Prints Grading Plan
- \_\_\_\_\_ Soils Report
- \_\_\_\_\_ 2 Check Prints Drainage Map and Calculations
- \_\_\_\_\_ Specifications
- \_\_\_\_\_ Covenant, Conditions & Restrictions
- \_\_\_\_\_ Engineer's Cost Estimate

***Engineering Dept. Use***

MAP NO. \_\_\_\_\_

NAME: \_\_\_\_\_

1<sup>st</sup> Check Date: \_\_\_\_\_

2<sup>nd</sup> Check Date: \_\_\_\_\_

# Engineering Design Standards

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## **Figure 2h**

### **SUBMITTAL REQUIREMENTS**

#### **Parcel Maps**

- \_\_\_\_\_ Four (4) Sets of Maps
- \_\_\_\_\_ Title Report
- \_\_\_\_\_ Boundary/Lot Calculations
- \_\_\_\_\_ Deeds; Property & Adjacent Property
- \_\_\_\_\_ Map Check Fee – Per current City Council Resolution – Call the Engineering Department for fee. (payable to City of Red Bluff)

#### **Subdivision Maps**

- \_\_\_\_\_ Four (4) Sets of Maps
- \_\_\_\_\_ Title Report
- \_\_\_\_\_ Boundary/Lot Calculations
- \_\_\_\_\_ Deeds; Property & Adjacent Property
- \_\_\_\_\_ Map Check Fee – Per current City Council Resolution – Call the Engineering Department for fee. (payable to City of Red Bluff)

#### **Improvement Plans/Development**

- \_\_\_\_\_ Four (4) Sets of Plans
- \_\_\_\_\_ Drainage/Hydraulic Calculations (2 sets)
- \_\_\_\_\_ Soil Report
- \_\_\_\_\_ R-Values
- \_\_\_\_\_ Earthwork Quantities
- \_\_\_\_\_ Retaining Wall Calculations
- \_\_\_\_\_ Cost Estimate
- \_\_\_\_\_ Plan Check Fee – Per current City Council Resolution – Call the Engineering Department for fee. (payable to City of Red Bluff)
- \_\_\_\_\_ Subdivision Improvement Inspection Fee – Per current City Council Resolution – Call the Engineering Department for fee. (payable to City of Red Bluff – due prior to construction)
- \_\_\_\_\_ One (1) Paper and one (1) Electronic Set of Final "As-Builts"

#### **Filing Requirements**

- \_\_\_\_\_ Two (2) Original Mylars, (three (3) if owner wants copy) Signed with Acknowledgements and One (1) Unsigned Electronic Copy to the City of Red Bluff
- \_\_\_\_\_ Tax Certificate (Tehama Tax Collector's Office 530-527-4535)
- \_\_\_\_\_ Deeds
- \_\_\_\_\_ Bonds and Agreements
- \_\_\_\_\_ Inspection Fees (if not already paid, payable to City of Red Bluff)
- \_\_\_\_\_ Recording Fees (payable to Tehama County Clerk & Recorder)(Tehama Co. Clerk & Recorder's Office 530-527-3350)
- \_\_\_\_\_ Two (2) Copies of Signed Improvement Plans
- \_\_\_\_\_ Parcel/Subdivision Guarantee

\* Subject to additional fees for excess staff time/consultant fees.

## **SECTION 3: STREET DESIGN**

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### **3.01 GENERAL**

Street improvements shall be designed to serve the ultimate level of development as defined in the current edition of the City Standard Specifications, City General Plan, the City Bikeway Master Plan, and the City Street Master Plan.

### **3.02 PLAN REQUIREMENTS**

The street improvement plans shall show geometric design including cross section, street width, traffic lanes, curb and gutter, sidewalk, driveways, existing and proposed right-of-way and easements, grades, existing and proposed utilities, signing and striping, and any supplementary information and data necessary to assist in properly reviewing and approving the street design.

### **3.03 SOILS TESTING REQUIREMENTS**

At least three (3) soil sample analyses shall be performed for any project site less than 50 acres. For each 25 acres over the initial 50 acres, one (1) additional test shall be made. Tests shall be performed at the estimated elevation of the subgrade and at locations selected for adequate representation of the quality of the basement soil. An R-value shall be determined for each test using California Test Method 301 procedures.

The Soils Report shall be bound in 8½ x 11 inch folders and shall include a map of the project area showing proposed and existing streets, contours, locations of the test samples, R-value results and proposed structural pavement sections.

### **3.04 PAVEMENT DESIGN**

Street pavement structural design thickness shall be calculated using the Caltrans Highway Design Manual. Typical traffic indexes for use in these calculations are listed in Table 3-1, Street Cross Sections. In all cases, the minimum allowable structural pavement section shall be three inches (3") of asphalt concrete and eight inches (8") of aggregate base.

### **3.05 CENTERLINE MONUMENTATION**

Standard monuments shall be placed at all street centerline intersections, at the center of all standard cul-de-sacs, and at any intermediate points necessary for maintaining line-of-sight from one monument to the next.

### 3.06 STREET CROSS SECTION

- A. Street Widths: Curb-to-curb street widths and right-of-way requirements behind curb will vary depending on planter strip widths and landscape architecture features, for the types of streets used. Streets shall be classified as follows:
1. *Residential*. A street along which residences, schools, or parks are proposed to front shall be classified as a residential street. Additional residential streets may be designated based on the City's review of the traffic circulation system.
  2. *Collector*. A street identified in the General Plan, Streets Master Plan, or projected to carry more than 3,000 vehicles per day (vpd) shall be classified as a collector street.
  3. *Major Collector*. A street identified in the General Plan, Streets Master Plan, or projected to carry more than 5,000 vehicles per day (vpd) shall be classified as a major collector street.
  4. *Industrial*. A street servicing an industrial/commercial subdivision where a high proportion of truck traffic is expected shall be classified as an industrial street. Additional right of way and pavement shall be provided at intersections for acceleration, deceleration, bus turnouts, and turn lanes, as specified by the Public Works Director.
  5. *Minor Arterial*. Those roads specified in the City's Streets Master Plan or General Plan as requiring a four lane roadway shall be classified as minor arterials. Additional right-of-way and pavement may be required for bus turnouts and at intersections and driveways for acceleration lanes, deceleration lanes, and additional turn lanes (left or right), as specified by the Public Works Director.
  6. *Major Arterial*. Those roads specified in the City's Streets Master Plan or General Plan as requiring a six lane roadway shall be classified as major arterials. Additional right-of-way and/or pavement may be required for bus turnouts and at intersections and driveways for acceleration lanes, deceleration lanes, and additional turn lanes (left or right), as specified by the Public Works Director.

**TABLE 3-1**

**STREET CROSS SECTIONS**

(excluding bike lanes)

The minimum width of right-of-way and pavement for streets shall be per the following table:

	<b>Minimum Width of Right-of-Way</b>	<b>Minimum Curb to Curb</b>	<b>Planter Width</b>	<b>Sidewalk Width</b>	<b>Traffic Index</b>
<b>Local (Residential)</b>	60'	40'	5'	5'	5.5
<b>Collector</b>	70'	42'	5'	5'	6.0
<b>Major Collector</b>	80'	52'	5'/ median 14'	5'	6.0
<b>Minor Arterial</b>	120	66'	5'/ median 14'	5'	6.0
<b>Major Arterial</b>	150'	90'	5'/ median 14'	5'	7.0
<b>Industrial</b>	70'	42'	5'	5'	7.0

Notes:

- These are minimums which may be raised at the discretion of the Technical Advisory Committee if traffic warrants a higher value.
- All dimensions shown in the table are in feet (ft).

B. **Bike Lanes:** Bike lanes or off-street bike paths may be required on any street based on the adopted Bikeway Master Plan, Community Design Guidelines, a specific plan or the General Plan. Typically all arterial road and collector road corridors will include either on or off street bicycle facilities. When on-street bike lanes are required an additional ten feet (10') of right-of-way and pavement shall be required. Where an off-street bike path is required, additional right-of-way and pavement requirements shall be determined by the Public Works Director.

1. *General.* Bikeways shall be designed in accordance with Chapter 1000, Bikeway Planning and Design, of the Highway Design Manual, as specified in the most recent edition of the Bikeway Master Plan.
2. *Bikeway Locations.* Bikeways shall be planned and constructed where locations are designated in the City's current Bikeway Master Plan, or as part of a Specific Plan approved by the City, or as may be determined and approved by the City.

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3. *Bikeway Identification.* Bikeways include all facilities provided primarily for bicycle travel. Specific types are defined as follows:
    - a. **Bike Path (Class I Bikeway).** Provides for bicycle travel on a right-of-way completely separated from any street. A completely separated right-of-way for the exclusive use of bicycles and pedestrians with crossflow minimized.
    - b. **Bike Lane (Class II Bikeway).** Provides for a striped lane for one-way bicycle travel on each side of a street or roadway (See Standard Drawing 0321).
    - c. **Bike Route (Class III Bikeway).** Provides shared use with pedestrian or motor vehicle traffic and continuity to the bicycle facilities (usually bike lanes). Designates preferred routes through high traffic corridors by signing (See Standard Drawing 0321).
  4. *Bikeway Design Criteria – Width.* The minimum paved width for a two-way bike path shall be eight feet (8'). The minimum paved width for a one-way bike path shall be five feet (5'). A minimum 2-foot wide graded area shall be provided adjacent to the finished bike path for Class I Bikeways.
- C. **Lane Widths:** All areas of new construction shall have a minimum of twelve foot (12') lane widths. (This subsection does not apply to residential streets.) In areas of reconstruction of existing streets less than twelve foot (12'), reduced widths may be used when approved by the Public Works Director. When travel lanes are adjacent to a curb, minimum width shall be fourteen feet (14'). All lanes adjacent to bike lanes shall be a minimum of twelve feet (12').
- D. **Turn Lanes (Lengths and Widths):** Right turn lanes shall be required when projected turn movements are 300 vehicles per hour (vph) or more in the peak hour. Left turn lanes shall be required at signalized intersections and at intersections of Collectors and Arterial Streets. If the projected turn movements are 300 vph or more in the peak hour, dual left turn lanes shall be required. The storage length of the turn lane at an intersection shall be a minimum 50 feet. This may be increased based on a traffic study. All turn lanes shall have a minimum width of twelve feet (12'). In the case of two-way left turn lanes, the width may be increased due to high speed or to conform with other raised roadway medians.
- E. **Medians:** The standard cross section width for a raised median shall be fourteen feet (14') and shall accommodate a four foot (4') median nose with a left turn lane. In areas of high pedestrian use or curb-to-curb street widths (including turn lanes) greater than 80' the median shall be widened to accommodate a six foot median nose width for pedestrian refuge, and the adjacent twelve foot (12') turn lanes.

Median landscaping shall be soft (planted) scapes using native vegetation or low maintenance plants and only medians greater than 4 foot in width shall be planted. Medians less than 4 feet in width shall consist of hardscape materials, principally concrete. The design and associated patterns imprinted in the surface of the concrete shall be shown on the plans and conform to a City approved standard. Concrete in medians shall be a minimum of four inches (4") thick.

- F. Partial Streets: Partial completion of residential streets are not permitted (curb, gutter and sidewalk may be allowed only on one side as an interim measure). On collectors and arterials, the developer shall, as a minimum, dedicate sufficient right-of-way and construct a 32 foot wide section of pavement with full frontage improvements along the developing property and a two foot (2') wide gravel shoulder on the opposite side with appropriate drainage to meet or exceed requirements. Crown shall be located at the ultimate centerline.

### **3.07 INTERSECTION ANGLE**

Street intersections shall be as near right angles as possible and shall be on tangents not less than 100 feet in length from the intersecting centerlines.

### **3.08 INTERSECTION SPACING**

The distance between street intersections on local streets shall not be less than 240 feet measured between centerlines. The distance between intersections on collector and arterial streets shall not be less than 660 feet measured between centerlines. The length of blocks shall not exceed 1,320 feet as measured between centerlines of adjacent streets.

### **3.09 RIGHT-OF-WAY AT INTERSECTIONS**

The right-of-way line at all intersections shall be along a diagonal cord perpendicular to the centerline of the handicap ramp and located so as to provide a four foot (4') sidewalk behind the handicap ramp.

**3.10 INTERSECTION CURB RADII**

The minimum radius at the face-of-curb, based on the classes of the intersecting streets, shall be as specified in the table below unless otherwise directed by the Public Works Director.

<b>INTERSECTION TYPE</b>	<b>RADIUS AT FACE OF CURB</b>
Local at Local	25'
Local at Collector	30'
Local at Arterial	30'
Collector at Collector	35'
Collector at Arterial	35'
Arterial at Arterial	35'
Truck Route	50'
Industrial at Industrial	50'
Industrial at Collector	50'
Industrial at Arterial	50'

***NOTE:** Based on the number of receiving lanes, parking lanes, bike lanes, expected truck volumes, pedestrian volumes, and the use of turning vehicle templates, the City may require increased curb radii, the use of three-centered compound curves, or intersection tapers.*

**3.11 EXPANDED CORNER GEOMETRICS**

See Standard Plan 0323 for widths and radii of expanded corners.

**3.12 CUL-DE-SAC GEOMETRICS**

See Standard Plan 0323 for widths and radii of cul-de-sacs.

**3.13 CUL-DE-SAC LENGTH**

Cul-de-sac streets shall not be more than 500 feet in length measured from the center of the connecting street to the radius point of the cul-de-sac.

**3.14 SLOPES**

Minimum longitudinal gutter slopes shall be 0.5% through all curb returns and cul-de-sac bulbs, and 0.3% in all other areas. The maximum gutter slope shall be 8.0%. Street cross slopes shall be a minimum of 2.0% and a maximum of 4.0%.

### **3.15 VERTICAL CURVE**

Where the change in grade exceeds 2.0%, a vertical curve with a length of 50 feet or more shall be designed.

### **3.16 CURB, GUTTER, AND SIDEWALK**

Vertical curb, gutter and sidewalk with driveways shall be used on all streets. Curb, Gutter, and Sidewalk may be used in residential areas with monolithic curb. (These typically are in fill areas and will require approval of the Public Works Director).

Sidewalks shall be five feet (5') width in all residential and industrial areas with a five foot (5') parkway between the back of curb and the front edge of the sidewalk, and eight feet (8') width in commercial areas. Two feet (2') of width shall be added to any sidewalk that abuts a solid object (i.e., building, soundwall or fence).

Sidewalk barricades shall be required where satisfactory provisions cannot be made for pedestrians to safely continue beyond the terminus of the sidewalk. Where sidewalks end in fill areas, the fill shall be extended beyond the end of the sidewalk at a 6:1 slope and paved with a minimum of 2" AC.

Projects located in the downtown area or other specific plan areas may require enhanced sidewalk treatment in accordance with the Downtown Specific Plan.

The useable width (5 feet) of sidewalks shall not be reduced by the installation of aboveground poles, signs, or similar obstructions, unless no other practical solution exists and unless approved by the Planning Director and Public Works Director.

### **3.17 HANDICAP RAMPS (Curb Ramps)**

A handicap ramp shall be installed on all corners of intersecting streets. For intersecting local streets, ramp design shall be as shown in Standard Plan 0309 or 0310. For all other situations, ramp design shall be in accordance with State of California, Department of Transportation Standard Plans, Detail A88.

### **3.18 DRIVEWAYS/SITE ACCESS**

Backing of vehicles out of driveways onto the roadway shall only be permitted for single family residential or duplex land uses. Other land uses shall be designed so both ingressing and egressing vehicles are traveling forward.

Driveways shall be located to provide at least five feet (5') between the driveway's traveled way (throat) and appurtenances such as fire hydrants, poles, and curb inlets.

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- A. **Location and Spacing:** Driveway cuts in vertical curb shall have a minimum separation of five feet (5') at face of curb.

New driveways shall be a minimum of 35 feet from the intersection measured from the projected gutter flow line of the parallel street, five feet (5') from any property line at face of curb, and five feet (5') from any fire hydrant curb inlet or other facility. An exception may be made where a local street intersects a local or collector street. On streets intersecting arterial or collector streets, the driveway shall be located as far from the intersection as practical, subject to Public Works Director approval.

In non-residential areas, driveways shall be separated by a minimum of 100 feet on local streets, 150 feet on collector streets, and 250 feet on arterial streets.

- B. **Width:** Single-family residential and duplex driveways shall have a minimum throat width of 12 feet and maximum throat width of 24 feet at back-of-walk.

Multiple-family and commercial/industrial driveways shall have a maximum throat width of 40 feet at back-of-walk, unless approved otherwise.

Apartments, condominiums, schools, churches, commercial or industrial properties shall require City Standard "Commercial" or "Industrial" driveways (See Standard Drawings 0303 and 304).

- C. **Number of Driveways:** For single family residential land uses, only one driveway per parcel will be permitted, except where circular drives are proposed and are approved on the Tentative Subdivision Map or by the Public Works Director. A secondary driveway access on corner lots may be considered by the City.

The maximum number of driveways for a non-residential parcel shall be:

<b>STREET FRONTAGE LENGTH (FT)</b>	<b>MAXIMUM NO. OF DRIVEWAYS*</b>
up to 100	One
101 to 400	Two
over 400	>Two shall require Technical Advisory Committee approval

*\* For corner lots, the maximum number of driveways to the site shall be reduced by one if corner distance standards cannot be met.*

The maximum number of driveways indicated above may be reduced by requiring that driveways be located at the common property line of adjacent parcels.

Consolidation of driveways with adjacent parcels shall occur whenever possible. Where driveway location standards cannot be met for a parcel,

the City may require access to that parcel be achieved via cross-access over an adjacent parcel.

- D. Right Turn Deceleration/Acceleration Lanes for Driveways: A right turn deceleration lane shall be provided for driveways under the following conditions:
1. The driveway is located on an arterial.
  2. Right turn ingress volume is expected to exceed fifty during peak hour flows on the roadway. For right turn ingress volumes between ten and fifty, a right turn curb taper shall be required.
  3. There is ample room and frontage to fit a deceleration lane as determined by the Public Works Director.
  4. The travel speed of the roadway, as determined by the Public Works Director, equals or exceeds 45 mph.

There may be cases where some of the above criteria are not met, whereupon the Public Works Director may still require a deceleration lane in the interest of safety.

There may be cases where it will be necessary to merge a deceleration lane with an existing acceleration lane. Where the beginning of a deceleration taper will be within 100 feet of the end of an acceleration taper, then the deceleration and acceleration shall be merged to form a continuous auxiliary lane.

In cases where it is desirable to provide room for right turn deceleration, but an entirely separate deceleration lane is infeasible due to design constraints, a right turn curb taper shall be provided.

- E. Left Turn Deceleration/Acceleration Lanes for Driveways: Left turn deceleration lanes (left turn pockets) are not required on collector or residential streets.

On arterials and where left turns are permitted, a left turn deceleration lane shall be provided. This may be in the form of a separate left turn pocket on a four (4) or six (6) lane road. Depending on land use, traffic volumes, and driveways, a continuous two-way-left-turn-lane may be considered on a four (4) lane road with approval of the Technical Advisory Committee. In the absence of a traffic study, or if one is determined not to be necessary, the pocket shall be 200 feet in length with a 90 foot bay taper. The length of the left turn pocket may be increased or decreased based on a traffic study. However, in no case shall it be less than 50 feet.

- F. Restricted Turning Movements for Driveways: Turning movement restrictions shall apply to unsignalized driveways off of arterials and

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expressways and may be restricted for any driveway where deemed a safety concern by the Public Works Director.

- G. **Signalized Driveways:** The need for signalized driveways shall be based on warrants contained in the latest edition of the Caltrans Traffic Manual. Any such evaluation shall be performed by the consultant as part of the project traffic study.
- H. **Minimum Required Throat Depth:** Driveways shall meet the minimum required throat depth (MRTD) requirements as defined in Table 3-2. In the case of “drive-thru” facilities, attention is directed to Table 3-2 for minimum on-site storage distances for ingressing vehicles.

On-site parking shall not be permitted within the MRTD area. The MRTD requirement does not apply to single family residential or duplex land uses.

Table 3-2 shall be used to determine MRTD for access points for a site, unless by determination of the Public Works Director a traffic study is required to determine the MRTD. The distances shown in Table 3-2 chart represent vehicle storage equivalents, which means the total required distance may be achieved by summing the throat depths for several access points if more than one access point is to serve the site. In these cases, the distance shown in Table 3-2 shall be prorated to each access point to the nearest 25 feet based on the estimated relative percent usage of each. However, the MRTD for any location shall be 25 feet.

**TABLE 3-2**

### MINIMUM THROAT DEPTH

LAND USE	SIZE	STREET RIGHT-OF-WAY <60' 60' >60'
Multi-family, Residential, Mobile Home Park, Planned Unit Development	0 - 80 units	25' 50' 50'
	81 - 160 units	50' 50' 50'
	>160 units	50' 50' 100'
Restaurants	0 - 15,000 SF	25' 25' 25'
	>15,000	25' 25' 50'
Restaurant with Drive - Thru	0 - 2,000 SF	25' 25' 25'
	2,001 - 3,000	25' 50' 100'
	3,001 - 5,000	50' 75' 150'
	>5,000	75' 100' 225'
Motel	0 - 150 rooms	25' 25' 25'
	151 - 400	25' 75' 125'
	>400	25' 125' 175'
Convention Hotel	0 - 150 rooms	50' 50' 100'

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	151 - 400 >400	50' 150' 250' 50' 250' 350'
Office Park	0 - 20,000 SF 20,001 - 50,000 50,001 - 100,000 100,001 - 150,000 150,001 - 300,000 >300,000	25' 25' 25' 25' 50' 75' 25' 75' 175' 75' 125' 250' 125' 250' 500' 200' 400' 825'
General Office	0 - 50,000 SF 50,001 - 100,000 100,001 - 150,000 150,001 - 200,000 200,001 - 300,000 300,001 - 400,000 >400,000	25' 25' 50' 25' 50' 100' 50' 75' 175' 50' 100' 225' 75' 175' 350' 125' 225' 450' 150' 275' 575'
Light Industrial	0 - 100,000 SF 100,001 - 200,000 200,001 - 300,000 300,001 - 400,000 >400,000	25' 25' 50' 25' 50' 100' 50' 75' 150' 50' 100' 200' 75' 125' 250'
Industrial Park	0 - 500,000 SF	25' 25' 50'
Big Box Retailer	0 - 30,000 SF 30,001 - 50,000 50,001 - 75,000 >75,000	25' 25' 25' 25' 50' 75' 25' 50' 125' 50' 75' 175'
Shopping Center (Retail Center)	0 - 10,000 SF 10,001 - 20,000 20,001 - 30,000 30,001 - 40,000 40,001 - 100,000 100,001 - 150,000 150,001 - 200,000 200,001 - 250,000 250,001 - 600,000 600,001 - 700,000 700,001 - 800,000 800,001 - 900,000 900,001 - 1 million >1 million	25' 25' 50' 25' 50' 125' 50' 100' 175' 75' 125' 225' 75' 150' 250' 100' 175' 375' 125' 250' 500' 150' 300' 625' 175' 375' 750' 200' 375' 750' 225' 425' 875' 250' 500' 975' 275' 550' 1075' 425' 825' 1625'
Drive-in Bank	0 - 10,000 SF 10,001 - 20,000 20,001 - 30,000 30,001 - 40,000 >40,000	25' 25' 50' 50' 50' 200' 75' 150' 300' 100' 200' 400' 150' 250' 500'
Supermarket	0 - 20,000 SF 20,001 - 30,000 30,001 - 40,000 >40,000	25' 25' 50' 25' 50' 75' 25' 50' 100' 25' 75' 150'
Medical	0 - 100 employees >100 employees	25' 25' 50' 25' 50' 75'

For land uses not listed above, the MRTD shall be as determined by the Technical Advisory Committee.

### **3.19 LATERAL CLEARANCE**

A lateral clearance of two (2) feet from face-of-curb to any fixed object (except sign posts of an approved breakaway or yielding design) shall be maintained at all times.

### **3.20 EASEMENTS**

A PUE and TPM (Tree Maintenance Easement) may be dedicated where required by the Public Works Director.

### **3.21 SIGNING AND STRIPING**

Signing and striping plans shall include all pavement markings and markers and roadway signing, as required by these Standard Specifications and Details and the Traffic Manual of the State Department of Transportation. All pavement markings shall be thermoplastic.

### **3.22 VALLEY GUTTERS**

Valley gutters will not be allowed within the public right-of-way or public easement unless otherwise approved by the Public Works Director.

### **3.23 BUS TURNOUTS**

Bus turnouts shall be provided at the intersection of all arterial streets, and at all other locations directed by the Public Works Director. Space for bus turnouts shall be provided outside of the travel lane and shoulder of the road. The design of the bus turnouts shall comply to the Standards Specification or as required by the Public Works Director. Bus turnouts and shelter pads shall be required at locations specified by the Public Works Director. The size and location of bus shelter pads, whether existing or proposed, shall be shown at all bus turnouts. Bus shelters shall be designed in accordance with Section 12 of these standard specifications. All bus turnouts shall be designed using the Tehama County Transit Agency Details as a model, including bus stops, shelters, signing, and turn-arounds and as approved by the Public Works Director.

### **3.24 STREET NAME SIGNS**

Street name signs shall be furnished and installed by the Developer at all intersections, including signalized intersections. Street name signs shall

conform to City of Red Bluff specifications and shall consist of white die-cut letters on a blue reflective background. Type "C" stroke width lettering shall be used until the number of characters and spacing exceeds the capacity of a 30" blank sign. Should more letters be required, all letters shall be type "B" stroke width. Street name signs shall be six inch (6") in height with four inch (4") uppercase and two inch (2") lowercase letters. Collector Streets and above shall be eight inch (8") signs with six inch (6") lettering.

- A. Location and Number Required: The required number of street name signs and location depends on the street right-of-way width and shall be as follows:

Signs shall be located adjacent to the major street at the end of the curb return.

One street name sign installation (with four sign plates on each post) is required at each intersection. At a four-way intersection, the installation shall be located at one of the far right hand corners of the intersection relative to the direction of travel on the street having the greater right-of-way width or on the major street if the right-of-way widths are equal.

At a "T" intersection, the installation shall be located on the far right hand corner relative to the direction of travel on the through street. Signs shall be located at the midpoint of the curb return.

- B. Advance Street Name Signs: May be required at the discretion of the Public Works Director in advance of intersections with arterial streets, or signalized intersections.
- C. Signalized Intersections: Mast-arm street name signs shall be required for all approaches. These signs shall have a minimum lettering size of eight inches (8") uppercase and 6" lowercase with type D stroke-width. The signs shall have a visual reflectivity equal to V.I.P. diamond grade.

### **3.25 NO PARKING SIGNS**

Along new streets where parking is prohibited, R26 and R28 signs (12" x 18") shall be used for streets with a speed limit of 30 mph or less, and R26A and R28A signs (24" x 30") shall be used where the posted speed limit is 35 mph or more. Maximum spacing for R26 and R28 signs shall be 150'; maximum spacing for R26A and R28A signs shall be 400' up to 45 mph, 500' up to 50 mph, and 600' up to 55 mph. Where two or more lanes of travel are in the same direction, use R23A at appropriate spacing.

### **3.26 MONUMENTATION**

Concrete monuments six inches in width or diameter and at least eighteen inches in length shall be set at all corners and angle points on the exterior boundary of the subdivision. All front lot corners shall be monumented in the following manner: A

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metal disc shall be imbedded in the sidewalk by a tack on the produced side lot line. Such monuments shall be offset from the front property line with offset being noted on the final map. All other lot corners shall be monumented by a three-fourths inch galvanized steel pipe eighteen inches in length or approved equal. Street centerline monuments shall be placed at all centerline intersections, angle points, points of curve, tangent point intersection and at intervals on centerline not to exceed five hundred feet. Street centerline monuments shall be a 1-½" disc with a 5/8" rebar 18" long set to finish grade or approved equal. All centerline points shall have a minimum of three tangent ties. Ties shall be a tack in lead and set in the curb, or other method approved by the Public Works Director. Monuments set shall be flush with the ground at the finish grade of the tract, shall be marked with the registration or license number of engineer or surveyor setting the same, and shall be properly shown on the final map in accordance with the Subdivision Map Act.

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**SECTION 4: STORM DRAINAGE SYSTEM DESIGN**

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**4.01 GENERAL**

Storm drainage improvements shall be designed to serve the ultimate development level as defined in the current City General Plan and the current Storm Drainage Master Plan.

New development projects shall be designed to achieve “no net increase” in peak 25-year stormwater flow, unless professional engineering analysis reviewed and approved by the City determines that the existing storm drainage system has sufficient capacity to accommodate the increase.

Although these standards are intended to apply to physical development within the City, the standards may not apply for all situations. Compliance with these standards does not relieve the Developer of the responsibility to apply conservative and sound professional judgment. These are minimum standards and are intended to assist, but not substitute for competent work by design professionals. The Utility may, at its sole discretion due to special conditions and/or environmental constraints, require more stringent requirements than would normally be required under these standards.

The Applicant may propose a deviation from the Standards. A non-standard system may take longer to review. The Applicant acknowledges these risks when submitting a non-standard system for review.

The City’s decision to grant, deny, or modify the proposed deviation shall be based upon evidence that the deviation request meets the following criteria:

- A. The change will achieve the intended result through a comparable or even superior design; and
- B. The change will not adversely affect safety and/or operation; and
- C. The change will not adversely affect maintainability.

**4.02 PLAN REQUIREMENTS**

All storm drainage improvement plans shall show geometric designs including plan and profile views, utility crossings, catch basins, laterals, manholes and invert elevations at all structures. In addition, the hydraulic grade line shall be shown on the storm drain profile

In addition to the above, design computations for all drainage system projects shall include the following information:

A. Topographic Drainage Shed Map:

1. Topographic map showing existing and proposed ground elevations and total and sub-shed areas in acres.
2. Quantity of flow in cubic feet per second (cfs) to each structure with corresponding area that generates the quantity.
3. Quantity of flow (cfs) in each pipe.
4. Flow line elevation of manhole or structure.
5. Average groundwater elevations.
6. Top of structure elevation.
7. Hydraulic grade line elevation at each structure.
8. Hydraulic gradient.
9. Pipe size, class, length and slope.

(Items 6 & 7 are not required when design is based on hydraulic grade line inside conduit).

B. Table of Values:

A Table of Values, with neat and legible calculations, demonstrating all required information in section 4.02A has been considered.

### 4.03 FACILITIES CLASSIFICATIONS

For the purpose of presentation and design, the following classifications will be used in defining storm drainage facilities:

- A. Minor: Drainage facilities receiving runoff from an area of less than 30 acres shall be called a minor system.
- B. Trunk: Drainage facilities receiving runoff from an area of 30 acres or larger shall be called a trunk system.
- C. On-Site Drainage: Drainage facilities needed to carry runoff within the development, excluding trunk drainage conduits, facilities draining public streets, and facilities draining concentrated flow from other properties shall be called on-site drainage.

### 4.04 DESIGN CAPACITIES

Drainage facilities shall be designed to accommodate the future development of the entire upstream watershed. The future development shall be defined as full buildout of the General Plan Land Use Designations.

The capacity design criteria for storm drainage facilities are as follows:

- A. **Storm Drain**: Closed conduit storm drain systems shall be designed to convey the ten (10) year storm event while maintaining the hydraulic grade line at least one (1) foot below the elevation of inlet grates and manhole covers.
- B. **Open Channel**: Open channels shall be designed to convey the 100-year storm event while maintaining at least one (1) foot of freeboard in cut sections and three (3) feet of freeboard in levied sections.
- C. **Bridges**: Bridges shall be designed to pass the 100-year storm while maintaining a minimum of one (1) foot of freeboard to the low chord.
- D. **Culverts**: Culverts shall be designed to pass the channel design capacity while meeting freeboard requirements.
- E. **Local Detention Facilities (LDF)**: LDF's are designed to reduce peak flows in accordance with Section 4.06
- F. **Roof, Footing and Yard Drains, Commercial and Residential (as applicable)**: Roof and footing drain pipes shall be separate lines which may only be joined as a non-perforated pipeline at an elevation at least one (1) foot below the lowest footing drain invert elevation. The minimum cover over the storm drain stub at the property line shall be two (2) feet. Clean-outs (4-inch minimum diameter) with factory manufactured fittings, shall be provided at all junctions and bends greater than 45 degrees. The maximum spacing between clean-outs shall not exceed 100 feet. Roof, footing and yard drains shall not be connected to the sanitary sewer system. Roof, footing and yard drains shall not be located within the public right-of-way except where connecting to the municipal drainage system. Roof, footing and yard drain systems serving more than one parcel shall be within private utility easements. Corrugated polyethylene tubing (CPT) may not be used in the Right-of-way, or for any other purpose except as a privately owned and maintained overbank drain.

**Maintenance**: Roof, footing and yard drainage systems, drainage systems on commercial and multifamily properties, drainage facilities within private easements, and drainage facilities otherwise denoted as private, shall be designed to provide access for maintenance and operation by the owners of such facilities.

#### **4.05 STORM DRAINAGE CALCULATIONS**

Three methods of estimating design storm drainage flows are allowable. Methods, applications and locations of additional information are summarized in Figure 4a.

Storm drainage system design calculations are to be submitted to the City in bound form and in electronic form (Microsoft Excel format). Submittal to be signed by an appropriately registered engineer. Calculations using the Rational Method shall be submitted on standard forms (see Figure 4f) and on computer disk in Excel format, for all storm drainage improvements including trunk lines, laterals, curb inlets and open channels proposed in connection with new development projects.

The calculations based on the Rational Method for infill development areas limited up to 640 acres shall be as follows:

The Rational Method equation has the form:  $Q = CiA$

Where:

Q = rate of runoff, acre-inches per hour or cubic feet per second (acre-inch per hour = 1.008 cubic feet per second, a negligible difference);

C = runoff coefficient, which is the ratio of peak runoff to average rainfall intensity;

i = average rainfall intensity, inches per hour; and

A = drainage area, acres.

The Rational Method shall be applied using the procedure outlined below.

- A. **Basic Information Preparation:** Layout the proposed storm sewer system and delineate the sub-basins tributary to points of concentration for the design of inlets, junctions, pipelines, etc. Delineate the land uses and hydrologic soil groups within each sub-basin.
- B. **Runoff Coefficient Determination:** The runoff coefficients, C, are presented in Figure 4g by land use designation and hydrologic soil group.

- C. **Time of Concentration Determination:** The time of concentration or the travel time is the time required for runoff to flow from the most upstream point of the drainage area through the conveyance system to the point of interest. The travel time is calculated by dividing the length of the conveyance system component by the corresponding velocity of flow. The travel time,  $T_c$ , is computed as follows:

$$T_c = T_o + T_g + T_p + T_{ch}$$

Where:

$T_o$  = overland flow time of concentration;

$T_g$  = gutter flow travel time;

$T_p$  = pipe flow travel time; and

$T_{ch}$  = channel flow travel time.

The equation used to compute the travel time for each conveyance component is described below.

- D. **Overland Flow:** The recently developed Kinematic wave empirical equation based upon available SCS, COE, and FAA overland flow data (Papadakis, 1987) is:

$$T_o = \frac{0.66L^{0.50}n^{0.52}}{S^{0.31}i^{0.38}}$$

Where:

$T_o$  = overland flow time of concentration, minute;

$L$  = overland flow length, ft,

$n$  = roughness coefficient for overland flow

$S$  = average slope of flow path, ft/ft; and

$i$  = intensity of precipitation, in/hr

Use of the overland time of concentration equation requires an iterative approach: an initial estimate of the time of concentration updated by successive estimates of precipitation intensity.

- E. **Gutter Flow:** Manning's equation for a triangular channel cross section is used to determine the flow velocity and travel times for street gutter flow. The average distance from the overland flow surface to the nearest inlet is divided by flow velocity to obtain street gutter flow time. The gutter flow equation was derived using the following assumptions:

- The cross slope of the street is 0.02 ft/ft.
- The flow in the gutter is six inches deep and contained by the curb.
- The street surface is smooth asphalt or concrete.

The velocity of flow in the gutter is computed by the equation:

$$V_g = \frac{1.12}{n} S_x^{0.67} S^{0.50} T^{0.67}$$

Where:

$V_g$  = velocity of flow in the gutter, ft/s;

$S_x$  = street cross slope, ft/ft, design value = 0.02;

$S$  = street longitudinal slope, ft/ft;

$T$  = spread of flow in gutter =  $d/S_x$ , ft;

$d$  = depth of flow in the gutter, ft, design value = 0.5 ft; and

$n$  = Manning's "n" for pavement, design value = 0.02.

- F. **Pipe Flow:** Manning's equation can also be used to determine travel time of flow through pipes. Travel time is usually calculated by assuming full pipe flow. Flow velocity is calculated with the equation:

$$V = \frac{1.49}{n} R^{0.67} S^{0.50}$$

Where:

$V$  = velocity in pipe, ft/s;

$R$  = hydraulic radius,  $D/4$  for full pipe flow, ft;

$D$  = diameter of pipe, ft;

$S$  = slope, ft/ft; and

$n$  = Manning's "n", design value = 0.015.

G. **Trapezoidal Channels:** A modified Manning's equation is used for open channel flow to derive the velocity for trapezoidal grass-lined channels. The following assumptions were made in the derivation of the modified equation:

- Channel side slopes are 1:3.
- Channel bottom width equals the depth.
- Top width is seven times the bottom width.

$$V = \frac{0.995}{n} b^{0.67} S^{0.50}$$

Where:

V = velocity, in ft/s;

b = bottom width, ft;

n = Manning's "n" for channel flow; and

S = slope, ft/ft.

H. **Intensity Determination:** The rainfall intensity shall be determined from the rainfall intensity duration curve using the computed time of concentration.

### 4.06 UNDERGROUND DETENTION FACILITIES

Underground detention facilities will be required in order to reduce peak flows in certain areas. In certain cases, Detention Ponds may be allowed if approved by TAC.

The specific design elements for the detention facility shall be established on a case-by-case basis. The design will vary depending upon whether or not the particular facility is permanent or temporary, or is a dual or multi-purpose facility, with drainage, water quality, and possibly recreational components. Detention facilities shall be designed according to State Division of Safety of Dams.

Detention Pond facilities shall be designed to detain the post development 25-year storm event at a minimum. In restricted watershed, detention facilities shall detain up to the 100-year storm event. Detention facilities shall be designed with spillway features to conduct excess flows into streets. Overland flow through streets shall not adversely impact areas downstream.

**4.07 SEEPAGE IN TO/OUT OF DETENTION FACILITIES AND OPEN CHANNELS**

The seepage of groundwater into or out of the detention facilities and open channels shall be evaluated based upon available groundwater information and driller logs to determine if inflow of groundwater into drainage facilities would affect design capacities or operations.

**4.08 HORIZONTAL ALIGNMENT**

Storm drainage lines shall be parallel with the centerline of streets. Large angular changes over five degrees (5°) in the alignment of storm drains are not allowed.

**4.09 HYDRAULIC GRADE LINE**

Hydraulic grade lines shall be a minimum of one-foot (1') below the elevation of inlet grates and manhole covers and shall be shown on improvement drawings.

**4.10 CURB INLETS**

The spacing of storm drain inlets shall not exceed a maximum of 500 feet. Drainage inlets shall be located to prevent surface flow through street intersections. Stormwater inlets in a roadway shall be located in the curb line.

**4.11 STORM DRAINAGE PIPE**

Storm drainage pipe shall be reinforced concrete pipe, non-reinforced concrete pipe, cast-in-place concrete pipe, HDPE, or PVC as specified in Materials and Construction Methods. Other types of conduit (arch culvert, box culvert, etc.) will be considered upon submittal to Public Works Director.

Where cast-in-place concrete pipe (CIPCP) is proposed, the soils report for the project shall address CIPCP placement. Consulting Engineers shall provide details to the City for connection of CIPCP to different piping materials as are proposed and affected.

**4.12 COVER**

All pipes shall be constructed with a minimum cover of three feet (3'). In any instance where the distance from the paving surface to the top of pipe is less than 24 inches, a six-inch (6") thick reinforced concrete slab shall be placed over pipe for protection (slab to overlap pipe on each side by 12 inches min.)

#### **4.13 MANHOLES**

Maximum spacing between manholes shall be 500 feet for pipe sizes of 48 inches and under and 800 feet for pipes of 54 inches and larger. When a catch basin, manhole, or concrete inlet is located off the traveled portion of the roadway or under other conditions of limited surveillance, the grate or cover shall be bolt locking.

Manholes shall be located at all changes in pipe sizes or slopes, at angles greater than twenty degrees (20°) and at all lateral connections. A curb inlet shall be sufficient as a manhole when the connecting upstream lateral serves only one additional curb inlet. Manholes shall be required at the junction of all lines, except at curb inlets as described.

Upon approval by Public Works Director, site drainage laterals under eighteen inches (18") in diameter may be directly connected into mains thirty inches (30") or larger in diameter. Details for storm drainage lateral connections to a main storm drain line without a manhole design shall be provided to the Public Works Director for approval.

Crowns of pipe shall match in elevations at manholes. Curb inlets may be considered as manholes if provided with a forty-eight inch (48") diameter or larger riser barrels. See Standard Plans for a curb inlet manhole design.

On curved pipes with a radius of 200 feet to 400 feet, manholes shall be placed at the beginning of curve (B.C.) and ending of curve (E.C.) and at 300 foot maximum intervals along the curve. On curves with a radius exceeding 400 feet, manholes shall be placed at the B.C. and E.C. and at 400 foot maximum intervals along the curve for pipes 24 inches and less in diameter; and 500 foot maximum intervals along the curve for pipes greater than 24 inches in diameter.

#### **4.14 MINIMUM SIZE OF STORM DRAINS**

Storm drain mains and laterals connecting inlets to mains shall not be less than eighteen inches (18") in diameter. Exceptions are subject to approval by the Public Works Director.

#### **4.15 VELOCITY**

All storm drain lines shall be designed to flow with a minimum velocity of two feet (2') per second.

### 4.16 EASEMENTS

General: Drainage facilities that are constructed to serve predominantly public property or public right-of-way shall be publicly owned and shall be dedicated to the City.

Where possible, public conveyance systems shall be constructed within the public right-of-way. When site conditions make this infeasible, public utility easements or dedicated tracts shall be provided. Private drainage facilities shall be constructed outside of the public right-of-way, on private property.

Easement Documentation Requirements: All easements shall be shown on the project plans and shall be designated with either "private" or "public". All property documentation shall be properly executed. Easement/tract documents shall include a map, the Tehama County Assessor number of affected properties and owners' names.

Easements shall be dedicated to and approved by the City prior to acceptance of a public drainage system. Grantee shall be the "City of Red Bluff, a municipal corporation, its heirs, successors, or assignees." Indemnification and hold harmless agreements to hold the City harmless shall be included in recorded documents where maintenance access across private property and/or pumping of storm drainage is deemed necessary by the City.

Bills of sale for all drainage facilities appurtenant to public easements or tracts shall be given to the City with the executed real property documents that transfer property rights to the City. Grantor shall pay all title policy and recording fees necessary to transfer rights to the City.

- A. Drainage Facilities: All drainage facilities other than on-site systems shall be located in one of the following:
1. Public street or alley.
  2. Public utility easement, specifically dedicated to include drainage facilities.
  3. Dedicated drainage easement.
- B. Closed Conduits: closed conduit Easements shall meet the following requirements:
1. For pipes under 24 inches in diameter, minimum width of ten feet with the centerline of the pipe at quarter point; pipe may reverse sides at angle points.
  2. For pipes exceeding 24 inches in diameter or trenches exceeding five feet in depth, the easement width shall be based upon the following formula:

WIDTH = Trench Depth + Pipe Diameter + Two Feet

3. Minimum width of fifteen feet for side and backlot drains in a subdivision.
- C. Open Channels: Easements for open channels shall have sufficient width to contain the channel, fencing where required, and a fifteen-foot service road.

### 4.17 TRENCH DRAINS

Trench drains shall not be utilized for public or private drainage systems. Private developments shall be connected directly to the City underground storm drain system or graded to drain into street side surface drainage system.

### 4.18 STUB END PIPES

All stub end pipes shall be plugged with a pre-fabricated water tight plug.

### 4.19 OPEN CHANNELS

Requirements for open channels are as follows:

- A. Drainage: Drainage may be conveyed through an open channel with prior written approval of the Public Works Director.
- B. Construction: Channels shall be constructed to a typical cross section. Fully lined channels shall be designed with maximum side slopes of 1:1; channels with unlined sides shall be designed with maximum side slopes of 3:1. Lined channels shall have a minimum bottom width of six feet (6') and shall have adequate access ramps for maintenance equipment.
- C. Design: Channels shall be designed to convey the design flow with a minimum velocity of two feet per second (2 fps). The maximum velocities shall be as follows:
  1. Earth channels, six (6) fps.
  2. Fully lined channels, ten (10) fps.
  3. Bottom only lined channels, eight (8) fps.
- D. Curve Radius: The centerline curve radius of an open channel shall be equal to or greater than twice the bottom width (35-foot minimum).

### **4.20 RETENTION PONDS**

Retention ponds are generally prohibited. The Public Works Director may consider retention pond, case-by-case.

### **4.21 LEVEES**

Where new levees are constructed, the land side levee slope will be 2:1. The water side slope of the new levee embankment will be constructed at 3:1. The top width of the levee beam will be fifteen feet and will also function as a patrol road. The limits of the right-of-way will extend ten feet beyond the toe of the land side slope of the new levee embankment to provide access for levee maintenance.

### **4.22 SLOPE PROTECTION**

Where channel slope protection is required, stone riprap protection shall be designed in accordance with FEMA Standard EM 1110-02-1601, "Hydraulic Design of Flood Control Channels".

### **4.23 STRUCTURE OPERATION CRITERIA**

All structures such as ponds, control gates, weirs, flap gates, temporary facilities, etc., shall be shown in detail on design and construction drawings. Their purpose, functional operation parameters and settings shall be described on the drawings. Pond ownership and maintenance responsibilities shall also be included.

### **4.24 DRAIN INLETS**

Storm drain inlets located in non-paved areas shall utilize 24" x 24" minimum galvanized steel grate set horizontally and be surrounded by six inch (6") cobble one-foot (1') in depth and six feet (6') in radius. Cobble may be sloped no steeper than 3:1.

**FIGURE 4**

**HYDROLOGIC SOIL GROUPS**

Soils are classified by the Natural Resource Conservation Service into three Hydrologic Soil Groups based on the soil's runoff potential. The three Hydrologic Soils Groups are B, C and D.

Details of this classification can be found in 'Urban Hydrology for Small Watersheds' published by the Engineering Division of the Natural Resource Conservation Service, United States Department of Agriculture, Technical Release-55.

**Group B** is silt loam or loam. It has a moderate infiltration rate when thoroughly wetted and consists chiefly of moderately deep to deep, moderately well to well drained soils with moderately fine to moderately coarse textures.

**Group C** soils are sandy clay loam. They have low infiltration rates when thoroughly wetted and consist chiefly of soils with a layer that impedes downward movement of water and soils with moderately-fine to fine structure.

**Group D** soils are clay loam, silty-clay loam, sandy clay, silty clay or clay. This HSG has the highest runoff potential. They have very low infiltration rates when thoroughly wetted and consist chiefly of clay soils with a high swelling potential, soils with a permanent high water table, soils with a claypan or clay layer at or near the surface and shallow soils over nearly impervious material.

**FIGURE 4a**

**METHODS FOR ESTIMATING DESIGN FLOW**

<b>APPLICATION</b>	<b>METHOD</b>	<b>MAXIMUM BASIN SIZE</b>	<b>DESIGN PARAMETER</b>	<b>REFERENCES</b>
Design of: * Street Drainage * Storm Drains * Culverts not Associated With Channels	Rational	640 ac	Flow	
Master Plans or Designs of: * Storm Drains * Open Channels * Bridges and Culverts * Detention Basins	HEC-1, Runoff Block of SWMM	No Limit	Flow and Volume	
Water Quality Detention Basins	HEC-1, Runoff Block of SWMM	No Limit	Volume	

**FIGURE 4b**

MANNING'S 'n' FOR CHANNEL FLOW

LAND USE DESCRIPTION	MANNING'S "n"
Concrete Pipe	0.015
Corrugated Metal Pipe	0.024
Concrete -Lined Channels	0.015
Earth Channel - Straight/Smooth	0.022
Earth Channel - Dredged	0.028
Mowed Grass Lined Channel	0.035
Natural Channel - Clean/Some Pools	0.040
Natural Channel - Winding/Some Vegetation	0.048
Natural Channel - Winding/Stony/Partial Vegetation	0.048
Natural Channel - Debris/Pools/Rocks/Full Vegetation	0.070
Floodplain - Isolated Trees/Mowed Grass	0.040
Floodplain - Isolated Trees/High Grass	0.050
Floodplain - Few Trees/Shrubs/Weeds	0.080
Floodplain - Scattered Trees/Shrubs	0.120
Floodplain - Numerous Trees/Dense Vines	0.200

Source: Draft "Sacramento City/County Drainage Manual, Hydrology Standards Volume II," December 1996 and City of Redding Standard Specifications.



**FIGURE 4d**

**LAND USE VS. EFFECTIVE PERCENT IMPERVIOUS AND RUNOFF COEFFICIENTS  
FOR THE RATIONAL METHOD**

*Page 1 of 2*

Land Use from Aerial Photography	General Plan Land Use Designation	Effective % Impervious	Runoff Coefficient by Hydrologic Soil Group		
			B	C	D
Highways, Parking	Central Commercial (CC)	95	0.86	0.87	0.87
Commercial, Office	General Commercial (GC); Service Commercial (SC); Highway Commercial (HC); Business Park (BP)	90	0.82	0.84	0.85
Industrial	Industrial (I)	85	0.78	0.80	0.82
Apartments	N/A	80	0.74	0.77	0.79
Mobile Home Park	N/A	75	0.70	0.74	0.76
Condominiums	Med. Density Residential (MDR)	70	0.66	0.71	0.74
Residential: 8-10 du/acre	Medium/Low Density Residential (MLDR)	60	0.58	0.64	0.68
Residential: 6-8 du/acre	Neighborhood Preservation (NP); Planned Neighborhood (PN)	50	0.50	0.58	0.63
Residential: 3-4 du/acre	N/A	30	0.34	0.45	0.52
Residential: 2-3 du/acre	Very-Low Density Residential (VLDR)	25	0.30	0.41	0.49

**FIGURE 4d (cont.)**

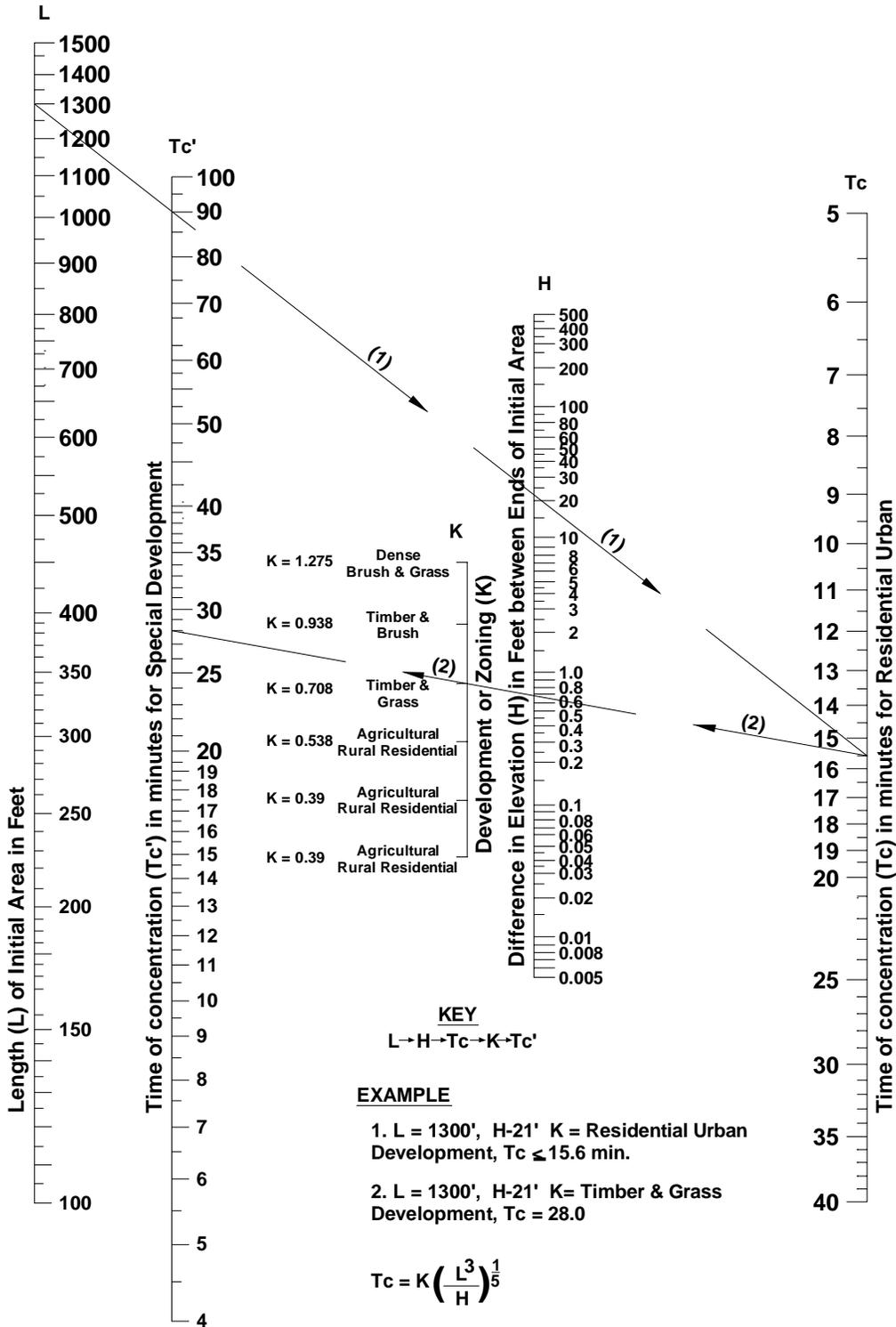
**LAND USE VS. EFFECTIVE PERCENT IMPERVIOUS AND RUNOFF COEFFICIENTS  
FOR THE RATIONAL METHOD**

*Page 2 of 2*

Land Use from Aerial Photography	General Plan Land Use Designation	Effective % Impervious	Runoff Coefficient by Hydrologic Soil Group		
			B	C	D
Residential: 1-2 du/acre (2.5-5 du/ha)	N/A	20	0.26	0.38	0.46
Residential: .5-1 du/acre (1-2.5 du/ha)	Rural Residential (RR)	15	0.22	0.35	0.43
Residential: .2-.5 du/acre (0.5-1 du/ha)	N/A	10	0.18	0.32	0.41
Residential: <.2 du/acre (.05 du/ha)	Agricultural Residential (AR)	5	0.14	0.28	0.38
Open Space, Grassland	N/A	2	0.12	0.26	0.36
Agriculture	N/A	2	0.26	0.41	0.51

FIGURE 4e

HYDROLOGY  
TIME OF CONCENTRATION FOR INITIAL AREA  
OVERLAND FLOW



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**SECTION 5: SANITARY SEWER SYSTEM DESIGN**

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**5.01 GENERAL**

Sanitary sewer improvements shall be designed to serve the ultimate level of City development as defined in the General Plan and the Wastewater Facilities Master Plan.

All improvements shall conform to the requirements of the Tehama County Health Department, the current California Building Code and the Standard Specifications of the City.

**5.02 PLAN REQUIREMENTS**

Street Plan and Profile sheets shall show sanitary sewer (geometric) design improvements. Required information shall include main and lateral sizes and slopes, utility crossings, manholes, cleanouts, invert elevations and calculations used in design.

**5.03 CALCULATIONS**

The design sanitary sewer flow shall be computed using the following formula:

$$Q_d = Q_p + I$$

$Q_d$  is the design flow in gal. per day

$Q_p$  is the peak flow in gal. per day

$I$  is the infiltration and inflow in gallons per day

The peak flow ( $Q_p$ ) for all areas is defined as 2.5 times the average flow with the average flow being computed from the following basic assumptions:

<b>DESCRIPTION</b>	<b>WASTEWATER FLOW RATE</b>	<b>UNIT</b>
Residential	225	gpd/unit
Central commercial	8,000	gpd/gross acre
Other commercial	1,500	gpd/gross acre
Industry	1,800	gpd/gross acre
Business park	1,000	gpd/gross acre
Public facilities	2,000	gpd/gross acre
School	25	gpd/student

The infiltration and inflow (I+I) shall be 600 gallons per acre per day for all areas.

**5.04 PIPE DESIGN CAPACITY**

Sewer mains shall be based upon sewers flowing full, without head, using design ( $Q_d$ ) flows.

Manning's Formula: 
$$Q = A \left( \frac{1.49}{n} \right) R^{2/3} S^{1/2}$$

Should be used to compute the required size of sewer pipe flowing full. The "n" value shall be 0.013 or the pipe manufacturer's recommendation; whichever is greater. Minimum sewer velocity, flowing full, shall be two feet (2') per second.

**5.05 PIPE SIZES AND SLOPES**

	PIPE DIAMETER	MINIMUM SLOPE
LATERALS	4"	.025
	6"	.025
MAINS	8"	.0035
	10"	.0025
	12"	.0020

**5.06 TYPE OF PIPE**

Acceptable material shall be PVC solid wall pipe SDR 35 ASTM D-3034 and PVC SDR 35 for sewer service connections 4" to 6" diameter. Special designs such as separation manholes and less than minimum cover requirements will require the use of special pipe materials if approved by the Public Works Director.

**5.07 PIPE COVER AND CLEARANCE**

Sewer mains shall have six feet (6') minimum cover from top of pipe to finished grade. Whenever deviation from this requirement is proposed, the pipes designed with less than minimum cover shall be clearly identified as such on the plans.

Sewer laterals shall have four feet (4') minimum and six feet (6') maximum cover from top of pipe to finished grade at the property line.

Sewer mains shall be located at least ten feet (10') horizontally from and one foot (1') minimum below water mains.

Vertical clearance between sewer mains and all other (non-potable water) utilities shall be a minimum of six inches (6").

**5.08 HORIZONTAL ALIGNMENT**

Mains and trunk sewers shall be located parallel with and six feet (6') off the centerline of streets, and on the opposite side of the centerline as the water main. With a horizontal separation of 10 feet.

Curved alignments are not allowed, except for force mains when approved by the Public Works Director. All changes in direction must be at a manhole.

**5.09 SERVICE LATERAL**

A separate service lateral shall be provided for each individual lot or parcel. Service laterals shall be located six (6") inches below and eighteen (18") inches away from the water lateral for residential lots. A cleanout shall be provided for all service laterals. Residential service laterals shall be four (4") inches minimum. Commercial and industrial service laterals shall be six (6") inches minimum. Six-inch (6") laterals may be required to tie into a manhole, depending on the proposed commercial or industrial land use and must comply with the California Building Code. See Standard Plan 0500, 0501 & 0502 for more information.

**5.10 MANHOLES:**

The spacing of manholes shall be a maximum of 500 feet between manholes. Manholes shall be located at the beginning of pipelines, the end of cul-de-sacs, at any change in pipe size or slope, at the connection point of any service lateral where adjacent manhole spacing is greater than 500 feet. Channelized bottoms of manholes shall be sloped 0.10 feet from inlet to outlet except where pipe sizes change, channel shall be sloped as necessary for crown-crown design. Maximum drop shall be 2 feet (2') without drop structure construction. Drop manholes shall not be used unless approved by Public Works Director.

**5.11 ONSITE CONNECTIONS**

There shall be no design connections that introduce storm runoff into the sanitary sewer.

**5.12 SPECIAL DESIGN**

Special designs of sanitary sewer facilities or other unusual structures (clean-outs or manholes upstream of sewer lines) shall require a study and approval of Public Works Director.

**5.13 STUB END PIPES**

All stubs shall be plugged.

### **5.14 PUMP STATIONS**

To the extent practicable, regional wastewater pump stations shall be avoided. In unavoidable cases, a regional pump station may be considered for ownership by the City after submission of a detailed engineering report documenting reasons for proposing a pump station. This report shall establish that there is no reasonable alternative other than a pump station to serve the proposed tributary area. This report will be reviewed by the Public Works Department and a decision will be made by the Public Works Director or authorized representative to accept City ownership of such a pump station. All publicly owned wastewater pump stations shall comply with the City of Red Bluff Wastewater Pump Station Design Standards. Single parcel pump stations for required detention facilities shall be owned and maintained privately by the parcel owner.

**SECTION 6: WASTEWATER PUMP STATION**

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**6.01 SCOPE OF WORK**

The work performance under this section shall consist of furnishing all labor, materials, tools, equipment and incidentals in constructing a complete and operational sanitary sewer lift station as shown on the design plans, including but not limited to the following: wet well, pumps, piping, electrical wiring and control systems, dry pit, force main, force main discharge manhole, generator for backup electrical power and station facilities.

**6.02 PLANS OF WASTEWATER PUMP STATIONS**

A. General Layout:

1. Plot plan showing layout of site and building(s), including driveway and number of parking stalls, exterior piping and appurtenances, fencing, and utilities. Property ties shall also be shown.
2. Plans and details of grading, drainage, erosion control, landscaping, and sprinkler system.
3. Show FEMA flood elevations if area is in a 100-year flood plain.
4. Define site easement for all pump stations not within the City Right-of-way.

B. Detail Plans: Detail plans shall consist of the following:

1. Architectural plans, elevations, and details.
2. Structural plans, elevations, sections, and details.
3. Utility plans (electrical, mechanical, etc.) showing exact location and elevation to prevent damage from future excavations.
4. Mechanical plans including pump, isometrics, plumbing, ventilation, air condition and other equipment installations, piping layout, and details.
5. Electrical and telemetering plans and details including conduit schedule and lighting fixture layouts, control equipment arrangement, and wiring diagrams (one line and elementary control diagrams) for power distribution and controls.
6. Wastewater level control arrangement for operating pumps and alarms.

7. Other plans, sections, elevations, schematics, details and notes, as required, to adequately show the proposed construction.

### 6.03 SPECIFICATIONS

All work shall be in accordance with these Standard Specifications. Special provisions may supplement the Standard Specifications and may specify in detail the construction of sewer, wastewater pump station, and all appurtenances.

### 6.04 OTHER REQUIREMENTS

- A. Wet Well: The wet well shall be a manhole with a six foot (6') minimum diameter and adequate capacity so no more than five starts per hour are required at one half of the design flow. The minimum water level in the on/off cycle should be one foot (1') above the floor of the wet well and the maximum level shall be at the top of the influent sewer. There shall be eight feet (8') minimum from the bottom of the wet well to the invert of the influent sewer.
- B. Appurtenances: Package lift stations shall include the following appurtenances for safe and convenient operation and maintenance:
  1. Each pump shall be isolated with gate or plug valves on both the suction and discharge piping in addition to the discharge check valve.
  2. A circuit breaker shall be located within the lift station.
  3. Pump control shall be start-stop based on the wet well. Level detection shall be accomplished using a Multitrode MT2PC with 2.5/10-30 Probe system with a visual indicator installed in the control panel. Hour meters are required for each pump. A manual pump prime switch shall be provided for maintenance personnel.
  4. Lift station by-pass piping and valves shall be provided for emergency operation and maintenance serving. Minimum clearance from valve top to the underside of the cover shall be eight inches (8").
  5. Lift station shall include a transfer switch and emergency hook-up for power failure.
  6. A six-inch (6") concrete slab shall be placed around the lift station for maintenance access and valve box protection and support. Limits of the concrete slab will be dependent upon the location and design of the lift station and the adjacent area. A security fence around the lift station may be required by the City.

## **Engineering Design Standards**

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- C. **Design Calculations**: Calculations pertinent to the design shall be submitted to the Public Works Department. Such calculations shall be used by the City for determining the adequacy and feasibility of the proposed facilities under review. Any failure on the part of the applicant or authorized representatives to submit such calculations may lead to delay in review and approval of the desired project.
- D. **Revisions to Approved Plans and Specifications**: Any deviations from these specifications shall be approved in writing before such changes are made. Any deviations shall be submitted well in advance of any construction work which will be affected by such changes to permit sufficient time for review and approval.
- E. **Operation During Construction**: Existing facilities and pump station units shall be kept in operation during construction.
- F. **Equipment Manuals**: Equipment manuals shall be provided for each pump station. The manuals shall contain sufficient information on the installation, operation, maintenance, and repair of the pump station equipment. Manuals shall be bound in looseleaf "D" binders and three sets of manuals shall be provided to the City. Folders shall contain only the information in relation to the equipment furnished. Each binder shall be labeled on its front cover and spine with the name of the facility and subject matter.
- G. **Facilities Operations and Maintenance Manual**: A detailed operations and maintenance manual for the facilities to be constructed shall be required for all pump station projects. The manual shall give the operations and maintenance personnel the proper understanding, techniques, and any other information necessary to efficiently operate and maintain their facilities. Operations and maintenance manuals shall comply with all applicable State and Federal statutes, ordinances, and regulations. Three sets of manuals shall be provided to the City.
- H. **Initial Start-Up Procedure Training**: Services of field engineers or qualified personnel for all equipment provided shall be required to assist and instruct the City's operating and maintenance personnel. Such services shall commence before final acceptance testing. Three sets of manuals shall be provided to the City.
- I. **Spill Prevention Plan and Emergency Response Plan**: The facilities O&M manual shall include sufficient operating instructions in the form of a spill prevention plan to prevent spills. The emergency response plan shall also provide instructions to the operator on how emergencies are to be handled. Three sets of manuals shall be provided to the City.
- J. **One Year Certification**: A certification shall be prepared after one year of facility operation documenting the performance of the facility. This certification is intended to confirm that the facility is operating as planned and there are no problems with the equipment. The certification should be

prepared by the facility designer, construction manager, or other person approved by the City.

### 6.05 DESIGN FACTORS TO BE CONSIDERED

- A. Type of Station (Wastewater Pump Station): All pump stations shall be premanufactured “packaged” pump station systems as approved by the Public Works Director. Pump station shall be compatible with existing City pump stations for interchangeable parts. Built-in place pump stations will be considered under special conditions if approved by the Public Works Director.
  
- B. Wastewater Flows and Design Capacity:
  - 1. Wastewater Flows. Wastewater flows shall be determined in accordance with Section 5 of the CITY DESIGN STANDARDS.
  - 2. Design Capacity. Wastewater pump stations shall be designed to discharge design flows.
  
- C. Location: Wastewater pump stations shall be located where tributary areas will be most effectively serviced and where development, construction, and operational costs would be at a minimum. Pump stations should not be subject to flooding and shall be readily accessible.

Wastewater pump station sites shall be adequate to allow on-site parking of service trucks and equipment and to buffer adjoining properties from noise. Future modification and expansion requirements shall be given consideration.

### 6.06 SITE IMPROVEMENTS

- A. Grading: Wastewater pump stations shall be located three feet (3') above 100-Year Flood Level and provided with adequate drainage facilities to carry away storm waters. Adjacent properties shall not be jeopardized by such provisions.
  
- B. Driveways and Parking Areas: Paved driveways and parking areas shall be provided for service trucks. Width of driveways shall be 12 feet minimum. Pavement shall be asphalt or Portland cement concrete. Concrete curbs shall be required for all pump stations. Entrance gates shall be set inward, toward the station, at least 18-feet to provide safety for trucks entering or leaving the station.
  
- C. Fencing: Pump station sites shall be fenced in with a six foot (6') high fence or wall. Masonry walls or other approved types of enclosures are required if pump station is located adjacent to a residential project.

## **Engineering Design Standards**

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Where chain link fences are used, wire fabric shall be nine gauge minimum. In corrosive areas, corrosion protection or additional thickness shall be provided. In isolated areas, three strands of barbed wire should be installed along the top of the fence on an arm projecting outward at an angle of 45 degrees.

Gates shall be provided with heavy duty padlock hasp fixtures and shall be designed for safe opening and closing during strong winds. At facilities where PG&E transformers and/or meters are installed within the station's perimeter, hasps shall be designed to accommodate two padlocks. Design shall allow access with either padlock removed.

A one foot (1') wide gravel strip shall be provided under fencing. Gravel strip shall be contained with redwood or other approved durable material headers.

- D. Landscaping: Sites shall be landscaped to blend with the surrounding environment to render a pleasing overall appearance. Consideration shall be made to minimize grounds keeping maintenance. Chain link fencing shall be screened with landscaping.

In lieu of grass for ground landscaping, crushed rock such as coral chips, red cinder stone or blue stone shall be considered.

- E. Sprinkler System: Automatic sprinkler systems shall be installed for lawn/foilage irrigation.

### **6.07 STRUCTURE AND APPURTENANCES**

- A. Architectural Design: Wastewater pump stations shall be architecturally designed to be in harmony with surrounding development. Materials shall be selected to keep construction and maintenance cost at a practical level. As much as possible, non-corrosive materials shall be used. All architectural design shall be prepared by a Qualified Professional.
- B. Substructure: Built-in-place pump station substructures shall be reinforced concrete construction. All substructures shall be waterproof and watertight. Test borings shall be made to determine the soil characteristics and ground water conditions at all pump station sites and foundations shall be suitably designed. Consideration shall be given to flotation during construction and/or flooding condition. Ensure that NPSH requirements of pump are met.

Structural backfill for the lift station shall be placed as engineered fill, in lifts not exceeding 12 inches in compacted thickness. Each layer being of uniform moisture conditioned to at least the optimum moisture condition and compacted to at least 90% of the maximum dry density per ASTM D1557-91 specifications. Where backfill will support pavements the upper

12 inches of backfill shall be compacted to at least 95% relative compaction.

Backfill around the lift station well shall consist of clean crushed rock with 100% passing through a one inch (1") sieve and appreciable amount passing through a #4 sieve. A minimum of 12 inches (12") of crushed rock shall be placed at the base of the sewer lift station footing for stabilization and extending a minimum of 12 inches (12") outside the edge of cast-in-place or pre-cast base. In all areas the crushed rock shall be separated from the native material with an approved non-woven geotextile fabric.

With approval of the Public Works Director, excavated soils may be used for backfill, after required drying has occurred to allow the specified degree of compaction to be achieved. Imported soils must be free of organic concentrations, rubble or debris and must have approval of the Public Works Director.

1. *Dry Wells.* Dry wells shall be sized to meet space requirements for equipment, piping and ease of maintenance. Adequate working space, at least two feet (2') clear, shall be provided between and around pumps and other equipment. Provide three feet (3') clearance for electrical equipment to comply with the National Electrical Code. Space and provisions for planned future pumps and equipment shall also be provided.
2. *Wet Wells.* Wet wells shall be designed on the basis of minimizing deposits of solids, preventing wastewater from becoming septic, and avoiding frequent starting of pumps. Minimum pump cycle (period from start to start) for any one pump shall be 5 minutes. Maximum retention time of wastewater in wet wells shall be 30 minutes at average flow (total wet well wastewater volume shall be used in computing retention time). There shall be a minimum of eight feet (8') from the bottom of the wet well to the invert of the influent sewer line.

Wet wells shall have a minimum inside diameter of six feet (6') and shall be sized to keep wastewater levels within the following limits:

- a. High water level. Desired: invert of incoming sewer.  
Maximum: crown of incoming sewer.
- b. Low water level. Not lower than top of pump casing.
- c. Vertical distance between pump start and stop levels. Six inches (6") minimum.

Floors shall have a slope of 1:1 minimum, sloping towards a hopper bottom. The hopper bottom shall be designed for proper installation and function of pump suction inlets.

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Wet wells shall have an approved lining to protect against hydrogen sulfide corrosion.

3. *Access.* Reinforced concrete stairways shall be provided for access to dry wells. Stairways shall have a clear passage of at least 30 inches. Stairs shall be provided with permanent non-slip treading. Built-in ladders shall not be used.
4. *Ventilation.* Outlets of exhaust system should not be located less than 12 feet from any opening except when exhausting through the roof.

Ventilation exhaust shall be located downwind of any inlet openings. Velocity in air ducts shall not exceed 1500 fpm. When required fan capacity is large, the use of two fans shall be considered.

Switches for the operation of the ventilation equipment shall be interlocked with the dry well light switch.

Ventilation shafts shall be provided for wet well compartments with only one access opening.

5. *Drainage.* Dry well floors shall be constructed to drain by gravity into trench drains channeled to a sump. The sump pump shall be submersible.

Minimum sump pump capacity shall be 25 gpm with exception of stations equipped with water seal systems, hydraulic operated conecheck valves, or similar type equipment. These stations shall be provided with duplex submersible pumps, each capable of pumping at least 50 gpm. A switch for lead/lag operations shall be provided at the MCC.

Sump pump discharge shall enter the wet well adjacent to and as high as possible to the ground floor level.

Trench drains shall be covered with corrosion resistant gratings. Floor framing and anchoring devices for gratings shall be 316L stainless steel.

C. Superstructure: All pump stations shall have a superstructure.

1. *Floor Elevation and Area.* The latest flood zone map shall be consulted. Floor areas shall be adequate for mechanical equipment, electrical equipment and controls, sanitary facilities, storage, and future expansion. Adequate working space, at least two feet (2') clear, shall be provided between and around all equipment. Provide

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three feet (3') clearance for electrical equipment to comply with the National Electrical Code.

2. *Height.* Height of superstructure shall provide adequate working height. Whenever possible, height of superstructures shall be adequate to permit the removal of motor rotor from its stator or the removal of other equipment of larger size with the installed hoisting equipment.
  3. *Materials of Construction.* The following materials are acceptable for construction of superstructures:
    - a. Beams and Columns: reinforced concrete or structural steel.
    - b. Roof: reinforced concrete.
    - c. Wall: masonry or reinforced concrete.
  4. *Insect Screens.* All structure openings for ventilation or light, except doorways, shall be equipped with removable stainless steel insect screens.
  5. *Doors.* Doors shall be of adequate size to permit removal of pumps, motors, and other equipment. Locks shall be keyable to the Department of Public Works master key.
  6. *Roofing.* Unless otherwise submitted and approved, roofing shall be pitched, standing seam metal.
  7. *Railings and Stairways.* Railings and stairways shall conform to OSHA regulations and City Building Codes.
  8. *Outdoor Enclosures.* Gages, meters, and control devices installed outdoors shall be mounted within weather protected enclosures. Gages integral of other devices such as bearing thermometer on motors are excepted. PG&E meter location shall permit easy PG&E viewing.
- D. Provision for Equipment Removal: Provisions shall be made to facilitate removing pumps and other equipment for repair and maintenance.
1. *Openings.* Openings shall be provided in ground and intermediate level floors of pump stations. Ground level floor openings shall be covered with removable grates and have removable pipe posts and guard chains around its periphery. Stationary posts with removable pipe railing sections shall be provided around intermediate floor openings. All openings shall be provided with portable peripheral curbing and shall be large enough to provide ample room to install or remove pumps and other equipment.

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2. *Hoists.* Built-in-place pump stations shall be equipped with trolley type hoists traveling on steel beams or traveling bridge cranes. Traveling bridge cranes shall be provided for installations equipped with 6 mgd pumps and larger. Bridge cranes shall be electrically controlled.

Hoists for station with a vertical lift of 25 feet or more (pump room floor to top floor) shall be electrically powered. Plug-in type hoists operating on single phase 120 volts may be allowed for small stations.

3. *Eye Bolts.* Eye bolts for block and tackle type hoist shall be provided over pumps, valves, header piping, and other locations to facilitate maintenance operations and equipment removal. The load rating of each eyebolt shall be shown on the plans.
4. *Headroom.* Sufficient headroom, including room for lifting device, shall be provided to allow pump rotating element to be removed without disturbing the pump volute.

- E. Station Facilities: Depending on proximity of station to other available facilities, and on a case-by-case basis, built-in-place pump stations may be required by the Public Works Director to incorporate any or all of the following:

1. *Sanitary Fixtures and Accessories:*

- a. Service sink shall be acid resistant, white enameled, cast iron body, stainless steel rim.
- b. Water closet shall be vitreous china, wall hung, close-coupled closet combination with open front, black closet seat without cover.
- c. Paper towel dispenser shall be chromium plated.
- d. Toilet paper holder shall be chromium plated.
- e. Paper toilet seat cover dispenser shall be chromium plated.
- f. Soap dish shall be chromium plated.
- g. Waste paper basket shall be plastic or noncorrosive material.
- h. Wall mirror shall be a minimum 12 in. x 24 in.
- i. Small storage cabinet for janitorial supplies shall be a minimum 12 in. wide, 18 in. high, and 8 in. deep.

2. *Light Fixtures and Receptacles.*

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- a. **Light Fixtures.** Light fixtures shall be provided to supply adequate illumination within pump stations and shall be mounted where relamping can be accomplished with reasonable ease. Light fixtures shall also be installed next to exterior doors on the outside and around the perimeter of the building with at least one light over the wet well cover manholes. Wet wells shall not require light fixtures. Light fixtures below ground level shall be vapor-tight. Fluorescent fixtures using 48 inch T-8 type tubes are preferred. High pressure sodium fixtures shall be used where appropriate.
  - b. **Night Lights.** Night lights shall be provided above all building entrances and equipped with lamp shades to prevent glare beyond the perimeter fence line. Consideration shall be made for a night light at the perimeter entrance gate. Night lights shall be automatically controlled by photocells.
  - c. **Emergency Lights.** Battery-powered emergency lights shall be provided at all floor levels of the pump station and emergency generator location or building. Emergency lights shall be connected to the normal service via a receptacle, mounted adjacent to the emergency light.
  - d. **Receptacles.** Weather-proof receptacles shall be installed at all floor levels of pump station and outside the building, adjacent to the wetwell.
  - e. **Electrical Code.** Electrical system shall conform to the National Electric Code, and the Building Code of the City.
3. *Telephone.* Telephone cabinet and touch tone instrument shall be provided
4. *Miscellaneous Equipment.*
- a. **Fire Extinguishers.** Fifteen lbs. CO<sub>2</sub> for MCC room and generator area. Ten lbs. dry chemical for lower floors. All fire extinguishers shall be wall mounted.
  - b. First aid kit.
  - c. Eight inch electric clock.
  - d. Plastic trash receptacle, thirty gallons capacity with cover.
  - e. Desk and chair.
  - f. Storage cabinet for flammable materials.
  - g. Legal size drawer file cabinet with lock.

## **6.08 PUMPS, MOTORS, AND CONTROLS**

### **A. Sewage Pumps and Motors:**

1. *General.* Major pump stations shall be equipped with a minimum of three pumps. Smaller pump stations may be equipped with two pumps. Pumps shall be capable of operating over the range of flows without excessive cycling and without long retention time.

Variable speed drives shall be utilized for wastewater pump stations and whenever conditions such as long retention periods or short pumping cycles cannot be avoided. Dual speed motors may be considered where appropriate.

All pump stations shall be equipped with a standby pump equal in capacity to the largest of the main pumping units. The main pumping units shall be capable of handling the station's design flow without the use of the standby unit.

Pumps shall be capable of passing spheres of at least two inches (2") and shall have a minimum discharge opening of four inches (4") in diameter. Speed of pumps shall not exceed 1200 rpm.

Pumps shall be capable of safely rotating in reverse direction at full runaway speed without damage to appurtenances under the shutoff head of the units. The brake horsepower required at full motor speed at any head along the curve shall not exceed the rated horsepower of the motors.

2. *System Head-Capacity Curves.* Pumps shall be selected so that the head-capacity characteristics correspond as nearly as possible to the overall station requirements. This shall be accomplished by the preparation of the system head-capacity curves showing all conditions of head and capacity under which the pumps will be required to operate. The system head-capacity curves shall be developed using standard hydraulic methods for determining friction losses to show the minimum and maximum head losses that can be expected. The equivalent length method using the Hazen-Williams formula is preferred.

Minimum and maximum head losses shall be determined using "C" values.

The system head-capacity curves shall consist of the following:

- a. *System Curves.* Curves showing total dynamic losses in the force main at varying pumping rates for minimum and maximum static heads.

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- b. Individual Pump Characteristic Curves. Curves furnished by pump manufacturer showing pump's head-capacity characteristics. Curves at minimum and maximum anticipated speeds shall be furnished for variable speed pumps.
  - c. Modified Pump Curves. Curves showing pump's head capacity characteristics at the station header, obtained by deducting friction losses in the suction and discharge piping of each individual pump from their characteristic curves at corresponding pumping rates.
  - d. Combined Modified Curves. Curves showing multiple pump operation, obtained by adding capacities at points of equal heads on the modified pump curves.
  - e. NPSH Curves. Curves showing the available system net positive suction head (NPSHA) and the pump's required net positive suction head (NPSHR) shall also be evaluated to minimize the occurrence of cavitation. The NPSHA and NPSHR curves shall include the operating conditions of minimum static suction head and maximum frictional loss ( $C=100$ ) over the entire operating range of each pump. For variable speed pumps where operation of a single pump at the maximum speed will result in cavitation, NPSHA and NPSHR curves shall also be evaluated at the highest variable speed that the pump will experience when it is operated alone or when operated simultaneously with other pumps.
3. *Types of Pumps.* All pumps shall be vertical units. Motors for stations with pump capacities greater than 2 mgd shall be installed on the ground level floor and connected to pumps with removable drive shafts, intermediate drive shafts, and equipped with removable and adjustable flexible couplings. For pumps of less than 2 mgd capacity, submersible pumps may be used for wet pit installation. Consideration for pump on/off cycling shall be made to avoid high motor temperature. Motors for stations with pump capacities less than 2 mgd may be pedestal mounted.
4. *Pump Construction.*
- a. Dry Pit Pump.
    - (i) Hand holes shall be provided on the periphery of pump casings and suction elbows for purposes of inspection and removal of obstructions. Hand hole covers shall be flanged and secured to bossed sections and shall have interior surfaces formed to match interior surfaces of casting to which attached. Pump casing handhole shall be located so that visual inspection can be made of the discharge end as well as the volute. Hand holes shall be a minimum of four inches (4") or about half of the pump size.

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- (ii) Pumps shall have flanged suction and discharge nozzles, faced and drilled to conform to ANSI Class 125 lb. standard. Pumps of sizes greater than five inches (5") shall be furnished with suction elbows that are separate and not integrally cast with any other part of the pump. Suction elbows shall be designed to prevent cavitation. Guide vanes shall not be used in suction nozzles.
- (iii) Pumps of sizes greater than five inches (5") shall be provided with either fabricated structural steel supports or cast iron ribbed supports. Cast iron supports shall be cast integral with the pump casing or suction nozzle.
- (iv) Base or sole plates shall be provided. Plates shall be anchored by stainless steel bolts with stainless steel lock washers and grouted to reinforced concrete pedestals. Hardened steel jacking screws for leveling and for aligning of pumps shall be provided. Mating surfaces shall be machined and all holes drilled and not be burned.
- (v) Intermediate drive shaft sections should be not more than 12 feet in length. Where more than one drive shaft is required, self-aligning steady bearings shall be provided at each intermediate location. Bearings shall be equipped with mechanism to allow alignment adjustments. Bearing and shaft guards shall be provided. Safe access to bearing and guards shall be provided. Grease fittings shall be equipped with extension tubing to facilitate lubrication.
- (vi) Drain and air release lines shall be provided for all pumps. Drain lines shall be installed at the packing drip reservoir and at the centerline of the suction pipe. Air release line shall be installed at high point of pump casings. Connecting points shall be bossed, drilled, and tapped. Minimum size shall be  $\frac{3}{4}$  inch. Air release lines from pump to the first valve shall be brass. Provisions shall be made for a sampling tap for wastewater unless waived by City.
- (vii) Other features of pumps shall be as follows:
  - (a) Bearing Housing: Of single cast piece or fabricated structural steel.
  - (b) Bearings: Not less than two.
  - (c) Shaft Sleeve: Replaceable stainless steel sleeve, from the outside end of the seal gland to the impeller, and set screwed to the drive shaft.

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- (d) Sealing Gland: Double mechanical seal with suitable fluid sealing/lubrication system.
  - (e) Casing and Impeller Wearing Rings: Stainless steel and "Z" or "L" shaped.
  - (f) Suction Plate: Separate from suction elbow (pumps five inches (5") and smaller may be excepted).
  - (g) Taper Pins and Jacking Screws: On all machined joints and handholes.
  - (h) Eyebolts or Other Provisions For Lifting: On volute and bearing housing.
  - (i) Impeller Locknut: With smooth surface, no sharp corners and edges, and easily replaceable.
  - (j) Seals: On both the upper and lower sections of the bearing housing.
  - (k) Tapered Shaft: Tapered for the full length of fit and keyed to the impeller. Exception may be made for four inch pumps.
- (viii) Stock bronze fitted pumps with cast iron casings and bronze impellers are permitted for temporary installations. Impeller rings and shaft sleeve shall be bronze.
- b. Wet Well Submersible Pump.
- (i) Hand holes shall be provided on the periphery of pump casings and suction elbows for purposes of inspection and removal of obstructions. Hand hole covers shall be flanged and secured to bossed sections and shall have interior surfaces formed to match interior surfaces of casting to which attached. Pump casing hand hole shall be located so that visual inspection can be made of the discharge end as well as the volute. Handholes shall be a minimum of four inches (4") or about half of the pump size.
  - (ii) Pumps shall have flanged suction and discharge nozzles, faced and drilled to conform to ANSI Class 125 lb. standard. Pumps of sizes greater than five inches (5") shall be furnished with suction elbows that are separate and not integrally cast with any other part of the pump. Suction elbows shall be designed to prevent cavitation. Guide vanes shall not be used in suction nozzles.

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- (iii) Base sole plates shall be provided. Plates shall be anchored by stainless steel bolts with stainless steel lock washers and grouted to reinforced concrete pedestals. Hardened steel jacking screws for leveling and for aligning of pumps shall be provided. Mating surfaces shall be machined and all holes shall be drilled and shall not be burned.
- (iv) Drain and air release lines shall be provided for all pumps. Drain lines shall be installed at the centerline of the suction pipe. Air release line shall be installed at high point of pump casings. Connecting points shall be bossed, drilled, and tapped. Minimum size shall be  $\frac{3}{4}$  inch. Air release lines from pump to the first valve shall be brass. Provisions shall be made for a sampling tap for wastewater unless waived by the City.
- (v) Other features of pumps shall be as follows:
  - (a) Pump shaft shall be stainless steel.
  - (b) Bearings: Not less than two, sealed, and grease lubricated.
  - (c) Seal: Tandem, double mechanical seal running in an oil reservoir. It shall be composed of two separate lapped-face seals, each consisting of one stationary and one rotating tungsten carbide ring; with each pair held in contact by a separate springs. The compression spring shall be protected against exposure to the pump liquid.
  - (d) Casing and Impeller Wearing Rings: Stainless steel and "Z" or "L" shaped.
  - (e) Suction plate: Separate from suction elbow (pumps five inches (5") and smaller may be excepted).
  - (f) Taper Pins and Jacking Screws: On all machined joints and handholes.
  - (g) Eyebolts or Other Provisions for Lifting: On volute and bearing housing.
  - (h) Impeller Locknut: With smooth surface, no sharp corners and edges, and easily removable and replaceable.

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- (i) Tapered Shaft: Tapered for the full length of fit and keyed to the impeller. Exception may be made for four inch (4") pumps.
- (j) Provide sensors and alarms for:
  - High temperature
  - Vibration
  - Seal leakage

### 5. *Motor Construction.*

#### a. Dry Pit Motor.

- (i) Motors shall conform to the latest standards of the NEMA and the IEEE. Motors shall have ample capacity to operate the pumps under all head and discharge conditions without overloading. Starting current taken by the motors shall not exceed the values as regulated by PG&E or as permitted by the emergency generator. Motors shall be capable of safely rotating in the reverse direction at runaway speed without damage to appurtenances under shutoff head. Motors shall operate pumps through flexible shafts and couplings. Vertical shaft motors mounted on floors shall be furnished with rugged cast iron or steel foundation rings. Motors shall be induction type, drip proof, and suitable for operation from 230/460 volts, 3 phase, 60 cycle A.C. power systems. Motors shall have a service factor of 1.15. All pump motors shall have running time meters installed at the starter. All pump motors above 20 HP shall have an ammeter installed at the starter.

Dry pit sump pump motor shall have running time meters installed at the starter.

- (ii) Motors shall be grease lubricated. Motors 7 HP or larger shall be provided with space heaters. Variable speed motors shall be provided with a RPM measuring device with a 4 to 20 milliamp output and a panel mounted digital RPM indicator.

#### b. Submersible Motor.

- (i) Motors shall conform to the latest standards of the NEMA and the IEEE. Motors shall have ample capacity to operate the pumps under all head and discharge conditions without overloading. Starting current taken by the motors

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shall not exceed the values as regulated by the PG&E or as permitted by the emergency generator. Motors shall be capable of safely rotating in the reverse direction at runaway speed without damage to appurtenances under shutoff head. Motors shall be suitable for operation from 230/460 volts, 3 phase, 60 cycle A.C. power systems. Motors shall have a service factor of 1.15. All pump motors shall have running time meters installed at the starter. All pump motors above 20 HP shall have an ammeter installed at the starter. The motor power wiring shall be brought up directly to the level of the MCC.

- (ii) Pump motors shall be housed in a watertight casing and shall have moisture resistant insulated windings. Pump motors shall have cooling characteristics suitable to permit continuous operation in a non-submerged condition.
6. *Indicating Pressure Gauges.* Indicating pressure gauges shall be provided at discharge nozzle and suction plate of pumps. Indication shall be in feet. Isolation valves and stainless steel diaphragm seals shall be provided at gauges.
7. *Testing.* All wastewater pumps shall be factory tested in accordance with the ASME Power Test Codes or the Standards of the Hydraulic Institute. Five (5) certified copies of the pump curves and data shall be furnished with each pump requiring drive motors 40 HP or smaller. For pumps requiring drive motors greater than 40 HP, a witness shop test shall be required and five (5) certified copies of the pump curves, data and report shall be furnished with each pump. Each pump casing shall be tested under a hydrostatic pressure of not less than 60 psi. All impellers, including spares, shall be statically and dynamically balanced.

All electric motors shall be tested by the motor manufacturer. Routine tests are required for motors rated at 40 HP or less and Witnessed Complete Tests shall be required for motors larger than 40 HP. Five (5) copies of the certified or witnessed test data shall be furnished for each motor.

All pumps shall be field tested to demonstrate satisfactory operations.

8. *Spare Parts.* All installations shall be furnished with the following minimum spare parts:
- a. For each pump:
    - (i) One set renewable sleeve for the pump shaft.

