CITY OF RIVERBANK

STANDARD SPECIFICATIONS

DEVELOPMENT SERVICES DEPARTMENT

6707 Third Street

Riverbank, CA 95367

Phone: 209-863-7127

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www.riverbank.org

Adopted by City Council
January 26, 2016
Updates Approved 02.27.24

CITY OF RIVERBANK
STANDARD SPECIFICATIONS

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City of Riverbank
DESIGN SPECIFICATIONS

PREFACE

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1.100 Specifications

SECTION 1 – PREFACE

1.101 GENERAL

The Standards of the City of Riverbank include specifications and drawings as contained herein. All work done in the public rights-of-way within the City of Riverbank shall conform to these Standards, and the Riverbank Municipal Code which includes insurance and business license requirements.

Developers are advised to have their representatives contact the engineer during design to ensure conformance with these Standards.

Work requiring plans prepared by a registered engineer such as improvements for subdivisions, parcel maps, and planned developments shall conform to these Standards, even though reference to these Standards is not made on such plans.

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

1.102 DEFINITIONS

The following shall apply to these Standards:

CITY: City of Riverbank.

DEVELOPER: Subdivider, developer, property owner, registered engineer or contractor proposing to design work or do work in the City of Riverbank public rights-of-way.

CONSTRUCTION INSPECTOR: Construction Inspector of the City of Riverbank.

ENGINEER: The Contract City Engineer of the City of Riverbank or their authorized representative.

O.I.D: Oakdale Irrigation District.

M.I.D: Modesto Irrigation District.

PLANS: Improvement Plans prepared by the developer or the engineer (Department of Public Works) for a specific project.

PUBLIC WORKS DEPARTMENT: Development Services of the City of Riverbank.

SPECIAL PROVISIONS: Specifications accompanying contract documents.

UTILITY: City Sewer, City Storm Drain, City Water, Cable, Pacific Gas and Electric Company, AT&T, Railroads, Hetch Hetchy, Oakdale Irrigation District, and Modesto Irrigation District.

1.103 PLANS

Improvement Plans shall be prepared by the Developer and shall be submitted to the Construction Inspector and the City Engineer for approval prior to commencement of any work. The Improvement Plans shall be 24 inches by 36 inches, minimum. Submittal to the City Engineer shall allow a minimum of two weeks for review. After approval, the Developer shall provide two sets of the approved plans to the Construction Inspector and one set to the City Engineer.

The Developer shall be responsible for the design and construction of all improvements except gas lines, utility owned electric lines, telephone lines and cable television lines.

Within 2 weeks after completion of the work, and prior to final acceptance the Developer shall submit one set of plans and one digital copy(AutoCAD or PDF) marked "As Built", to the Construction Inspector. See Section 1.04, Item G.

1.104 STANDARDS

Subdivision improvements shall conform to the following minimum requirements and to any local standards and to any special standards as prepared or referred to by the Construction Inspector, recommended by the Planning Commission and adopted by the City Council.

A. Subdividers shall have their contractors for subdivision improvements consult with the Director of Public Works before any construction is started, to arrive at an understanding as to the requirements and the schedule of inspections required.

B. All required improvements shall be constructed under the inspection of and to the approval of the Department head or their authorized representative.

C. Plans and profiles for proposed and existing improvements shall be submitted to and approved by the City Engineer prior to the commencement of construction. A plan of the entire subdivision shall be shown on the first sheet.

D. Plans and profiles shall be on 24 inch by 36 inch paper, minimum.

E. Cross sections or profiles beyond the boundary of the subdivision may be required to clarify drainage or road design.

F. A plan check and inspection fee shall be charged the subdivider, equal to 3% of the Engineers's Estimate of the improvements.

G. The subdivider shall direct his engineer to furnish the city one complete set of improvement plans in paper format and digital format (AutoCAD or PDF) after completion of improvements. These plans shall show any corrections as to location and grade of improvements, including water, sewage, and storm drains, or "No Corrections," whichever is applicable. Such plans shall be marked "As Built" and submitted to the Construction Inspector prior to acceptance of improvements by the City Council (Ord. No. 267, 7.1; Ord. No. 594, 1,).

H. The Developer shall direct his Engineer or Land Surveyor to establish a benchmark within the boundary of the subdivision to the satisfaction of the Construction Inspector or the City Engineer.

1.105 PRIORITY OF WORK

All underground utilities shall be constructed prior to installation of curbs, gutters, sidewalks, and surfacing of streets or rights-of-way. The Developer shall be responsible for making payments as necessary with utility companies to insure that the necessary underground utilities are constructed.

1.106 STAKING

The Developer's Engineer shall provide survey stakes for work shown on plans prepared by said Engineer.

The City Engineer will stake a city funded project in a manner needed by the City Contractor and as specified by the City Engineer or the Construction Inspector. Costs of restaking may be billed to the City Contractor.

1.107 INSPECTION

The City Engineer or Construction Inspector shall perform inspection of the work to determine conformance with these Standards.

The Developer or Contractor shall request inspections 48 hours in advance to permit scheduling of inspection by the City Engineer or Construction Inspector.

The cost of inspection shall be paid by the Developer in the case of subdivisions or when so specified by agreement or by the Riverbank City Code (see Section 1.04, Item F). The cost of inspection on City contract projects will be borne by the City. Reference section 31-37 City Code.

All work rejected by the City Engineer or Construction Inspector shall be remedied, removed or replaced by the Developer or Contractor on private work or City Contractor on City contracts. Any work done beyond that shown on the plans approved by the City Engineer may be ordered at the Developer's or City Contractor's expense.

1.108 CONCRETE

Portland cement concrete, unless otherwise specified in the Special Provisions, shall be Class B as defined in the State Standards with a 28-day compressive strength of 2,500 pounds per square inch and a maximum slump of 3 inches. Concrete shall consist of Portland Cement, water, and aggregate. Portland cement shall be Type II. Aggregates shall be washed before use and be free from any foreign matter.

The aggregate shall be graded to provide a plastic, workable mixture of maximum density with a maximum size aggregate of 3/4 inches. The water shall be potable and no admixtures shall be used without approval of the City Engineer or Construction Inspector.

The cement, water and aggregates shall be combined at the batch plant and be thoroughly mixed. No water shall be added to the mixture after leaving the batch plant without approval of the City Engineer or Construction Inspector. All concrete shall be · placed within 90 minutes after the introduction of water to the cement. The temperature of the concrete shall be not less than 50 degrees F. and not more than 90 degrees F.

The concrete shall be consolidated by tamping or vibrating. Concrete which has cracks, rock pockets or honey combing after curing shall be removed and replaced.

All concrete shall be cured in accordance with Section 907.01 B of the State Standards.

1.109 DUST CONTROL

Dust control shall be the responsibility of the Developer, Contractor, or City Contractor. However, the City Engineer or Construction Inspector may perform emergency dust control and the cost shall be borne by the Developer, Contractor, or City Contractor.

On existing streets the dust shall be controlled by sweeping and removal of the dirt before it leaves the site or enters the storm drain system.

In the work area, the dust may be controlled by use of water, but the storm drain system must be protected.

Water from City fire hydrants must be metered through a meter installed by the City. There is a charge for the water to the Developer. The charge rate will be set by the City of Riverbank City Council.

1.110 SURFACE RESTORATION

The surface of the work area shall be restored to its original condition with material as described in each trench section drawing.

Work in easement areas must be confined to the easement and the surface must compacted, be reseeded, leveled, and all undesirable material removed.

Written agreements must be made with the property owners if work or equipment is to go outside the easement. The surface of the area outside the easement must be restored to the satisfaction of the property owner.

In the case of paved areas, excavations that leave 3 feet or less of existing surfacing shall have the remaining surfacing removed and repaved with the same material as the trench section.

Excavations in the shoulder area located with 3 feet beyond the edge of pavement shall be restored with a minimum of 8 inches of aggregate base material. The City Engineer may require a full structural section if the existing surfacing is at approximate ultimate of grade.

The Developer is responsible for obtaining from the City Engineer the resurfacing requirements for each project when the plans are drawn or an encroachment permit is obtained.

Prior to any paving, all uneven or loose edges shall be trimmed in true and even lines parallel to the center line of the work, by saw cut method. Wheel cutting is not allowed. The aggregate base shall conform to the requirements of Section 3.7 of these Standards.

A paint binder as specified in Section 3.10 of these Standards shall be applied to all existing vertical surfaces arid construction joints prior to placing asphalt concrete.

The asphalt concrete shall conform to the requirements of Section 3.9 of these Standards. The asphalt concrete shall be per CALTRANS standards. 1/2 inch, or 3/4 inch-maximum, whichever is required by the City Engineer or Construction Inspector.

1.111 CLEANUP

The Developer, Contractor, or City Contractor shall, at least once each week, or as requested by the City Engineer, clean up the dirt and debris in all of the adjacent streets caused by the construction. All sidewalks, curbs, and gutters, approaches, crosswalks, existing and new drain inlets, lawns, etc., shall be kept free of excess dirt and rubbish and kept in a clean and neat condition.

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

A. All of the right of way, adjacent property, adjacent streets and alleys and all areas used by the Developer or City Contractor in connection with this project shall be cleared of all debris and excess material, and left in a neat and presentable condition.

B. All paved areas and gutters shall be free of dirt and dust.

C. All concrete surfaces shall be left free of excess concrete, paving materials, liquid asphalt, dirt and dust. All expansion joints shall be trimmed flush with the concrete, all paint and reference marks will be removed.

D. All old and new drain inlet bottoms and outlet pipes shall be left free of all dirt and debris. If water is used to clean streets, care shall be taken to keep sand and silt out of storm system. Any storm drain facilities affected by the work shall be cleaned by the Developer, Contractor, or City Contractor.

E. All sewer and storm drain manhole bottoms shall be cleaned of all foreign matter and covers shall have all paving asphalt removed.

F. Slurry seal all pavement prior to bond release. Restripe as required by the City Engineer or Construction Inspector.

G. All striping shall be Thermoplastic.

The Developer, Contractor, or City Contractor shall not remove temporary warning, regulatory, and guide signs prior to formal acceptance by the City Council. Such signs shall be removed when directed by the City Engineer or Construction Inspector.

1.112 DEVIATIONS

These Standards may be deviated from, if in the opinion of the City Engineer or Construction Inspector, a proposed deviation meets or exceeds the quality of these Standards, or minor deviations which meet the spirit of these Standards.

Work in developed areas may require conforming to existing work in lieu of conforming to these Standards. All such deviations shall be approved by the City Engineer or Construction Inspector.

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

Underground work shall not be backfilled or covered until an inspection by the City Engineer or Construction Inspector has been made and the work approved. Any work that is covered without inspection shall be uncovered at the Developer's, Contractor's, or City Contractor's expense in order for an inspection to be made. The City Engineer or Construction Inspector shall have access to the work at all times and shall be furnished every reasonable facility for ascertaining that the work done, materials used, and workmanship performed are in accordance with the requirements and intentions of these Standards. Failure of the City Engineer or Construction Inspector to note faulty material or workmanship during construction or on material submittals shall not relieve the Developer, Contractor, or City Contractor of the responsibility for correcting such deficiencies at his expense.

1.113 SPECIAL CONDITIONS

Cold mix or cutback shall be required on all trenches on existing roadway if the project will not be complete within forty-eight (48) hours.

Require that a street must pass a water test to ensure that there will be no standing water in the flow line of the curb and gutter.

Lasers shall be used to set grades and install sewer and storm drain lines, unless otherwise approved by the City Engineer or Construction Inspector.

City of Riverbank
DESIGN SPECIFICATIONS

SAFETY

SECTION 2- SAFETY

2.100 Specifications

2.101 GENERAL
2.102 TRAFFIC CONTROL
2.103 SIGNS
2.104 BARRICADES
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2.108 WARNING LIGHTS
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2.110 RULES AND REGULATIONS.
2.111 UNDERGROUND SERVICE ALERT - USA

2.101 GENERAL

This Safety Section is intended to establish general principles of traffic control, worker protection and public safety measures to be taken in the performance of all work covered by these Standards.

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

The requirements of the State of California, Department of Transportation, CA MUTCD, Caltrans Traffic Manual, Manual of Traffic Controls for Construction and Maintenance of Work Zones and the Uniform Sign Chart shall take precedence over the requirements of this Safety Section.

2.102 TRAFFIC CONTROL

The Safe movement of traffic through construction areas depends upon communicating concise and proper information to the public by signs, barricades, delineators, flaggers and warning lights. All such devices necessary during construction shall be furnished by the Developer or City Contractor.

The size, shape, and color of such devices as shown herein shall be as required by the State of California, Department of Transportation and CA MUTCD.

All posts, signs or other obstructions must be FHWA350 tested.

A traffic control plan is required for all road or lane closures. The plan must be submitted and approved prior to construction.

2.103 SIGNS

The types of signs shown are typical under normal conditions.

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

Reflectorized signs fastened to barricades or similar supports shall have the face of the sign vertical and normal to the direction of traffic for effective visibility.

Signs are to be used only as long as necessary and then removed. During periods when the signs are temporarily unnecessary, they shall be removed or have their message covered.