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- (ii) One set of gaskets for all pump casing joints.
  - (iii) One set of wearing rings, complete, for both pump casing and impeller.
  - (iv) All parts recommended in the manufacturer's O&M manual.
- b. In addition to the above, provide for each different size pump:
- (i) One complete pump, including suction plate.
  - (ii) One set of each type of bearing used in the pump and shafting.
  - (iii) One packing gland complete with rings, nuts, bolts, and one box of coil packing (if applicable)
  - (iv) One mechanical seal assembly (if applicable).
- c. For submersible pump:
- (i) One complete pump unit with stand.
- d. For motor:
- (i) One set of bearings, complete for each size of motor 30 HP or larger.
  - (ii) One set of space heaters for each size of motor.
  - (iii) One set of brushes for each wound rotor motor.
  - (iv) One brush holder assembly (for each size of wound rotor motor).
- e. For generator:
- (i) All parts recommended in the manufacturer's O&M manual.
  - (ii) One circuit board for the voltage regulator.
- f. For ventilation fan:
- (i) One set of fan drive belts.

### B. Starters and Controls:

1. *Liquid Level Controls.* The operation of wastewater pump motors shall be automatically controlled by liquid level sensing devices, actuated by wastewater level fluctuations in the wet well. Ultra Sonic/Transducer type with a 4-20 MA output should be provided. Automatic control settings shall be manually adjustable. Duplicate control units shall be provided for all pump stations equipped with split wetwell chambers. Controlling devices should also be capable of alternating the lead pump and setting off high and low level alarm. The operating range of controlling devices shall conform with the requirements of minimum pump cycle and maximum detention time.
2. *Selector Switches.* HAND-OFF-AUTO selector switches shall be provided to operate pumps. Selector switches shall be located at the motor control center and watertight switches next to pumps. Both selector switch settings must be the same in order for the pump to operate (Example: HAND-HAND or AUTO-AUTO). Automatic and manual control for variable speed pumps shall be capable of being adjusted over the effective speed range.
3. *Starters.* Unless otherwise restricted by PG&E, starters shall be of the combination, magnetic, across-the-line type. Starters shall be solid-state.
4. *Control Centers.* Starters shall be mounted and wired as an integral part of free standing, unitized, enclosed control centers. Control centers shall be designed and constructed in accordance with the latest standards of the NEMA and the IEEE. Starters for temporary installations may be surface mounted. Control center cabinets shall be installed to permit full opening of doors without interference from adjoining cabinets, walls or other equipment. Split hinge doors may be used to prevent opening interference.

All major components of control centers shall be by one manufacturer. If more than one control center is to be installed it shall be of the same type and manufacturer who has a qualified electrical service engineer permanently assigned and residing in Northern California. All panel units, devices, indicating lights, and instrumentation shall be identified by engraved nameplates or metal collars. All starters shall be of the draw out type whereby all control wiring and power conductors are automatically disconnected upon removal of the starter.

5. *Indicating Lights and Elapsed Time Meters.* Appropriate indicating lights and elapsed time meters should be installed for each starter. The running time meters shall be non-resetting, digital display, including a one-tenth hour feature. Indicating lights should be of the push-to-test type or light emitting diode (LED).

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### C. Instrumentation and SCADA System:

1. The City of Red Bluff has a Supervisory Control and Data Acquisition (SCADA) system in place. This Section includes requirements for integration of the Pump Station with the City's SCADA system.
  - a. The Human Machine Interface (HMI) development software shall be National Instrument's Lookout (Version to be provided during construction).
  - b. The SCADA alarm development software shall be SCADAlarm by Wonderware (Version to be provided during construction).
  - c. The PLC programming software shall be SCADAPak's Telepace (Version to be provided during construction).
  - d. The Contractor shall be responsible for PLC programming in accordance with the control description specified herein.
  - e. The Contractor shall be responsible for developing all HMI screens required to integrate the Pump Station with the City's SCADA System and shall bear the cost of system integration.
2. *Instrumentation.* Pump stations shall be provided with instrumentation and SCADA systems which include the following:
  - a. Telemeter.
    - (i) Discharge flow.
    - (ii) Discharge pressure.
    - (iii) Wet well level.
    - (iv) Run-time pump hours.
  - b. Report-back of operational status:
    - (i) Sewage pumps.
    - (ii) Sump pumps.
    - (iii) Emergency generator.
    - (iv) Other items of importance to operations.

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- c. Alarms:
  - (i) Normal power source failure (i.e. low voltage, high and low frequency, or phase reversal).
  - (ii) Alternate power source failure.
  - (iii) Generator operating.
  - (iv) Main buss power failure.
  - (v) Low level in wet well.
  - (vi) High level in wet well.
  - (vii) High level in pump room sump.
  - (viii) Other equipment failures which could endanger pump station operations.
  - (ix) Diesel Engine Supervision (i.e., starter failure, low speed, low oil pressure, high water temperature, etc.)
  - (x) Building intrusion.
- 3. *Remote Controls.* When conditions dictate that installations be remotely controlled from supervisory stations, the following additional functions shall be provided:
  - a. Report-back:
    - (i) Operational status of each pump (running or not running).
    - (ii) Operational status of any other item of importance to remote control operations.
  - b. Supervisory remote controls:
    - (i) Start and stop pumps.
    - (ii) Other functions of importance to remote control operations.
  - c. Alarms:
    - (i) Warning of transfer to supervisory remote control operations.

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- (ii) Other alarms of importance to remote control operations.
4. *Relay to Department of Public Works.* All readings, alarms, and indications, shall be relayed to supervisory stations designated by the Public Works Director.
5. *Suppliers.* Instrumentation systems should be provided by one integrator with field and shop maintenance facilities and full time service engineers located in Northern California.
6. *Flow Meters.*
- a. Flow meter receiving instruments at the pump station shall be capable of totalizing, indicating, and recording of flows.
  - b. Recorder shall be electronic type with a month duration, four inch (4") wide circular paper chart and a visible face of approximately four inches (4").
  - c. Indicator shall be four inches (4") long or shall be digital with approximately one inch high numerals.
  - d. Flow meter pressure differential producers shall be of the standard venturi type. Insert type differential producers or Dall tubes shall not be permitted.
  - e. Magnetic flow meters may not be used.
  - f. All sensors for temperature, pressure, flow, and all other measurement outputs must have 4-20 mA outputs if possible.
7. *Level Meters.*
- a. Wet well level meter receiving instruments at the pump station shall be capable of indicating and recording wet well levels.
  - b. Recorder shall be electronic type with a month duration, four inch (4") wide circular paper chart and a visible face of approximately four inches (4").
  - c. Indicator shall be four inches (4") long or shall be digital with approximately one inch high numerals.
  - d. Fuel level (inventory) meter shall be installed in the generator room for diesel fuel tank systems.

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### 8. *Pressure Meters.*

- a. Force main pressure meter receiving instruments at the pump station shall be capable of indicating and recording pressure.
- b. Recorder shall be electronic type with a month duration, four inch (4") wide circular paper chart and a visible face of approximately four inches (4").
- c. Indicator shall be four inches (4") long or shall be digital with approximately one inch high numerals.
- d. Single recorder with three (3) inputs may be used.

9. *Instrumentation Panels.* All pertinent receiving instruments, devices, alarms, indicating lights, and remote controls shall be mounted on centralized instrument panels. All items shall be identified with engraved nameplates. Electrical power to the panel and all instruments shall be through an uninterruptible power supply unit.

10. *Indicating Lights.* Appropriate indicating lights shall be provided to show the status of equipment operation, alarms, controls, etc. Indicating lights shall be of the push-to-test type or light emitting diodes (LED).

11. *Amperage Meter.* Provide an amperage meter for each sewage pump motor. Amperage metering to monitor all legs.

## **6.09 PIPING AND VALVES**

### A. Wastewater Pump Piping:

1. Discharge and header (manifold) piping for wastewater pumps shall be not less than four inches (4") in diameter. Suction piping shall be not less than six inches (6") in diameter.
2. Velocities in wastewater pump piping shall be as follows:
  - a. Suction from wet well            5 fps (desirable max.)  
   6 fps (absolute max.)
  - b. Discharge to header                7 fps (desirable max.)  
   8 fps (absolute max.)
  - c. Header (Manifold)                 6 fps (desirable max.)  
   7 fps (absolute max.)  
   2 fps (desirable min.)  
   1.5 fps (absolute min.)



flow when the wet well is filled to capacity. Typical discharge elevation shall be under and close to the ground floor.

The sump pump shall be fitted with a flexible PVC hose, minimum two inches (2") diameter. Camlock fittings shall be provided for the PVC hose connectors to the pump and fixed piping.

- C. Waste, Drain, and Vent Lines: Pipe and fittings shall be extra heavy cast iron soil type, except piping installed above ground or inside pump stations and piping two and one-half inches (2 ½") in diameter or smaller, may be standard weight galvanized steel pipe with standard cast iron screwed, recessed drainage fittings. Clean-outs shall be provided as necessary and shall be solid cast brass, rough finish with square heads. Bronze access frames and covers shall be provided for finish floors and walls.

Frames and covers for wall installation shall be square with polished finish. Those for floor installations shall be round with scoriated finish. Clean-outs shall be readily accessible.

- D. Potable Water Piping: Water piping and fittings shall be copper except that water piping one inch (1") in diameter and smaller within structures shall be Type K copper pipe with standard brass fittings.
- E. Sprinkler System Piping: Sprinkler system piping shall be solvent welded schedule 40 PVC. Lawn risers shall be PVC or polypropylene and shrubbery risers shall be galvanized steel.
- F. Piping Between Flow Tube and Instruments: Piping between flow tube to flow transmitter shall be one inch (1") minimum diameter 316 stainless steel. Horizontal runs shall have a minimum declining slope of one quarter inch (¼") per foot from the flow tube to the in-station equipment and shall be permanently supported and braced to prevent sediment traps and/or air pockets. Piping shall be connected to the flow tube on a horizontal axis. 316 stainless steel valves, unions and necessary fittings shall be installed close to the flow tube to facilitate maintenance. 316 stainless steel ball valves, gate valves, unions, tees and elbows shall be used on the entire system. Flow transmitters and diaphragm seals shall be installed inside the pump station and mounted for easy maintenance access.
- G. Pipe Sleeves: Pipe sleeves shall be provided whenever small piping passes through concrete walls. Wall pipe shall be used for larger piping.

### 6.10 EMERGENCY PROVISIONS

Emergency facilities shall be provided to protect pump stations and the community from possible damages that may result from power failure,

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emergency maintenance shutdown, pumping capacity being exceeded, or other unforeseen circumstances.

A. Standby Electric Power Equipment: Stations shall be equipped with a diesel powered generator(s) to provide electric power to pump the design flow. The generator's synchronous speed shall be 1800 RPM. The engine generator set shall be a new, standard, current model and in accordance with ANSI and NEMA standards. Provide vehicular access including a pad for a portable generator. Fuel day tank if required, of approved capacity, shall be equipped with two fuel pumps with a manual feature for automatic primary and standby operations.

1. Operation of the emergency facilities shall be automatic upon power failure. Power failure monitors shall monitor all three phases. Monitoring of one phase of a three-phase system is not adequate.
2. Automatic load transfer switches shall conform to PG&E requirements. When possible, bypass of the automatic transfer switch and manual override of automatic functions shall be provided.
3. A plug for connection of a portable load bank shall be provided to fully load the generator periodically. The connection shall be made to the generator side of the transfer switch via a circuit breaker. This connection can also be used to connect a portable generator when the installed generator is not available for service.
4. Telemetry and SCADA systems shall be powered through an uninterruptible power supply unit. The uninterruptible power supply shall be sized to furnish emergency power for 8-hours minimum.

B. Portable Pump Facilities: Pump stations shall be equipped to pump wastewater from the wet well into the force main with a portable pump. This shall be accomplished by providing fixed discharge and suction piping for the portable pump with connections to the force main and the wet well. The portable pump discharge piping shall be connected to the downstream side of the flow meter tube and shall include a gate valve, 90° elbow, flanged reducer, and a blind flange. The suction piping shall be connected to the wet well and shall include piping with a 90° elbow and a blind flange. All piping for the portable pumps shall be sized with consideration to the capacity of the installed pumps and the operating characteristics of the available standby pumps. Portable pumps shall be located near the wet well to minimize the possible occurrence of cavitation. Provide vehicular access including a pad for a portable engine-driven pump.

**6.11 MISCELLANEOUS**

- A. Potable Water Supply: All pump stations shall be provided with a potable water supply system for sanitary fixtures, lawn sprinkling, washdown, and other maintenance purposes, as required.

Adequate and conveniently located water outlets shall be provided for flushing and washing purposes. Hose bibs shall be 3/4-inch with vacuum breakers at all floor levels and outside of pump station. Stopcock valves shall be provided immediately before each hose bibb located within the building.

Two conveniently located 1-1/2 inch diameter standpipes shall be provided adjacent to the wet well. The standpipes shall have 1-1/2 inch angle globe valves for National Standard fire hose thread and end cap with chain. A 3/4-inch hose bib with vacuum breakers shall be installed on the standpipe directly below the 1/2 inch globe valve.

The main water supply line shall be two inches (2") in diameter, metered and equipped with a master valve located within the station's perimeter fence. A two inch (2") reduced pressure backflow preventor shall also be provided and located within the station's perimeter fence.

Under no circumstances shall potable water supply be directly connected to sewage pumps or piping. Seal water, positive air gap and/or pneumatic water tanks shall be provided as necessary. The potable water supply system shall conform to City, State, and Federal codes and regulations.

- B. Painting: Pump stations shall have maintenance-free colored exterior finish, subject to Public Works Director approval. City may, at its own discretion, approve a painted exterior finish. Painting shall be in accordance with the best practice and in strict compliance with the paint manufacturer's instructions and recommendations. No lead-base primer or paint shall be used. A minimum of two (2) finish coats over one prime coat shall be required.
- C. Corrosion Protection: All materials and equipment exposed to corrosive conditions shall be either corrosion resistant or protected with appropriate protective coatings or linings.
- D. Odor Control: All stations shall be provided with a 6-inch wet well vent pipe to be used for treatment of foul odors. The vent pipe shall be schedule 40, 316 stainless steel, permanently installed through the wet well slab and covered with a blind flange. A receptacle, at appropriate voltage, shall be installed near the vent pipe.

**6.12 FORCE MAINS**

- A. Locations: Force mains shall be located in streets or along road rights-of-way. In locating force mains, ease of installation and maintenance and elimination of high points shall be considered. Air release valves shall be installed at high points.
  
- B. Sizing:
  - 1. Force mains shall be sized not less than six inches (6") in diameter (four inches (4") upon approval).
  - 2. Velocities in force mains shall be as follows:
    - a. Minimum: 3.0 fps
    - b. Maximum: 10.0 fps
  - 3. Force mains shall be designed to carry the maximum rate of pumping without excessive frictional head loss. Total dynamic head should not exceed 100 feet.
  
- C. Materials: The material selected shall be adapted to local conditions with special consideration given to the quality of wastewater, possible septic conditions, soil characteristics, internal pressure, abrasion, external loadings, foundations, necessity of reducing the number of joints and other similar problems. Corrosion resistant lining, coating, wrapping, and cathodic protection shall be used when corrosion protection is required. Insulating flanges or fittings may be required at entrance or exits from buildings. The following material is acceptable for force mains subject to the conditions indicated:
  - 1. *Ductile Iron Pipe (Cement or other approved lining and Coated)*. Ductile iron pipe shall be tape wrapped and have cathodic protection where the force main may be subjected to external corrosion.
  
- D. Minimum and maximum Cover and Clearances: Shall conform to the requirements as set forth in Subsection 5.07 of these standards.
  
- E. Alignment and Grade: Pipe shall be laid in a straight alignment and with constant grades. Force mains may be curved by deflecting the joints to eliminate the necessity for fittings. In no case shall the deflection exceed the maximum as set forth by the manufacturer for the type of pipe used. Fittings shall be used when alignment or grade changes cannot be accomplished by joint deflection.

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F. Appurtenances:

1. *Air Bleeders.* Air bleeders and valves shall be provided at high points. A corporation stop shall be provided at the force main connection. Internal and external corrosion shall be considered.
2. *Blow Offs.* Blow off valves and vaults will not generally be required but may be required where sedimentation may occur.
3. *Emergency By-Pass.* Emergency by-pass facilities shall be provided.

G. Structural Considerations:

1. *Pipe Loads.* Force mains shall be designed to withstand all internal and external forces to which they may be subjected. Internal forces will be the pressure from the wastewater and the water hammer effect. External forces shall consider loads due to Trench backfilling and Superimposed uniform and concentrated loads.
2. *Foundation.* Soil conditions shall be determined by test borings. Beddings shall be designed to adequately support pipe and minimize settlement.
3. *Reaction Blocks and Anchorage.* Reaction blocks and anchorage shall be provided at bends and fittings and may be required at joint deflections.

H. Termination: Force main discharge outlets shall be designed to minimize turbulence and sulfide release and be submerged at all times. The interior surface of the outlet manhole and first downstream manhole shall be protected with plastic lining.

1. The severity of odor and its treatment shall be considered. A suitable odor control means shall be submitted to the Public Works Director for approval.
2. Gravity connection to the force main discharge manhole and connection to the first leg of the gravity line exiting the discharge manhole will not be permitted.

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**SECTION 7: WATER DISTRIBUTION SYSTEM DESIGN**

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**7.01 GENERAL**

The purpose of water design standards is to promote good public utility practices, to encourage efficiency and economy, and to establish minimum standards to be hereafter observed in the design, construction and operation of waterworks facilities by the City of Red Bluff. The standards herein prescribed are intended as minimum standards applicable after adoption. Water system improvements shall be designed to serve the ultimate level of development as defined in the City of Red Bluff's General Plan. All improvements shall conform with, but not be limited to, the California Safe Drinking Water Act and Related Laws (commonly referred to as the "Drinking Water Law Book"), the California Building Code (CBC), the California Plumbing Code (CPC), the National Board of Fire Underwriters, the California Department of Health Services, the California Fire Code, the City of Red Bluff Standard Specifications and Details, and the City of Red Bluff's current Water System Master Plan documents.

**7.02 DESIGN PLAN REQUIREMENTS**

Plans shall be drafted to present plan and profile views and shall show existing and proposed water main sizes, fire hydrants, water valves, water main blow-off valves, trench details, crossings with other utilities, lateral distances to nearest sanitary and storm sewer lines, top of pipe elevations at all grade changes, and surveying coordinates of water main intersections, points of direction change, water main taps, water main terminations, and service locations. If public water mains are to be located outside of public street sections, legal descriptions of proposed rights-of-way or easements shall be submitted with the plans. (Refer also to Section 2.03).

**7.03 FIRE FLOW**

Minimum fire flows shall be in accordance with the California Fire Code, Division III Fire Protection.7.04

**7.04 DESIGN FLOW**

Design flow for sizing public water distribution mains shall be based on the following:

$$Q_1 = (2.2 \times A) + F, \text{ and } Q_2 = 3.5 \times A,$$

Where:

$Q_1$  = Maximum-day demand plus fire flow, gpm,

$Q_2$  = Peak-hour demand, gpm,

A = Average day water demand for service area, gpm,

F = Fire flow requirement, gpm. (See Subsection 7.03.)

The average day water demand, A, is calculated by multiplying service area acreage by a water demand coefficients as listed in the following table. NOTE: That "A" should be weighted for service areas with more than one land use classification.

**WATER DEMAND COEFFICIENT BY LAND USE CLASSIFICATION**

LAND USE CODE	LAND USE CLASSIFICATION	GPM/GROSS ACRE
RR	Rural Residential	0.4
VLDR	Very Low Density Residential	1.3
LDR	Low Density Residential	2.2
MDR	Medium Density Residential	4.5
NC	Neighborhood Commercial	1.1
GC	General Commercial	1.4
SC	Service Commercial	1.2
HC	Highway Commercial	1.4
BP	Business Park	1.0
I	Industrial	1.7
PS	Public Services (schools)	1.4
OS	Open Space (irrigated park)	1.5
PN <sup>1</sup>	Mixed Land Use	2.0

<sup>1</sup> Calculated by weighting demand coefficients by land use acreages

Estimates of water demands for new development areas must be specified in the design phase. The City will incorporate use of its computer model into the evaluation of water system designs. Hazen-Williams coefficient of 135 shall be assumed for cement lined ductile iron pipes

**7.05 NORMAL OPERATING PRESSURES**

Normal operating pressures in water distribution system mains of not less than 35 psig or more than 70 psig shall be provided at service connections. Pipeline head loss should be limited to approximately 5 feet/1,000 feet.

**7.06 MINIMUM OPERATING PRESSURES**

During periods of peak day demand plus fire flow,  $Q_1$ , or peak-hour demand conditions,  $Q_2$ , minimum allowable water system pressures shall be 20 psig and 30 psig, respectively.

**7.07 PIPELINE VELOCITIES**

Pipeline design velocities shall be limited to 8 fps and 10 fps for peak-hour and peak day plus fire flow conditions, respectively.

**7.08 PIPELINE LAYOUT**

Water mains shall be laid out only in grids and loops and shall be located within streets. Dead-end water mains shall be installed only if:

- A. Looping or gridding is impractical due to topography, geology, pressure zone boundaries, unavailability of easements or locations of users; or
- B. The main is to be extended and the planned extension will eliminate the dead-end conditions.

Grids shall include minimum size 8 inch pipelines at one-quarter (1/4) mile intervals, and minimum 12 inch lines at one-half (1/2) mile intervals. All public water supply pipelines shall be located within the right-of-way of public streets or roads. Water mains shall be offset six feet from the centerline of streets. All exceptions shall require approval by the Public Works Director.

**7.09 DISTANCE FROM SANITARY SEWER LINES**

Water mains shall be installed:

- A. At least ten feet horizontally from and one foot higher than sanitary sewers located parallel to the main.
- B. At least one foot higher than sanitary sewers crossing the main.
- C. Ten feet minimum from sewer lines joints where sanitary sewers cross a main.

- D. In separate trenches.
- E. The location of the water main in any street shall be six feet (6') from the centerline of the street, on the opposite side of the centerline in relation to the sanitary sewer line.

Refer to Section 5.07, Sanitary Sewer Line Design. All exceptions shall require approval by the Public Works Director.

### **7.10 TYPE OF PIPE**

Pipe used for public water distribution shall be ductile iron AWWA C151 (Class 50), [polyvinyl chloride (PVC) AWWA c900, DR18 (Class 150), or rolled copper tube soft type "K".

### **7.11 MINIMUM SIZE OF PIPELINE**

The typical minimum size of pipeline shall be eight inches (8") in diameter. A six-inch (6") pipeline may be used on dead end lines having no fire hydrants.

### **7.12 VALVE LOCATIONS**

The distribution system shall be equipped with a sufficient number of valves so that no single shutdown would result in the removal from service of a length of pipe greater than 500 feet in school, commercial, industrial, or multiple family dwelling areas, or greater than 800 feet in other areas, i.e. residential, or more than two fire hydrants in any area. Valves shall not be located on deep (>60") water line sections.

Fire service lines greater than or equal to six inch (6") diameter and services to hospitals, dialysis clinics, businesses with boilers and large 24-hour users require valves on the water main on both sides of service connections within 50 feet.

### **7.13 FIRE HYDRANTS**

Hydrants shall have a maximum spacing of 500 feet in all areas subject to the requirements of TAC, California Fire Code, Appendix III, and approval of the City Fire Marshal.

All fire hydrants shall be painted in accordance with City specifications. All fire hydrants which are privately owned and/or fed by water lines with boosted pressure shall be indicated as such on design plans.

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Blue reflective markers shall be installed at all fire hydrant locations in accordance with these standards. Fire hydrants at intersections or on divided streets shall have markers on each street in each direction.

All fire hydrants shall be suitably protected from vehicular damage using bollards when required by the City. The placement of bollards shall permit full access to hydrant nozzles and shall not interfere with the operation of the hydrant.

### 7.14 METERED WATER SERVICE

Meters shall be required for all non-fire flow service connections. Service meters shall be supplied and installed by the building or landscape contractor. Water service lines and meters shall be sized by the developer's engineer, using the design procedures outlined in American Water Works Association Manual M22, "Sizing Water Service Lines and Meters." The selection of the class and size of meter shall be based on the flow requirement, type of use, pressure loss through the meter, and safety requirements. The following tables list recommended meter capacities. Irrigation is a continuous flow.

POSITIVE-DISPLACEMENT METERS MEETING AWWA SPECIFICATIONS

SIZE, IN.	MAX. CAPACITY , GPM	RECOMMENDED PEAK FLOW, GPM	RECOMMENDED CONTINUOUS FLOW, GPM
¾	35	40	16.5
1	50	40	16.5
1 ½	100	80	30
2	160	128	38

TURBINE METERS MEETING AWWA SPECIFICATIONS

SIZE, IN.	MAX. CAPACITY , GPM	RECOMMENDED PEAK FLOW, GPM	RECOMMENDED CONTINUOUS FLOW, GPM
2	160	128	80
3	350	280	175
4	600	480	300
6	1,250	1,000	625

Minimum service tap and line size for residential services shall be 1 inch. Minimum meter size per table, this section. Each single family dwelling unit shall have a separate service and meter. Meters shall be equipped with automatic meter reading equipment including absolute encoder systems. Positive displacement meters shall include the oscillating piston design. Meters shall be in accordance with Standard Plan 0701 or 0702.

**7.15 BACKFLOW PREVENTION**

All non-residential domestic and irrigation water services shall include backflow prevention assemblies. Backflow prevention assemblies are also required for residential water services which have access to water from private wells, or any other alternate water supplies such as reclaimed water, or gray water. Fire service lines will require backflow prevention assemblies where there are onsite private water storage facilities or booster pumps or as determined by the Fire Marshal. All backflow prevention assembly installations shall be located on the customer side of the water meter and within P.U.E.

Selection of the appropriate backflow prevention assembly shall be based on general level of hazard. The following table presents levels of hazard and associated acceptable backflow prevention assemblies:

BACKFLOW PREVENTION ASSEMBLY SELECTION	
APPLICATION	TYPE
Residential site w/ alternate water Supply	Double Check Valve Assembly
All normal commercial & industrial Sites	Double Check Valve Assembly
Special Hazard	Reduced Pressure Principle Assembly or Air Gap
Fire Service	Double Check Valve Detector Check Assembly

All backflow prevention devices shall have enclosure per Standard Plan 0711, 0712. Only backflow prevention assemblies on the annually updated list approved by the State of California Department of Health Services shall be considered for service installation. A list of approved backflow prevention assemblies is available upon request at the Public Works Department, City Hall, 555 Washington Street, Red Bluff.

**7.16 SERVICE TRENCH**

Water services in residential areas may be placed in a common trench with the sanitary sewer lateral per Standard Plan 0501. The location of the water service at back of walk shall be within an area five feet (5') maximum from the side property line.

**7.17 WATER MAIN TRENCH COVER**

All water mains shall have a minimum and normal trench cover of 36 inches (36"). Maximum pipe cover shall be 60 inches (60"), unless required to avoid obstructions.

**7.18 WATER MAIN BLOW-OFF**

Dead end water mains shall have a fire hydrant service connection, or a blow-off assembly (SP0709) within two feet (2') of the end of the line.

**7.19 WATER MAIN THRUST RESTRAINT**

Pipeline thrust restraint shall be incorporated in all designs to resist the thrust forces which are generated at changes of direction. Thrust restraint may include concrete thrust block, locking gasket, or restrained mechanical joint. Concrete thrust block force bearing areas shall be designed to meet thrust restraint forces for given thrust conditions as presented in Standard Plan 0705, 0705A.

Concrete thrust blocks shall be designed to meet in-situ soil conditions assuming soil moisture conditions are at "field capacity" or fully saturated. Design plans shall include concrete thrust block design calculations and supporting data. Mechanical thrust restraint may be used in-lieu of thrust block restraint. Approved methods and types of mechanical thrust restraint include the following:

- Field Lok® gasket (U.S. Pipe), or approved equal, for runs of pipe that will not normally require disassembly,
- MJ Gripper® Gland (U.S. Pipe), or approved equal,
- Mega-Lug® (EBAA Iron), or approved equal.

Restrained pipe length shall be computed using the following minimum parameters: soil type, trench type, fitting type, fitting angle, nominal size of pipe, pipe material, test pressure, factor of safety, and depth of bury. Installation of mechanical thrust restraint shall follow manufacturers' specifications. Restrained length of pipe shall meet or exceed the specifications of the table shown in FIGURE 7a.

**7.20 DISTRIBUTION SYSTEM WATER SAMPLING STATION**

Sampling stations to be installed throughout the water distribution system at locations as required by these specifications and the Public Works Director. Requirements for station determined by number of added service connections and/or location of services. Sampling stations shall be added to the water system to ensure that water is sampled throughout the distribution system including all pressure zones. As a minimum, a primary sampling station shall be added for every new 1,000 service connections, or for every 2,000 persons, or in isolated areas. One sampling station shall be added on each side of a primary sampling station and within 5 water service connections.

Sampling stations shall be installed in the P.U.E. per Standard Plan 0710.

**7.21 GROUNDWATER SOURCE PROTECTION**

A “Phase 1” environmental assessment addressing groundwater risk shall be prepared and submitted as part of design of commercial and industrial area facilities. The assessment shall as a minimum include:

- A. An inventory of chemical use including storage quantities and an assessment of their hazard with regard to contaminating the City groundwater supply in the event of a chemical spill, and
- B. On-site management plans and facility designs intended to prevent or mitigate groundwater pollution from chemical spills.

**7.22 WATER CONSERVATION**

Design of the onsite water systems shall include estimates of water consumption for irrigation, indoor or potable uses, and fire flow. Estimates shall be included on plan sheets or submitted separately. Water demand estimates shall be used by the City in its assessment of the water distribution system’s capacity to meet projected demands. Water use estimates shall be developed with consideration given to water conservation practices and the use of lower water use plumbing fixtures, equipment, and appliances. Design efforts shall be made to promote landscape irrigation to occur at times of the day of lower evaporation losses, especially night and early morning.

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**FIGURE 7a**

### REQUIRED RESTRAINED LENGTH, FEET - For Ductile Iron Pipe Only

DIAMETER (FITTINGS, VALVES, PIPE, ETC.)		4"	6"	8"	10"	12"	14"
Fittings	90°	16'	22'	29'	34'	40'	45'
	45°	6'	9'	12'	14'	17'	19'
	22 1/2°	3'	4'	6'	7'	8'	9'
	11 1/4°	2'	2'	3'	3'	4'	4'
Tee-branch, size	4"	28'	28'	28'	28'	28'	28'
	6"	---	39'	39'	39'	39'	39'
	8"	---	---	51'	51'	51'	51'
	10"	---	---	---	61'	61'	61'
	12"	---	---	---	---	72'	72'
Dead-Ends (& in-line valves)		28'	39'	51'	61'	72'	83'
Reducer	4"	---	20'	37'	50'	63'	74'
	6"		---	21'	38'	53'	66'
	8"			---	21'	38'	54'
	10"				---	36'	51'
	12"					---	21'
Vertical offset 45°	upper bend	11'	16'	21'	25'	30'	34'
	lower bend	4'	5'	7'	9'	9'	12'
22 1/2°	upper bend	5'	8'	10'	12'	14'	16'
	lower bend	2'	3'	3'	5'	4'	6'
11 1/4°	upper bend	3'	4'	5'	6'	7'	8'
	lower bend	1'	1'	2'	2'	2'	3'

NOTES: Restrained lengths calculated for pipe placement conditions as follows:

- 1) Soil type is poorly graded sands, and gravely sands,
- 2) Type 3 trench,
- 3) 150 psig line test pressure,
- 4) Factor of safety of 2:1,
- 5) Minimum pipe bury depth of 3 1/2 feet,
- 6) Pipe is ductile iron, without poly-wrap (Polyethylene encased sections of a line will require additional joint restraint since the friction between the pipe and the soil is reduced with the use of polyethylene encasement),
- 7) Vertical offset lower bend assumed depth of bury of 6 feet minimum - if less than 6 feet, use restraint length for upper bend. 90 ° bends should not be used in vertical offsets. Due to the possibility of severe stresses imposed on the fittings bend angles should be limited to 45 °,
- 8) EBAA iron computer program was used to calculate thrust restraint lengths.

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**SECTION 8: GRAYWATER DISTRIBUTION SYSTEM DESIGN**

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**8.01 GENERAL**

State of California standards are developed and adopted to guide the use of Gray water. Gray water is untreated household wastewater which has not come in contact with toilet waste. California's gray water standards are now part of the State Plumbing Code, making it legal to use gray water everywhere in California. Standards outlining minimum system design and operation parameters are included in Title 24, Part 5, of the California Administrative Code, GRAYWATER SYSTEMS FOR SINGLE FAMILY DWELLINGS, commonly called the California Gray water Standards.

**8.02 SAFETY**

Gray water systems shall have no connection to any potable water system and shall not result in any surfacing of the gray water. Siting of gray water system components has been determined by California Gray water Standards, and by the local Administrative Authority (City and County) as follows:

MINIMUM HORIZONTAL DISTANCE FROM	SURGE TANK (FEET)	IRRIGATION FIELD (FEET)
Water supply wells	100	200
Public water supply pipeline	10	10
On-site domestic water service line	5	5
Water ditches	50	50

The California Gray water Standards also defines additional safety requirements and include minimum irrigated square footages for systems based on standards for gray water daily household production. All standards shall be complied with.

**8.03 CROSS-CONNECTION PREVENTION**

Gray water distribution systems shall have no connection to any potable water system. Backflow prevention assemblies shall be required and installed at all water service connections serving a site that uses gray water of any source.

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## **SECTION 9: STREET LIGHTING SYSTEM DESIGN**

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### **9.01 GENERAL**

Street lighting improvements shall be designed to serve the ultimate level of development as defined in the City General Plan. This section describes typical design practices for new or modified street lighting systems within the City of Red Bluff.

### **9.02 STREET LIGHTING DESIGN STANDARDS**

Street lighting shall be designed and drafted in conformance with the City of Red Bluff's street light standard plans and specifications, the current editions of Caltrans Standard Specifications and Standard Plans on State Route roads, and the National Electrical Code.

### **9.03 STREET LIGHTS REQUIRED**

Street lights shall be required for all lots and parcels being developed or constructed upon unless exempted by Section 9.04. In addition, street lights may be required for lots and parcels containing existing structures which are being improved or altered, depending on the nature and extent of the work. Illustrations of street lights generally required are shown in the Standard Plans and as approved by the Public Works Director.

Data and calculations supporting the satisfaction of the above requirements shall be submitted for review, or the predetermined design standards included herein shall apply.

### **9.04 STREET LIGHTS NOT REQUIRED**

Street lights are not required for a single residence.

### **9.05 DEVELOPER'S RESPONSIBILITY**

Existing street lights which must be relocated or repositioned as a result of the construction of new streets or driveways into a development shall be the responsibility of the developer.

### **9.06 PLAN REQUIREMENTS**

Final Improvement Plans shall be prepared following formal City approval of a utility site plan showing existing and proposed street light locations. These plans shall show the following:

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- A. Scale: A scale of 1" = 100' horizontal is the minimum scale for street lighting plan sheets.
- B. Existing Topography: Existing topography shall include existing service points, existing City owned electrical facilities, such as traffic signals, irrigation controllers, and street lighting in the immediate vicinity of the project, and conduit runs.
- C. Proposed Improvements: Proposed street light types, locations, conduit sizes and locations, service locations, pull boxes, mast arm lengths, and light pattern to be installed shall be shown on the plans.
- D. Right-of-Way: All right-of-way lines, easements, section lines, and temporary construction easements, both existing and proposed, shall be properly dimensioned. Any public utility easements shall be noted.
- E. Subdivision and Lot Details: Subdivision plans shall show lot numbers and frontage measurements, intersection property lines of adjacent properties, and names and plan numbers of adjacent subdivisions. Service details shall be shown as applicable.
- F. Luminaire Schedules: Luminaire schedules shall be shown in tabular form and shall indicate, but not be limited to, the amount and type of luminaires on each new or existing service, the service location and voltage, the number of lights removed or added from an existing service, and any other pertinent information affecting the service load.

### **9.07 STREET LIGHT LOCATIONS**

Street lights shall be located on property lines whenever possible, at least five feet (5') from driveways or any above ground facility, and at such locations to maximize their separation from trees. Street lights shall normally be staggered on opposite sides of the street and on outer edge of curves. See Standard Plans.

In cases with separated sidewalk the street light standard (foundation) shall be placed in the landscape strip adjacent to the front of sidewalk. When the landscape strip is greater than six feet the luminaire arm shall be increased to eight feet in length.

### **9.08 STREET LIGHT TYPE AND SPACING**

TYPE	TYPICAL	MOUNTING HEIGHT	HPS/WATTS	SPACING
A	Residential	28'	70	220-330'
B	Collector	28'	100	220-330'
C	Arterial	28'	200	300' max
D	Industrial	28'	70	300' max

**9.09 STREET LIGHT POLES**

All pole construction and materials shall conform to the standards outline in the Standard Specifications and as shown in Standard Plans. The Public Works Director may approve special or unusual designs if the character of the surrounding neighborhood warrants unusual design. Where special or unusual design street light poles are to be used, the developer shall supply to the City additional poles to be used for future pole replacement. The minimum number of replacement poles to be supplied to the City shall be ten percent (10%) of the poles being installed with any fractional percent being rounded up to the next whole number.

**9.10 MAST ARM LENGTH**

For Type B or C street lights that are located seven feet (7') or less from the face of curb (as measure from centerline of pole) a six foot (6') mast arm shall be specified. When these poles are greater than seven feet (7') from the face of the curb, an eight foot (8') mast arm shall be specified.

**9.11 LUMINAIRES**

The type of street light shall be specified on the plans. The luminaires shall be high-pressure sodium type with internal regulator ballasts. All luminaires shall conform to the Standard Specifications, see Standard Plans. The Public Works Director may approve special or unusual designs if the character of the surrounding neighborhood warrants unusual design. Where special or unusual design street light luminaires are to be used, the developer shall supply to the City additional luminaires to be used for future luminaire replacement. The minimum number of replacement luminaires to be supplied to the City shall be ten percent (10%) of the poles being installed with any fractional percent being rounded up to the next whole number.

**9.12 SERVICE CONNECTION**

A 120-volt underground circuit shall be employed on all systems. A maximum of seven (7) street lights shall be designed on any given circuit. Other voltage circuits will be considered upon separate application to the Public Works Director for approval. Service points shall be provided within a utility easement immediately adjacent to or within the right-of-way and shall be open and easily accessible to the street frontage.

Service Pedestal shall conform to PG. &E requirements for underground services.

### **9.13 PULL BOXES**

All pull boxes, including the size, shall be shown and identified on the plans. Pull boxes shall be located where two or more conduits intersect, at critical angle points, street crossings, and where conduit runs are more than 175 feet long. Pull boxes shall also be located adjacent to the bases of all street light poles. Pull boxes shall be of the size and type required by the National Electric Code.

### **9.14 CONDUCTORS**

All conductors, including quantity and size, shall be identified on the plans. Unless otherwise specified, conductors shall be single conductor with THW insulation, solid or stranded copper, sized and color coded in accordance with these standards and the National Electric Code. The same color of wire must be used for the whole length of the circuit. Tape shall not be used to identify the color of the wire.

The minimum conductor shall be No. 4 A.W.G. on a direct underground service.

The minimum conductor size from the service point to the service can shall be No. 4 A.W.G. The size of each conductor from the service point to the luminaires shall be such that the voltage drop along each circuit will not exceed five percent (5%) of the nominal service voltage to be used which is 120 volts. Calculations shall be made substantiating the design criteria for every circuit. Calculations shall also be made showing the total load in amperes of each circuit at the service can.

The minimum size for street lighting conductors shall be No. 10 A.W.G. A photo cell is required in each service system and it shall be connected to the service can with three No. 14 A.W.G.

### **9.15 PHOTO CELL**

A single twist-lock receptacle photo cell shall be provided on the luminaire nearest to the service point for each service.

### **9.16 CONDUITS**

Conduits shall be sized in accordance with the National Electrical Code with a minimum size of 1½" in diameter. Larger size conduits may be required at the City's discretion.

**9.17 RIGHT-OF-WAY AND EASEMENTS**

Street lighting improvements shall be placed within public easement dedications or rights-of-way. The easements or rights-of-way should be sufficient in width to provide access for operations and maintenance.

**9.18 ELECTRICAL EQUIPMENT AND WORK**

Control and switching equipment and fusing of all circuits shall meet the requirements of these specifications, PG&E specifications, and the National Electrical Code for underground control and switching equipment. Control and switching equipment and fusing in State of California right-of-way shall meet the requirements of California Department of Transportation Standard Specification.

**9.19 MASTER PLANNING**

Master planning is the determination of street light locations between control points. Control points are proposed street light locations at street intersections. The purpose for master planning is to end up with an overall uniform street light system meeting minimum requirements. On collector and arterial streets, master planning shall apply to both sides of the street. The procedure for master planning is outlined as follows:

- A. Determine the nearest intersections each way from the street light locations required. Determine the location of the street lights at the intersections in conformance with these design standards.
- B. Determine the existence of any City owned and maintained street lights situated between the adjacent intersections above.
- C. Determine the distance between the adjacent designed intersection street lights above and/or adjacent existing street lights, whichever are nearest to the street light locations being determined.
- D. Divide the distance into the most possible equal spaces between lights that can be obtained in conformance with the spacing requirements herein.
- E. Compare the light locations to intersecting property line, driveways, pedestrian lanes and utility obstructions as follows:
  - 1. If the locations fall close to a property line and the street light location can be adjusted to the property line while staying within the maximum spacing allowed, then the adjustment should be made.
  - 2. Generally, street lights should be situated at intersecting property lines for residential lots with minimal frontage (75 feet or less).

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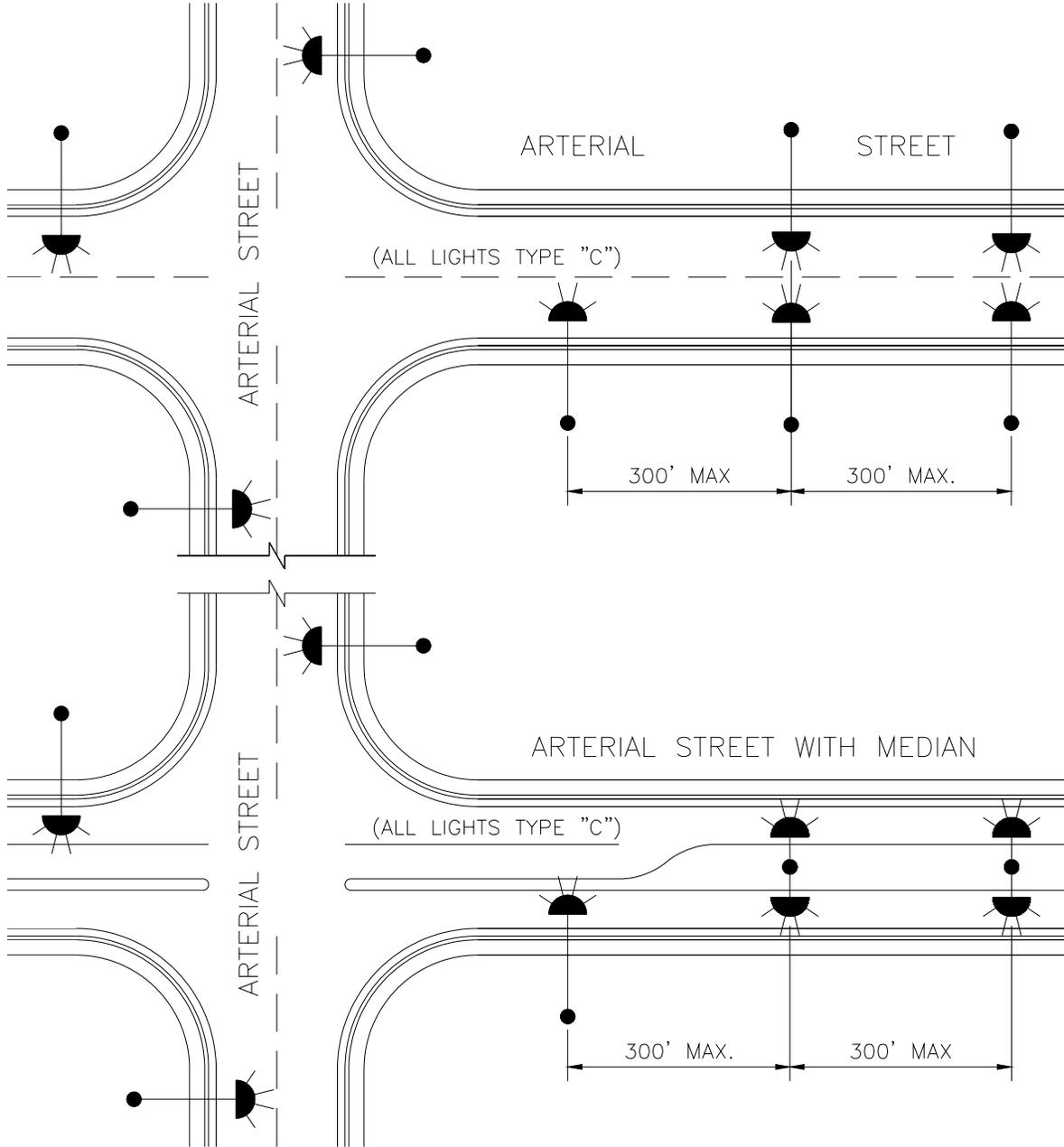
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The light spacing may have to be unbalanced with additional lights being added to attain this and still comply with the maximum spacing allowed.

3. Street light locations shall be adjusted to miss driveways and existing utility obstructions by five feet (5').

**FIGURE 9a**

**STREETLIGHT LOCATIONS ON ARTERIAL STREETS**

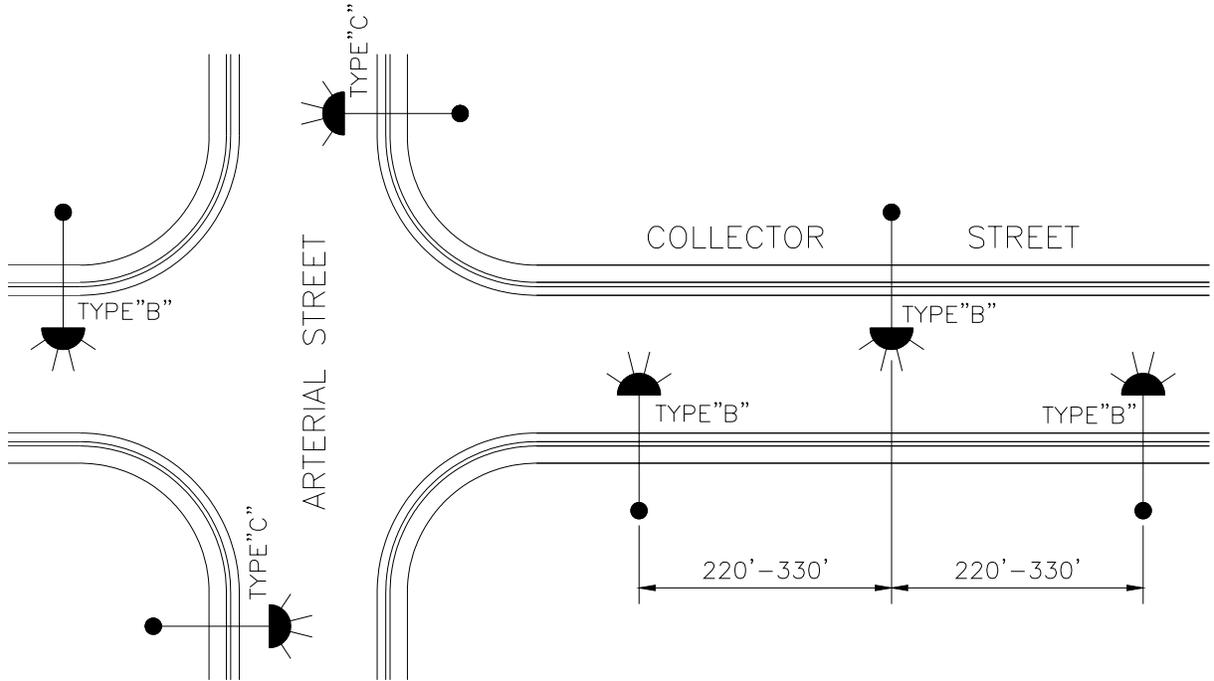


Note: Locate Street Lights on Traffic Signal Poles at Signalized Intersections.

STANDARD PLAN  
0907

**FIGURE 9b**

**STREETLIGHT LOCATIONS ON COLLECTOR STREETS**

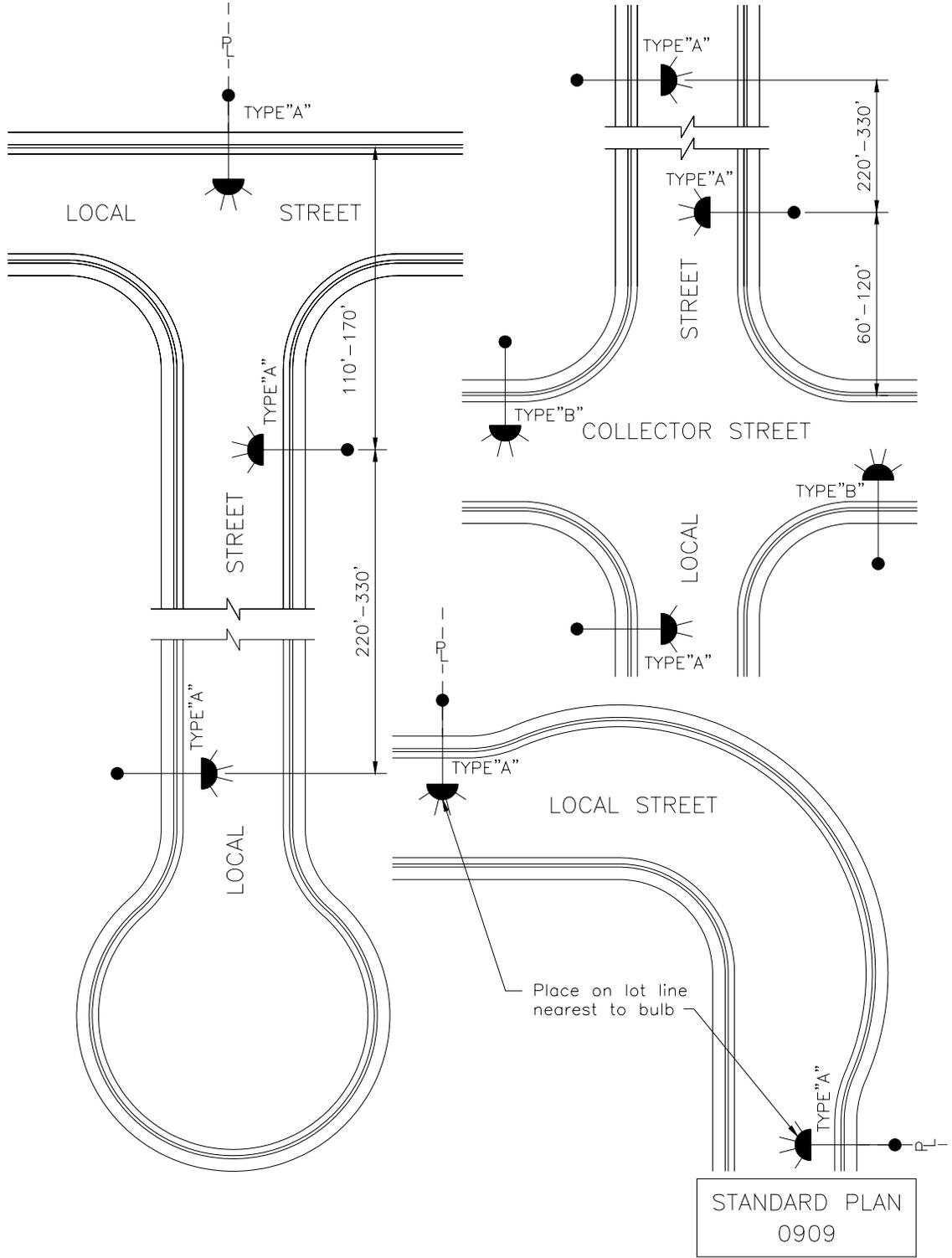


Note: Locate Street Lights on Traffic Signal Poles at Signalized Intersections.

STANDARD PLAN  
0908

FIGURE 9c

STREETLIGHT LOCATIONS ON LOCAL (RESIDENTIAL) STREETS



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**SECTION 10: TRAFFIC SIGNALS**

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**10.01 GENERAL**

The need for new traffic signals shall be based on the Street Master Plan or warrants contained in the latest edition of the Caltrans Traffic Manual. Traffic signals shall be designed in accordance with these Standard Specifications and the latest editions of the following:

- State Standard Specifications and State Standard Plans, including all standard symbols contained therein.
- Manual on Uniform Traffic Control Devices.
- State Traffic Manual, Chapter 9. Attention is directed to the following:
- State Traffic Manual, Section 9-10.3 for luminaire illumination requirements (minimum 0.15 foot-candles for crosswalks, minimum .6 foot-candles for middle of intersection).
- Tables 9-8 and 9-9 for conduit sizing. The 26% fill limit shall apply for new facilities, 40% for reconstruction.

**10.02 SIGNAL STANDARD TYPES**

Traffic signal standards, posts, and mast arms shall be of the types listed in the most recent edition of the State Standard Plans and shall meet 80 M.P.H. wind load design.

The typical luminaire arm length used shall be 15 feet.

**10.03 VEHICLE AND PEDESTRIAN SIGNAL TYPES**

All vehicle signals and pedestrian signals shall have terminal block components and be of the types listed in the latest edition of the State Standard Plans. All mast arm mounted vehicle signals shall be 12" in diameter and MAS mounted.

Protected left turn signals shall be all arrows.

All vehicle visors are to be tunnel type.

All vehicle and pedestrian signals must be the LED type.

Programmed visibility vehicle signals shall not be used without prior approval of the Public Works' staff.

### 10.04 VEHICLE SIGNAL ALIGNMENT

Typical vehicle signal alignments are listed below. Case-by-case variations may occur.

- A. For single left turn lanes with protected left turn movement, the left turn signal shall line up with the center of the left turn lane as close as possible.
- B. For dual left turn lanes (which shall have a protected movement), the left turn signal shall line up with the extension of the line between the two left turn lanes as close as possible.
- C. When a protected left turn signal is used, the signal for the through movement shall line up with the center of the lane group as close as possible, regardless of the number of through lanes. When 50' or 55' mast arms are used, only one MAS signal shall be used for the through movement instead of two signals as shown in the State Standard Plans (unless there are four through and right turn only lanes).
- D. For one through lane with permissive left turn, the MAS signal shall line up with the center of the left half upon approach of the through lane, as close as possible.
- E. For two through lanes with permissive left turn, the MAS signal shall line up with the center of the #1 through lane (i.e., the lane adjacent to the left turn lane), as close as possible.
- F. When a 4 section MAS signal is used, it shall line up with the center of the left half (upon approach) of the #1 through lane, as close as possible.

### 10.05 NUMBER AND SIZE OF VEHICLE SIGNAL INDICATIONS

Typical indications are as follows:

- A. For Protected Left Turn Movements: One 3-section all arrow MAS and one 3-section all arrow far left side pole-mounted signal.
- B. For Intersections With a Left Turn Pocket (For Permissive Left Turn Movements): There shall be an additional far (left) side 3-section pole mounted head. Signal head shall be all circular indications.
- C. For Through Movements (With Protected Left Turns): One 3-section MAS, one 3-section far right side pole-mounted signal, and one 3-section near right side pole-mounted signal. (Near side signals may not be required if the intersection is less than 100' wide, approach speeds are 30 mph or less, and it is not needed to meet continuous sight distance requirements).

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- D. For Through Movements (With Permissive Left Turns): One 3-section MAS, one 3-section far left side pole-mounted signal, one 3-section far right side pole-mounted signal, and one 3-section near right side pole mounted signal. (Near side signals may not be required if the intersection is less than 100' wide, approach speeds are 30 mph or less, and it is not needed to meet continuous sight distance requirements.) If left turns are not permitted the far side left pole mounted signal head is not required.
- E. For Split Phased Situations: One 4-section MAS (w/GA), one 4-section far left side pole-mounted signal (w/GA), one 3-section far right side pole mounted signal, and one 3-section near right side pole-mounted signal.
- F. For Right Turn Arrow Overlap Situations: Same as above except the far right side and near right side pole-mounted signals shall be 5-section with green and yellow arrows. Overlaps required prohibited U-turn on associated protected left movements. Right turn arrow overlaps shall not be provided without prior approval of the Public Works Director.
- G. For Size of Vehicle Indication: As a general guideline, size of vehicle indication shall be in accordance with the MUTCD, but an individual indication's size may be adjusted by the Public Works Director.

### **10.06 VEHICLE DETECTOR LAYOUT AND INPUTS**

Vehicle Detector shall be by video detection (camera) and shall comply with Caltrans requirements.

### **10.07 CONDUIT**

Conduit requirements shall conform to the following (unless restricted by push button post size):

- A. Service run conduit shall be 2 ½- inch minimum diameter.
- B. Conduit from the main pull box to the controller shall be two (2) 3-inch diameter conduits minimum.
- C. Any signal run and interconnect conduit shall be 2-inch minimum diameter.
- D. All street crossing conduit runs shall be a minimum of 3-inches.

### **10.08 CONDUCTORS**

All conductor runs for each signal phase to each terminal block on a pole shall be direct from the controller home run pull box. The conductor schedule shall not allow for splicing at intermediate pull box location.

**10.09 PULL BOXES**

Refer to Caltrans Standard Plans No. ES-8.

- A. The minimum size for pull boxes shall be #5. However, #6 pull boxes shall be used at the ends of street crossings and when four or more conduits enter the box. Covers shall be concrete and marked "Traffic Signal".
- B. Larger pull boxes shall be required as follows:

CONDITION	SIZE
Any pull box with 12 or more cross sectional inches of conduit entering	a pull box extension or 20" x 42" dual lid pull box may be required.
Home run pull box for a 2, 3, or 5, phase signal	20" x 42" dual lid pull box shall be required.
Home run pull box for a 8 phase signal	30" x 48" dual lid pull box shall be required.

- C. Traffic signal interconnect conduit shall be installed in separate concrete pull boxes and their covers shall be marked "I.C." or interconnect.
- D. Pull boxes subjected to vehicular travel shall be installed with one quarter inch steel plate covers (galvanized after fabrication) with a diamond-type surface in accordance with ES-8 of the State Standard Plans.
- E. Maximum distance between pull boxes shall be 175 feet.

**10.10 CONTROLLER CABINETS LOCATION**

Controller cabinets shall be approved by the City. Typical location should be on the minor street adjacent to the service pedestal. Both controller cabinet and service pedestal should be located such that the conduit from the service point to the service pedestal does not require trenching across a street.

**10.11 PROTECTED VS. PERMISSIVE LEFT TURN PHASING**

Protected left turn phasing should be provided under the following conditions:

- A. For an intersection with one through lane and a left turn pocket, a protected left turn phase may be required at the discretion of the Public Works Director, if the product of the left turn volume and the opposing through volume exceeds 30,000 for any hour or if any of the guidelines for protected left turn phases are met (or are expected to be met as a result of a development project) as outlined in Section 9-01.3 of the State Traffic Manual (e.g. accidents, delay, volume, and misc.).

- B. Where there are two or more opposing through lanes and the left turning vehicle occupies a dedicated left turn pocket, or where dual left turns are provided.
- C. Where the travel distance through the intersection for left turn vehicles is more than 100 feet, and the 85th percentile speed of opposing traffic is 45 mph or more.
- D. Where there are three or more opposing through lanes.
- E. Where the left turn queue recurrently occupies the #1 through lane, and where dual left turn lanes cannot be provided, and where left turn lane can't be extended.

Protected/Permissive phasing, as discussed in Section 9-03.8 of the Traffic Manual, is typically not used in the City of Red Bluff. This type of operation, if proposed, would need prior approval of the Public Works Director.

### **10.12 TRAFFIC SIGNAL INTERCONNECT**

Traffic signal interconnect shall be provided for new signal installations, and for modification of existing signals which currently do not have interconnect. The interconnect cable shall not share conduit with service conductors, and may only share conduit with signal conductors and detector lead-in cable if the installation of separate interconnect cable conduit would result in extensive unnecessary disturbance of an existing traffic signal system.

The interconnect shall connect the subject signal with at least one existing traffic signal. If the subject signal is between two existing signals, the interconnect shall connect all three signals.

In cases where interconnect conduit is or will be provided, but for some reason interconnect cable is not being provided, the interconnect conduit shall be provided with a green #14 AWG pull wire.

### **10.13 MAST ARM STREET NAME SIGNS**

Mast arm street name signs shall be required for all approaches. These signs shall have a minimum lettering size of 8" U.C. and 6" L.C. with type D stroke width. Other lettering sizes shall not be used without prior approval by the Public Works Director. The signs shall be double sided. The signs shall have a visual reflectivity equal to V.I.P. diamond grade.

**10.14 EMERGENCY VEHICLE PREEMPTION (EVP)**

The Public Works Director will determine the new traffic signals that will require (EVP) for all directions of approach on public. Each direction shall have a separate detector. Detectors shall be optical in nature and 3M Opticom equipment or approved equal.

**10.15 SIGNAL PHASING**

The phases following in the Standard NEMA order with Phase 2 shall be for eastbound traffic and phase 8 for northbound traffic.

**10.16 ADVANCE FLASHING BEACONS**

Advance flashing beacons shall be included at the discretion of the Public Works Director. Typically they are located on roads with speed limits 45 m.p.h. or greater when there are no controlled intersections over the previous mile. All flashing beacon assemblies shall have two beacons flashing in alternating sequence.

**10.17 MISCELLANEOUS APPURTENANCES**

- A. Bicycle push buttons shall be included for all approaches unless otherwise specified by the Public Works Director.
- B. Audible signal for the blind shall be required in commercial areas and other areas as directed by the Public Works Director.
- C. Walking man (international symbol) type plate shall be used for all pedestrian push buttons.
- D. Additional pedestrian push buttons on medians of four or more lane roads may only be installed where the center median/pedestrian refuge area is a minimum of six feet in width.
- E. Push buttons shall be large button "ADA" type and shall be submitted to City for approval.

**10.18 PREPARATION OF PLANS**

Traffic signal plan sheets shall conform to the provisions of Section 2 of these Standard Specifications, including submittal requirements, AutoCAD files, etc. Traffic signal plans shall have a title sheet followed by a signal and listing sheet for each intersection. Signing, striping, and interconnect information may be included on the signal and lighting sheet, or may be included on separate sheets, depending on ease or readability. The format, symbols, and content

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shall follow the recommendations as outlined in the Caltrans Traffic Manual and Standard Plans. Plans shall include:

- A. **Title Sheet**: The title sheet shall include the following:
- Title of project, which shall include the location.
  - A vicinity map (not required to be to scale) with north arrow.
  - Pertinent signature blocks and revision block.
  - A legend for symbols not found in the Standard plans (e.g., Utility lines, etc.).
  - Below the legend, place the following note: NOTE: SEE CALTRANS STANDARD PLANS ES-1A AND ES-1B FOR EXPLANATION OF OTHER SYMBOLS.
  - General Notes and Construction Notes.
  - Name, addresses and phone numbers for the utility companies and City Services.
- B. **Signal and Lighting Sheet**: The signal and lighting sheet shall be drawn at a scale of 1 inch equals 20 feet (1" = 20'), and shall include the following:
- A north arrow.
  - The plan shall be orientated to show the major street to be laid out horizontally on the plan sheet, with the north arrow to be either pointed up or to the right. The phase diagram shall show phases per the Caltrans Traffic Manual with Phase 2 to be for eastbound traffic and the remainder of phases in regular NEMA order.
  - Existing and proposed field conditions which include, but are not limited to, the following: underground and overhead utilities, driveways, fire hydrants, poles, signs, fences, street lights, edge of pavement, curb and gutter, sidewalk, right-of-way line, P.U.E.'s, roadway striping, medians, centerline, pull boxes, wheelchair ramps, trees (particularly those needing trimming), adjacent topography, etc. Existing field conditions, appurtenances, etc., shall be dashed and screened. Proposed shall be solid and bold.
  - Complete traffic signal design, including but not limited to, the following: conduit runs, detector loops with input designations, detector handholes, vehicle and pedestrian signals (with phase designation), luminaries, pedestrian push buttons (with phase designation), controller, service pedestal, service point, emergency

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vehicle detectors, signing, striping, interconnect, and location for phone line service.

- On a separate sheet the service equipment schedule and wiring diagram with legend, pole and equipment schedule, and conductor and conduit schedule. The schedule shall include rows showing percent fill values, and conduit quantity/size.
  - Phasing for emergency vehicle preemption (and railroad preemption where applicable). Protected left turn phases shall be combined with the concurrent through movement during EVP.
  - Conduit shall not be shown to pass through detector loops.
  - Right-of-way lines and easements to be shown on ALL plans.
  - All submittals for review shall be three (3) complete sets of plans and specifications, with comments from previous submittals.
- C. Utility Relocation Plan (as required). Shall show all existing and proposed underground and overhead utilities. All new facilities are required to be underground installations.
- D. Striping and Signing Plan (40, 50 or 100 scale): Shall include all existing signs, curb and pavement markings, and shall show disposition of each (removal, relocate or remain). Shall show all necessary parking removal signs and curb markings.
- E. Signal Interconnect Plan (if necessary).
- F. Civil Plan (20 or 40 scale): To include all paving, structural section, concrete, drainage, sanitary sewer, and earthwork items.
- G. Signal Hardware.

Draft special provisions are to be provided to the City for review.

The City of Red Bluff uses the following:

Service pedestal:	Type III-AF
Cabinet:	Type 332 Anodized aluminum, with 210 conflict monitor (monitor reds)
Controller:	Type 170E with 68HC11 CHIP with Comm port on front panel (As an alternate, City may require 2070L Controller with Bitran Systems Program 233/2070)
PROM board:	412-F System Memory module with 27C1001 EPROM and full complement of RAM

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Software: Bi-Tran Systems program # H200CA

Other components: Detector units- Model 222 only

LED Signal Heads: LED signal heads are required for all vehicular and pedestrian signal indications.

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**SECTION 11: GRADING AND EROSION CONTROL DESIGN**

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**11.01 GENERAL**

Grading improvements shall include excavation, embankment and erosion control work for channels, pads and roadways, erosion control measures and retaining walls. All work shall be performed in accordance with the City of Red Bluff Grading Ordinance and Design Standards (Appendix A), latest edition of the California Building Code, approved improvements plans, and the current edition of the State of California Caltrans Standard Specifications.

**11.02 RESIDENTIAL LOT GRADING**

- A. Intent: Preclude steep slopes along the front, side and rear lot areas that would encourage erosion, make landscaping difficult, cause driveways to be unreasonably steep and threaten the stability of fences. The prohibiting of steep lot slopes will encourage the percolation of irrigation and rainfall and will reduce the amount of run-off water to be handled by the City drainage system. As such, the intent of the following specifications is to apply to the basic grading of lots before house construction and is not intended to restrict the homeowner in landscaping design options.
- B. Grading Plan: A grading plan shall be included in the improvement plans for subdivisions. Guidelines for the preparation of the grading plan are as follows (see Appendix A for revised Grading Plan requirements):
1. Grading plans shall be prepared by a registered Civil Engineer in accordance with the current California Building Code and the Project Soils Report.
  2. A grading permit shall be required prior to beginning grading and construction activities.
  3. Grading plans shall require the Geotechnical Engineer's signature and shall be submitted to the Public Works Director, the City Building Official, and the Planning Director for review and approval.
  4. The grading plan shall be on sheets of the same quality and size as the improvement plans.
  5. The plan shall clearly show each lot number, how each lot drains, and the pad elevation of each lot.
  6. Each lot shall drain to the street, without crossing the property line of any other lot unless otherwise approved. Run off flowing over driveways and/or sidewalks is prohibited.

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7. When grading along existing residential property, the grade should be, if at all possible, held equal to or lower than the existing property grades. When grades are to be raised higher than existing adjacent residential lots, a masonry retaining wall shall be used, regardless of the difference in elevation. The wall shall be located as close to the property line as is feasible for construction. If written permission can be obtained from the adjacent property owner(s), the wall should be placed on the property line or onto the lower lot and the fence relocated to the top of the wall. If possible, all exterior slopes, fill or cut, shall be constructed off-site, with the property line being situated a minimum of two feet inside the higher elevation. If a right of entry cannot be obtained for this, a retaining wall shall be placed as near to the property line as practicable in compliance with the California Building Code.
8. If retaining walls are needed, they shall be constructed of concrete. All concrete or masonry walls are subject to the review and approval of TAC and shall conform to the materials and specifications provided by the wall manufacturer or designing engineer. Retaining walls over 4feet-0 inches (4'-0") in height from bottom of posting to top of wall and/or supporting a surcharge fill shall be engineered in accordance with the California Building Code.
9. Maximum lot grading shall not exceed eight percent (8%) in any direction. Minimum lot grading shall not be less than two percent (2%), unless otherwise approved by TAC.
10. The plan shall show all drainage facilities being installed, clearly labeling high and low points and curb elevations.
11. Every part of the subdivision shall be designed with a drainage release such that if any portion of the storm drain system fails, water shall stand in the street no less than 1.0 feet below the pad elevation of any house.
12. The plan shall clearly show (by contours, elevations, typical cross sections, drainage aprons, percent slope, etc.) the relationship of the grading plan to the existing ground and drainage pattern of adjacent properties.
13. Existing drainage patterns on adjacent properties shall remain the same (or be improved) by the grading plan for the subdivision.
14. Lots shall be graded to within 0.2 feet plus or minus of the elevations shown on the approved plan.
15. The plan shall indicate that an Engineer's Certificate for the grading shall be required prior to acceptance of the improvements.

16. The plans shall identify trees to be removed with an “X”. Any trees not so marked on the plans are to remain.
17. The plan shall list the total cut & fill quantities in cubic yards.

### 11.03 NON-RESIDENTIAL LOT GRADING

- A. **Intent:** Preclude steep slopes along the front, side and rear lot areas that would encourage erosion, make landscaping difficult, cause driveways to be unreasonably steep and threaten the stability of fences. The prohibiting of steep lot slopes will encourage the percolation of irrigation and rainfall and will reduce the amount of run-off water to be handled by the City drainage system. The intent of the following specifications is to apply to the basic grading of the lot before building construction and is not intended to restrict property owner landscaping.
- B. **Grading Plan:** A grading plan shall be included in the improvement plans for the project. Guidelines for the preparation of the grading plan are as follows:
  1. Grading plans shall be prepared by a registered Civil Engineer in accordance with the current California Building Code and the Project Soils Report.
  2. Grading plans shall require the Geotechnical Engineer’s signature and shall be submitted to the Public Works Director, the City Building Official, and the Planning Director for review and approval.
  3. The grading plan shall be on sheets of the same quality and size as the improvement plans.
  4. The grading plan shall be the same scale as the improvement plans.
  5. The plan shall clearly show each lot number, how each lot drains, lot grading between two and eight percent (2% - 8%), and the pad elevation of each lot.
  6. The site must be graded so storm runoff is collected in a drainage system and conveyed via underground pipes to a proper point of discharge. This point of discharge shall be an underground or open channel storm drainage system if one exists in the public street along the frontage of the project site. If no system exists, the drainage may discharge through underground pipes into the street gutter via an under the “sidewalk drain” per Standard Plan 0401, 0402. Runoff flowing over driveways and/or sidewalks into the street is prohibited.
  7. When grading along existing residential property, the grade should be, if at all possible, held equal to or lower than the existing property grades. When grades are to be raised higher than existing adjacent

residential lots, a masonry retaining wall shall be used, regardless of the difference in elevation. The wall shall be located as close to the property line as is feasible for construction. If permission can be obtained from the adjacent property owner(s), the wall should be placed on the property line or onto the lower lot and the fence relocated to the top of the wall. If possible, all exterior slopes, fill or cut, shall be constructed off-site, with the property line being situated a minimum of two feet inside the higher elevation. If a right of entry cannot be obtained for this, a retaining wall shall be placed as near to property line as practicable.

8. If retaining walls are needed, they shall be constructed of concrete and designed per the California Building Code.
9. Maximum lot grading slope shall not exceed eight percent (8%) in any direction. Minimum lot grading slope shall not be less than two percent (2%) in any direction.
10. The plan shall show all drainage facilities being installed, clearly labeling high and low points and curb elevations.
11. Every part of the project must be designed with a drainage release. The drainage release shall be such that if any portion of the storm drain system fails, water shall stand in the street no less than 1.0 foot below the pad elevation of any building.
12. The plan shall clearly show (by contours, elevations, typical cross sections, drainage arrows, percent slope, etc.) the relationship of the grading plan to the existing ground and drainage pattern of adjacent properties.
13. Existing drainage patterns on adjacent properties must remain the same (or be improved) by the grading plan for the proposed project.
14. Lot drainage shall not discharge across sidewalks.
15. Lots shall be graded to within 0.2 feet plus or minus of the elevations shown on the approved plan.
16. The plans shall indicate that an Engineer's Certificate for the grading will be required prior to acceptance of the improvements.
17. The plans shall identify trees to be removed with an "X". Any trees not so marked on the plans are to remain.

### **11.04 EROSION AND SEDIMENTATION CONTROL PLAN**

- A. Plan: An erosion and sedimentation control plan must be done for all projects. The plan shall follow the guidelines of the Storm Water Pollution

## **Engineering Design Standards**

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Prevention Plan (SWPPP). The plan shall include site map(s), and identification of construction/ contractor activities describing measures for providing erosion and sediment control. The SWPPP must be prepared and implemented before construction start.

B. Erosion Control Notes: Notes shall be placed on the Erosion Control Plan (or on the Grading Plan if no separate Erosion Control Plan), addressing the following:

1. Erosion and sediment control measures shall be effective for the duration of the construction activity.
2. No storm runoff water shall be allowed to drain directly into the existing underground storm system before the onsite storm drain system is installed.
3. As soon as is practical after the new onsite storm system is installed, fabric screens shall be installed around the catch basins. The Contractor shall have an option to install prefabricated steel frames with filter screen or filter fabric attached to the front of the drain inlet and extended 12 inches (12") on each side of the drain inlet opening. Frame shall be approved by the Public Works Director and shall fit the opening with less than one-quarter inch ( $\frac{1}{4}$ " ) gap at any one point.

Should the proposed onsite storm drain system not be installed by October 15, temporary sediment basins shall be constructed around the openings of any existing storm drain that drain the site.

The name, address, and 24-hour telephone number of the person responsible for implementation of the erosion and sedimentation control plan shall be provided.

A minimum of 50' of drain rock, 1-1/2" diameter or larger, at a minimum depth of 6", shall be installed at each driveway entrance to the site. This does not need to be done at driveways, which will be closed by immovable barricades during construction.

7. All erosion and sedimentation control measures shall be maintained until disturbed areas are stabilized. Changes to the Erosion and Sedimentation Control Plan shall be made to meet field conditions, but only with the approval of or at the direction of the Public Works Director.
8. During the rainy season as specified in Note "1", all sidewalk and paved areas shall be kept clear of earth material and debris. The site shall be maintained so as to minimize sediment laden runoff from entering any storm drainage system.

## **Engineering Design Standards**

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9. The Erosion and Sedimentation Control Plan covers only the first winter during which construction is to take place. Plans are to be resubmitted prior to September 1 of each subsequent year until the City accepts the site improvements.
10. It is the responsibility of the Contractor to inspect and repair all erosion control facilities at the end of each workday during the rainy season.
11. It is the responsibility of the Contractor to clean out sediment basins whenever the level of sediment reaches the sediment clean out level indicated on the plans.
12. It is the responsibility of the Contractor to protect temporary borrow areas and/or stockpiles with appropriate erosion control measures satisfactory to the Public Works Director, Planning Director, and Building Director as appropriate.
13. The cleaning of paved streets, during and at the completion of construction, shall be performed with mechanical sweepers. The use of water trucks to “wash down” the street is prohibited.
14. The Erosion and Sedimentation Control Plan, details, notes and calculations if required, must be a part of the plan check submittal package for either Grading Permit only or Final Site Approval. The Design Engineer prior to plan preparation should consult the Public Works Director if the need for a separate plan is in doubt.

**SECTION 12: BUS SHELTERS**

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**12.01 GENERAL**

Bus shelters are covered, semi-enclosed waiting areas with benches located at bus stops. Refer to the Tehama County Transit Agency Standard Details, Appendix B, for construction concept. Bus shelters offer protection from inclement weather conditions, provide for passenger comfort, and establish a transit presence within a local area.

**12.02 PLACEMENT GUIDELINES**

Bus shelters shall meet the following minimum placement guidelines:

- A. Shelters located adjacent to buildings shall be placed a minimum of 8 inches away from the building wall.
- B. Shelters shall not be placed so as to obstruct sidewalks or access to and from transit vehicles.
- C. Shelters should not be placed where they obstruct visibility at street intersections or where vehicles enter onto an arterial from a private roadway or driveway.

A standard bus stop design with shelter placement is shown in the Standard Details provided by the Tehama County Transit Agency as conceptual guidelines.

**12.03 DESIGN**

Bus shelter designs can vary considerably, from a single standardized structure, to a fully integrated design treatment when provided by developers or other sources (i.e. property owners, City, County etc.) However, bus shelters shall be easily recognizable as a bus stop and be consistent with the standard design specification provided by the City.

All bus shelters shall meet the following minimum guidelines:

- A. Bus shelters shall be constructed of 3/4" bronze tempered glass and aluminum posts, bends and mullions. Components requiring routine, time-based replacement shall not be included. All components shall be easily removable to facilitate maintenance. The Contractor shall submit details prior to installation for approval.
- B. Bus shelters shall be constructed so as not to pose safety hazards to passengers or to other individuals.

## **Engineering Design Standards**

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- C. Free standing shelters shall be placed on a non-slip concrete pad sloped toward the roadway for drainage (2%), with the minimum dimensions of the pad to be 12 feet x 7 feet x 4 inches (12' x 7' x 4").
- D. Curb cuts and ramps shall be provided for wheelchair access, as necessary.
- E. Minimum clearance of four feet (4') from the curb is required (five feet (5') is desirable) for the front, sides, and the rear for free standing shelters to provide for wheelchair access.
- F. Shelters shall have an opening from grade to the bottom of the wall panel of at least six inches (6").
- G. Roof and support structure of the shelter shall be designed to hold a load of 40 pounds per square foot, and designed so that drainage is sloped away from the street side of the shelter.
- H. Benches installed in bus shelters should be at least 6-feet long and be made of aluminum or other durable material.
- I. Bus shelters may have bike racks. When bike racks are included they shall be placed at the rear and shall have a minimum allowance of four feet (4') on the sides and a minimum maneuvering space allowance of nine and one-half feet (9.5').

In addition, the City requires that bus shelters be provided with lighting where the existing outdoor lighting level is inadequate. Lighting fixtures shall be easily maintained and vandal resistant, and placed to maximize passenger illumination.

**SECTION 13: STREET TREE PLANTING REQUIREMENTS**

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**13.01 GENERAL**

Appendix C lists recommended trees for the Red Bluff area and a general description of their characteristics.

All of the trees on this list have characteristics that make them desirable street trees. Some also have characteristics that may make them undesirable in certain locations. All of the trees listed have been selected for their resistance to injurious insects and diseases. The list of trees and the accompanying information about each tree is meant to be used as a guide. Landscaping plans for City right-of-way are subject to City approval.

The height and spread figures are given for trees at maturity. Trees with a rapid growth rate can be expected to grow at least two feet per year, those with a moderate growth rate between one and two feet per year, and those with a slow growth rate will generally grow less than one foot per year.

Note there are no perfect trees and no one tree will meet all the needs of a particular area. It is very important that a tree species or cultivar be selected that will adapt best to the space available both horizontally and vertically while still meeting the aesthetic needs of the area.

Planting within City right-of-way shall be in accordance with City planting guidelines and subject to approval by the City.

**13.02 LANDSCAPE & BIKE PATHS MASTER TREE LIST**

Appendix C provides the Landscape & Bike Paths requirements. The City Master Tree List contains the approved deciduous and evergreen trees, giving common name, botanical name, and locations of use and is available under separate cover.

**SECTION 14: LOT STANDARDS**

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**14.01 GENERAL**

1. Area and Dimensions:
  - Minimum lot area - 6,000 square feet;  
7,000 square feet (corner lot)
  - Minimum width - 60 feet  
70 feet (corner lot)  
40 feet (cul-de-sac lot frontage)
  - Minimum depth - 100 feet
2. Location: All lots shall abut by their full frontage on a publicly dedicated street or a street that has received the legal status as such. Flag lots are not permitted unless they can be justified by geographic features and approved by TAC.
3. Lines: Side lot lines shall be substantially at right angles to straight street lines or radial to curved street lines.
4. Corner Lots: Corner lots for residential use shall have a seventy-foot minimum width to permit appropriate building setback from and orientation to both streets. Lots abutting on a pedestrian walkway shall be treated as a corner lot.
5. Uninhabitable Lots: Lots subject to flooding and lots deemed by the Technical Advisory Committee to be uninhabitable shall not be platted for residential occupancy, nor for other uses as may increase danger to health, life or property, or aggravate the flood hazard. Uninhabitable land within a development shall be set aside for such uses not endangered by periodic or occasional inundation. Such use shall not produce unsatisfactory living conditions.
6. Lot Remnants: All remnants of lots below minimum size left over after subdividing of a larger tract must be added to adjacent lots, rather than allowed to remain as unusable parcels.

**SECTION 15: FEE SCHEDULE**

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**15.01 GENERAL**

1. Filing Fees: Current Fee Schedule available at city Hall.
2. Recording Fees: Fees in accordance with the Tehama County Clerk's Fee Schedule.
3. Engineering Fees on Divisions when Improvements are Required: Current Fee Schedule available at City Hall.

**SECTION 16: POSTAL FACILITIES**

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**16.01 GENERAL**

For location of neighborhood mailboxes, contact the Postmaster. Site is to be approved by the Public Works Director.

**SECTION 17: UTILITIES**

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**17.01 GENERAL**

All utilities shall be underground. Easements shall be provided as required to serve the development.

**STANDARD PLANS**

**SECTION:** \_\_\_\_\_ **PAGE NO.** \_\_\_\_\_

**1 GENERAL** \_\_\_\_\_ **0100**

IMPROVEMENT PLAN LEGEND ..... 0100

**2 TRENCH DETAILS** \_\_\_\_\_ **0200**

PIPE BEDDING AND TRENCH BACKFILL  
IN EXISTING PAVED AREAS ..... 0200  
PIPE BEDDING AND TRENCH BACKFILL  
IN UNPAVED AREAS ..... 0201  
NARROW TRENCH ..... 0202

**3 STREET DESIGN** \_\_\_\_\_ **0300**

EXISTING VERTICAL CURB,  
GUTTER, AND SIDEWALK ..... 0300  
NEW RESIDENTIAL VERTICAL CURB,  
GUTTER, AND SIDEWALK ..... 0300A  
CURB AND GUTTER ..... 0301  
TYPE "A" RESIDENTIAL DRIVEWAY  
VERTICAL CURB ..... 0302  
TYPE "B" COMMERCIAL & INDUSTRIAL  
DRIVEWAY ..... 0303  
TYPE "C" COMMERCIAL & INDUSTRIAL  
DRIVEWAY ..... 0304

## **Engineering Design Standards**

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RESIDENTIAL DRIVEWAY WITH CURB & GUTTER SEPARATE FROM SIDEWALK .....	0305
STANDARD DRIVEWAY FOR EXISTING ROLL CURB .....	0306
RETROFIT CONFORMS AT DRIVEWAY OR CURB AND GUTTER .....	0307
SIDEWALK BARRICADE .....	0308
HANDICAP RAMP (TYPE I) WITH MONOLITHIC SIDEWALK .....	0309
CURB RAMP DETAILS .....	0310
CURB RAMP AND ISLAND PASSAGEWAY DETAILS .....	0310A
CURB RETURN & CROSS GUTTER .....	0311
STAMPED CONCRETE .....	0312
CURB ADDRESS NUMBERS .....	0313
BARRICADE .....	0314
PARKING STANDARD .....	0315
PAVEMENT MARKERS & TRAFFIC STRIPING .....	0316
EXPANDED CORNER GEOMETRY .....	0317
CULDESAC & EXPANDED CULDESAC GEOMETRY .....	0317A
GEOMETRICS & PROFILES AT ROAD INTERSECTIONS .....	0318
TYPICAL STREET CROSS SECTION .....	0319
TREE AND PAVEMENT LAYOUT IN MEDIAN ISLANDS RELATED TO WIDTH OF MEDIAN .....	0320
TYPICAL BIKE LANE CROSS SECTIONS .....	0321
RIGHT-OF-WAY FENCE / WALL DETAIL .....	0322
RIGHT-OF-WAY FENCE / WALL DETAIL .....	0322A
HAMMERHEAD TURNAROUND GEOMETRY .....	0323
MINIMUM FIRE TRUCK TURNING RADIUS .....	0324

**4      STORM DRAINAGE SYSTEM DESIGN      0400**

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TYPE I STORM DRAIN MANHOLE..... 0400  
UNDER SIDEWALK DRAIN TYPE 1 .....0401  
UNDER SIDEWALK DRAIN TYPE 2 ..... 0402  
CATCH BASIN NO. 1..... 0403  
CATCH BASIN FACE ANGLE DETAIL ..... 0404  
DETAIL OF BOLT SUPPORT FOR CATCH BASIN .....0404A  
CATCH BASIN NO. 2 ..... 0405  
LOCAL DEPRESSIONS, CASES A & B ..... 0406  
CATCH BASIN NO. 3 ..... 0407  
CATCH BASIN NO.4 ..... 0408  
LOCAL DEPRESSION GRATED CATCH BASIN ..... 0409  
TIME OF CONCENTRATION..... 0410  
RAINFALL INTENSITY DURATION CURVES  
10 YEAR RETURN ..... 0411  
RAINFALL INTENSITY DURATION CURVES  
100 YEAR RETURN .....0412  
RUNOFF COEFFICIENT CURVE .....0413  
SAND AND OIL INTERCEPTOR (SOI).....0414  
OIL AND GREASE INTERCEPTOR (OGI).....0415  
INTERCEPTOR MONITOR STATION .....0416  
SWING OPEN PIPE BARRIER & OUTLET STRUCTURE  
FOR PIPES 30" OR LARGER..... 0417

**5      SANITARY SEWER SYSTEM DESIGN      0500**

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SEWER SERVICE LATERAL ..... 0500  
RESIDENTIAL SERVICE LATERAL TRENCH .....0501  
STANDARD SEWER MANHOLE ..... 0503  
OUTSIDE SANITARY SEWER DROP MANHOLE ..... 0504

**Engineering Design Standards**

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INSIDE SANITARY SEWER DROP MANHOLE..... 0505  
SEWER LINE TAPS ..... 0506  
MANHOLE - VALVE BOX ..... 0507  
ADJUSTMENT TO FINISH GRADE

**6 WASTEWATER PUMP STATION 0600**

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CRITERIA FOR NEW SEWAGE LIFT STATIONS .....0600  
CONT'D..... 0600A

**7 WATER DISTRIBUTION SYSTEM DESIGN 0700**

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1", 1 1/2" & 2" WATER SERVICE  
AND METER BOX LOCATION ..... 0700  
3/4", 1", 1 1/2" & 2" WATER SERVICE  
METER, VALVE & BOX.....0701  
4" AND LARGER DOMESTIC METERED  
WATER SERVICE ..... 0702  
WATER VALVE & VALVE BOX IN PAVED AREAS ..... 0703  
VALVE BOX IN LANDSCAPE AREAS..... 0704  
THRUST BLOCK DETAILS ..... 0705  
THRUST BLOCK DETAILS .....0705A  
TYPES OF RESTRAINED MECHANICAL JOINTS ..... 0706  
BACKFLOW PREVENTION ASSEMBLY ..... 0707  
FIRE HYDRANT ..... 0708  
TYPICAL BLOWOFF INSTALLATION..... 0709  
WATER SAMPLING STATION.....0710  
3/4", 1", 1 1/2" & 2" BACKFLOW DEVICE ENCLOSURE ..... 0711  
3", 4", 6", & 8" BACKFLOW DEVICE ENCLOSURE..... 0712

**Engineering Design Standards**

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**9 STREET LIGHTING SYSTEM DESIGN 0900**

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DECORATIVE LUMINAIRE COMMERCIAL AREA ..... 0900  
PHOTOMETRIC DATA ..... 0901  
DECORATIVE STREET LIGHTS  
(MAST ARM TYPE) ..... 0902  
DECORATIVE STREET LIGHTS ..... 0903  
ELECTRICAL STREET LIGHT BOX ..... 0904  
ALUMINUM STREET LIGHT STANDARD  
(POLE AND ARM DETAILS) ..... 0905  
ALUMINUM STREET LIGHT STANDARD  
(BASE AND GROUNDING DETAILS) ..... 0906  
STREET LIGHT LOCATIONS (ARTERIAL STREETS) ..... 0907  
STREET LIGHT LOCATIONS (COLLECTOR STREETS)..... 0908  
STREET LIGHT LOCATIONS (LOCAL STREETS)..... 0909

**13 LANDSCAPING 1300**

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BOLLARD .....1300  
REMOVABLE BOLLARD ..... 1301  
STANDARD TRASH/RECYCLING ENCLOSURE .....1302  
TRASH ENCLOSURE GATE.....1303  
TREE AND SHRUB PLANTING.....1304  
POP-UP SPRINKLERS..... 1305  
QUICK COUPLER VALVE.....1306  
INSTALLATION OF SPRINKLER HEADS..... 1307  
PEDESTAL MOUNT  
AND WALL MOUNTED CONTROLLER.....1308  
MAIN, LATERAL, AND CONTROL WIRE..... 1309  
INSTALLATION OF CONTROL VALVE ..... 1310  
REMOTE CONTROL VALVE..... 1311



## **Engineering Design Standards**

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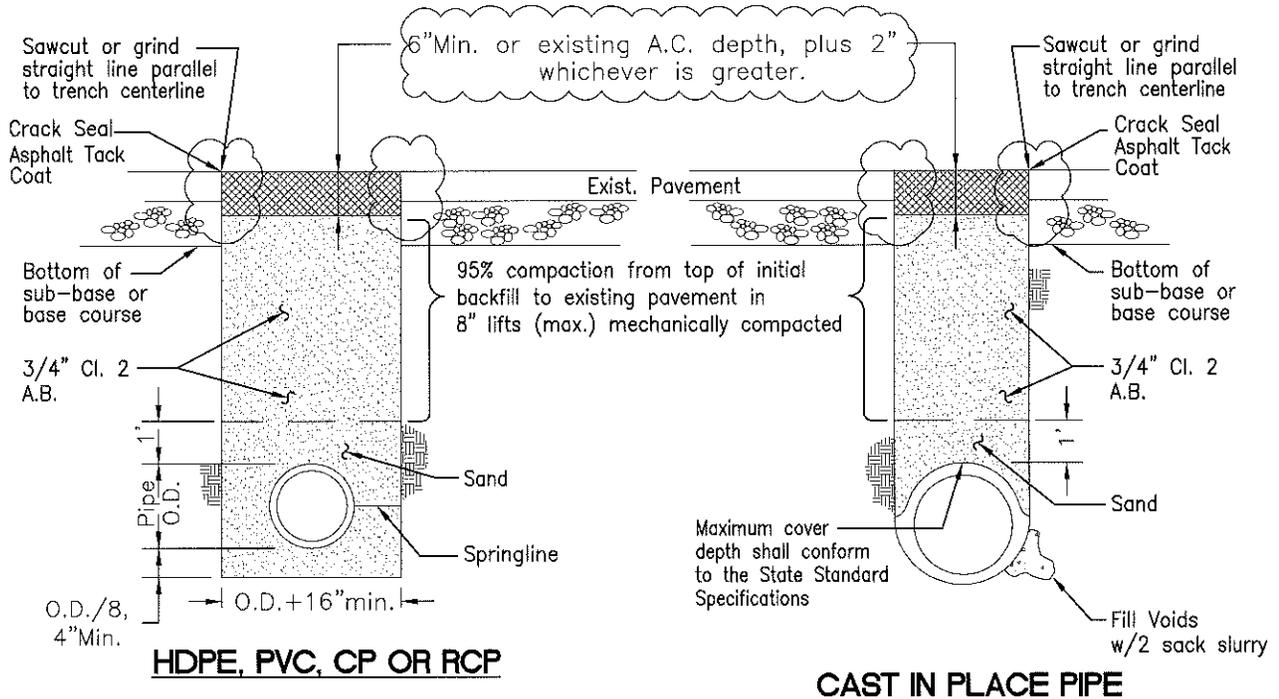
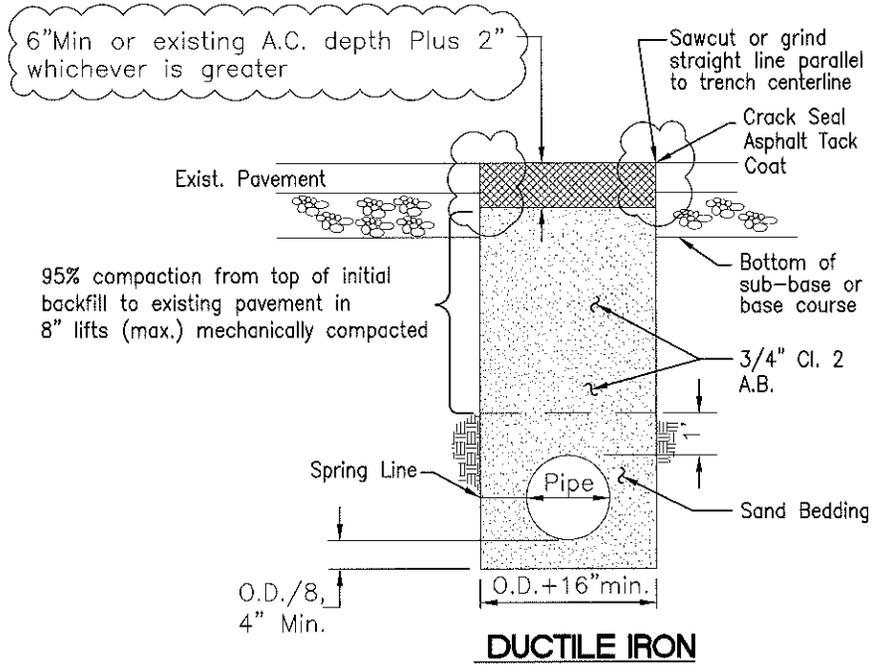
TYPE 9 BUS STOP LAYOUT –	
NEAR SIDE WITH TURNOUT .....	1608
BUS TURNOUT DETAIL .....	1609
BUS PASSENGER SHELTER LAYOUT.....	1610
BUS PASSENGER SHELTER PLACEMENT .....	1611
BUS TURNAROUNDS .....	1612

## IMPROVEMENT PLAN LEGEND

PROPOSED LINES/SYMBOLS TO BE CONTINUOUS LINETYPE W/.50 mm/.0197in LINE WEIGHT  
 EXISTING LINES/SYMBOLS TO BE HIDDEN LINETYPE/SHADED 50% W/.35mm/.0138in LINE WEIGHT

	8"	WATER LINE PROPOSED (SIZE)
	6" AC	WATER LINE EXISTING (SIZE & TYPE)
		SINGLE WATER SERVICE
		FIRE HYDRANT PROPOSED
		FIRE HYDRANT EXISTING
		WATER VALVE PROPOSED
		WATER VALVE EXISTING
		PLUG IN END OF LINE
		BLOW OFF ASSEMBLY
		BLOW OFF ASSEMBLY EXISTING
	CB NO. 1	CATCH BASIN (SIZE & TYPE AS NOTED)
	CB NO. 1	CATCH BASIN W/LD (LOCAL DEPRESSION)
		DROP INLET
		STORM DRAIN MANHOLE PROPOSED
		STORM DRAIN MANHOLE EXISTING
		UTILITY POLE
	8" PVC	SEWER LINE PROPOSED (SIZE & TYPE, USE CONTINUOUS LINETYPE)
	6" AC	SEWER LINE EXISTING (SIZE & TYPE)
		SEWER MANHOLE PROPOSED
		SEWER MANHOLE EXISTING
		SEWER CLEANOUT
		SEWER HOUSE CONNECTION
	F.M.	SEWER FORCE MAIN
		STREET LIGHT
		HEADWALL
	15" CMP	STORM DRAIN PIPE PROPOSED (SIZE & TYPE, USE CONTINUOUS LINETYPE)
	12" CMP	STORM DRAIN PIPE EXISTING (SIZE & TYPE)
		SIGN POST
		CURB & GUTTER NEW
		CURB & GUTTER EXISTING
		CENTERLINE (USE CL LINETYPE)
		PROPERTY LINE (PL USE DASHEDX2 LINETYPE)
	DWY	DRIVEWAY OPENINGS PROPOSED
	DWY	DRIVEWAY OPENINGS EXISTING

NO.	REVISION	BY	 CITY OF RED BLUFF	STANDARD PLAN	0100
001	05/23/2016	VJP	 APPROVED BY DATE: 05/23/16 BRUCE HEINZ CITY ENGINEER	IMPROVEMENT PLAN LEGEND	



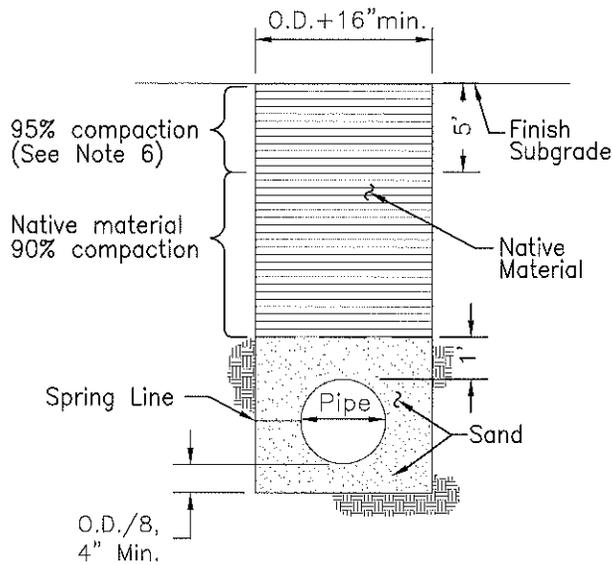
**NOTES**

1. Prior to using the sand bedding, the contractor shall submit for approval to the engineer the gradation and sand equivalent of the proposed material.

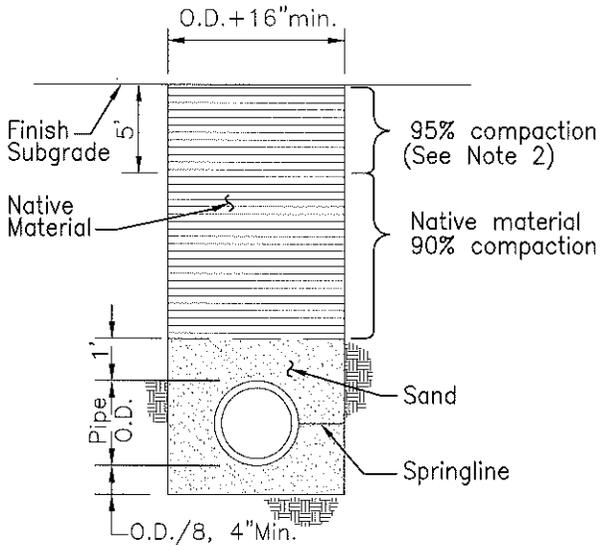
**REVISIONS**

001. Remove 1/8" lip. Change Depth of A.C. patch 6" Min or existing A.C. depth plus 2" whichever is greater. Remove 6" additional width on sawcut.

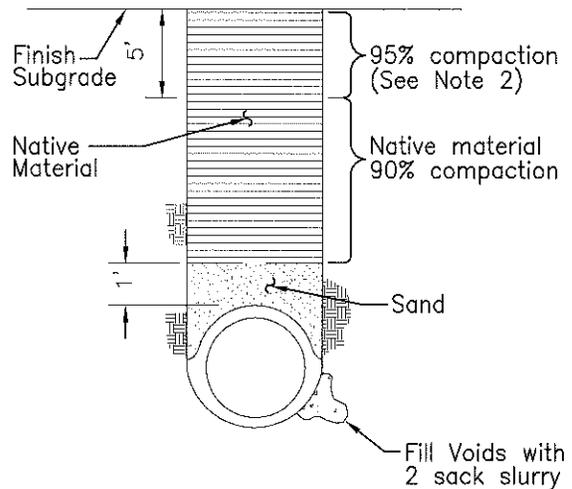
NO.	REVISION	BY	CITY OF RED BLUFF	STANDARD PLAN	0200
001	01/29/2013	VJP	<i>PWD</i>	PIPE BEDDING AND TRENCH BACKFILL IN EXISTING PAVED AREAS	
			APPROVED BY <i>Bruce Henz</i>		
			DATE: 05/23/16 BRUCE HENZ, CITY ENGINEER		



**DUCTILE IRON**



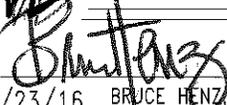
**HDPE, PVC, CP OR RCP STORM DRAIN**

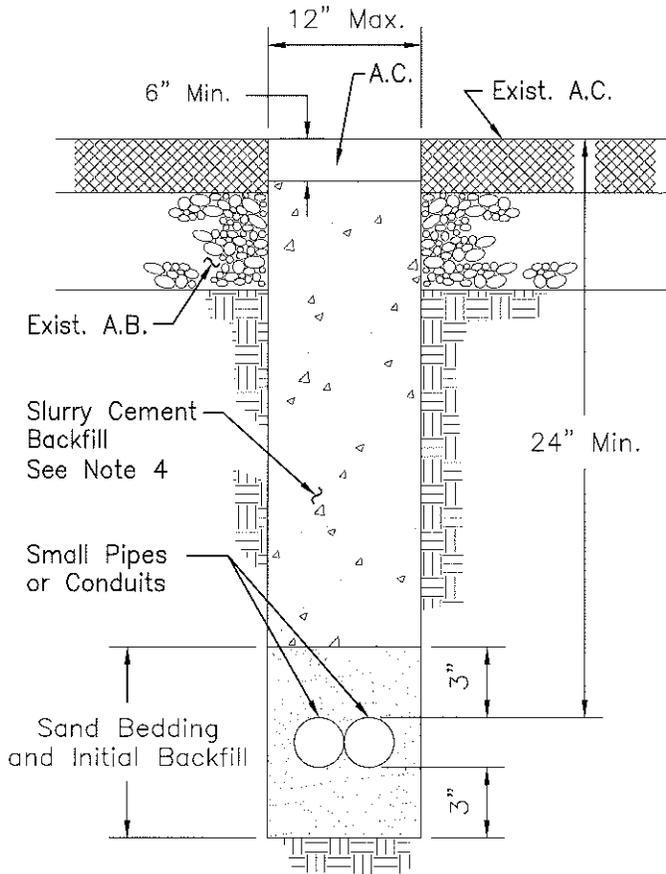


**CAST IN PLACE PIPE**

**NOTES**

1. Prior to using the sand bedding, the contractor shall submit for approval to the engineer the gradation and sand equivalent of the proposed material.
2. In areas that will remain unpaved, compaction for the upper 5 feet of the trench can be reduced to 90%.

NO.	REVISION	BY	 CITY OF RED BLUFF	STANDARD PLAN	0201
				APPROVED BY  DATE: 05/23/16 BRUCE HENZ, CITY ENGINEER	



**EXISTING STREET  
EXCAVATION AND BACKFILL**

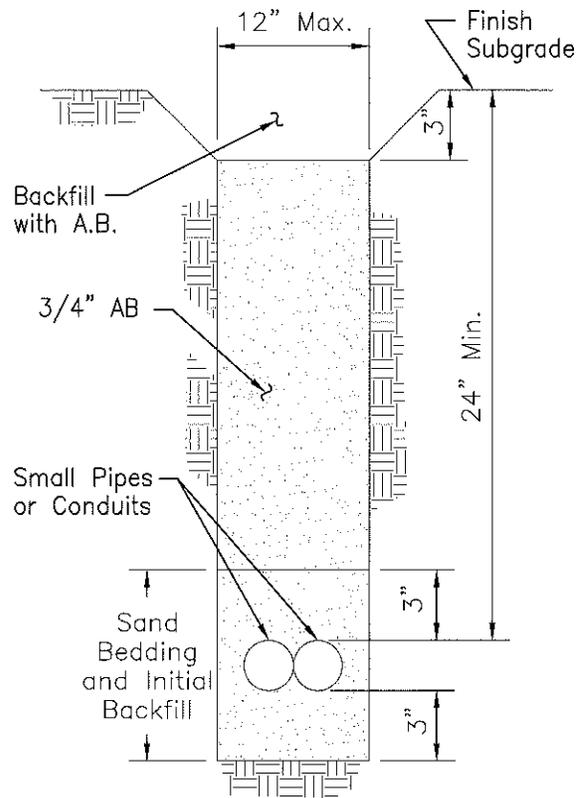
**NOTES:**

1. These requirements apply to all trenches up to 12" in width within public right of way.
2. In existing streets, trenches shall be protected with steel plates, or cold/hot mix, until final paving.
3. Minimum sand equivalent value for native materials shall be 20.
4. Slurry Backfill should conform to State of California, Dept of Transportation Standard Specifications or the following non-shrink slurry backfill design.

2600 lb 3/8" Aggregate  
 800 lb Mortar Sand  
 95 lb Portland Cement  
 16 gal Water

**NOTES:**

001. Add Max Dimension of Narrow Trench 12"  
 Change 4" AC backfill to 6" Backfill



**NEW STREET  
(WITHIN RIGHT OF WAY)**

NO.	REVISION	BY	 CITY OF RED BLUFF	STANDARD PLAN	0202
001	01/17/2013	VJP		 APPROVED BY DATE: 05/23/16 BRUCE/HENZ, CITY ENGINEER	

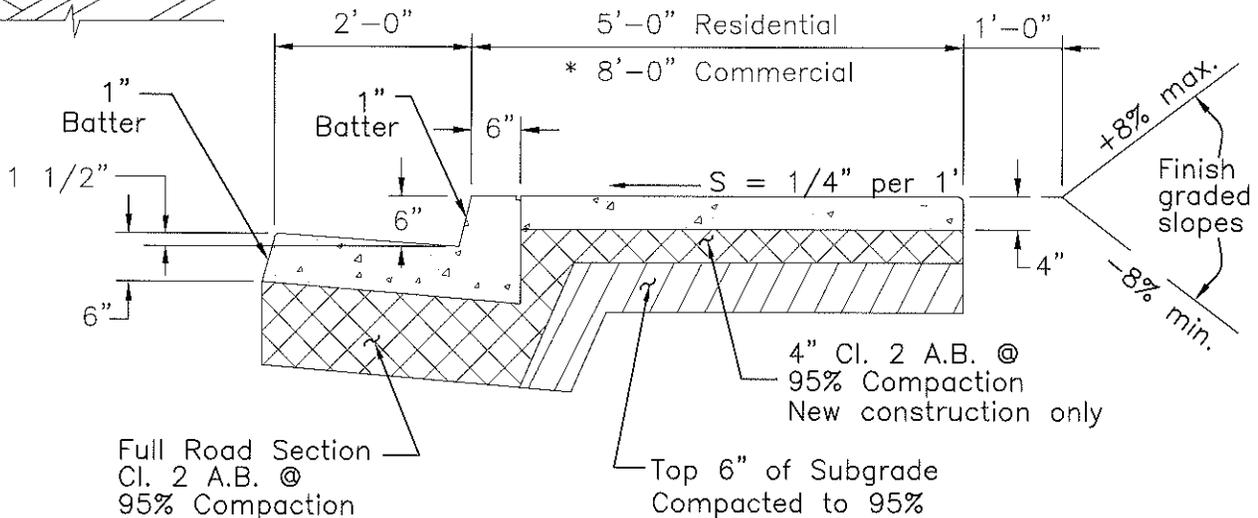
Weakened Plane Joints  
Residential: 12'-0" Intervals  
Commercial: 12'-0" Intervals

1/2" expansion joints at 60' max. intervals, at ends of curb returns, and at both ends of driveways

Score line to form a square pattern.

Match existing score marks.

**PERSPECTIVE**

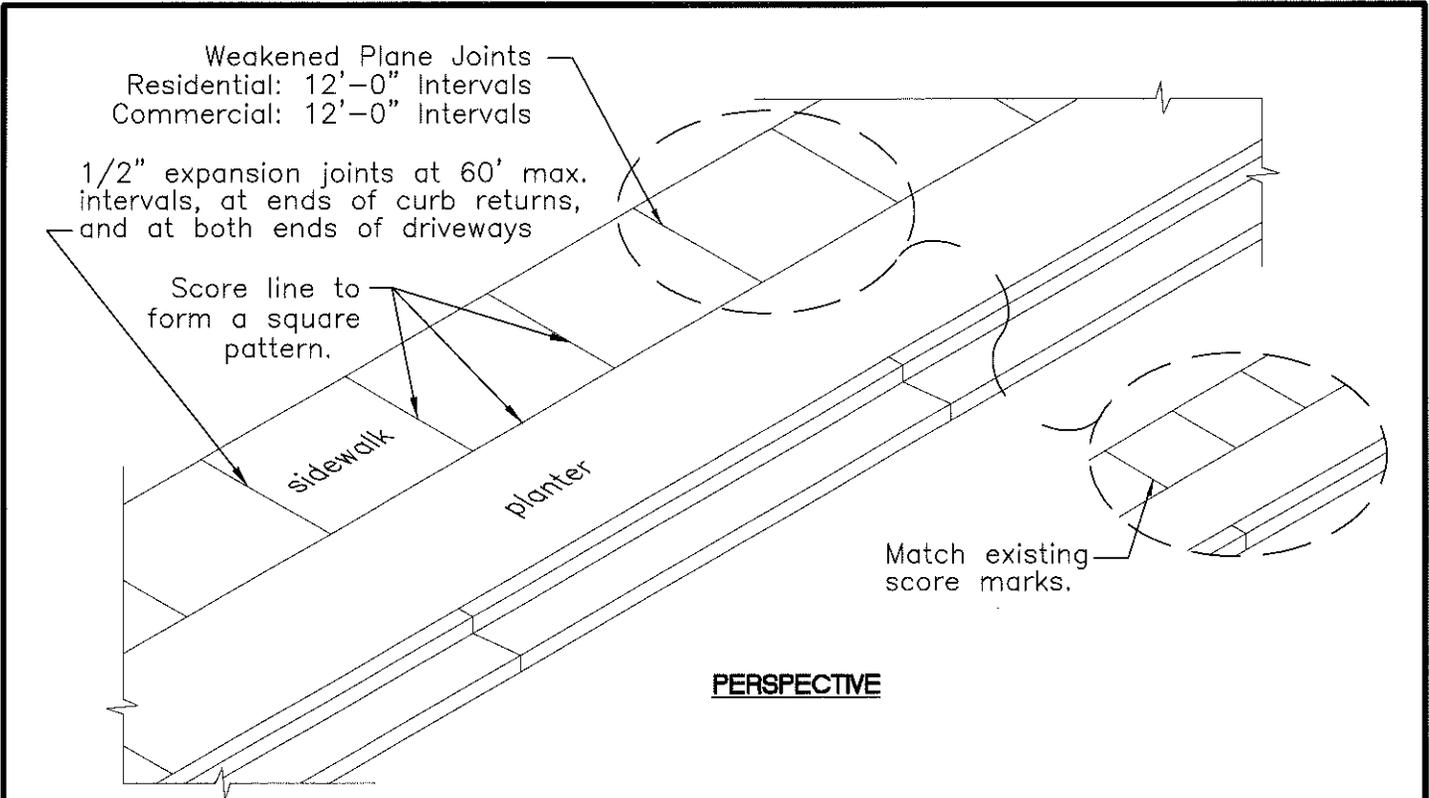


**TYPICAL SECTION**

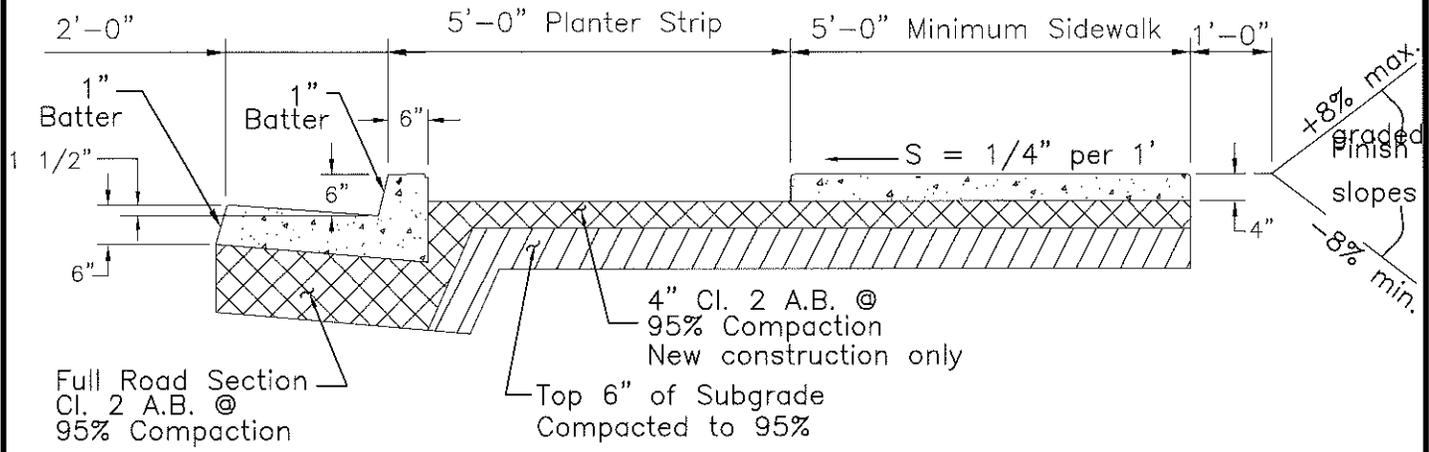
**NOTES:**

1. Score lines shall be 1/4" deep and form a square pattern.
2. Apply light broom finish to surface of walk at right angle with face of curb. Broom finish curb and gutter parallel with street.
3. Backfill behind sidewalk.
4. All edges shall have a 1/2" radius.
5. All concrete shall be 520-C-2500
6. A 4'-6" transition shall be used between different curb types.
7. Where feasible and where sufficient R/W exists, the repair or replacement of existing sidewalks shall attempt to achieve a separation from the street curb with a landscape planter strip.

NO.	REVISION	BY	CITY OF RED BLUFF	STANDARD PLAN	
			<i>PWB</i>	EXISTING VERTICAL CURB, GUTTER & SIDEWALK	0300
			APPROVED BY <i>Bruce Henz</i>		
			DATE: 05/23/16 BRUCE HENZ, CITY ENGINEER		



**PERSPECTIVE**

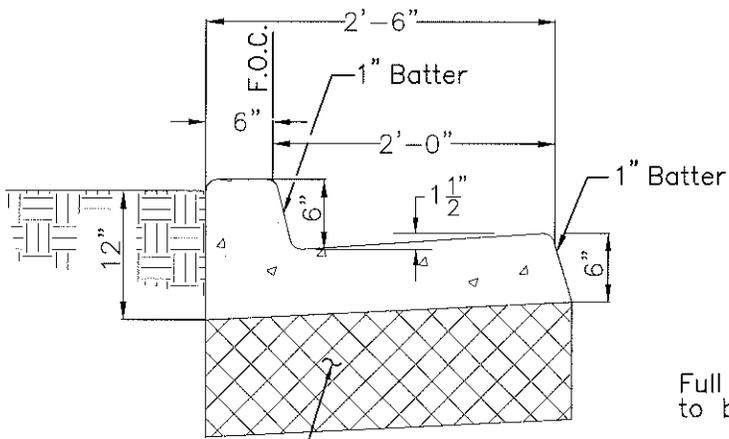


**TYPICAL SECTION**

**NOTES:**

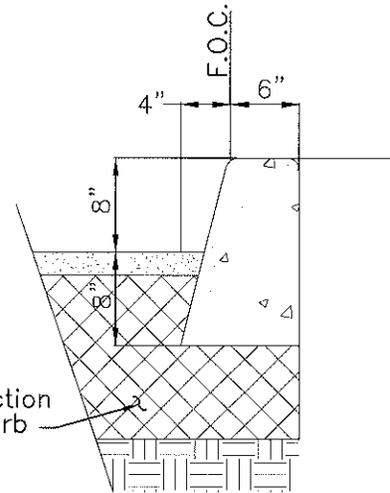
1. Score lines shall be 1/4" deep and form a square pattern.
2. Apply light broom finish to surface of walk at right angle with face of curb. Broom finish curb and gutter parallel with street.
3. Backfill behind sidewalk.
4. All edges shall have a 1/2" radius.
5. All concrete shall be 520-C-2500
6. A 4'-6" transition shall be used between different curb types.

NO.	REVISION	BY	CITY OF RED BLUFF	STANDARD PLAN	0300A
			<i>PMB</i>	NEW RESIDENTIAL	
			APPROVED BY <i>Bruce Henz</i>	VERTICAL CURB, GUTTER & SIDEWALK	
			DATE: 05/25/16 BRUCE HENZ, CITY ENGINEER		



Full Street Section  
Cl. 2 A.B.

CURB & GUTTER

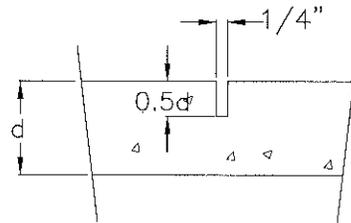


Full street section  
to back of curb

MEDIAN CURB

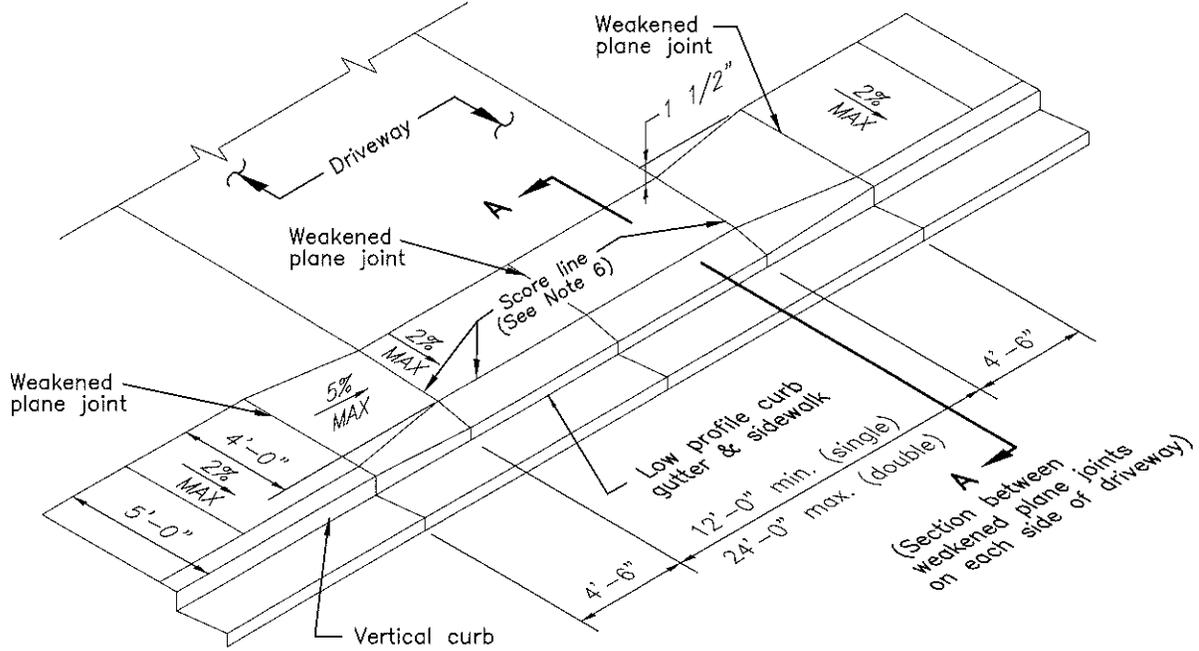
GENERAL NOTES:

1. All edges shall have 1/2" radius.
2. Apply light broom finish to surface of Curb and Gutter parallel with street.
3. Weakened plane joint spacing at 12' intervals.
4. 1/2" Expansion Joints at 60' intervals.
5. Concrete shall be Class 520-C-2500

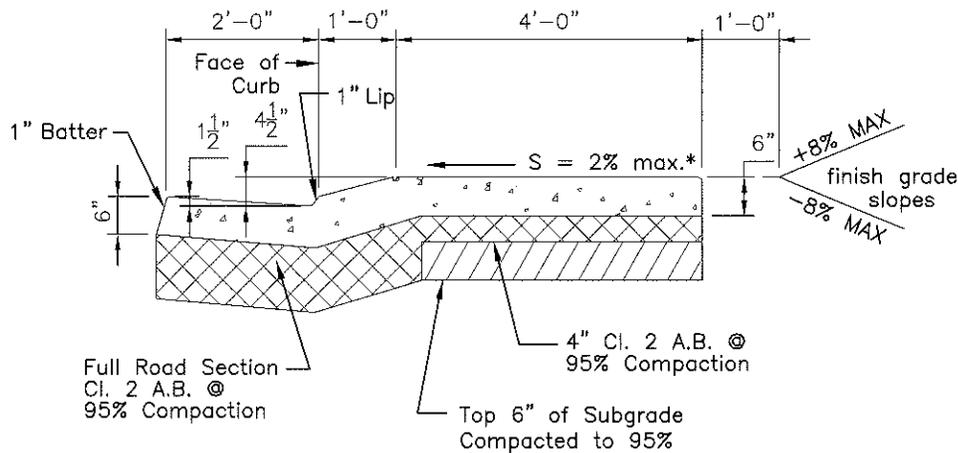


WEAKENED PLANE JOINT

NO.	REVISION	BY	CITY OF RED BLUFF	STANDARD PLAN	0301
			<i>PMB</i>	CURB & GUTTER	
			APPROVED BY <i>[Signature]</i>		
			DATE: 05/25/16 BRUCE HENZ, CITY ENGINEER		



PERSPECTIVE



SIDEWALK SECTION

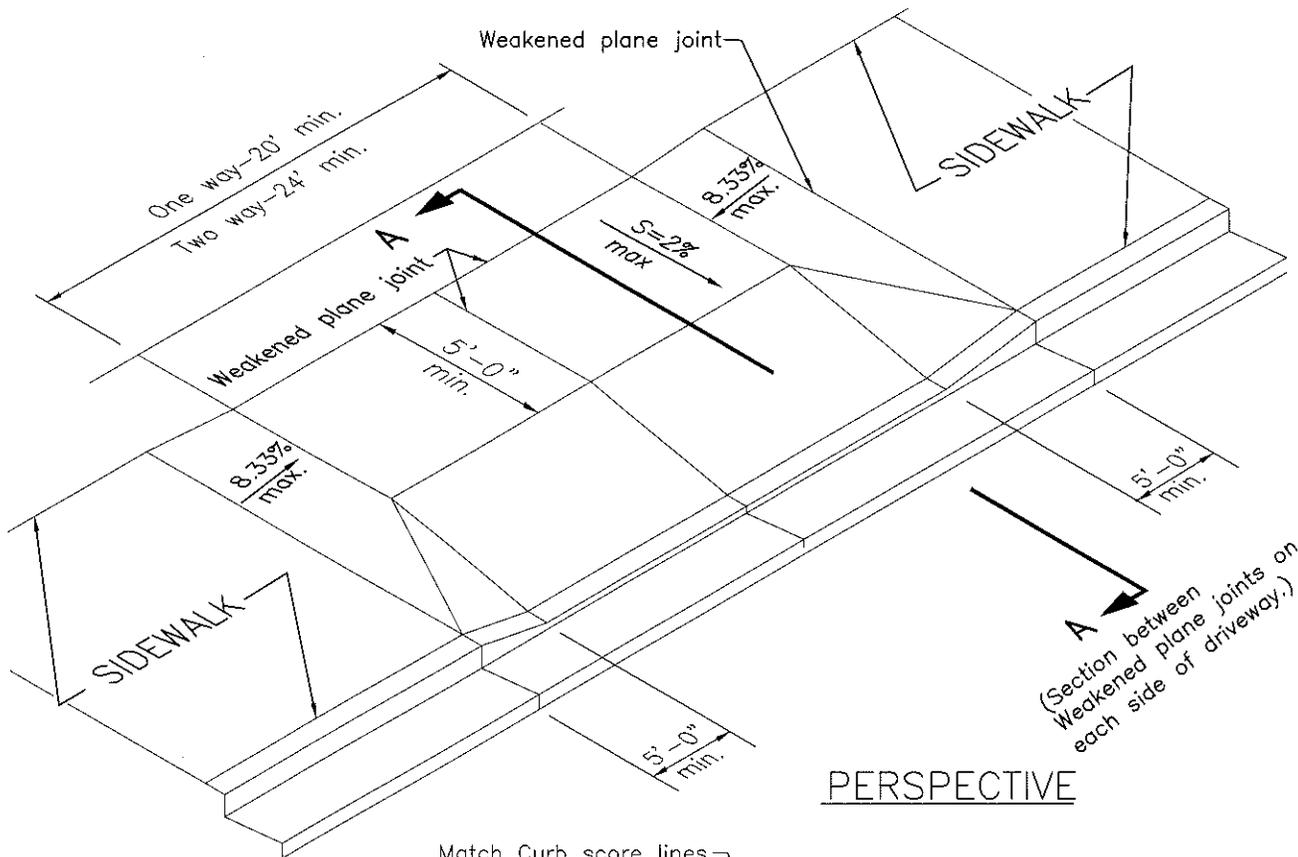
NOTES:

1. All concrete shall be 520-C-2500
2. Score lines shall be 1/4" deep and form a square pattern.
3. Apply light broom finish to surface of walk at a right angle with the street. Broom finish curb and gutter parallel with street.
4. All edges shall have 1/2" radius.
5. Driveways shall be located to provide at least 5' clearance from all appurtenances such as fire hydrants, utility poles and drainage inlets.
6. Sidewalk Section. Back of curb score line required only in cases when it connects score marks along existing back of curb.

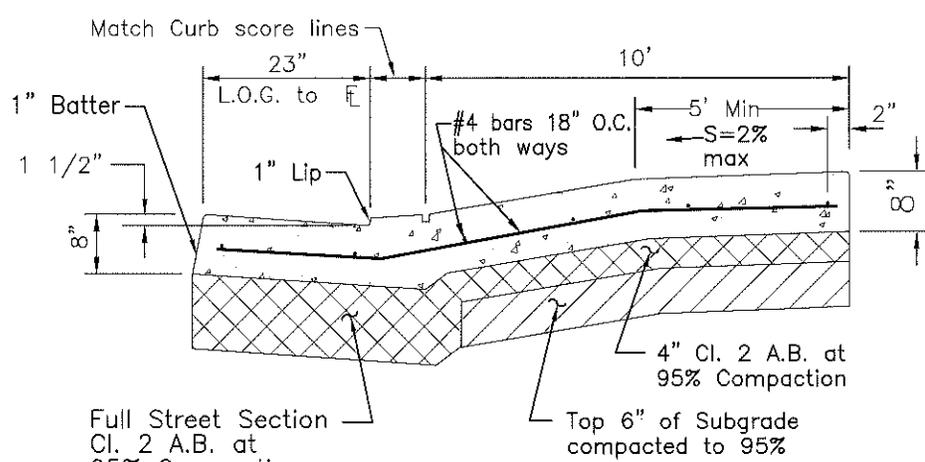
NOTES:

1. Remove expansion joints. Insert Weakened plane joints

NO.	REVISION	BY	 CITY OF RED BLUFF	STANDARD PLAN	0302
001	1/17/2012	VJP		 APPROVED BY DATE: 05/25/16 BRUCE HENN, CITY ENGINEER	



PERSPECTIVE



SECTION A-A

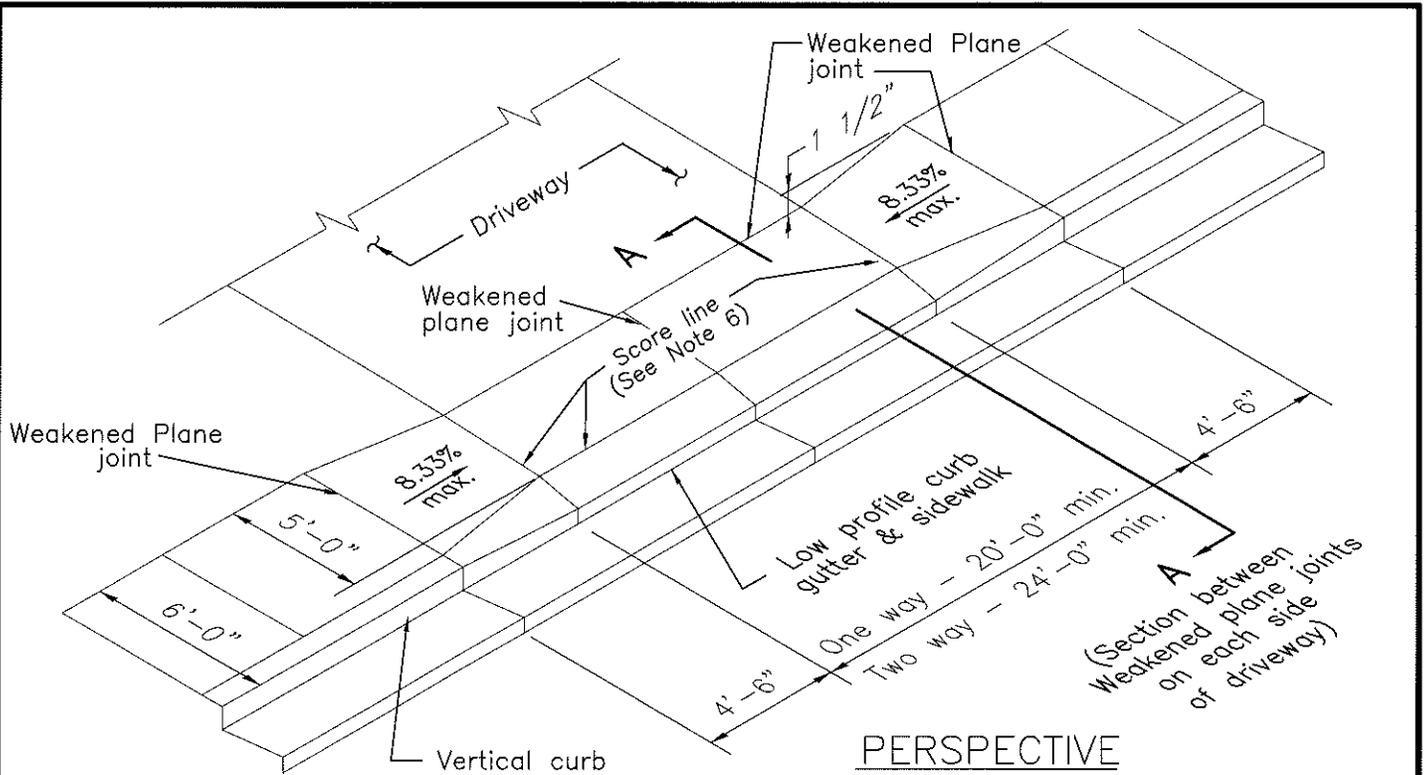
NOTES

1. All concrete shall be 520-C-2500
2. Score lines shall be 1/4" deep and form a square pattern.
3. Apply light broom finish to surface of walk at a right angle with face of curb. Broom finish curb and gutter parallel with street.
4. All edges shall have 1/2" radius.
5. Driveways shall be located to provide at least 5' clearance from all appurtenances such as fire hydrants, utility poles and drainage inlets.
6. Truncated domes shall be located on either side of driveway. Truncated domes shall be wetset. (Not Shown)

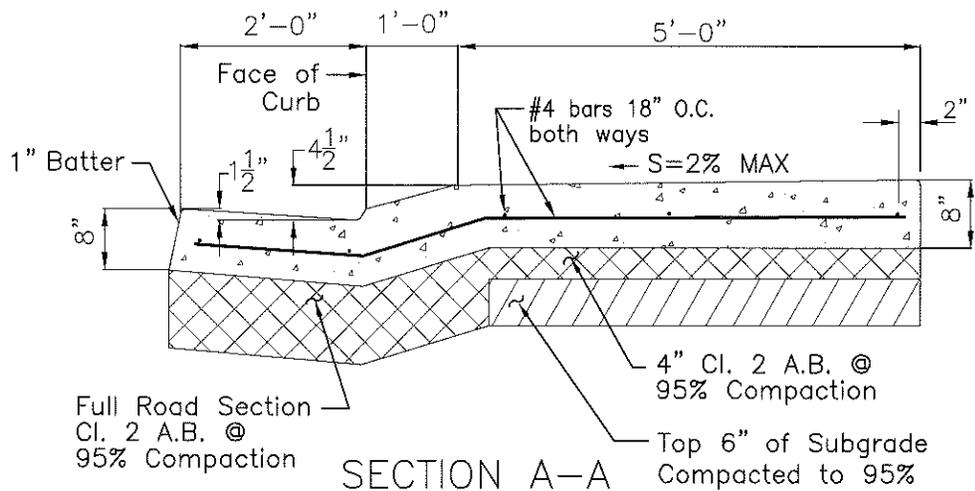
REVISION

001. REPLACED EXPANSION JOINTS WITH WEAKENED PLANE JIONTS. ADD MAX" TO 2% CROSS SLOPES.
002. ADD NOTE 6

NO.	REVISION	BY	 CITY OF RED BLUFF APPROVED BY DATE: 05/25/16 BRUCE HENTZ, CITY ENGINEER	STANDARD PLAN	0303
001	1/17/2012	VJP		TYPE "B"	
002	1/25/2012	VJP		COMMERCIAL & INDUSTRIAL DRIVEWAY	



PERSPECTIVE

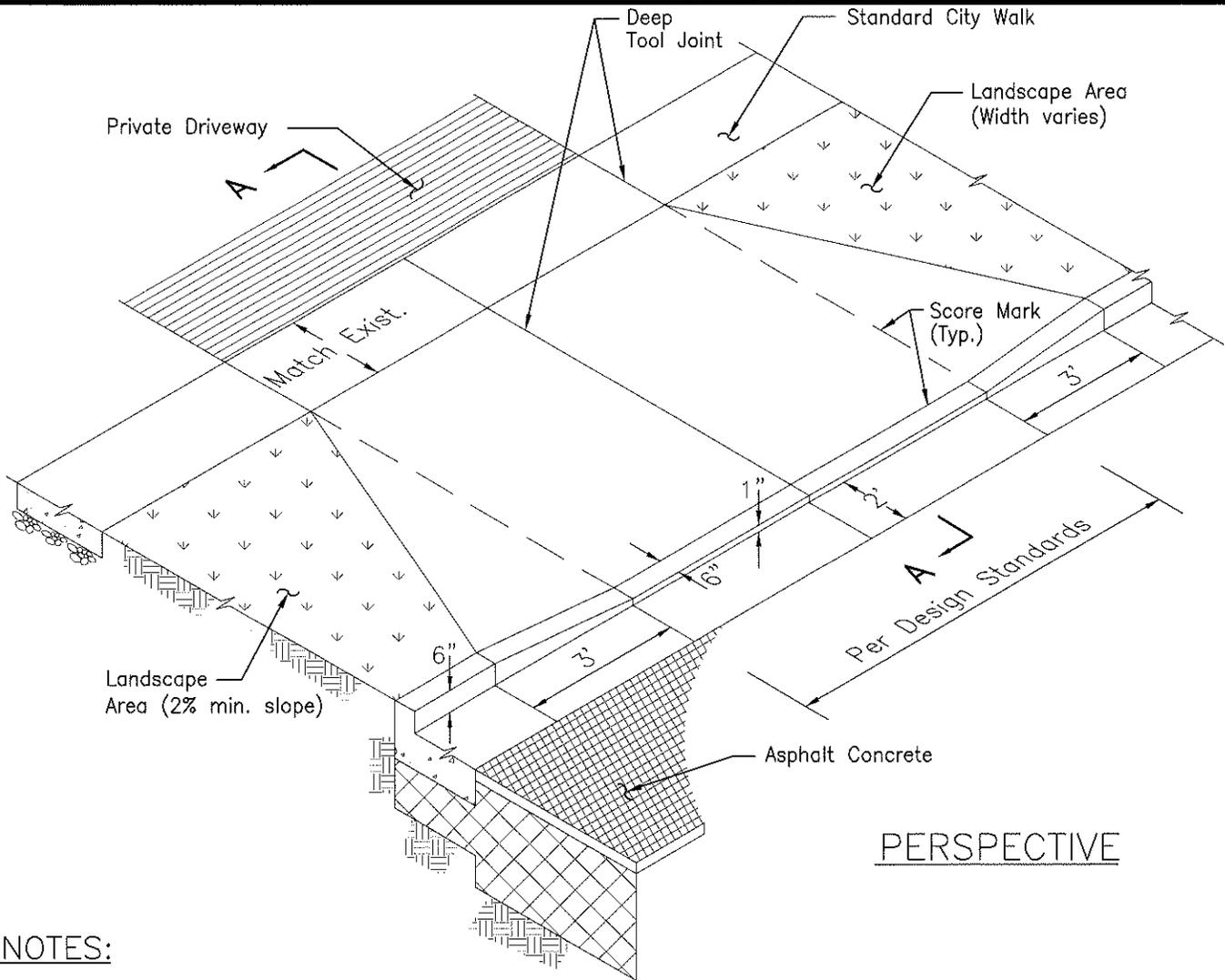


SECTION A-A

NOTES:

1. All concrete shall be 520-C-2500
2. Score lines shall be 1/4" deep and form a square pattern.
3. Apply light broom finish to surface of walk at a right angle with the street. Broom finish curb and gutter parallel with street.
4. All edges shall have 1/2" radius.
5. Driveways shall be located to provide at least 5' clearance from all appurtenances such as fire hydrants, utility poles and drainage inlets.
6. Back of curb score line required only in cases when it connects score marks along existing back of curb.
7. Truncated domes shall be placed on each side of driveway. Truncated domes shall be wetset only. (Not Shown)

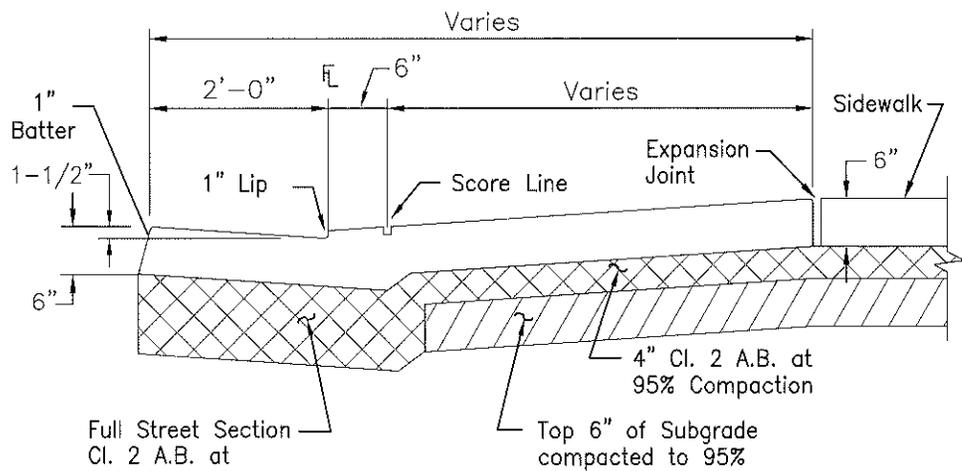
NO.	REVISION	BY	 CITY OF RED BLUFF	STANDARD PLAN	0304
001	01/25/2013	VJP		APPROVED BY DATE: 05/25/16 BRUCE HENZ CITY ENGINEER	



PERSPECTIVE

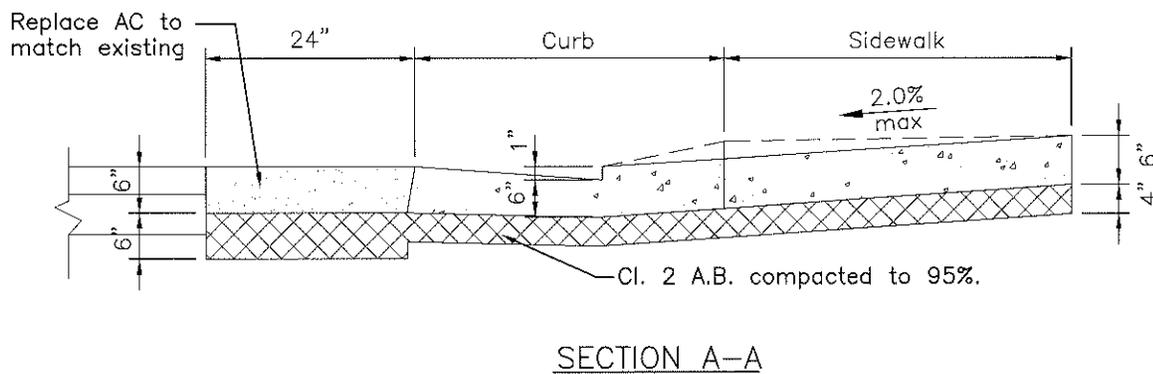
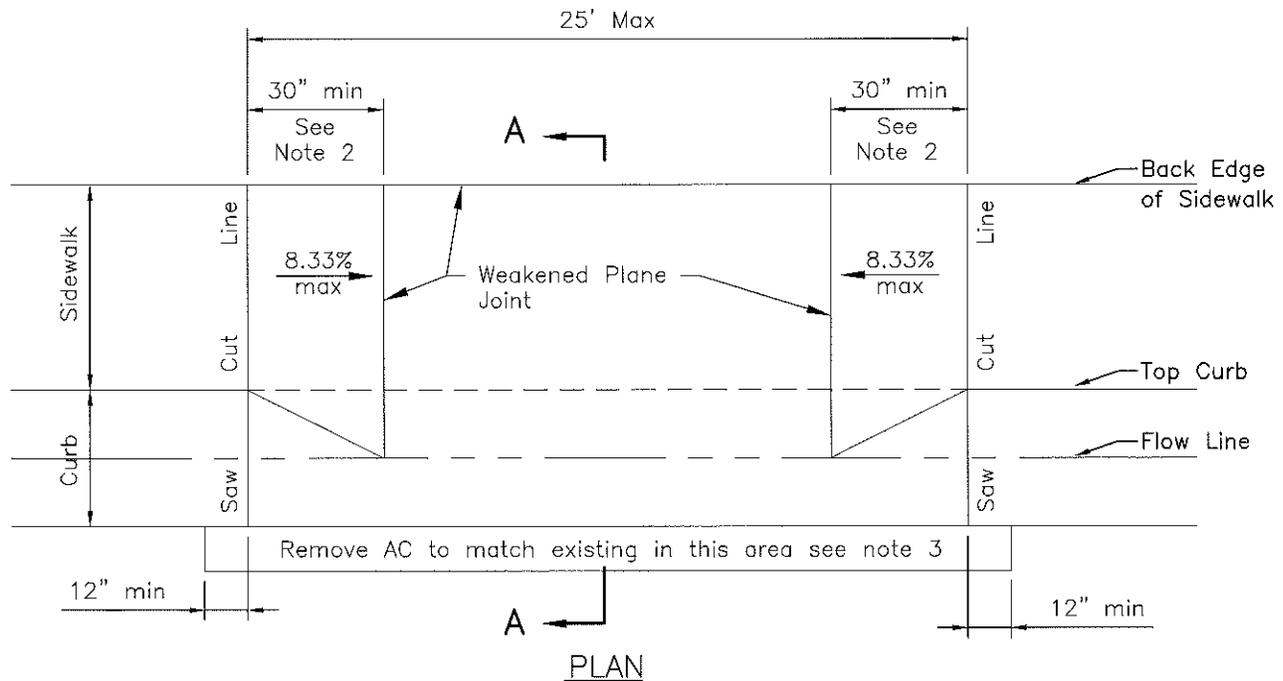
NOTES:

1. In existing street, sawcut and remove 2 feet width of asphalt concrete adjacent to the gutter.
2. Deep tool joints shall be no more than 12 feet O.C.
3. All concrete shall be 520-C-2500
4. All edges shall have a 1/2" radius.
5. Driveways shall be located to provide at least 5' clearance from all appurtenances such as fire hydrants, utility poles and drainage inlets.



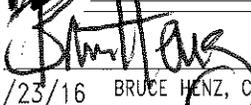
SECTION A-A

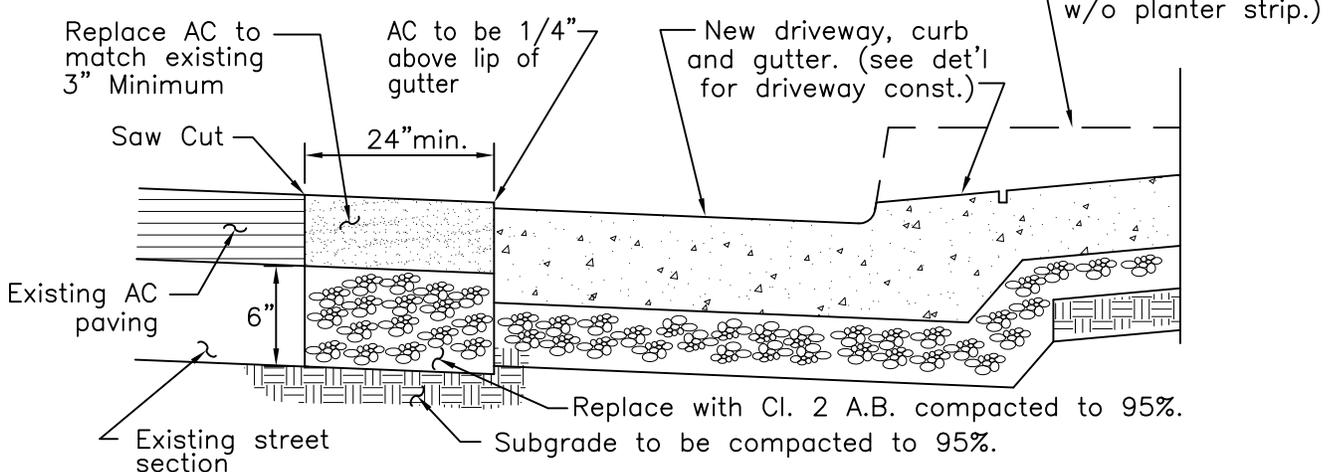
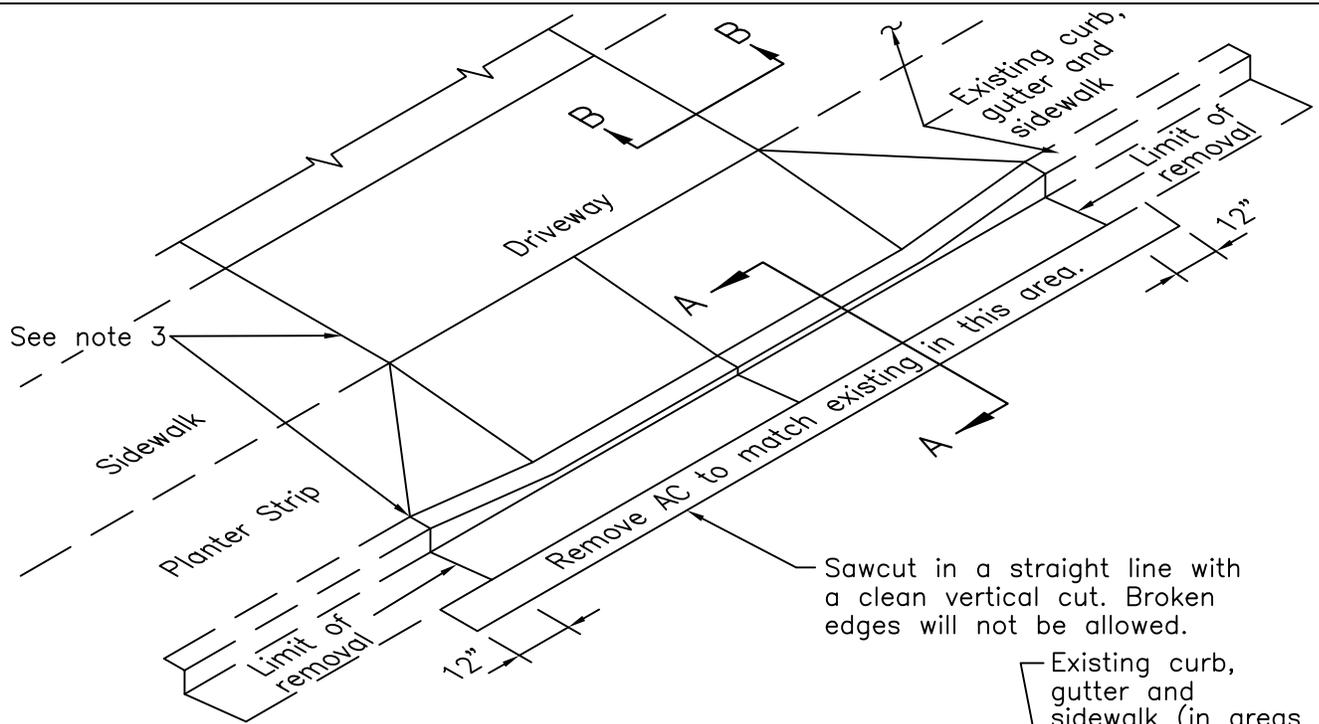
NO.	REVISION	BY	 CITY OF RED BLUFF	STANDARD PLAN	0305
001	05/25/2016	VJP		 APPROVED BY DATE: 05/25/16 BRUCE HEITZ, CITY ENGINEER	



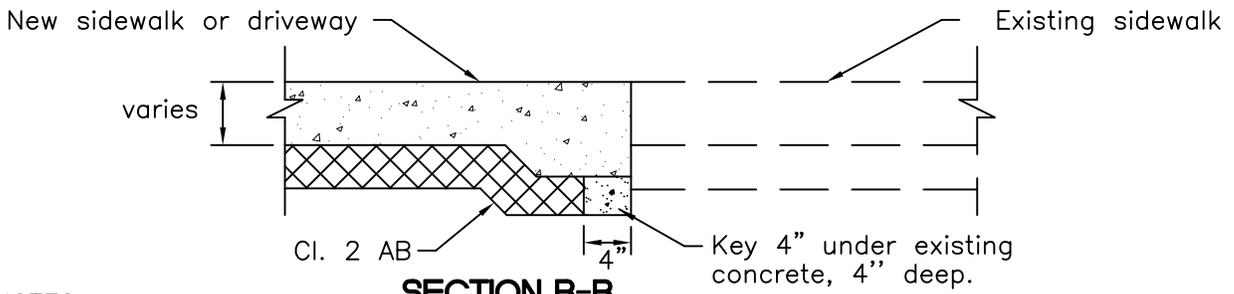
**NOTES:**

1. All work shall be performed in accordance with adopted specifications.
2. Construct within driveway apron width.
3. Remove 24" width min and replace with 6"AC/6"AB min bring AC up in 2 lifts min.
4. Obtain an encroachment permit
5. Remove to existing cold joint or saw cut to full depth.

NO.	REVISION	BY	 CITY OF RED BLUFF	STANDARD PLAN	0306
001	05/25/2016	VJP		 APPROVED BY DATE: 05/23/16 BRUCE HENZ, CITY ENGINEER	



**SECTION A-A**

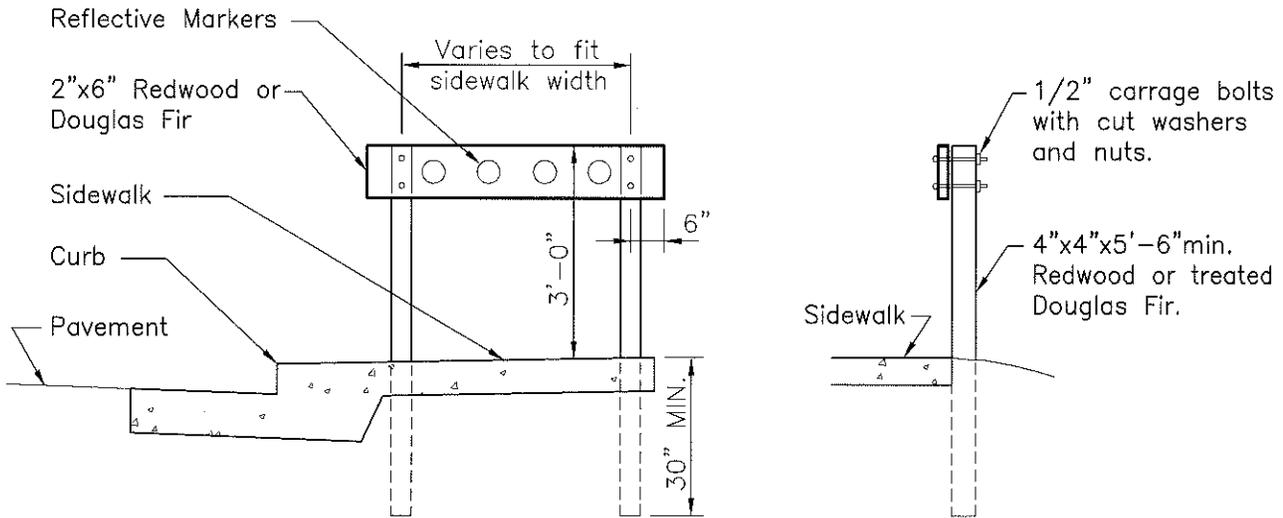


**SECTION B-B**

**NOTES**

1. Obtain an encroachment permit.
2. Remove 24" min.
3. Remove to existing cold joint or saw cut to full depth.

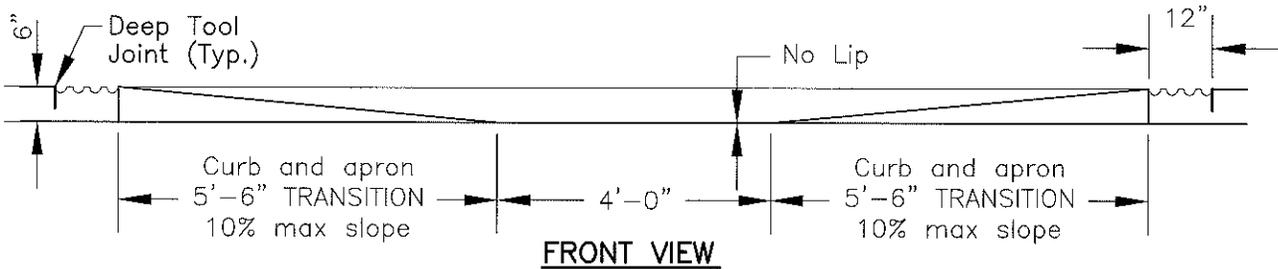
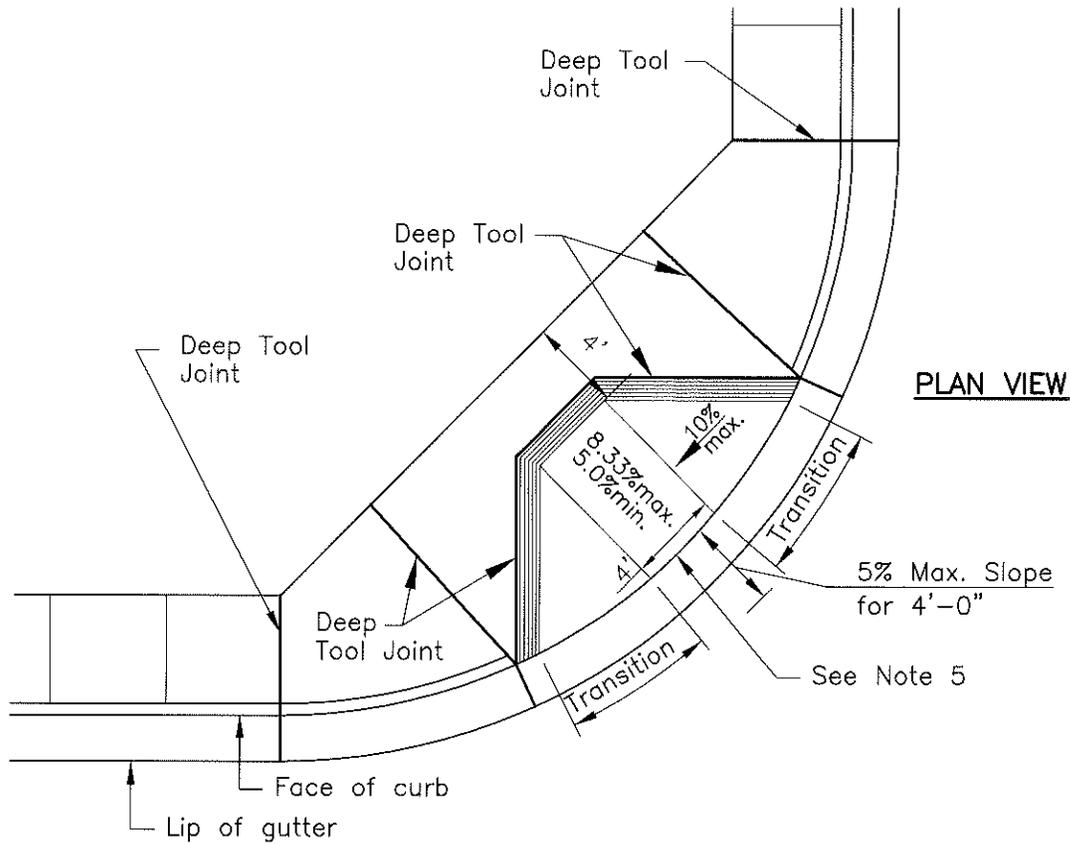
NO.	REVISION	BY	 CITY OF RED BLUFF	STANDARD PLAN	0307
APPROVED BY _____			DATE: GARY M. GORDON, CITY ENGINEER		



NOTES:

1. Sidewalk barricades to be installed at each location where standard provisions can not be made for pedestrians to continue beyond the terminus of a sidewalk. Locations shall be as determined by City Engineer.
2. All exposed surfaces to be painted with two (2) coats of white paint conforming to section 91-3.02 of State Specifications.
3. In areas with planter strips the barricade need not extend to the curb.

NO.	REVISION	BY	CITY OF RED BLUFF	STANDARD PLAN	0308
			<p><i>PWB</i></p> <p>APPROVED BY <i>Bruce Herz</i></p> <p>DATE: 06/23/16 BRUCE HEZ CITY ENGINEER</p>	SIDEWALK BARRICADE	



**NOTES**

1. All concrete shall be 520-C-2500
2. Apply light broom finish to surface of walk at a right angle with face of curb. Broom finish curb and gutter parallel with street.
3. The ramp shall have a 12" wide border with 1/4" grooves approximately 3/4" on center.
4. The surface of the ramp shall have a transverse broomed surface texture rougher than the surrounding sidewalk except when located in the center of the curb return.
5. Raised Truncated Domes shall be located at the curb line and be the full width of the ramp and 3' in depth.

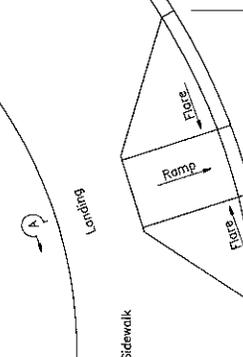
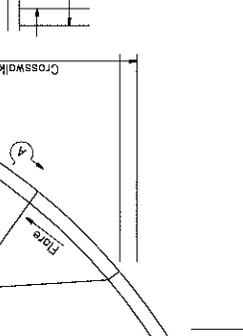
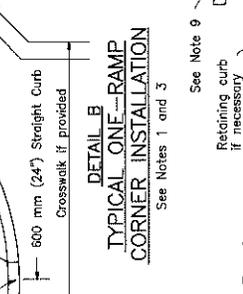
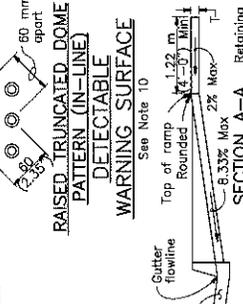
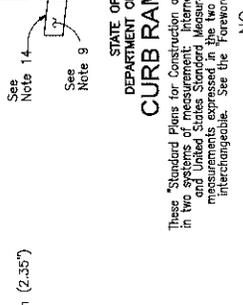
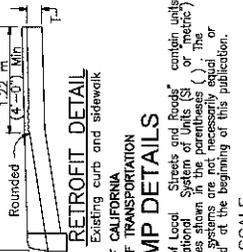
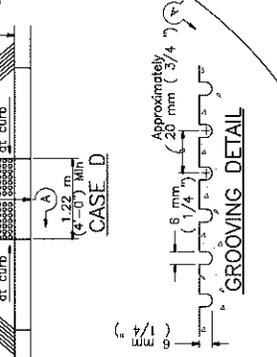
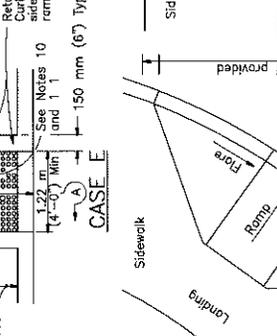
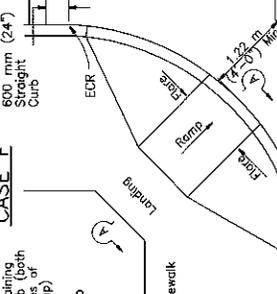
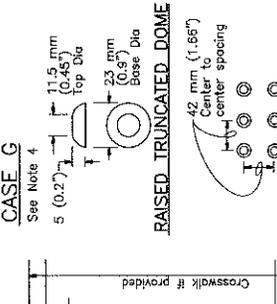
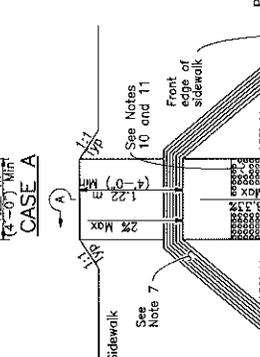
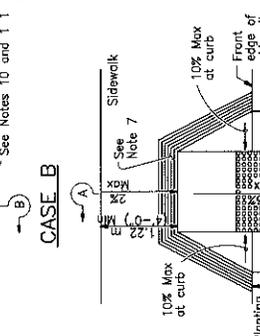
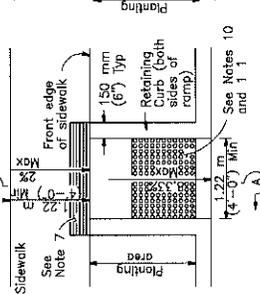
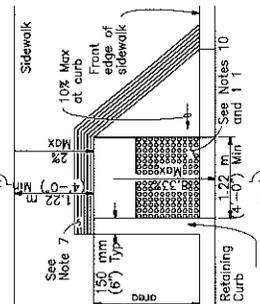
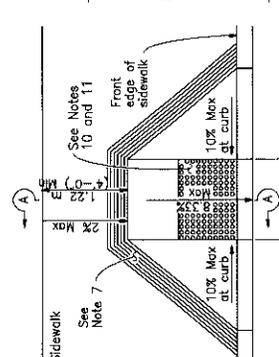
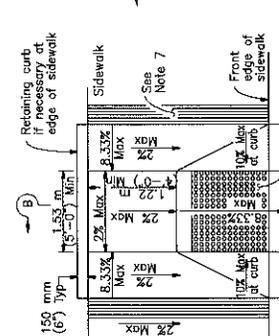
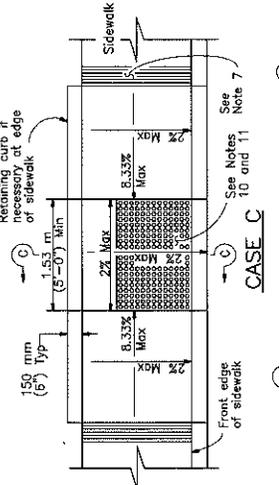
NO.	REVISION	BY	 CITY OF RED BLUFF	STANDARD PLAN	0309
001	06/25/2016	VJP		 APPROVED BY DATE: 06/23/16 BRUCE HENZ, CITY ENGINEER	

9-29-04

PLEASE APPROVE THIS DRAWING FOR THE CITY ENGINEER'S REVIEW AND SIGNATURE. THE CITY ENGINEER'S REVIEW IS LIMITED TO THE TECHNICAL ASPECTS OF THIS PLAN AND DOES NOT CONSTITUTE A GUARANTEE OF THE ACCURACY OR COMPLETENESS OF THE INFORMATION PROVIDED HEREON.

When new law is not yet in effect, refer to the old law, in the City of Red Bluff, Georgia.

- NOTES**
- As site conditions dictate, Case A through Case G curb ramps may be used for corner installations similar to those shown in Detail A and Detail B. The curb and ramp shall be constructed in accordance with the same. Case A through Case G curb ramps also may be used at mid block locations, as site conditions dictate.
  - If distance from curb to back of sidewalk is 1.22 m (4'-0") minimum (rounding as shown in Case A, the sidewalk may be depressed longitudinally as in Case B, or C or may be widened as in Case D.
  - When ramps are located in center of curb return, crosswalk configuration must be similar to that shown for Detail B.
  - As site conditions dictate, the retaining curb side and the flared side of the Case G ramp shall be constructed in reversed position.
  - If located on a slope, the sides of the ramp need not be parallel, but the minimum width of the ramp shall be 1.22 m (4'-0").
  - Slope of ramp flares vary uniformly from a maximum of 10% at curb to conform with longitudinal sidewalk slope adjacent to top of the ramp, except in Case C and Case F.
  - The curb ramp shall be outlined, as shown, with a 300 mm (12") wide border with 6 mm (1/4") grooves approximately 20 mm (3/4") on center. See grooving detail.
  - Transitions from ramps to walks, gutters or streets shall be flush and free of abrupt changes.
  - Maximum slopes of adjoining gutters, the road surface immediately adjacent to the curb ramp and continuous passage to the curb ramp shall not exceed 5 percent within 1.22 m (4'-0") of the top or bottom of the curb ramp.
  - Curb ramps shall have a detectable warning surface that extends the full width and 914 mm (3'-0") depth of the ramp. Detectable Warning Surfaces shall conform to the details on this plan and the requirements in the Special Provisions.
  - The edge of the detectable warning surface nearest the street shall be between 150 mm (6") and 285 mm (9") from the gutter flowline.
  - Sidewalk and ramp thickness, "T", shall be 90 mm (3 1/2") minimum.
  - Utility pull boxes, manholes, vaults and all other utility facilities shall be located at least 1.22 m (4'-0") from the curb ramp and be adjusted to grade by the owner prior to, or in conjunction with, curb ramp construction.
  - For retrofit conditions, removal and replacement of curb apron will be at the Contractor's option, unless otherwise shown on project plans.



STATE OF CALIFORNIA  
DEPARTMENT OF TRANSPORTATION  
CURB RAMP DETAILS

These Standard Plans for Construction of Local Streets and Roads contain units in two systems of measurement: International System of Units (SI) and the United States Standard Customary System. The units and measurements shall be interchangeable. See the Foreword at the beginning of this publication.

NO SCALE

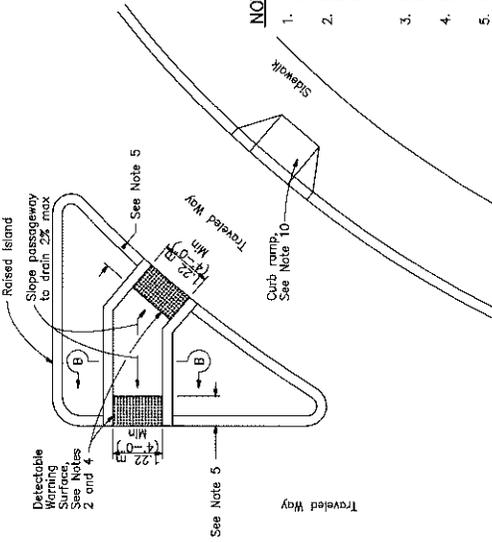
ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

RSP A88A DATED 9-29-04 SUPERSEDES RSP A88A DATED 08-19-04 AND STANDARD PLAN A88A DATED JULY 1, 2002-PAGE 83 OF THE STANDARD PLANS BOOK DATED JULY 2002.

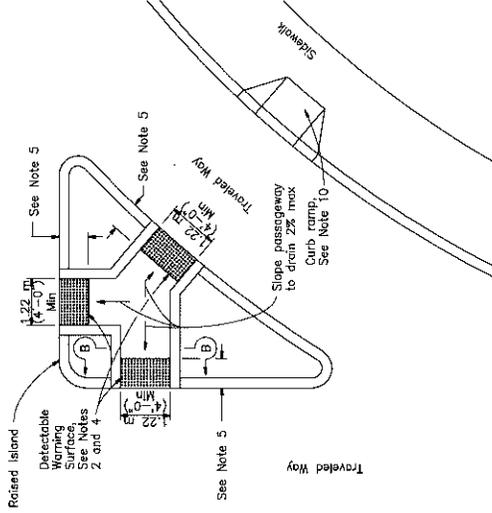
SECTION A-A  
SECTION B-B  
SECTION C-C

STANDARD PLAN		CITY OF RED BLUFF	
HANDICAP RAMP OPTIONS		APPROVED BY: <i>[Signature]</i>	
REVISED DUAL UNITS STANDARD PLAN RSP A88A 9-29-04		DATE: 06/25/16	
NO.	REVISION	BY	
001	06/25/2016	VJP	
		APPROVED BY: BRUCE KENZ, CITY ENGINEER	
		DATE: 06/25/16	

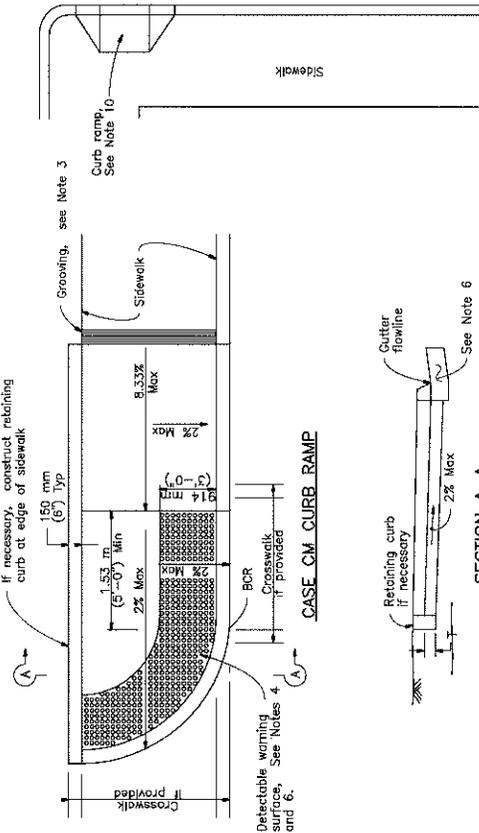
9-29-04  
 THIS DRAWING IS THE PROPERTY OF THE CITY OF RED BLUFF. IT IS TO BE USED ONLY FOR THE PROJECT AND LOCATION SPECIFICALLY IDENTIFIED HEREON. ANY REUSE OR MODIFICATION OF THIS DRAWING WITHOUT THE WRITTEN PERMISSION OF THE CITY ENGINEER IS PROHIBITED.  
 (All other notes shall apply to this drawing as if they were part of the drawing.)



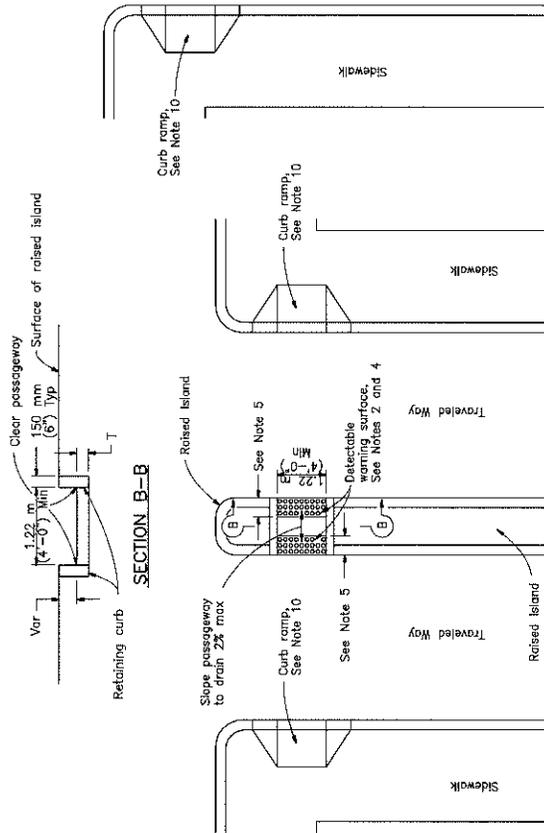
TYPE B PASSAGEWAY



TYPE C PASSAGEWAY



SECTION A-A



TYPE A PASSAGEWAY

NOTES

1. Sidewalk, ramp and passage way thickness, "T", shall be 90 mm (3 1/2") minimum.
2. Minimum width of passage way through raised islands shall be 1.8 m (6'-0"). Where the width of the passage way is less than 1.8 m (6'-0"), the width and full depth of the passage way length, where an island passage way length is greater than or equal to 1.8 m (6'-0"), but less than 2.44 m (8'-0"), a detectable warning surface shall extend the full width and 600 mm (2'-0") depth of the passage way length. Where 2 m (6'-0") or more of the passage way length is greater than 1.8 m (6'-0"), a detectable warning surface shall extend the full width and 914 mm (3'-0") depth of the passage way length.
3. For details of grooving used with Case CM curb ramp, see Revised Standard Plan RSP A88A.
4. For details of detectable warning surfaces, see Revised Standard Plan RSP A88A.
5. Where an island passage way length is less than 1.8 m (6'-0"), the width and full depth of the passage way length, where an island passage way length is greater than or equal to 1.8 m (6'-0"), but less than 2.44 m (8'-0"), a detectable warning surface shall extend the full width and 600 mm (2'-0") depth of the passage way length. Where 2 m (6'-0") or more of the passage way length is greater than 1.8 m (6'-0"), a detectable warning surface shall extend the full width and 914 mm (3'-0") depth of the passage way length.
6. For Case CM curb ramp, the edge of the detectable warning surface nearest the street shall be between 150 mm (6") and 205 mm (8") from the gutter flowline.
7. Transitions from ramps to walks, gutters or streets shall be flush and free of abrupt changes.
8. Maximum slopes of adjoining gutters, the road surface immediately adjacent to the curb ramp shall not exceed 5 percent within 1.22 m (4'-0") of the top or bottom of the curb ramp.
9. Utility pull boxes, manholes, vaults and all other utility facilities within the boundaries of the curb ramp will be located prior to curb ramp construction.
10. For additional curb ramp details, see Revised Standard Plan 0310.

STATE OF CALIFORNIA  
 DEPARTMENT OF TRANSPORTATION

CURB RAMP AND ISLAND PASSAGEWAY DETAILS

These Standard Plans for Construction of Level Streets and Ramps comply with the requirements of the Americans with Disabilities Act (ADA) and United States Standard Measures shown in the parentheses ( ) or the measurements expressed in the two systems are not necessarily equal or interchangeable. See the Foreword at the beginning of this publication.

NO SCALE

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

RSP A88B DATED 9-29-04 SUPERSEDES RSP A88B DATED 03-12-04 AND STANDARD PLAN A88B DATED JULY 1, 2002-PAGE 84 OF THE STANDARD PLANS BOOK DATED JULY 2002.

REVISED DUAL UNITS STANDARD PLAN RSP A88B

9-28-04

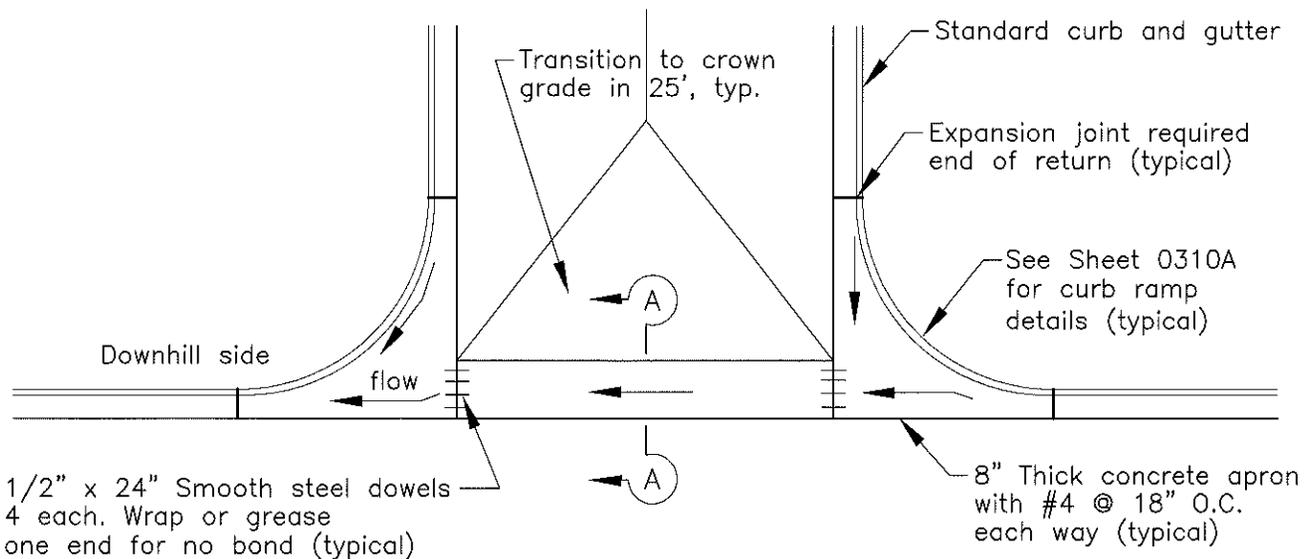
NO.	REVISION	BY
001	06/27/2016	VJP

APPROVED: *[Signature]* DATE: 06/27/16  
 BRUCE HENZ, CITY ENGINEER

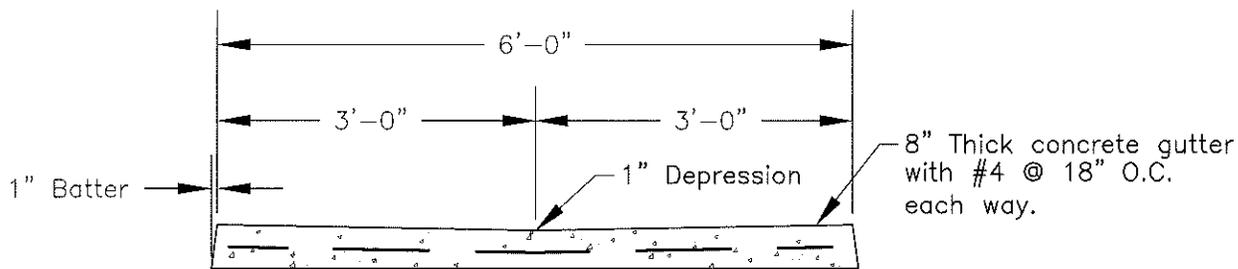
STANDARD PLAN

HANDICAP RAMP OPTIONS

0310A



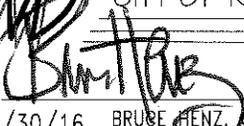
PLAN

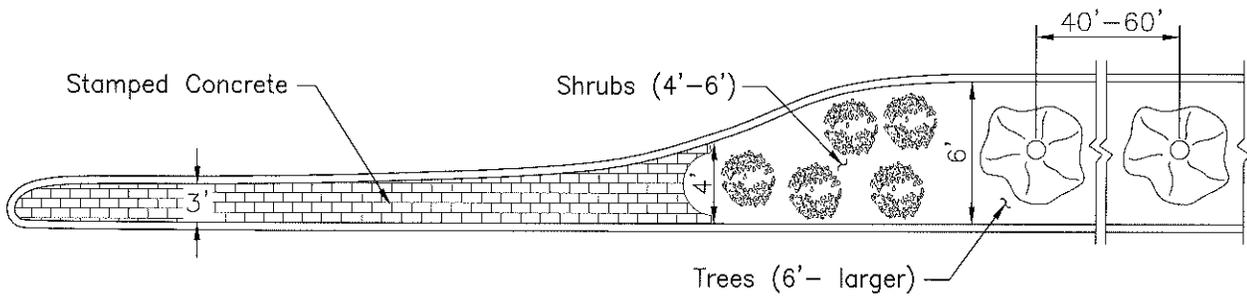


CROSS GUTTER SECTION A-A

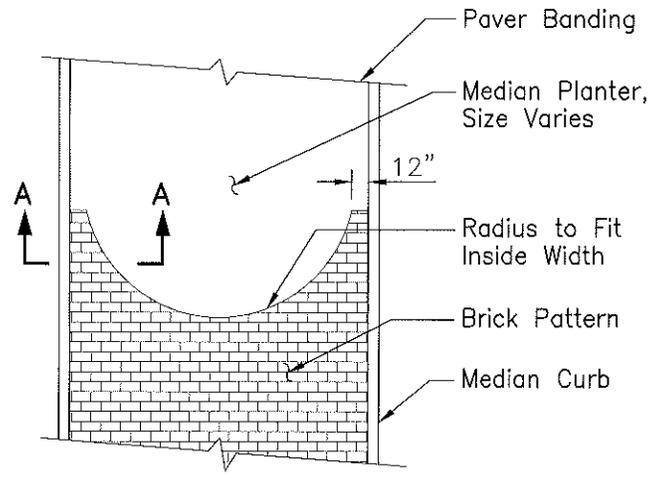
NOTES

1. Concrete shall be Class 520-C-2500.
2. No concrete shall be placed prior to form inspection by the Engineer.
3. Asphalt concrete shall be held 1/4" high at edge of concrete.