2.104 BARRICADES

Barricades are intended to impose an obstacle in or close off the normal flow of travel. Approved barricades are shown on Drawing Nos. 2-E and 2-F.

Barricades shall not be used unless they are needed to separate the motorist from objects of greater hazard than the barricades themselves. Barricades should never be used primarily for delineation. The use of nonstandard types of barricades, such as drums, buckets, sandbags, etc., can be hazardous and their use is prohibited.

2.105 FLASHER SUPPORTS

Portable flasher supports shall be as required by the State Department of Transportation.

2.106 DELINEATORS

The function of delineators is to channelize traffic. They shall consist of post and paddle type markers or cylindrical or cone shaped objects 18 to 48 inches in height.

Delineators should be uniformly positioned laterally and longitudinally relative to the line of traffic and they must be maintained in an erect position.

Delineators for night time use shall be reflectorized or illuminated to be visible from 500 feet under normal atmospheric conditions.

When placed in close proximity to the edge of a traffic lane, delineators should be made of a material that will withstand impact without damage to them or the striking vehicle. Consideration must also be given to the necessity for stability against knockdown from wind or from the wash of passing traffic.

2.107 FLAGGER

A flagger is one of the oldest and most basic means of controlling traffic. A flagger can observe changing conditions and transmit information to the motorist based on current conditions. The flagger can also act as a guard in advance of a work party by observing approaching traffic, and being prepared to warn the workers.

A flagger should be used only when such discretionary capability is required, and not as a substitute for other warning signs and devices.

When a flagger is necessary, the flagger must convey a message, and the message must be timely and accurate. The flagger's effectiveness and the safety of the traffic and their fellow workers depend upon the way the flagger works. Standard hand signals shall be used as shown in the State Traffic Manual and CA MUTCD.

2.108 WARNING LIGHTS

Warning lights shall be electric lanterns, electric markers or flashers provided to indicate an obstruction or restriction during periods of low visibility. Warning lights shall be placed to mark the location of obstructions. Motion may be incorporated into warning lights.

Flashing lights for delineating the path the traffic is to follow shall be uniformly spaced as approved by City Engineer or Director of Public Works.

Warning lights may be fastened to signs, barricades and portable flasher supports in a manner satisfactory to the City Engineer or Director of Public Works.

2.109 STREET CLOSURES

Partial temporary street closures shall be made as per the City Engineer or the Director of Public Works. One lane for each direction of through traffic must be maintained except where flaggers are provided to control traffic, then one lane may serve both directions.

When trenching is necessary across intersecting streets, the work shall be done in such a manner to maintain two-way traffic on cross streets at all times.

Where the trench line crosses an entrance to private property, access to the property shall be maintained at all times by means of a suitable bridge, until the trench may be backfilled. Such bridges shall be properly guarded and illuminated at night. Where any crosswalk is cut by the trench, suitable bridging shall be constructed. Such bridging shall be at least 4 feet in width, shall have suitable hand railing, shall be properly guarded and illuminated at night and shall be made immediately in cases where backfill material is suitable for jetting. The City Engineer shall determine which backfill material is suitable.

The complete closure of a street is allowed only when authorized in writing by the City Engineer or Director of Public Works, as provided by the City of Riverbank Code. Such closure shall be accomplished only through the use of Type III barricades.

Permanent street closures as per City Council: Temporary closures in new developments at dead end streets and where pavement transitions match existing pavement at the edge of the development shall be constructed as per Drawing No. 205.

2.110 RULES AND REGULATIONS

All work performed and all materials used by the Developer or Contractor shall comply with the following: the State Labor Code, the California Administrative Code, Construction Safety Order, Title 8, Subchapter 4, Caltrans and all other applicable Federal, State and Local Laws and regulations.

Specifically, the Developer or Contractor shall furnish, install and maintain all shoring, bracing and sheeting. Any damage resulting from a lack of adequate shoring, bracing or sheeting shall be repaired at the Developers' or Contractors' expense.

Additional requirements may be imposed by the City Engineer or Director of Public Works in the interest of public safety.

2.111 UNDERGROUND SERVICE ALERT - USA

USA is a "One Call Notification Center" used for identifying any underground facilities prior to digging. The Developer or Contractor shall call USA at 800-642-2444 at least 48 hours prior to the start of any excavation, with the City Limits. All participating members not including the City of Riverbank will be informed by USA of the location, date, time and description of the proposed excavation. Any existing underground facilities will then be located and marked in the field by the appropriate USA member organization(s). Requests for field meeting shall be included in the initial call to USA. For further information, contact the City of Riverbank Public Works Department at 869-7128.

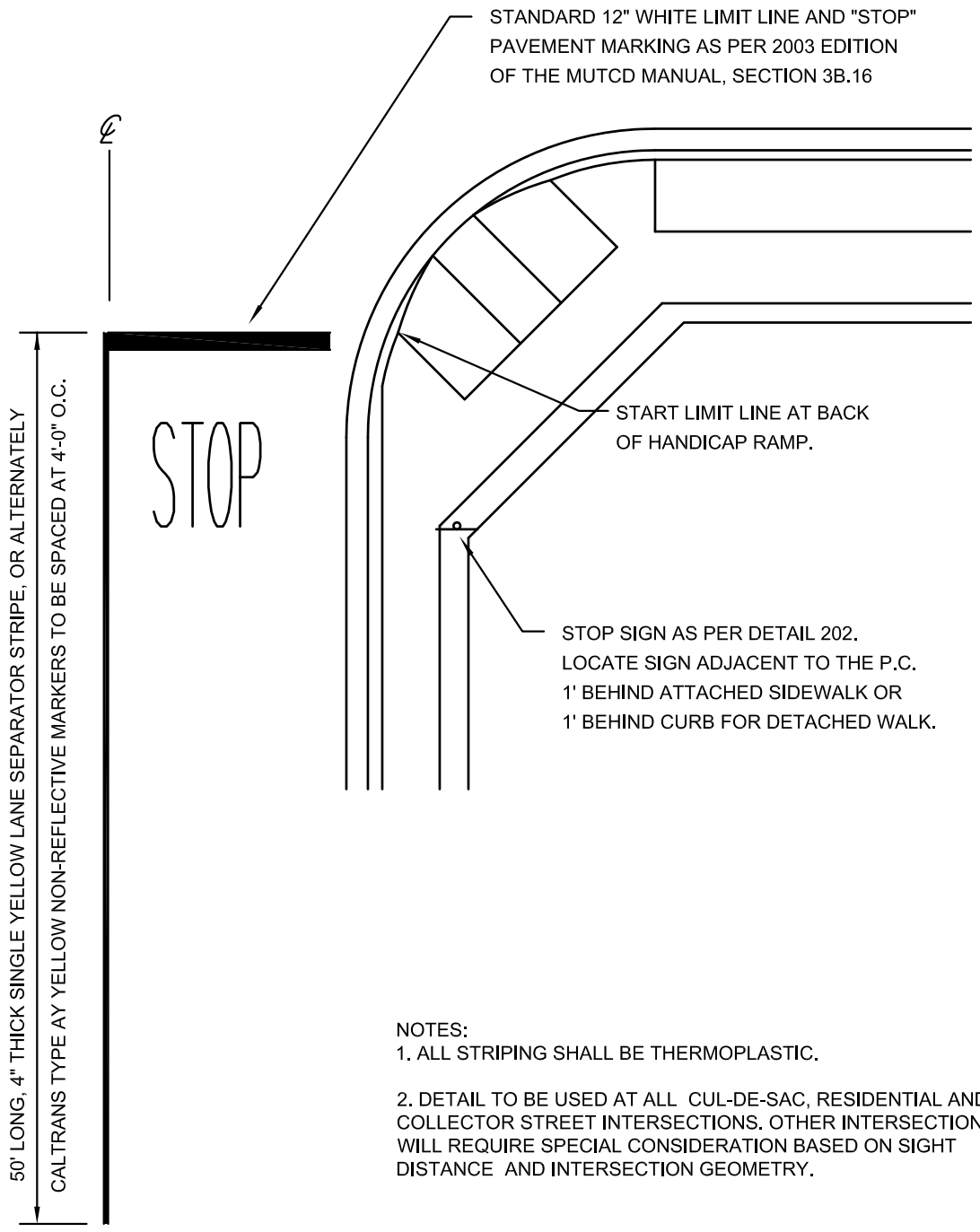
The Developer or Contractor shall be responsible for the preservation of, and any damage to, both private and public property in accordance with the current Caltrans Standards - Section 7-1.

City of Riverbank
STANDARD PLANS

SAFETY

SECTION 2- SAFETY

Drawing No	Description
201	STOP SIGN, STOP BAR, AND LANE SEPARATION LOCATIONS
202	STOP SIGN INSTALLATION
203	STREET SIGN
204	STANDARD REFLECTOR PADDLE BOARD
205	BARRICADES
206	BARRICADES- PORTABLE



NOTES:
1. ALL STRIPING SHALL BE THERMOPLASTIC.

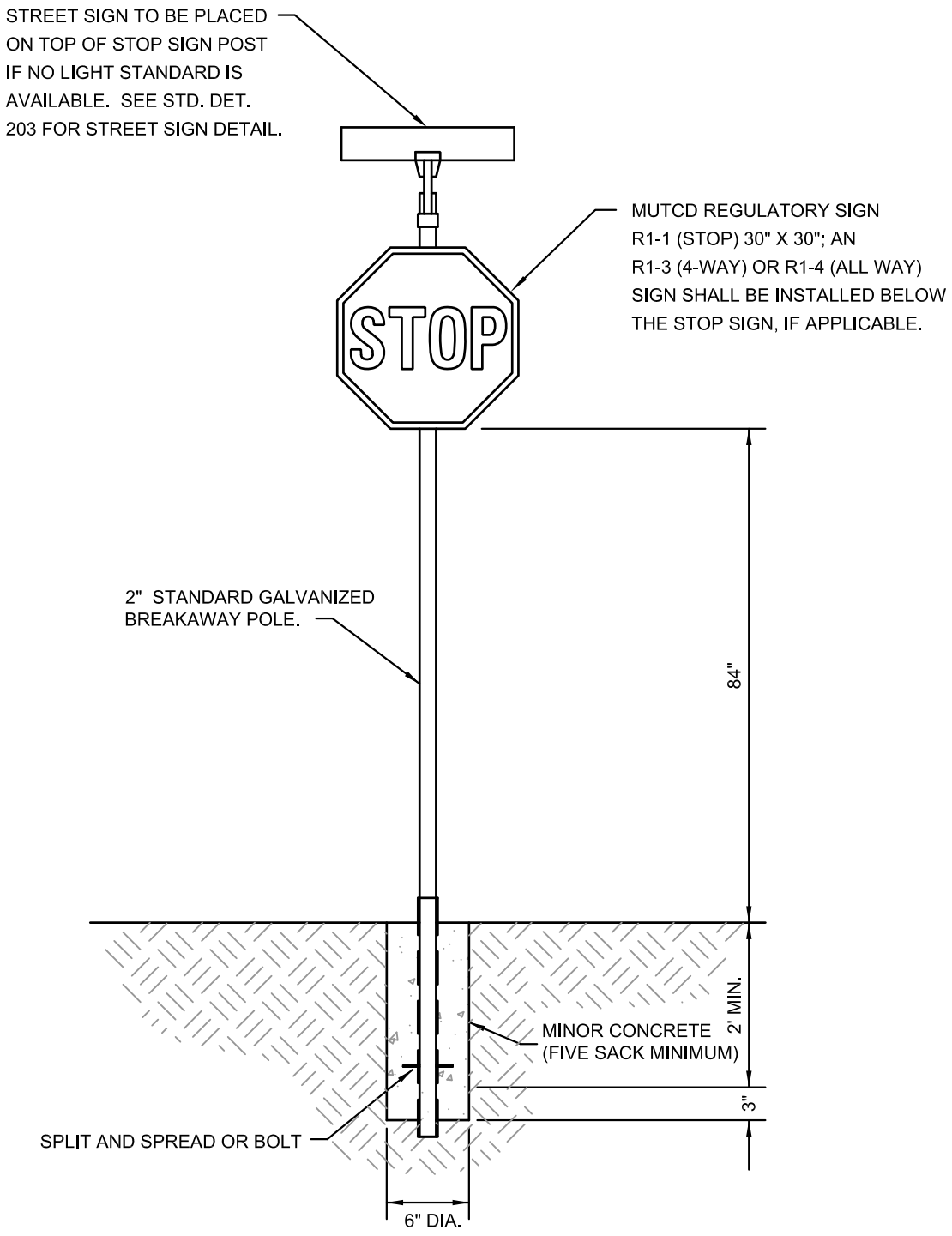
2. DETAIL TO BE USED AT ALL CUL-DE-SAC, RESIDENTIAL AND COLLECTOR STREET INTERSECTIONS. OTHER INTERSECTIONS WILL REQUIRE SPECIAL CONSIDERATION BASED ON SIGHT DISTANCE AND INTERSECTION GEOMETRY.

CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

William F. Kull
CITY ENGINEER - WILLIAM F. KULL

STOP SIGN, STOP BAR AND 56' R.O.W. - CUL-DE-SAC LOCATIONS

DRAWN BY:	DATE:	SCALE:	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
GK	9/28/15	NTS	1-26-16	201
REVISIONS: NONE	SECTION: SAFETY	DRAWING NAME: 201.DWG		



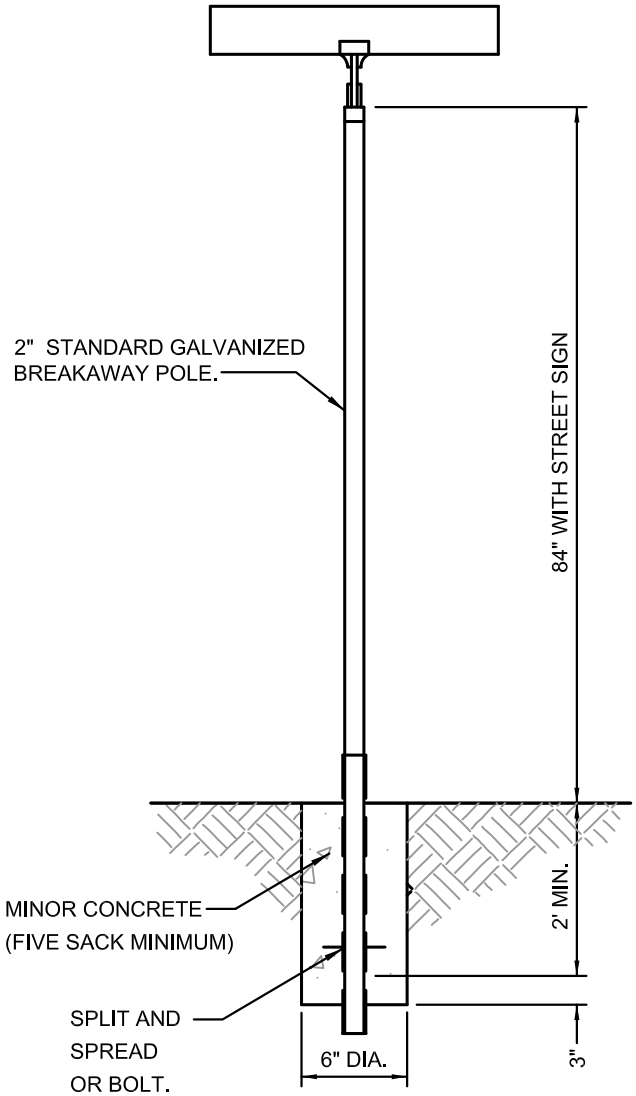
CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

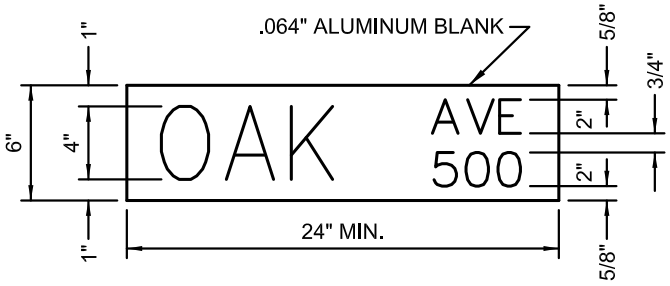
William F. Kull

CITY ENGINEER - WILLIAM F. KULL

STOP SIGN INSTALLATION

DRAWN BY:	DATE:	SCALE:	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
GK	9/28/15	NTS	1-26-16	202
REVISIONS: NONE	SECTION: SAFETY	DRAWING NAME: 202.DWG		





"SCOTCHLITE" (OR APPROVED EQUAL REFLECTIVE FACE).

GREEN REVERSED SCREENED BACKGROUND WITH SILVER COPY ON BOTH SIDES, UPPER CASE LETTERING ONLY.

NOTES:

1. STREET SIGNS SHALL BE PLACED ON LIGHT STANDARD WHENEVER POSSIBLE.
2. STREET SIGN SHALL BE PLACED ON STOP SIGN TOP IF NO LIGHT STANDARD IS AVAILABLE.

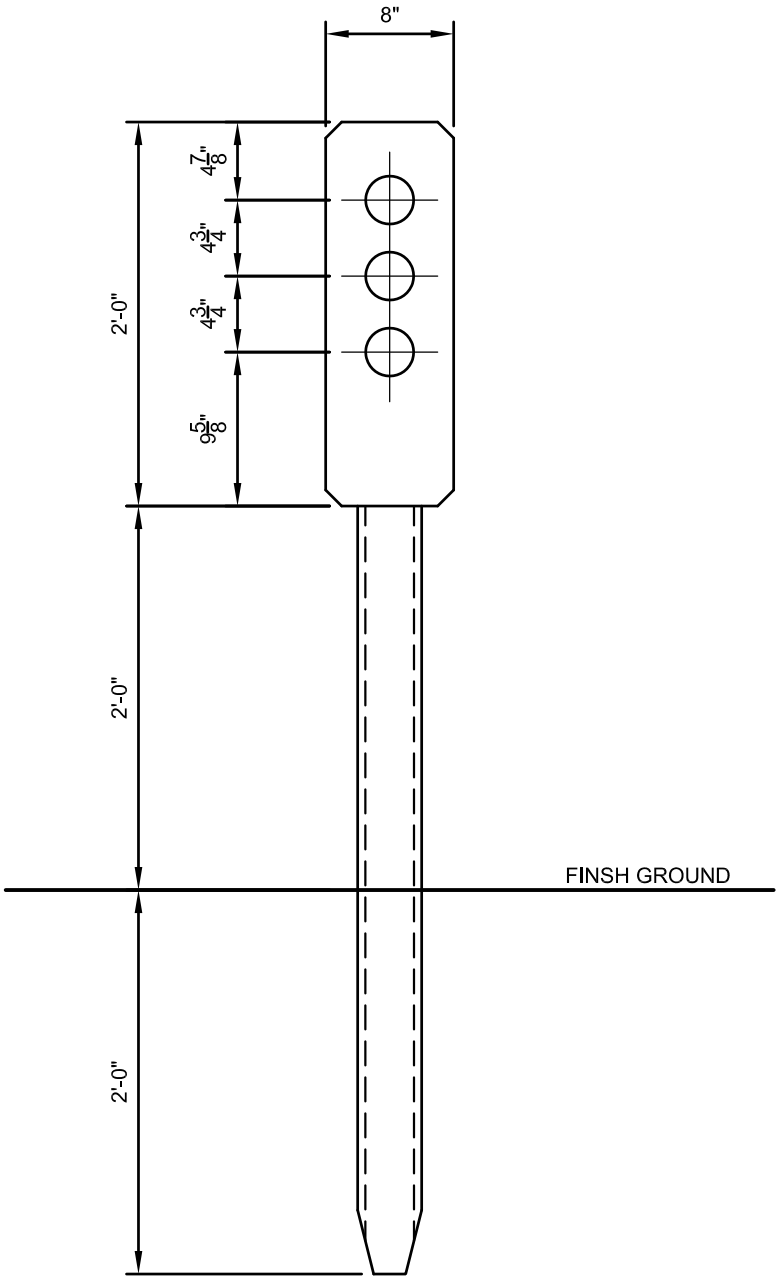
CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

William F. Kull

CITY ENGINEER - WILLIAM F. KULL

STREET SIGN

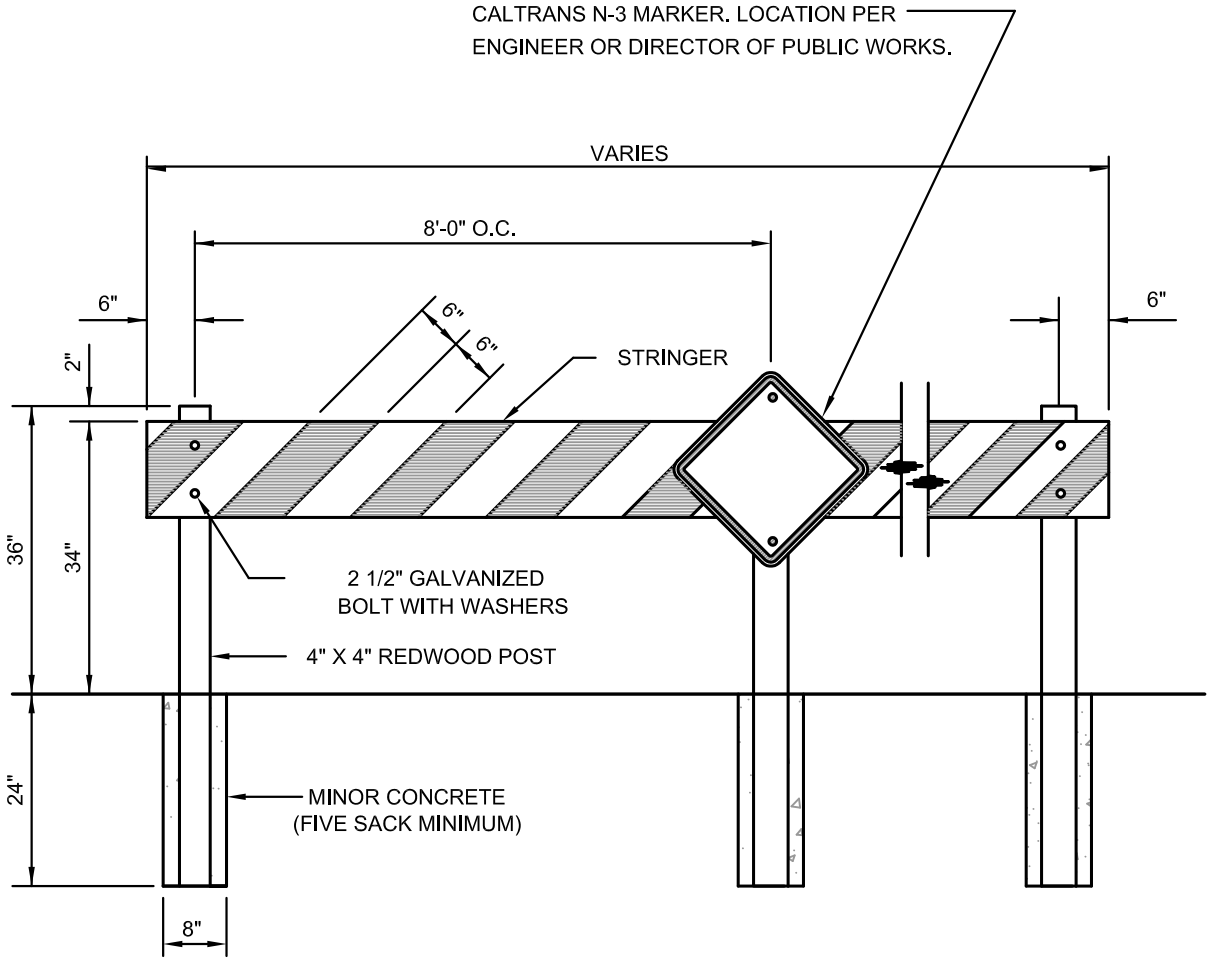
DRAWN BY:	DATE:	SCALE:	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
GK	9/28/15	NTS	1-26-16	203
REVISIONS: NONE	SECTION: SAFETY	DRAWING NAME: 203.DWG		



NOTES:

1. CONFORMS TO STATE STANDARD
2. SPACING SHALL BE AT 5' INTERVALS OR AS REQUIRED BY ENGINEER / DIRECTOR
3. STANDARD REFLECTOR SHALL BE CONSTRUCTED IF HIGH IMPACT PLASTIC.

CITY OF RIVERBANK DEPARTMENT OF PUBLIC WORKS			STANDARD REFLECTOR PADDLE BOARD	
William F. Kull CITY ENGINEER - WILLIAM F. KULL				
DRAWN BY: GK	DATE: 9/28/15	SCALE: NTS	ADOPTED BY THE CITY COUNCIL: 1-26-16	DRAWING NO. 204
REVISIONS: NONE	SECTION: SAFETY	DRAWING NAME: 204.DWG		



NOTES:

1. STRINGER TO BE 2" X 12" DOUGLAS FIR WITH ALTERNATING WHITE AND REFLECTIVE ORANGE TAPE (CODIT OR EQUAL), AND POST TO BE 5' X 4' REDWOOD AND PAINTED WHITE.
2. ALIGNMENT TO BE DETERMINED BY THE CITY OF RIVERBANK.
3. STRINGER TO BE KILN DRIED LUMBER REQUIRED.
4. IF STRINGER JOINTS ARE BETWEEN POSTS, THERE WILL BE 4" X 10" X 1/4" STEEL STRAP INSTALLED.

CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

BARRICADES

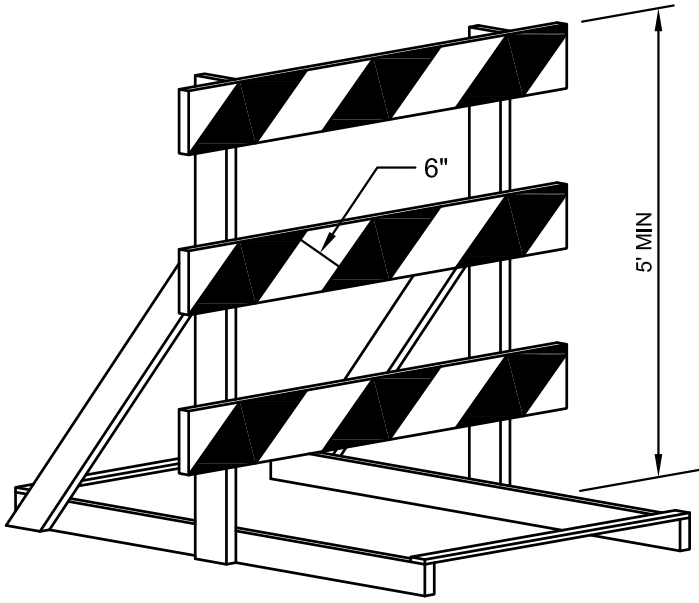
William F. Kull

CITY ENGINEER - WILLIAM F. KULL

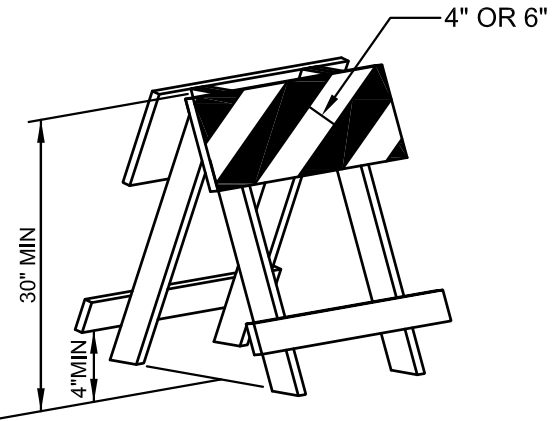
DRAWN BY:	DATE:	SCALE:	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
GK	9/28/15	NTS	1-26-16	205
REVISIONS: NONE	SECTION: SAFETY	DRAWING NAME: 205.DWG		

BARRICADE AND PORTABLE FLASHER SUPPORT CHARACTERISTICS

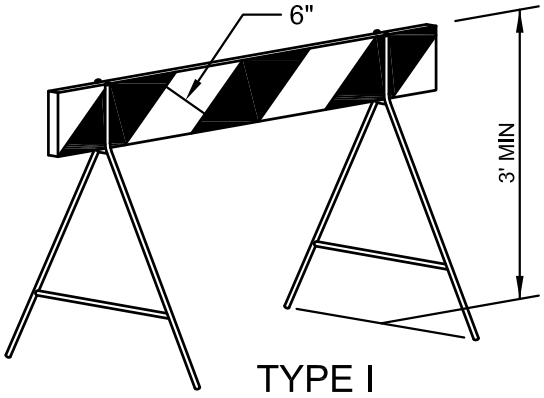
TYPE	I	II	III	PORTABLE FLASHER SUPPORT
LENGTH OF RAIL	2' MIN	32" - 4'	3' MIN	31" MAX
WIDTH OF STRIPE	6"	6"	6"	4" OR 6"
WIDTH OF RAIL	8" - 12"	8" - 12"	8" - 12"	TOP - 8" TO 12" BOTTOM - 4" MIN
HEIGHT	3' MIN	3' MIN	5' MIN	30" MIN
NUMBER OF RAIL FACES REFLECTORIZED	2	4	3 IF FACING TRAFFIC IN ONE DIRECTION 6 IF FACING TRAFFIC IN TWO DIRECTIONS	2 IF TOP RAIL IS 12"WIDE 4 IF TOP RAIL IS LESS THAN 12" WIDE



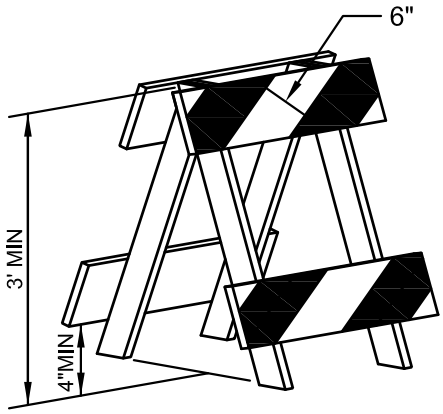
TYPE III



PORTABLE FLASHER SUPPORT



TYPE I



TYPE II

NOTES:

1. IF THE TOP BOARD OF A PORTABLE FLASHER SUPPORT IS LESS THAN 12" WIDE, THE BOTTOM BOARD SHALL BE 8" WIDE, STRIPED, AND REFLECTORIZED.

2. REFLECTORS AS REQUIRED BY THE CITY ENGINEER OR DIRECTOR OF PUBLIC WORKS.

CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

William F. Kull

CITY ENGINEER - WILLIAM F. KULL

BARRICADES

DRAWN BY:	DATE:	SCALE:	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
GK	9/28/15	NTS	1-26-16	206
REVISIONS: NONE	SECTION: SAFETY	DRAWING NAME: 206.DWG		

City of Riverbank
DESIGN SPECIFICATIONS

STREETS

SECTION 3 – STREETS

3.100 Specifications

3.101 General

Street improvements in the public right of way shall be constructed by the Developer or City Contractor to conform to these Standards.

Only a Developer or City Contractor with an appropriate license and required insurance may perform the work described herein.

The Developer shall improve all existing streets bordering on his development.

Any street improvement damaged by the Developer or City Contractor shall be repaired by the Developer or City Contractor as required by the City Engineer.

3.102 Geometric Design

The street widths shall conform to Drawing Nos. 3-A, 3-B, 3-C, 3-D, 3-E, and 3-F. Cul-de-sac and knuckle design shall conform to Drawing Nos. 3-G, 3-H, 3-1, and 3-J.

The gutter slope shall not be less than 0.20% without the approval of the City Engineer and the Director of Public Works.

The street cross slope grades shall be 2% on all new streets. Where matching existing pavement, cross slopes shall be 2% minimum and 4% maximum, unless approved by the City Engineer and Director of Public Works.

The streets shall be designed to collect storm water at intersections whenever possible. Horizontal curves shall conform to the following criteria:

A. Maximum length of street without horizontal curvature shall be 500 Feet.
B. Minimum horizontal curve radii shall be 300 feet on centerline

Design Speed (mph)	Minimum Radius of Curve (ft)
30 or less	300
40	550
50	850

C. Street intersections shall be as near right angles as practical. In no case shall the angle of intersection be less than 70 degrees.

3.103 Structural Section

The R-value design method used by the California Department of Transportation shall be used as a basis to determine the structural section of the streets. Whenever the pavement calculations produce more than 8" of base rock, a safety factor may be used at the option of the City Engineer.

The Traffic Index (T.I.) shall be determined from traffic counts where they are available, or as determined by the City Engineer. A 20-year design life shall be used.

Where sufficient information is not available to determine the structural section using the above data, the following minimums may be used with the approval of the City Engineer:

Street		Aggregate Base (inches)	Asphalt Concrete (Inches)
Major	9	8	3
Collector	7	6	3
Industrial	8	6	3
Residential	6	6	2
Cul-de-sac	5	6	2

The City Engineer shall require the Developer to collect data for the R-value design method. All soil samples shall be collected in the presence of the City Inspector.

3.104 Clearing

Clearing and grubbing shall be done in accordance with Sections 16-1.01, 16-1.02, and 16-1.03 of the State Standards.

3.105 Earthwork

Earthwork shall be performed as set forth in Sections 19-1.01, 19-2.01, and 19-2.05 of the State Standards and the City of Riverbank Grading Ordinance, except that it shall further include the shaping of ground in the park strip and fill areas.

All embankment or fill materials shall be placed and compacted in accordance with Section 19-5.02, 19-5.03 and 19-5.04 of the State Standards, except that the City Contractor or Developer will only be required to strip the original ground of vegetation and compact the top 6 inches of original ground in place to not less than 95% relative compaction in accordance with Test Methods No. California 216 or 231-1978, a nuclear density-moisture gauge, before the fill is placed.

The Developer or City Contractor shall obtain a disposal site for all of the roadway excavation not used on the job site. The Developer or City Contractor shall obtain and file with the City a letter showing permission and conditions for use of the disposal site. The Developer or City Contractor shall control dust at the disposal site and keep any streets used free of excess material.

3.106 Subgrade

All clods shall be broken and all rocks, hard ribs, and earth lumps over 2-1/2 inches in greatest dimension and other unsuitable material such as roots shall be removed from the job site. The subgrade material shall be compacted to a firm, stable condition with approved equipment until a relative compaction of not less than 95% has been obtained to a depth of 6 inches. Special provisions may require a greater depth for 95% compaction.

All street subgrades shall be tested by a geotechnical engineer at a maximum interval of 300 feet. All street testing shall be at the Developer's expense prior to final acceptance by the City (see Section 3-18).

The finished subgrade shall not vary more than 0.05 foot above or below the planned grade at any point. Care shall be taken to obtain compaction around existing manholes and water gate valves.

Relative compaction shall be tested by the City Engineer in accordance with Test Methods No. California 216 or 231-1978.

3.107 Aggregate Base

The aggregate base material shall conform to the requirements of Section 26-1.01, 26-1.028, 26-1.03, 26-1.035, 26-1.04, 26-1.048, and 26-1.05 of the State Standards for 3/4 inch maximum combined grading.

An exception to Section 26-1.04 shall be that a single layer up to 0.7 foot shall be permitted.

Motor grader shall be permitted to spread and shape the aggregate base materials. The aggregate base shall be maintained in a well mixed optimum moisture condition.

All aggregate bases shall be tested by a geotechnical engineer at a maximum interval of 300 feet. All street testing shall be at the developer's expense prior to final acceptance by the City Council (see Section 3-18).

3.108 Prime Coat

A liquid asphalt prime coat shall be applied in conformance with Section 39-4.02 of the State Standards. The liquid asphalt prime coat grade shall be approved by the City Engineer.

When directed by the City Engineer, a sand cover shall be spread over the prime coat at approaches and side streets in order to maintain use. Before through traffic is permitted on the prime coat, all wet spots shall be covered with sand. All loose sand shall be completely removed from the treated areas before the placing of any surfacing materials.

If, in the opinion of the City Engineer, conditions are such that this work is not feasible, the prime coat may be deleted.

3.109 Asphalt Concrete

The asphalt concrete shall conform to the requirements of Sections 39-2, 39-3 and 39-6.03 of the State Standards. Asphalt concrete used in the base course shall be Type B with 3/4 inch medium grading. Asphalt concrete used in the final course shall be Type B as follows:

Major, Collector and Industrial Streets - 3/4 inch, medium grading Residential Streets - 1/2 inch, maximum medium grading.

Aggregate for 1 inch overlays shall as specified in the Special Provisions for each project.

The asphalt grade shall be AR 4000 as specified by the latest revision of the State Standards unless otherwise approved by the City Engineer.

A. The base course may be placed in any reasonable number of passes and widths except that the center line of the street shall be either on the edge of the center pass or in the center of one pass. The base course may be placed with a motor grader.

   The spreading of the base course shall be as required for Class 2 aggregate base in Section 26-1.04 of the State Standards.

B. The final surface course shall be paved in the number of passes approved by the City Engineer, starting from the curb and paving toward the center line.

C. When paving the final surfacing course, there shall be a minimum to two rakers and one screed man per paving machine.

D. Rolling equipment shall conform to the requirements of Section 39-6.03 of the State Standards. Vibratory rollers may be approved by the City Engineer.

E. The surface course shall be laid with a paving machine except when permitted otherwise by the City Engineer in difficult areas.

F. Paving machines shall have automatic joint control.

G. Extensions or wings shall not be permitted except as approved by the City Engineer.

H. Temperature requirements shall conform to the requirements of Section 39-6.01 of the State Standards.

I. Deep strength or full depth asphalt concrete shall conform to the Special Provisions of the particular project.

Excerpt from Caltrans Standards 39-6 - Spreading and Compacting:

General Requirements- 39-6.01: Unless lower temperatures are directed by the Engineer, all mixtures, except open graded asphalt concrete, shall be spread and the first coverage of initial or breakdown compaction shall be performed when the temperature of the mixture is not less than 250 degrees F., and all breakdown compaction shall be completed before the temperature of the mixture drops below 200 degrees F. Open graded asphalt concrete' shall be

spread at a temperature of not less than 200 degrees F., and not more than 250 degrees F., measured in the hopper of the paving machine. Open graded asphalt concrete shall be compacted as soon as possible after spreading.
Type A and Type B asphalt shall be placed only when the atmospheric temperature is above 50 degrees F. Asphalt concrete base shall be placed only when the atmospheric temperature is above 40 degrees F.

Open graded asphalt concrete shall be placed only when the atmospheric temperature is above 50 degrees F., and where placement is to be on bridges or other structures, when surface temperature of such structure is above 60 degrees F.