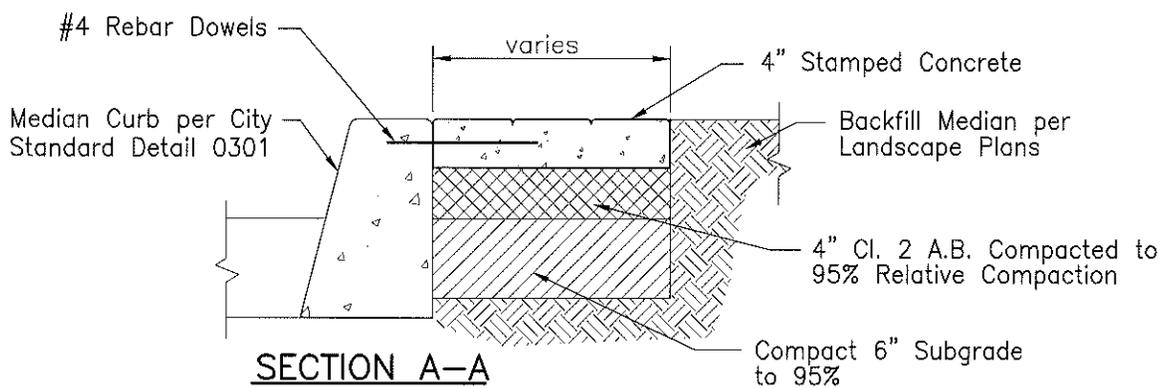
NO.	REVISION	BY	 CITY OF RED BLUFF	STANDARD PLAN	0311
001	06/30/2016	VJP		CURB RETURN & CROSS GUTTER	
			APPROVED BY  DATE: 06/30/16 BRUCE HENZ, CITY ENGINEER		



Back of Curb Dimension Table	
4' max.	Stamped concrete
4' to 6'	Ornamental trees/bushes/shrubs
6' and Larger	All ground cover/trees/shrubs



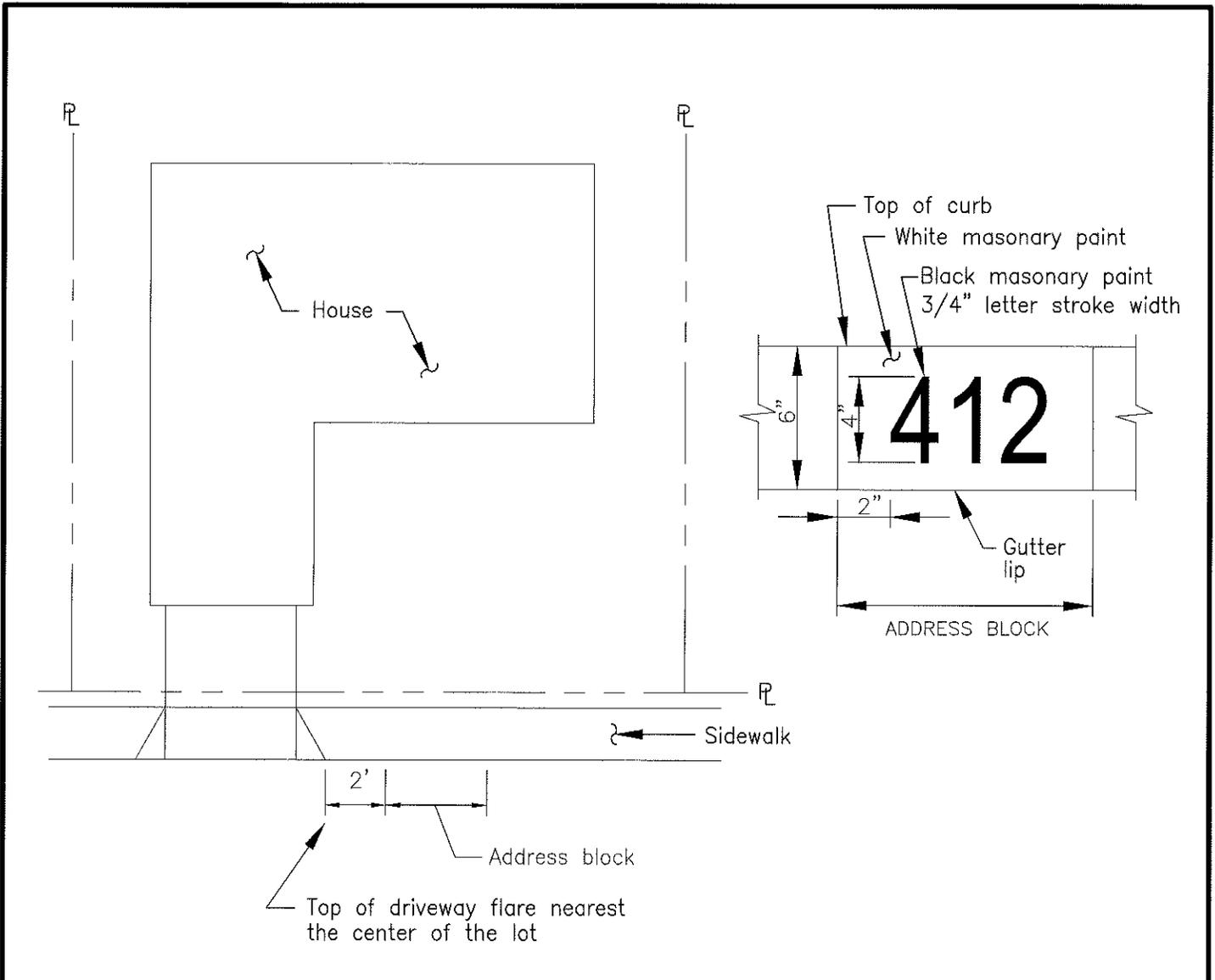
**STAMPED CONCRETE**



**NOTES:**

1. All concrete shall be 520-C-2500
2. Broom finish curb and gutter parallel with street.
3. All edges shall have 1/2" radius.
4. Stamp pattern and color shall be approved by City Engineer. Sample shall be submitted prior to start of work. (Color shall be added at Batch Plant)

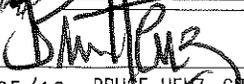
NO.	REVISION	BY	 CITY OF RED BLUFF APPROVED BY DATE: 07/05/16 BRUCE HENZ, CITY ENGINEER	STANDARD PLAN	0312
001	07/05/2016	VJP		STAMPED CONCRETE	

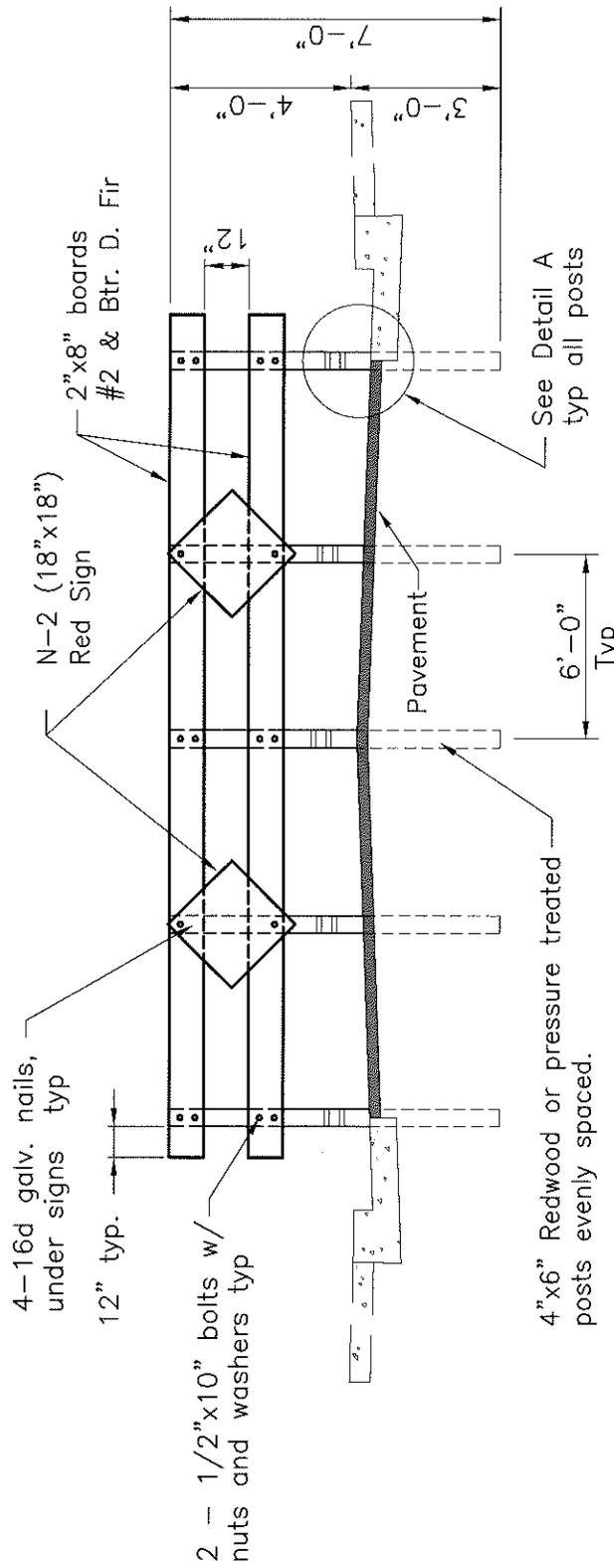


TYPICAL LOT CURB ADDRESS LOCATION

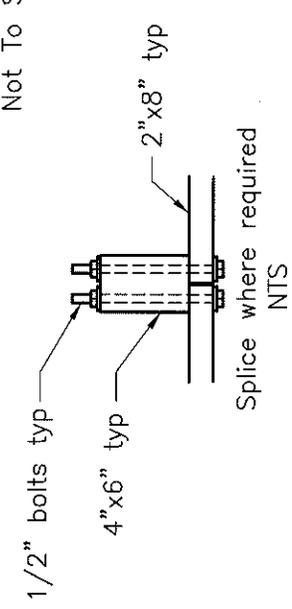
NOTES

1. Direct personal contact shall be made with individual property owners with permission to proceed with installation secured prior to installation of curb numbers.
2. When curb address numbers are applied, they must be maintained and/or replaced by home owner as shown.
3. Existing curb shall be cleaned with a wire brush prior to placing address numbers.

NO.	REVISION	BY	 CITY OF RED BLUFF	STANDARD PLAN	0313
001	07/05/2016	VJP		APPROVED BY:  DATE: 07/05/16 BRUCE HENZ, CITY ENGINEER	



Not To Scale



**NOTES:**

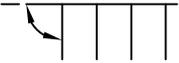
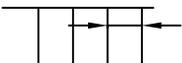
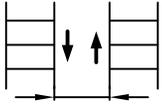
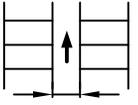
1. All wood shall be S4S.
2. All hardware shall be galvanized.
3. All exposed surfaces to be painted with one prime coat and two coats of exterior white paint.
4. Boards and post tops shall be level.
5. Mount signs with 2 - 1/2"x10" bolts w/ nuts and washers.

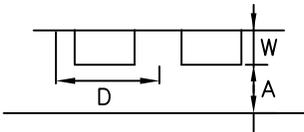
**Detail A**

Breakaway feature  
NTS

NO.	REVISION	BY	 CITY OF RED BLUFF	STANDARD PLAN	0314
001	07/05/2016	VJP			
APPROVED BY			 BRUCE HENZ, CITY ENGINEER	BARRICADE	
DATE: 07/05/16					

# AUTOMOBILE PARKING STANDARDS

PARKING ANGLE 	STALL WIDTH 		STALL DEPTH 		2-WAY AISLE WIDTH 	1-WAY AISLE WIDTH 
	Standard	Compact	Standard	Compact		
90	9'	8 1/2'	18'	16'	25'	25'
60	9'	8 1/2'	20'	18'	20'	15'
45	9'	8 1/2'	19'	17'	20'	15'
30	9'	8 1/2'	17'	15'	20'	15'
Parallel	W = 8'	W = 8'	D = 22'	D = 20'	A = 25'	A = 15'

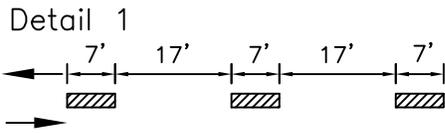


## NOTES

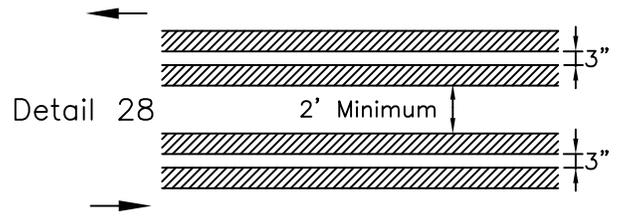
1. Turning radius minimum 25' at centerline of auto path.
2. Compact spaces shall be marked "C" using 12" high letters painted white.
3. Angle Parking – Approved wheel stops are required
4. All parking spaces shall have a side clearance to any type of fixed object of 30".
5. When one-way driveways are used, approved directional signs shall be placed at the entrance or exit to the access street, as well as directional arrows marked on the pavement.
6. Use 6" concrete curb as wheel stop whenever possible; expand sidewalk or landscape area to accommodate.
7. Use 6" concrete curb in parking lots to protect all landscape areas unless otherwise approved by Technical Advisory Committee.

NO.	REVISION	BY	 CITY OF RED BLUFF	STANDARD PLAN	
				PARKING STANDARD	0315
APPROVED BY _____					
DATE: _____			GARY M. GORDON, CITY ENGINEER		

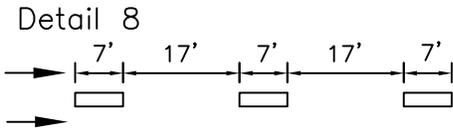
## CENTERLINES



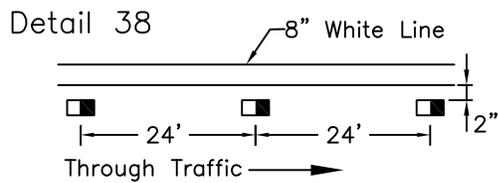
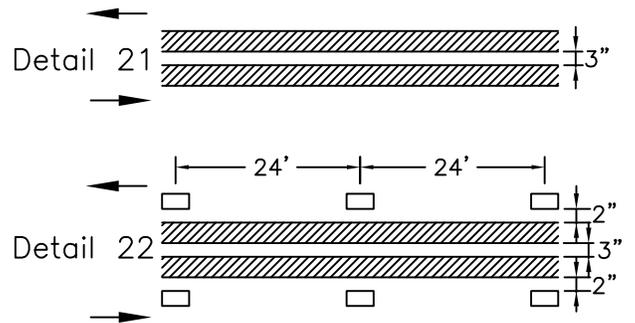
## MEDIAN ISLANDS



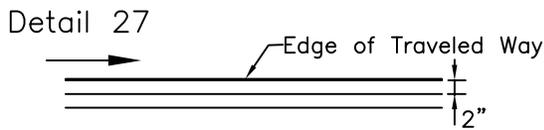
## LANELINES



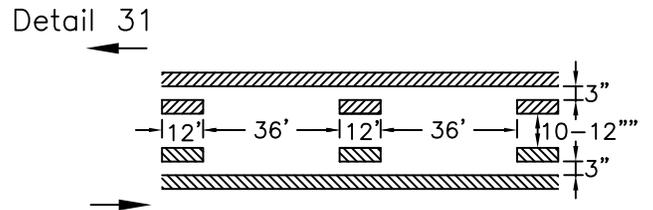
## NO PASSING ZONES



## EDGELINES



## TWO WAY LEFT TURN LANES



### Lines

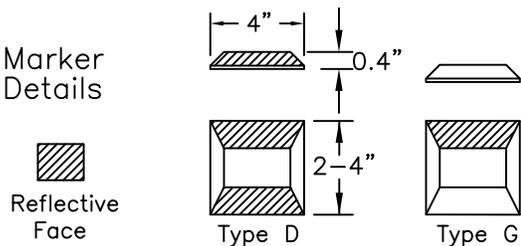
- 4" White
- 4" Yellow
- Direction of Travel

## LEGEND

### Markers

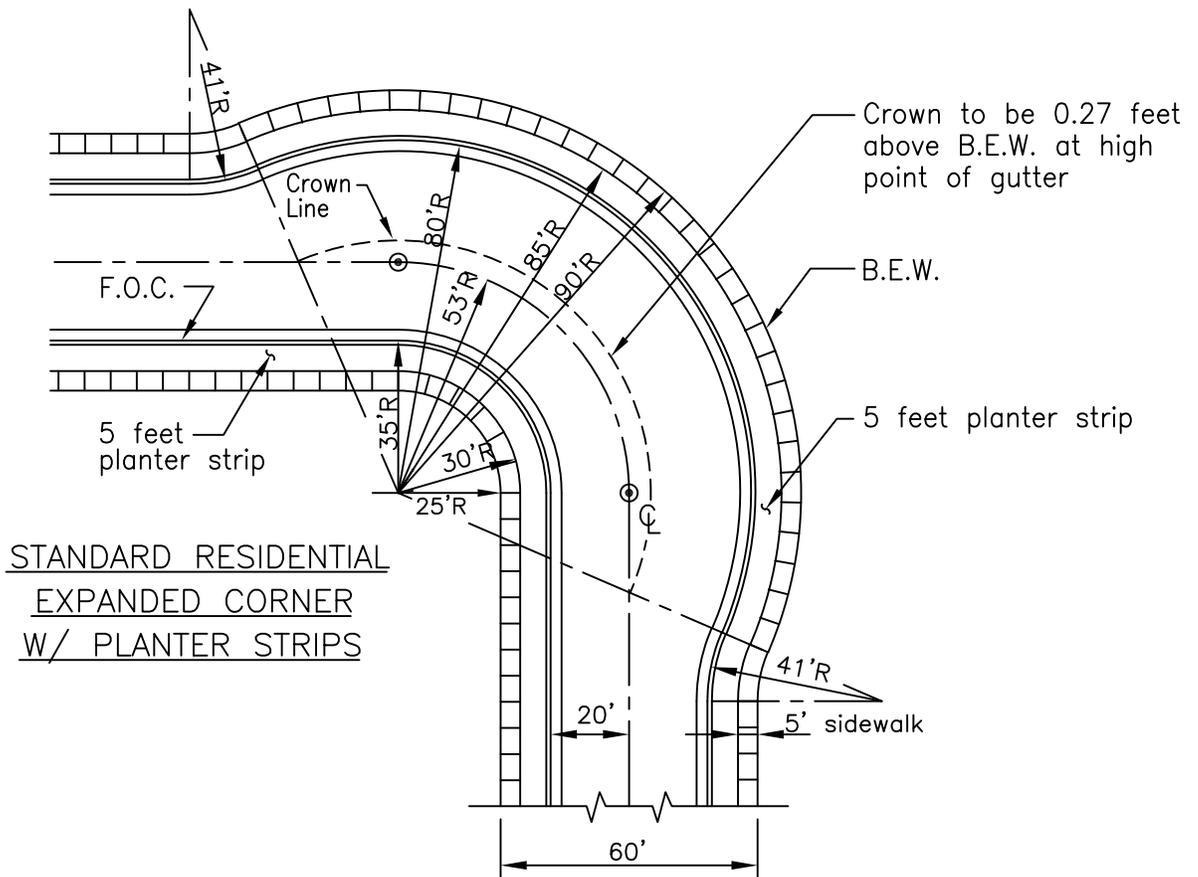
- Type D Two-way Yellow Reflective
- Type G One-way Clear Reflective

### Marker Details

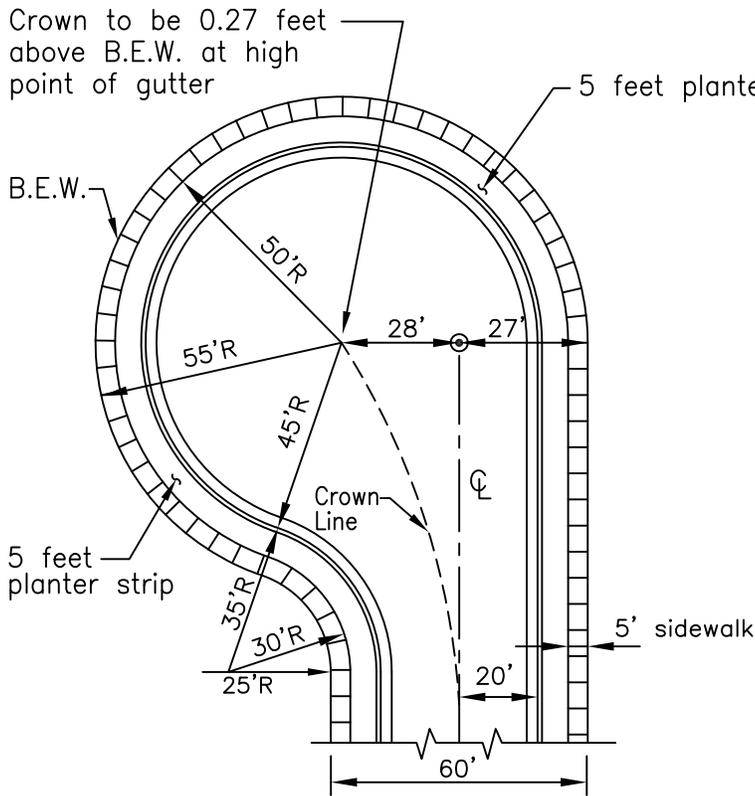


NO.	REVISION	BY	
			CITY OF RED BLUFF <hr/> <hr/>
APPROVED BY			GARY M. GORDON, CITY ENGINEER
DATE:			

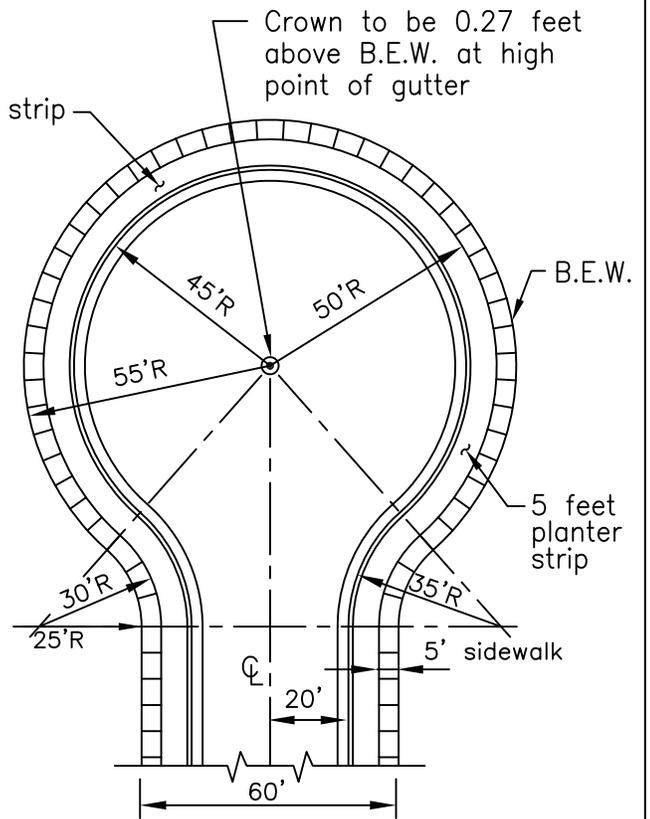
<b>STANDARD PLAN</b> <b>PAVEMENT MARKERS</b> <b>&amp;</b> <b>TRAFFIC STRIPING</b>	<b>0316</b>
--	-------------



NO.	REVISION	BY	CITY OF RED BLUFF		STANDARD PLAN	0317
			<i>PWD</i>		EXPANDED CORNER GEOMETRY	
			APPROVED BY _____			
			DATE: GARY M. GORDON, CITY ENGINEER			



STANDARD RESIDENTIAL  
EXPANDED CUL DE SAC  
W/ PLANTER STRIPS



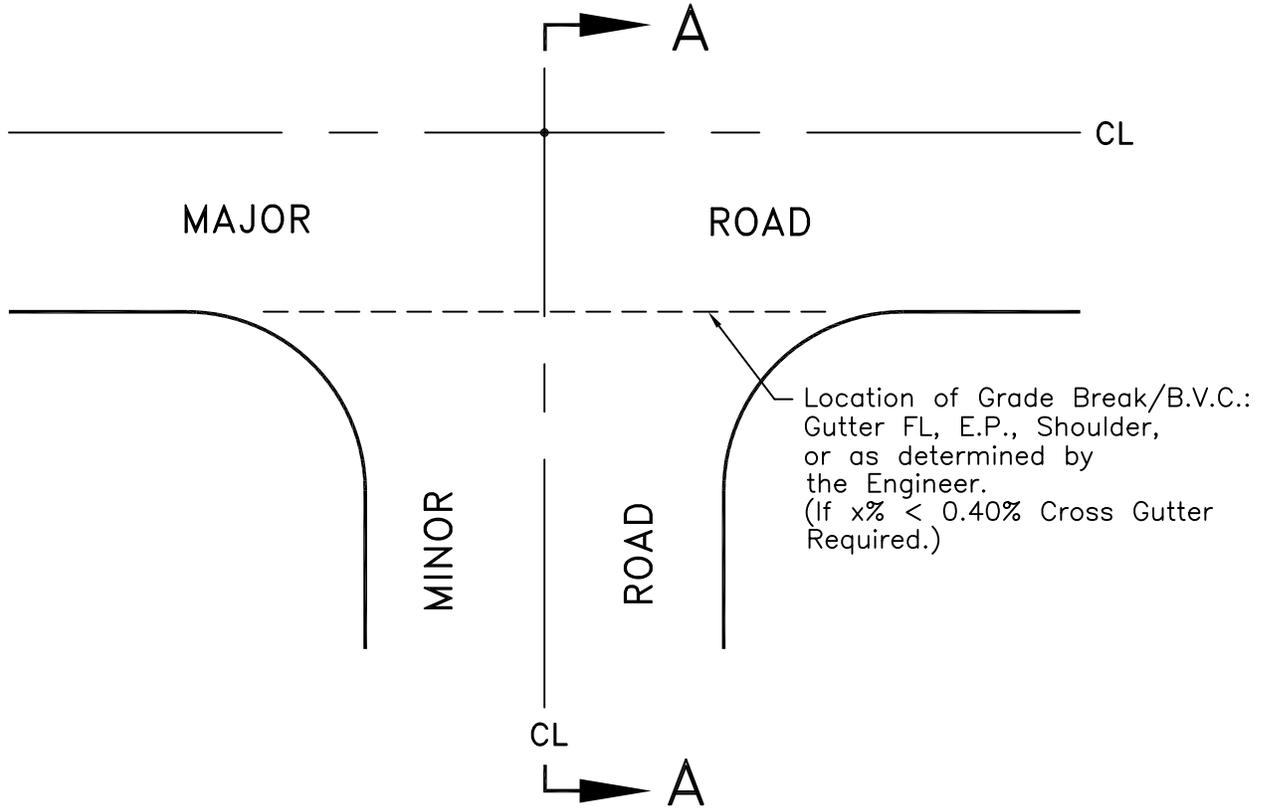
STANDARD RESIDENTIAL  
CUL DE SAC  
W/ PLANTER STRIPS

NO.	REVISION	BY

**PWD** CITY OF RED BLUFF  
 APPROVED BY \_\_\_\_\_  
 DATE: GARY B. ANTONI, CITY ENGINEER

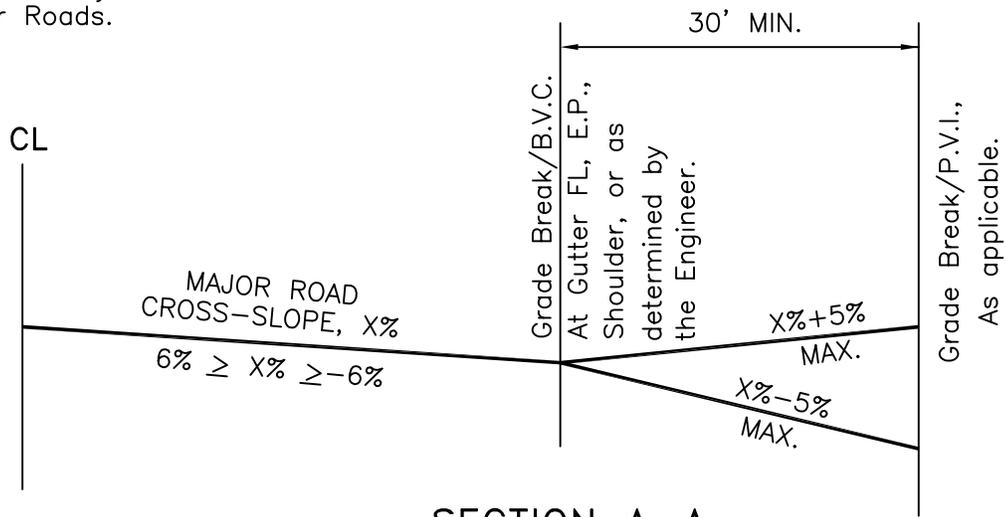
STANDARD PLAN  
 CULDESAC & EXPANDED  
 CULDESAC GEOMETRY

0317A



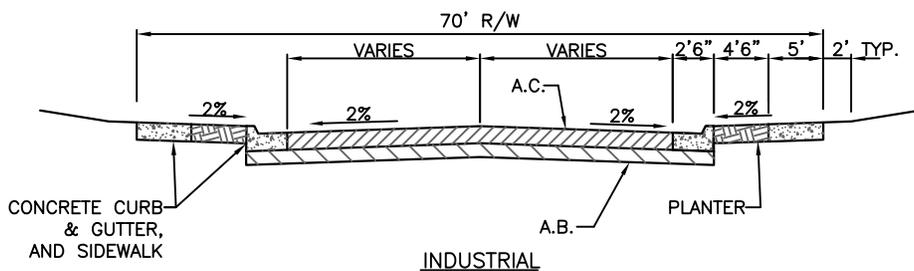
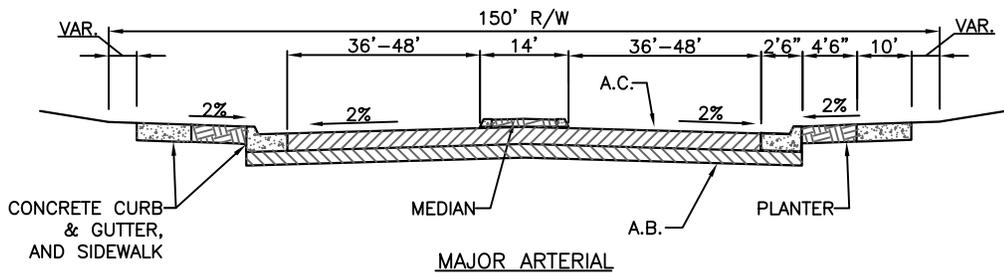
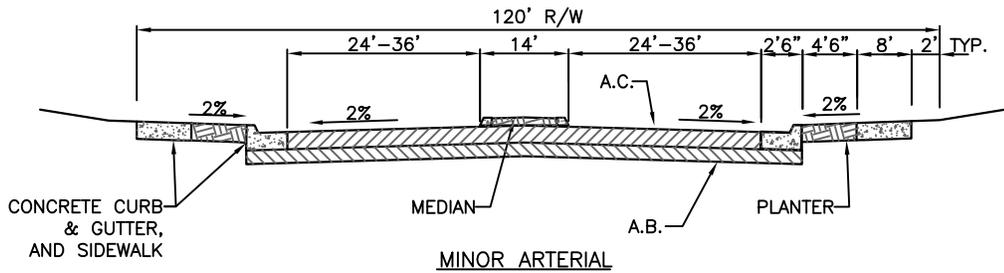
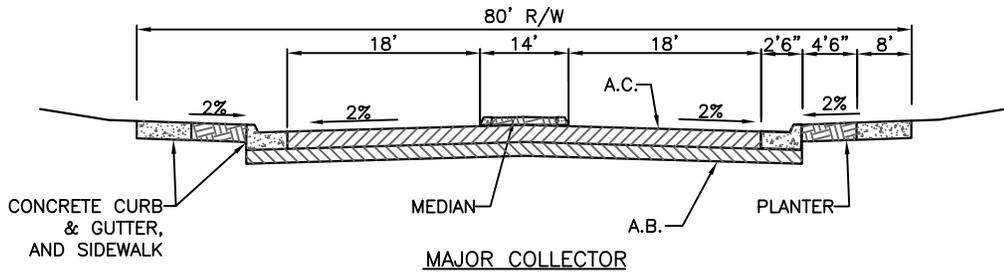
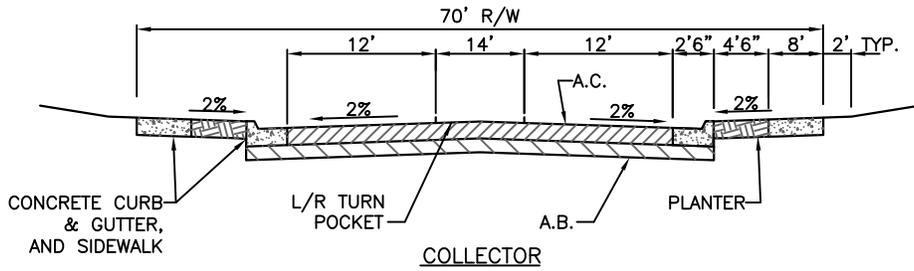
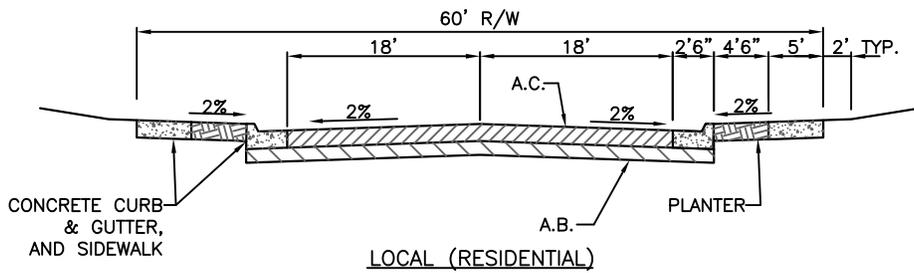
PLAN VIEW

**NOTE:**  
Grade Break location shall be outside of Traveled Way of Major Roads.



SECTION A-A

NO.	REVISION	BY	 CITY OF RED BLUFF <hr/> <hr/>	STANDARD PLAN	
					GEOMETRICS & PROFILES AT ROAD INTERSECTIONS
			APPROVED BY _____ DATE: _____	GARY M. GORDON, CITY ENGINEER	

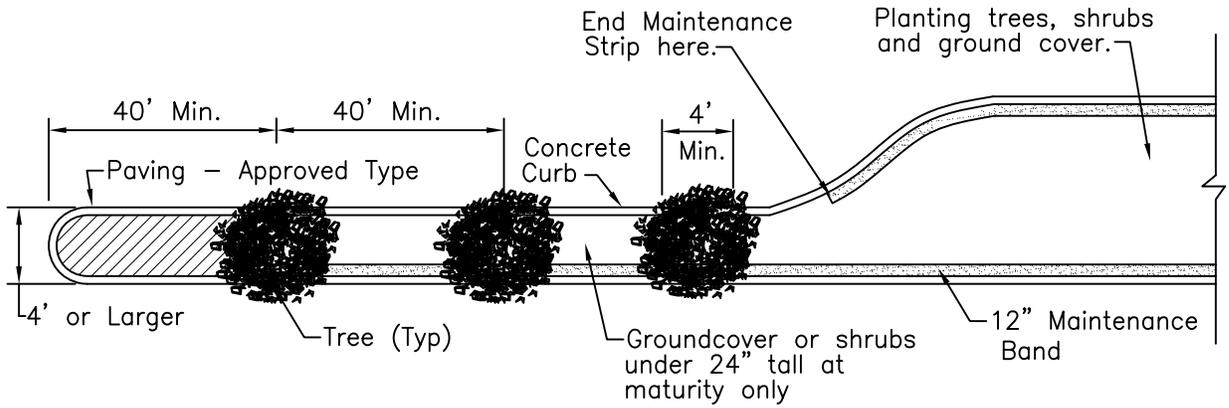


NO.	REVISION	BY

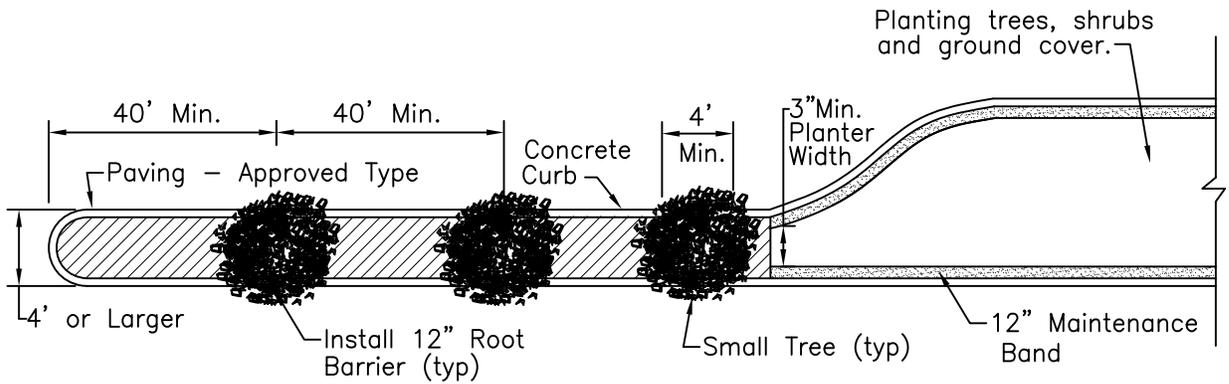
**PWD** CITY OF RED BLUFF  
APPROVED BY \_\_\_\_\_  
DATE: GARY M. GORDON, CITY ENGINEER

STANDARD PLAN  
TYPICAL STREET CROSS SECTION

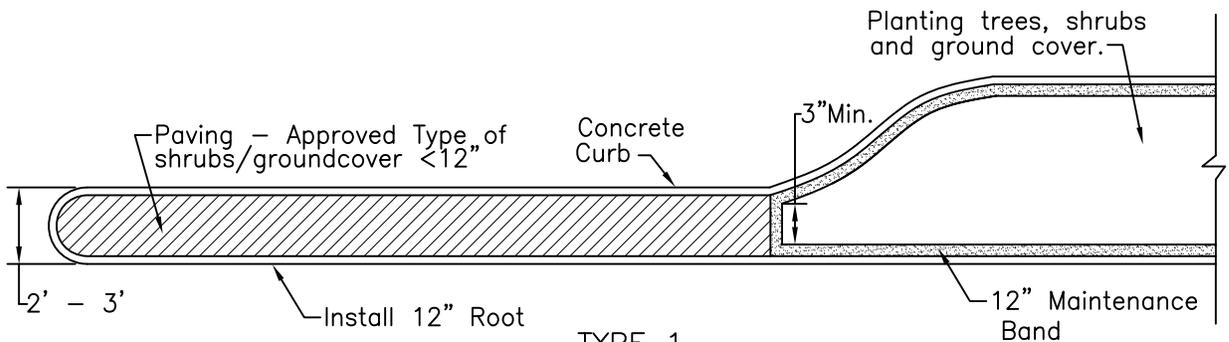
0319



TYPE 3



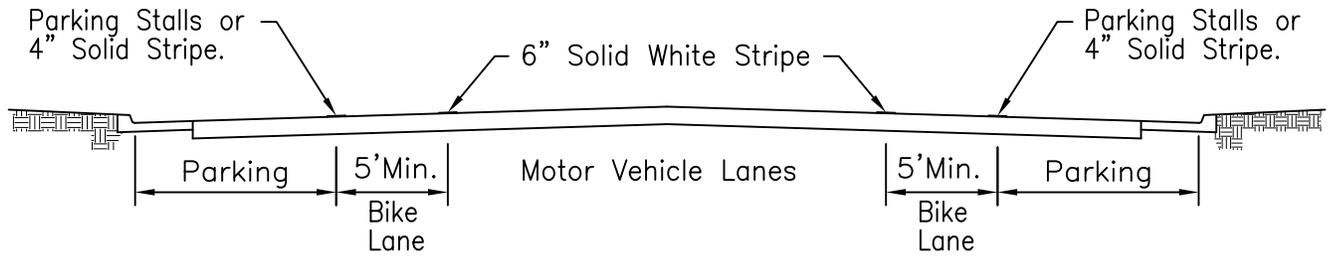
TYPE 2



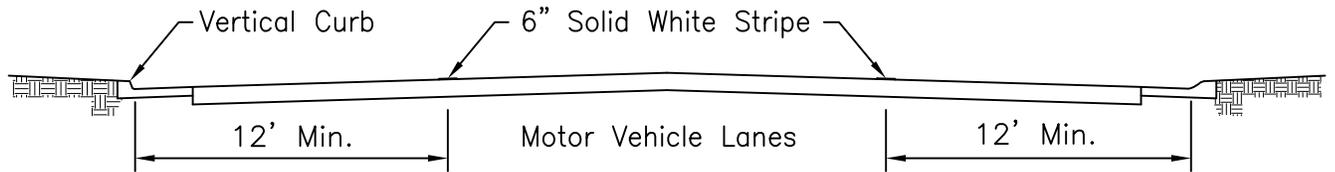
TYPE 1

PLAN VIEW

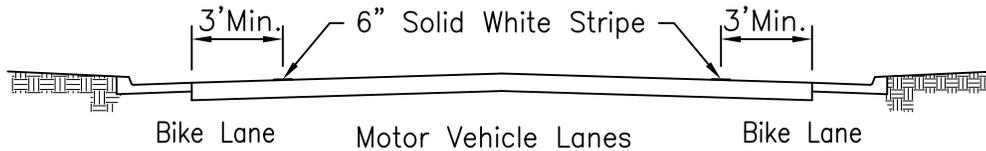
NO.	REVISION	BY	CITY OF RED BLUFF		STANDARD PLAN	0320
			<i>PWD</i>		TREE AND PAVEMENT LAYOUT IN MEDIAN ISLANDS RELATED TO WIDTH OF MEDIAN	
			APPROVED BY _____			
			DATE: _____			
			GARY M. GORDON, CITY ENGINEER			



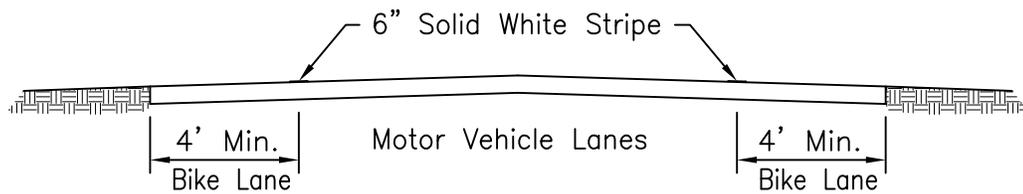
(1) STRIPED PARKING



(2) PARKING PERMITTED WITHOUT PARKING STRIPE OR STALL



(3) PARKING PROHIBITED



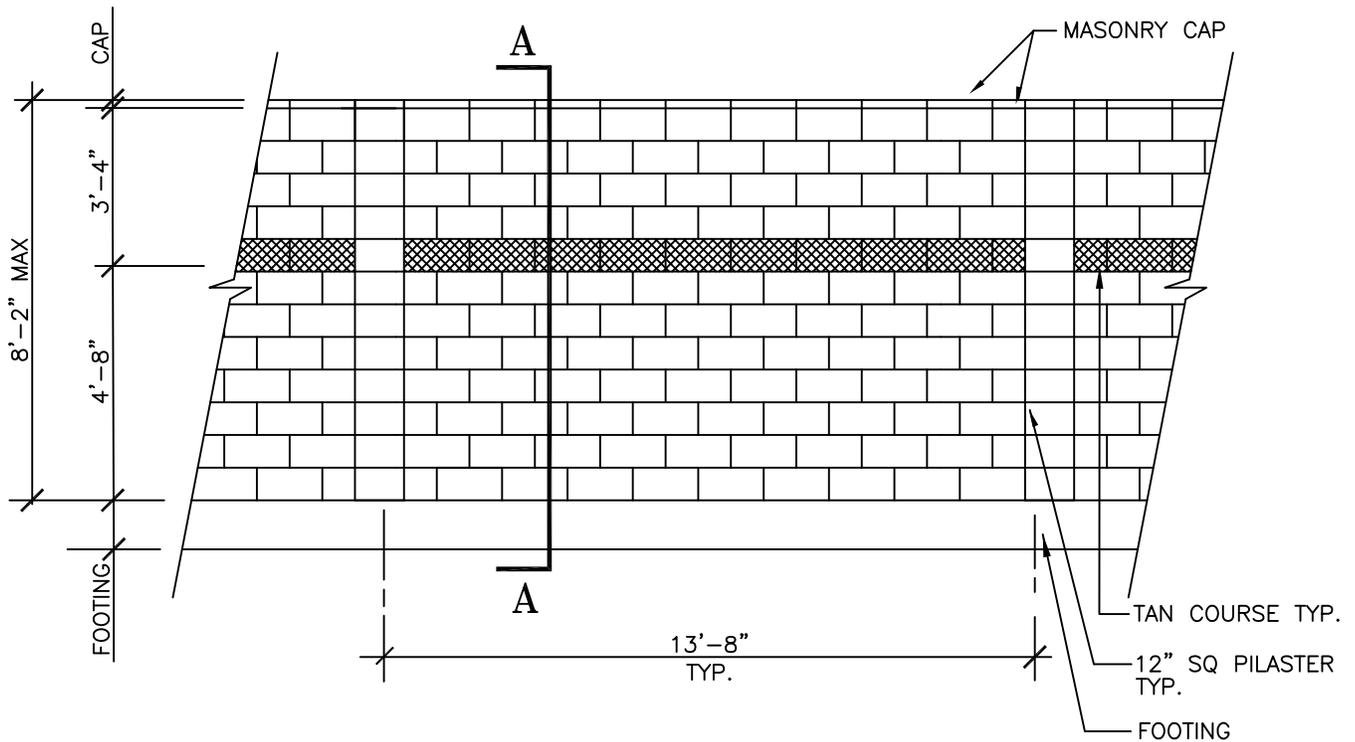
(4) TYPICAL ROADWAY IN OUTLYING AREAS - PARKING RESTRICTED

TYPICAL BIKE LANE CROSS SECTIONS  
(ON TWO-LANE OR MULTILANE HIGHWAYS)

NO.	REVISION	BY	 CITY OF RED BLUFF	STANDARD PLAN	0321
				TYPICAL BIKE LANE CROSS SECTIONS	
			APPROVED BY _____		
			DATE: GARY M. GORDON, CITY ENGINEER		

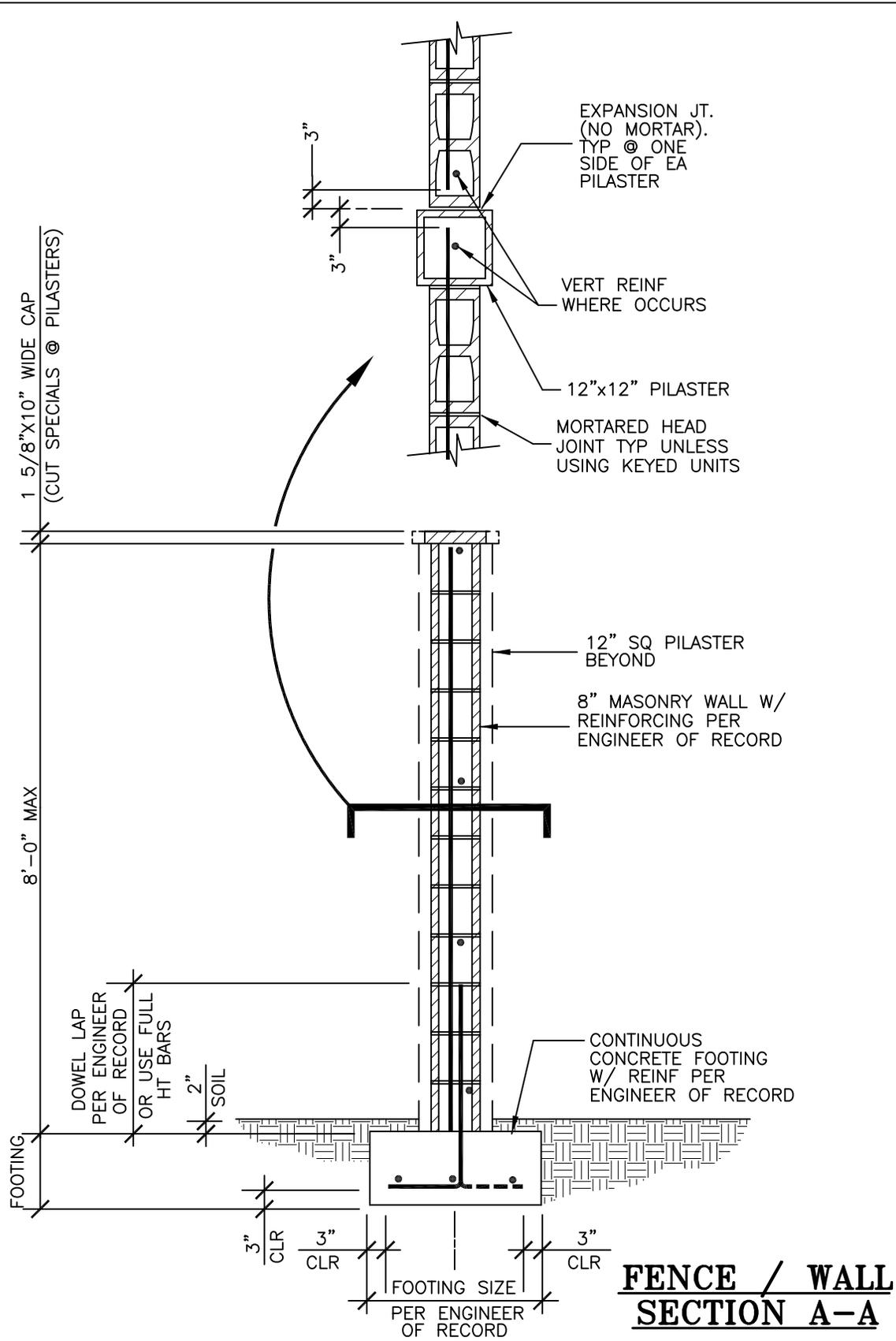
**NOTES**

1. Masonry units shall have a minimum compressive strength of 1900 PSI and conform with ASTM C-90. All masonry units shall be gray (Natural) unless noted otherwise.
2. Masonry units shall be lightweight units having nominal dimensions of 8 inches by 8 inches by 16 inches and shall be laid in running bond.
3. All masonry cells shall be grout filled. Cleanouts shall be provided in the bottom course At each vertical bar for all grout pours over five feet in height, and shall be inspected By the Engineer prior to sealing.
4. Mortar and grout shall comply with Greenbook Section 202-2.2. Grout shall be course grout and have a minimum 28-Day compressive strength of 2000 PSI. Mortar shall have a minimum 28-Day compressive strength of 1900 PSI.
5. A letter of certification from the supplier of the grout shall be provided to the Engineer At the time of or prior to the delivery of grout to the job site.
6. A letter of certification from the manufacturer of the masonry units shall be provided to the Engineer at the time of or prior to delivery of the units to the job site.
7. Reinforcing Steel shall comply with ASTM A615, Grade 40.
8. Concrete shall comply with Greenbook Section 201 for concrete Class 500-C-2500.
9. All mortar joints shall be concave.
10. Footings shall extend a minimum of 12" into and bear directly on undisturbed native soil or Engineered fill.
11. Structural calculations and construction details signed and stamped by a California Licensed Civil or Structural Engineer shall be provided, reviewed and approved by the City for all fence designs prior to construction.
12. Alternative design may be considered subject to TAC review and approval.



**FENCE / WALL ELEVATION**

NO.	REVISION	BY	 CITY OF RED BLUFF APPROVED BY _____ DATE: GARY M. GORDON, CITY ENGINEER	STANDARD PLAN	0322



**FENCE / WALL  
SECTION A-A**

NO.	REVISION	BY

**PWD** CITY OF RED BLUFF  
 APPROVED BY \_\_\_\_\_  
 DATE: GARY M. GORDON, CITY ENGINEER

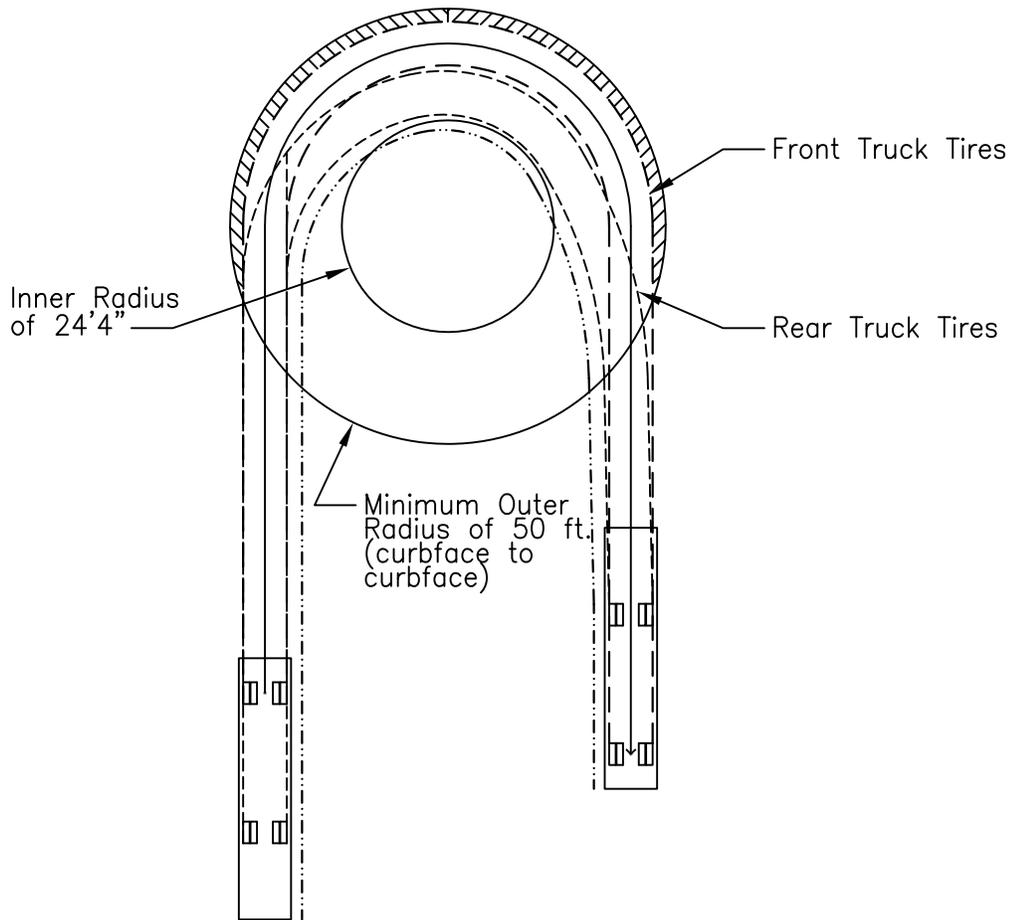
STANDARD PLAN  
 RIGHT-OF-WAY  
 FENCE / WALL DETAIL

0322A



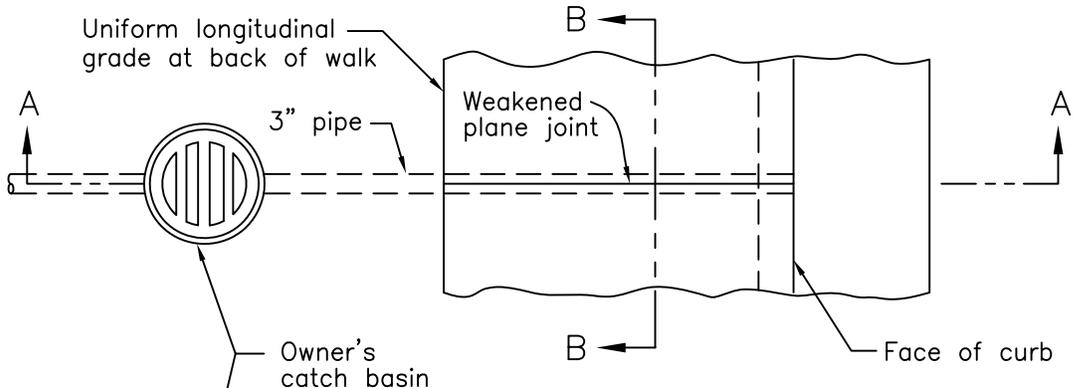
Red Bluff Truck  
02/27/06

 On-Street Parking

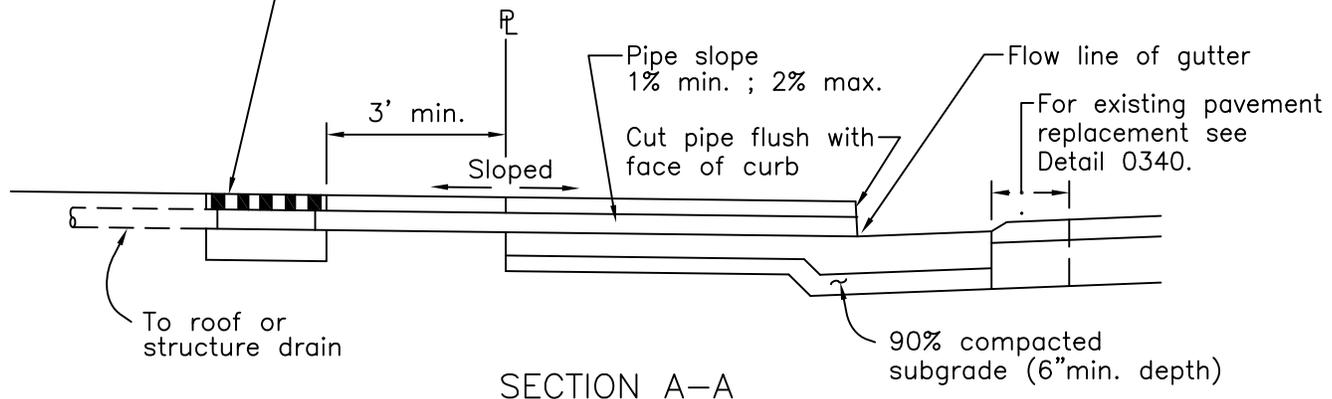


NO.	REVISION	BY	 CITY OF RED BLUFF	STANDARD PLAN		0324
				MINIMUM FIRE TRUCK TURNING RADIUS		
			APPROVED BY _____ DATE: GARY M. GORDON, CITY ENGINEER			

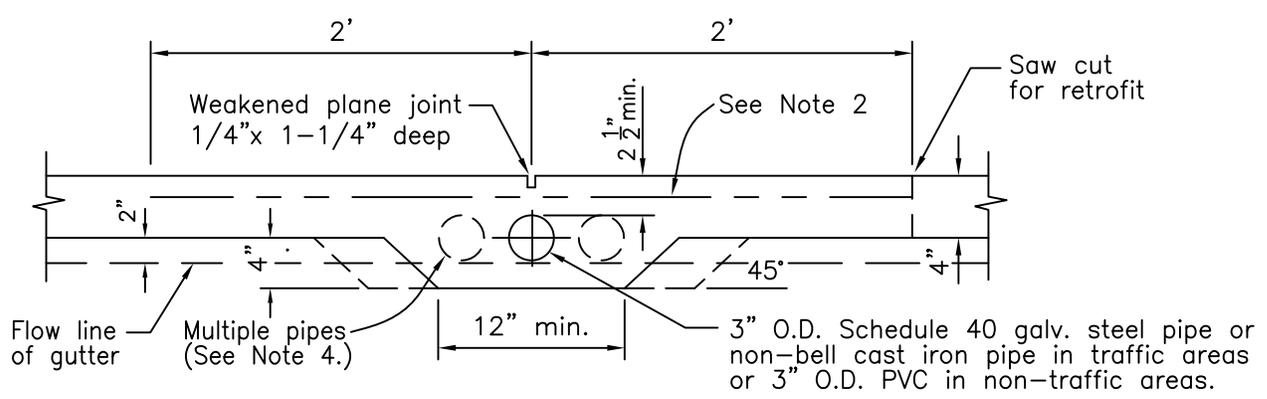




PLAN



SECTION A-A

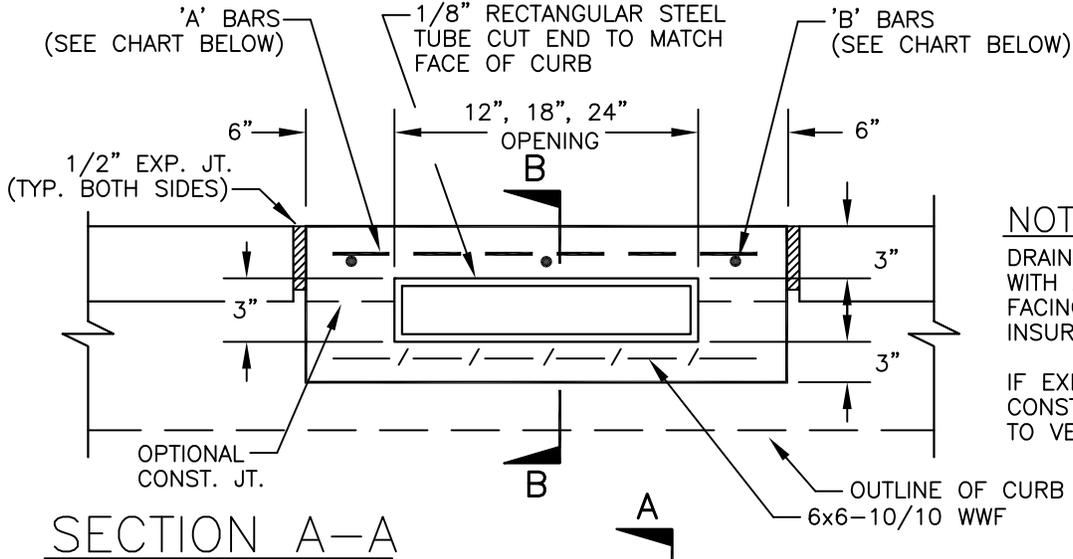


SECTION B-B

**NOTES:**

1. Owner shall be responsible for cleaning and maintaining drain pipe on both his property and the portion through the sidewalk.
2. Place 4x4 10 ga. wire mesh.
3. Under sidewalk drains to be used only by approval of City Engineer where a storm drain does not exist, or extension of an existing storm drain is impractical.
4. Multiple pipes may be used where necessitated by the contributing area. In this case pipes shall be spaced 7" on center.

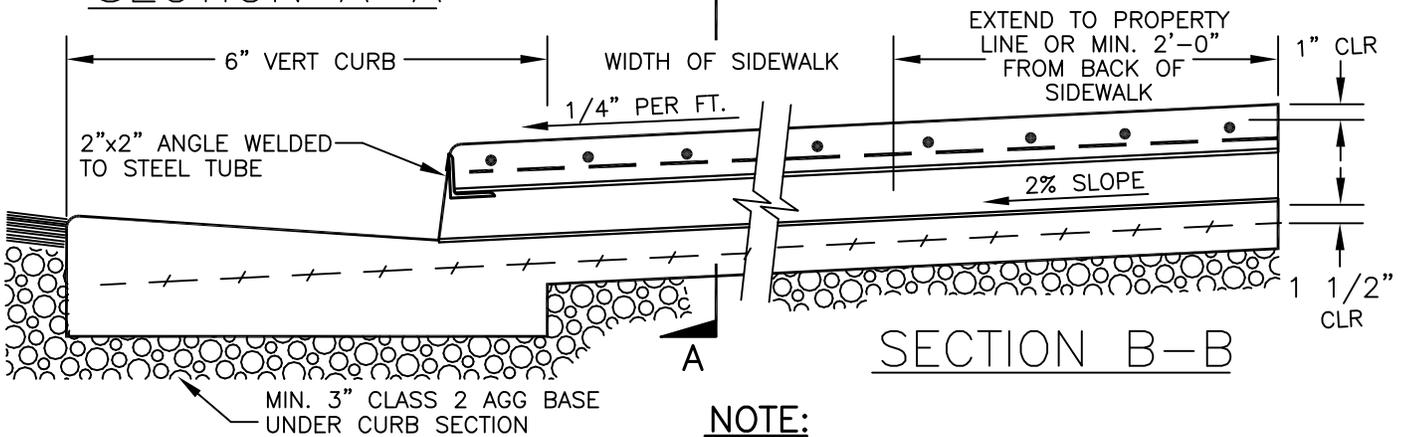
NO.	REVISION	BY	 CITY OF RED BLUFF	STANDARD PLAN	0401
				UNDER SIDEWALK DRAIN TYPE 1	
			APPROVED BY _____ DATE: GARY M. GORDON, CITY ENGINEER		



**NOTE:** UNDER SIDEWALK DRAIN TO BE CONSTRUCTED WITH A 30° ANGLE TO CURB FACING DOWNSTREAM TO INSURE PROPER FLOW.

IF EXISTING CURB IS ROLLED CONSTRUCT TRANSITION TO VERTICAL

SECTION A-A

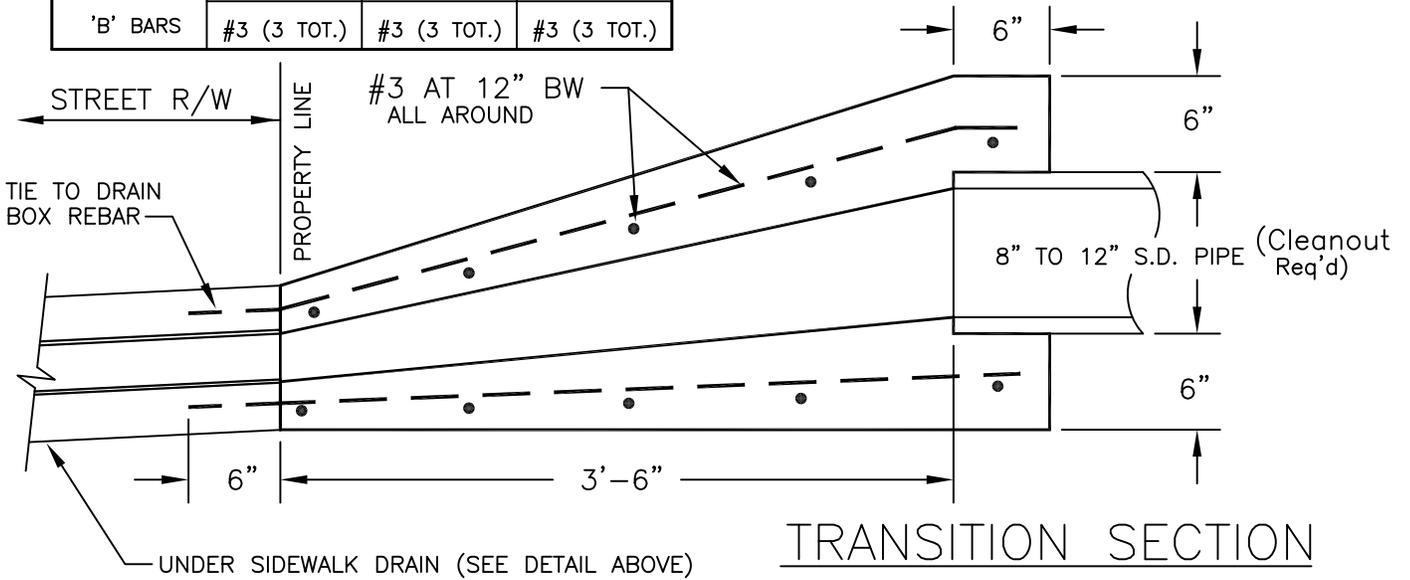


SECTION B-B

REINFORCING BARS	12" OPENING	18" OPENING	24" OPENING
'A' BARS	#4 AT 6" OC	#5 AT 8" OC	#5 AT 8" OC
'B' BARS	#3 (3 TOT.)	#3 (3 TOT.)	#3 (3 TOT.)

**NOTE:**

WHERE TRANSITION FROM S.D. PIPE TO UNDER SIDEWALK DRAIN IS CONSTRUCTED, UNDER SIDEWALK DRAIN TO EXTEND FROM FACE OF CURB TO PROPERTY LINE.



TRANSITION SECTION

FROM S.D. PIPE TO DRAIN BOX

NO.	REVISION	BY

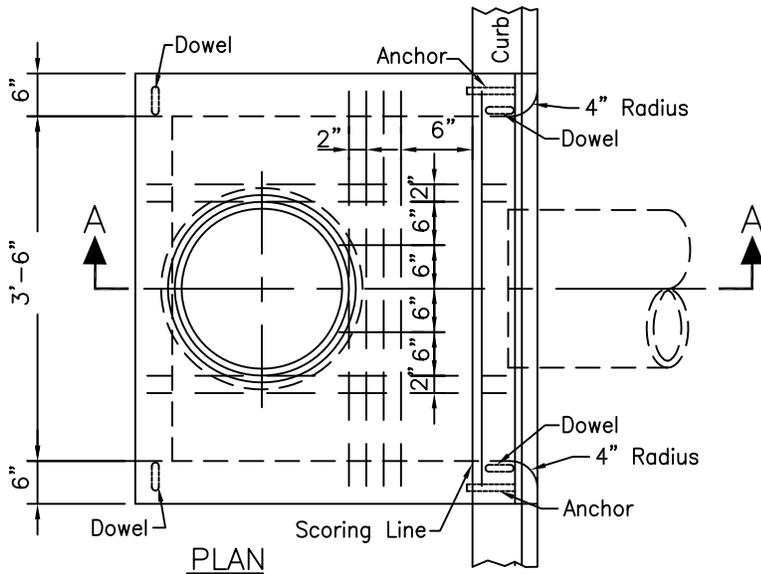
**PWD** CITY OF RED BLUFF

APPROVED BY \_\_\_\_\_  
DATE: GARY M. GORDON, CITY ENGINEER

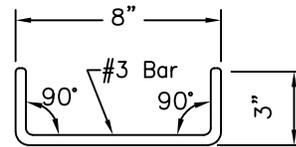
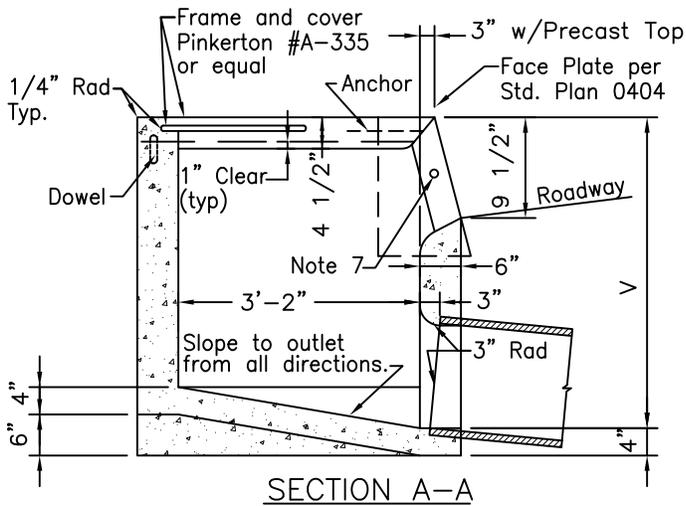
STANDARD PLAN

UNDER SIDEWALK DRAIN TYPE 2

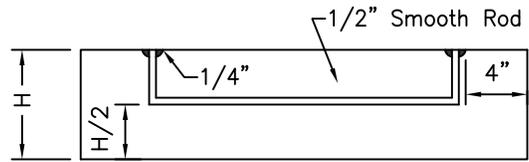
0402



STEEL LIST	
DESCRIPTION	REQ'D
#3 Bars, 4'-4" Long	5
#3 Bars, 3'-7" Long	4
#3 Bars, 1'-3" Long	3
Face Plate, 4'-6" Long	1
Dowels, See Detail	4
Frame and Cover Set	1
Protection Bar	Note 7



DOWEL DETAIL

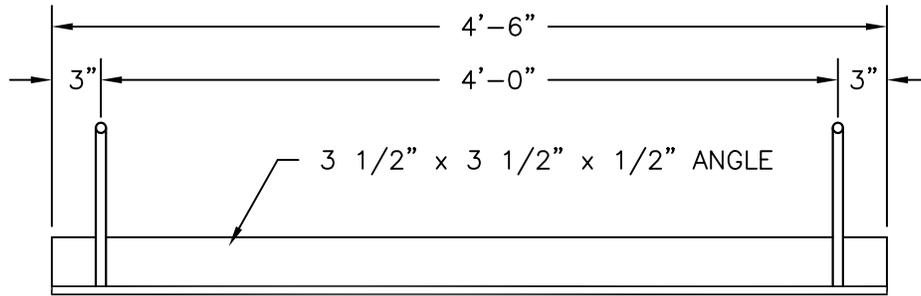


PROTECTION BAR DETAIL

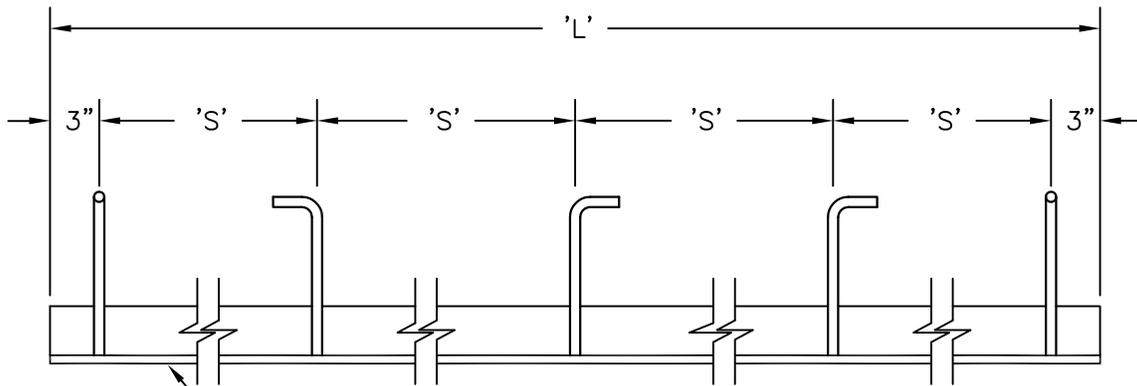
**NOTES:**

1. Connection pipe and outlet pipe may be placed in any position around the walls.
2. Curvature of the lip and sidewalls at the gutter opening shall be formed by curved forms.
3. Dimensions:  $V = 3'-6''$  unless otherwise specified.
4. Floor of basin shall be troweled to a hard, smooth surface and shall slope from all directions to the outlet.
5. Manhole shall be placed along the back wall.
6. Outlet pipe shall be trimmed to the final shape and length before concrete is poured.
7. Protection Bar: Place 1/2" smooth rod in center of opening attached to face plate.
8. Surface of all exposed concrete shall conform in slope, grade, color, finish and scoring to existing or proposed curb and walk adjacent to the basin.
9. Curb face at catch basin opening shall be that of the existing curb plus 2" or as otherwise shown.
10. Concrete shall be Class 560-C-3250
11.  $H = 9 \frac{1}{2}''$

NO.	REVISION	BY	 CITY OF RED BLUFF	STANDARD PLAN	
				CATCH BASIN NO. 1	
			APPROVED BY _____	0403	
			DATE: GARY M. GORDON, CITY ENGINEER		

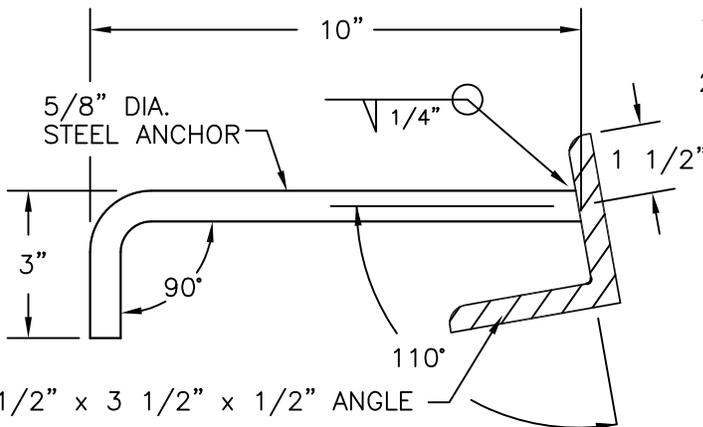


**PLAN**



**PLAN**

FACE ANGLES OVER  
4'-6" IN LENGTH



**ANCHOR DETAIL**

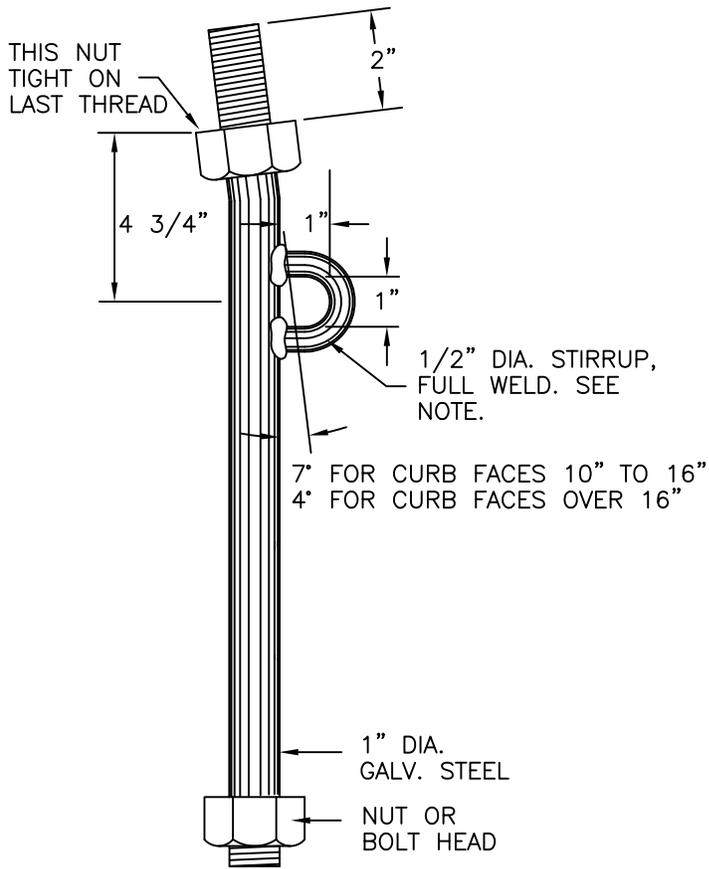
1. ALL ANGLES SHALL BE GALVANIZED AFTER FABRICATION.
2. INTERIOR ANCHORS SHALL BE TURNED 90°.

"L"	NO. OF ANCHORS	"S"
4'-0"	3	1'-9"
4'-6"	3	2'-0"
8'-0"	3	3'-9"
15'-0"	5	3'-7 1/2"
22'-0"	7	3'-7"
29'-0"	9	3'-6 3/4"

**ANCHOR LOCATION**

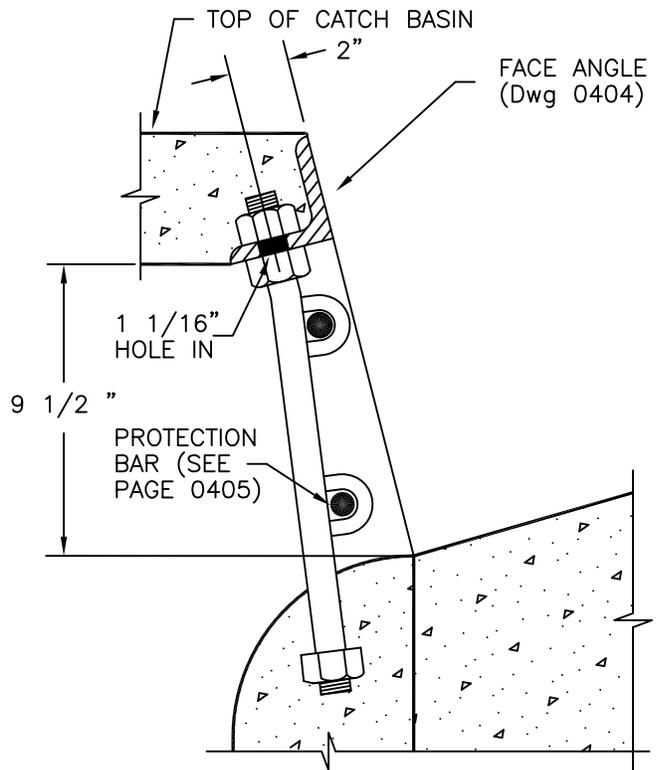
3 1/2" x 3 1/2" x 1/2" ANGLES  
OVER 4'-0" IN LENGTH

NO.	REVISION	BY	CITY OF RED BLUFF	STANDARD PLAN	0404
			<i>PWD</i>	CATCH BASIN FACE ANGLE DETAIL	
			APPROVED BY _____		
			DATE: _____		
			GARY M. GORDON, CITY ENGINEER		

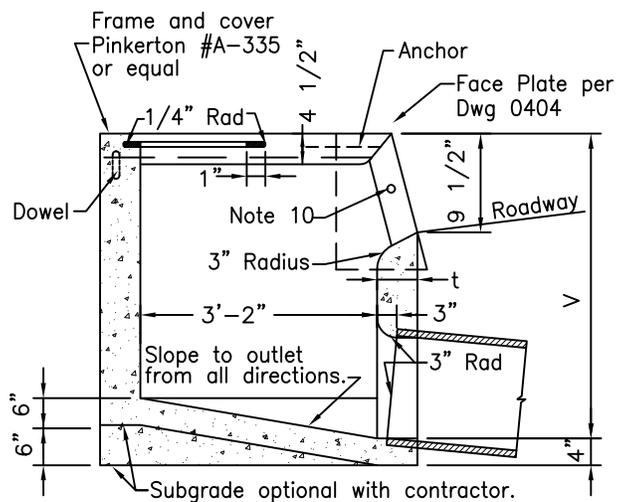
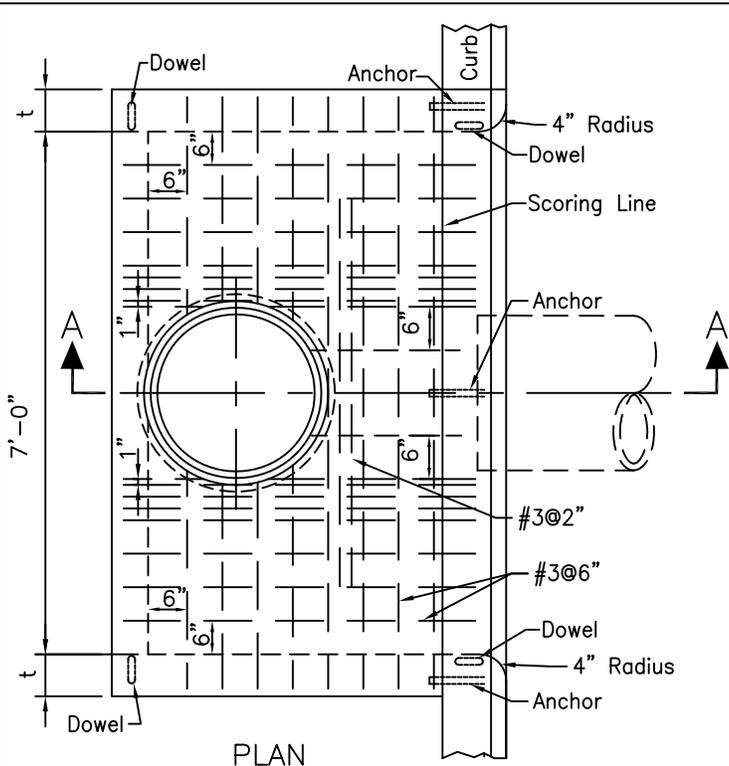


**NOTE:**

1. One Stirrup for protection bar shall be welded to support.
2. Install in center of opening.



NO.	REVISION	BY	CITY OF RED BLUFF		STANDARD PLAN	0404A
					DETAIL OF BOLT SUPPORT FOR CATCH BASIN	
APPROVED BY _____			GARY M. GORDON, CITY ENGINEER			
DATE: _____						

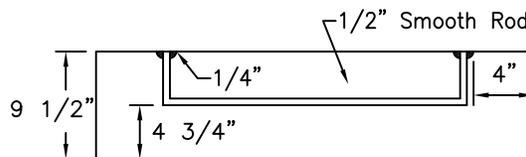


SECTION A-A

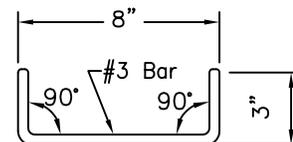
NOTES:

1. Connection pipe and outlet pipe may be placed in any position around the walls.
2. Curvature of the lip and sidewalls at the gutter opening shall be formed by curved forms.
3. Dimensions:  $t = 6''$  if  $V$  is  $4'-0''$  or less.  
 $t = 8''$  if  $V$  is between  $4'-0''$  and  $8'-0''$   
 $t = 10''$  if  $V$  is  $8'-0''$  or more.  
 $v = 4'-0''$  unless otherwise noted.
4. Floor of basin shall be troweled to a hard, smooth surface and shall slope from all directions to the outlet.
5. Manhole shall be placed along the back wall.
6. Outlet pipe shall be trimmed to the final shape and length before concrete is poured.
7. Surface of all exposed concrete shall conform in slope, grade, color, finish and scoring to existing or proposed curb and walk adjacent to the basin.
8. Curb face at catch basin opening shall be that of the existing curb plus 2" or as otherwise shown.
9. Concrete shall be Class 560-C-3250
10. Protection Bar: Place 1/2" smooth rod in center of opening attached to face plate.
11.  $H = 9 \frac{1}{2}''$
12. Install Bolt Support per Dwg 0404A.

STEEL LIST	
DESCRIPTION	REQ'D
#3 Bars, 7'-10" Long	3
#3 Bars, 3'-7" Long	14
#3 Bars, 3'-2" Long	2
#3 Bars, 2'-11" Long	6
#3 Bars, 1'-3" Long	3
Face Plate, 8'-0" Long	1
Dowels, See Detail	4
Frame and Cover Set	1



PROTECTION BAR DETAIL



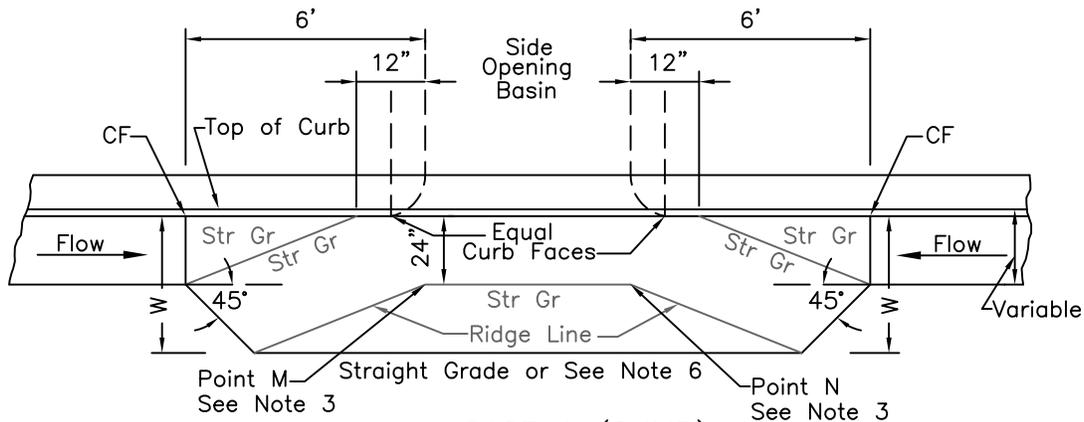
DOWEL DETAIL

NO.	REVISION	BY	
			 CITY OF RED BLUFF
APPROVED BY _____			GARY M. GORDON, CITY ENGINEER
DATE: _____			

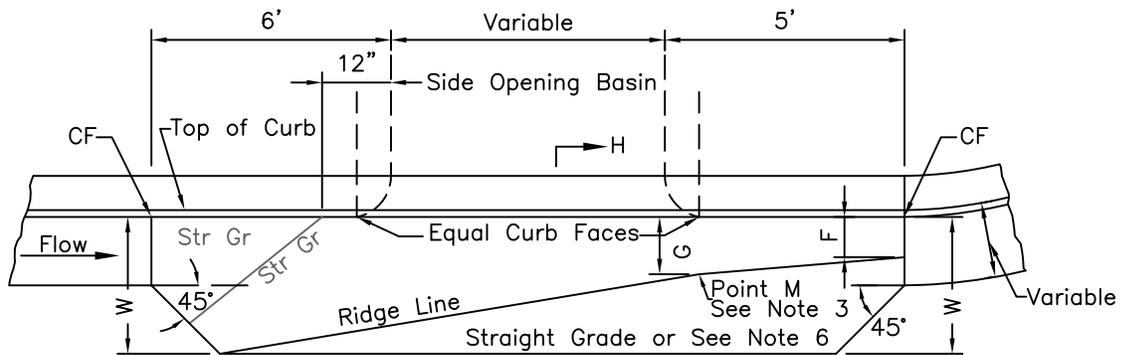
STANDARD PLAN	0405
CATCH BASIN NO. 2	

**NOTES:**

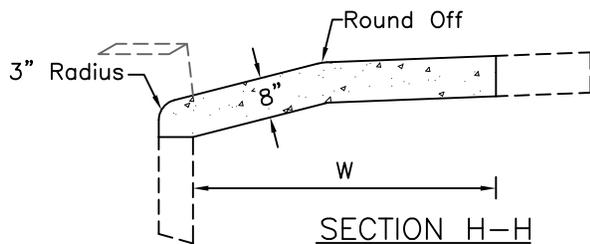
- Local depression shall be Case B unless otherwise specified on Construction drawings.
- Elevations at outer corners shown on const. dwgs. If no elevations are specified, the outer edge of local depression shall conform to finished street surface.
- Stakes shall be set to grade along the valley and along the ridge line (outer edge of actual depressed area). Stakes at points "M" & "N" shall be set on a straight grade between tops of end headers (if on a vertical curve see Note 6). These stakes shall not be removed until just prior to final finishing.
- $W = 4$  Feet unless otherwise specified.  
 $K = 5$  Feet unless otherwise specified.  
 $L = 6$  Feet unless otherwise specified.  
 $G =$  Width of Gutter.  
 $F = 2/3$  Width of Gutter.
- Concrete shall be Class 520-C-2500
- Special details governing the construction of this local depression on vertical curve shown on construction drawings.
- Where no curb exists, curb shall be constructed between ends of local depression with 6" CF at ends of local depression and 9 1/2" CF at CB openings. See construction drawings for curb section.