Asphalt concrete and asphalt concrete base shall not be placed when the underlying layer or surface is frozen, or when, in the opinion of the Engineer, weather conditions will prevent the proper handling or finishing.

3.110 Asphalt Paint Binder

As asphalt paint binder shall be applied in conformance with Section 39-4.02 of the State Standards to all existing vertical surfaces and construction joints prior to placing asphalt concrete.

3.111 Header Boards

Header Boards shall be constructed to protect the edges of the asphalt concrete where streets are partially complete

The Boards shall be 2" X 6" dimensioned of appropriate redwood or treated Douglas fir.

3.112 Curbs and Sidewalks

Curbs and sidewalks shall be constructed and repaired in accordance with the Drawings of this section and the requirements of City of Riverbank Municipal Code.

Concrete delivery tickets with weighmasters' certificates or certificates of compliance may be required by the City Engineer.

The construction shall conform to Sections 73-1.02, 73-1 .03, 73-1 .04, 73-1.05 and 73-1.06, of the State Standards, except for references to payments. Curbs shall be measured continuous through approaches. Approaches shall be measured to the "back of curb line", when payment is made by the square foot.

Special surface finishes or features such as exposed aggregate, color additives and redwood dividers require the written approval of the City Engineer.

Sidewalk shall have a cross slope toward the curb face of 1/4 inch per foot minimum to 1/2 inch per foot maximum.

Traffic parking and street name signs on city streets which require relocations because of the work will be relocated by the City but two working days advance notice is required. Traffic signs on state highways and stop signs on streets entering state highways must be relocated by Caltrans. Utility poles which require relocation because of the work shall be relocated by the utility company owning the poles. The Developer or City Contractor shall be responsible for coordinating this work, for protecting the work against damage, and for insuring the safety of the public.

Sidewalks which are required against the property line shall be placed 1 inch from the property line to provide space for lot corner monuments.

A gutter drainage test will be performed as per the Engineer and Director of Public Works.

3.113 Approaches

Approaches shall be constructed and repaired in accordance with the Drawing Nos. 3-K, 3-L, 3-M, and 3-N, and the Riverbank Municipal Code.

The construction shall conform to Sections 73-1.02, 73-1.03, 73-1.04, 73-1.05 and 73- 1.06, of the State Standards, except for references to payments. Curbs shall be measured continuous through approaches. Approaches shall be measured to the "back of the curb line" when payment is made by the square foot.

The total width of approaches serving a parcel of land shall not exceed the following limits:

A. For frontages having a vertical curb, the limit shall be 40% of the street frontage of the property or 36 feet, whichever is greater. In the case of corner lots, the limitation shall apply to each street frontage.

The minimum distance between approaches serving the same parcel of land shall be 20 feet. The minimum distance between approaches on adjacent parcels shall be 10 feet.

Approaches shall be located so they will not interfere with intersecting sidewalks, traffic signals, light poles, fire hydrants, or other public improvements unless specific approval is given by the City Engineer and the necessary adjustments to the improvements are accomplished without cost to the City.

3.114 Alleys

Alley approach driveway shall be constructed in accordance with these Standards and Drawing No. 3-K.

The concrete gutter for alley approach driveway shall be constructed as shown on Drawing No. 3-M and the concrete shall be as required in Section 1.8 of these Standards.

The subgrade shall be constructed as required in Section 3.6 of these Standards.

The aggregate base for the alley approach driveway shall be constructed as required in Section 3.7 of these Standards.

3.115 Valley Gutters

Valley Gutters in street right-of-ways are not allowed in the City of Riverbank.

3.116 Wheelchair Ramps

Wheelchair ramps shall be constructed at all intersections as shown on Drawing Nos. 3- AA through 3-HH.

The ramps must comply with Section 19956.5 of the State Health and Safety Code.

3.117 Raising Utility Boxes

Utility boxes and manholes shall be raised by the Developer or City Contractor to conform to these Standards. Utility boxes include, but are not limited to, sewer manholes, water valves, storm drain manholes, and survey monuments.

Where existing utility boxes are in the work area, their frames and covers shall be removed before subgrade compaction is made and a cover shall be placed to prevent dirt and loose material from entering the facility.

Base and surface material shall be placed over the covers, after which the frames and covers shall be set to finish grade as shown in these Specifications.

3.118 Testing

Testing of materials supplied for the work required in this section shall be performed by the City on City contract projects. On all other projects the testing of material shall be performed by the Developer and submitted to the City Engineer for approval.

Where approved by the City Engineer, certificates of compliance may be submitted in lieu of actual tests, as outlined below:

A. 95% Compaction of subgrade at 300 foot maximum testing intervals.
B. 95% Compaction of base at 300 foot maximum testing intervals.
C. 90% Compaction of trenching at two feet of depth at 300 foot maximum intervals.
D. 95% Compaction of trenching at less than two feet of depth {subgrade} at 300 foot maximum intervals.
E. 90% Compaction on all "engineered fills" in excess of one foot of fill.

Compaction and in-place moisture may be determined by use of a nuclear density moisture gauge.

3.119 Inspection

The Developer or City Contractor shall request inspections as follows: Before backfilling of any utilities lines.

A. Completion of subgrade preparation
B. Completion of form installation
C. During placement of concrete
D. During placement of aggregate base
E. Completion of aggregate base grade
F. During placement of asphalt concrete
G. Completion of rock well drilling before placement of drain rock
H. Completion of final clean up.

Other inspections to cover special items shall be requested by the Developer or City Contractor as needed.

3.120 Street Monuments

Street monuments shall be placed on the centerline of each street at the following locations:

A. Intersections
B. Beginnings and ends of curves
C. Changes of directions
D. Other points deemed necessary by the City Engineer

Final Maps or recorded maps shall show where monuments are to be set. Monuments when deemed by the City Engineer will be of the Standard Well Type as shown on detail No. 3-W.

The monuments shall consist of durable new material. They shall be 1 inch O.D. x 24 inch long galvanized iron pipe or approved equal. The monument shall be tagged as required by the State of California Land Surveyor's Act.

3.121 Boundary Monuments

Boundary monuments shall be placed on the exterior boundary of the subdivision at the following locations:

A. Changes of direction
B. Beginnings and ends of curves
C. Other points deemed necessary by the City Engineer.

Boundary monuments shall be placed in the same manner and of the same material as street monuments except that in unpaved areas the top shall be at least 1 foot below the finished grade.

3.122 Block Corner Monuments

Corner monuments shall be placed at all Block corners and alley corners.

Block corner monuments shall be placed in the same manner and of the same material as street monuments except the top shall be set at least 1 foot below the ground surface.

3.123 Lot Corner Monuments

Lot corner monuments shall be placed in the same manner and of the same material as street monuments except that they may be 3/4 inch O.D. and, in unpaved areas, the top shall be at least 1 foot below the finished grade.

The basic criteria for the location shall be as follows:

A. Lots shall have a monument at each corner except as otherwise provided by this section.

B. Lots that are created with zero back or side yards may have lot corners under building foundations deleted except those corners that are Block or alley corners.

C. Lots that are created as a part of townhouse or condominium development where land is to be owned in fee by the individual lot owner shall be monumented using a minimum of 4 monuments for each contiguous group of lots. Contiguous groups of lots containing 10 lots shall have additional monuments as required by the City Engineer.

D. Condominium airspace developments where land is not to be owned in fee by the individual lot owner shall have the exterior boundary monumented as required by Section 3.21 Boundary Monuments.

3.124 Concrete

Portland cement concrete, unless otherwise specified in the Special Provisions, shall be in accordance with Section 1.8 of these Specifications.

3.125 All Weather Roads

Prior to issuing a building permit, the City of Riverbank Building Inspection Department shall receive written confirmation from the City Public Works Department and the Riverbank Fire Protection District that all streets within the development meet the "All Weather Road" standards.

To be considered an "All Weather Road" the following criteria shall be met:

1. All curb, gutter, and sidewalk shall be installed in accordance with project plans and specifications.

2. Fire hydrants and water systems shall be pressure tested, bacteriological tested and approved. Blank plates and jumpers shall be removed to provide an approved water supply capable of supplying the required fire flow for fire protection to all premises upon which buildings or portions of buildings are hereafter constructed, in accordance with the current "Uniform Fire Code."

3. Sewer and storm drain system shall be installed, tested, and approved.

4. All other utilities (e.g. electricity, gas, cable, television, and telephone) shall be installed within the appropriate public utilities easement adjacent to the street right- of-way.

5. The street section shall meet the following requirements.

   A. The subgrade shall have a 95% compaction based on appropriate testing.
   B. The AB rock grade shall have a 95% compaction based on appropriate testing.
   C. The AC grade shall be at least 0.10 foot.

6. When utilities are placed in existing roadways, cold mix will be used to secure trenches until roadway is paved. This will be done in order to make roadways safe.

The City Engineer or Fire Chief shall have authority to terminate the construction at any time if any of the aforementioned conditions are violated.

City of Riverbank
STANDARD PLANS

STREETS

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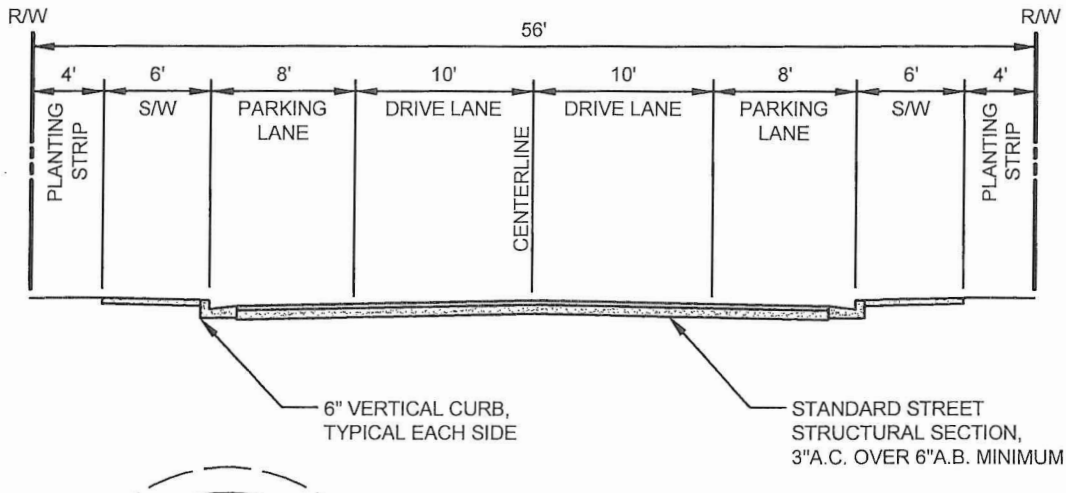
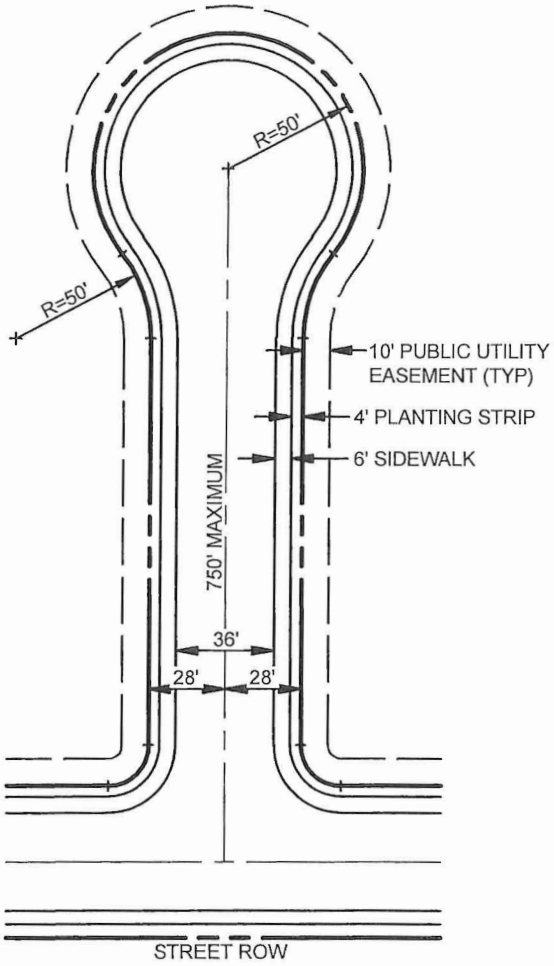




LEGEND:

P/S	PARKING STRIP
R	RADIUS
R/W	RIGHT OF WAY
S/W	SIDEWALK

NOTES:

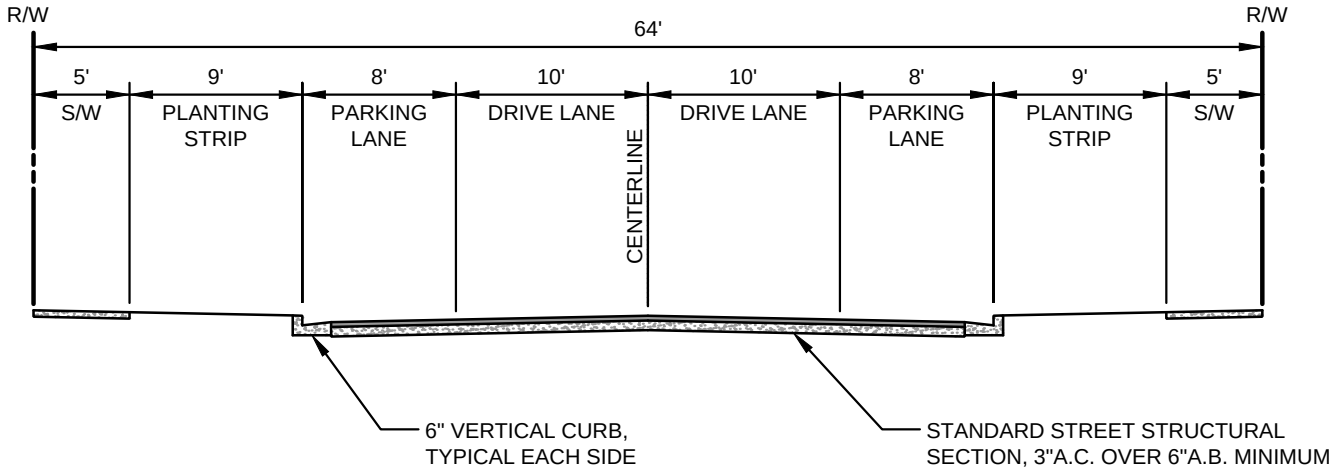
1. FINISHED PAVING SHALL BE 3/8" HIGHER THAN LIP OF GUTTER EXCEPT WHERE PEDESTRIAN CROSSINGS ARE LOCATED, LIP WILL BE FLUSH.
2. PART WIDTH STREETS, DEAD END STREETS AND ALL PAVEMENT TRANSITIONS SHALL REQUIRE 2"x6" REDWOOD OR PRESSURE TREATED HEADERBOARD.

CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

William F. Kull
CITY ENGINEER - WILLIAM F. KULL

STREET SECTION
56' R.O.W. - CUL-DE-SAC
RESIDENTIAL

DRAWN BY:	DATE:	SCALE:	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
GK	7/21/15	NTS	3-10-15	301
REVISIONS: NONE	SECTION: STREETS	DRAWING NAME: 301.DWG		



64' R.O.W. - Residential - Typical Street

LEGEND:

P/S	PARKING STRIP
R/W	RIGHT OF WAY
S/W	SIDEWALK

NOTES:

1. FINISHED PAVING SHALL BE 3/8" HIGHER THAN LIP OF GUTTER EXCEPT WHERE PEDESTRIAN CROSSINGS ARE LOCATED, LIP WILL BE FLUSH.
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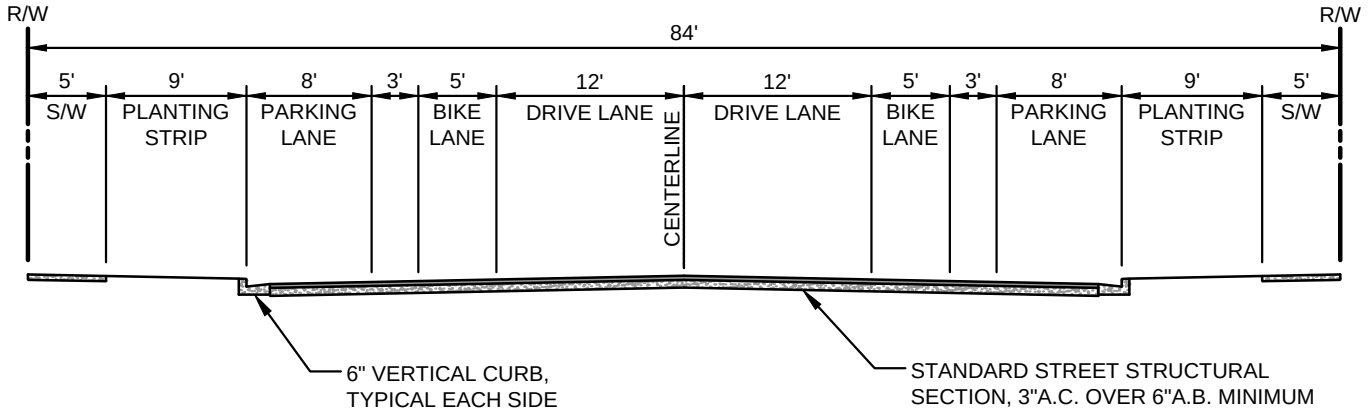
CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

William F. Kull
CITY ENGINEER - WILLIAM F. KULL

STREET SECTION
64' R.O.W.
RESIDENTIAL

DRAWN BY:	DATE:	SCALE:	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
GK	7/21/15	NTS	3-10-15	302
REVISIONS: NONE	SECTION: STREETS	DRAWING NAME: 302.DWG		



84' R.O.W. - Residential - Typical Minor Collector

LEGEND:

P/S	PARKING STRIP
R/W	RIGHT OF WAY
S/W	SIDEWALK

NOTES:

1. FINISHED PAVING SHALL BE 3/8" HIGHER THAN LIP OF GUTTER EXCEPT WHERE PEDESTRIAN CROSSINGS ARE LOCATED, LIP WILL BE FLUSH.
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CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

William F. Kull
CITY ENGINEER - WILLIAM F. KULL

STREET SECTION
84' R.O.W. - RESIDENTIAL
TYPICAL MINOR COLLECTOR

DRAWN BY:	DATE:	SCALE:	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
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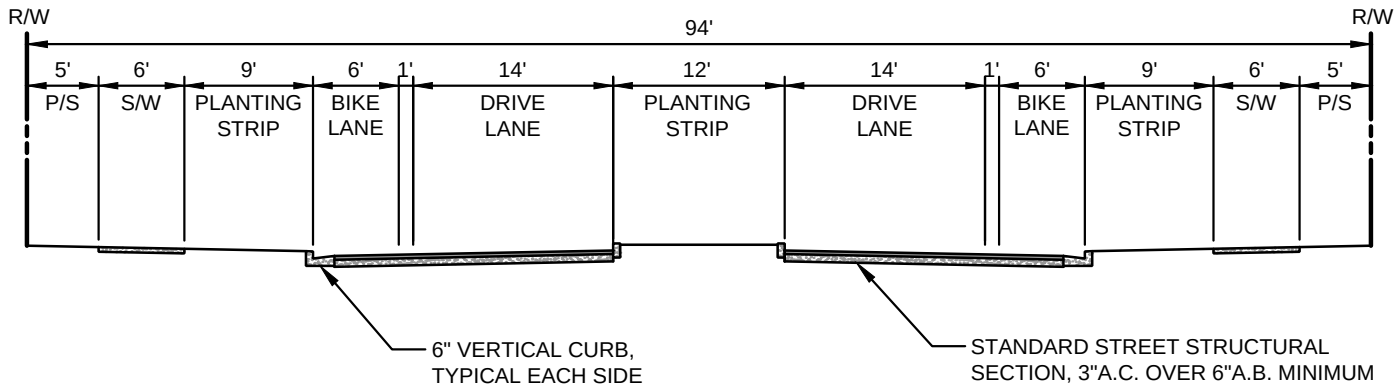

94' R.O.W. - Typical Major Collector - Residential

LEGEND:

P/S	PARKING STRIP
R	RADIUS
R/W	RIGHT OF WAY
S/W	SIDEWALK

NOTES:

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CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

William F. Kull
CITY ENGINEER - WILLIAM F. KULL

STREET SECTION
94' R.O.W. - RESIDENTIAL MAJOR COLLECTOR

DRAWN BY:	DATE:	SCALE:	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
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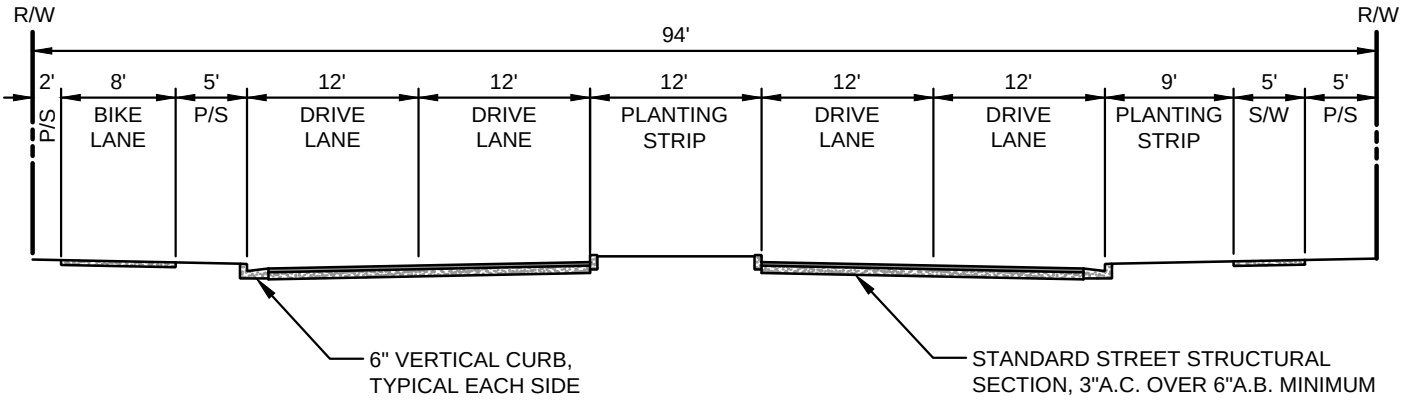
REVISIONS: NONE	SECTION: STREETS	DRAWING NAME: 304.DWG		



94' R.O.W. - Patterson Road East of Claus

LEGEND:

P/S	PARKING STRIP
R	RADIUS
R/W	RIGHT OF WAY
S/W	SIDEWALK

NOTES:

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CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

William F. Kull
CITY ENGINEER - WILLIAM F. KULL

STREET SECTION
94' R.O.W. - PATTERSON RD EAST OF CLAUS

DRAWN BY:	DATE:	SCALE:	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
GK	7/21/15	NTS	3-10-15	305
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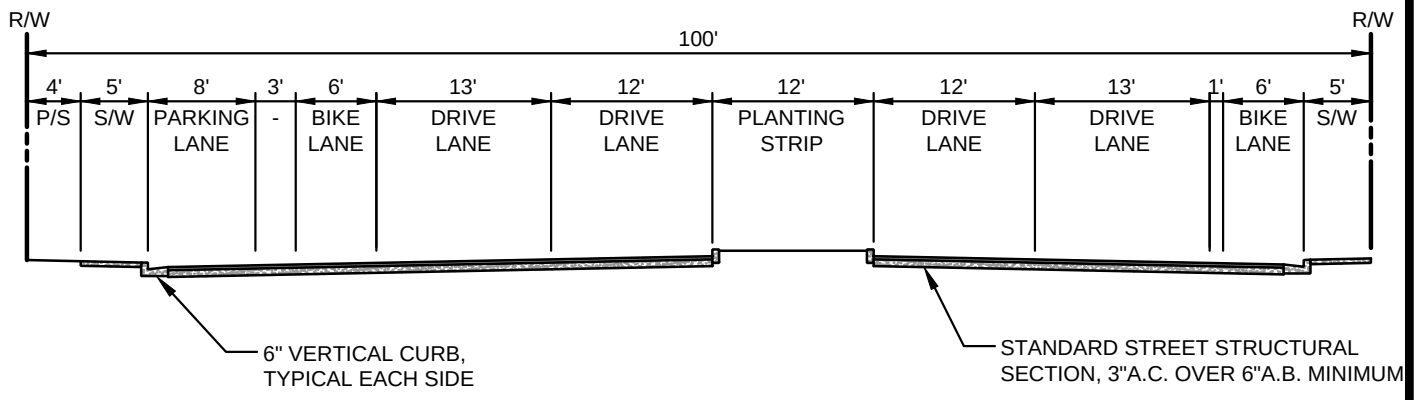

100' R.O.W. - Claus Road North of California

LEGEND:

P/S	PARKING STRIP
R/W	RIGHT OF WAY
S/W	SIDEWALK

NOTES:

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CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