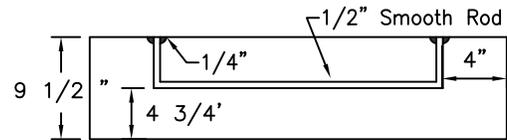
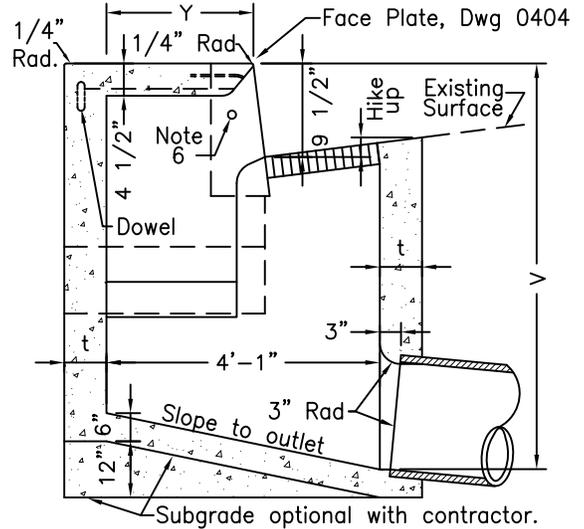
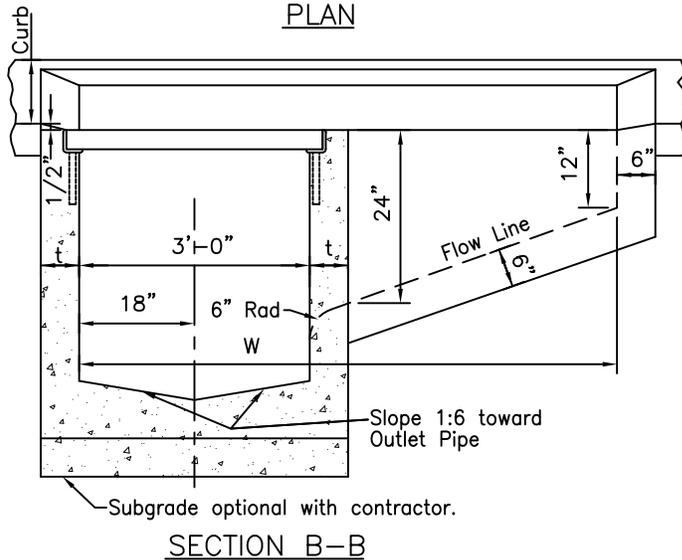
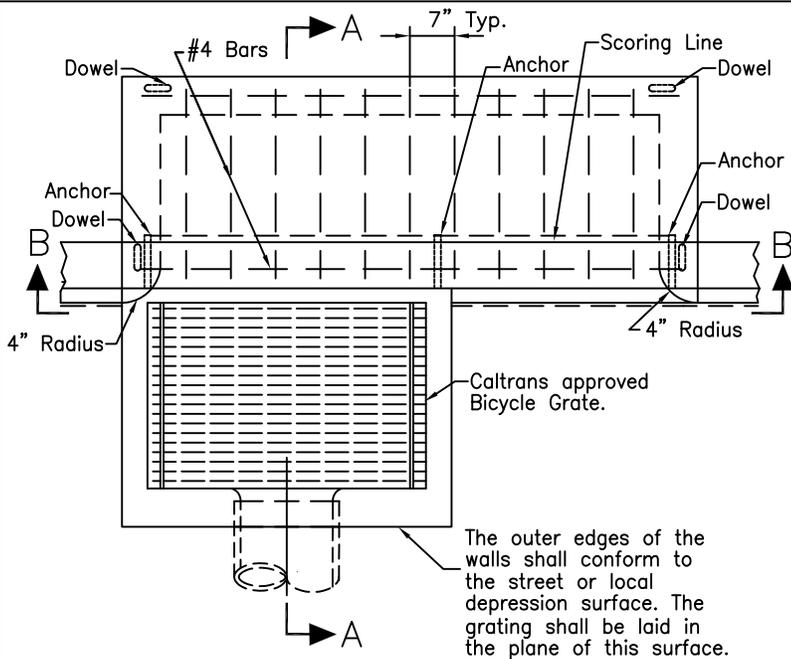
**CASE A (SUMP)**



**CASE B**



NO.	REVISION	BY	CITY OF RED BLUFF		STANDARD PLAN	0406
			<i>PWD</i>		LOCAL DEPRESSIONS CASES A & B	
			APPROVED BY _____			
			DATE: GARY M. GORDON, CITY ENGINEER			



STEEL LIST		
DESCRIPTION	NO. REQ'D	
Length of Basin, W=	14'	7'
#4 Bars, 2'-3" Long	24	12
#4 Bars, 7'-9" Long	0	2
#4 Bars, 14'-9" Long	2	0
Face Plate, Plan	1	1
Dowels	4	4
Protection Bar	Note 6	

**NOTES:**

1. Connection pipe and outlet pipe may be placed in any position around the walls Provided the position is consistent with the improvement plan.
2. Curvature of the lip and sidewalls at the gutter opening shall be formed by curved forms.
3. Dimensions:  
 Y = Variable (approx. 2'-3")  
 t = 6" if V = 5' or less.  
 t = 8" if V is greater than 5'  
 V = 4'-6" unless otherwise specified  
 W = 7'-0" unless otherwise specified  
 H = 9 1/2"

4. Floor of basin shall be troweled to a hard, smooth surface and shall slope from all directions to the outlet.
5. Outlet pipe shall be trimmed to the final shape and length before concrete is poured.
6. Protection Bar: Place 1/2" smooth rod in center of opening attached to face plate.
7. Reinforcing steel shall have 1" clearance from bottom of slab.
8. Surface of all exposed concrete shall conform in slope, grade, color, finish and scoring to existing or proposed curb and walk adjacent to the basin.
9. Concrete shall be Class 560-C-3250
10. Install Bolt Support per Dwg 0404A.

NO.	REVISION	BY

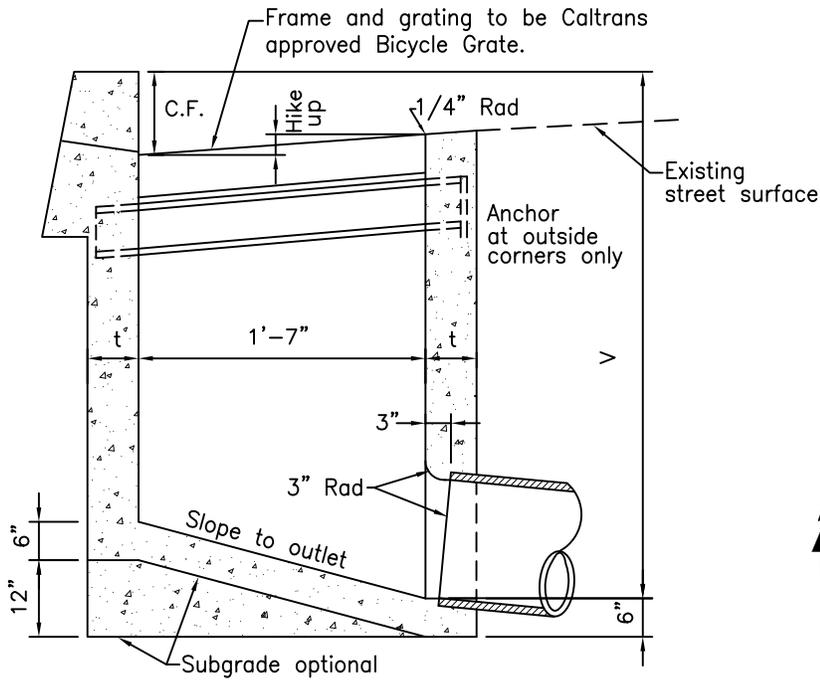
**PWD** CITY OF RED BLUFF

APPROVED BY \_\_\_\_\_  
 DATE: \_\_\_\_\_  
 GARY M. GORDON, CITY ENGINEER

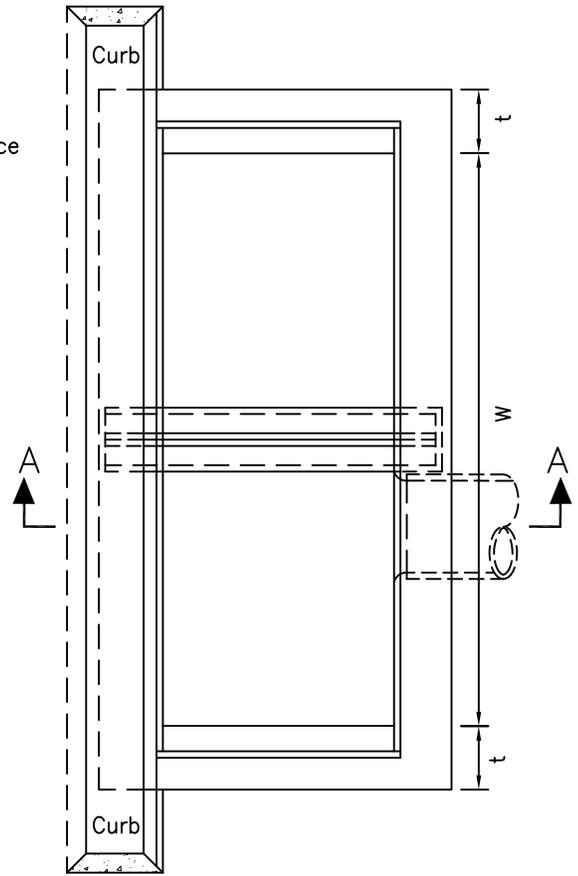
STANDARD PLAN

CATCH BASIN NO. 3

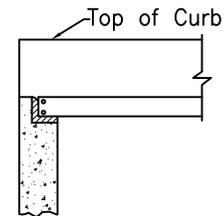
0407



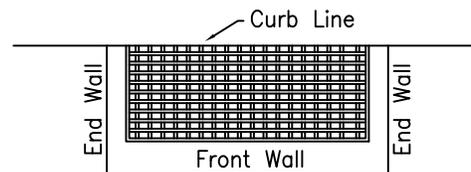
SECTION A-A



PLAN



DETAIL OF END WALL



NOTES:

1. Basin shall have one grating unless otherwise specified.
2. Connection pipes may be placed in any position around the walls.
3. Curb (Either standard or depressed).
4. Reinforcing, None required.
5. Dimensions:  
 The grating shall be laid in the plane of the existing street surface and the outer edges of walls shall conform to that surface.  
 The curb face shall equal that of the existing curb when not used with L.D.  
 $t = 6''$  if  $V = 4'$  or less.  
 $t = 8''$  if  $V$  is between  $4'$  and  $8'$ .  
 $t = 10''$  if  $V = 8'$  or greater.  
 $V = 3'-6''$  unless otherwise specified.  
 $W = 2'-11 \frac{3}{8}''$  for 1 grating. Add  $3'-5 \frac{3}{8}''$  for each additional grating.
6. Floor of basin shall be troweled to a hard, smooth finish and slope from all directions to outlet.
7. Surface of curb shall conform in slope, grade, color, finish and scoring to adjacent curb.
8. Outlet pipe shall be trimmed to the final shape and length before concrete is poured.
9. Concrete shall be Class 560-C-3250
10. Curb face at catch basin opening shall be that of the existing curb plus 2" or as otherwise shown.

NO.	REVISION	BY

**PWD** CITY OF RED BLUFF

APPROVED BY \_\_\_\_\_  
 DATE: GARY M. GORDON, CITY ENGINEER

STANDARD PLAN

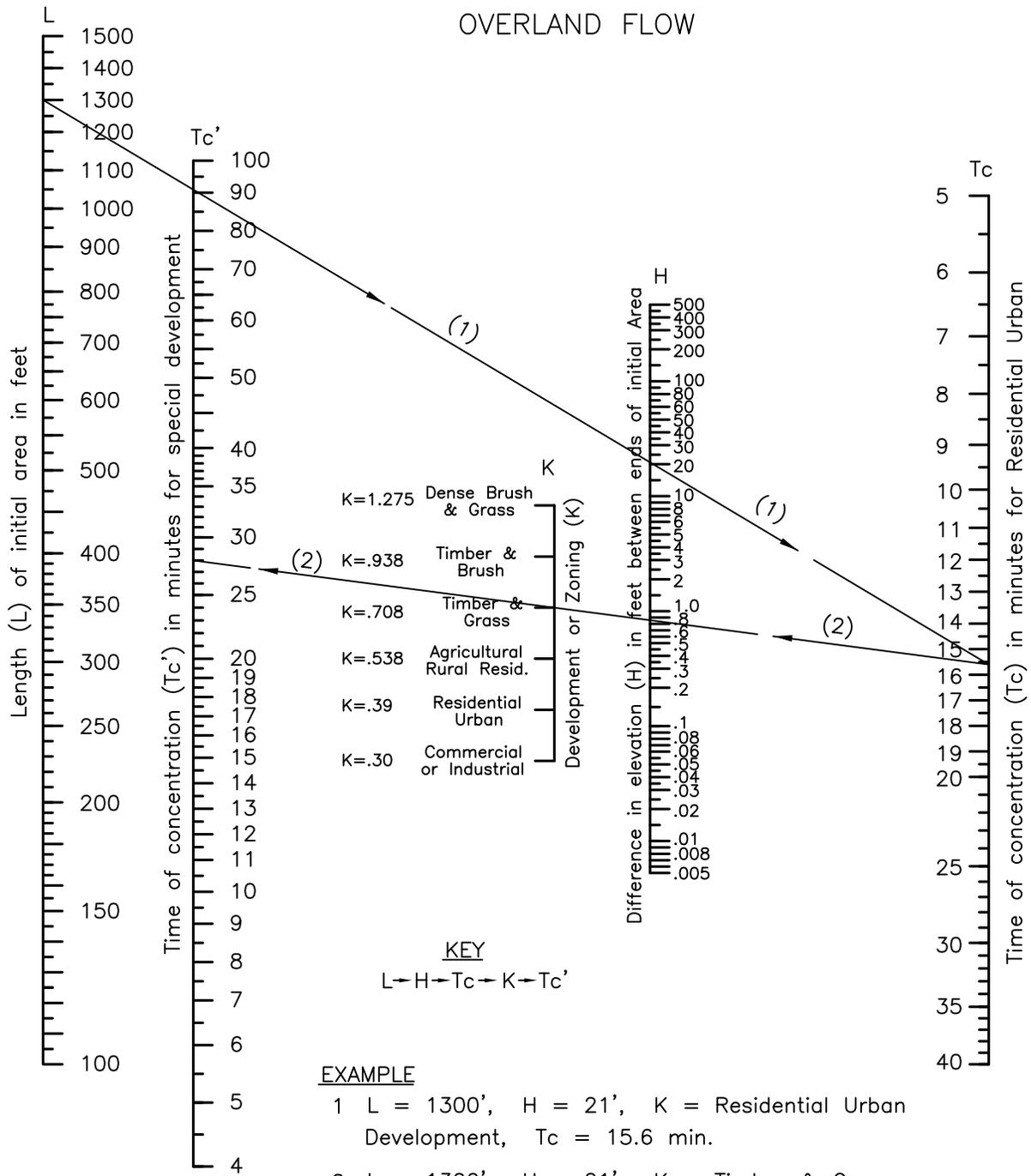
CATCH BASIN NO. 4

0408



# HYDROLOGY

## TIME OF CONCENTRATION FOR INITIAL AREA OVERLAND FLOW



**KEY**  
L → H → Tc → K → Tc'

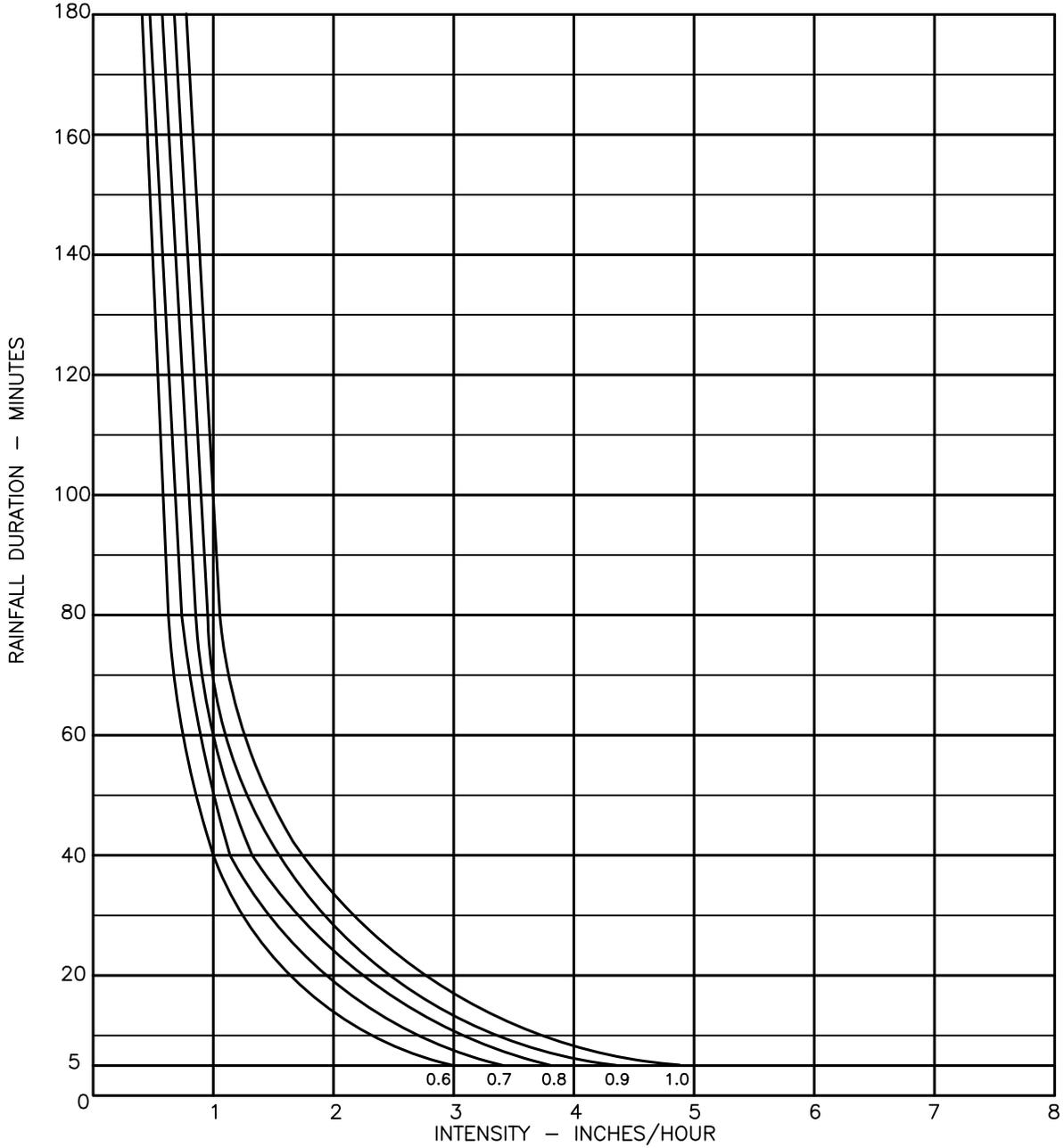
**EXAMPLE**

- 1 L = 1300', H = 21', K = Residential Urban Development, Tc = 15.6 min.
- 2 L = 1300', H = 21', K = Timber & Grass Development, Tc' = 28.0 min.

$$Tc = K \left( \frac{L^3}{H} \right)^{1/5}$$

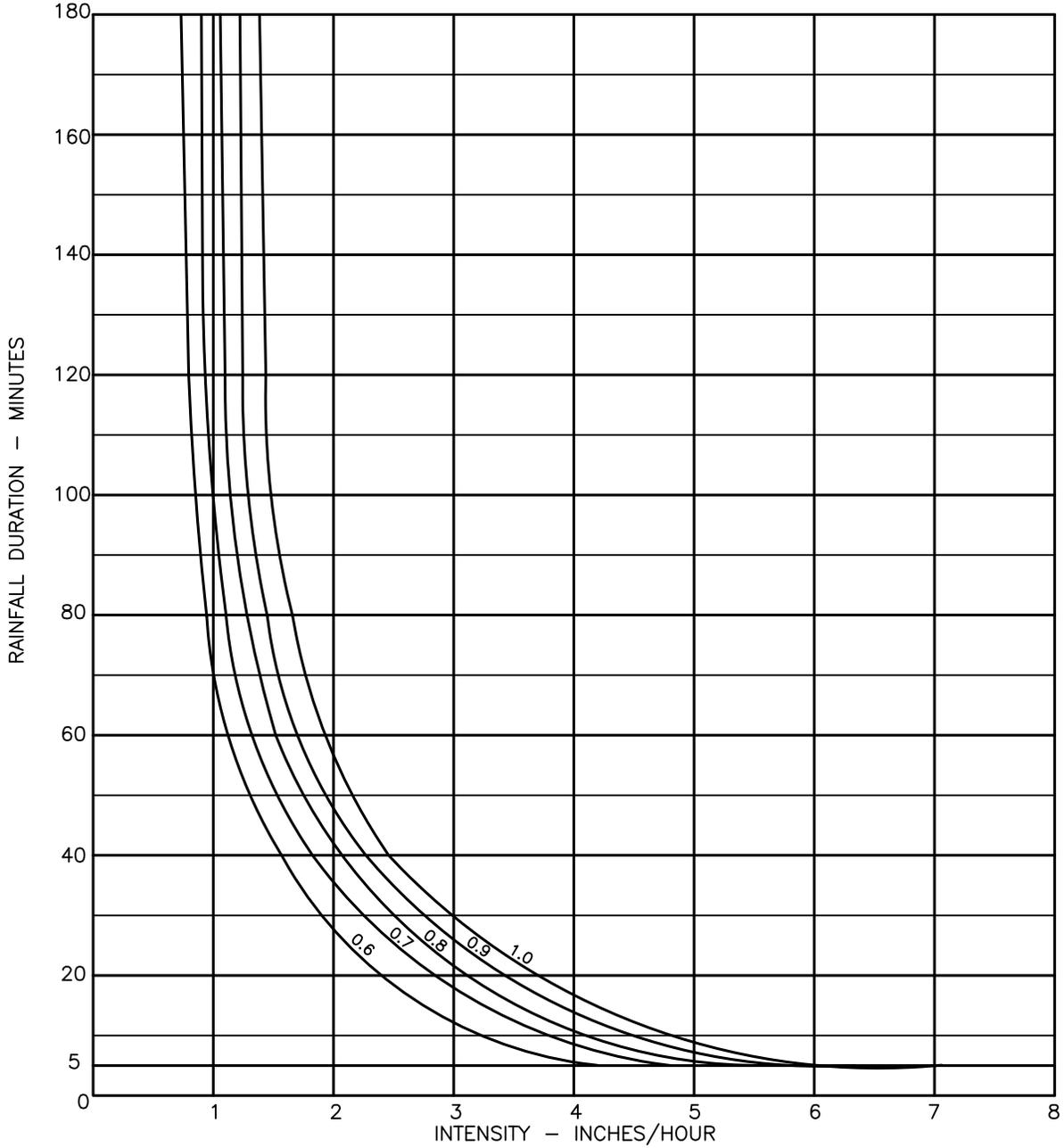
NO.	REVISION	BY	CITY OF RED BLUFF	STANDARD PLAN	0410
				TIME OF CONCENTRATION	
APPROVED BY _____					
DATE: _____			GARY M. GORDON, CITY ENGINEER		

10 YEAR RETURN PERIOD

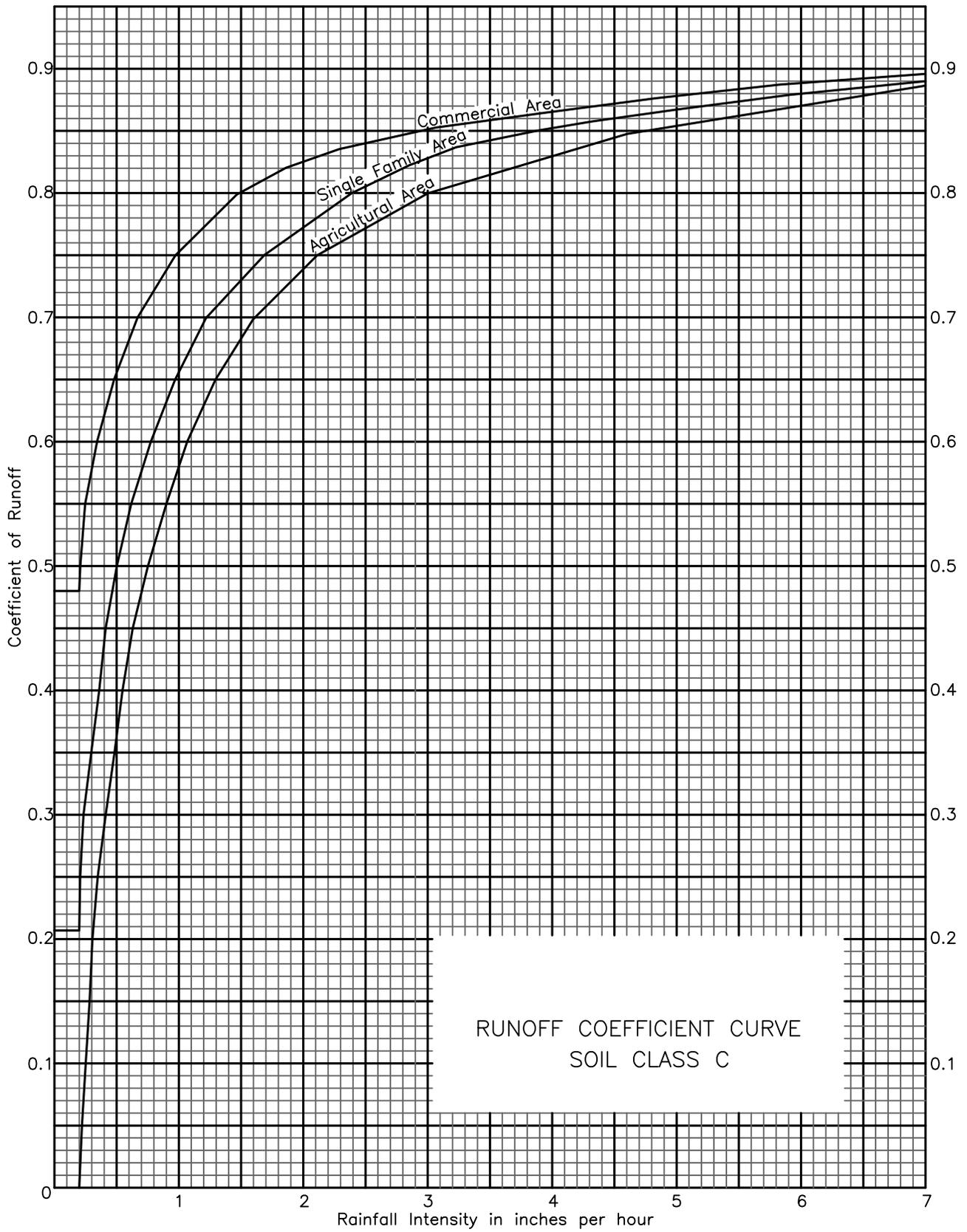


NO.	REVISION	BY	 CITY OF RED BLUFF	STANDARD PLAN	0411
				RAINFALL INTENSITY DURATION CURVES	
			APPROVED BY _____ DATE: GARY M. GORDON, CITY ENGINEER		

100 YEAR RETURN PERIOD

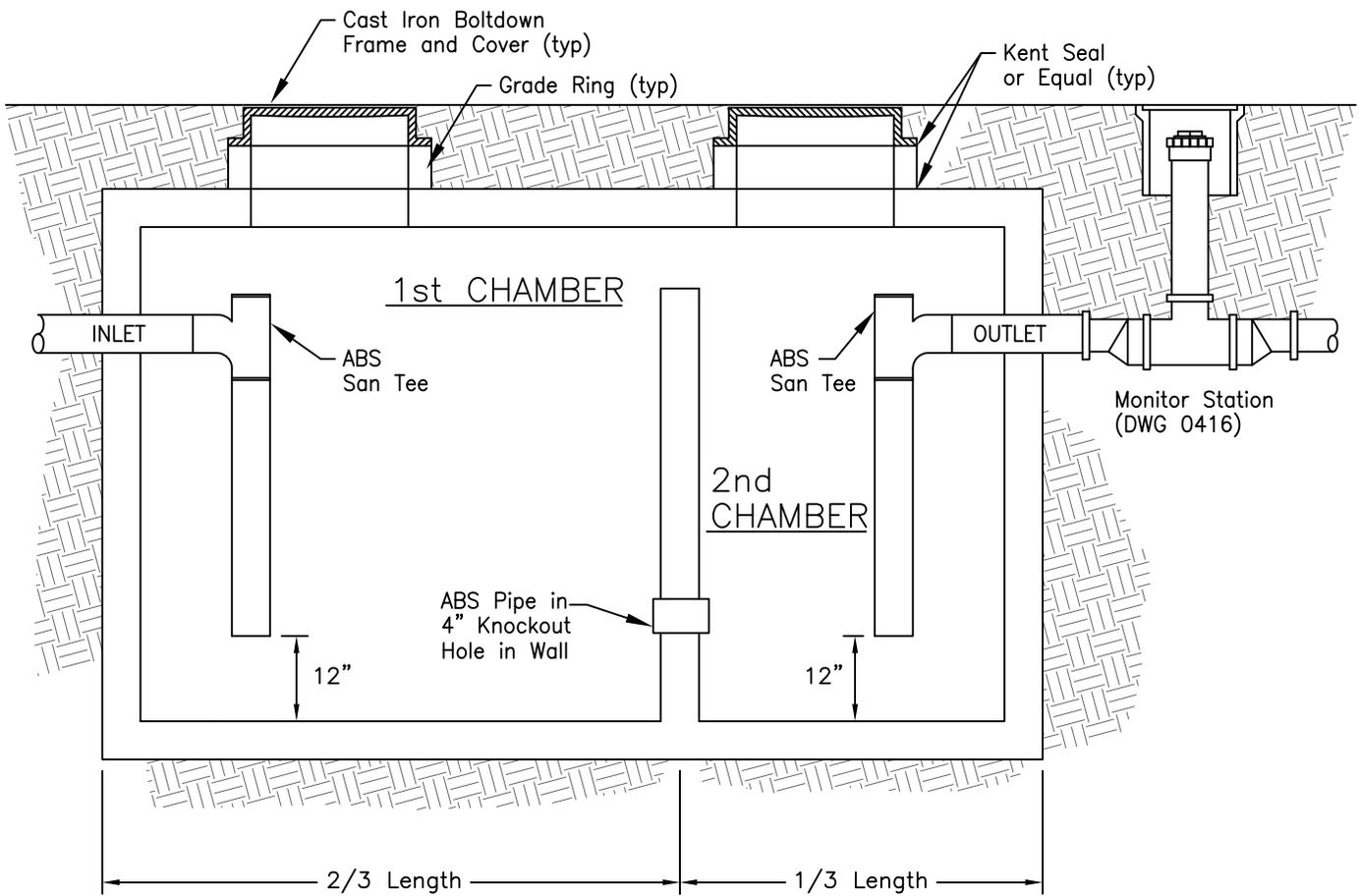


NO.	REVISION	BY	 CITY OF RED BLUFF <hr/> <hr/>	STANDARD PLAN	0412	
						RAINFALL INTENSITY DURATION CURVES
			APPROVED BY: _____ DATE: _____ GARY M. GORDON, CITY ENGINEER			

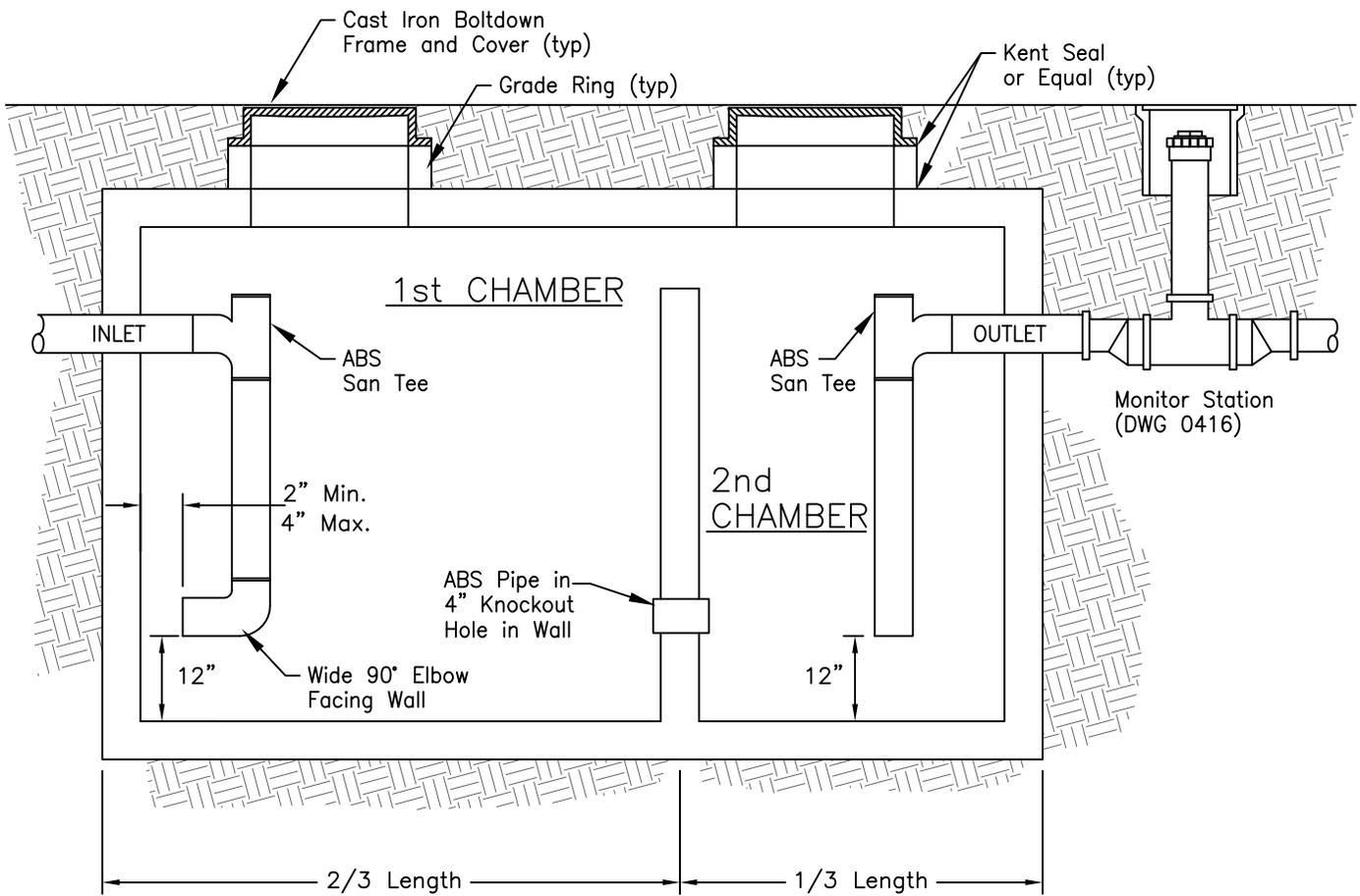


RUNOFF COEFFICIENT CURVE  
SOIL CLASS C

NO.	REVISION	BY	 CITY OF RED BLUFF <hr/> APPROVED BY _____ DATE: GARY M. GORDON, CITY ENGINEER	STANDARD PLAN	0413
				RUNOFF COEFFICIENT CURVE	



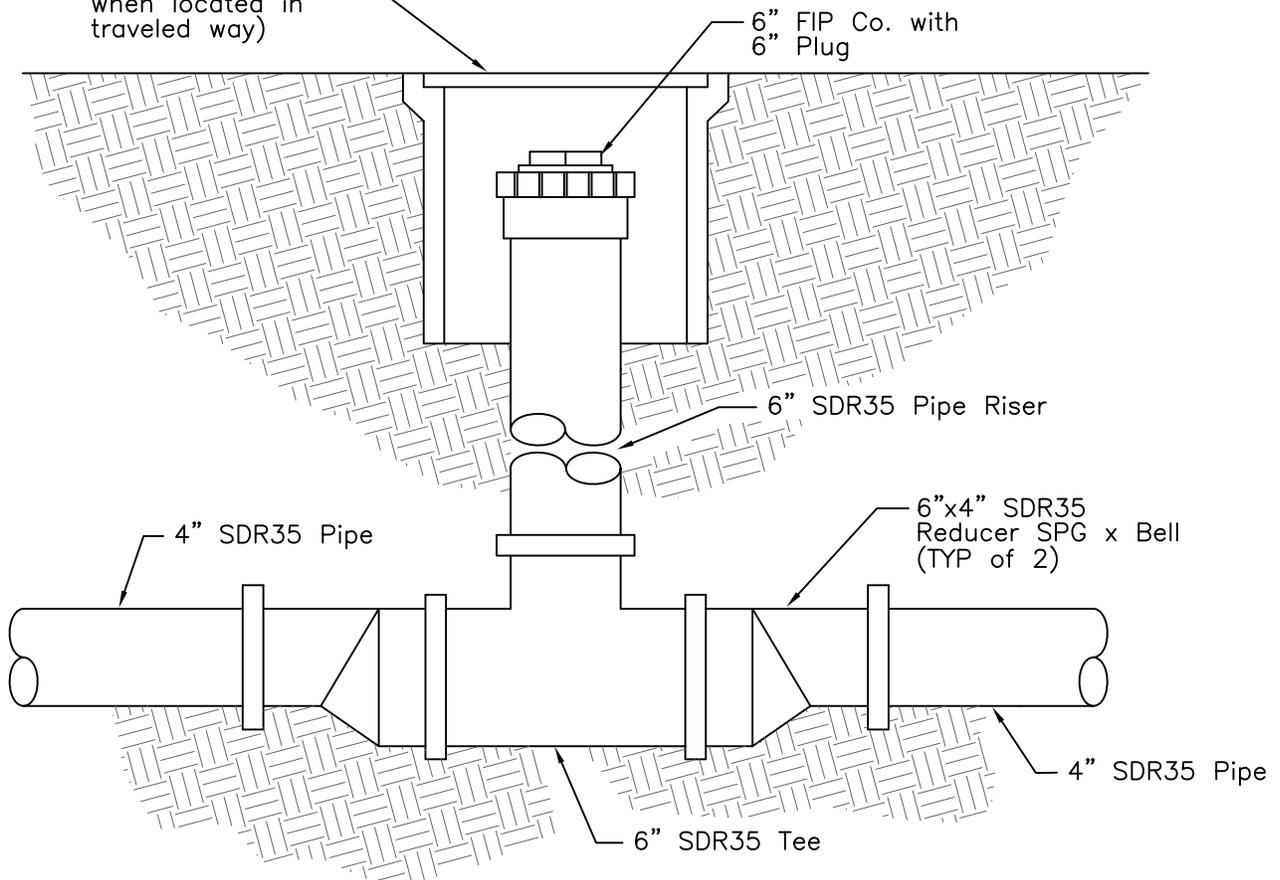
NO.	REVISION	BY	<p><i>PWD</i> CITY OF RED BLUFF</p> <hr/>	STANDARD PLAN	0414
				<p>APPROVED BY _____</p> <p>DATE: GARY M. GORDON, CITY ENGINEER</p>	



NO.	REVISION	BY	<p><i>PWD</i> CITY OF RED BLUFF</p> <hr/> <p>APPROVED BY _____</p> <p>DATE: GARY M. GORDON, CITY ENGINEER</p>	STANDARD PLAN	0415

Christy or equal  
G5 Conc. Box with lid  
(Provide traffic lid  
when located in  
traveled way)

NOTE:  
Monitor Station must be level.



PARTS LIST

- 1 ————— 6" SDR35 Tee
- 2 ————— 6"x4" SDR35 Reducer  
(SPG x BELL)
- 1 ————— 6" FIP Collar
- 1 ————— 6" Plug
- 1 ————— G5 Conc. Box (Christy or Equal)
- 1 ————— G5 Sewer Lid (Christy or Equal)

If Required

- 1 ————— 4" ABS CPLG
- 1 ————— 4" ABS x SDR Bushing

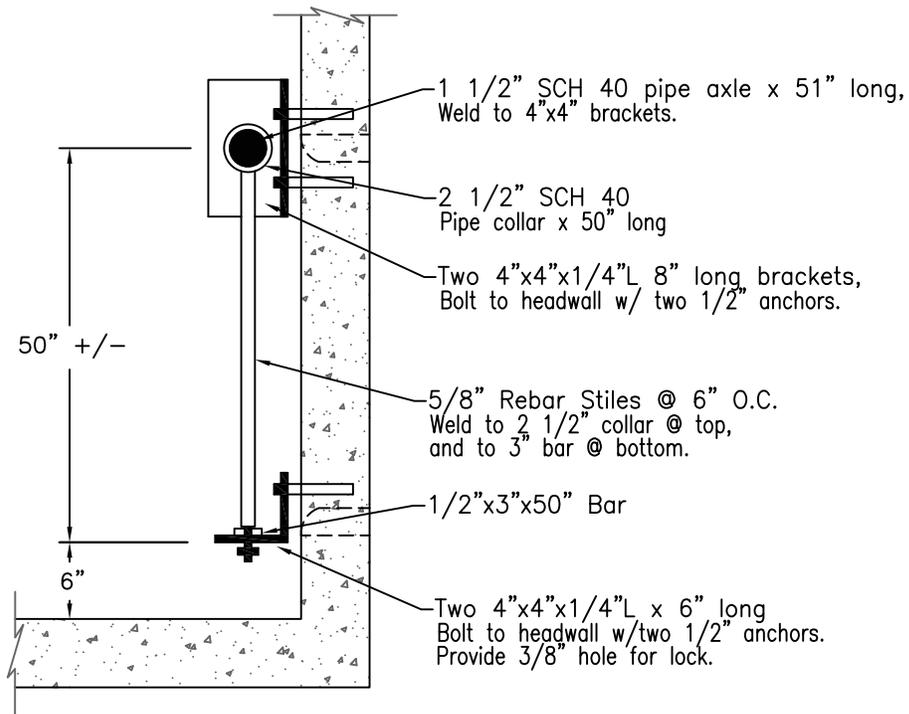
NO.	REVISION	BY

*PWD* CITY OF RED BLUFF

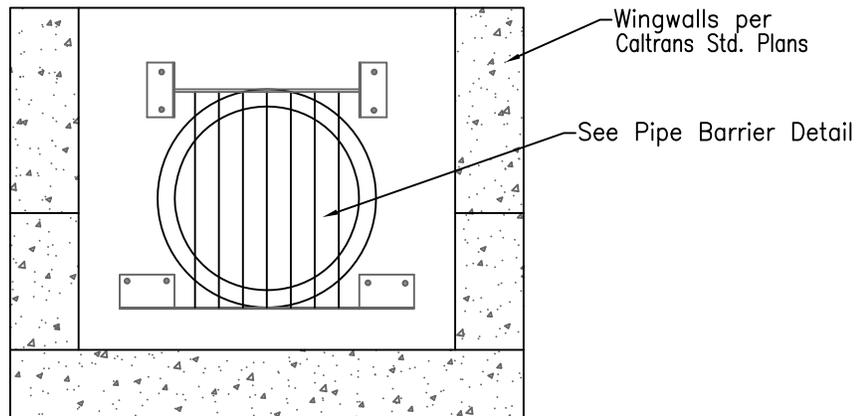
APPROVED BY \_\_\_\_\_  
DATE: GARY M. GORDON, CITY ENGINEER

STANDARD PLAN
INTERCEPTOR MONITOR STATION

0416

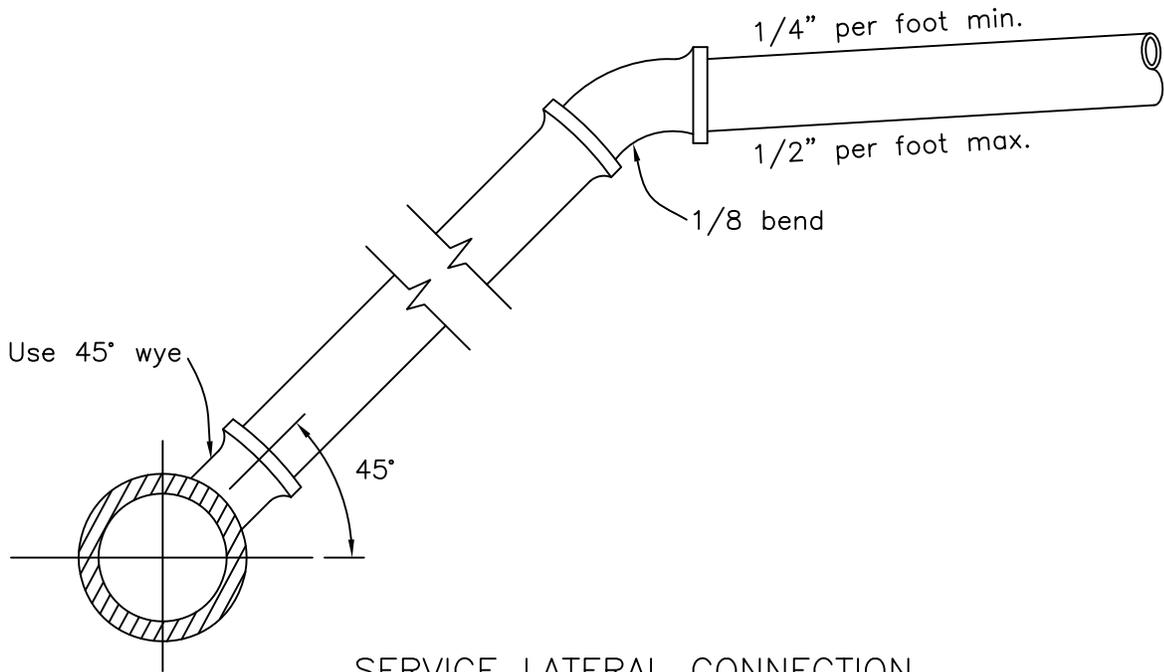
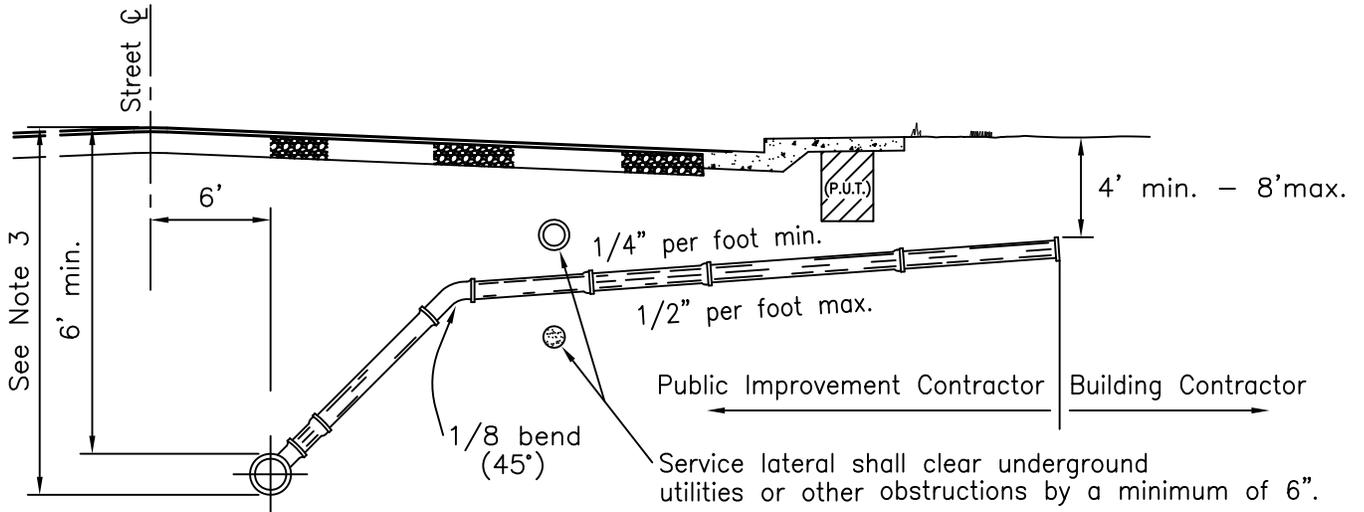


SWING OPEN PIPE BARRIER DETAIL



OUTLET STRUCTURE

NO.	REVISION	BY	 CITY OF RED BLUFF	STANDARD PLAN		0417
					SWING OPEN PIPE BARRIER & OUTLET STRUCTURE FOR PIPES 30" OR LARGER	
				APPROVED BY _____ DATE: _____ GARY M. GORDON, CITY ENGINEER		

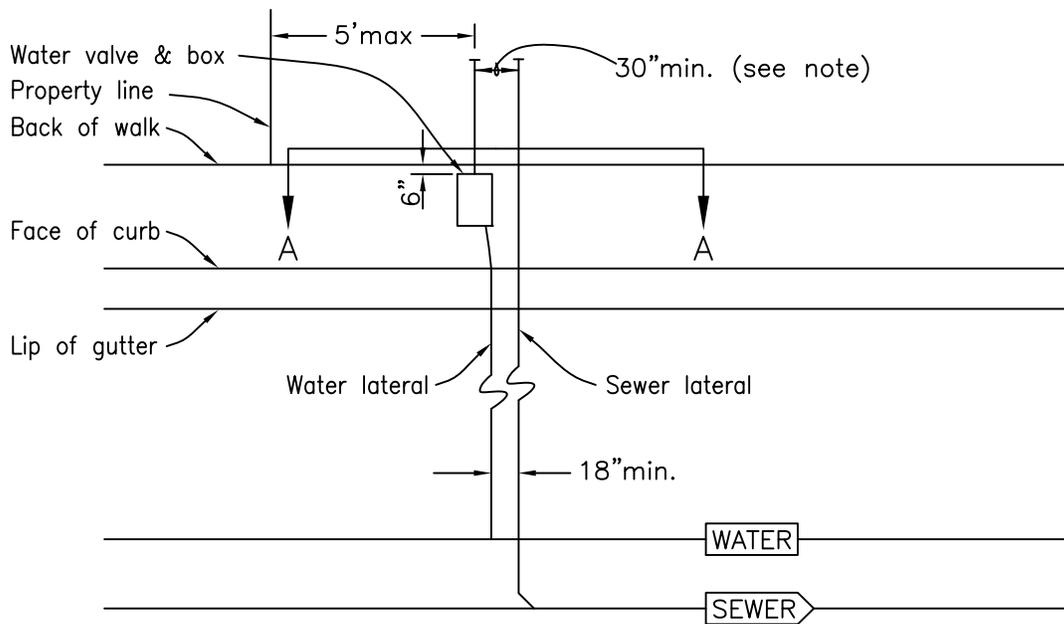


SERVICE LATERAL CONNECTION

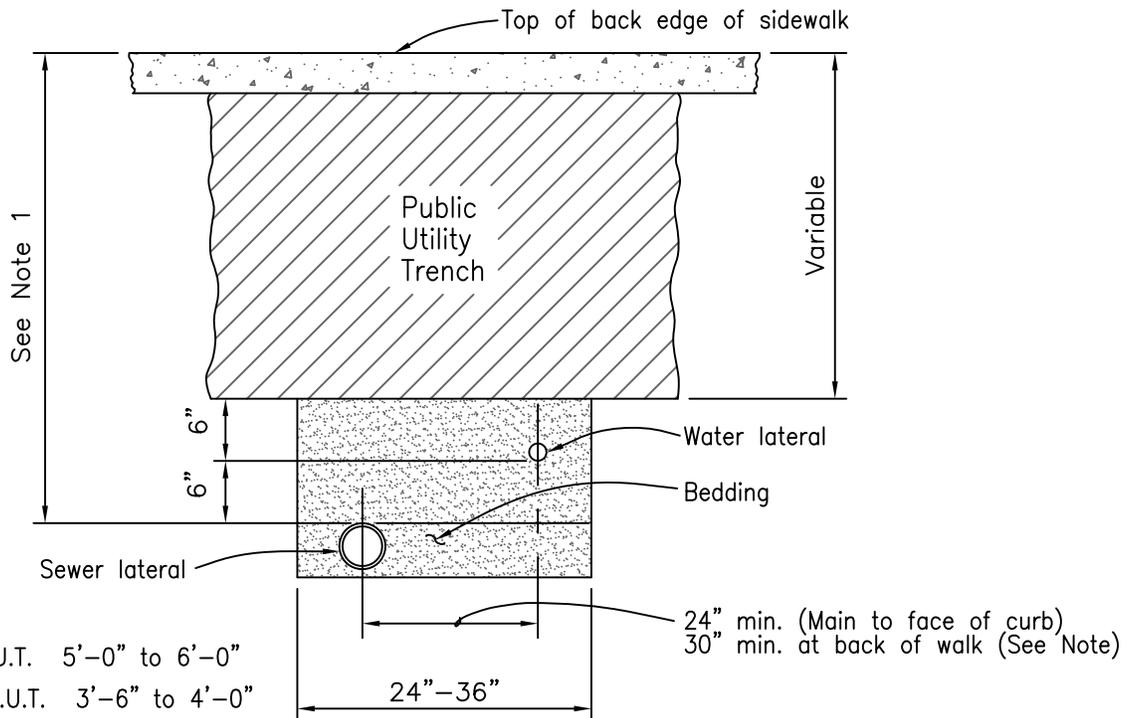
GENERAL NOTES:

1. For connection to existing sewer main, see Detail 0506.
2. Stamp "S" in 2" letter on top of curb at service locations.

NO.	REVISION	BY	 CITY OF RED BLUFF	STANDARD PLAN	0500
				SEWER SERVICE LATERAL	
			APPROVED BY _____ DATE: GARY M. GORDON, CITY ENGINEER		



PLAN VIEW  
(not to scale)

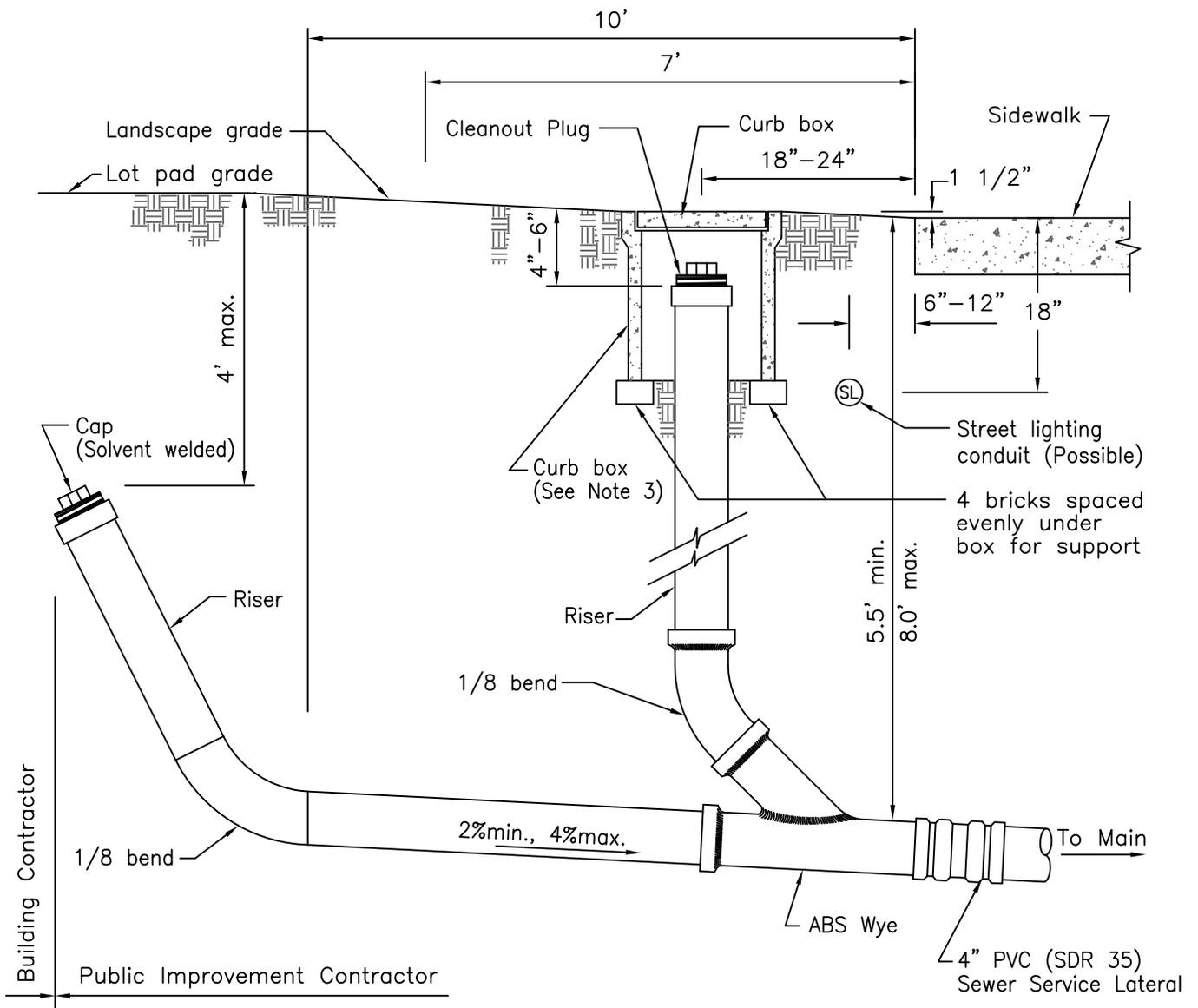


NOTE:

1. w/ P.U.T. 5'-0" to 6'-0"  
w/o P.U.T. 3'-6" to 4'-0"

SECTION A-A  
(not to scale)

NO.	REVISION	BY	 CITY OF RED BLUFF <hr/> <hr/>	STANDARD PLAN	0501
				APPROVED BY _____ DATE: _____ GARY M. GORDON, CITY ENGINEER	



**NOTES:**

1. Cleanout plug shall be threaded.
2. Curb box shall be as follows:
  - a) In landscaped areas, use Cook box with bolt down cover or approved equal, marked "SEWER".
  - b) In concrete or paved areas, use Cook box or approved equal, with a traffic lid marked "SEWER".
  - c) Box shall be set 1-1/2" above back of walk at landscape grade.
3. In areas where the sidewalk is not monolithic with the curb, the cleanout shall be located within 18" to 24" from the back of curb.
4. Joint trench shall be a minimum of six (6) inches above the sanitary sewer lateral.
5. Sanitary sewer lateral assembly shall not be less than 4" in diameter.

NO.	REVISION	BY			
			 CITY OF RED BLUFF	<b>SEWER LATERAL CLEANOUT</b>	<b>0502</b>
			APPROVED BY _____ DATE: _____		
			GARY M. GORDON, CITY ENGINEER		

In manhole where main pipe line turns through 90° angle, use long radius 90° V.C.P. channel section to allow pipe line to be laid continuously through manhole.

Main pipe to be laid through manhole. Top to be broken out after concrete in base has set.

Concrete shall be Class "A", as specified in Section 5, of the Materials and Construction Methods Division of these Standard Specifications.

Form channel in concrete base for lines coming in from side

Top of manhole frame to be set 1/4" below finished street surface

Manhole frame and cover to be as per Standard Detail No.0420

Concrete collar to extend 6" onto cone

Maximum of two 6" grade rings.

Place mortar band at joint - minimum 1/2"x4"  
Use Kent Seal at all joints.

One, two and three foot lengths are optional

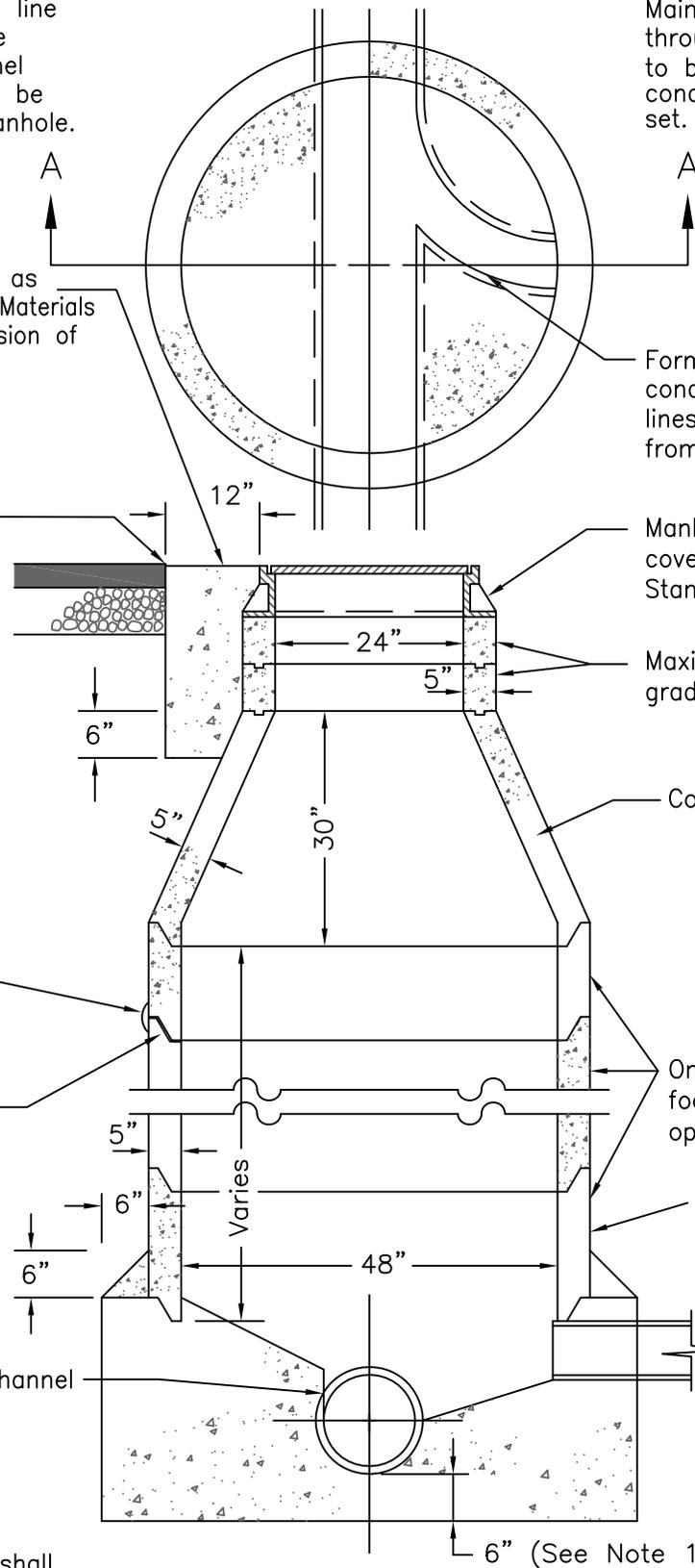
Ramneck (SP) or other water tight material

5" pre-cast or 6" cast-in-place Class "A" concrete (6 sack)  
Use Caulter Coupling if pre-cast base.

Full pipe depth "U" shape channel

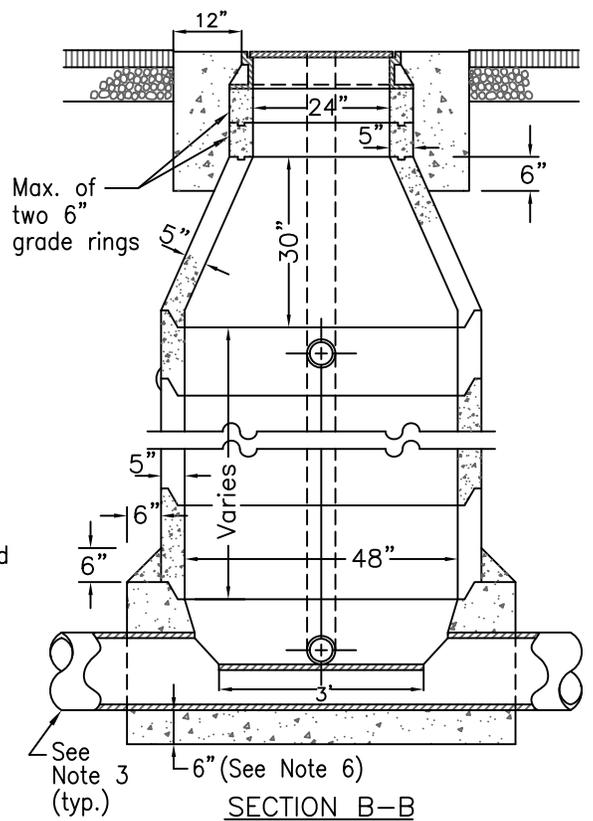
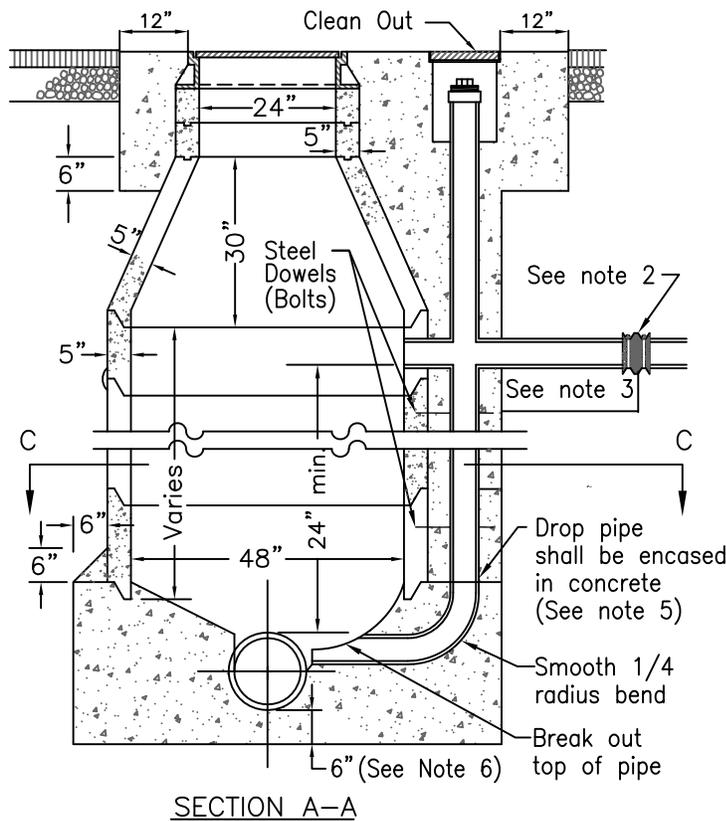
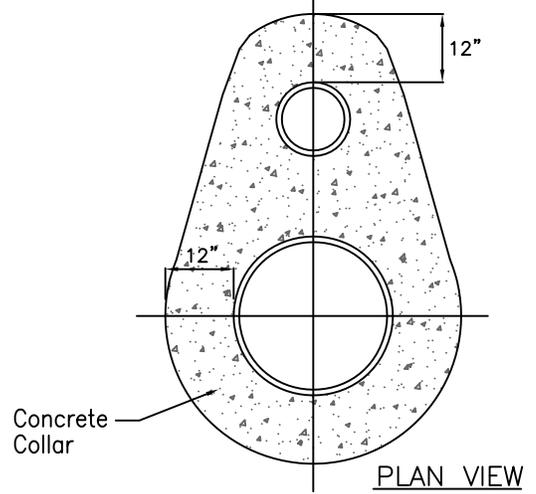
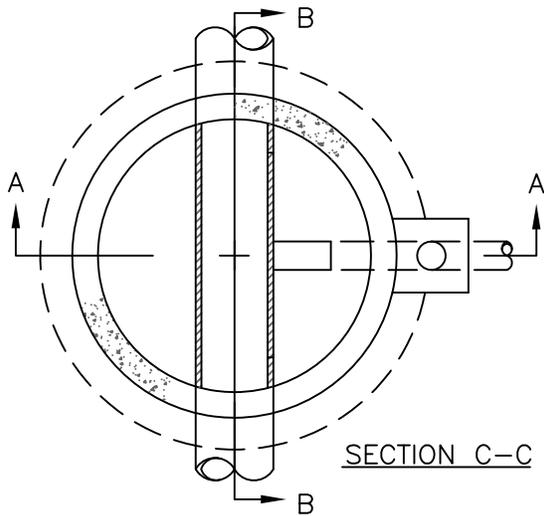
**NOTE:**

1. Precast manhole bases shall have 5" minimum thickness.



SECTION A-A

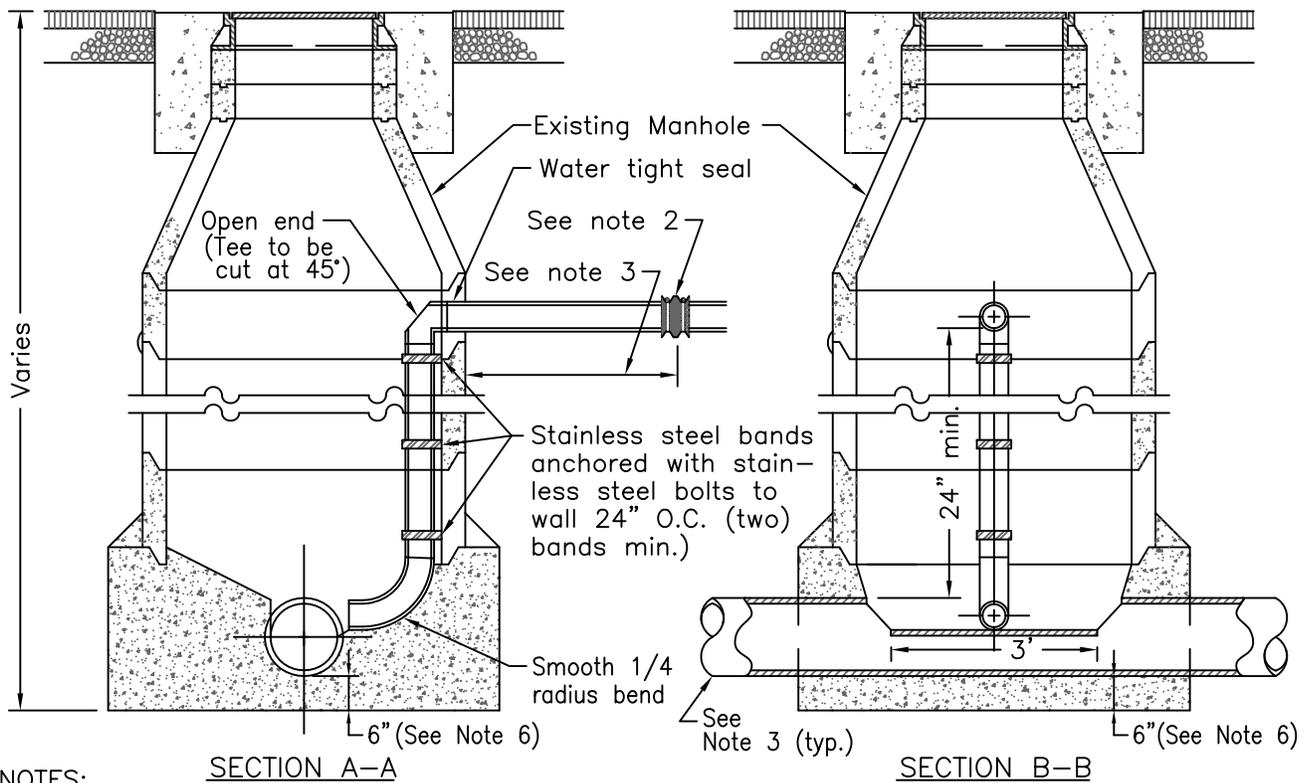
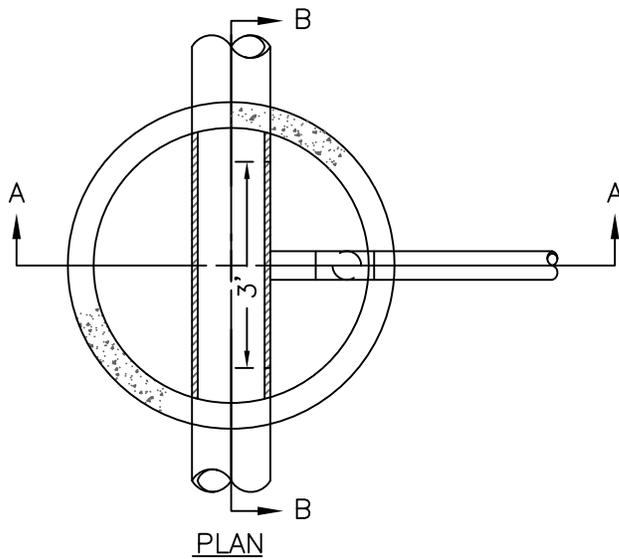
NO.	REVISION	BY		STANDARD PLAN	0503
				APPROVED BY _____ DATE: _____ GARY M. GORDON, CITY ENGINEER	



**NOTES:**

1. This installation shall be used on new manholes only where the difference in elevation between the top of the outlet pipe and the invert of the feeder or collector sewer exceeds 24".
2. Band shall have a minimum of 3 locking bands straps.
3. 12" max for 8" to 12" or larger pipe. 24" max. for pipes less than 8".
4. This detail shall only be used for drop pipes 12" or less. Larger pipes require individual design and approval by the City Engineer.
5. PVC pipe shall be used inside the concrete casting.
6. Precast manhole bases shall have 5" minimum thickness.

NO.	REVISION	BY	 CITY OF RED BLUFF	STANDARD PLAN	0504	
						OUTSIDE SANITARY SEWER DROP MANHOLE
			APPROVED BY _____ DATE: _____ GARY M. GORDON, CITY ENGINEER			



NOTES:

1. This installation shall be used on existing manholes only where the difference in elevation between the top of the outlet pipe and the invert of the feeder or collector sewer exceeds 24".
2. Band shall have a minimum of 3 locking bands straps.
3. 12" max for 8" to 12" or larger pipe. 24" max. for pipes less than 8".
4. This detail shall only be used for drop pipes 12" or less. Larger pipes require individual design and approval by the City Engineer.
5. PVC or ABS pipe must be used inside manhole.
6. Precast manhole bases shall have 5" minimum thickness.

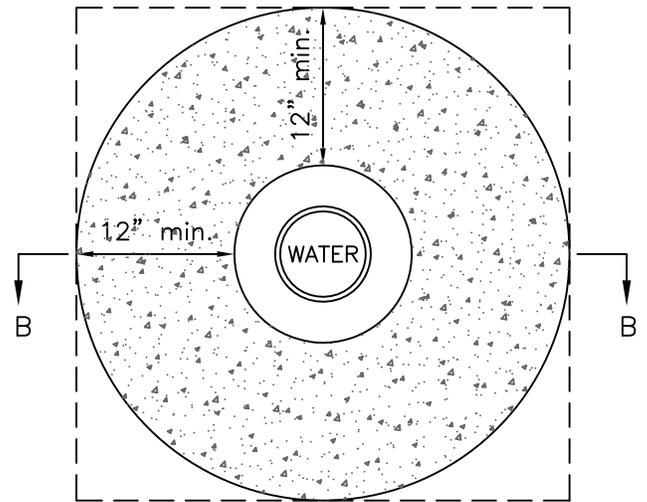
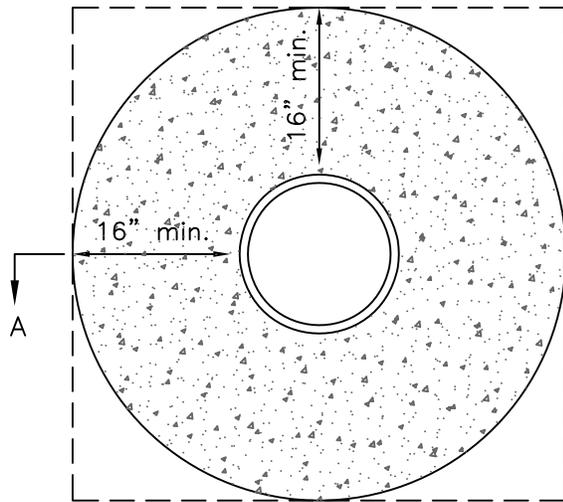
NO.	REVISION	BY	 CITY OF RED BLUFF <hr/> APPROVED BY _____ DATE: GARY M. GORDON, CITY ENGINEER	STANDARD PLAN	0505

# SEWER LINE TAPS

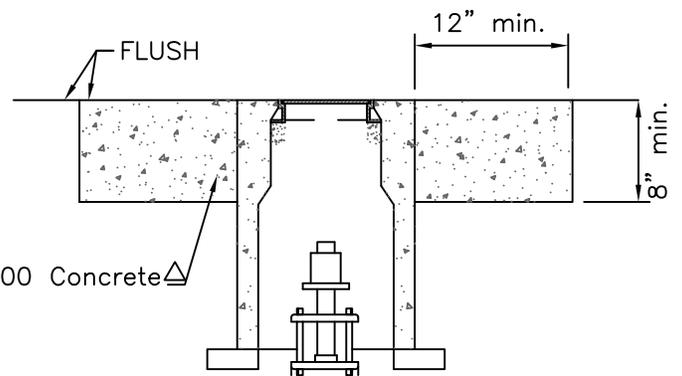
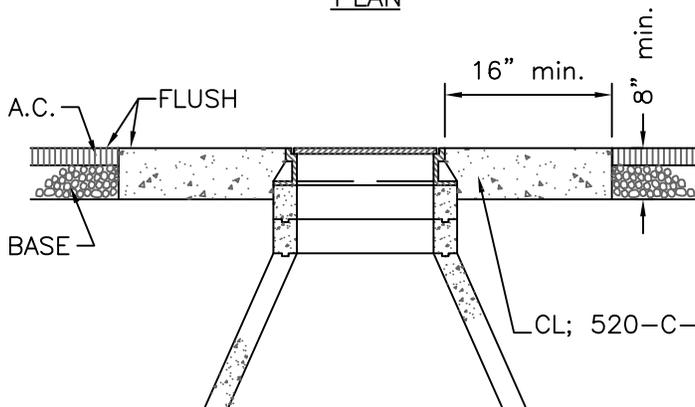
## NOTES

1. The saddle and hub shall be provided by City. The tap shall be performed by the City. All preparations, excavations, shoring and backfill shall be performed by the contractor. All on-site work shall be completed in accordance with the California Building Code and approved by the City Building Department prior to covering.
2. See Standard Detail 0500 for Sewer Service Lateral.
3. In new construction, wyes are to be used for all connections.

NO.	REVISION	BY	 <u>CITY OF RED BLUFF</u>	STANDARD PLAN	0506
				SEWER LINE TAPS	
APPROVED BY _____			DATE: _____	GARY M. GORDON, CITY ENGINEER	



PLAN



MANHOLE SECTION A-A

VALVE BOX SECTION B-B

No Scale

NOTES:

1. Use 12" min. collar on sanitary sewer rodhole.
2. Construct concrete collar square or circular.
3. Valve box shall be Brooks Products No. I-RT or equal.
4. Manhole frame and cover shall be Pinkerton No. A-107 or equal.
5. Rodhole frame and cover shall be Pinkerton No. A-490 or equal.

NO.	REVISION	BY	 CITY OF RED BLUFF	STANDARD PLAN	0507	
						MANHOLE-VALVE BOX ADJUSTMENT TO FINISHED GRADE
			APPROVED BY _____ DATE: _____ GARY M. GORDON, CITY ENGINEER			

## Type of Stations

Small lift stations shall be prefabricated package-type with non-submersible centrifugal non-clog pumps. Smith and Loveless Package Stations are recommended for consistency with existing stations.

Pneumatic ejection stations may be allowed in certain circumstances of low and intermittent flows normally associated with isolated dischargers to the City's collection system.

When a small number of connections require pumping to discharge to a gravity sewer, private stations shall be considered.

## Capacity

The design capacity of these stations shall be equal to the projected peak wet weather flow for the service area tributary to the station. It is recommended that the peak wet weather flow be based on available data for the service area. If the projected flow is more than twice the flow expected in the first two or three years of operation, pumping equipment should be sized for the first few years only. If possible, pumps shall be selected so future capacity increases can be made by installing larger impellers and motors.

Each station shall be equipped with a minimum of two pumps. The pumps should be sized so the full design capacity can be achieved with a single pump out of service.

## Appurtenances

Package lift stations shall include the following appurtenances for safe and convenient operation and maintenance:

1. Each pump shall be isolated with gate or plug valves on both the suction and discharge piping in addition to the discharge check valve.
2. A circuit breaker shall be located within the lift station.
3. Pump control shall be start-stop based on wet well level. Level detection shall be accomplished using a Multitrode MT2PC with 2.5/10-30 Probe system with a visual indicator installed in the control panel. Hour meters are required for each pump. A manual pump prime switch shall be provided for maintenance personnel.
4. Lift station by-pass piping and valves shall be provided for emergency operation and maintenance servicing. Minimum clearance from valve tope to underside of cover is 8".
5. Lift station shall include a transfer switch and emergency generator hook-up for power failure.

NO.	REVISION	BY	 <u>CITY OF RED BLUFF</u>	STANDARD PLAN	0600
				<small>APPROVED BY</small> _____ <small>DATE:</small> <b>GARY M. GORDON, CITY ENGINEER</b>	

- 6. Lift station to be equipped with SCADA Telemetry System. Replicate the existing SCADA set up.
- 7. A 4-inch concrete slab shall be placed around the lift station for maintenance access and valve box protection and support. Limits of the concrete slab will be dependent upon the location and design of the lift station and adjacent the area. A security fence around the lift station site may be required by the City.

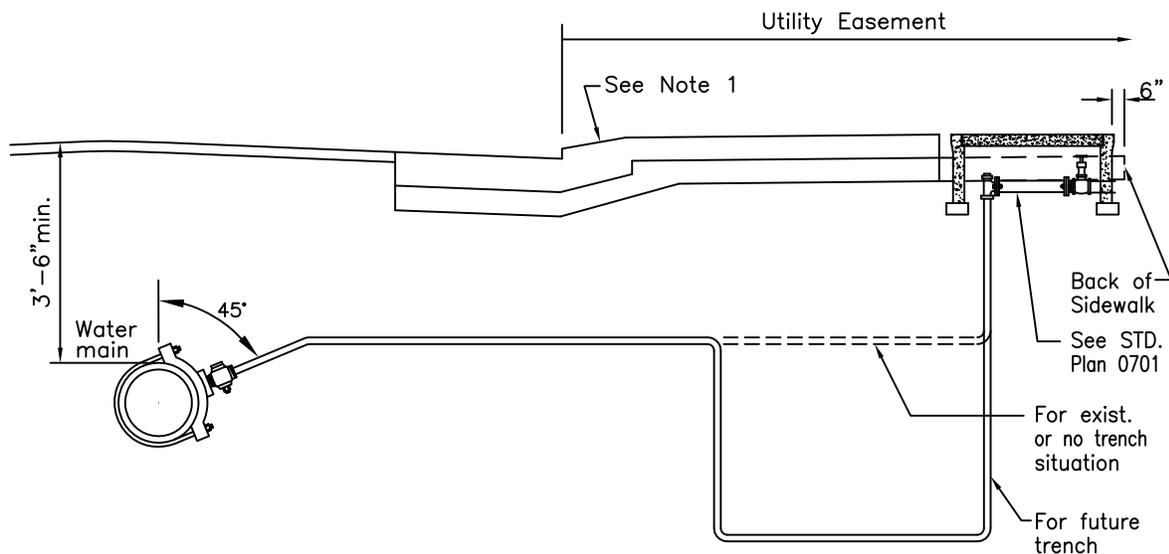
Wet Well

The wet well shall be a manhole with 8 feet minimum diameter and adequate capacity so no more than five starts per hour are required at one half of the design flow. The minimum water level in the on/off cycle should be one foot above the floor of the wet well and the maximum level at the top of the influent sewer. There shall be 8 feet from the bottom of the wet well to the invert of the influent sewer.

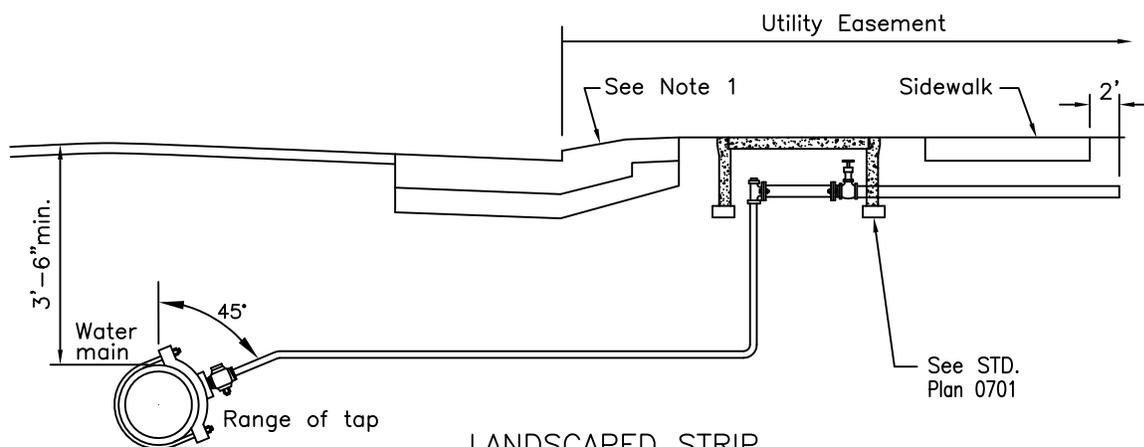
Enclosures

Enclosures should be constructed of either steel or fiberglass. If steel is used, corrosion protection in the form of sacrificial magnesium anodes should be provided. The enclosure should be placed on a reinforced concrete slab.

NO.	REVISION	BY	 CITY OF RED BLUFF <hr/>	STANDARD PLAN	0600A
				CRITERIA FOR NEW SEWAGE LIFT STATIONS	
		APPROVED BY _____ DATE: GARY M. GORDON, CITY ENGINEER			



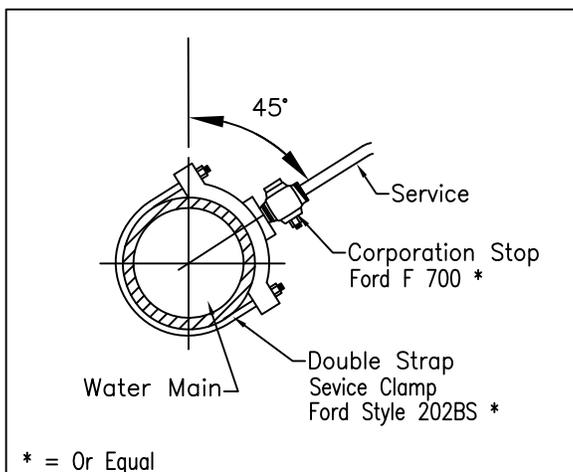
SIDEWALK



LANDSCAPED STRIP

NOTES:

1. 2" 'W' stamped in top of curb to identify water service.
2. Use compression fittings at all joints.
3. See standard details 0705 for additional information.
4. 36" minimum cover for lateral under street.