William F. Kull
CITY ENGINEER - WILLIAM F. KULL

STREET SECTION
100' R.O.W. - CLAUS ROAD NORTH OF CALIFORNIA

DRAWN BY:	DATE:	SCALE:	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
GK	7/21/15	NTS	3-10-15	306
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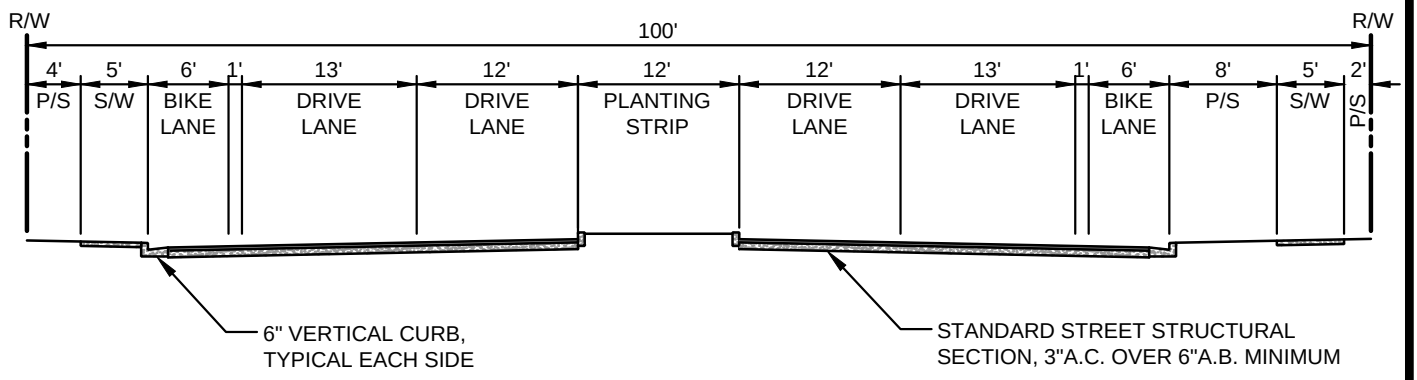


100' R.O.W. - Claus Road South of California

LEGEND:

P/S	PARKING STRIP
R/W	RIGHT OF WAY
S/W	SIDEWALK

NOTES:

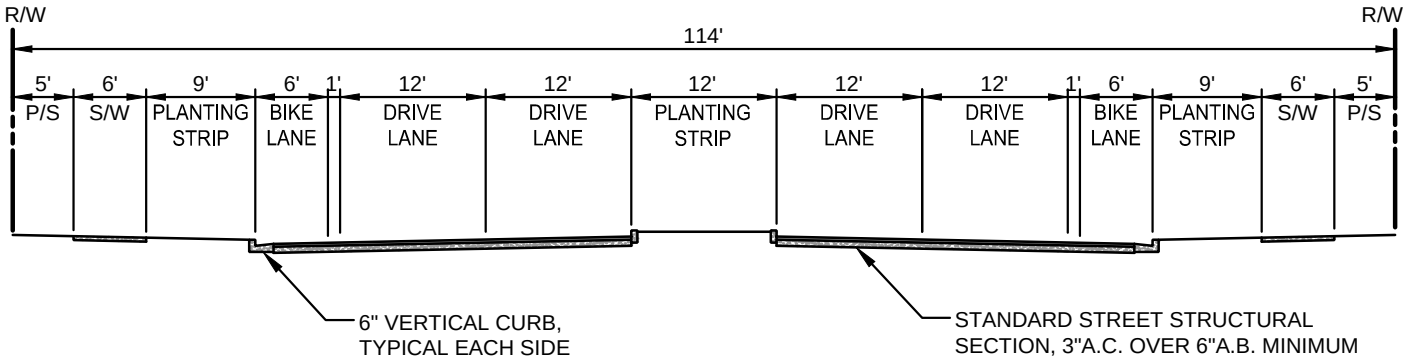
1. FINISHED PAVING SHALL BE 3/8" HIGHER THAN LIP OF GUTTER EXCEPT WHERE PEDESTRIAN CROSSINGS ARE LOCATED, LIP WILL BE FLUSH.
2. PART WIDTH STREETS, DEAD END STREETS AND ALL PAVEMENT TRANSITIONS SHALL REQUIRE 2"x6" REDWOOD OR PRESSURE TREATED HEADERBOARD.

CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

William F. Kull
CITY ENGINEER - WILLIAM F. KULL

STREET SECTION
100' R.O.W. - CLAUS ROAD SOUTH OF CALIFORNIA

DRAWN BY:	DATE:	SCALE:	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
GK	7/21/15	NTS	3-10-15	307
REVISIONS: NONE	SECTION: STREETS	DRAWING NAME: 307.DWG		



114' R.O.W. - Typical Major Collector

LEGEND:

P/S	PARKING STRIP
R/W	RIGHT OF WAY
S/W	SIDEWALK

NOTES:

1. FINISHED PAVING SHALL BE 3/8" HIGHER THAN LIP OF GUTTER EXCEPT WHERE PEDESTRIAN CROSSINGS ARE LOCATED, LIP WILL BE FLUSH.
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CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

William F. Kull
CITY ENGINEER - WILLIAM F. KULL

STREET SECTION
114' R.O.W. - TYPICAL MAJOR COLLECTOR

DRAWN BY:	DATE:	SCALE:	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
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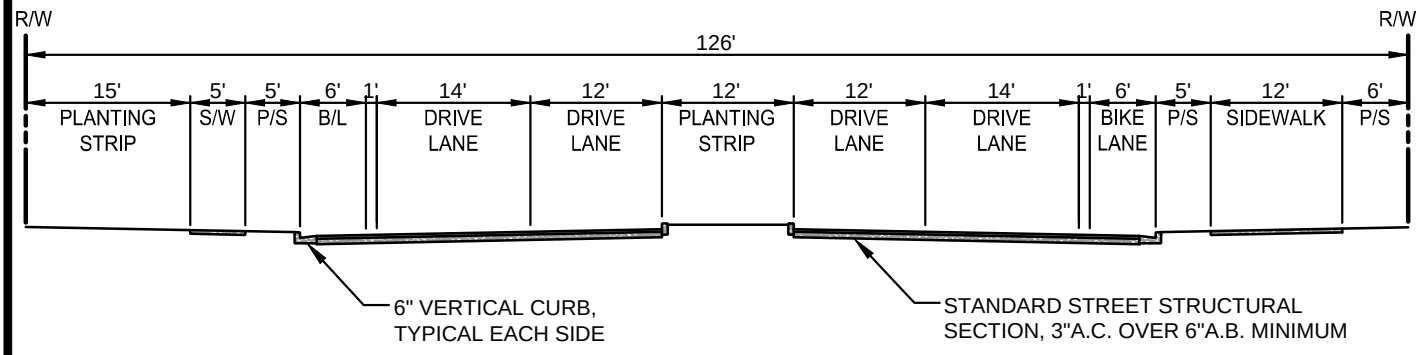


126' R.O.W. - Oakdale Rd South of Crawford Rd

LEGEND:

P/S	PARKING STRIP
R/W	RIGHT OF WAY
S/W	SIDEWALK

NOTES:

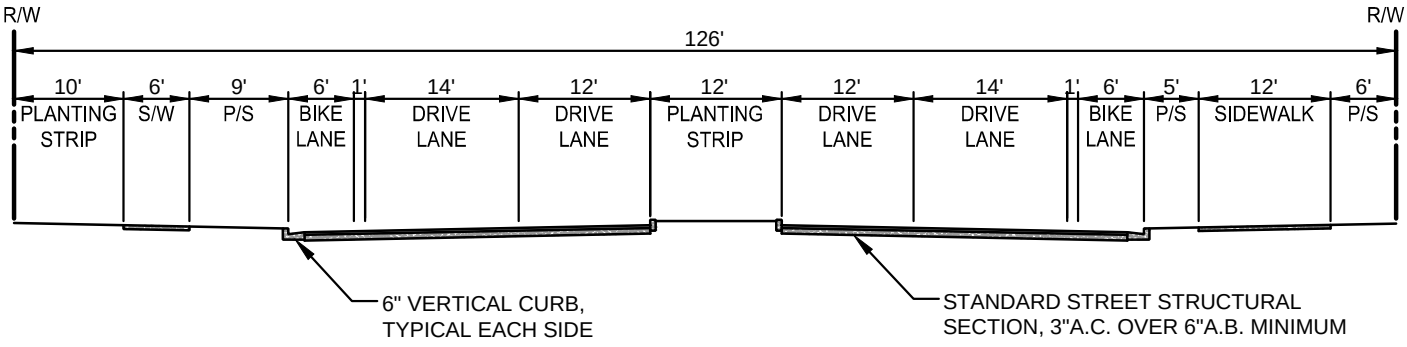
1. FINISHED PAVING SHALL BE 3/8" HIGHER THAN LIP OF GUTTER EXCEPT WHERE PEDESTRIAN CROSSINGS ARE LOCATED, LIP WILL BE FLUSH.
2. PART WIDTH STREETS, DEAD END STREETS AND ALL PAVEMENT TRANSITIONS SHALL REQUIRE 2"x6" REDWOOD OR PRESSURE TREATED HEADERBOARD.

CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

William F. Kull
CITY ENGINEER - WILLIAM F. KULL

STREET SECTION
126' R.O.W. - OAKDALE ROAD
SOUTH OF CRAWFORD ROAD

DRAWN BY:	DATE:	SCALE:	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
GK	7/21/15	NTS	3-10-15	309
REVISIONS: NONE	SECTION: STREETS	DRAWING NAME: 309.DWG		



126' R.O.W. - Oakdale Rd South of Morrill Rd

NOTES:

1. FINISHED PAVING SHALL BE 3/8" HIGHER THAN LIP OF GUTTER EXCEPT WHERE PEDESTRIAN CROSSINGS ARE LOCATED, LIP WILL BE FLUSH.
2. PART WIDTH STREETS, DEAD END STREETS AND ALL PAVEMENT TRANSITIONS SHALL REQUIRE 2"x6" REDWOOD OR PRESSURE TREATED HEADERBOARD.

LEGEND:

P/S	PARKING STRIP
R/W	RIGHT OF WAY
S/W	SIDEWALK

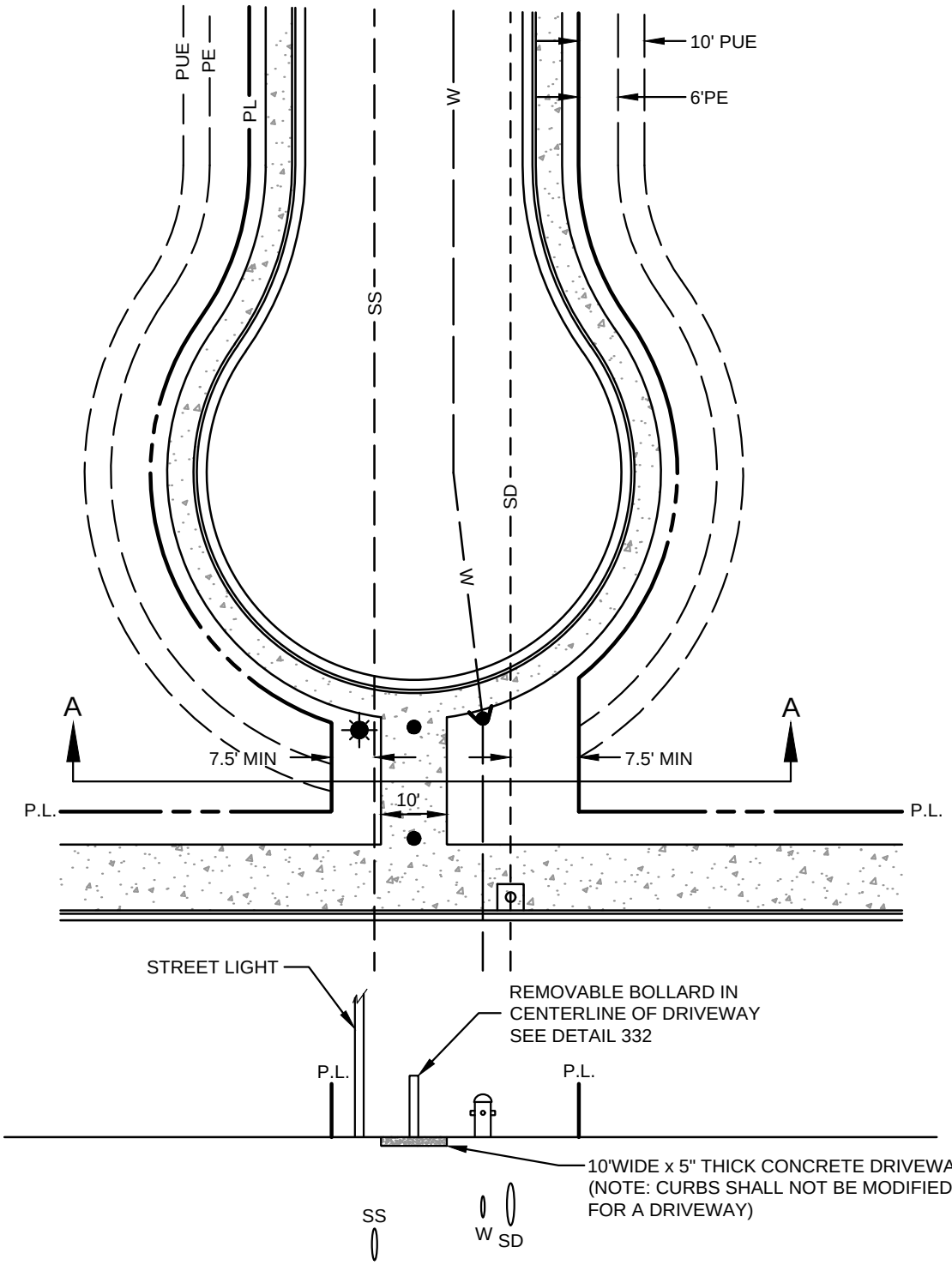
CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