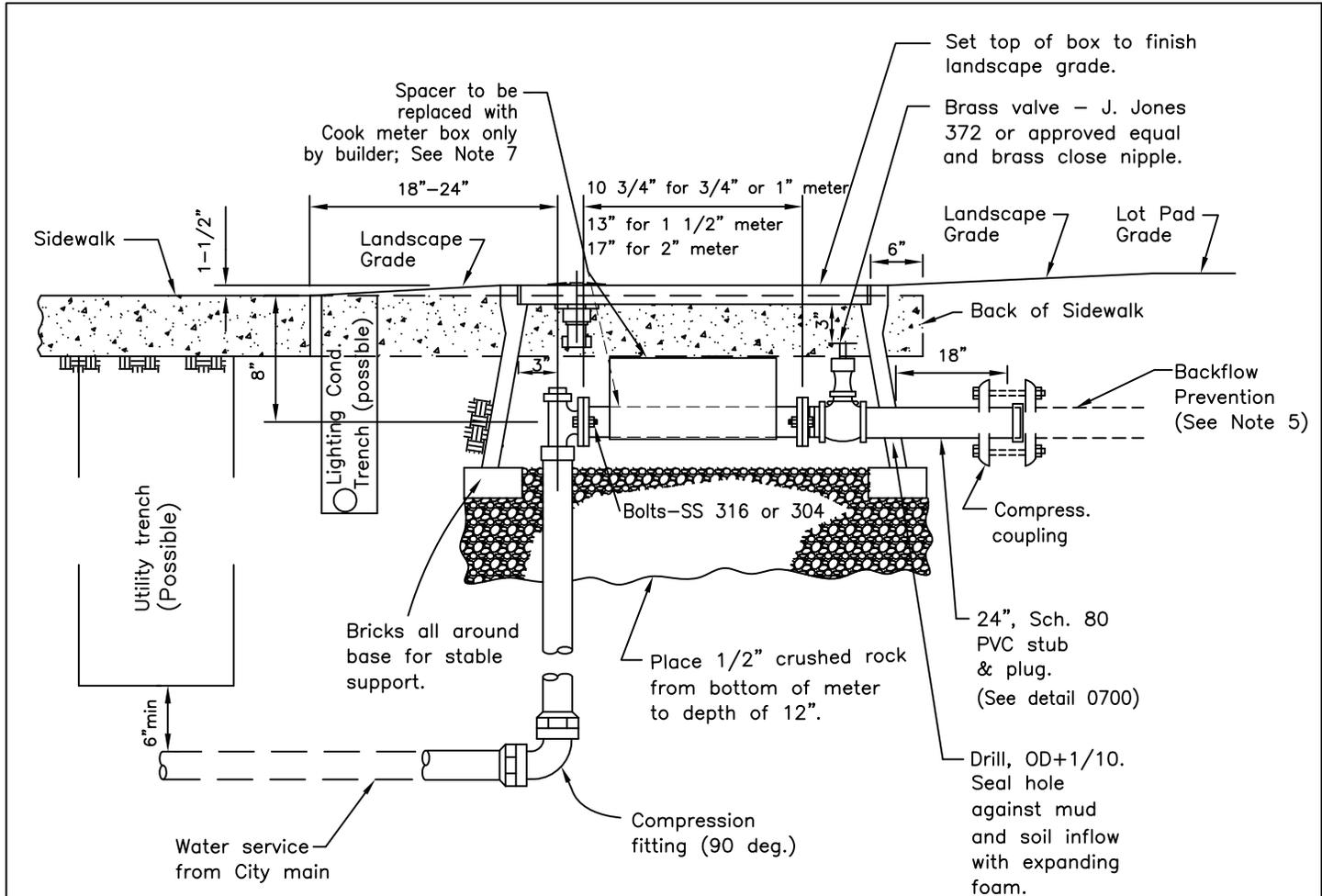
\* = Or Equal

NO.	REVISION	BY

*PWD* CITY OF RED BLUFF  
 \_\_\_\_\_  
 APPROVED BY \_\_\_\_\_  
 DATE: GARY M. GORDON, CITY ENGINEER

STANDARD PLAN  
 1", 1 1/2" & 2"  
 WATER SERVICE &  
 METER BOX LOCATION

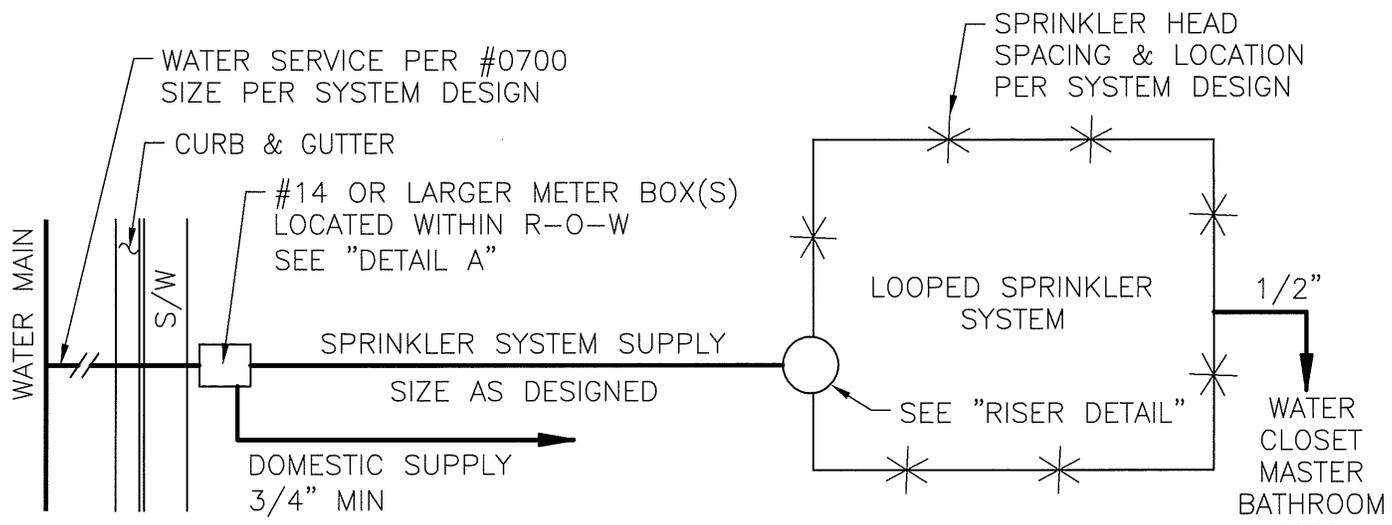
0700



**NOTES:**

1. Public Improvement Contractor shall install water service with lockable angle stop valve, (Mueller 300 or equal) and meter box; all in conformance with City Standards. Only Cook Concrete Products with solid concrete bolt down lid marked 'water' shall be used.
2. Dimensions for meter spacer shall be as shown above with a tolerance of  $\pm 1/8$ ".
3. At time of building construction, building contractor shall remove meter spacer and install the meter. The building contractor shall provide and install the meter in conformance with City Standards for Materials and Construction Methods before a Certificate of Occupancy will be issued.
4. Each single family and duplex dwelling unit shall have 1" water service line, but meter size may be reduced to 3/4". Meter size shall be based on expected flow rate (See Section 7, City Design Stds). A pair of adapters to adjust 1" meter to 1 1/2" tapped meter size and length (Ford Meter Co. Catalog #A46) or approved equal.
5. Backflow prevention devices are required (subject to Public Works Dept. Review) for all domestic services to nonresidential properties and for residential services with access to a private well. See Standard Plan No.0707
6. Electrical isolation between meter and building(s) is required (Plastic house service suffices).
7. Badger Recordall Bronze with Bronze Bottom Pit Transponder Orion with 3' Lead Reading in cubic feet.

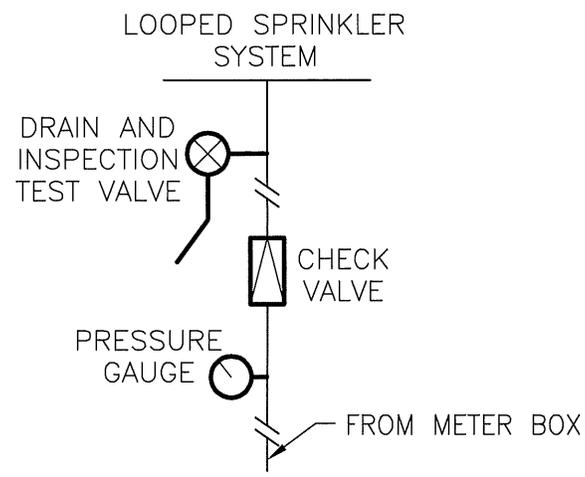
NO.	REVISION	BY	 CITY OF RED BLUFF	STANDARD PLAN	0701
				APPROVED BY _____ DATE: GARY M. GORDON, CITY ENGINEER	



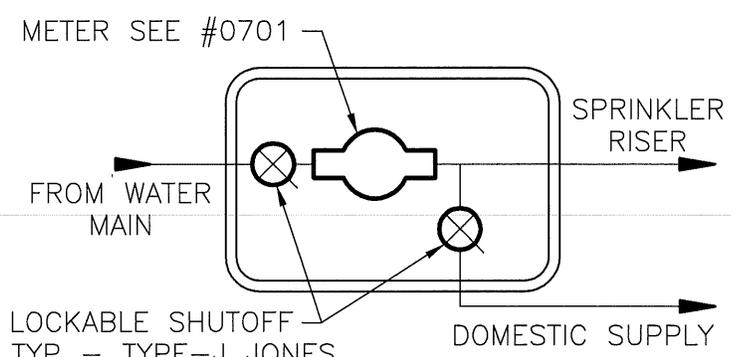
**PLAN VIEW**  
NTS

**NOTES:**

1. ALL CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE CITY OF RED BLUFF CONSTRUCTION STANDARDS AND THE STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION AND NFPA 13D
2. WHERE THE EXISTING DOMESTIC SERVICE IS SMALLER THAN THE REQUIRED RESIDENTIAL FIRE FLOW AND UP-SIZING TO THE LINE SHALL BE REQUIRED BASED ON THE SPRINKLER FLOW CALCULATIONS SHALL BE THE SOLE RESPONSIBILITY OF THE DEVELOPER
3. ALL UNDERGROUND FIRE SERVICE PIPING SHALL BE PER NFPA 13D.
4. AN AREA OF 12" WIDE ON ALL SIDES OF PIPE TRENCH SHALL BE KEPT FREE OF ALL VEGETATIVE OBSTRUCTIONS.
5. ALL ABOVE GRADE PIPING AND VALVES SHALL BE WRAPPED WITH ADEQUATE INSULATION OR OTHER MEANS OF PROTECTION TO PREVENT FREEZING.
6. ALL FIRE SPRINKLER UNDERGROUND PIPE SHALL BE WRAPPED WITH 2" WIDE DETECTABLE METALIZED WARNING TAPE OR PIPED WITH FIRE SPRINKLER CPVC PIPE
7. ALL PIPING PASSING THROUGH A SLAB SHALL PASS THROUGH A SLEEVE FOR THE FULL THICKNESS OF THE SLAB THE SLEEVE SHALL HAVE AN INSIDE DIAMETER OF 1/2" LARGER THAN THE OUTSIDE DIAMETER OF THE SYSTEM PIPE.
8. THE VALVE BOX TO BE ONLY COOK CONCRETE PRODUCTS WITH A SOLID CONCRETE BOLT DOWN LID MARKED "WATER"
9. THE VALVE BOX IN OR ADJACENT TO THE SIDEWALK WITH 12" WIDE 3 1/2" THICK CONCRETE COLLAR AROUND ALL SIDES.
10. ALL HARDWARE AND PIPE INSIDE VALVE BOX SHALL BE BRASS.
11. THE MINIMUM METER SIZE SHALL BE 1" OR BASED ON THE SPRINKLER FLOW CALCULATIONS WHICHEVER IS LARGER.



**RISER DETAIL**  
NTS

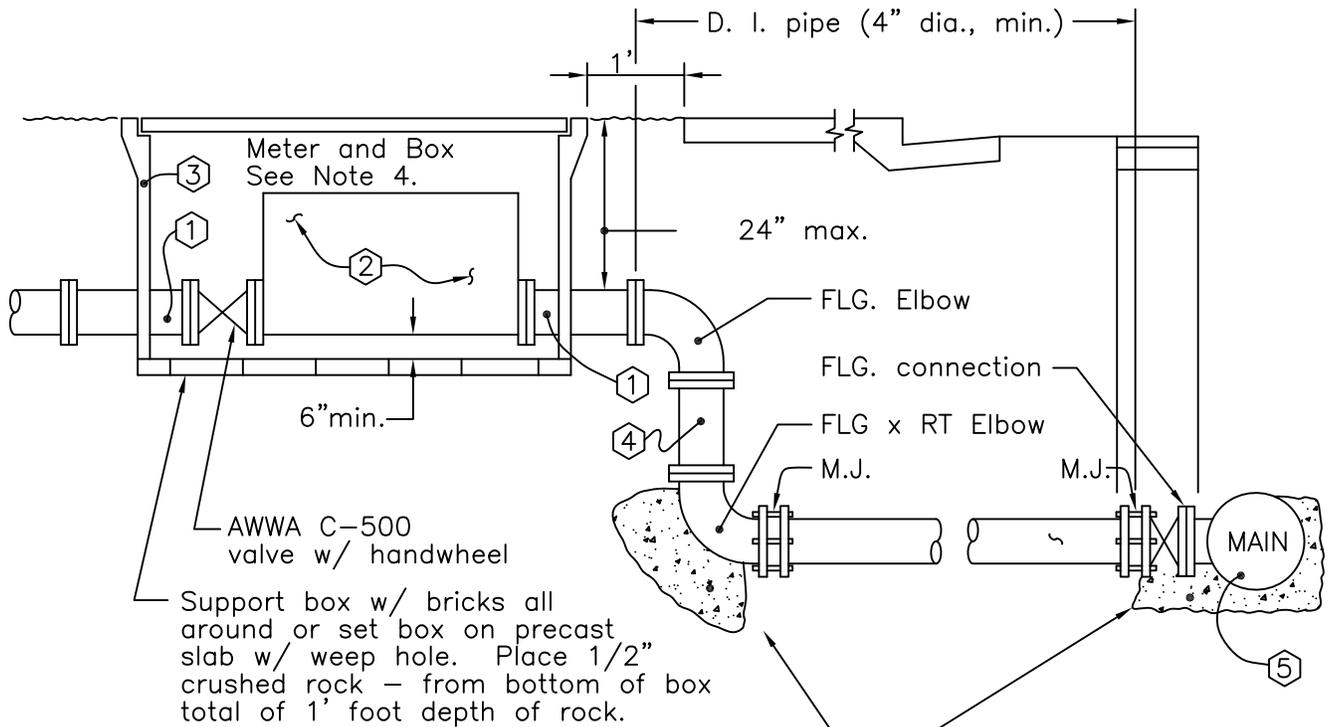


**DETAIL "A"**  
NTS

NO.	REVISION	BY	CITY OF RED BLUFF	STANDARD PLAN	0701A
			<p><i>PWD</i></p> <p>APPROVED BY <i>Bruce Henz</i></p> <p>DATE: 02/16/16 BRUCE HENZ, CITY ENGINEER</p>	<p>RESIDENTIAL AND FIRE SERVICE CONNECTION</p>	

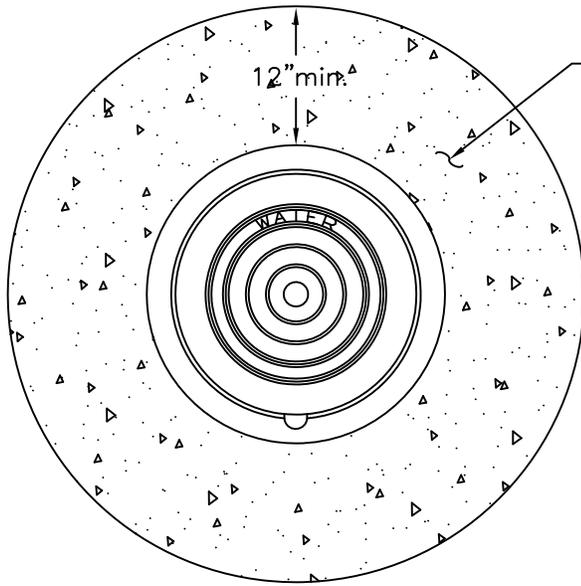
NOTES:

1. All backfill shall conform to Standard Specifications.
2. All fittings shall be ductile iron and conform to AWWA Std.
3. Taps to existing and new City water mains shall be inspected by City upon the request of the property owner.
4. Meter & meter box shall be supplied and installed by Building Contractor at the time of building construction.
5. Plug all openings in box against soil or mud inflow.



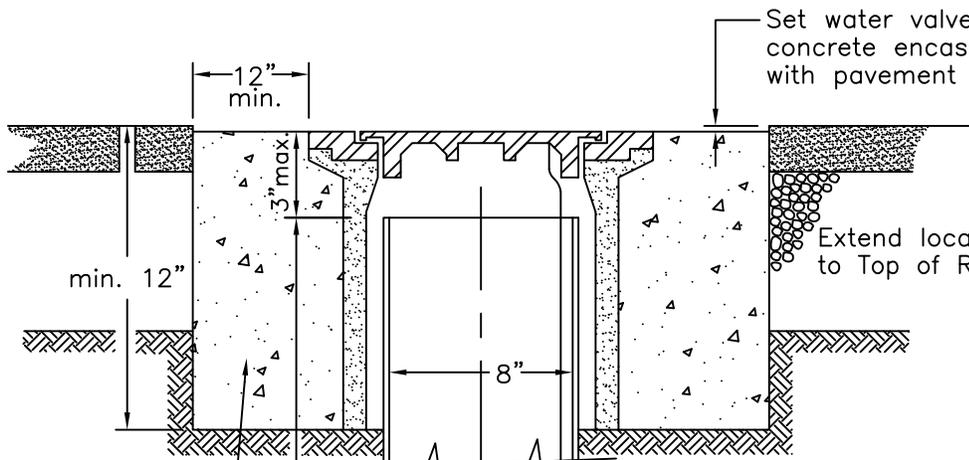
- ① FLG. Spool, 24" long (C.I. or D.I.) Fitting to suit Meter Installation.
  - ② Water Meter (See Note 4. above)
  - ③ Water Meter Box (Traffic lids shall be used in applicable areas). See Note 4.
  - ④ FLG. Spool, lengths as needed (optional) (C.I. or D.I.)
  - ⑤ Use Tee and Gate Valve for connection to existing water main.
  - ⑥ Insulating flange kits on both sides of water meter.
- See Detail 0705 – Thrust Block (Thrust block may be eliminated if restrained M.J. is used)

NO.	REVISION	BY	 CITY OF RED BLUFF <hr/> APPROVED BY _____ DATE: GARY M. GORDON, CITY ENGINEER	STANDARD PLAN	0702



Concrete shall be 520-A-2500

Cook Traffic Valve Box,  
With lid marked "WATER"



Set water valve box &  
concrete encasement flush  
with pavement surface

Extend locator wire  
to Top of Riser

Concrete collar

Riser to be 1 piece PVC  
(except when rising existing), min. Sch. 80.  
Bottom of Riser to rest on Valve Bonnet.

#10 Insulated  
Copper wire

\* Splice or loop  
locator wire  
into box.

Tie or tape  
locator wire to  
pipe at 20'  
min. spacing

**NOTES**

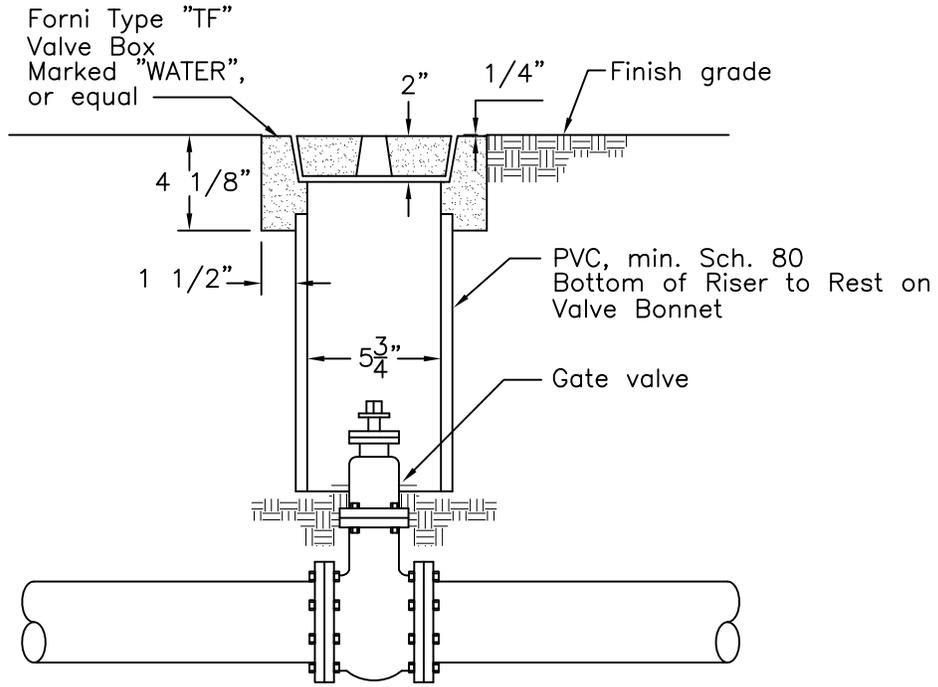
1. All valves AWWA C-509
2. Inline valve: mechanical joint inlet; mechanical joint outlet
3. 4" and larger water service valves at water main. Flanged inlet; mechanical joint outlet.
4. 4" and larger water valve at property line. Flanged inlet and outlet.

NO.	REVISION	BY

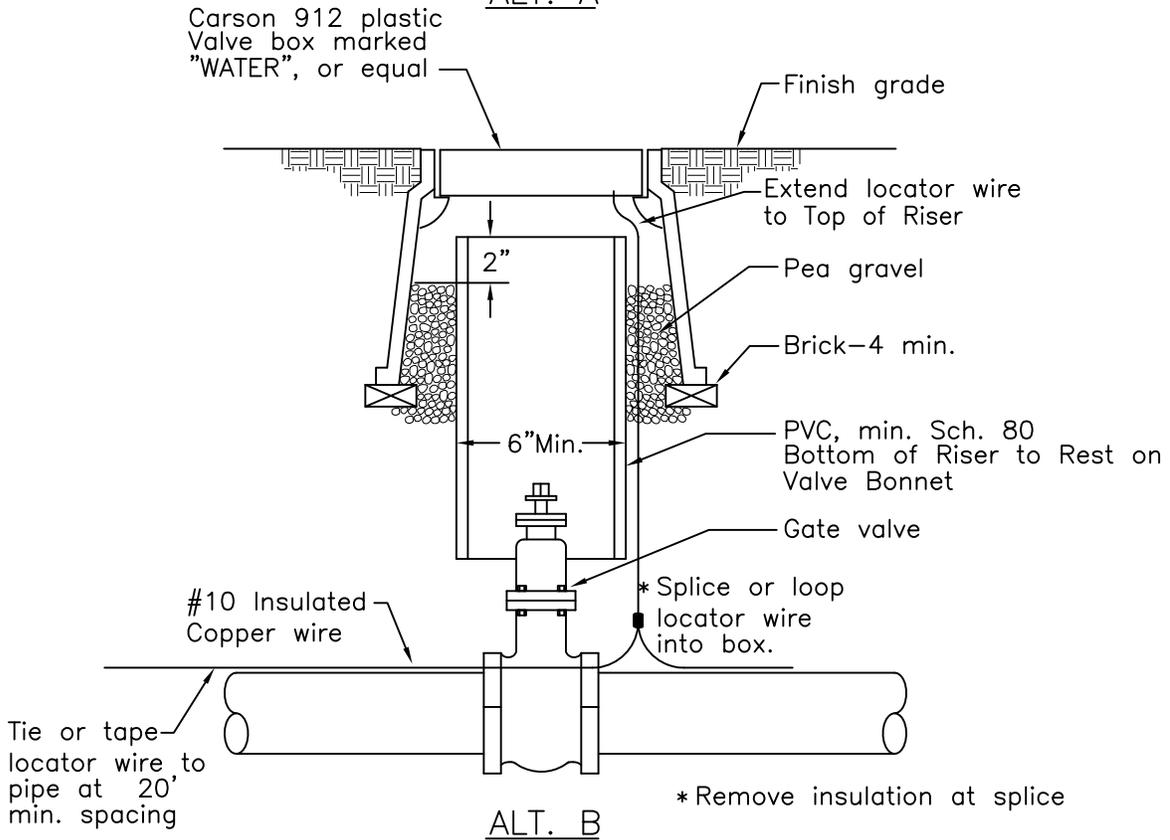
**PWD** CITY OF RED BLUFF  
 \_\_\_\_\_  
 \_\_\_\_\_  
 DATE: \_\_\_\_\_  
 GARY M. GORDON, CITY ENGINEER

STANDARD PLAN  
 WATER VALVE  
 & VALVE BOX  
 IN PAVED AREAS

0703



ALT. A



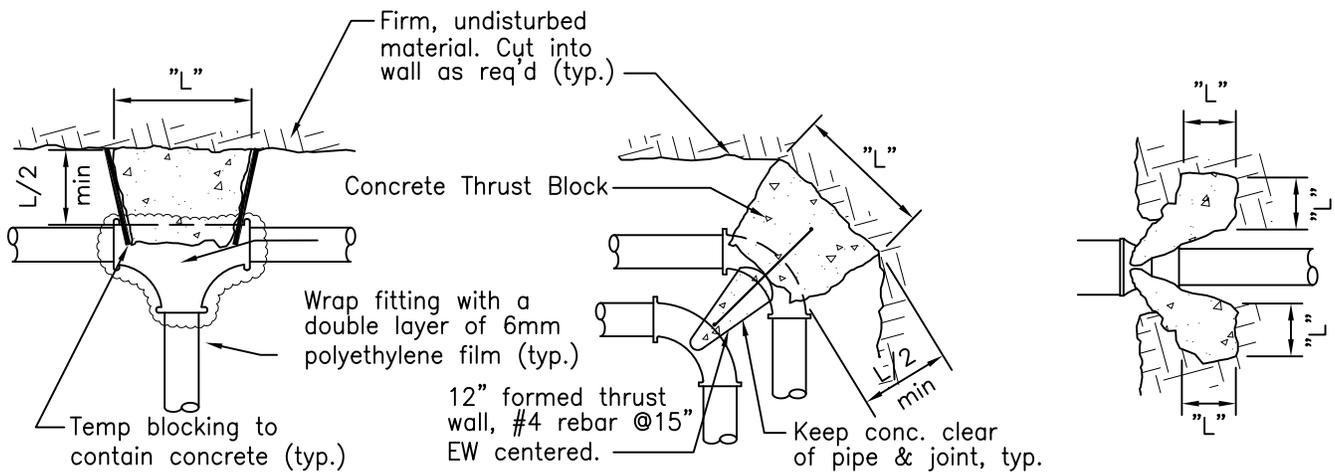
ALT. B

NO.	REVISION	BY

**PWD** CITY OF RED BLUFF  
 APPROVED BY \_\_\_\_\_  
 DATE: GARY M. GORDON, CITY ENGINEER

STANDARD PLAN  
 VALVE BOX IN  
 LANDSCAPE AREAS

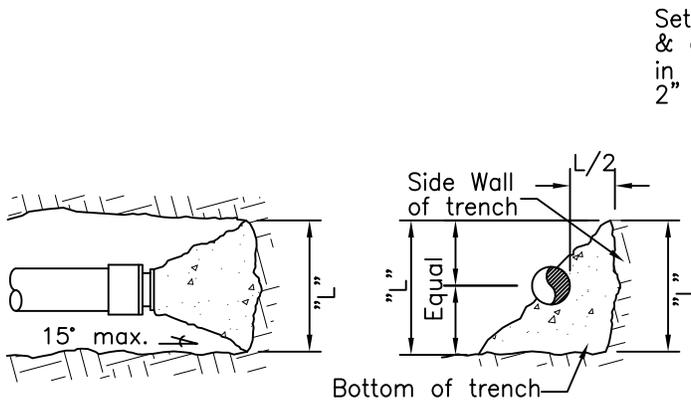
0704



TEES-PLAN

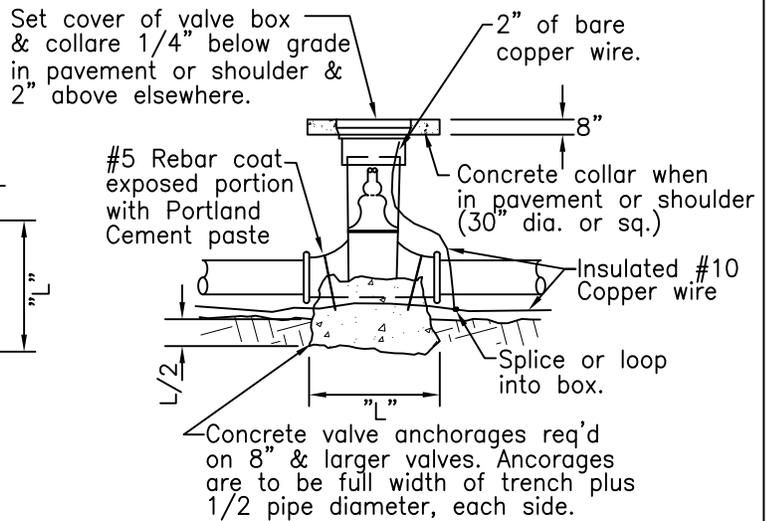
ALL BENDS-PLAN

REDUCERS-PLAN



CAP OR PLUG PLAN

ALL FITTINGS SECTION



VALVE INSTALLATION ELEVATION

NOTES:

1. Thrust blocks shall be provided at all buried pipe fittings of 4" dia. or larger.
2. Thrust block size is based on pipe size, 150 psi test pressure, & soil bearing of 1200 lb/sq. ft. Dimension "L" is shown in Table 1 & is both a vertical &
3. Dimension "L" is shown in Table 1 & is both a vertical & horizontal dimension unless shown otherwise. If pipe cover has been approved to be less than 30",
4. If pipe cover has been approved to be less than 30", increase horizontal thrust in proportion to 30 inches divided by the actual cover. If test pressure is less than 150 psi, thrust block areas or volumes may be proportionately smaller.
5. Keep concrete free of all joints, bolts and nuts.

NO.	REVISION	BY	 CITY OF RED BLUFF	STANDARD PLAN	0705
				APPROVED BY _____ DATE: GARY M. GORDON, CITY ENGINEER	

TABLE 1

Standard Thrust Block Minimum Dimension "L" in Inches

PIPE DIAMETER (INCHES)	FITTINGS						
	TEE, WYE, OR PLUG	90° BEND	45° BEND	22 1/2° BEND	11 1/4° BEND	REDUCER (LARGEST DIA)	VALVE
4"	18	22	16	15	15	--	--
6"	26	31	23	17	15	--	--
8"	34	40	30	21	15	17	12
10"	41	49	36	26	18	21	12
12"	49	59	44	31	22	25	16
14"	58	68	50	36	26	30	16
16"	66	77	57	41	28	33	18
18"	74	88	65	45	32	37	REQUIRES SPECIAL DESIGN
20"	81	97	71	50	36	41	
24"	97	115	85	61	43	49	

TABLE 2

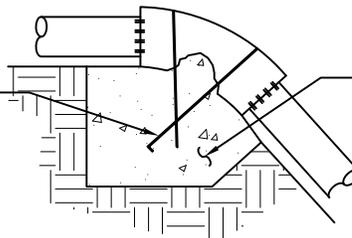
Vertical Fitting Thrust Blocks

1. Where vertical bends are directed with the thrust toward the bottom of the trench, they shall have thrust blocks per horizontal bends except concrete shall bear against the trench bottom.
2. Where vertical bends are directed with the thrust toward the top of trench, they shall be installed per the following detail. Minimum rod embedment shall be 30 inches for 12" and smaller pipe and 36 inches for 14" and larger pipe.

Cubic Yards Concrete for Vertical Fittings (See Detail Below)

BEND ANGLE	PIPE DIAMETER						
	4"	6"	8"	10"	12"	14"	16" & Over
11 1/4° BEND	0	0.4	0.7	0.9	1.3	1.8	REQUIRES SPECIAL DESIGN
22 1/2° BEND	0.4	0.8	1.3	1.8	2.5	3.4	
45° BEND	0.7	1.4	2.4	3.5	4.9	6.6	
90° BEND	1.3	2.5	4.3	6.4	9.1	12.2	

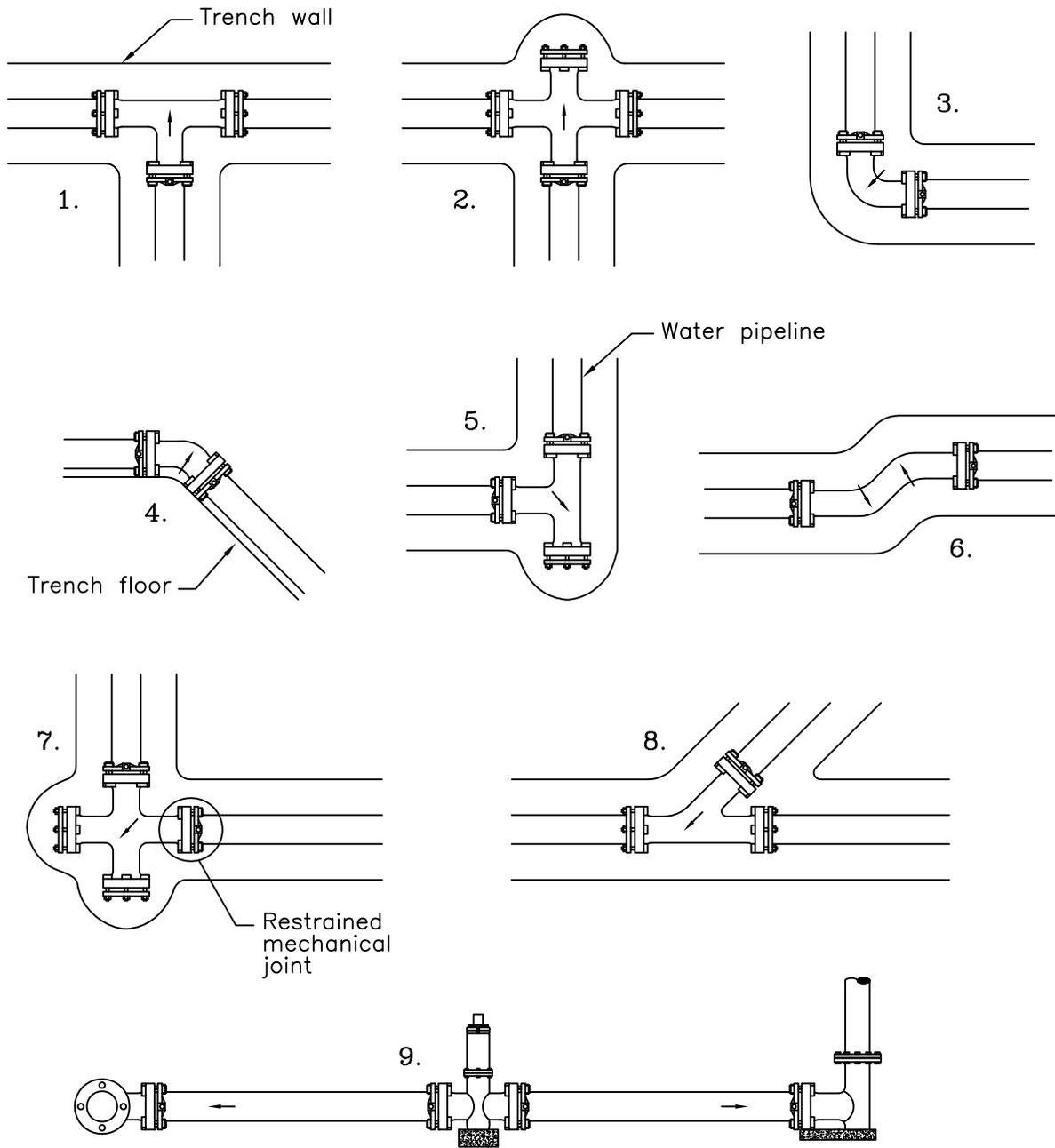
Steel Rods. Two 5/8" dia. minimum. Add extra rods for every two yards concrete over 4 yards. Coat exposed rods with Portland Cement Paste.



Concrete for gravity anchor. Volume of concrete per Table 2

ELEVATION

NO.	REVISION	BY	 CITY OF RED BLUFF <hr/> APPROVED BY _____ DATE: GARY M. GORDON, CITY ENGINEER	STANDARD PLAN	0705A

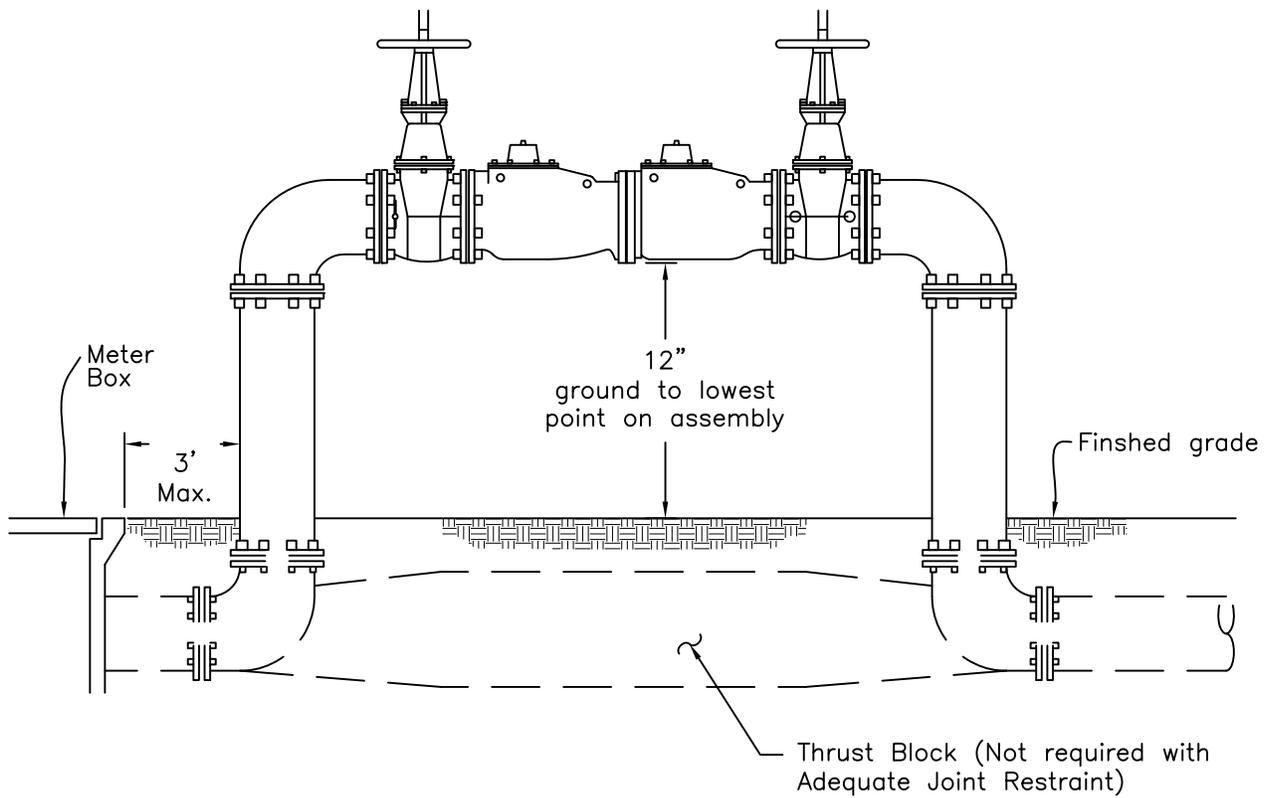


- 1. Thru line connection, tee
- 2. Thru line connection, cross used as tee
- 3. Direction change, elbow
- 4. Direction change vertical, bend
- 5. Direction change, tee used as elbow
- 6. Direction change
- 7. Direction change, cross used as elbow
- 8. Thru line connection, wye
- 9. Hydrant runout

NO.	REVISION	BY	 CITY OF RED BLUFF <hr/> <hr/>	STANDARD PLAN	0706
				APPROVED BY _____ DATE: _____ GARY M. GORDON, CITY ENGINEER	

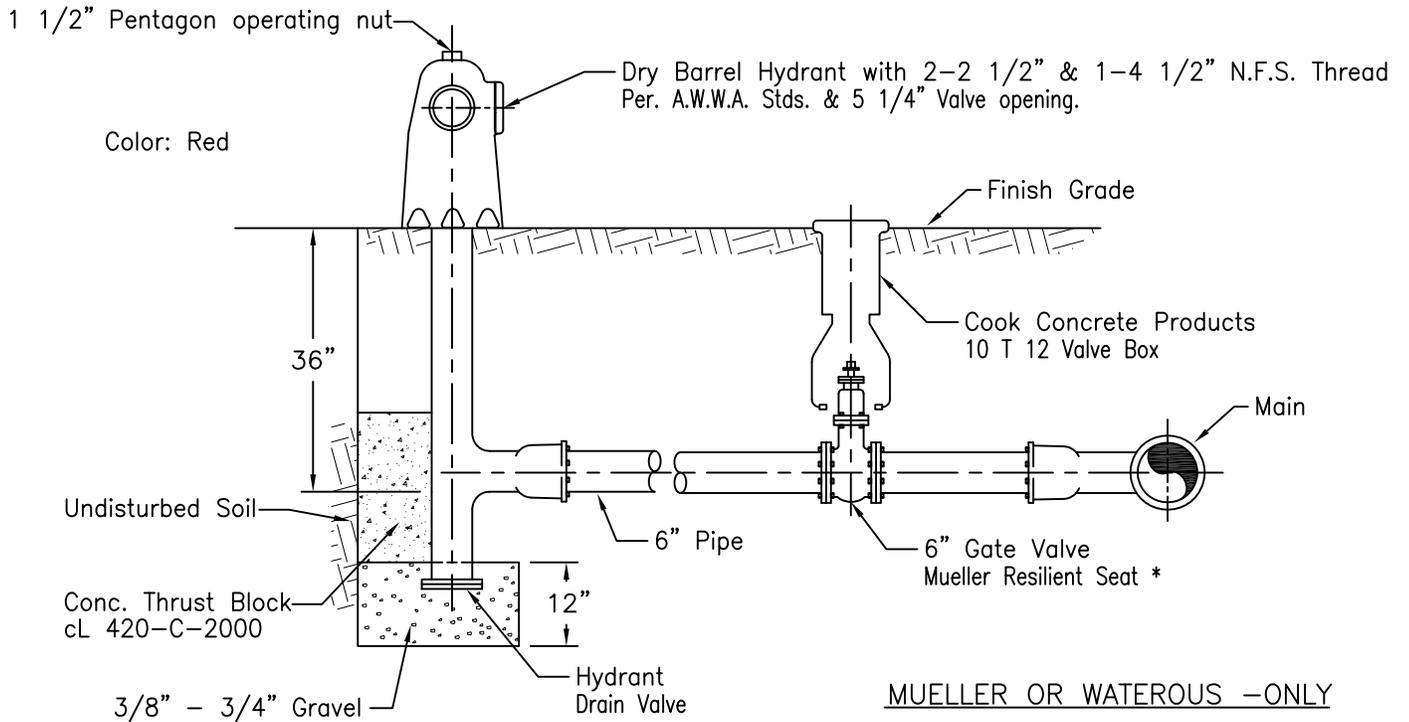
NOTES:

1. Backflow Prevention Assembly shall be installed above finished grade.  
 Leave 2' of Clearance all around for Tester Access.  
 Test Due on Installation, and Prior to City Sign-off.  
 Contact City at (530) 527-8947 ext. 2,  
 for Testing Information & Forms.
2. The backflow prevention assembly shall be located within the 10' P.U.E. adjacent to the street right-of-way.
3. Use insulating flange kit in bolted flanges between assembly and meter box for 2" and larger assemblies. See Detail 0712.
4. Backflow Prevention Assembly Model must be on State Dept. of Health's Current Approved List.  
 Approved List available at Public Works offices.
5. Enclosures are required. Lockable with 2 keys for City. Approved by Technical Advisory Committee.



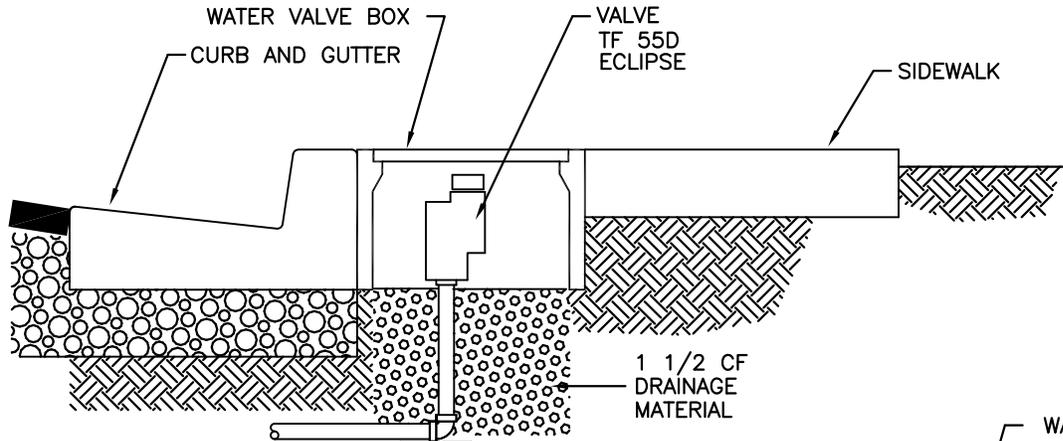
TYPICAL SIDE VIEW

NO.	REVISION	BY	 CITY OF RED BLUFF	STANDARD PLAN	
				0707	
			APPROVED BY _____ DATE: GARY M. GORDON, CITY ENGINEER	<b>BACKFLOW PREVENTION ASSEMBLY</b>	



FIRE HYDRANT DETAIL  
Traffic Type with break-off feature.

NO.	REVISION	BY	 <u>CITY OF RED BLUFF</u>	STANDARD PLAN	0708
			APPROVED BY _____		
			DATE: GARY M. GORDON, CITY ENGINEER		

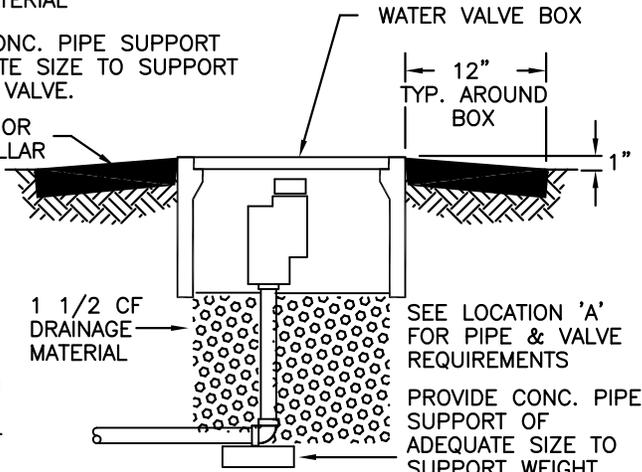


**BOX LOCATION 'A'**

IMPROVED STREET AREAS

PROVIDE CONC. PIPE SUPPORT OF ADEQUATE SIZE TO SUPPORT WEIGHT OF VALVE.

2" THICK AC OR 4" CONC. COLLAR

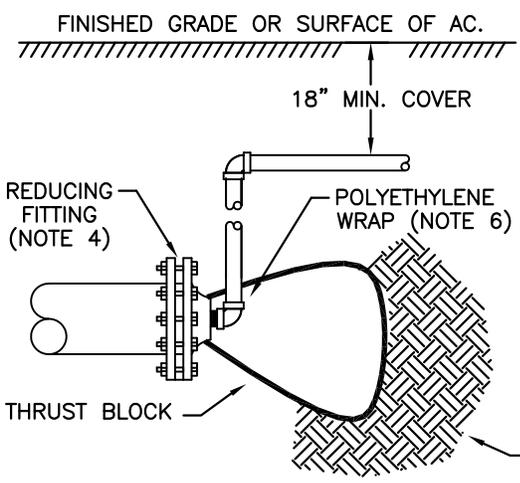


**BOX LOCATION 'B'**

UNIMPROVED AREAS

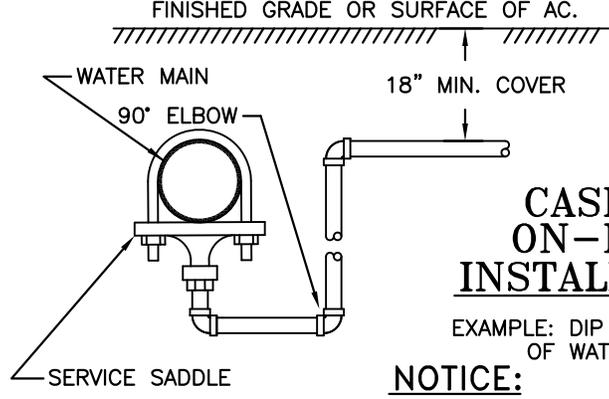
**NOTES:**

1. ALL BLOWOFFS SHALL BE A MIN. OF 2" DIA.
2. IN CASE OF A PRESSURE (HOT) TAP, A CORPORATION STOP SHALL BE INSTALLED AT THE WATER MAIN.
3. REDUCING FITTING SHALL BE A D.I. MECHANICAL JOINT CAP WITH 2 INCH TAP.
4. ALL PIPE EXPOSED TO CONCRETE SHALL BE WRAPPED WITH A DOUBLE LAYER OF 6 MIL POLYETHYLENE FILM.
5. BLOWOFF SHALL NOT DISCHARGE TO A DRAIN WITHOUT AN AIR GAP SEPARATION.
6. SIZE PERMANENT BLOWOFF ACCORDING TO CALIFORNIA WATER WORKS STANDARDS, TITLE 22, FOR 2" THRU 8" MAINS. 12" AND LARGER SHALL BE ENGINEERED.



**CASE 1 - DEAD END INSTALLATION**

EXAMPLE: AT CUL-DE-SAC



**CASE 2 ON-LINE INSTALLATION**

EXAMPLE: DIP IN ELEVATION OF WATER MAIN

**NOTICE:**

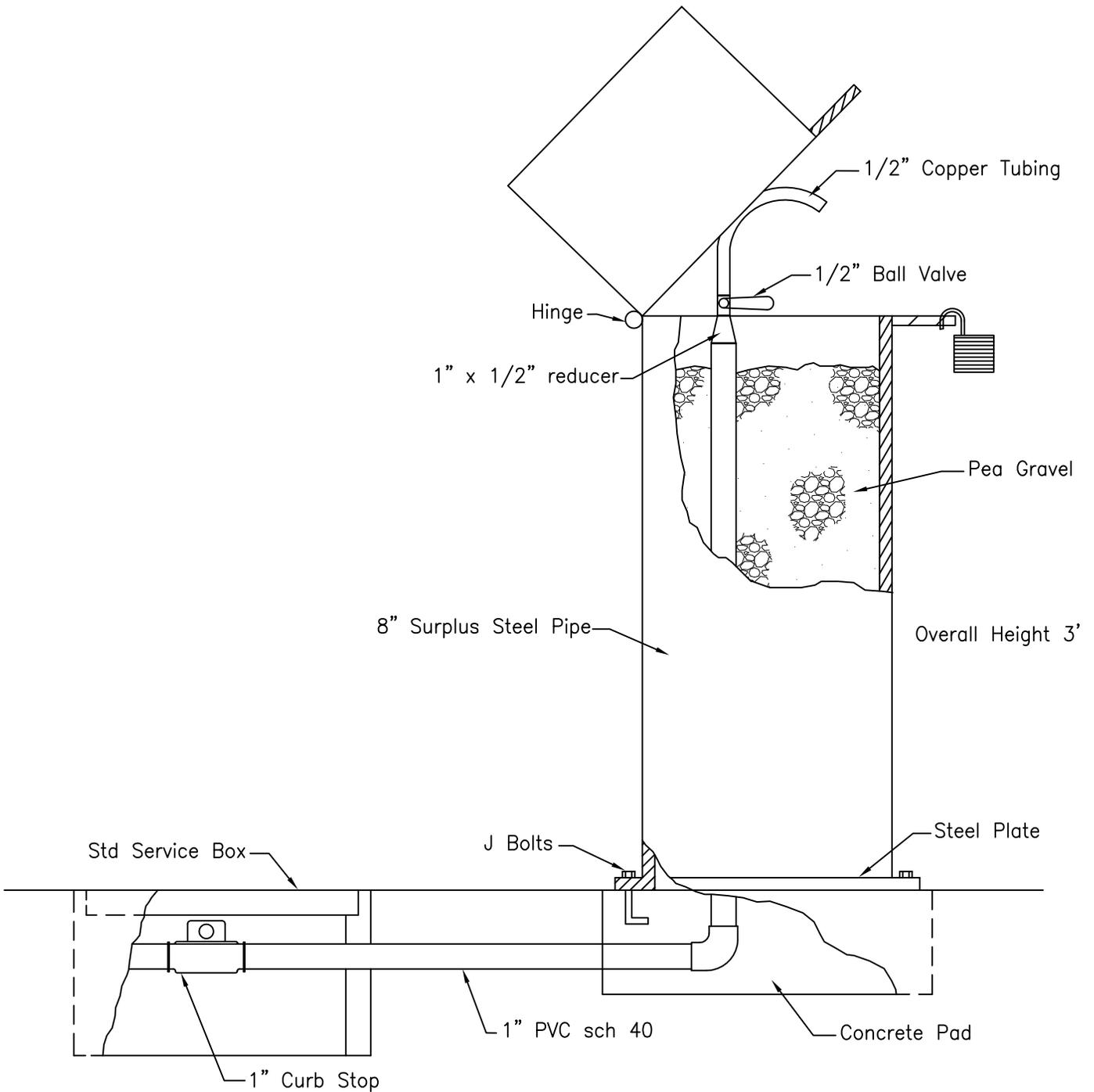
A BLOWOFF SHALL BE INSTALLED AT THE END OF EACH DEAD END WATER MAIN WHERE STAGNANT CONDITIONS ARE LIKELY TO DEVELOP AND AT DIPS IN THE ELEVATION OF THE WATER MAIN WHERE SEDIMENT MAY COLLECT.

NO.	REVISION	BY

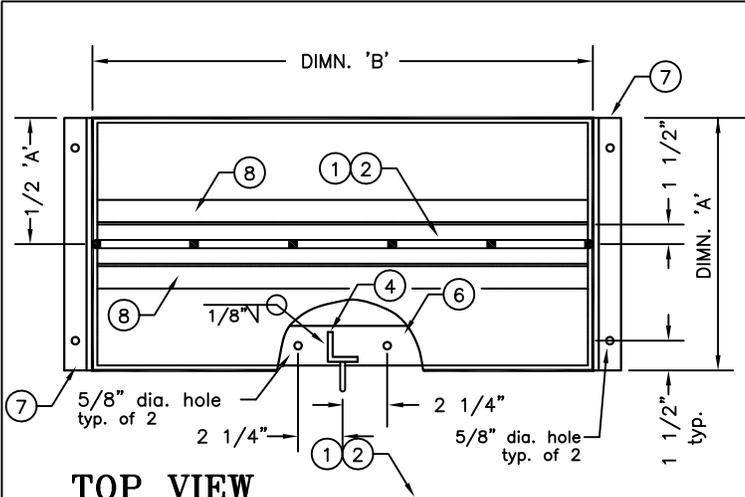
**PWD** CITY OF RED BLUFF  
 APPROVED BY \_\_\_\_\_  
 DATE: GARY M. GORDON, CITY ENGINEER

STANDARD PLAN  
 TYPICAL BLOWOFF INSTALLATION

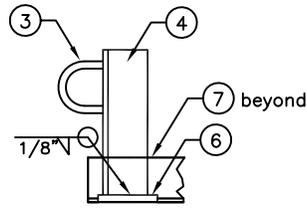
0709



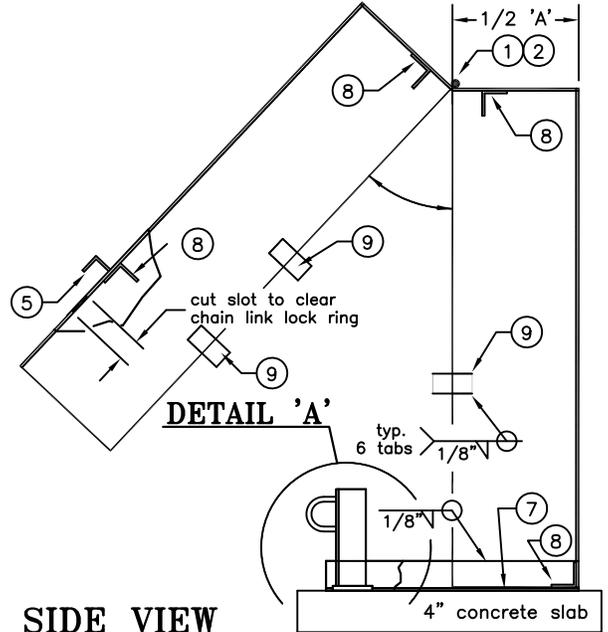
NO.	REVISION	BY	<p><i>PWD</i> CITY OF RED BLUFF</p> <p>APPROVED BY _____</p> <p>DATE: GARY M. GORDON, CITY ENGINEER</p>	STANDARD PLAN	0710



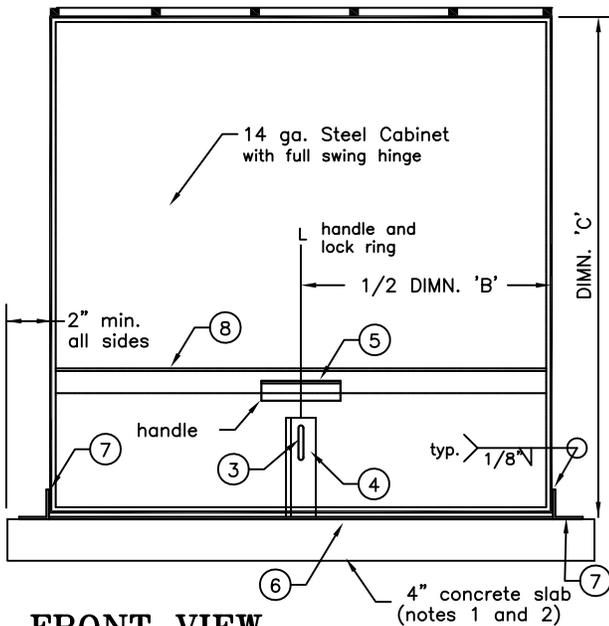
**TOP VIEW**



**DETAIL 'A'**



**SIDE VIEW**



**FRONT VIEW**

DIMN.	3/4" AND 1" DEVICES	1 1/2" AND 2" DEVICES
A	12 1/2"	20 1/2"
B	25"	32"
C	25"	25"

\* dimn. may vary to accommodate nontypical fire service device installation

**NOTES:**

- Cabinet shall be mounted on a a" thick concrete slab with 3/8"x4" 'J' Bolts (typ. of 6). Slab to extend min. of 2" beyond cabinet.
- All piping passing through slab shall pass through a PVC sleeve for the full thickness of the slab. The sleeve shall have a diameter 1/2" larger than that of the pipe.
- Cabinet shall be painted with olive green powder coat paint.

**MATERIALS LIST FOR BACK FLOW DEVICE ENCLOSURE**

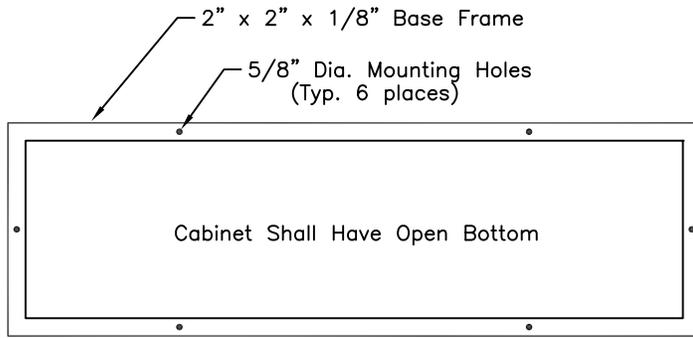
ITEM NO.	DESCRIPTION	LENGTH FOR 3/4" AND 1" DEVICES	LENGTH FOR 1 1/2" AND 2" DEVICES	QTY.
1	5/16" COLD ROLL HINGE PIN	25"	32"	1
2	1/4" PIPE HINGE	25"	32"	1
3	1/4" X 1 1/2" X 1 1/2" CHAIN LINK	N/A	N/A	1
4	1/4" X 1 1/2" X 1 1/2" ANGLE	5"	5"	1
5	1/8" X 1" X 1" ANGLE HANDLE	4"	4"	1
6	1/4" X 2" FLAT BAR	25 1/4"	32 1/4"	1
7	1/8" X 1 1/2" X 1 1/2" ANGLE	12 1/2"	20 1/2"	2
8	1/8" X 1 1/4" X 1 1/4" ANGLE BRACE	25"	32"	4
9	1/8" X 1" ALIGNMENT TABS	2"	2"	6

NO.	REVISION	BY

**PWD** CITY OF RED BLUFF  
 APPROVED BY \_\_\_\_\_  
 DATE: \_\_\_\_\_ GARY M. GORDON, CITY ENGINEER

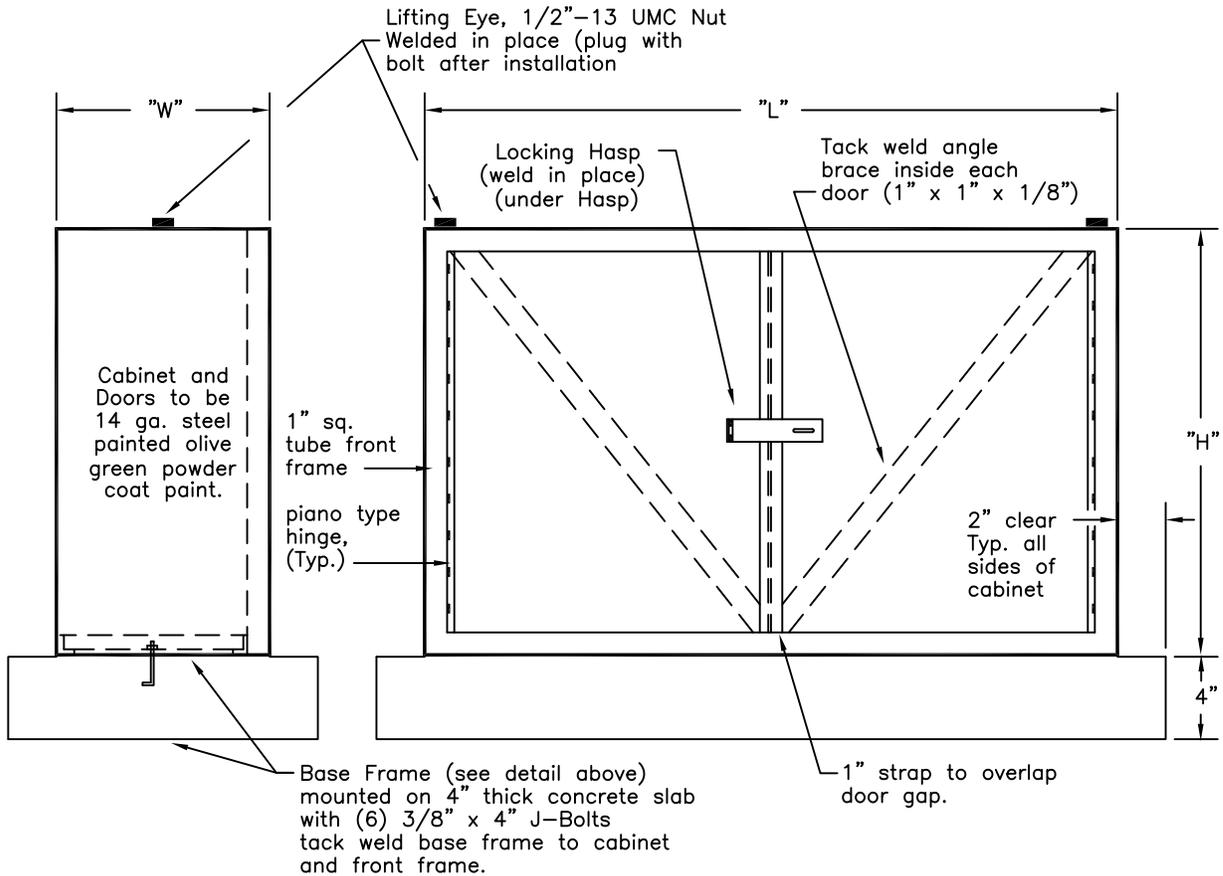
STANDARD PLAN  
 3/4", 1", 1 1/2", & 2"  
 BACKFLOW DEVICE  
 ENCLOSURE

0711



## BOTTOM MOUNTING FRAME

CABINET DIMENSIONS			
UNIT SIZE	L	W	H
3" & 4"	78"	24"	52"
6"	96"	24"	60"
8"	108"	30"	69"

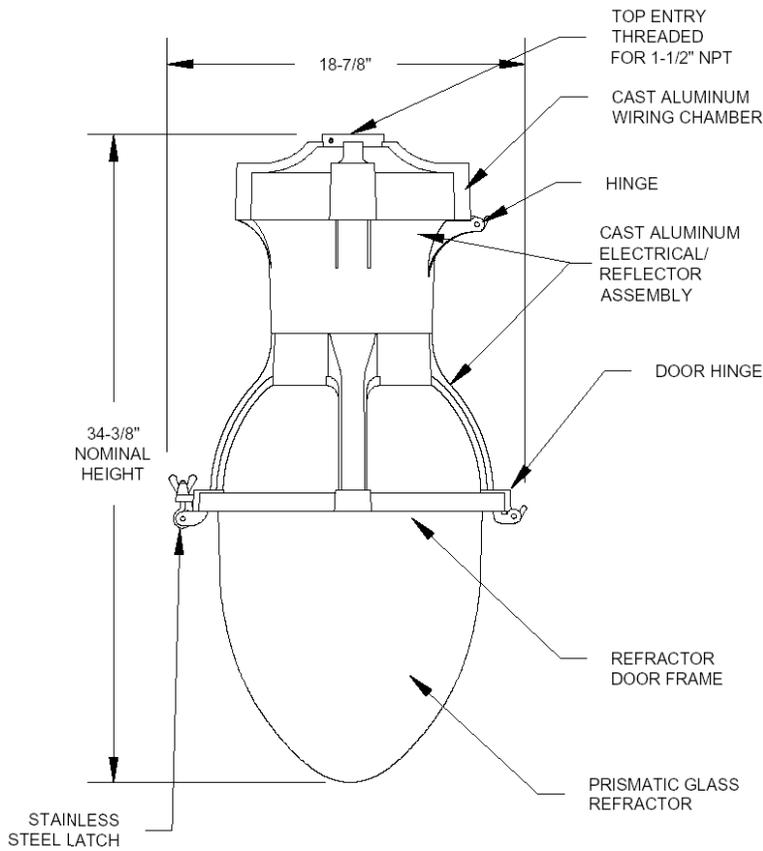


NO.	REVISION	BY	STANDARD PLAN		0712
			3", 4", 6", & 8" BACKFLOW DEVICE ENCLOSURE		
			 CITY OF RED BLUFF		
			APPROVED BY _____ DATE: GARY M. GORDON, CITY ENGINEER		

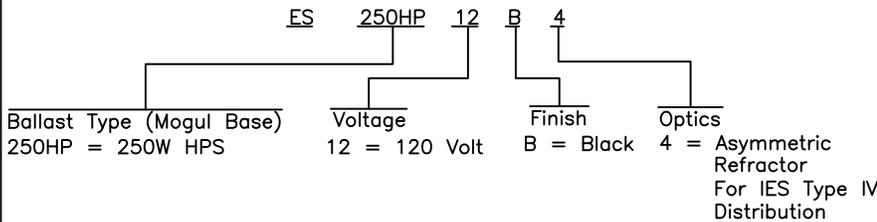
# Esplanade<sup>®</sup> Luminaire

## Teardrop Style

Maximum weight – 66 lbs  
Maximum effective projected area – 2.37 sq. ft.



### ORDERING INFORMATION



PR = Button Style Photocell with Prismscope (Not Available with 480 Volt).

Note: Esplanade Luminaire or Equal.

## Specifications

### DESCRIPTION

The Esplanade luminaire is styled to replicate the "teardrop" luminaires that lighted boulevards in the first half of this century. Designed for light control and ease of installation and maintenance, the Esplanade has a precision optical system for true street lighting performance.

### WIRING CHAMBER

The wiring chamber has a 1-1/2 inch NPT threaded entry for pendant mounting. A stainless steel set screw locks the unit in position. A three station terminal block will accept #14 through #2 wires and is prewired to one half of the plug assembly that connects to the removable electrical module.

### ELECTRICAL / REFLECTOR ASSEMBLY

The electrical / reflector assembly hinges down from the wiring chamber for ease in wiring and to facilitate the removal of the electrical module. The assembly is latched in place by a captive stainless steel hex head screw. The unitized electrical module consists of the ballast and socket mounted to a cast aluminum plate that is easily removed by loosening two screws in keyhole slots. The disconnect plug connects the ballast to the terminal block in the wiring chamber. The socket is street lighting grade with nickel plated lamp grip shell, center contact backed by a coiled spring and glazed porcelain body. The anodized and brightened reflector is formed with flutes to control voltage rise in the lamp and to work in conjunction with the refractor to provide the desired distribution of light.

### REFRACTOR / DOOR ASSEMBLY

The cast aluminum door cradles a teardrop shaped, thermal resistant borosilicate glass refractor that controls the light to provide an I.E.S. type IV cut off distribution. The combination of reflector, refractor and vertical burning lamp maximize efficiency and uniformity of illumination while controlling luminaire brightness. The refractor assembly and decorative skirt (when applicable) assembly hinges from the electrical / reflector assembly and is latched by a stainless steel, captive, wing nut assembly.

### BALLAST

(Refer to Ballast Data Sheet for specific operating characteristics)  
150 watt and below 120 volt High Pressure Sodium (HPS) ballasts are High Power Factor Reactor type. All other 150 watt and below are High Power Factor Autotransformer type. 250 and 400 watt HPS ballasts are Lead type. All Metal Halide (MH) ballasts are Peak Lead Autotransformer type.

### FINISH / MATERIAL

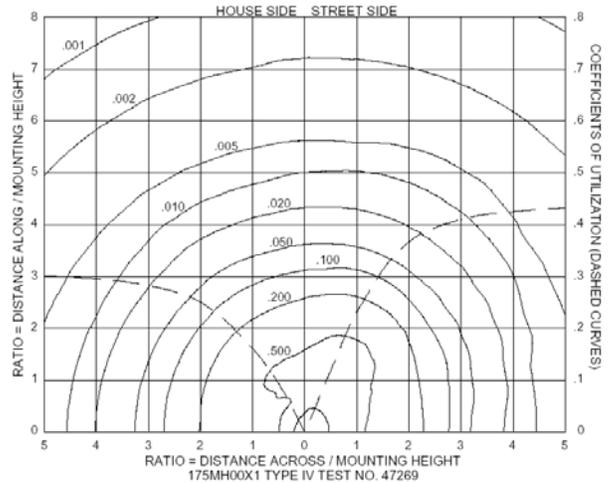
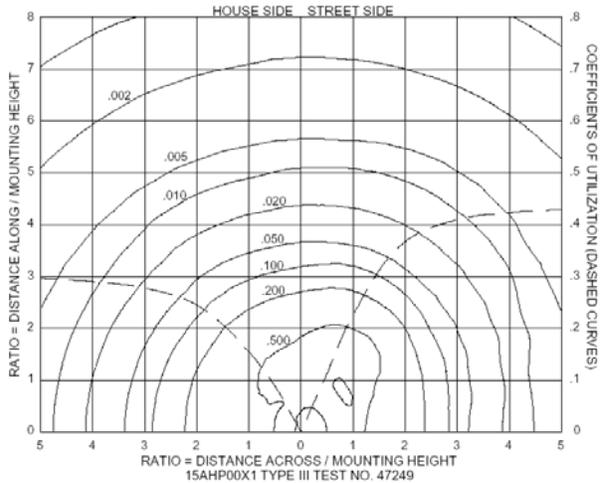
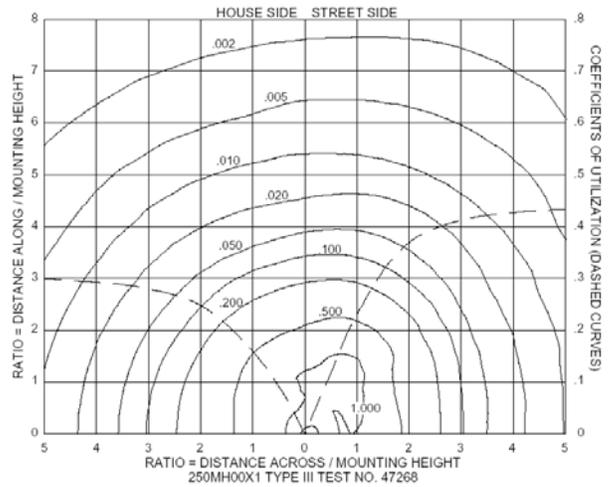
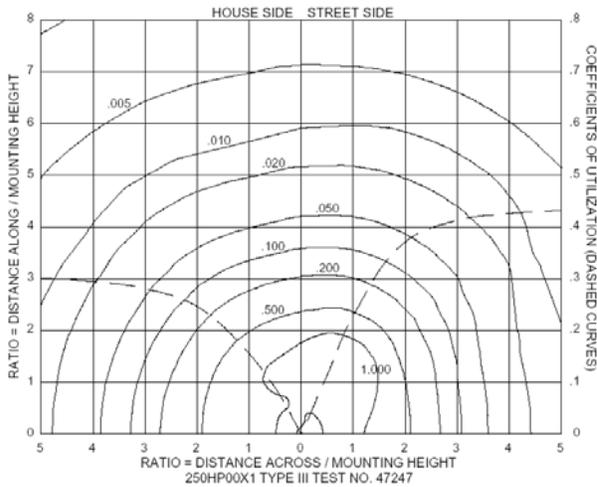
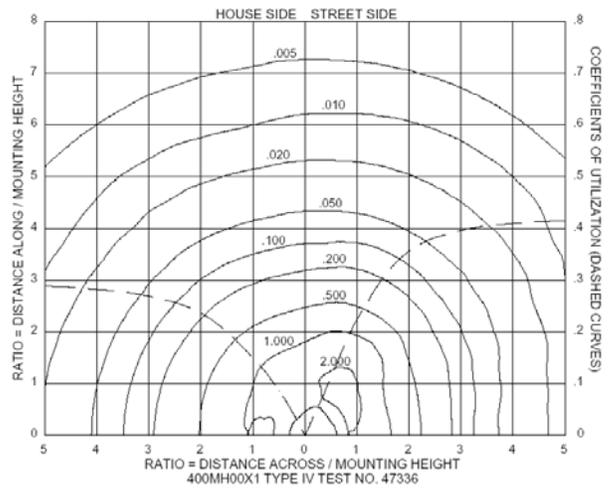
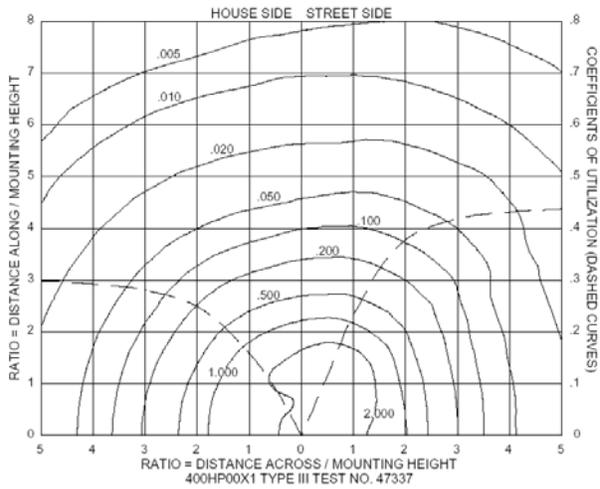
The luminaire is finished with polyester powder paint applied after a seven stage pretreatment process to insure maximum durability. All castings utilize alloy #356 copper free aluminum for maximum corrosion resistance and all exposed hardware is stainless steel.

### U.L. LISTING

U.L. listing suitable for wet locations - at 40 degrees C for 250 watt and below; at 25 degrees C for 400 watt.

NO.	REVISION	BY	
			 CITY OF RED BLUFF
APPROVED BY			
DATE:			GARY M. GORDON, CITY ENGINEER

STANDARD PLAN		0900
DECORATIVE LUMINAIRE COMMERCIAL AREA		



PHOTOMETRIC DATA FOR NON-SKIRTED VERSION ONLY

TYPICAL PHOTOMETRIC DATA  
(ISOFOOTCANDLE CHARTS AND  
COEFFICIENT OF UTILIZATION  
CURVES)

Isofootcandle data is based on a 30 foot mounting height. To determine values for mounting heights other than 30 feet, multiply the value shown by the following factors:

- 16' - 3.52    18' - 2.78    20' - 2.25
- 22' - 1.86    24' - 1.56    26' - 1.33
- 28' - 1.15    32' - 0.88    34' - 0.78

NO.	REVISION	BY

**PWD** CITY OF RED BLUFF

APPROVED BY \_\_\_\_\_  
DATE: GARY M. GORDON, CITY ENGINEER

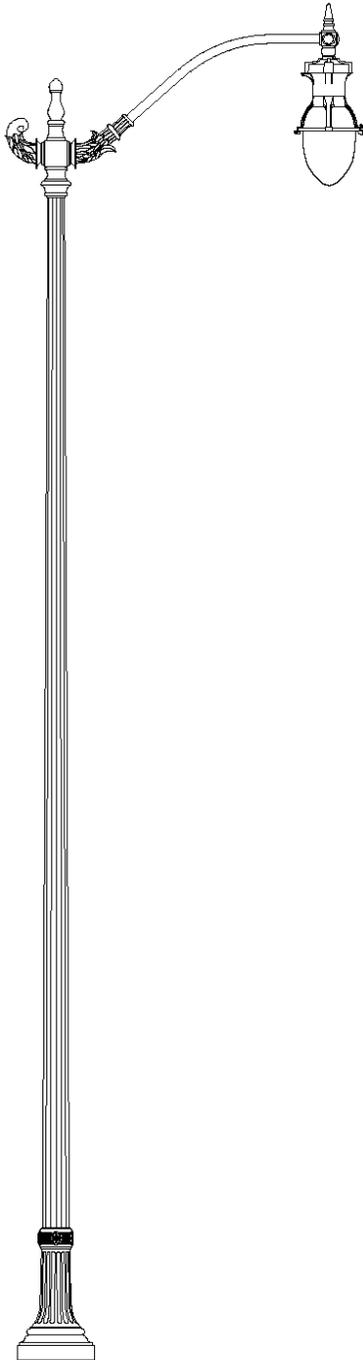
STANDARD PLAN

PHOTOMETRIC DATA

0901

# NORTH YORKSHIRE

for Pendant Mounted Luminaires  
with West Liberty Cast Aluminum Crossarm



## Specifications

### DESCRIPTION

The North Yorkshire lighting posts shall be cast iron and steel construction, massively tapered with a deep 16 flute pattern and a classic tapered fluted base. The post shall be shipped from the factory as a one piece unit with no multiple, slide over, or wraparound pieces. The West Liberty decorative crossarm(s) shall be all aluminum construction with a decorative design of leaves and arched arm(s), and decorative swivel mounting adaptor for pendant mounted luminaires.

### LIGHTING POST

Style: North Yorkshire  
 Height: 23'  
 Tenon Size: 3" OD by 6" high  
 Base: 20" diameter  
 Shaft Material: 16 flute steel  
 Base Material: Heavy wall cast iron, ASTM A48 Class 30  
 Finish: Prime painted with red oxide primer  
 Anchor Bolts: (4) 3/4" x 24" L type hot dipped galvanized

### CROSSARM

Style: West Liberty  
 Height: 41"  
 Width: 6' (from center line of post to center line of luminaire)  
 Material: Heavy wall cast #356 aluminum alloy and schedule 40 aluminum pipe

### Luminaire

Mounting: 1-1/2" NPT threaded nipple, schedule 40 aluminum, for pendent mounted luminaires  
 Slipfitter: Arm(s) slipfit a 3" OD by 6" tall tenon  
 Finish: Prime painted with red oxide primer  
 Color: Black

NO.	REVISION	BY	STANDARD PLAN		0902
			DECORATIVE STREET LIGHTS (MAST ARM TYPE)		
			 CITY OF RED BLUFF		
			APPROVED BY _____ DATE: GARY M. GORDON, CITY ENGINEER		

# NORTH YORKSHIRE

Cast Iron and Steel Post, 20" Dia. Base  
with West Liberty Cast Aluminum Crossarm  
for Pendant Mounted Luminaires

## ORDERING GUIDE

### Post

Post Series (Ht. / Base Dia.)	material / finish	options
NY23/20	- CIS/BK	-

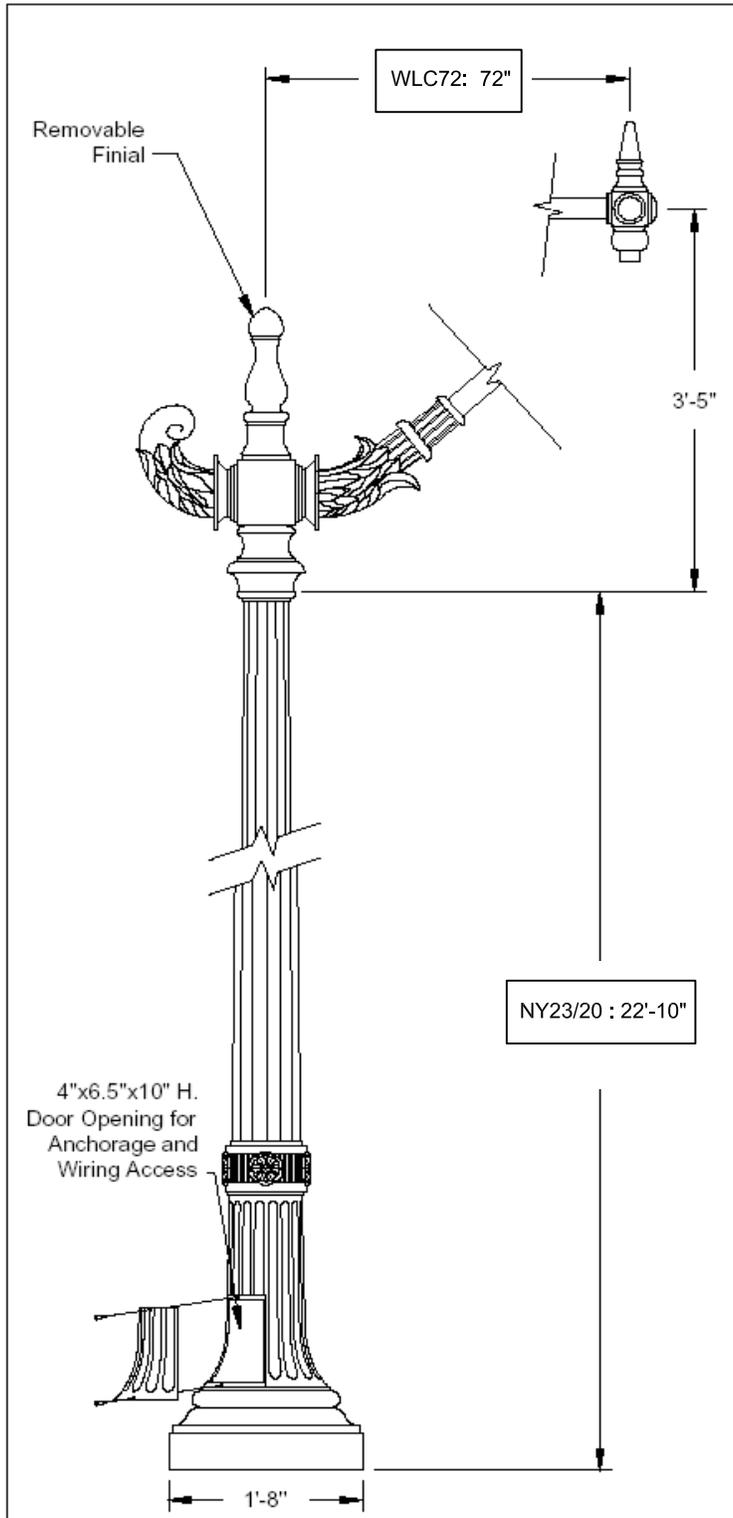
### Post Optional Equipment

Options	Description / Specification
<b>WPRB</b>	Weatherproof duplex receptacle located inside base. Specification: Receptacle shall be a duplex receptacle provided with a weatherproof enclosure mounted inside the base.
<b>WPRT</b>	Weatherproof receptacle located in the post. Specification: Receptacle shall be a duplex receptacle provided with a weatherproof cover mounted in the post, X'-X" above the ground.
<b>CLD</b>	Custom Logos cast into access door. Specification: Post shall be provided with the project logo cast into the access door as detailed.

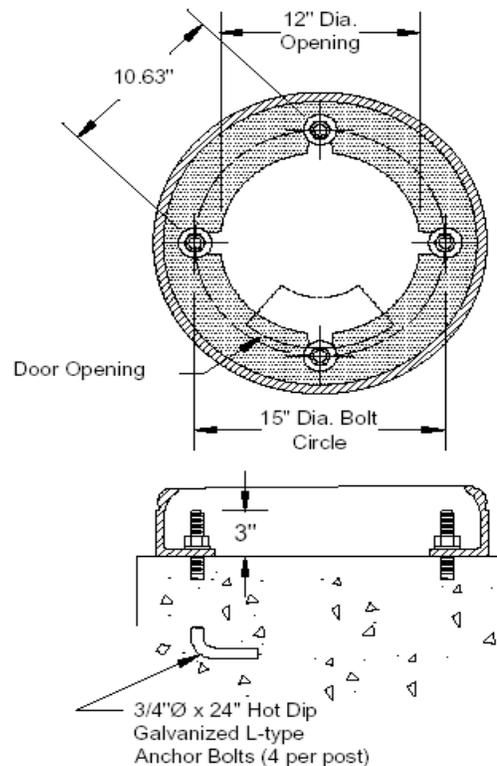
Note: Banner arms, Flag pole brackets and other custom equipment are also available.

### Crossarm

Series (Length / Luminaire No.)	Material / Finish
WLC72/1	- CA/BK -



## ANCHORAGE GUIDE

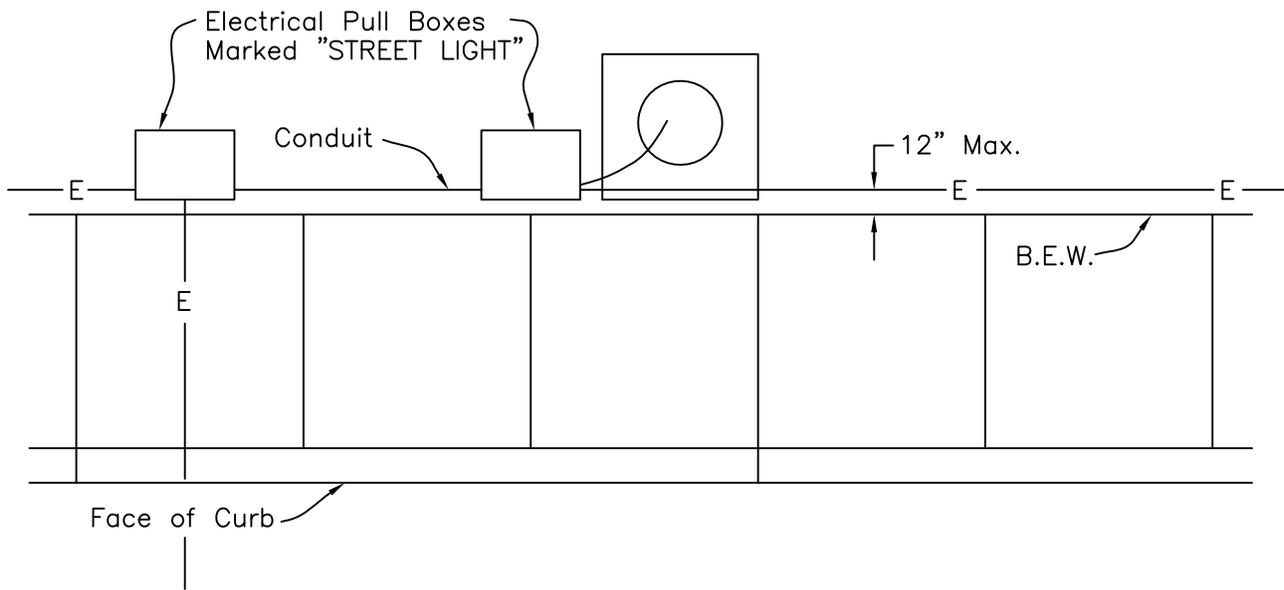


NO.	REVISION	BY

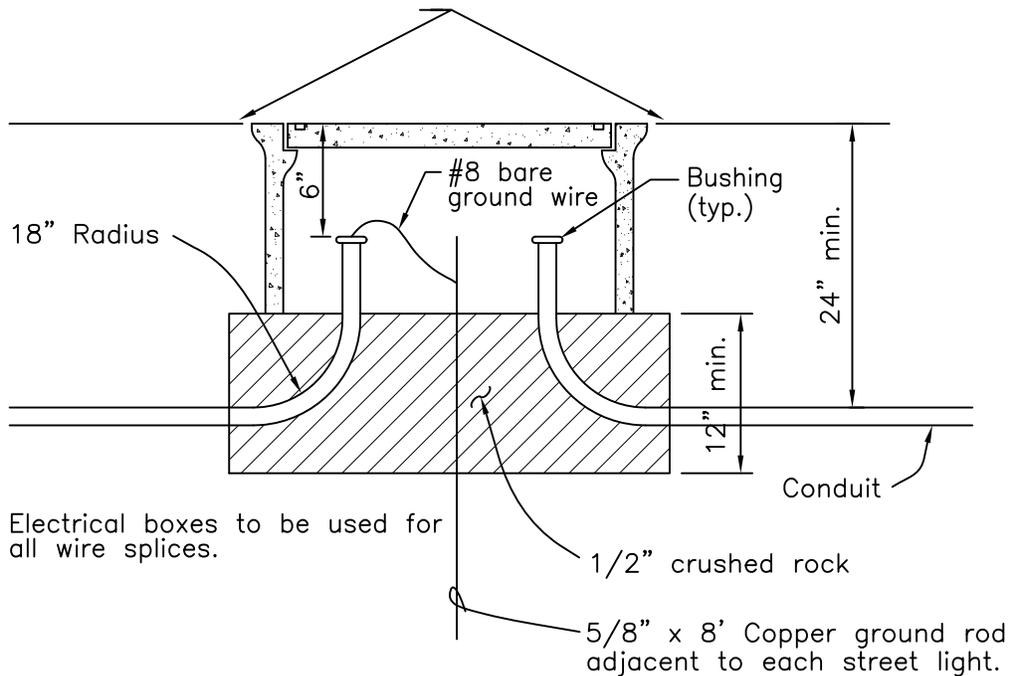
**PWD** CITY OF RED BLUFF  
 APPROVED BY \_\_\_\_\_  
 DATE: \_\_\_\_\_  
 GARY M. GORDON, CITY ENGINEER

STANDARD PLAN  
 DECORATIVE STREET LIGHTS

0903

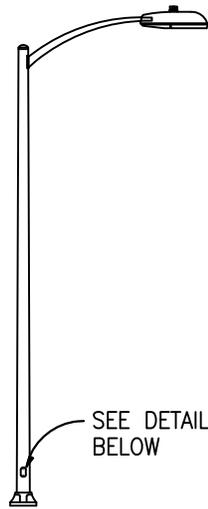


Electrical Box to be set at Back Edge of Walk/Top of Curb Grade

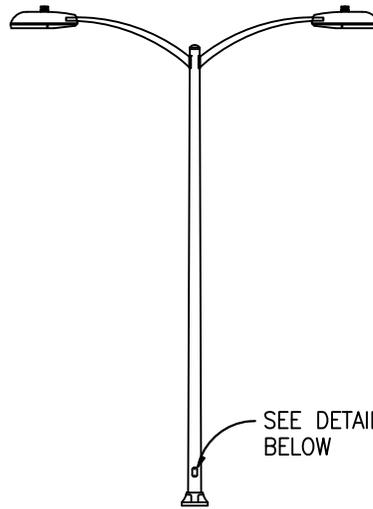
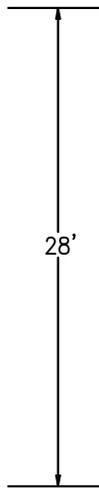


Electrical boxes to be used for all wire splices.

NO.	REVISION	BY	 CITY OF RED BLUFF	STANDARD PLAN	0904
APPROVED BY _____					
DATE: _____			GARY M. GORDON, CITY ENGINEER		



SINGLE ARM POLE



DOUBLE ARM POLE

LIGHT STANDARD

Tapered Aluminum Standard to withstand 90 M.P.H. constant wind loading (1.3 Gust Factor - Gust to 117 M.P.H.).

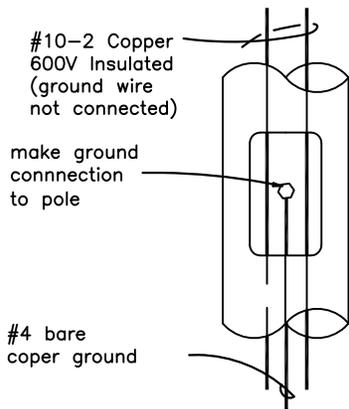
Table 7. Single-Arm Aluminum Poles

Mounting Height	Arm		Code	Wall Thk.	Union Metal Mfg. Co.		Hapco Co.		Pfaff & Kendall		Kaiser	
	Length	Rise			Shaft Size	Cat. No.	Shaft Size	Cat. No.	Shaft Size	Cat. No.	Shaft Size	Cat. No.
28'-0"	6'	2'-0"	35-7185	.188"	8"x4.5"x26'6"	500C-4B-804D-266B2G	8"x4.5"x26'6"	47142-004	8"x4"x26'6"	SPE842772/SB-2	9"x4.69"x26'6"	83-50-9426-0621

Table 8. Double-Arm Aluminum Poles

Mounting Height	Arm		Code	Wall Thk.	Union Metal Mfg. Co.		Hapco Co.		Pfaff & Kendall		Kaiser	
	Length	Rise			Shaft Size	Cat. No.	Shaft Size	Cat. No.	Shaft Size	Cat. No.	Shaft Size	Cat. No.
28'-0"	6'	2'-0"	35-7193	.188"	8"x4.5"x26'6"	500C-4B-804D-266B2G	8"x4.5"x26'6"	54620-001	8"x4"x26'6"	SPE842772/SB-2	9"x4.69"x26'6"	83-50-9426-0622

NOTE: Associated Material i.e., Arm, Bolt Covers, J-Bolts, etc., may need to be specified separately.



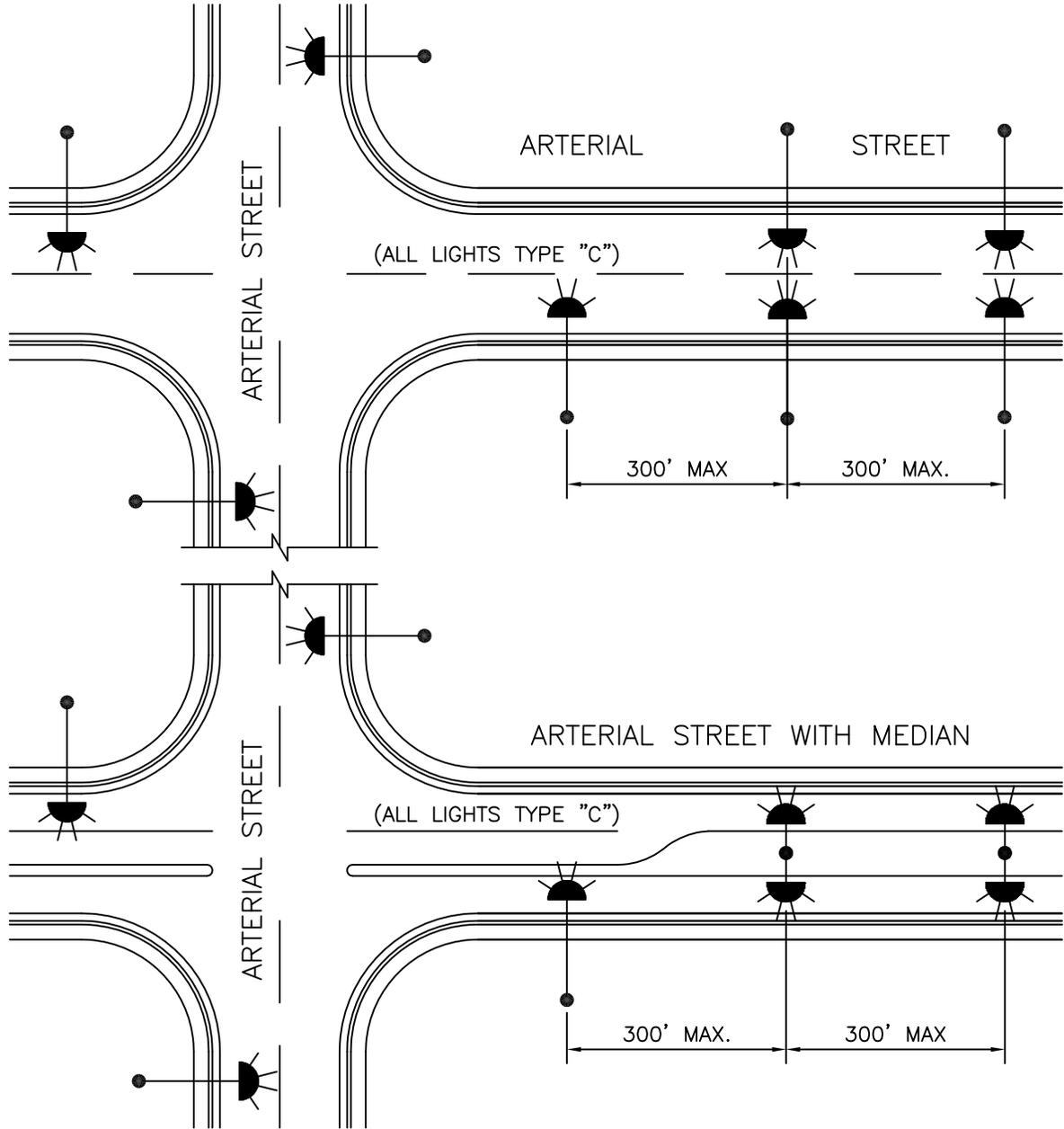
LOOKING INTO HANDHOLE

NOTES:

1. Wire from luminaire to base will be #10-2 Copper 600 Volt Insulated.
2. Must state single or double arms in order.
3. Contact supply for Anchor Base Data.
4. Cutoff Lense.
5. Satin Finish.

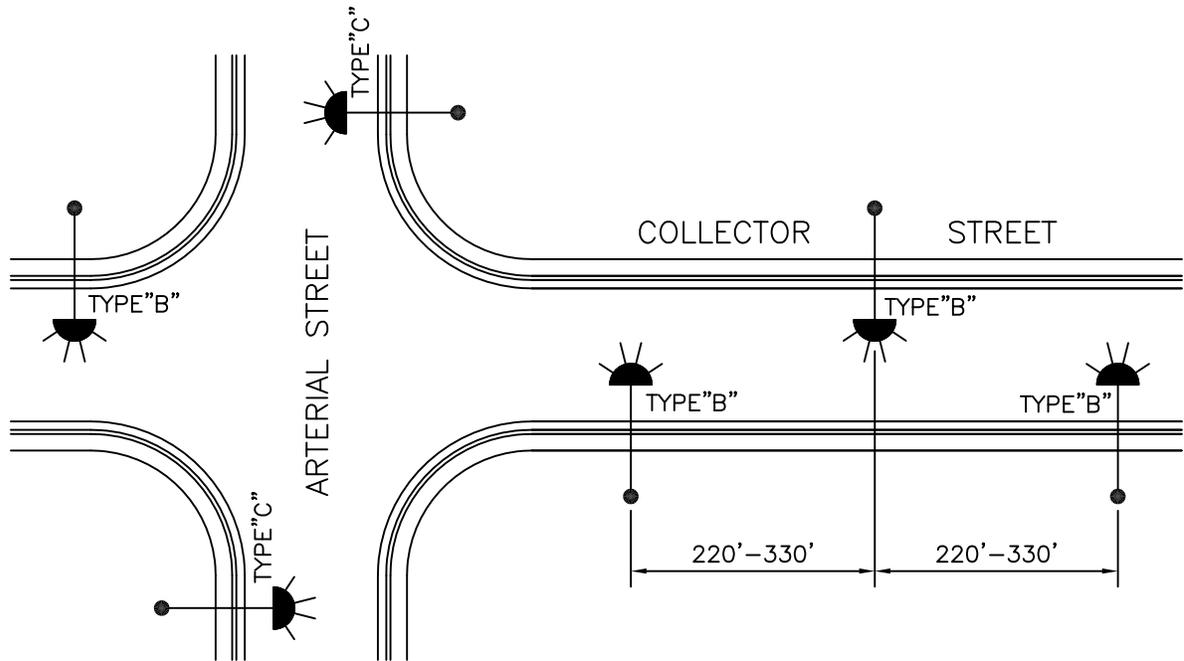
NO.	REVISION	BY	CITY OF RED BLUFF		STANDARD PLAN	0905
					ALUMINUM STREET LIGHT STANDARD (POLE AND ARM DETAILS)	
APPROVED BY _____			GARY M. GORDON, CITY ENGINEER			





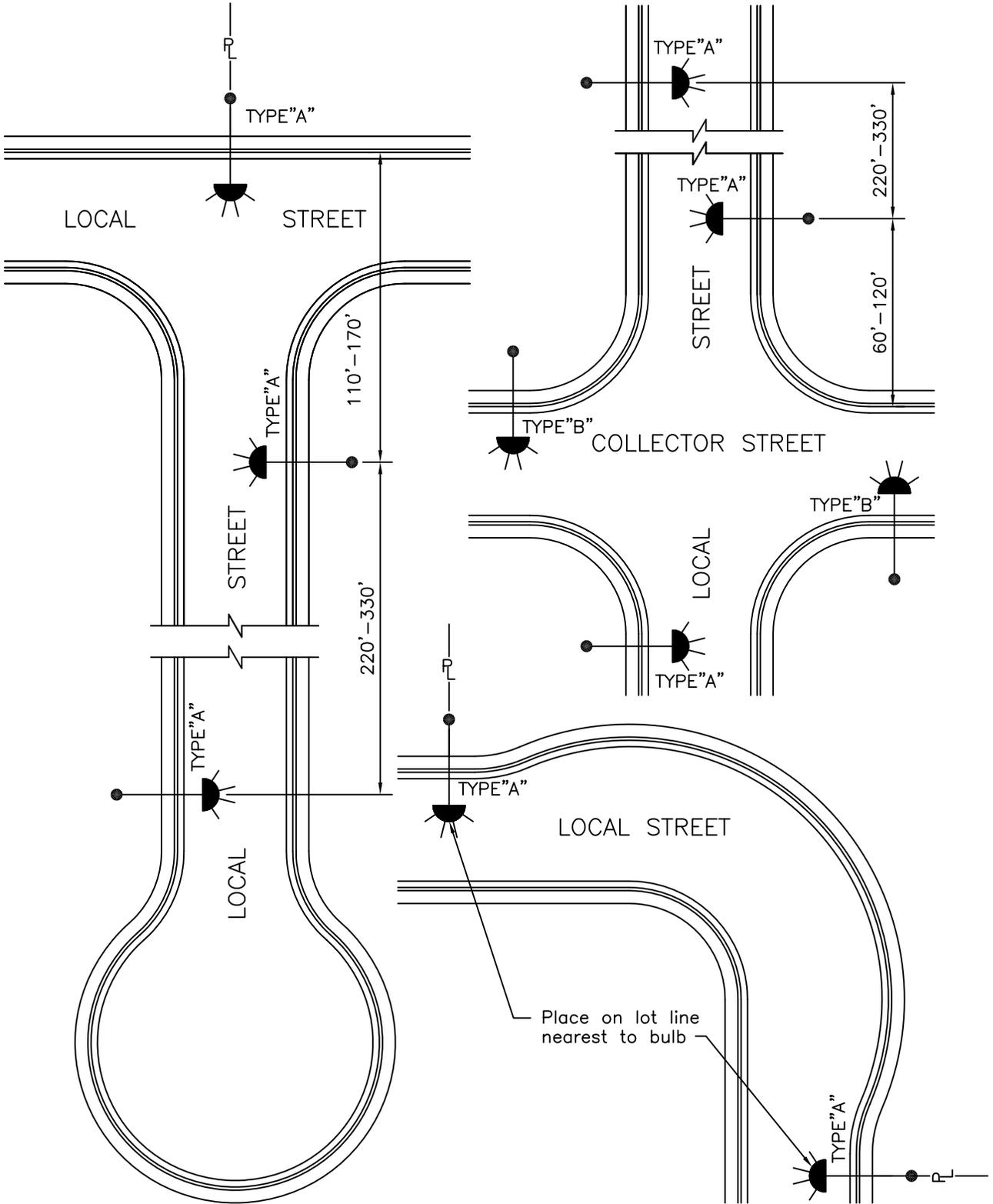
Note: Locate Street Lights on Traffic Signal Poles at Signalized Intersections.

NO.	REVISION	BY	 CITY OF RED BLUFF	STANDARD PLAN		0907
				APPROVED BY _____ DATE: GARY M. GORDON, CITY ENGINEER	STREET LIGHT LOCATIONS ON ARTERIAL STREETS	



Note: Locate Street Lights on Traffic Signal Poles at Signalized Intersections.

NO.	REVISION	BY	 CITY OF RED BLUFF	STANDARD PLAN	
				APPROVED BY _____ DATE: GARY M. GORDON, CITY ENGINEER	STREET LIGHT LOCATIONS ON COLLECTOR STREETS
				0908	

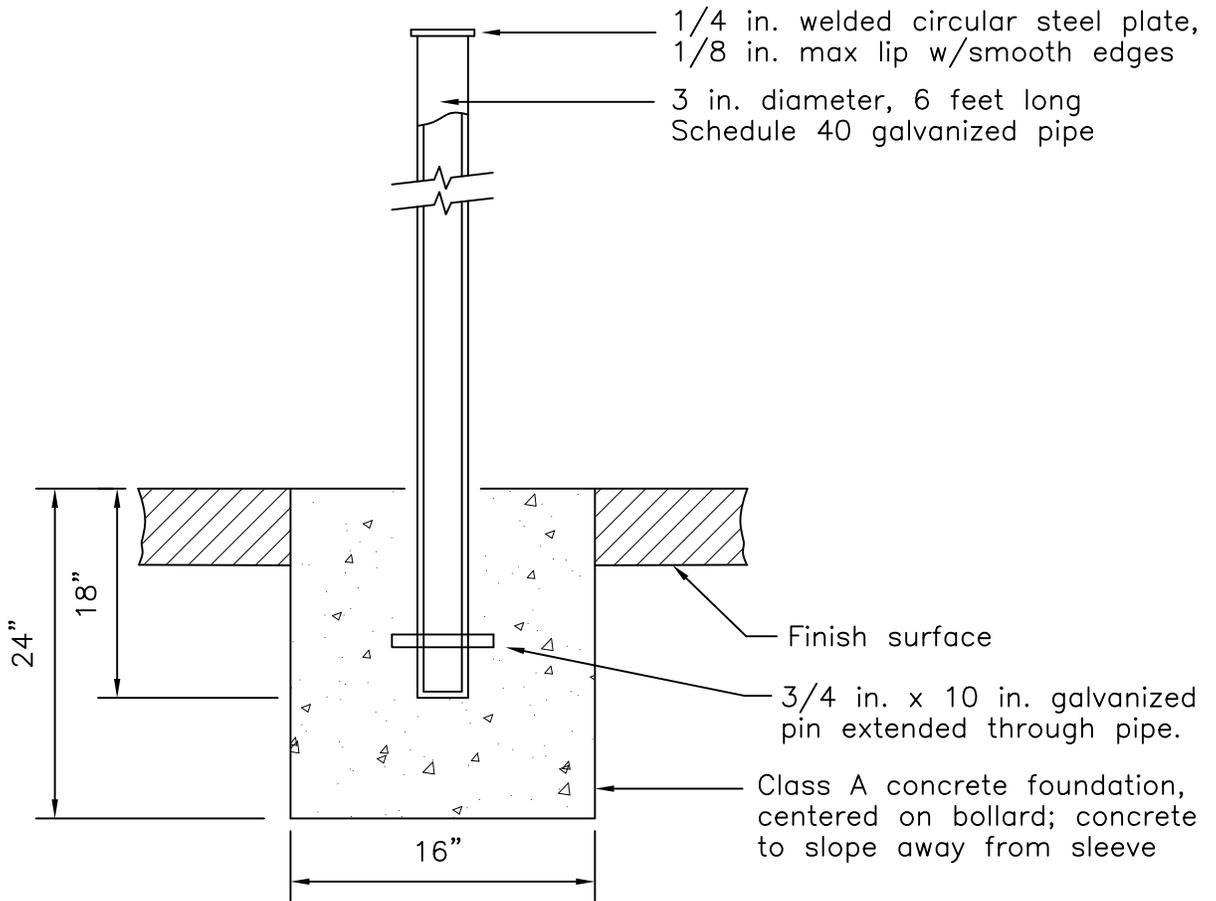


NO.	REVISION	BY

**PWD** CITY OF RED BLUFF  
 APPROVED BY \_\_\_\_\_  
 DATE: GARY M. GORDON, CITY ENGINEER

STANDARD PLAN  
 STREET LIGHT LOCATIONS  
 ON LOCAL (RESIDENTIAL)  
 STREETS

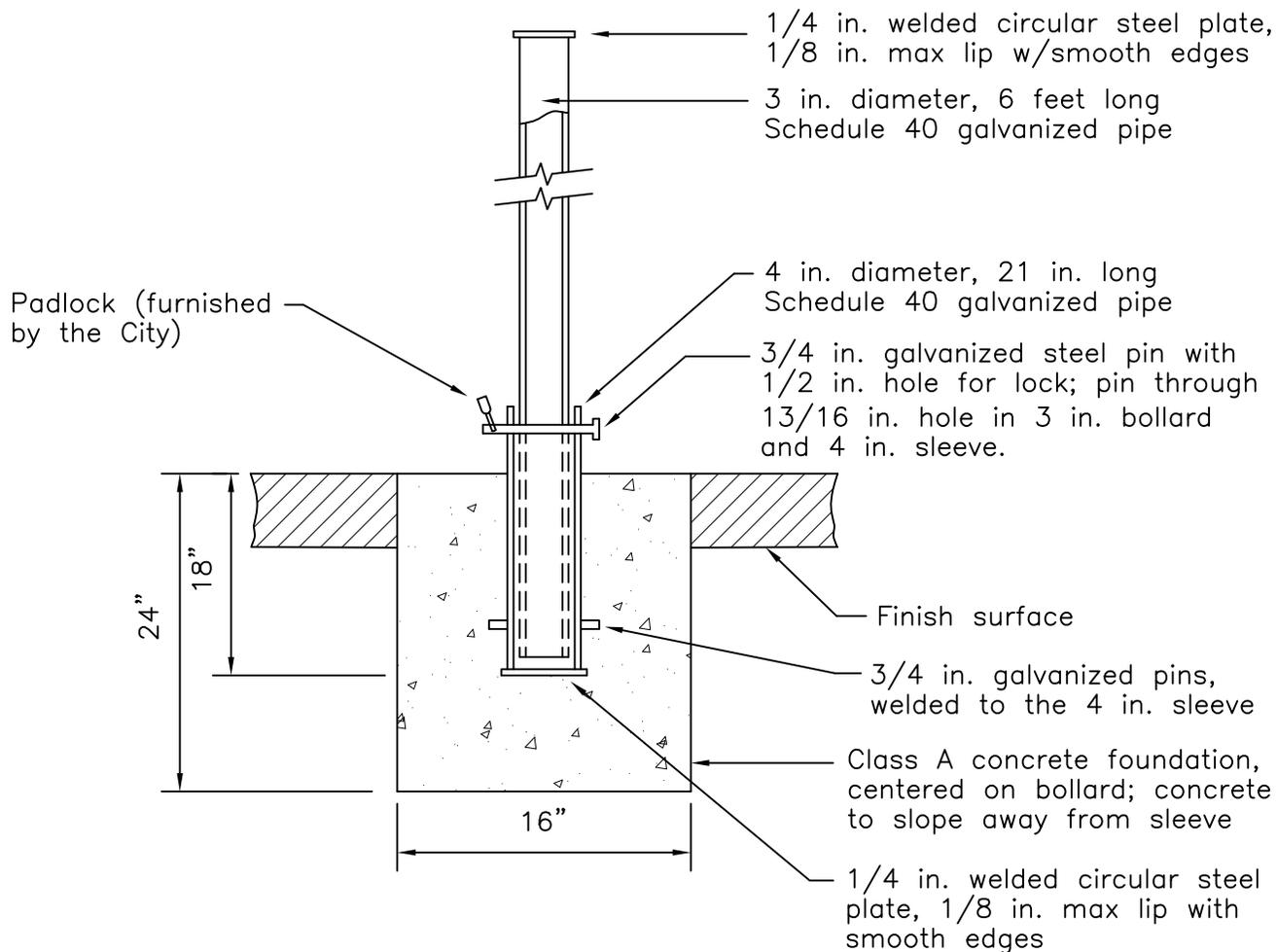
0909



NOTES

1. Bollard shall be spray painted with 2 coats of high gloss white rust inhibitive paint. on top of 1 coat of primer.
2. Reflective Striping as required.

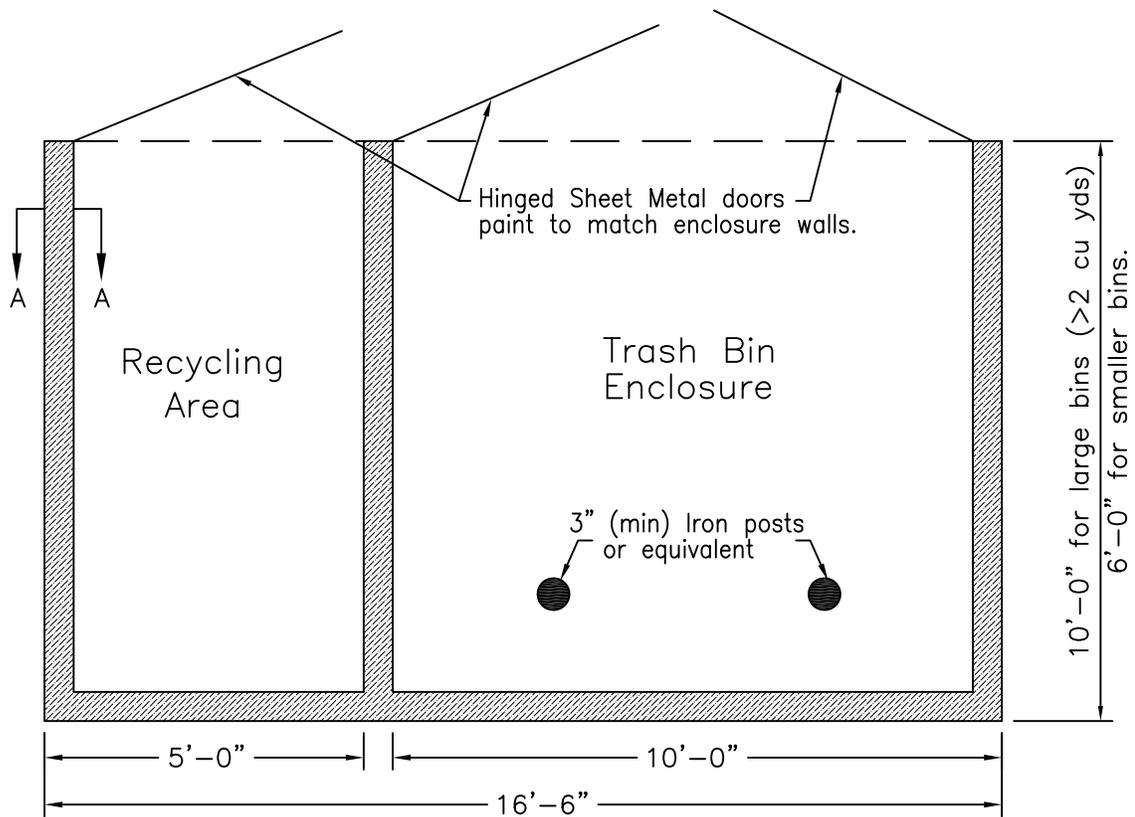
NO.	REVISION	BY	 CITY OF RED BLUFF	STANDARD PLAN	1300
				BOLLARD	
			APPROVED BY _____ DATE: _____ GARY M. GORDON, CITY ENGINEER		



NOTES

1. Bollard and sleeve shall be spray painted with 2 coats of high gloss white rust inhibitive paint on top of 1 coat of primer.
2. Reflective Striping as Required.

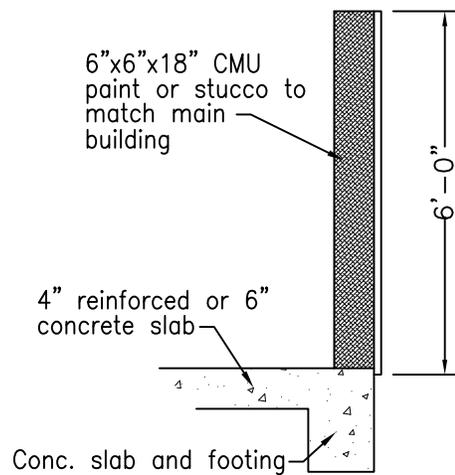
NO.	REVISION	BY	 CITY OF RED BLUFF	STANDARD PLAN	
				REMOVABLE BOLLARD	
			APPROVED BY _____ DATE: _____ GARY M. GORDON, CITY ENGINEER	1301	



PLAN

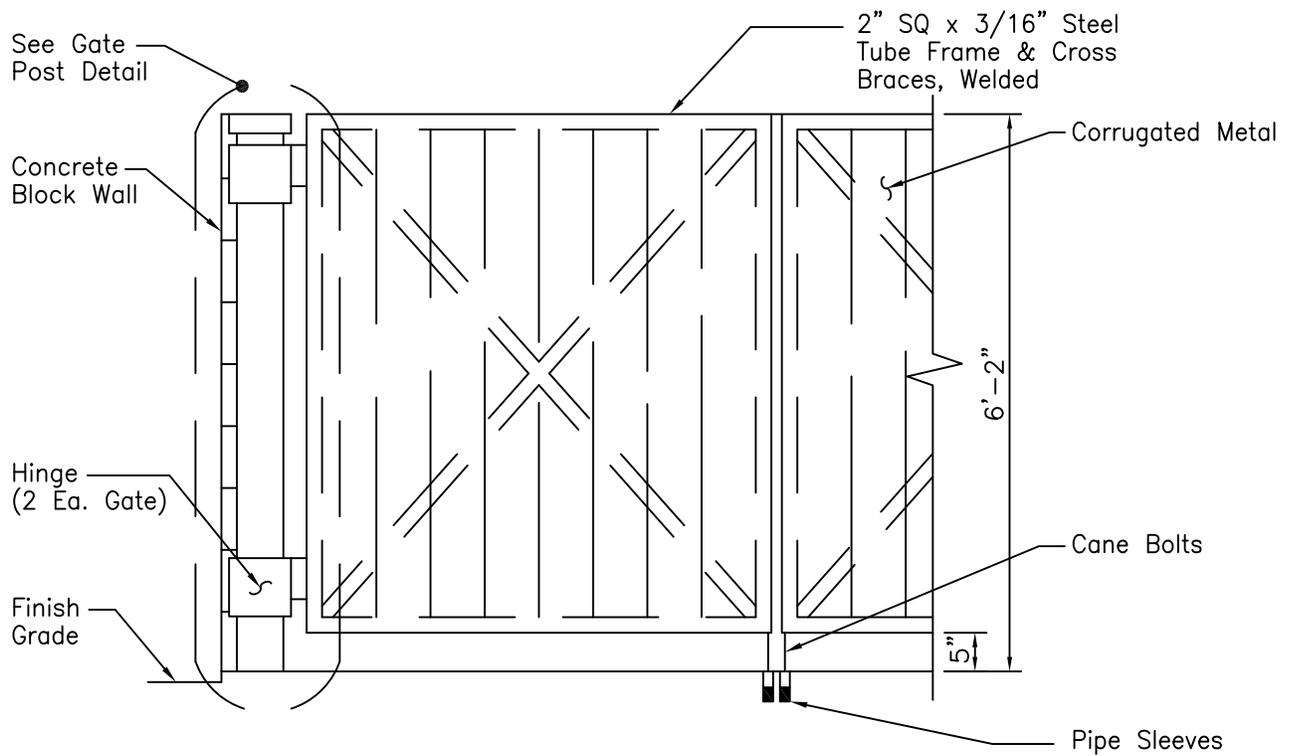
NOTES:

1. Refuse Truck requires 18" of vertical clearance over the entire approach to the enclosure. Minimum turning radius is 50 feet. Typical truck weight is 82,000 lbs.
2. Gates must be latchable or lockable in the open position.
3. Small bins (2 cu. yds. or smaller) may be rolled a short distance into and out of the enclosure. Large bins (3-10 cu. yds.) may not be rolled—direct truck access is required.
4. Accessway—shall provide direct truck approach for large bins. Max back up distance is 50'.
5. Enclosures shall include a full roof.
6. Enclosures shall include exterior finish and colors to match or complement the primary building.

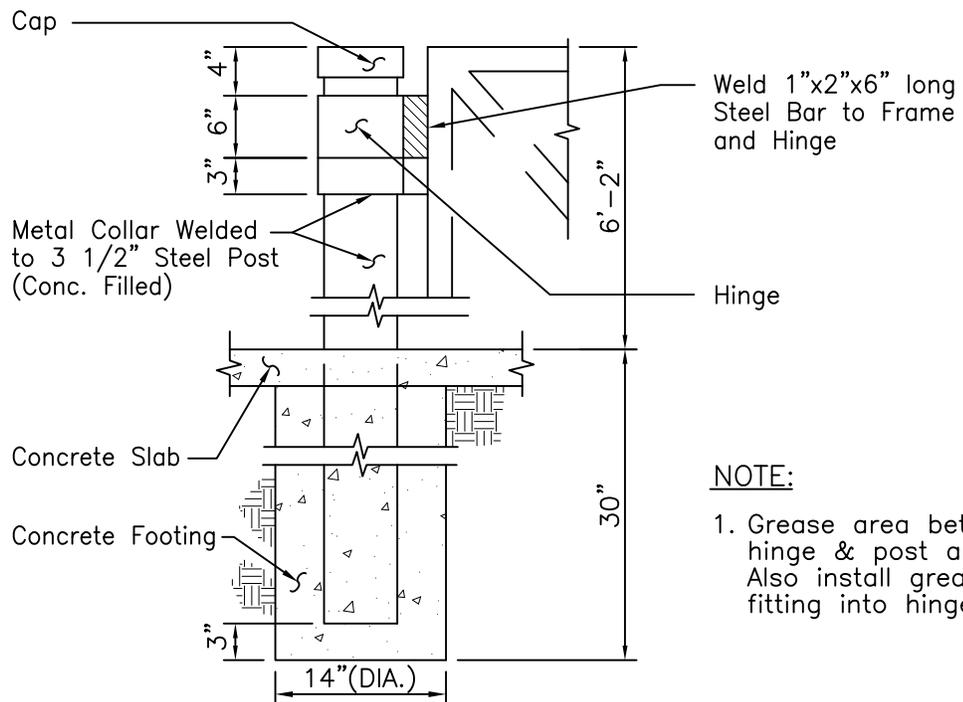


SECTION A-A  
Enclosure Wall

NO.	REVISION	BY	 CITY OF RED BLUFF <hr/> <hr/>	STANDARD PLAN	1302
				APPROVED BY _____ DATE: _____ GARY M. GORDON, CITY ENGINEER	



TRASH ENCLOSURE GATE ELEVATION

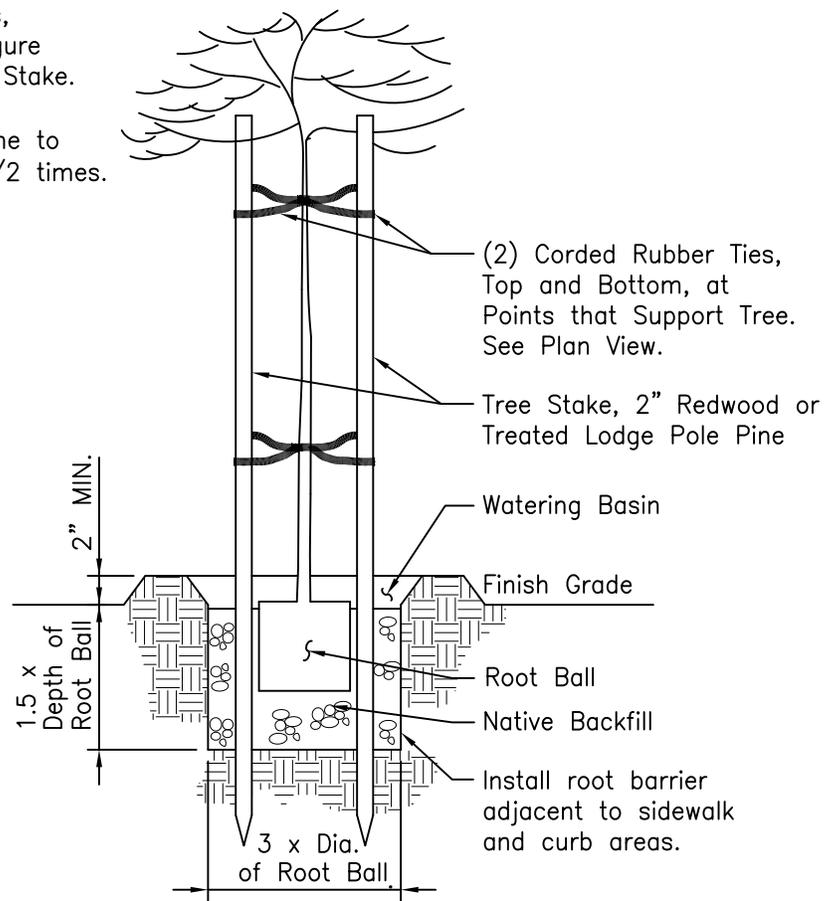
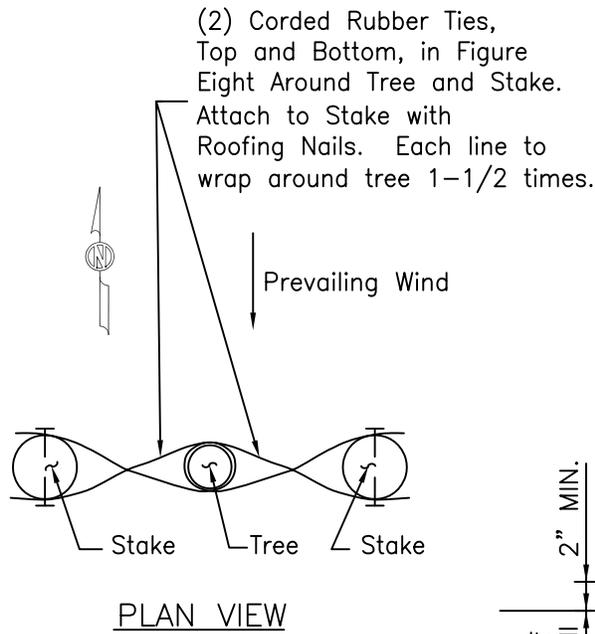


**NOTE:**

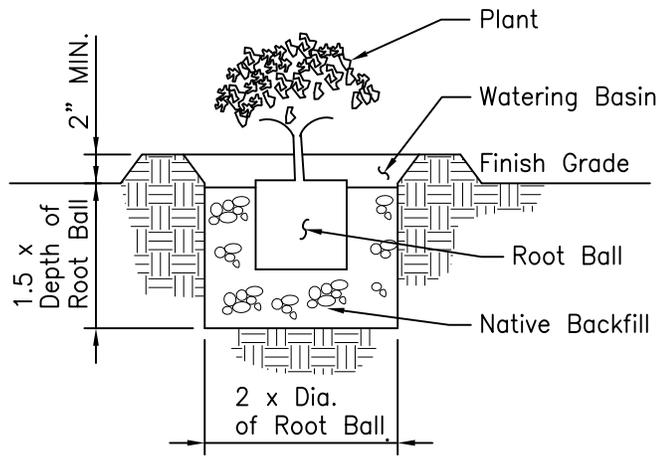
1. Grease area between hinge & post and collar. Also install grease fitting into hinge.

TRASH ENCLOSURE GATE POST DETAIL

NO.	REVISION	BY	 CITY OF RED BLUFF	STANDARD PLAN	1303
APPROVED BY _____					
DATE: _____			GARY M. GORDON, CITY ENGINEER		



TREE PLANTING

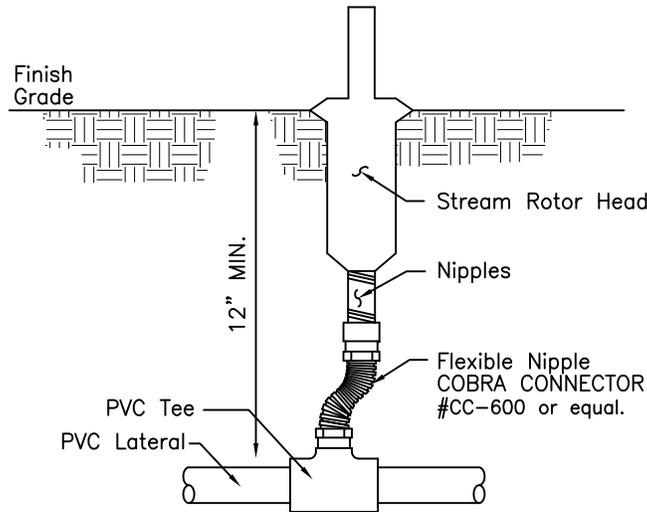
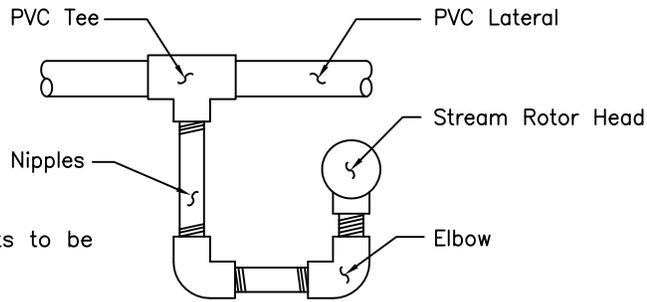


SHRUB PLANTING

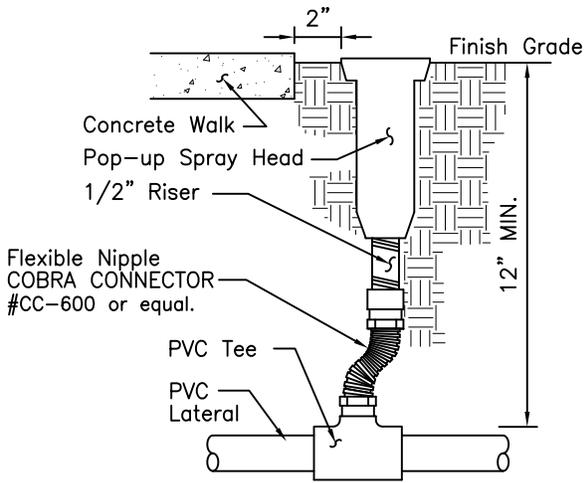
NO.	REVISION	BY	 CITY OF RED BLUFF <hr/> <hr/>	STANDARD PLAN	1304	
				APPROVED BY _____		TREE AND SHRUB PLANTING
				DATE: _____		
				GARY M. GORDON, CITY ENGINEER		

**NOTE:**

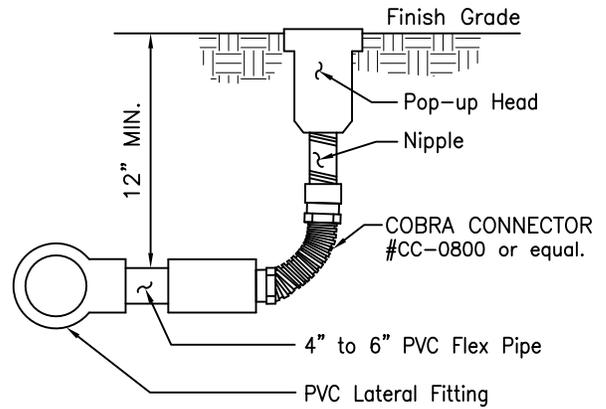
1. All Nipples and Joints to be Schedule 80 PVC.



**TRIPLE SWING JOINT WITH STREAM ROTOR**

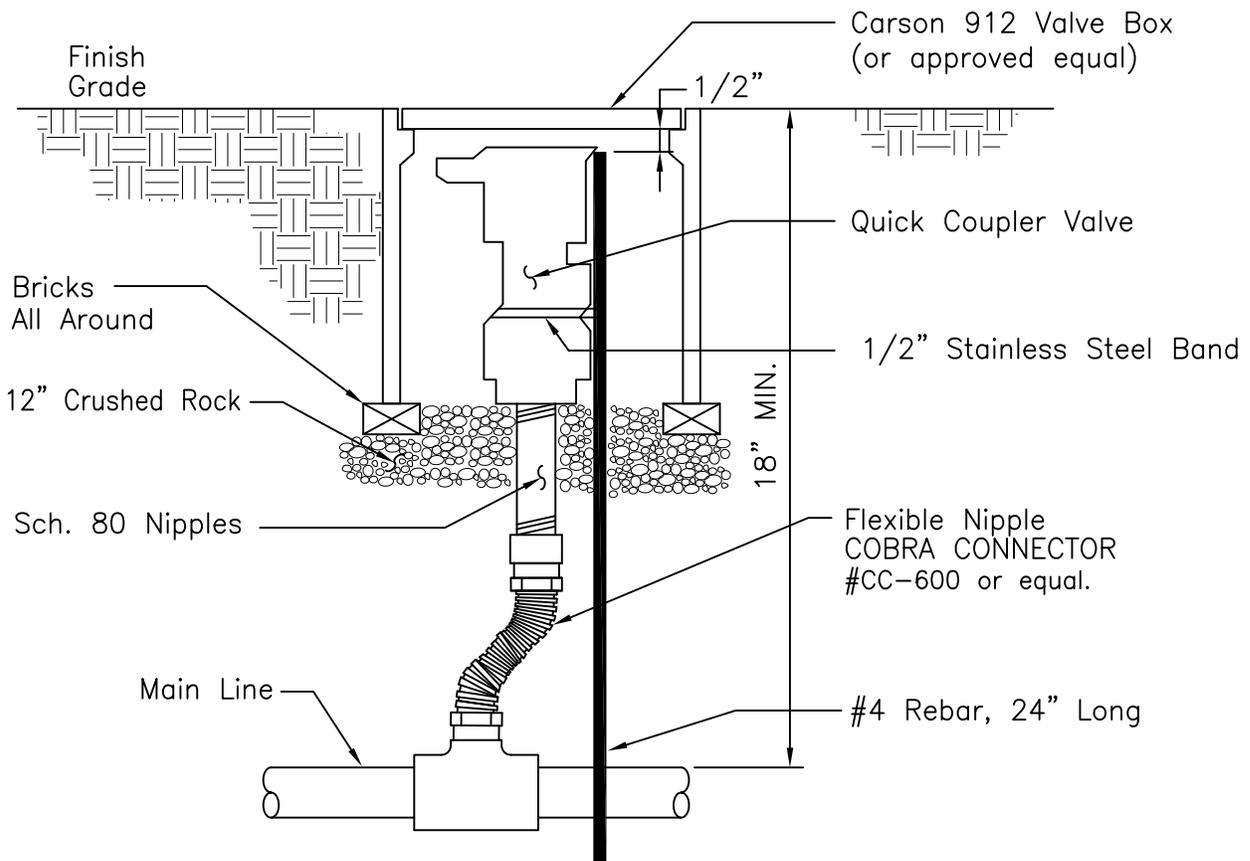
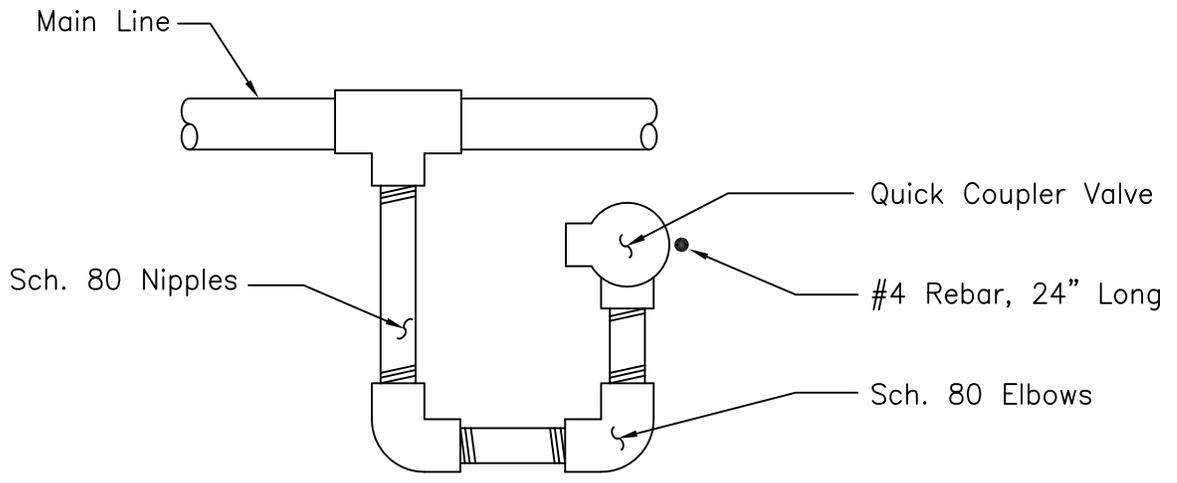


**LAWN POP-UP**



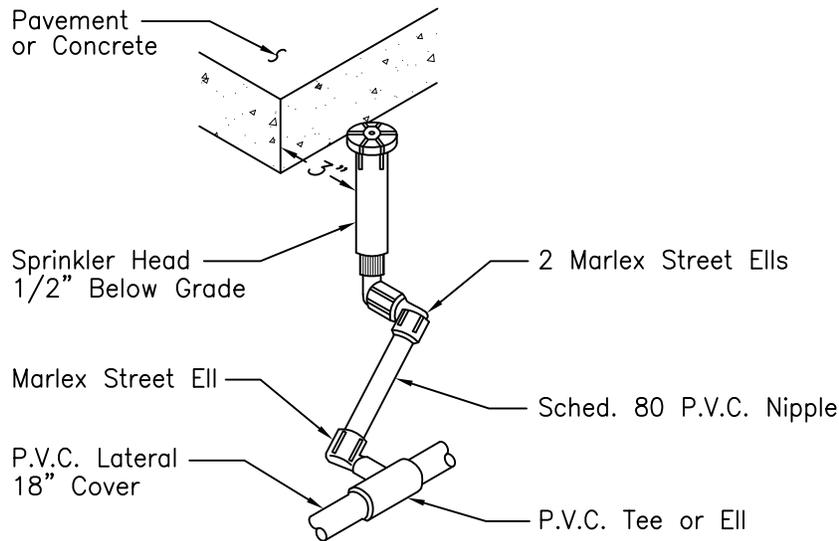
**FLEX RISER WITH POP-UP HEAD**

NO.	REVISION	BY	 CITY OF RED BLUFF <hr/> <hr/>	STANDARD PLAN	1305
				APPROVED BY _____ DATE: GARY M. GORDON, CITY ENGINEER	

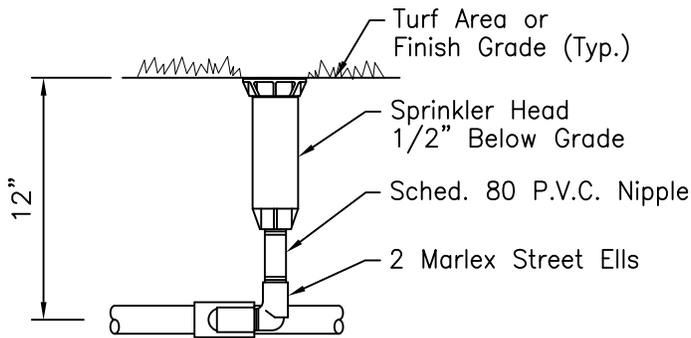


QUICK COUPLER VALVE

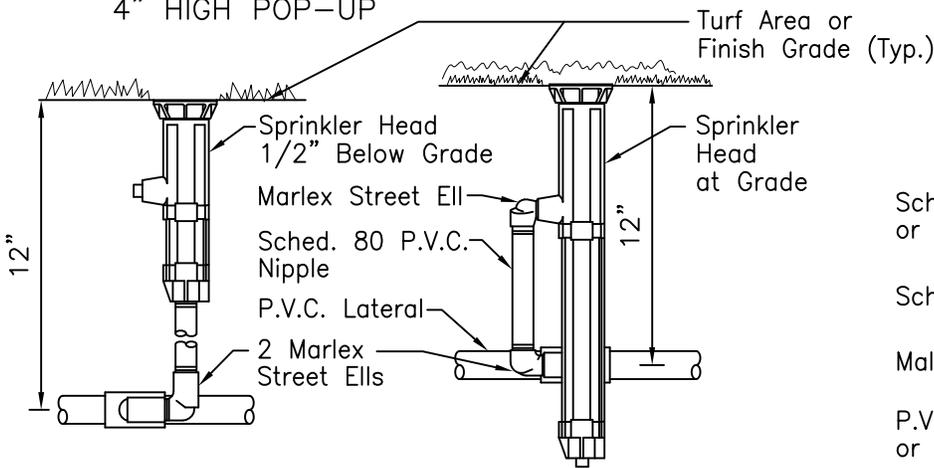
NO.	REVISION	BY	 CITY OF RED BLUFF <hr/> <hr/>	STANDARD PLAN	1306
APPROVED BY _____ DATE: _____			GARY M. GORDON, CITY ENGINEER	QUICK COUPLER VALVE	



TYPE A SPRINKLER DETAIL



4" HIGH POP-UP



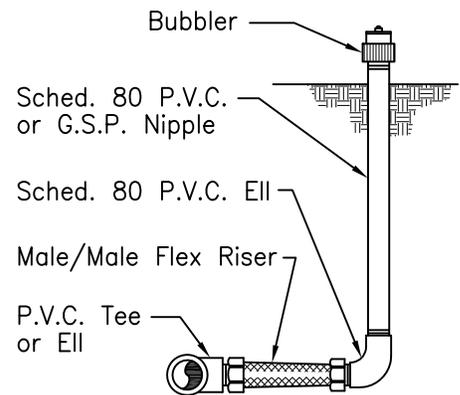
6" HIGH POP-UP

12" HIGH POP-UP

TYPE B SPRINKLER DETAILS

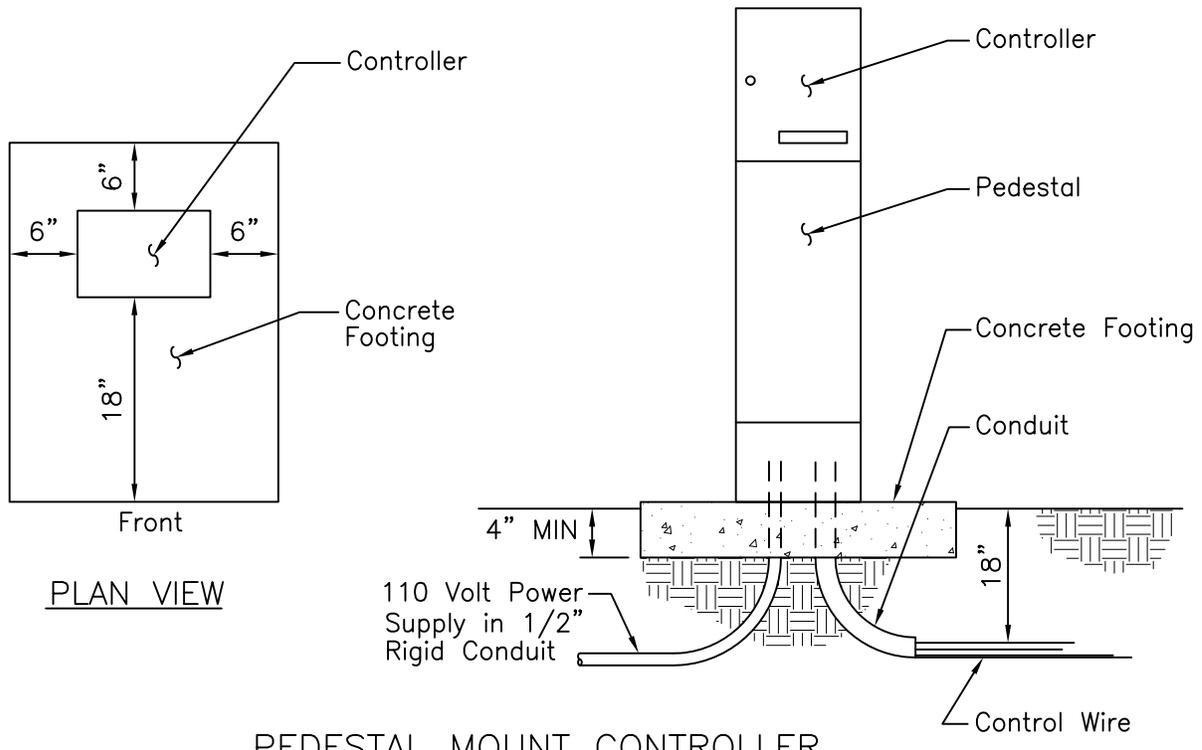
NOTE:

1. All Nipples and Joints to be Schedule 80 PVC.

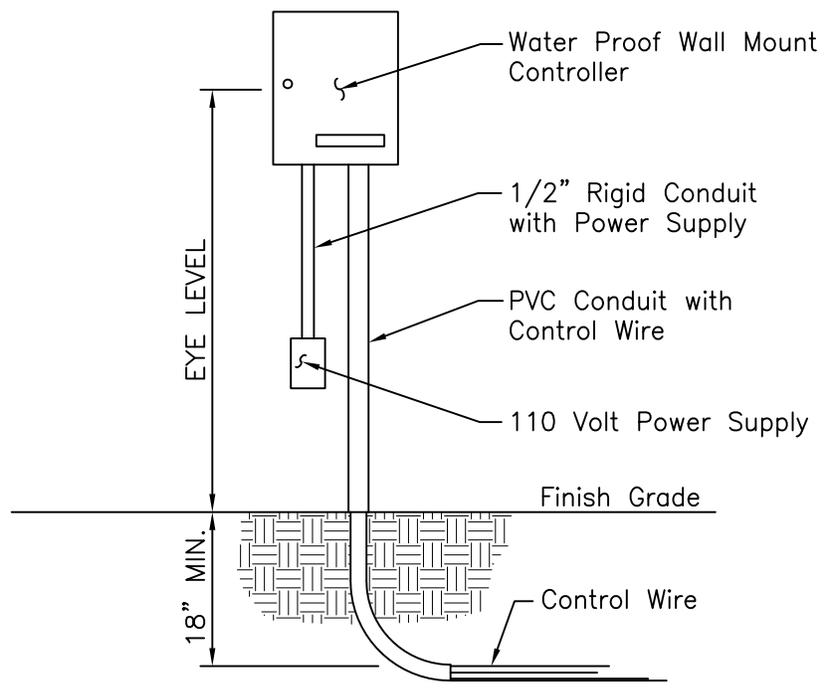


TYPE C SPRINKLER DETAIL

NO.	REVISION	BY	 CITY OF RED BLUFF	STANDARD PLAN	1307
APPROVED BY _____					
DATE: _____			GARY M. GORDON, CITY ENGINEER		

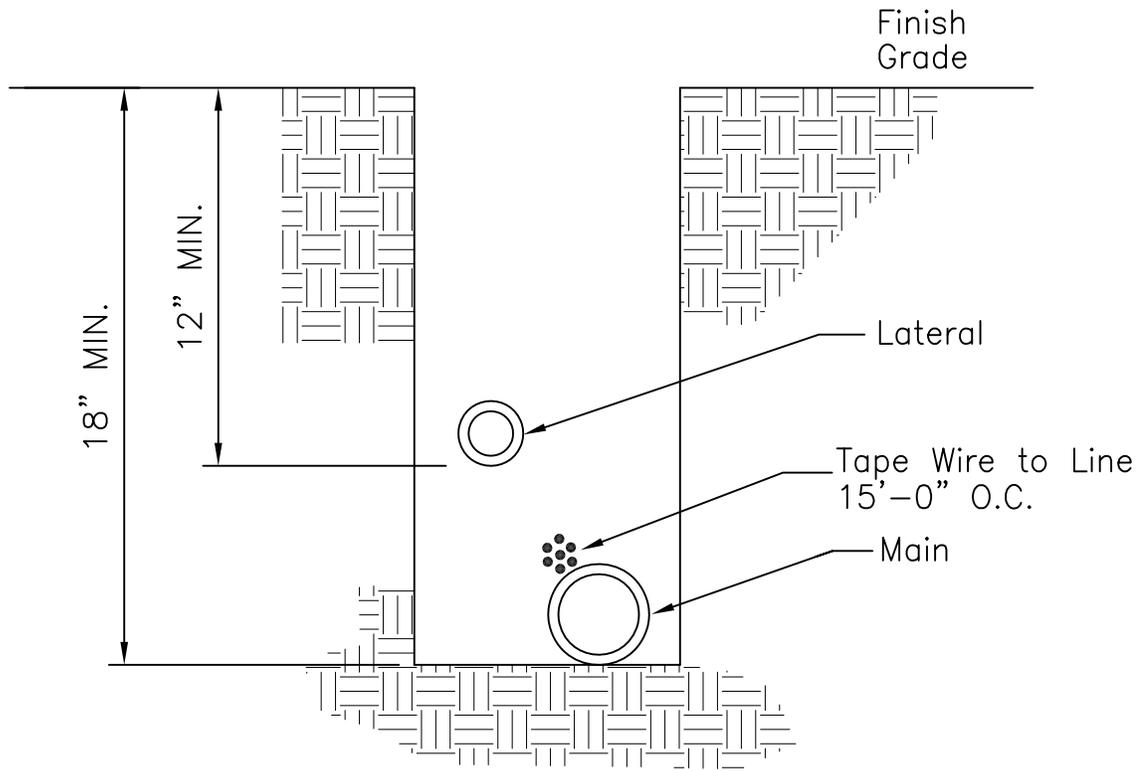


PEDESTAL MOUNT CONTROLLER



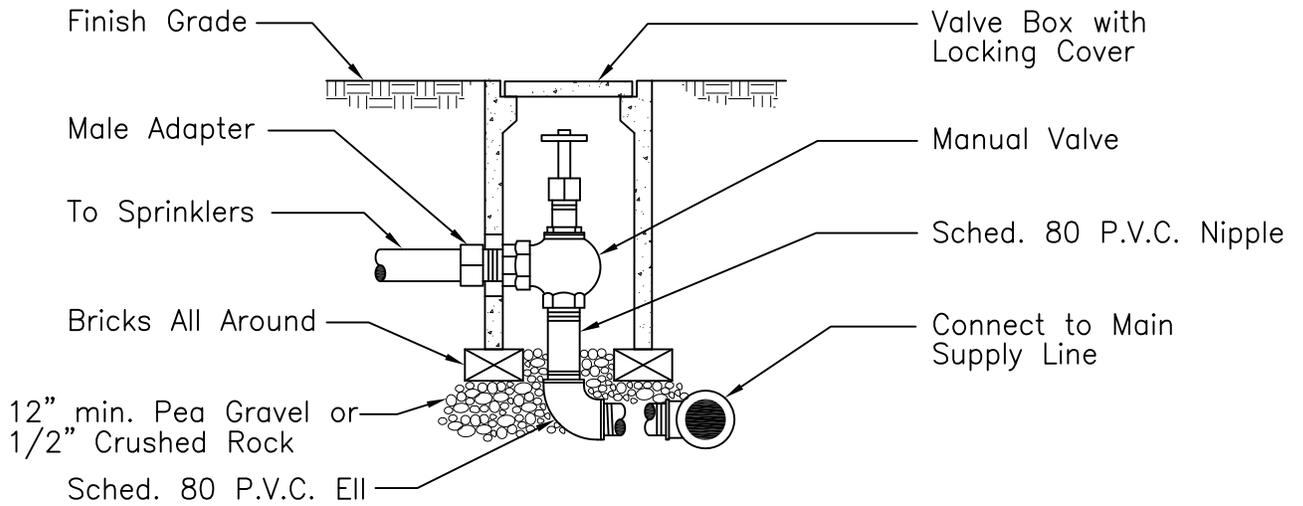
WALL-MOUNTED CONTROLLER

NO.	REVISION	BY	<p><i>PWD</i> CITY OF RED BLUFF</p> <hr/> <p>APPROVED BY _____</p> <p>DATE: GARY M. GORDON, CITY ENGINEER</p>	STANDARD PLAN	1308
				PEDESTAL MOUNT AND WALL MOUNTED CONTROLLER	



LANDSCAPE IRRIGATION  
MAIN AND LATERAL AND CONTROL WIRE

NO.	REVISION	BY	 CITY OF RED BLUFF <hr/> <hr/>	STANDARD PLAN	1309
				MAIN, LATERAL AND CONTROL WIRE	
APPROVED BY _____ DATE: _____			GARY M. GORDON, CITY ENGINEER		

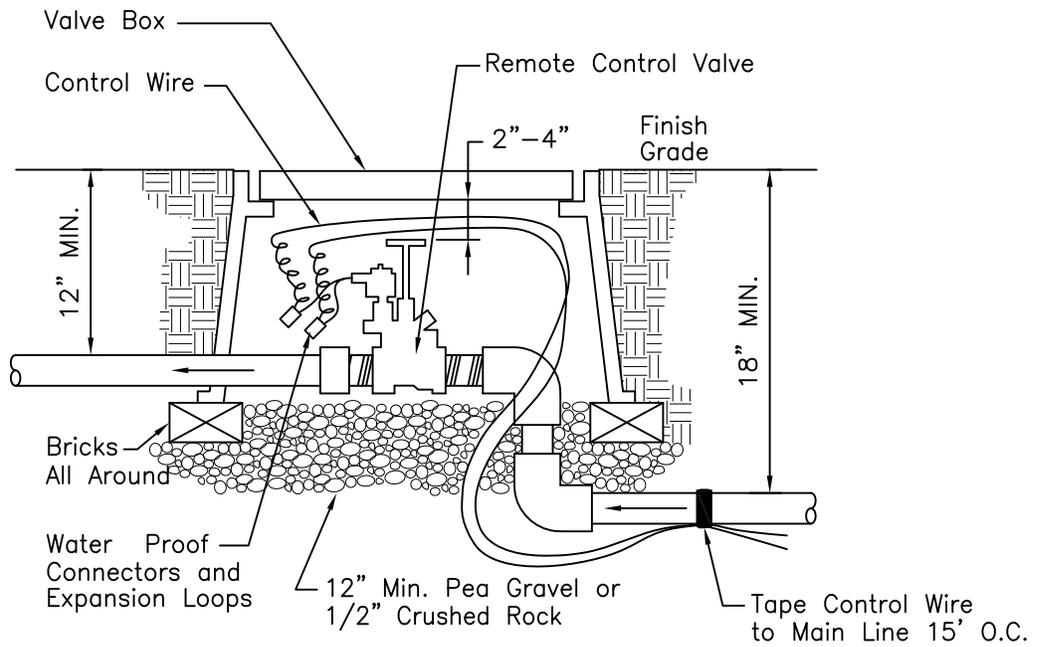


MANUAL VALVE

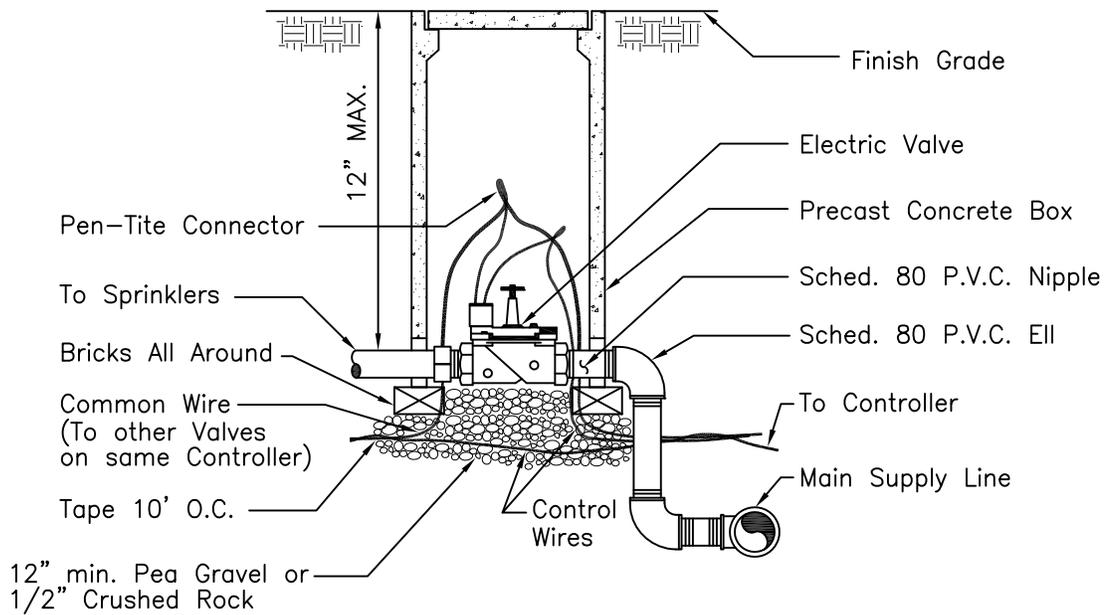
NOTES:

1. Use 10" x 10-1/4" round box for all ball valves, Carson Industries # 910-12B with green bolt down cover of approved equal. Extension sleeve shall be PVC -- 6-inch minimum size.
2. If required otherwise, all valve boxes & lids shall be traffic rated for H-20 load rating, Christy G5 or approved equal.
3. All Nipples and Joints to be Schedule 80 PVC.

NO.	REVISION	BY	 CITY OF RED BLUFF <hr/> <hr/>	STANDARD PLAN	1310
				INSTALLATION OF CONTROL VALVE	
APPROVED BY _____			DATE: GARY M. GORDON, CITY ENGINEER		



REMOTE CONTROL VALVE



ELECTRIC VALVE

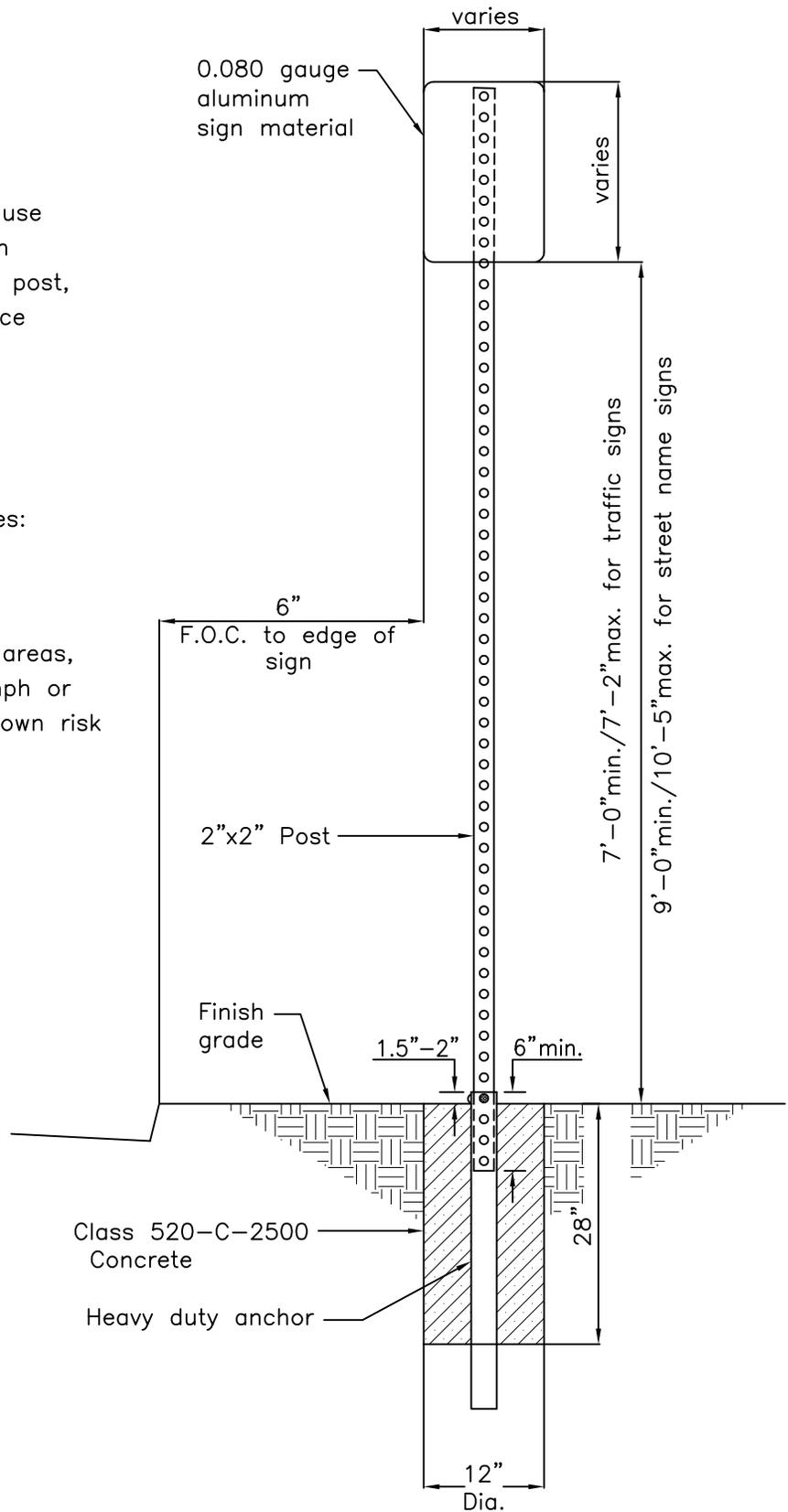
Notes:

1. Use 9-1/2" x 16" x 11" rectangular box for all electrical control valves, Carson Industries 1419-12B with green bolt down cover or approved equal.
2. If required otherwise, all valve boxes & lids shall be traffic rated for H-20 load rating, Cook or approved equal.
3. All nipples and joints to be schedule 80 PVC.

NO.	REVISION	BY	 CITY OF RED BLUFF <hr/> APPROVED BY _____ DATE: GARY M. GORDON, CITY ENGINEER	STANDARD PLAN	1311

NOTES:

1. The sign installation shall use the Unistrut Telespar® Sign Support System with a 2" post, fitted Heavy Duty One-Piece Anchor and drive rivet fasteners or approved equivalent system.
2. The post shall be secured to the anchor on two sides:
  - 1-facing oncoming traffic,
  - 1-facing the roadway.
3. For use only in industrial areas, with speed limits of 35 mph or greater, and high knock down risk installations.

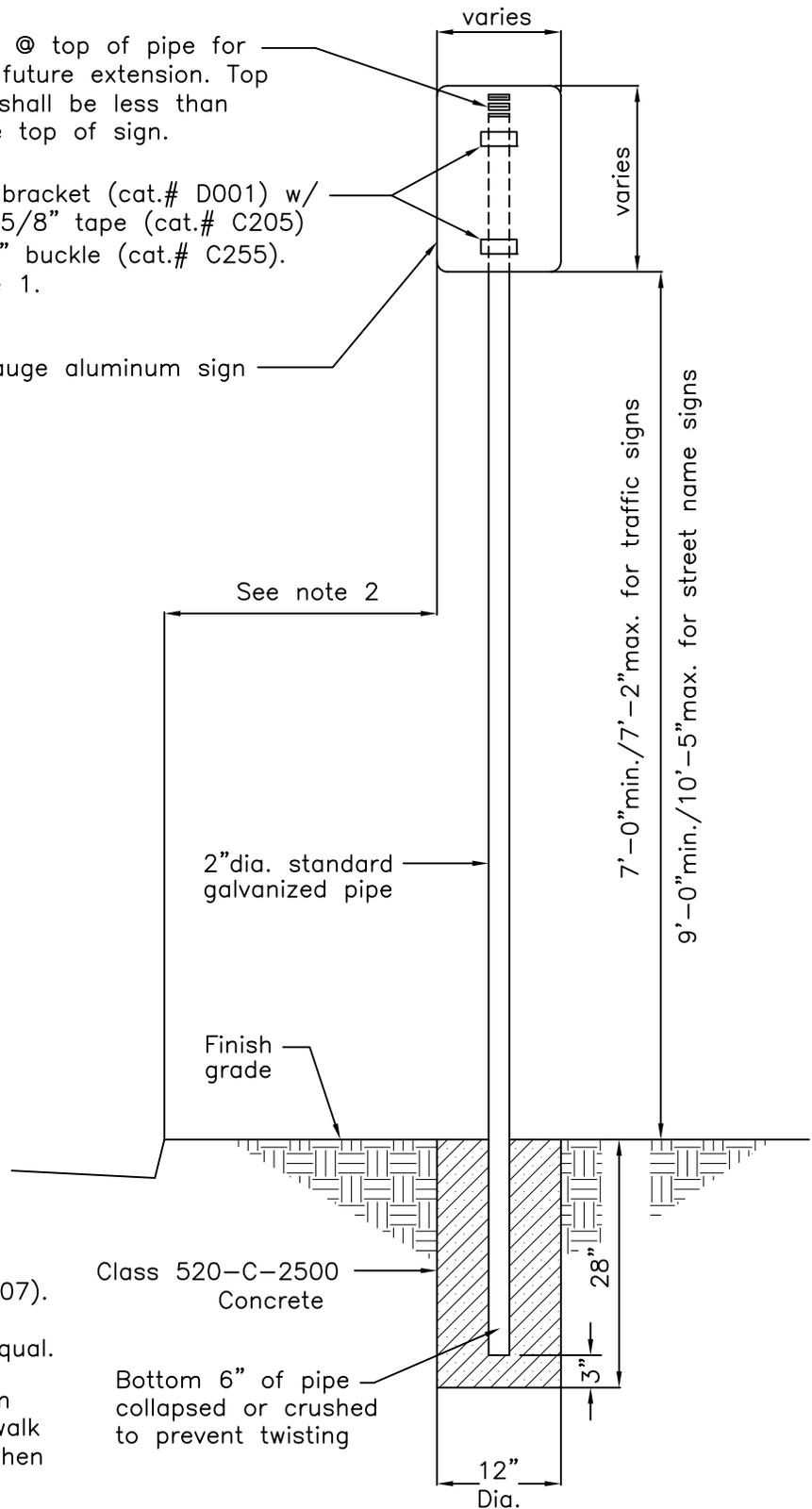


NO.	REVISION	BY	STANDARD PLAN		1400
			SIGN INSTALLATION 2x2 POLE AND ANCHOR ASSEMBLY		
<p><i>PWD</i> CITY OF RED BLUFF</p> <p>APPROVED BY _____ DATE: GARY M. GORDON, CITY ENGINEER</p>					

Threaded @ top of pipe for possible future extension. Top of post shall be less than 2" above top of sign.

Band-it bracket (cat.# D001) w/ band-it 5/8" tape (cat.# C205) and 5/8" buckle (cat.# C255). See note 1.

0.080 gauge aluminum sign material



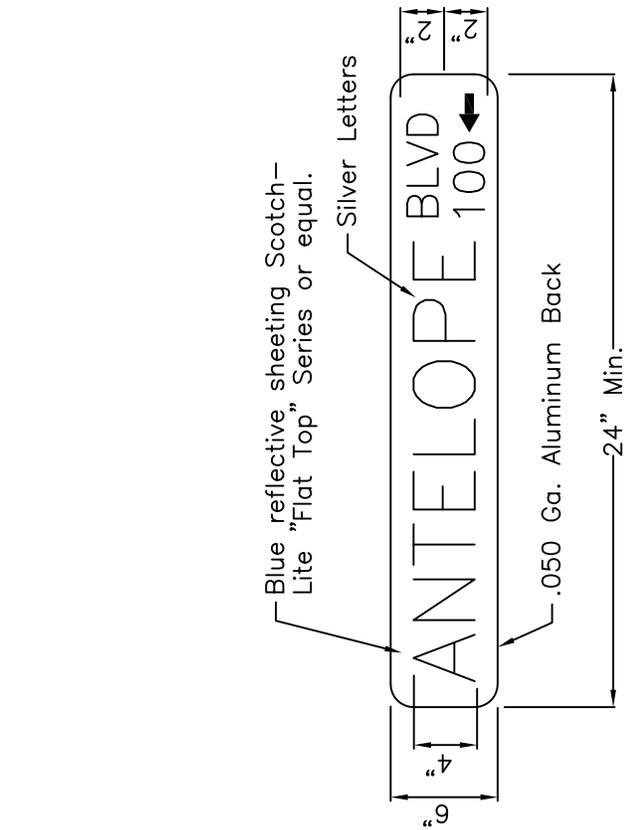
**NOTES:**

1. For up to 18"x18" flag-mounted signs use Band-it L-mount bracket (cat.# D007). Larger signs shall use type cat. number or approved equal.
2. Edge of sign to be 6" from F.O.C. when placed in sidewalk area or flush with B.E.W. when behind the sidewalk.

Class 520-C-2500 Concrete

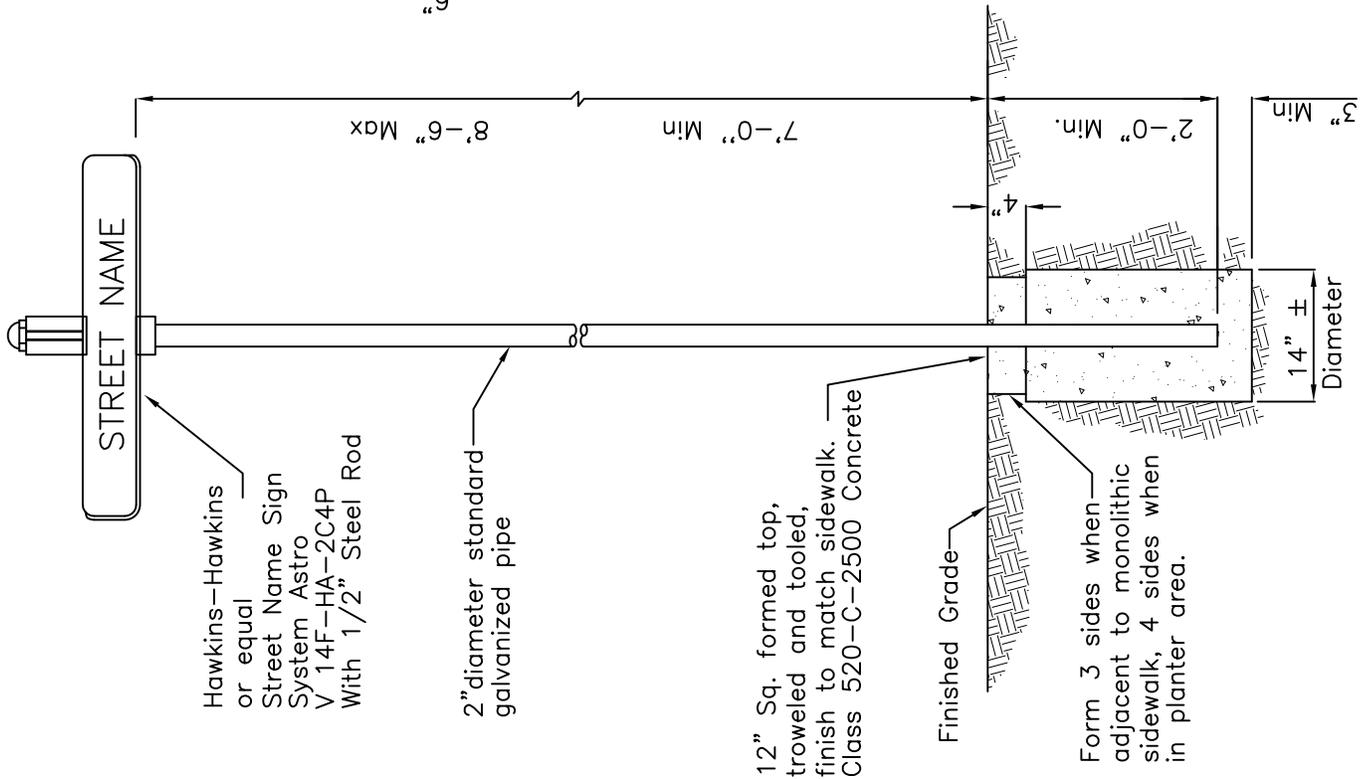
Bottom 6" of pipe collapsed or crushed to prevent twisting

NO.	REVISION	BY	 CITY OF RED BLUFF <hr/> <hr/>	STANDARD PLAN	1401
				APPROVED BY _____ DATE: _____ GARY M. GORDON, CITY ENGINEER	



**NOTES:**

1. Sign Location to be determined by the Engineer.
2. Block numbers should pertain to block on which sign is placed.
3. Locate at midpoint in return and one foot back of sidewalk.
4. Collectors and Arterials shall have 6" letters.



Hawkins-Hawkins or equal Street Name Sign System Astro V 14F-HA-2C4P With 1/2" Steel Rod

2" diameter standard galvanized pipe

12" Sq. formed top, troweled and tooled, finish to match sidewalk. Class 520-C-2500 Concrete

Finished Grade

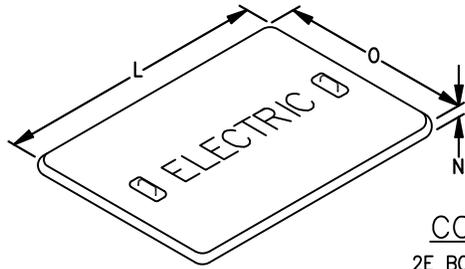
Form 3 sides when adjacent to monolithic sidewalk, 4 sides when in planter area.

NO.	REVISION	BY

**PWD** CITY OF RED BLUFF  
 APPROVED BY \_\_\_\_\_  
 DATE: GARY M. GORDON, CITY ENGINEER

STANDARD PLAN  
 STREET SIGN  
 INCORPORATED AREA

1402



**COVER**

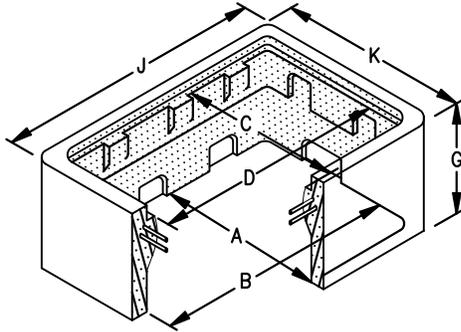
2E BOX-1 PIECE  
 3E BOX-1 PIECE  
 4E BOX-2 PIECE

**LID WEIGHT CHART**

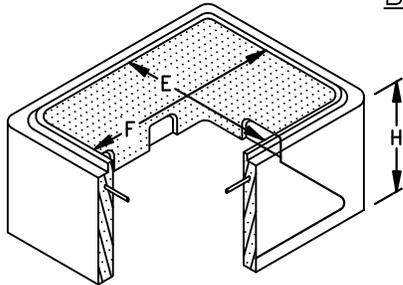
BOX NO.	MAX. LID WEIGHT
2E	90 LBS.
3E	140 LBS.
4E	140 LBS.

**EXTENSION**

2E BOX-1 REQUIRED  
 3E BOX-1 REQUIRED  
 4E BOX-1 REQUIRED



**BOX**



**APPROVED CONCRETE BOX/LID SUPPLIERS**

MANUFACTURER	CAT. NO.	BOX	LID	2E	3E	4E
COOK CONCRETE	2E		X	X		
" "	2E	X		X		
" "	3E		X		X	
" "	3E	X			X	
" "	4E		X			X
" "	4E	X				X
CHRISTY CONCRETE	B-40	X			X	
" "	B-40LT		X		X	
BES CONCRETE	C40	X			X	
" "	C40T		X		X	
" "	C36	X		X		

**NOTES:**

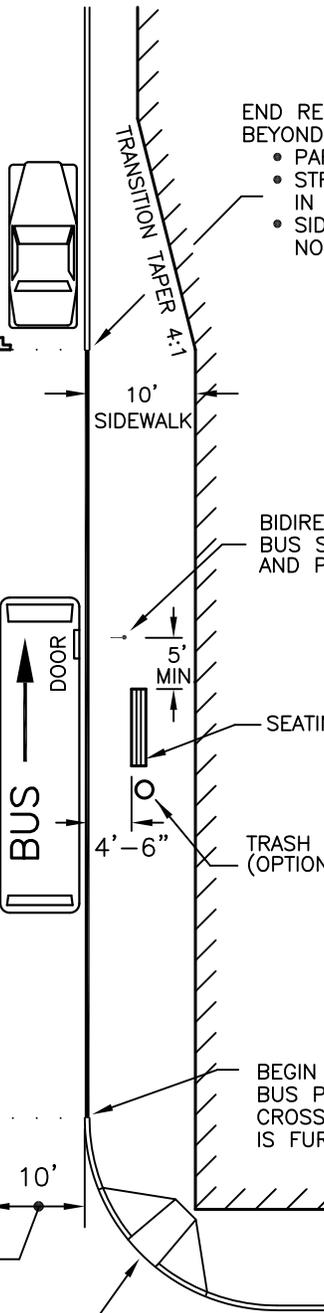
- ALL LIDS AND COVERS SHALL BE FURNISHED WITH HOLD-DOWN BOLTS.
- 2E AND 3E LIDS AND COVERS SHALL BE IMPRINTED WITH "C.O.R.B. ELECTRIC". 4E LIDS AND COVERS SHALL BE IMPRINTED WITH "C.O.R.B. ELECTRIC HIGH VOLTAGE".
- BOXES AND LIDS SHALL BE OF CONCRETE AND FROM SUPPLIERS WHO'S BOXES MEET THE NOMINAL DIMENSIONS SHOWN BELOW.
- PRIOR TO ACCEPTANCE OF A BOX AND LID, THE CITY OF RED BLUFF MUST HAVE RECEIVED A REPORT FROM AN INDEPENDANT, STATE OF CALIFORNIA, LICENSED CIVIL OR STRUCTURAL ENGINEER. THE REPORT SHALL BE STAMPED BY THE ENGINEER AND SHALL CERTIFY THAT THE BOX AND LID DESIGN MEETS THE REQUIRED SPECIFICATIONS AND STANDARDS OR TEST REPORTS SHOWING TEST RESULTS MEET OR EXCEED THE REQUIREMENTS OF NOTE 5.
- BOXES AND LIDS SHALL MEET OR EXCEED THE DESIGN STRENGTH FOR VERTICAL LOADING OF ASTM C 857 DESIGNATION (AASHTO DESIGNATION H10-44) BASED ON 8,000 LBS. PER WHEEL, 10"x10" WHEEL LOAD AREA, AND INCREASED 30% FOR AN IMPACT FACTOR.

BOX NO.	DIMENSIONS (IN INCHES)													
	A	B	C	D	E	F	G	H	J	K	L	M	N	O
2E	17	30	17	30	--	--	12	12	34.75	21.75	30.5	--	2	17.5
3E	24	36	21	32.5	24	36	14	10	40	28.5	35	--	3	24
4E	30	48	27	46	28	46	14	10	52	34	24	--	3	30

NO.	REVISION	BY	 CITY OF RED BLUFF APPROVED BY _____ DATE: _____ GARY M. GORDON, CITY ENGINEER	STANDARD PLAN	1500

SCALE OF FEET FROM CURB RETURN

80' MIN.



END RED CURB AND CONCRETE BUS PAD. BEYOND THIS POINT:

- PARKING MAY BE PERMITTED.
- STREET TREES MAY BE PLANTED IN SIDEWALK. (SEE LOCAL STANDARDS)
- SIDEWALK WIDTH MAY BE REDUCED TO NORMAL WIDTH.

**TYPE 1-A**

**FOR BUS STOPS ON NARROW SIDEWALKS IN SEVERELY CONSTRAINED AREAS**

ALLOW 40-FOOT PULL OUT BUFFER BETWEEN FRONT OF BUS AND PARKED CAR OR FIXED OBSTRUCTION.

ALLOW 40-FOOT STOP AREA FOR ONE STANDARD BUS. ADD 50 FEET FOR EACH ADDITIONAL STANDARD BUS EXPECTED TO USE THE STOP AT THE SAME TIME

ALLOW 10-FOOT SIGHT DISTANCE BUFFER BETWEEN REAR OF BUS AND CURB

40'

0'

10'

8" CONCRETE BUS PAD (FOR STOPS WITH 4 OR MORE BUSES PER HOUR)

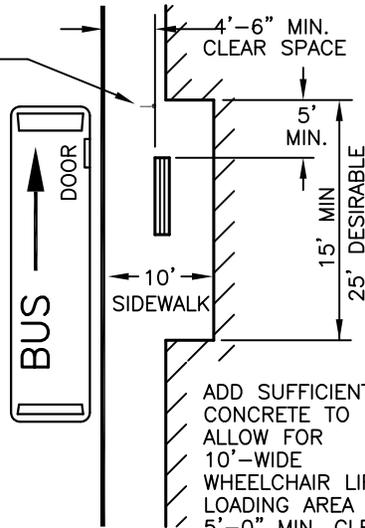
PEDESTRIAN HANDICAP RAMP PER LOCAL STANDARDS

BIDIRECTIONAL BUS STOP SIGN AND POLE

SEATING

TRASH RECEPTICLE (OPTIONAL)

BEGIN RED CURB AND CONCRETE BUS PAD AT CURB RETURN OR CROSSWALK LIMIT LINE (WHICHEVER IS FURTHER FROM INTERSECTION)



ADD SUFFICIENT CONCRETE TO ALLOW FOR 10'-WIDE WHEELCHAIR LIFT LOADING AREA & 5'-0" MIN. CLEAR ZONE.

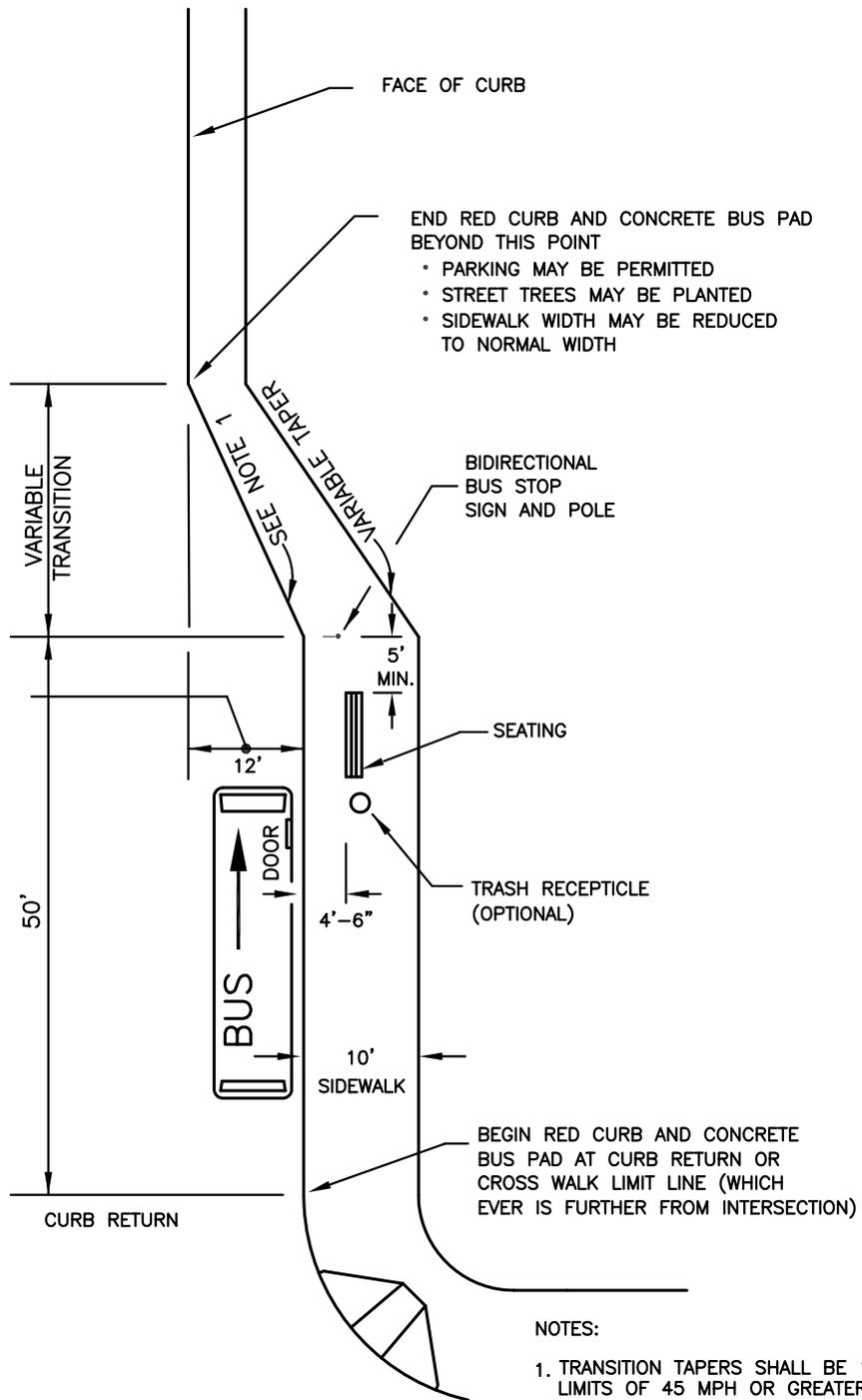
Note: Type 1 & 1A bus stops are to be used on existing streets only

NO.	REVISION	BY

**PWD** CITY OF RED BLUFF  
 APPROVED BY \_\_\_\_\_  
 DATE: GARY M. GORDON, CITY ENGINEER

STANDARD PLAN  
 TYPE 1 & 1A  
 BUS STOP  
 LAYOUT- FAR SIDE  
 NO TURNOUT

1600



NOTES:

1. TRANSITION TAPERS SHALL BE 10:1 FOR SPEED LIMITS OF 45 MPH OR GREATER & 4:1 FOR SPEED LIMITS OF LESS THAN 45 MPH.
2. TYPE 2 BUS STOPS ARE TO BE USED WITH NEW DEVELOPMENTS.

NO.	REVISION	BY

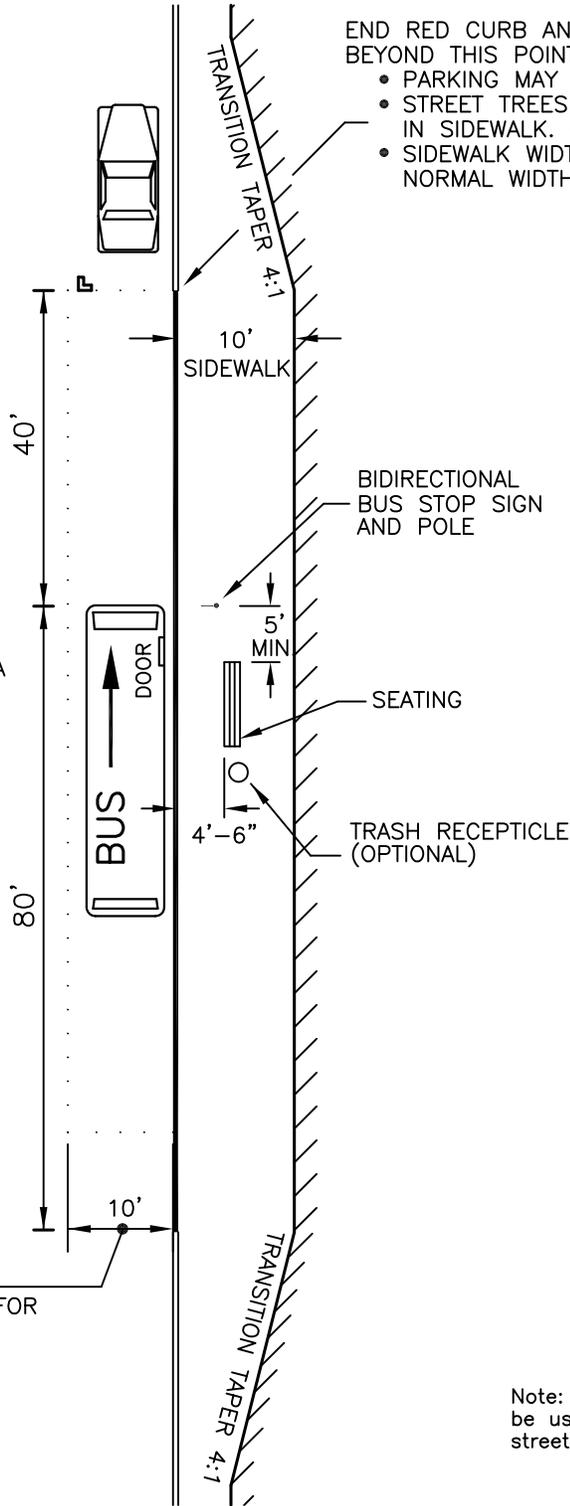
*PWD* CITY OF RED BLUFF  
 APPROVED BY \_\_\_\_\_  
 DATE: GARY M. GORDON, CITY ENGINEER

STANDARD PLAN  
 TYPE 2 BUS STOP  
 LAYOUT - FAR SIDE  
 WITH TURNOUT

1601

ALLOW 40-FOOT STOP AREA FOR ONE STANDARD BUS. ADD 50 FEET FOR EACH ADDITIONAL STANDARD BUS EXPECTED TO USE THE STOP AT THE SAME TIME

8" CONCRETE BUS PAD (FOR STOPS WITH 4 OR MORE BUSES PER HOUR)

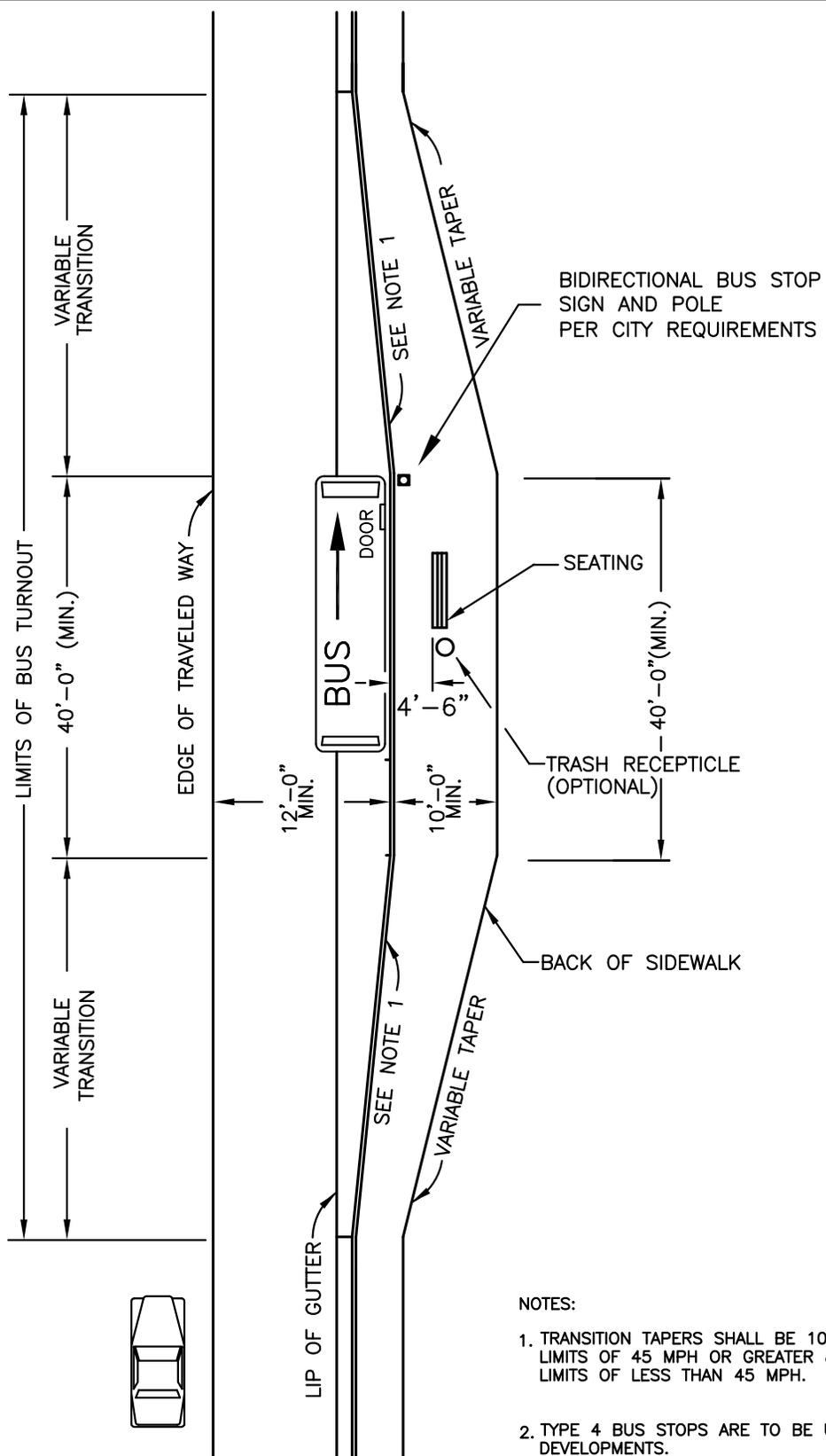


END RED CURB AND CONCRETE BUS PAD. BEYOND THIS POINT:

- PARKING MAY BE PERMITTED.
- STREET TREES MAY BE PLANTED IN SIDEWALK. (SEE LOCAL STANDARDS)
- SIDEWALK WIDTH MAY BE REDUCED TO NORMAL WIDTH.

Note: Type 3 bus stops to be used on existing streets only

NO.	REVISION	BY	CITY OF RED BLUFF		STANDARD PLAN	1602
			<i>PWD</i>		TYPE 3 BUS STOP LAYOUT - MID-BLOCK NO TURNOUT	
			APPROVED BY _____			
			DATE: GARY M. GORDON, CITY ENGINEER			



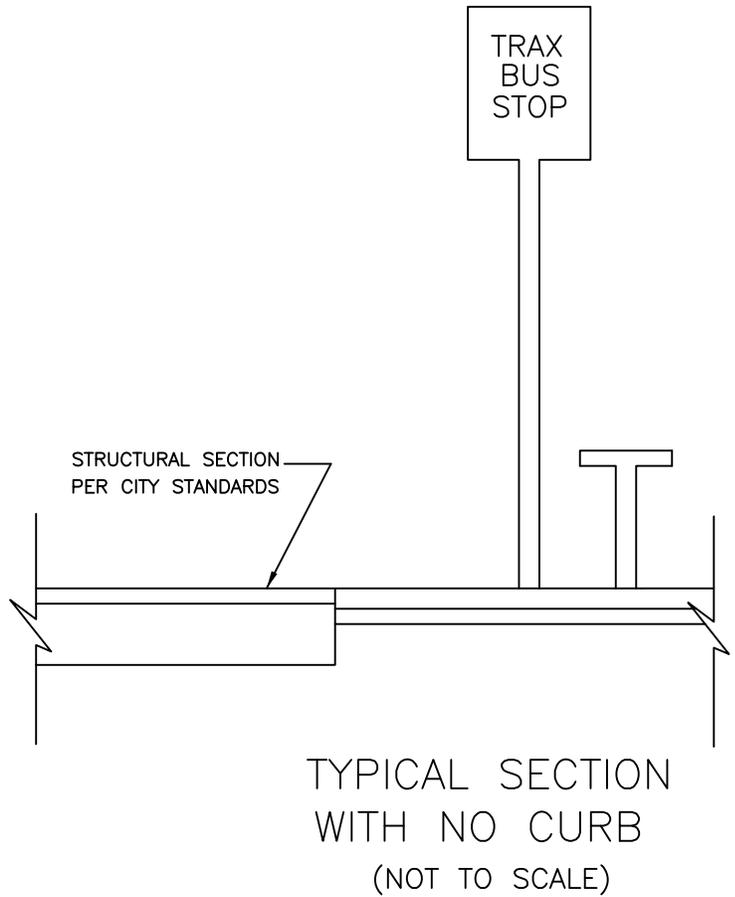
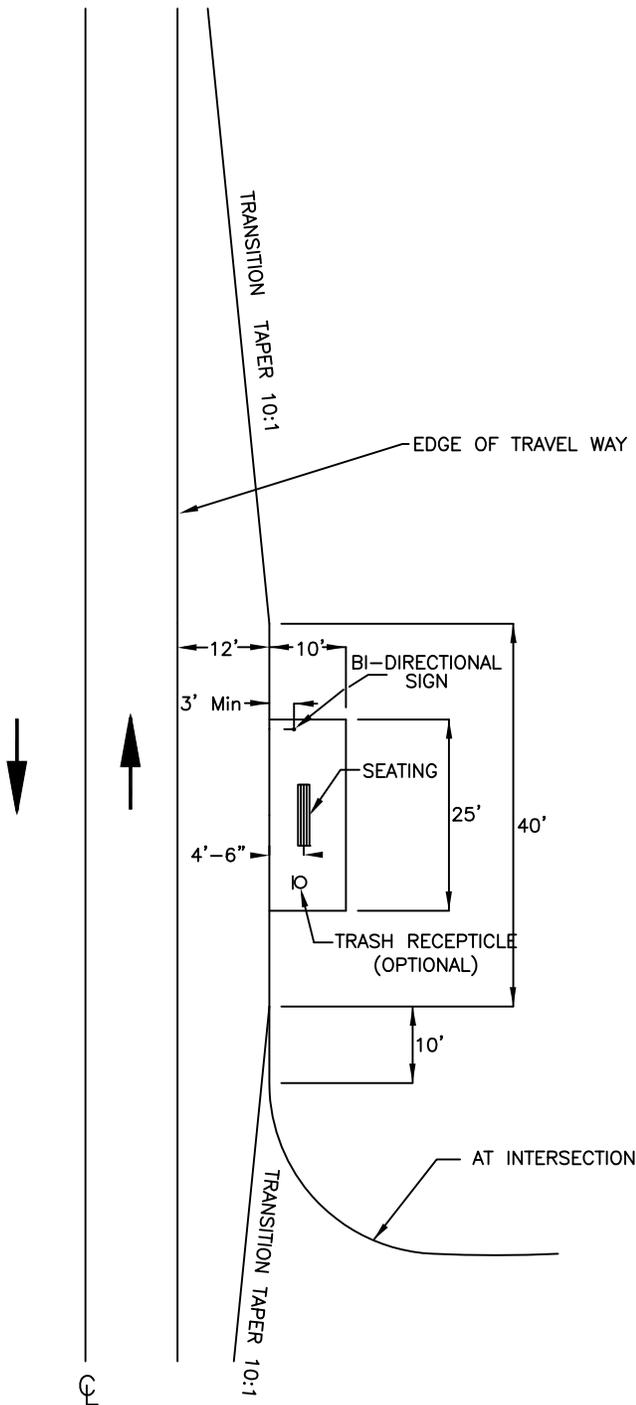
- NOTES:
1. TRANSITION TAPERS SHALL BE 10:1 FOR SPEED LIMITS OF 45 MPH OR GREATER & 4:1 FOR SPEED LIMITS OF LESS THAN 45 MPH.
  2. TYPE 4 BUS STOPS ARE TO BE USED WITH NEW DEVELOPMENTS.

NO.	REVISION	BY

**PWD** CITY OF RED BLUFF  
 APPROVED BY \_\_\_\_\_  
 DATE: \_\_\_\_\_  
 GARY M. GORDON, CITY ENGINEER

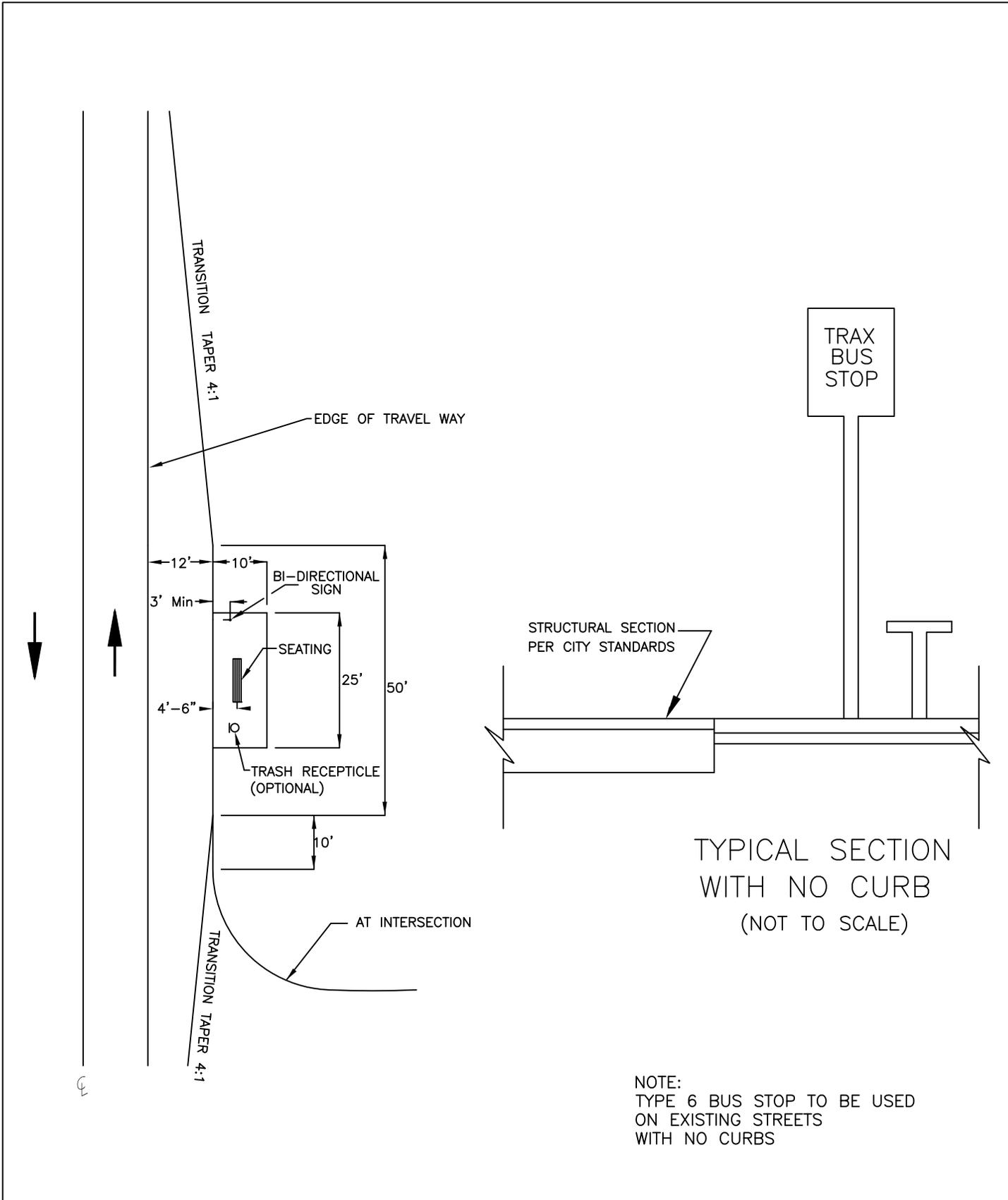
STANDARD PLAN  
 TYPE 4 BUS STOP  
 LAYOUT - MID-BLOCK  
 WITH TURNOUT

1603



NOTE:  
 TYPE 5 BUS STOP TO BE USED  
 ON EXISTING STREETS  
 WITH NO CURBS

NO.	REVISION	BY	 CITY OF RED BLUFF	STANDARD PLAN	1604
APPROVED BY _____					
DATE: _____			GARY M. GORDON, CITY ENGINEER		



NO.	REVISION	BY

**PWD** CITY OF RED BLUFF

APPROVED BY \_\_\_\_\_  
DATE: GARY M. GORDON, CITY ENGINEER

STANDARD PLAN

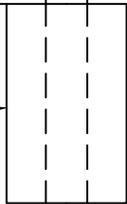
TYPE 6 BUS STOP  
LAYOUT - NO CURB  
SPEED LIMIT  
LESS THAN 45 MPH

1605

BI-DIRECTIONAL SIGN  
(OFFSET IF NEEDED)



ROUTE MAP SIGNS  
INSTALLED BY  
RESPECTIVE  
JURISDICTION



4'-6"

7'

3' Min

NO.	REVISION	BY	 CITY OF RED BLUFF <hr/> <hr/>	STANDARD PLAN	1606
				TYPE 7 BUS STOP SIGN	
APPROVED BY _____			GARY M. GORDON, CITY ENGINEER		
DATE: _____					

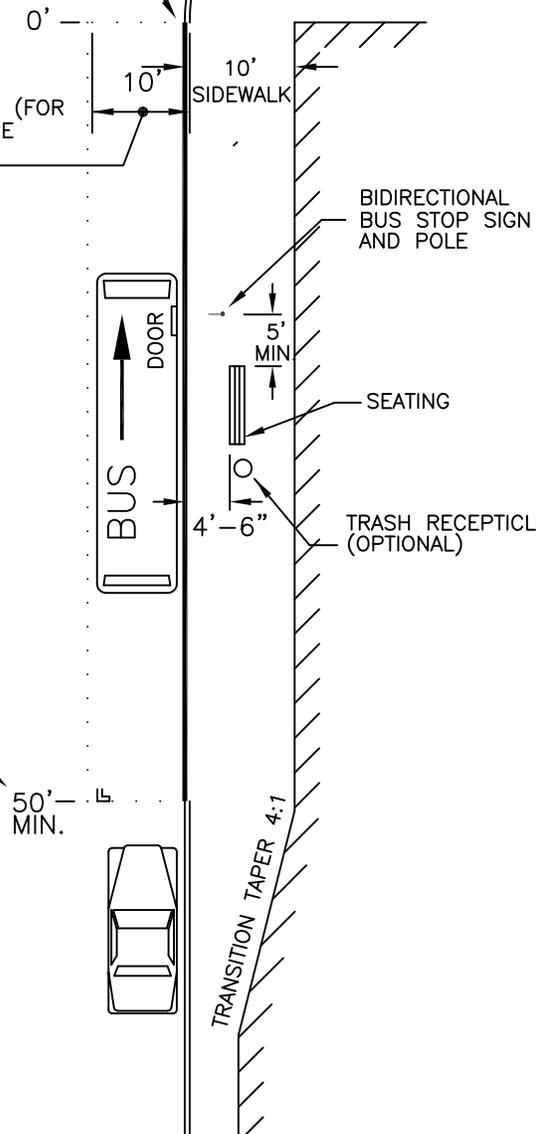
PEDESTRIAN HANDICAP RAMP PER LOCAL STANDARDS

END RED CURB AND CONCRETE BUS PAD AT CURB RETURN OR CROSSWALK LIMIT LINE (WHICHEVER IS FURTHER FROM INTERSECTION)

8" CONCRETE BUS PAD (FOR STOPS WITH 4 OR MORE BUSES PER HOUR)

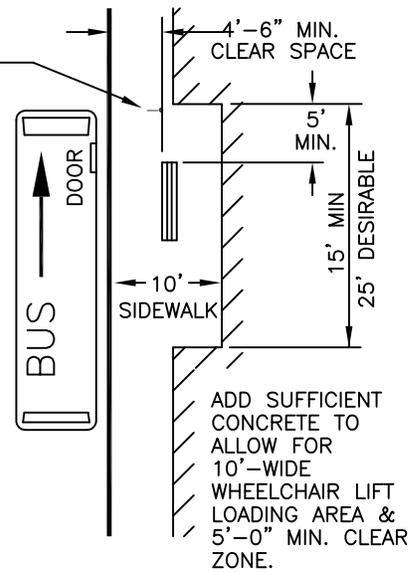
ALLOW 40-FOOT STOP AREA FOR ONE STANDARD BUS. ADD 50 FEET FOR EACH ADDITIONAL STANDARD BUS EXPECTED TO USE THE STOP AT THE SAME TIME

SCALE OF FEET FROM CURB RETURN BEGIN RED CURB AND CONCRETE PAD



**TYPE 8-A**

**FOR BUS STOPS ON NARROW SIDEWALKS IN SEVERELY CONSTRAINED AREAS**



Note: Type 8 & 8A bus stops are to be used on existing streets only

NO.	REVISION	BY

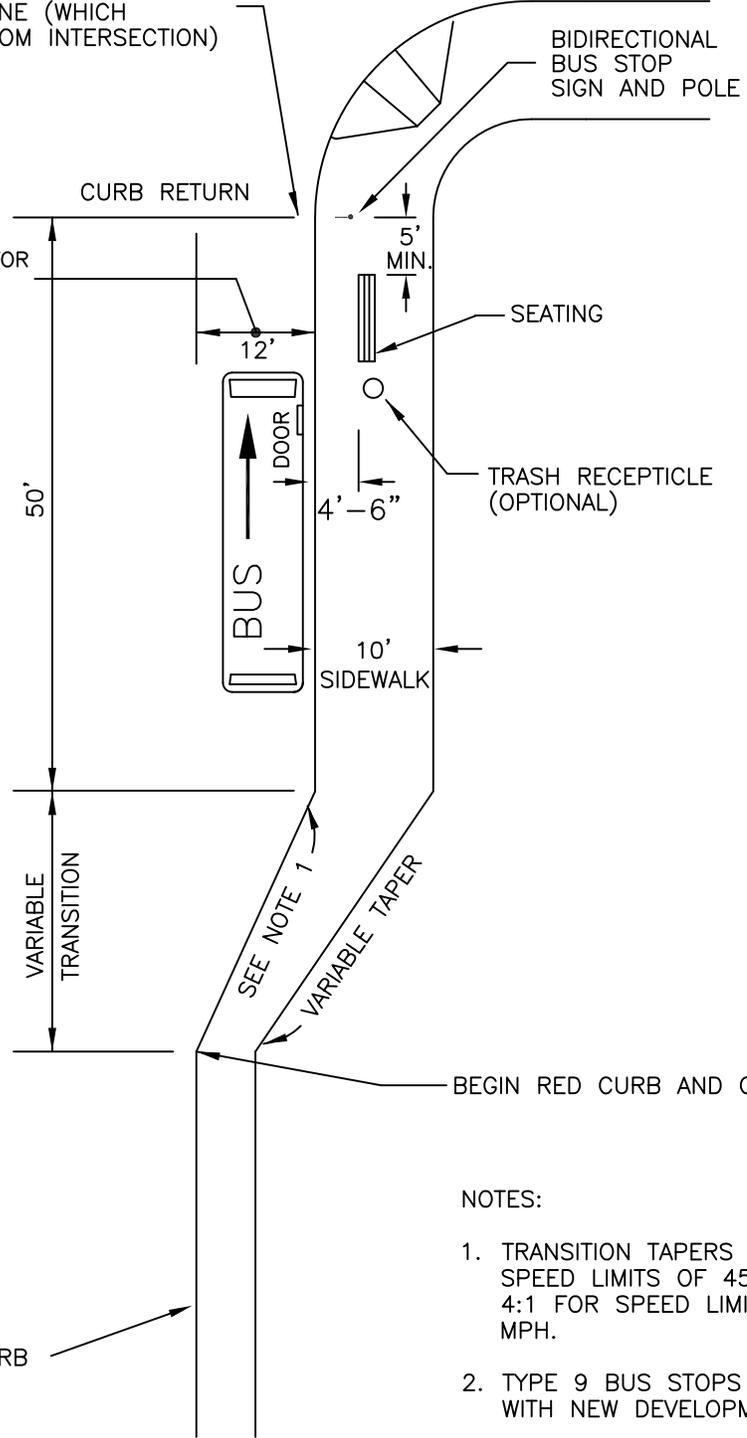
**PWD** CITY OF RED BLUFF  
 APPROVED BY \_\_\_\_\_  
 DATE: GARY M. GORDON, CITY ENGINEER

STANDARD PLAN  
 TYPE 8 & 8A  
 BUS STOP  
 LAYOUT - NEAR SIDE  
 NO TURNOUT

1607

END RED CURB AND CONCRETE BUS PAD AT CURB RETURN OR CROSS WALK LIMIT LINE (WHICH EVER IS FURTHER FROM INTERSECTION)

8" CONCRETE BUS PAD (FOR STOPS WITH 4 OR MORE BUSES PER HOUR)



NOTES:

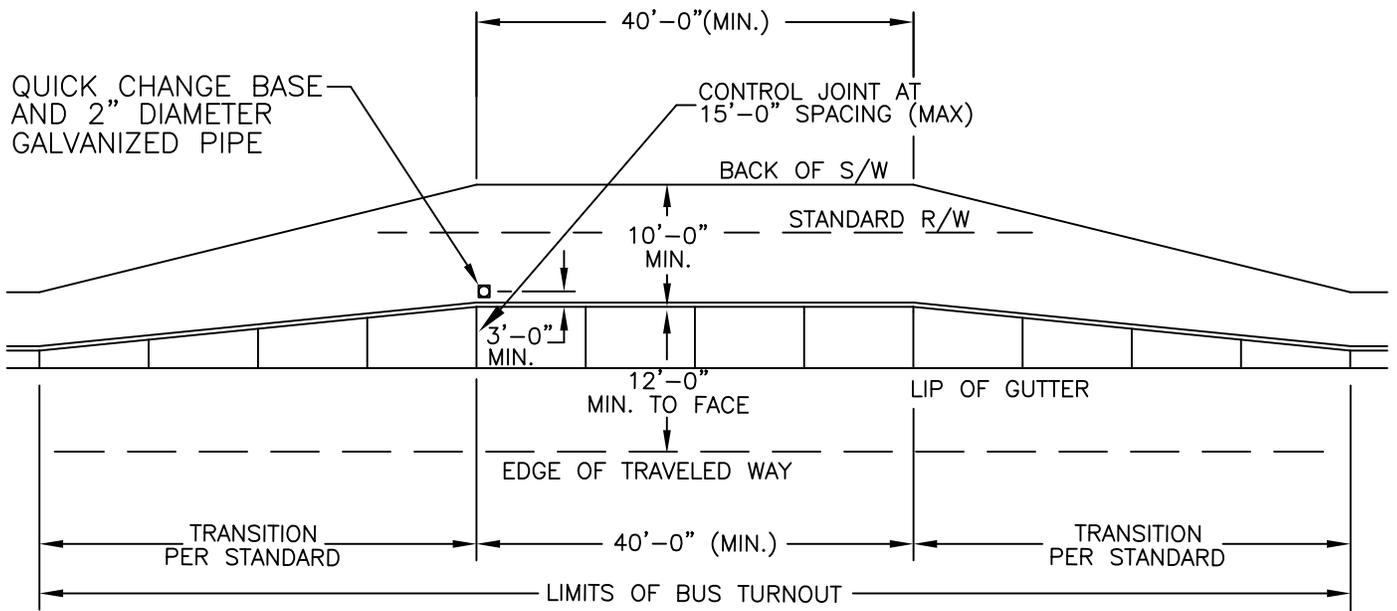
1. TRANSITION TAPERS SHALL BE 10:1 FOR SPEED LIMITS OF 45 MPH OR GREATER & 4:1 FOR SPEED LIMITS OF LESS THAN 45 MPH.
2. TYPE 9 BUS STOPS ARE TO BE USED WITH NEW DEVELOPMENTS.

NO.	REVISION	BY

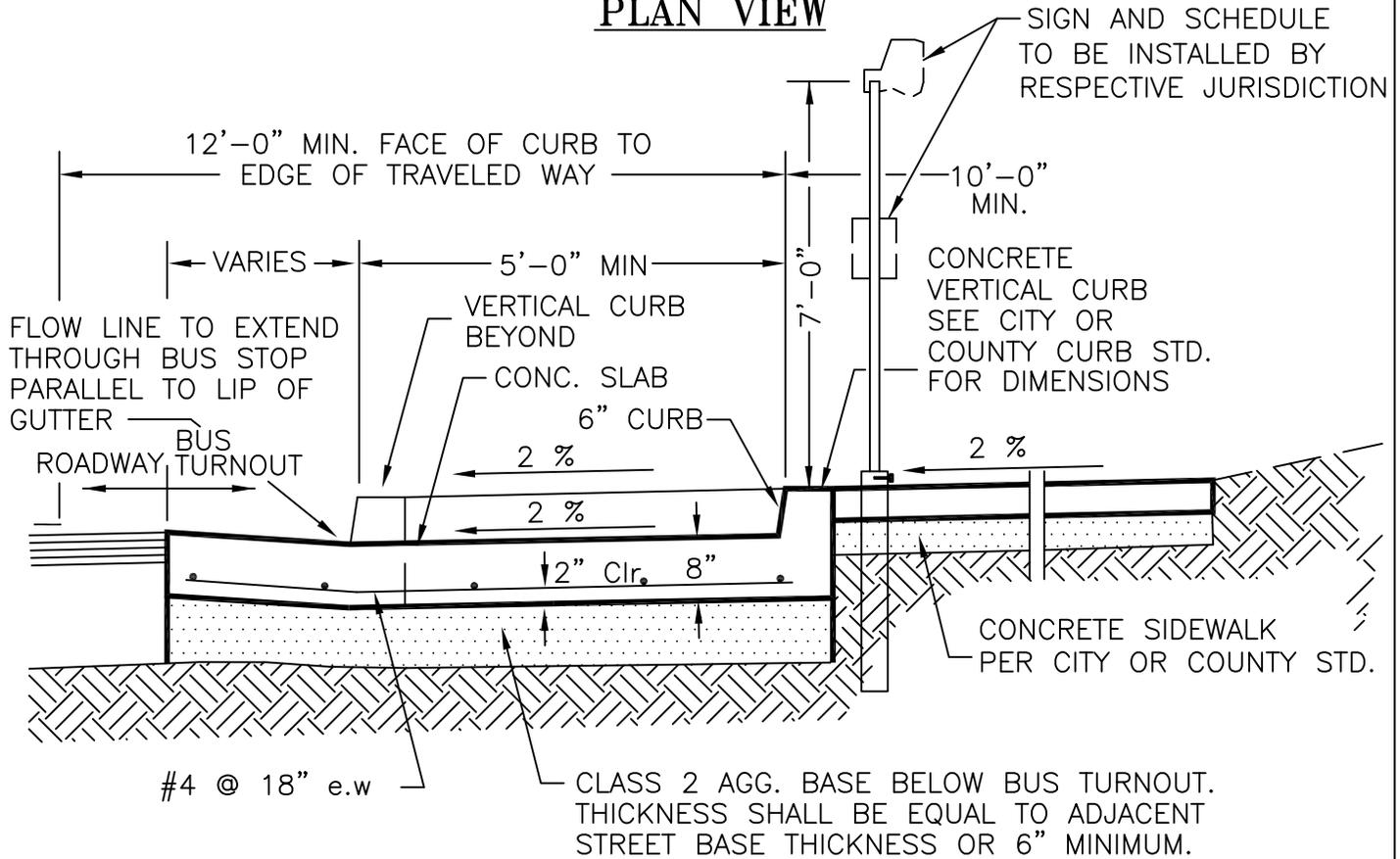
**PWD** CITY OF RED BLUFF  
 APPROVED BY \_\_\_\_\_  
 DATE: GARY M. GORDON, CITY ENGINEER

STANDARD PLAN  
 TYPE 9 BUS STOP LAYOUT - NEAR SIDE WITH TURNOUT

1608



**PLAN VIEW**

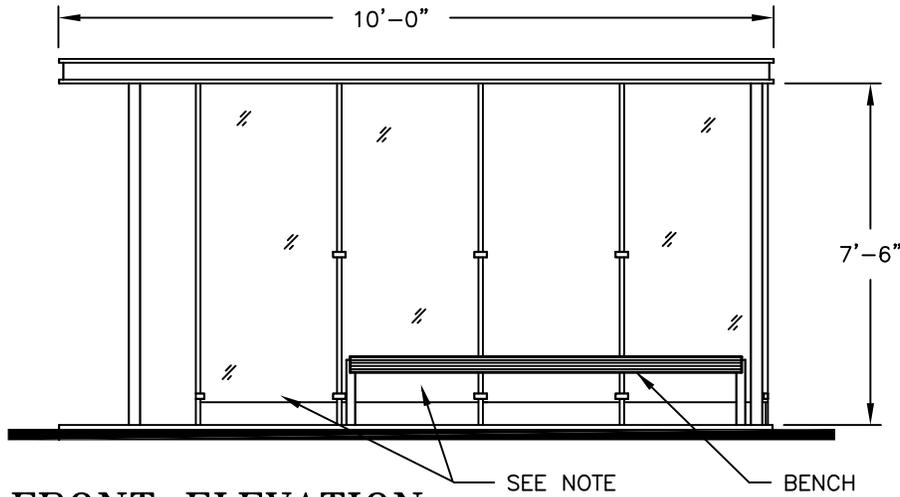


**NOTE:**

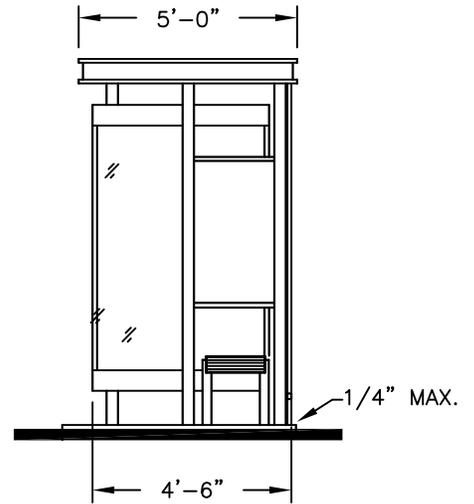
- 1. EASEMENT DEDICATION REQUIRED TO BACK OF SIDEWALK. CONTROL JOINTS SHALL BE 1 1/2" MIN. DEPTH TOOLED JOINTS.

**SECTION VIEW**

NO.	REVISION	BY	 CITY OF RED BLUFF	STANDARD PLAN	1609
				BUS TURNOUT DETAIL	
			APPROVED BY _____		
			DATE: _____		
			GARY M. GORDON, CITY ENGINEER		



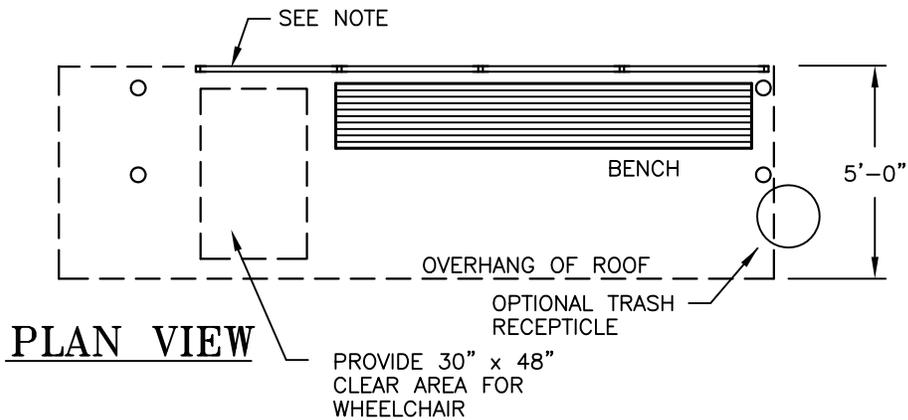
**FRONT ELEVATION**



**RIGHT SIDE ELEVATION**

**NOTE:**

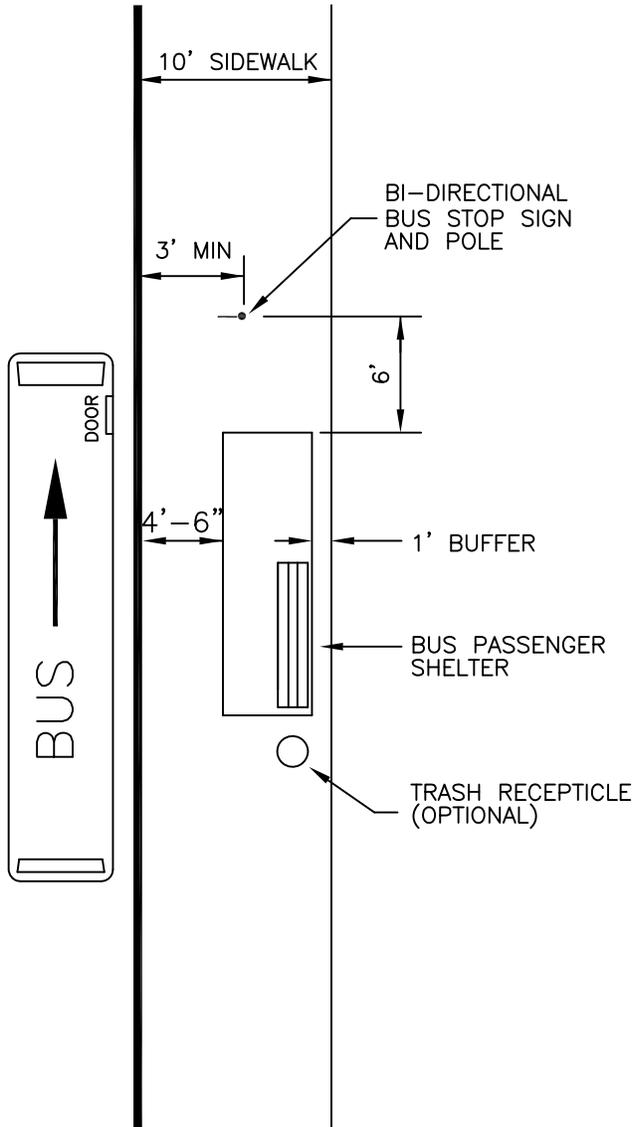
LEFT-REAR TEMPERED SAFETY GLASS (OR EQUAL) PANEL MAY BE OMITTED IF ACCESS FROM THE REAR OF THE SHELTER IS REQUIRED. IF PANEL IS OMITTED AN ALTERNATE 30" x 48" WHEELCHAIR SPACE SHALL BE PROVIDED ADJACENT TO THE BENCH AND UNDER THE SHELTER ROOF.



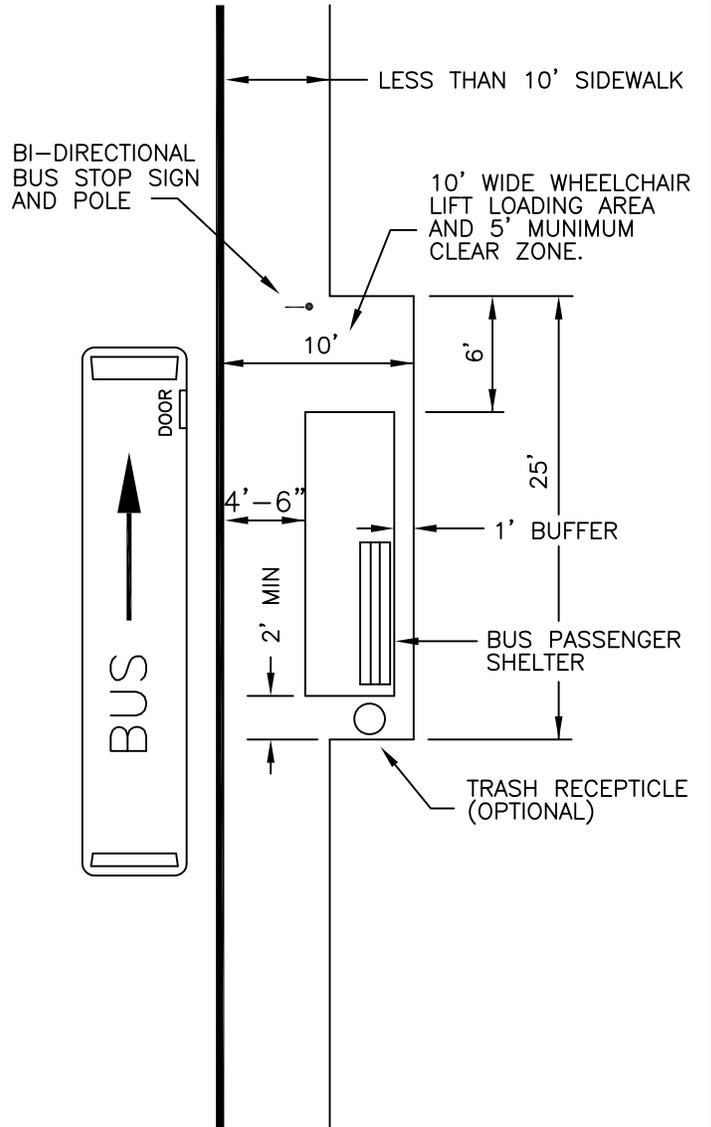
**PLAN VIEW**

NO.	REVISION	BY	STANDARD PLAN		1610
			BUS PASSENGER SHELTER LAYOUT		
APPROVED BY: <u>PWD CITY OF RED BLUFF</u> DATE: <u>GARY M. GORDON, CITY ENGINEER</u>					

**CASE I:  
FOR STANDARD  
BUS STOPS**



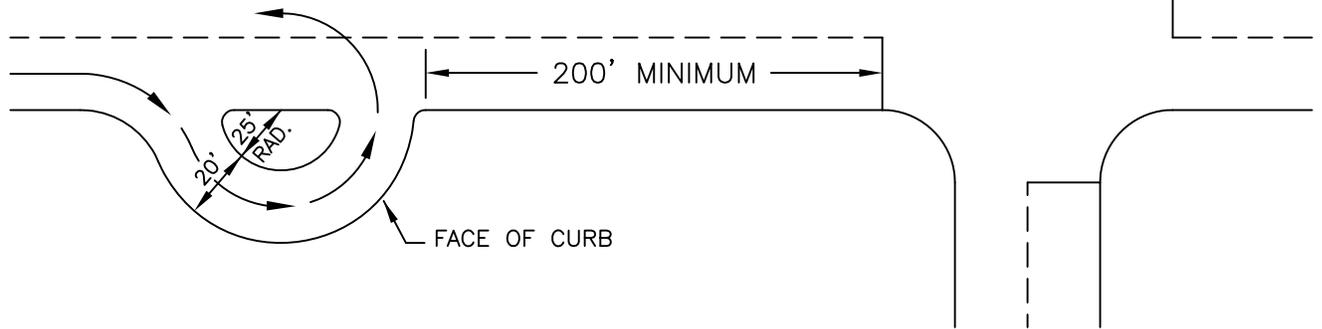
**CASE II:  
FOR BUS STOPS ON NARROW  
SIDEWALKS IN SEVERELY  
CONSTRAINED LOCATIONS**



NO.	REVISION	BY	APPROVED BY	STANDARD PLAN	1611
			<i>PWD</i> CITY OF RED BLUFF	BUS PASSENGER SHELTER PLACEMENT	
			APPROVED BY _____		
			DATE: GARY M. GORDON, CITY ENGINEER		

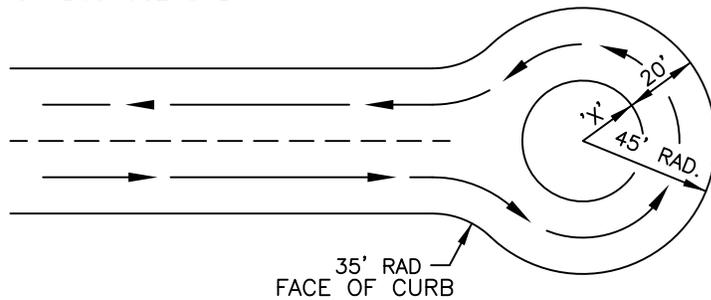
### CASE I: JUG HANDLE

FOR BUS USE ONLY



### CASE II: SYMMETRICAL CUL-DE-SAC

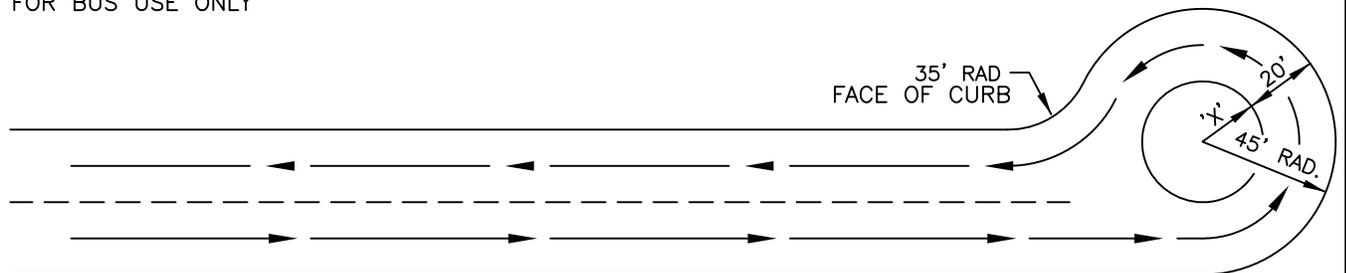
FOR BUS USE ONLY



NOTE:  
'X' = 25 FT RADIUS (MAX)  
IF ISLAND DESIRED

### CASE III: ASYMMETRICAL CUL-DE-SAC

FOR BUS USE ONLY



NOTE:  
'X' = 25 FT RADIUS (MAX)  
IF ISLAND DESIRED

### NOTE:

1. TO MAINTAIN SIGHT DISTANCE, ONLY LOW PLANTINGS ARE RECOMMENDED IN ISLAND AREAS.
2. 30 FT. LANE WIDTH ASSUMES NO PARKING IN LOOP AREA.

NO.	REVISION	BY	CITY OF RED BLUFF	STANDARD PLAN	1612
			<i>PWD</i>	BUS TURNAROUNDS	
			APPROVED BY _____		
			DATE: _____		
			GARY M. GORDON, CITY ENGINEER		

## **APPENDIX A**

### **GRADING**

#### **A-1.0 INTRODUCTION**

The City's authority to regulate grading is provided by the Zoning Ordinance and by the California Building Code (CBC). The CBC requires that a grading permit be obtained from the City prior to beginning any grading work unless the work meets certain exemptions specified in the CBC. This is necessary to ensure that on-site drainage is adequately accommodated, off-site drainage is conveyed through the project, the proposed grading is compatible with adjacent property topography, and adequate erosion and sedimentation control measures are addressed.

This Section specifies design and plan submittal requirements of grading plans for private developments. It includes items pertinent for the City's review and reflects established professional engineering practice for preparation of grading plans. Questions and clarifications regarding this Section should be directed to the Engineering Division of the Public Works Department.

Two types of grading plans are reviewed by the City: finished grading plans and rough grading plans.

Finished grading plans shall be submitted as part of the improvement plans for a project. Finished grading requirements shall be as specified in Section A-4.

Rough grading plans are submitted separately from and may be approved prior to improvement plans. The plans should detail only preliminary grading of a site. The design shall not allow for construction of any improvements (storm drains, streets, curbs, gutters, etc.) and shall indicate positive drainage flow except in those instances provided on the plans for erosion and/or sedimentation control. Rough grading requirements shall be as specified in Section A-5.

#### **A-2.0 FEES AND BONDS**

Plan review and permit fees for grading shall be in accordance with the adopted City user fee resolution. One hundred (100) percent of the plan review fees will be required at the time of the submittal.

**A-3.0 PREPARATION**

All grading plans shall be prepared by or under the direction of a Registered Civil Engineer. All sheets shall be stamped and signed by a Registered Civil Engineer.

**A-4.0 FINISHED GRADING PLAN REQUIREMENTS**

Grading plans for subdivisions and all developments shall be submitted as part of the improvement plans and shall detail the following:

- A. Slope symbols for all slopes 3:1 or steeper.
- B. Typical lot grading details.
- C. Proposed spot and/or pad elevations. All lot corner elevations shall be shown on the Grading Plan.
- D. Flow directional arrows both on-site and off-site and perimeter elevations at the property line.
- E. Existing spot elevations and/or contour lines on-site and off-site around the perimeter of the development. Where the existing terrain is not relatively flat, contour lines shall be shown. Contour lines shall be in maximum increments of two feet. The spot elevations or contour lines shall be extended off-site for a minimum distance of 25 feet (flat terrain – 50 feet minimum).
- F. Existing trees (variety, size and elevation at base of all trees six inches in diameter or larger). For native oak trees, the plan shall show the protected zone and the approved protective fencing locations. Encroachments into the protected zone require tree permit approval.
- G. A Certificate of Compliance of Grading with signature blocks for both the Registered Civil Engineer and the Geotechnical Engineer shall be provided stating the following:

**Engineering Design Standards**

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**CERTIFICATE OF COMPLIANCE**

I HEREBY CERTIFY THAT THE GRADES SHOWN ON THESE PLANS AND APPROVED BY THE DEPARTMENT OF PUBLIC WORKS, HAVE BEEN CONSTRUCTED TO WITHIN 2/10<sup>TH</sup> OF ONE FOOT OF THEIR INDICATED ELEVATION FOR ALL LOT PADS AND IMPROVEMENTS SHOWN.

\_\_\_\_\_  
PROJECT ENGINEER

\_\_\_\_\_  
PE NUMBER

\_\_\_\_\_  
DATE

I HEREBY CERTIFY THAT THE PADS FOR THE FOLLOWING LOTS FOR THIS PROJECT HAVE BEEN TESTED FOR COMPACTION IN ACCORDANCE WITH GENERALLY ACCEPTED TEST METHODS AND BASED UPON THE RESULTS OF THESE TESTS THE COMPACTION OF SAID PADS CONFORMS TO THE RECOMMENDATIONS OF THIS PROJECTS GEOTECHNICAL REPORT.

LOTS: \_\_\_\_\_.

I ALSO STATE THAT OUR FIRM OBSERVED THE GRADING OPERATION TO A SUFFICIENT EXTENT TO EVALUATE CONFORMANCE WITH THE PROJECT'S GEOTECHNICAL REPORT AS APPROVED BY THE CITY, AND FURTHER STATE THAT BASED UPON OUR OBSERVATIONS, THE GRADING FOR THIS SUBDIVISION CONFORMS WITH THE RECOMMENDATIONS OF SAID SOIL REPORT.

\_\_\_\_\_  
GEOTECHNICAL ENGINEER

\_\_\_\_\_  
PE NUMBER

\_\_\_\_\_  
DATE

- H. Back of sidewalk elevations at property lines, curb returns, high and low points, and other areas deemed necessary by the City Engineer.
- I. All existing and proposed surface and subsurface drainage facilities including drain inlets, underground pipes, surface swales, channels, and any other drainage improvement proposed to be constructed with, or as part of, the proposed work.
- J. Location of existing and proposed buildings or structures on the site, including proposed pad and/or finished floor elevation. Proposed residential plot plans should not be shown on the grading plans.
- K. Location of existing and proposed buildings or structures on the land of adjacent owners, which are within 25 feet of the property and which may be impacted by the proposed grading operations.
- L. Location of all existing and proposed retaining walls.

- M. Typical sections across side yard property lines where the difference in finish pad elevations exceeds one foot.
- N. Names of adjacent subdivisions.
- O. Off-site intersecting property lines.
- P. For all projects involving the export of soil material:
  - 1. Location of spoiled disposal. If spoil area is within a Specific Plan area of the City, a separate Conditional Use Permit is required for that site.
  - 2. Spoil areas shall meet all the requirements of these standards.
- Q. Silt retention and erosion control details as necessary and specified in these Design Standards.
- R. The plan shall list the total cut/fill quantities in cubic yards.

**A-5.0 ROUGH GRADING PLAN REQUIREMENTS**

Grading plans for subdivisions and all developments located within Planned Development zones shall conform to the same requirements as those specified for finished grading plans excepting the following:

- A. Improvements – Only existing Improvements such as utilities, curbs, gutters, etc. shall be shown. Utilities and streets to be constructed with the improvement plans shall not be shown as part of the rough grading plans.
- B. Drainage – All rough grading plans shall provide for positive surface drainage flow except in those instances provided on the plans for erosion and/or sedimentation control.

**A-6.0 DESIGN REQUIREMENTS**

- A. Rolling Terrain Grading – Grading of rolling terrain shall be accomplished in a manner whereby the effect of the rolling terrain is maintained as close to that which exists, to the extent practicable. Every effort shall be made to keep grading of rolling terrain to a minimum.
- B. Boundary Grading – Special attention shall be given to grading adjacent to the exterior perimeter property line of a development. All adverse effects to off-site properties adjacent to new developments shall be kept to an

## **Engineering Design Standards**

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absolute minimum. Fills and cuts adjacent to the exterior perimeter property line shall be designed in accordance with the following:

1. When grading along existing residential property, the grade shall be held equal to or lower than the existing property grades, unless physically impossible. When grades are to be raised higher than existing adjacent residential lots, a masonry or concrete retaining wall shall be used, regardless of the difference in elevation. The wall shall be located as close to the property line as is feasible for construction. If permission can be obtained from the adjacent property owner(s), the wall should be placed on the property line or onto the lower lot and the fence relocated to the top of the wall.
  2. If possible, all exterior slopes, fill or cut, shall be constructed off-site, with the property line being situated a minimum of two feet inside the higher elevation. If a right of entry cannot be obtained for this, a retaining wall shall be placed as near to property line as practicable.
  3. A recorded notarized right of entry shall be required for all off-site fills and grading prior to plan approval.
  4. Maximum slope shall be 2:1 or as specified by the Geotechnical Engineer.
  5. All slopes steeper than 4:1 adjacent to the public right of way and private streets shall be protected with permanent erosion control measures.
  6. All fill material shall achieve 90 percent relative compaction certified by a Registered Geotechnical Engineer in max lifts of 8 inches.
  7. When a drainage swale or ditch is proposed to run adjacent to the property line, a level area, minimum width of 5-feet, is required between the property line and the top of the slope bank.
  8. A specific haul route shall be approved by the City Engineer when large quantities of imported or exported soil is required. Where a haul route has not been determined at the time of plan approval, the permit shall be conditioned stating that no grading activities shall occur until a haul route has been approved by the City Engineer.
- C. Interior Grading – Differences in elevations across interior property lines within a development, such that slopes or retaining walls are required, shall conform to the following:
1. Cross lot drainage is not allowed unless specifically approved by the City for tree preservation. All single-family residential lots shall

have Class 1 grading as per the Standard Drawings unless approved otherwise by the City. When a Class 2 or Class 3 lot grading plan is proposed as part of a tentative map application for a single-family residential subdivision, the tentative grading plan showing rear lot drains shall be supplemented with an alternative plan showing the effect on the subdivision if rear lot drains are not utilized.

2. Retaining walls shall be required whenever adjacent side lot elevations differ by more than  $\frac{1}{2}$  foot. In such cases, a minimum 3-foot wide walk path shall be maintained adjacent to all side property lines. Where the design engineer feels that this path will be maintained without the use of a retaining wall, application for a waiver may be made by preparing and submitting a site plan to scale on 8-1/2" X 11" reproducible paper for each lot which is requested to be exempted, or by submitting a standard Lot Grading and Setback Guarantee. The Lot Grading and Setback Guarantee shall specify which lots for which a waiver of the retaining wall requirement is requested, shall state the minimum setback of the proposed structure from the toe of slope, and shall state that should the minimum setback not be possible during construction, a retaining wall shall be constructed to requirements of these Improvement Standards. Upon approval, a copy of these will be given to the Building Division to utilize in their review. Any deviation to these plans will be subject to approval by the Technical Advisory Committee.
3. Property lines shall be situated a minimum of 1.0 foot inside the top of fill or cut slopes when pad elevations differ by  $\frac{1}{2}$ -foot or less. When retaining walls are used, the property lines shall be situated on the high side of the retaining wall with a minimum setback of 1.0 foot from the property line to the retaining wall. Where pad elevations differ by more than  $\frac{1}{2}$ -foot and waiver of placement of retaining walls is requested per the requirements stated above, property lines shall be situated a minimum of 2.0 feet inside the top of fill or cut slopes.
4. The maximum earth slopes allowed shall be 2:1 (horizontal to vertical). Minimum asphalt concrete surface slopes shall be 1% and minimum concrete cement surface slopes shall be 0.25%. All proposed slopes that are 3:1 or steeper shall be shown on the plans by some type of slope symbol delineation.
5. Lots on the low side of streets at sag points shall have pad elevations a minimum of one foot above the 100-year water surface elevation assuming failure of all subsurface drainage systems.

- D. Retaining Walls – Retaining walls, when required, shall be shown on the plans and shall include all necessary information and details for construction. All retaining walls adjacent to the public right of way or along the exterior boundary of the project shall be masonry or concrete. Other retaining walls less than or equal to 2'-6" in height may be redwood conforming to the Standard Plans except as specified on Section A-6. Walls higher than 2'-6" shall be masonry. All walls higher than 4-feet as measured from base of foundation to top of wall shall be substantiated with structural calculations stamped by a Registered Civil Engineer and a building permit shall be obtained from the Building Department.
- E. Grading near Trees – No person shall conduct any activity within the protected zone of a Native Oak Tree or Landmark tree without approval a Grading Permit issued in conformance with the Tree Permit Conditions. Great care must be exercised when work is conducted upon or around Protected Trees. The purpose of this section is to define procedures necessary to protect the health of the protected trees. The policies and procedures described in this section apply to all encroachments into the protected zone of Protected Trees. All Tree Permits shall be deemed to incorporate the provisions of this section and the City's Tree Preservation Ordinance except as the Tree Permit may otherwise specifically provide.
1. General
    - a. Trenching within the Protected Zone of a Protected Tree, when permitted, may only be conducted with hand tools, in order to avoid root damage.
    - b. Minor roots less than one inch in diameter may be cut, but damaged roots shall be traced back and cleanly cut behind any split, cracked or damaged area.
    - c. Major roots over one inch in diameter may not be cut without approval of an Arborist. Depending upon the type of improvement being proposed, bridging techniques or a new site design may need to be employed to protect the root and the tree.
    - d. If any Native Ground Surface Fabric within the Protected Zone must be removed for any reason, it shall be protected within 48 hours.
    - e. An independent low-flow drip irrigation system may be used for establishing drought-tolerant plants within the Protected Zone of a Protected Tree. Irrigation shall be gradually reduced and discontinued after two years.

## **Engineering Design Standards**

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- f. Planting Live material under native oak trees is generally discouraged and it will not be permitted within six feet of the trunk of a native oak tree with a SDBH of 18 inches or less or within ten feet of the trunk of a native oak tree with a DBH of more than 18 inches. Only drought-tolerant plants will be permitted within the protected zone of native oak trees.
- g. A barrier fence shall be installed at the outermost edge of the protected zone of each protected tree of group of protected trees. The fence shall not be removed until written authorization is received from the Planning Director. Exceptions to this policy may occur in cases where protected trees are located on slopes that will not be graded. However, approval must be obtained from the Planning Department to omit fences in any area of the project. The fences must be installed in accordance with the approved fencing plan prior to the commencement of any grading operations or such other time as determined by the approving body. The Developer shall call the Planning Department and Engineering Division for an inspection of the fencing prior to grading operations.
- h. Once approval has been obtained, the fences must remain in places throughout the entire construction period and may not be removed without obtaining written authorization from the Planning Department.
- i. A minimum \$10,000 deposit, or amount deemed necessary by the Planning Director, shall be posted and maintained to ensure the preservation of protected trees during construction. The deposit shall be posted in a form approved by the City Attorney prior to any grading or movement of heavy equipment onto the site or issuance of any permits. Violation of any Tree Permit condition regarding tree preservation shall result in a forfeiture of a portion of, or the entire deposit, at the discretion of the Planning Director.
- j. If required, preservation devices such as aeration systems, oak tree wells, drains, special paving, and cabling systems must be installed per approved plans and certified by the developer's arborist.
- k. Every effort should be made to avoid cut and/or fill slopes within or in the vicinity of the protected zone of any tree.
- l. No grade changes are permitted that cause water to drain to within twice the longest radius of the protected zone of any protected tree.
- m. Certification letters are required for all regulated activity conducted within the protected zone of protected trees. The developer's arborist will be required to submit a certification letter to the

Planning Department within five working days of completion of such regulated activity attesting that all the work was conducted in accordance with the appropriate permits and requirements of this section.

- n. The following information must be located and permanently retained in the construction trailer starting at the site planning meeting:
  - i. Arborist's report and all future modifications
  - ii. Tree location with a copy of the tree fencing plan
  - iii. Tree permit and inspection card
  - iv. Approved construction plans
  - v. Tree preservation guidelines
  - vi. Approved planting and irrigation drawings.

### 2. Tree Permit Construction Phase

- a. All work conducted within the protected zone of any protected tree shall be performed as required by this section and as required in project approval.
- b. As a condition of the Tree Permit, the developer will be required to submit a utility trenching-pathway plan for approval following approval of the project improvement plans. The trenching-pathway plan shall depict all of the following systems: storm drains, sewers, easements, water mains, area drains, and underground utilities. Except in lot sale subdivisions, the trenching-pathway plan must show all lateral lines serving buildings. To be completely effective, the trenching-pathway plan must include the surveyed locations of all protected trees on the project as well as an accurate plotting of the protected zone of each protected tree.

The trenching-pathway plan should be developed considering the following general guidelines:

- i. The trenching-pathway plan must be developed to avoid going into the protected zone of any protected tree on its path from the street to the building.
- ii. Where it is possible to avoid such encroachment, the design must minimize the extent of such encroachment. Encroachments and mitigation measures must be addressed in a supplemental arborist's report.
- c. All of the tree preservation measures required by the conditions of the discretionary project approval, the arborist's report, and the

Tree Permit, as applicable, shall be completed and certified by the developer's arborist prior to issuing an occupancy permit.

- F. Erosion and Sedimentation Control – A site-specific erosion and sedimentation control plan shall be submitted concurrently with the improvement and/or Grading Plans. The plan shall comply with the City Grading, drainage, and ground cover policies contained in the Land Use Element of the City's General Plan, and the Storm Water Pollution Prevention requirements of the Central Valley Regional Water Quality Control Board (CVRWQCB).
1. Criteria – The purpose of erosion and sedimentation control plans is to ensure protection of the following:
    - a. Water Quality – Measures shall be provided to prevent siltation of streams, rivers, etc.; avert instream degradation due to turbidity and pollutant load; and prevent toxic materials from leaving construction sites.
    - b. Collection System – Methods shall be provided to prevent sediment from entering the storm drainage system.
    - c. Adjacent Properties – Methods shall be employed to prevent any damage to adjacent properties.
  2. Plan Requirements – An erosion and sedimentation control plan shall be submitted along with all grading plans. These plans need not be on a separate sheet if all facilities and measures can be shown on the grading sheets without obscuring the clarity of either the grading plan or the erosion and sedimentation control plan. The erosion and sedimentation control plan shall contain the following:
    - a. Revegetation Plan – The revegetation plan should detail the location of Revegetation, seeding mixture, type of fertilizer and rate of application, mulch and/or straw application rate along with method of application. All sites to be revegetated shall be completed by October 5.
    - b. Runoff/Drainage Control Plan – The location of all existing and proposed storm water containment and/or conveyance systems shall be shown. Examples of such include diversion dikes and swales, grade stabilization structures (temporary pipe or slope drains), ditches, straw bale dikes, and sediment basins or traps. Sufficient calculations and supporting material to demonstrate the adequacy of such measures shall be provided.

## **Engineering Design Standards**

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- c. Phasing of Erosion Control Measures – The Engineering Division may require phasing of the grading plan to ensure all necessary erosion control measures are in place. As an example, this may require the developer to construct sediment traps and basins during the first phase of grading.
3. Subdivision Requirements – The following is a list of general notes that shall be placed on sedimentation and erosion control plans as erosion and sedimentation control measures:
- a. All erosion and sediment control measures shall be implemented by October 5 or as approved by the City Engineer and specified on the grading plans.
  - b. Straw bales shall be stockpiled on site at a rate of 1.5 bales per acre by September 25. Measures shall be provided to keep straw dry.
  - c. All slopes greater than 10:1 shall be covered with broadcast straw at a rate of 50 bales or 4,000 pounds per acre. For slopes 4:1 or steeper, straw shall be pressed in place. Other methods shall be approved by the Engineering Division.
  - d. Slopes steeper than 4:1 and adjacent to City right-of-way, flood plains, natural drainages, park land, or designated open space shall be broadcast seeded and covered with straw matting.
  - e. All bare areas, regardless of slope, within 50 feet of natural drainages, shall be covered with straw and pressed in place.
  - f. Where required, broadcast seed shall be applied as follows:

Blando Brome	12 lbs/acre
Rose Clover	9 lbs/acre

Areas with sandy, dry soil shall be:

Zorro Annual Fescue	6 lbs/acre
Rose Clover	9 lbs/acre

16-20-0 fertilizer or equivalent shall be applied at a rate of 500 pounds per acre. If hydroseeding/mulching is used, seed quantities shall be increased by 30%.

- g. No grading or trenching, except as required for erosion or sediment control, shall occur within 35 feet from the centerline of perennial and intermittent drainage swales between October 5 and April 1 unless approved by the Engineering Division.

## **Engineering Design Standards**

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- h. All erosion and sediment control measures shall be checked following all storms to ensure all measures are functioning properly.
  - i. Sediment and trash accumulated in drainages or detention basins shall be removed as soon as possible. In addition, oil and material floating on water surfaces must be skimmed weekly and the debris properly disposed of.
  - j. Construction activities occurring between October 15 and April 1 shall have erosion and sediment control measures in place or capable of being in place within 24 hours. The contractor shall ensure the construction site is prepared prior to the onset of any storm.
  - k. The contractor shall establish a specific site within the development for maintenance and storage of equipment or any other activity that may adversely contribute to the water quality of the runoff. This area shall have a berm located around its perimeter. This area shall be restored to acceptable condition upon completion of the project.
  - l. Hydroseeding may be considered as an alternative to broadcast straw subject to the Engineering Division based upon a review of the existing site conditions (location, slopes, proximity to streams) and time of year.
- G. Mitigation Monitoring Equipment – All mitigation measures and mitigation monitoring measures as required to mitigate environmental impacts shall be complied with. The developer is responsible for monitoring all mitigation measures and shall submit to the Planning Department a letter certifying compliance with such measures.
- H. Certifying Pad Elevations – Upon completion of the grading and prior to the acceptance of the subdivision improvements or issuance of building permits by the City, the Consulting Engineer shall verify the final pad elevations. The elevation shall be verified at the center and the corners of each pad. Pad grades shall be certified to an accuracy of 0.10 feet.

A signature block (see Section A-4.G), certifying that final grade elevations in the field are the same as those shown on the plans, shall be included on the tracings of the subdivision grading plans. The Consulting Engineer shall sign the signature block certifying to the above, and shall provide three sets of record (as-built) grading plans to the City Engineer.

## **Engineering Design Standards**

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- I. Maintenance of Access to Utility Facilities – Continuous, suitable access shall be maintained during all stages of construction to any facility owned or operated by an utility/district providing essential services (i.e. sanitary sewer, water, drainage, electricity, gas, telephone, etc.).

**APPENDIX B**

**BUS STOP STANDARDS, POLICIES, AND PROCEDURES**

**GENERAL**

Bus stops are the front door to our transit system, introducing transit service, making transit safer, more accessible, more attractive, and operationally functional for passengers/drivers and vehicles. They provide essential information and basic components for the public resulting in increased ridership.

These standards were developed and fully coordinated with the Cities of Corning, Red Bluff, and Tehama and the County of Tehama and adopted by said agencies.

Technical references used in the development of these standards include, but are not limited to: the Institute of Transportation Engineers (ITE) Traffic Engineer Handbook (late 1980's), AC Transit Bus Stop Design Manual also late 1980's, ITE Transportation Planning Handbook, 2<sup>nd</sup> edition, 1999, and the Draft Tehama County Transit Development Plan.

Installation of transit facility components such as, signs, benches, bike racks, trash receptacles, shelters, bus turnouts and other related facilities shall be coordinated with the proper governing body. These standards, policies, and procedures shall be minimum guides in the planning and decision making process.

Administration and oversight of bus stops shall be the responsibility of the Tehama County Transit Agency and the Tehama County Department of Public Works in accordance with the Agreement for Transit Services in Tehama County between the County of Tehama, and the incorporated cities of Corning, Red Bluff, and Tehama as adopted on February 25, 2003 (miscellaneous agreement book # 63-2003).

**FREQUENCY PLACEMENT CRITERIA**

1. Transit industry and traffic engineering standards practice is to place bus stop signs at intervals of 660 to 880 feet, or about every two to three blocks, excluding undeveloped areas (per ITE).
2. Bus stops shall be identified with a bi-directional sign and shall be placed at minimum intervals of 700 to 900 feet along each route in the incorporated cities and in densely populated areas of the county, excluding undeveloped

areas.

3. In developed areas where it is not practical to place bus stop signs at above intervals due to auto-oriented development patterns, bus stops shall be placed in close proximity to subdivisions access points and within one block of activity centers such as shopping centers, schools, health care facilities, social service offices, apartment complexes, and mobile home parks.

### **BUS STOP LOCATION, LAYOUT, AND CRITERIA**

4. Bus stop locations shall be as approved by the appropriate governing body and installed in accordance with the standards herein.
5. Bus stop signs, benches, and shelters shall be placed to allow adequate maneuvering space for pedestrians.
6. Where space permits, inclusion of bike racks at bus stops should be considered. Bike racks shall be consistent with Tehama County Bikeways Plan (bike parking facilities).
7. The preferred location of a bus stop is a far side of an intersection, as it requires the least curb area, minimizes conflicts with pedestrians and turning vehicles, and facilitates safe departure of the bus from the stop during breaks in traffic provided by stop signs or traffic signals. Other locations may be more suitable depending on transit operations, traffic and development considerations.
8. Far-side bus stops are preferred at intersections where sight distance or signal capacity problems exist, and where right or left turns by general traffic are heavy.
9. Near-side bus stops shall be an alternative at intersections where transit flows are heavy, but traffic and parking conditions are not critical.
10. Mid-block bus stops shall be an alternative in strip commercial areas (such as Antelope Boulevard in Red Bluff) where the block faces are longer, with multiple destinations served within the block; and in downtown areas where multiple routes require long loading areas that might extend an entire block, or where traffic, physical or environmental conditions prohibit near or far-side stops.
11. Turnout bus stops shall be an alternative where traffic conditions make conventional on-facility placement of bus stops unsafe or unsuitable, as turnouts provide a safe refuge for the bus while loading or unloading passengers.

12. Bus turnout locations shall be determined by Tehama County Transit Agency, subject to approval by the appropriate governing body, and shall be constructed in conformance with the Standards adopted by the Transit Agency.
13. Specifically, turn-out bus stops will be required where current streets are of insufficient width to allow a bus stop width of 10 feet from the edge of the traveled way where speed limits are 25 MPH or less, or 12 feet where speed limits are greater than 25 MPH but less than 45 MPH.
14. Turn-out bus stops will be required at all timed stops where the speed limit is 45 MPH or greater.
15. Except for new developments, bus stops will be installed at the expense of the Transit Agency.
16. Facilities shall comply with CBC requirements.

### **BUS STOP ACCESSIBILITY**

17. Access to bus stops via the street and sidewalk are essential for TRAX mobility-impaired individuals. The Americans with Disabilities Act (ADA) requires TRAX to provide accessibility to bus stops. If bus stops are not accessible paratransit service may be required to comply with ADA.
18. Accessibility criteria include wheelchair deployment area of a hard flat surface, or pad, measuring eight (8) feet wide by eight (8) feet deep (behind and contiguous to the curb face). An accessible path in compliance with ADA and California building codes must link the bus stop to adjacent streets, sidewalks, and nearby buildings.
19. Not all TRAX bus stops are or will be accessible in the immediate future. In newly developed areas, the need for accessible features shall be considered during the site plan review process. In older developed areas, a program with retrofit features for accessibility should target: medical facilities and residential areas for the seniors/disabled; other life and service needs of seniors/disabled (social services, post office, banks).

### **ESTABLISHING A BUS STOP**

20. To establish a bus stop, a site inspection should be made for visibility and safe footing. The following criteria dictate actual placement of the bus stop:
  - a. Spacing relative to other bus stops on the route.
  - b. Potential for use, given the land uses within one-fourth mile.
  - c. Visibility (vehicle safety).

- d. Traffic.
- e. Passenger safety.
- f. A hard flat surface for safe footing.
- g. An accessible loading area in accordance with CBC requirements.
- h. Effect on adjacent property owner.
- i. Ease of transit service operation.
- j. Natural or pre-existing amenities (shade, shelter, seating, lighting, public phones, public restrooms).
- k. Existing red curb space or No Parking zone (used wherever possible).

21. The location is then assessed for the following needs:

- a. A red curb or "No parking" sign, if not already present.
- b. A bench.
- c. A shelter.
- d. A trash receptacle.

**ALL DESIGNATED BUS STOPS - MINIMUM EQUIPMENT**

22. The minimum requirement for a bus stop shall be:

- a. A bi-directional sign with a pictograph of a transit bus.
- b. A pole or an existing surface suitable for mounting a sign.
- c. A flat safe boarding area.
- d. Within the communities, or areas with parking conflicts, a red curb or a No parking sign.

**OTHER EQUIPMENT AT DESIGNATED BUS STOPS**

23. A bench or other seating will be included at a bus stop if the site can accommodate a bench, and if the location meets one or more of the following criteria:

- a. The bus stop boarding activity is at least five passengers per day.
- b. The bus stop is adjacent to a senior citizen housing complex or activity center.
- c. The bus stop is accessed by disabled, students, seniors, or transit dependant individuals.
- d. The bus stop is adjacent to a medical facility.
- e. The stop is located at a major shopping center.
- f. The stop serves as a transfer point between two or more TRAX routes.
- g. The stop is identified as needing a bench by the Tehama County Transit Board, or the local jurisdiction (e.g., City Council, Board of Supervisors).

24. A shelter will be considered at a bus stop that meets all of the following criteria:

- a. The bus stop warrants a bench.

- b. A bench, if installed would be exposed to the elements (rain, wind, direct sun) and there is no nearby structure that provides reasonable shelter.
  - c. The bus stop boarding activity is at least eight passengers per day.
25. A trash receptacle may be installed at any bus stop that warrants a bench or shelter if littering is perceived or found to be a problem at that stop.

**BUS STOPS FOR NEW DEVELOPMENT**

26. Upon receipt of written notification of any commercial or multiple residential development proposals from one of the City or the County Planning Directors, the Transit Agency will review such proposals in a timely manner for bus facility needs. If the Agency determines that bus facilities are needed, it will identify the locations and type of facilities to be installed, and any right of way dedications or circulation improvements that may be needed. The Agency will then provide that information to the Planning Director who submitted the notification.
27. At a minimum bus stops at new developments shall include bi-directional signs, benches, shelter(s) and trash receptacle. Routine maintenance of the site is the responsibility of the jurisdiction.
28. Turnout bus stops are the preferred bus stop for new development.
29. Shelters, benches, and other transit facilities for new development will be consistent with Planning guidelines and designs of the appropriate governing body.
30. Bus stop facilities shall be installed at developer's expense with all new developments to be served by current or planned bus routes.

**COMMUNICATION**

31. The Transit Agency shall request assistance from the appropriate jurisdiction regarding safety issues or the trimming, removal of limbs/shrubs/litter at bus stops or within the transit service area as needed.
32. The County or incorporated cities of Corning, Red Bluff, and Tehama shall communicate safety concerns related to bus stops or issues with the transit service area to the Transit Agency.

**REIMBURSEMENT OF INCURRED COST**

33. The cost of repairs for broken benches, replacement of safety glass, painting, or modifications to allow display of transit information or other repairs, shall be approved for reimbursement only after the appropriate jurisdiction has submitted an estimate for repairs to the Transit Agency, except in cases where repairs are needed without delay due to a possible hazard.
34. Emergency repairs may be approved in advance by the Transit Agency based on a telephone description of the damages along with an approximate estimate of repair cost. Minor repairs costing \$200.00 or less do not require prior approval by the Transit Agency.
35. Repair estimates will include all labor and materials (including tax) and shall be submitted to the Transit Agency prior to repairs being made. The Transit Agency shall respond to the jurisdiction in a reasonable time.
36. The Transit Agency shall not provide reimbursement for any repairs if an estimated cost was not submitted or if the repair was completed prior to the approval of the estimate by the Agency (this process is needed for budgeting purposes). The Executive Director of the Transit Agency may grant an exception if reasonable information is presented by a jurisdiction.
37. All costs related to bus stops, except the procurement of shelters/benches by the Transit Agency, shall be on a reimbursement basis only.
38. Funding for the reimbursement of repairs, procurement of benches or shelters and installation is identified in the Transit Agency's annual budget.

**MAINTENANCE**

39. Routine maintenance, cleaning, and litter removal shall be the responsibility of the respective jurisdictions.
40. If bus routes are revised and an existing bus stop is no longer needed, the cost of removal(s) shall be reimbursed by the Transit Agency.

**ADVERTISING**

41. Bus stop benches and shelters shall not be used for advertisements unless specifically authorized to do so by the responsible jurisdiction which includes the approval of Transit Agency Board.

## **Engineering Design Standards**

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42. Prior to advertising at a proposed bus stop the Transit Agency Board shall approve an advertising policy and all related the advertising material related to the proposed bus stop.

**APPENDIX C**

**LANDSCAPING & BIKE PATHS**

**C-1.0 GENERAL**

Landscaped areas serve both functional and aesthetic purposes. From a functional standpoint, a barrier is created that provided noise attenuation, security, and privacy between residential projects and roadways. Aesthetically, landscaping provides a visual buffer and softens the appearances of walls and fences. The City of Red Bluff landscaping and bike path standards are designed to ensure adequate recreational bike path construction; proper landscaping along soundwalls, fences, and other open areas that abut public roadways; and to assure a consistent and visually pleasing environment along the City of Red Bluff's public roadways.

**C-2.0 DESIGN CRITERIA**

All landscaping design shall conform to these standards and the ground cover policies contained in the City's Land Use Element of the General Plan, Zoning Ordinance and Design Guidelines.

Landscaping plans shall be drawn at a scale no smaller than one inch = 20 feet. The plans shall show all proposed grades, landscaping, soundwall or fence locations, utility boxes, street lights, manholes, traffic signs, and any other structure what may be impacted by revisions to grading and planting. Soundwall fence details shall be drawn at a sufficient scale to show adequate detail.

**C-3.0 PLAN APPROVAL**

Prior to construction of any landscape-related improvements (grading, irrigation installation, planting, etc.), a complete set of plans must be approved and seven sets of approved plans provided to the Engineering Division for distribution to the Technical Advisory Committee.

**C-4.0 DESIGN REQUIREMENTS**

The following standards shall apply to all projects where landscaping along a soundwall, fence, or open area abuts a public roadway:

## **Engineering Design Standards**

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### **A. Landscaping**

1. All landscaping shall be consistent with the City's ground cover policies.
2. Trees, shrubs, and ground cover plantings shall be consistent with the plant listings contained in the Specific Plan or Master Tree Plan where applicable. Substitutions or alternatives shall be approved by the Technical Advisory Committee.
3. Tree placement shall allow for sufficient root space adjacent to paved surfaces. Root guards are required to force roots away from soundwalls, utility facilities, sidewalks, curbs, gutters, and roadways.
4. Trees are to be located a minimum of ten feet from the curb return at all intersections and driveways to maintain sufficient site distance as determined by the Engineering Division.
5. Vegetation shall be located so as not to create conflicts with underground or above-ground utility lines, services, and equipment. All such facilities shall be noted on the landscape plans.

### **B. Irrigation - Irrigation plans shall include the location and detail of the automatic clock system, controller, strainer, siphon valve, water, meter, drip emitters, spray heads, quick couplers, and other appropriate elements. Other requirements are as follows:**

1. A drip/bubbler or other approved low-flow irrigation system shall be used for trees and shrubs. Specification requirements for irrigation are per the Standard Drawings. If other irrigation type is required for ground cover, low-flow control heads shall be used. Recommended spray sprinkler heads are Rainbird with PRS stem valve nozzles. Substitutions are acceptable if deemed equal or better by the Public Works Department.
2. The Developer or his consultant shall ensure to the satisfaction of all departments that there are no conflicts between irrigation lines and underground or over-ground utilities, equipment, or services.
3. An addition one-inch line shall be installed for quick couplers (Rainbird 33D, 34D, and approved equal valve) and shall be located every 100 feet along sidewalk, road, and curb. Quick coupler keys with hose swivels may be required depending upon the landscape situation.
4. The landscaping consultant is responsible for ensuring adequate and proper water supply connection and pressure to the main irrigation line. The consultant shall coordinate such service with the City Water

## **Engineering Design Standards**

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Department. The connection shall be defined on the plans and inspected in the field for proper implementation during construction. The water service shall be constructed to the City of Red Bluff specifications.

5. The electrical service point for the sprinkler system time clock is to be coordinated by the landscaping consultant with the Public Works Department. The service point is to be approved by the Department and shown on the landscaping plans. Final installation is to be inspected prior to the energization of the timeclock by the Department.

NOTE: It is the contractor's responsibility to call for inspections. Failure to do so may result in delay of project acceptance by the City.

- C. Grade and Line of Sight – The maximum slope from back of sidewalk to base of soundwall shall not exceed 3:1 for non-turf areas and 5:1 in turf areas. The minimum slope shall not be less than 2%. All slopes shall be rounded and tapered to blend with contours on adjacent areas.

Landscaping design along soundwalls and fences shall be according to line of sight on corners and shall not wrap around corners.

- D. Soundwalls and Fences – All soundwalls and fences adjacent to landscape areas shall be located on private property.

### **C-5.0 BIKE PATHS**

All Class 1 recreational bike path design shall be in accordance with the State of California Department of Transportation, AASHTO Guide for Bike Paths, and the following standards. For pedestrian/bicycle pathways within landscape corridors along roadways, refer to the applicable specific plan landscaping guidelines.

- A. Structural Section – Bike path structural section shall be a minimum of two inches of asphalt concrete on four inches aggregate base. Bike paths shall have a width of eight feet with one-foot gravel shoulders. Minimum cross slope for drainage shall be a minimum of 1%, maximum 2%.
- B. Design Speed – Bike paths shall be designed for an average design speed of ten miles per hours. On downhill sections, minimum radius curves shall be as follows:

## **Engineering Design Standards**

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DESIGN SPEED	RADIUS
10 mph	15 feet
15 mph	35 feet
20 mph	70 feet

C. Grades – Grades along bike paths shall be as follows:

1. Maximum extended grade (greater than 1,500 feet) shall be 2%.
2. Maximum sustained grade (greater than 300 feet) shall be 5%.
3. Maximum grade shall be 8%.

D. Striping – Striping of bike path shall be in accordance with the California Department of Transportation Highway Design Manual, latest edition.

Also, where applicable, two barrier posts/bollards shall be placed on bike path where it intersects with the roadway. Bollard shall be of a removable design.

### **C-6.0 MAINTENANCE REQUIREMENTS**

The project Developer shall be responsible to properly maintain the landscape for a minimum of three months (90 days) after installation of all planting and before the City makes its final inspection. In those cases where private, long-term maintenance is not required, the City will take over maintenance responsibilities after all conditions are met via the final inspection.

### **C-7.0 AS-BUILTS**

As-built, reproducible mylars shall be provided to the Public Works Department prior to a notice of completion being filed for the project.