William F. Kull

CITY ENGINEER - WILLIAM F. KULL

STREET SECTION
126' R.O.W. - OAKDALE ROAD
SOUTH OF MORRILL ROAD

DRAWN BY:	DATE:	SCALE:	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
GK	7/21/15	NTS	3-10-15	310
REVISIONS: NONE	SECTION: STREETS	DRAWING NAME: 310.DWG		



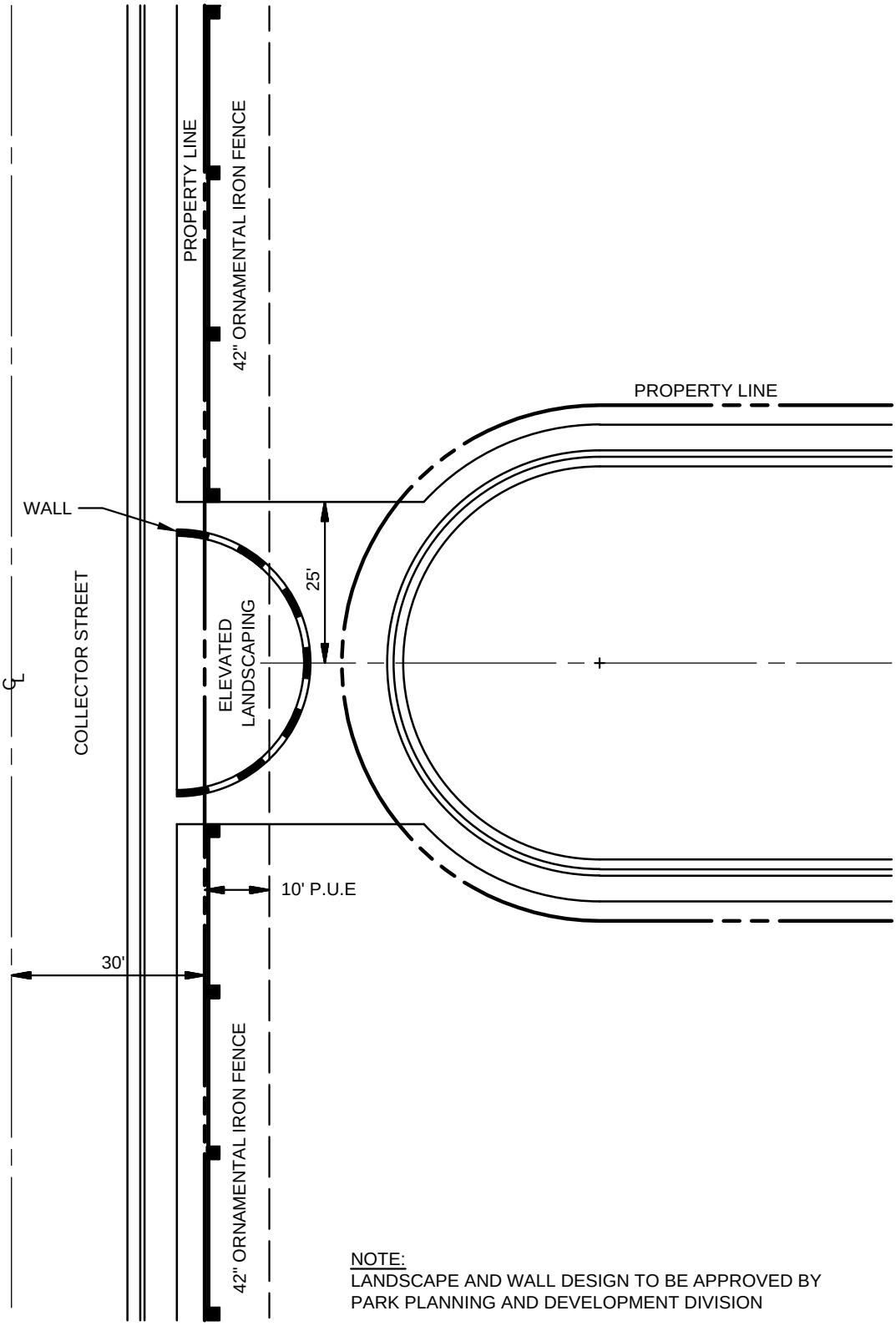
SECTION A-A
TYPICAL UTILITY SECTION

CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

William F. Kull
CITY ENGINEER - WILLIAM F. KULL

WALK THRU
CUL-DE-SAC SECTION

DRAWN BY:	DATE:	SCALE:	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
GK	7/21/15	NTS	3-10-15	311
REVISIONS: NONE	SECTION: STREETS	DRAWING NAME: 311.DWG		



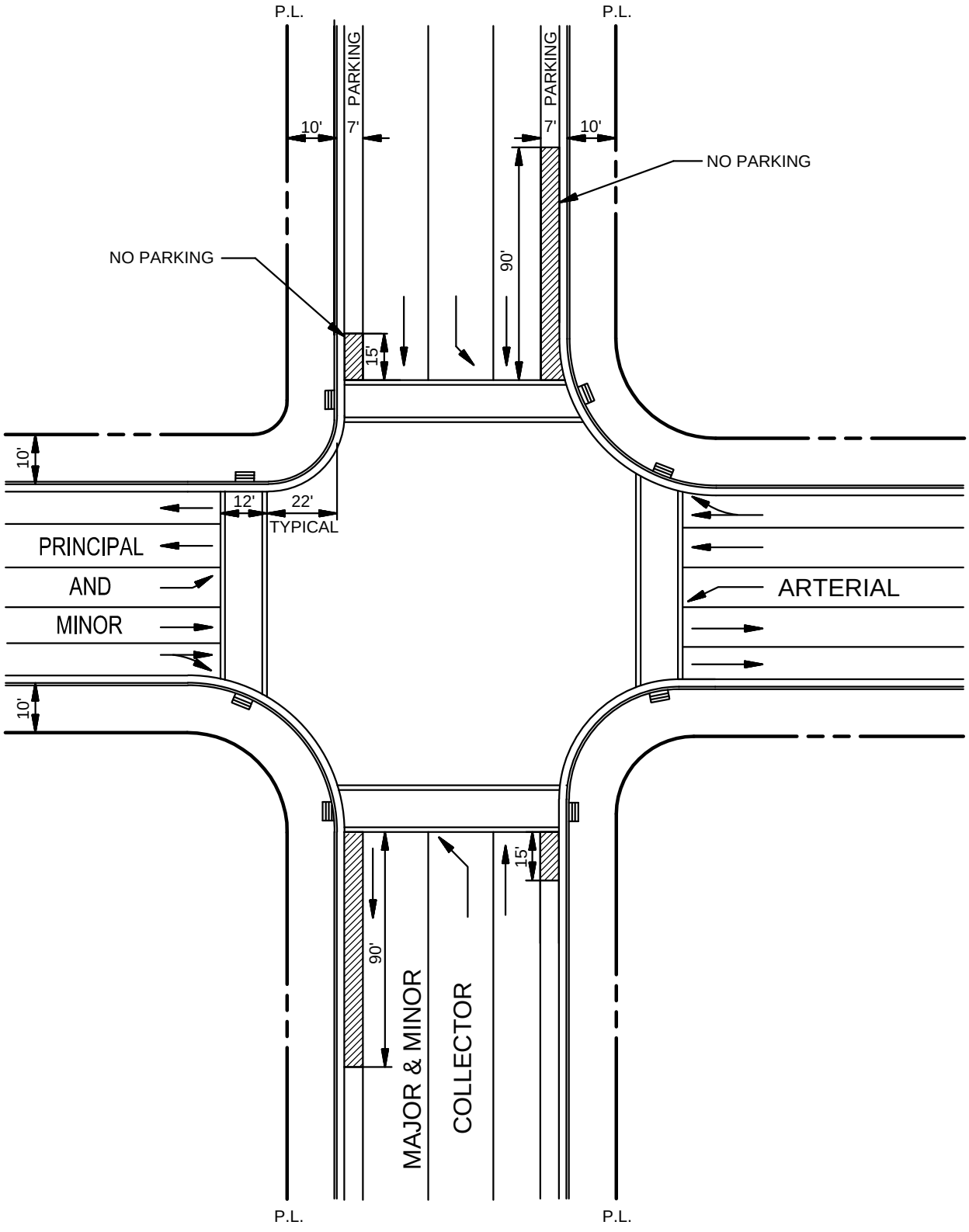
NOTE:
LANDSCAPE AND WALL DESIGN TO BE APPROVED BY PARK PLANNING AND DEVELOPMENT DIVISION

CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

OPEN-ENDED CUL-DE-SAC

William F. Kull
CITY ENGINEER - WILLIAM F. KULL

DRAWN BY:	DATE:	SCALE:	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
GK	7/21/15	NTS	3-10-15	312
REVISIONS: NONE	SECTION: STREETS	DRAWING NAME: 312.DWG		

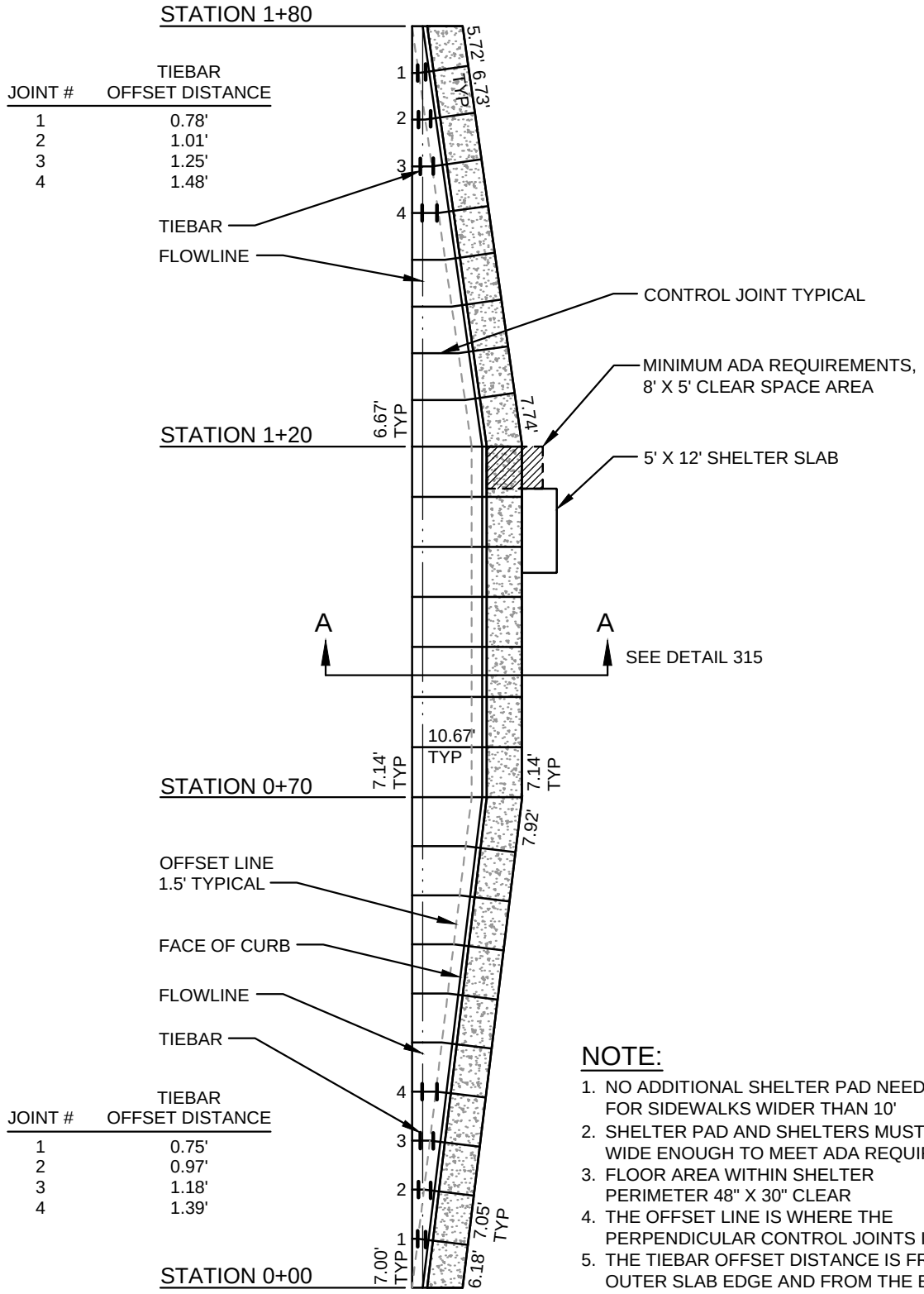


CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

William F. Kull
CITY ENGINEER - WILLIAM F. KULL

NO-PARKING AREA COLLECTOR / ARTERIAL INTERSECTON

DRAWN BY:	DATE:	SCALE:	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
GK	7/21/15	NTS	3-10-15	313
REVISIONS:	SECTION:	DRAWING NAME:		
NONE	STREETS	313.DWG		



NOTE:

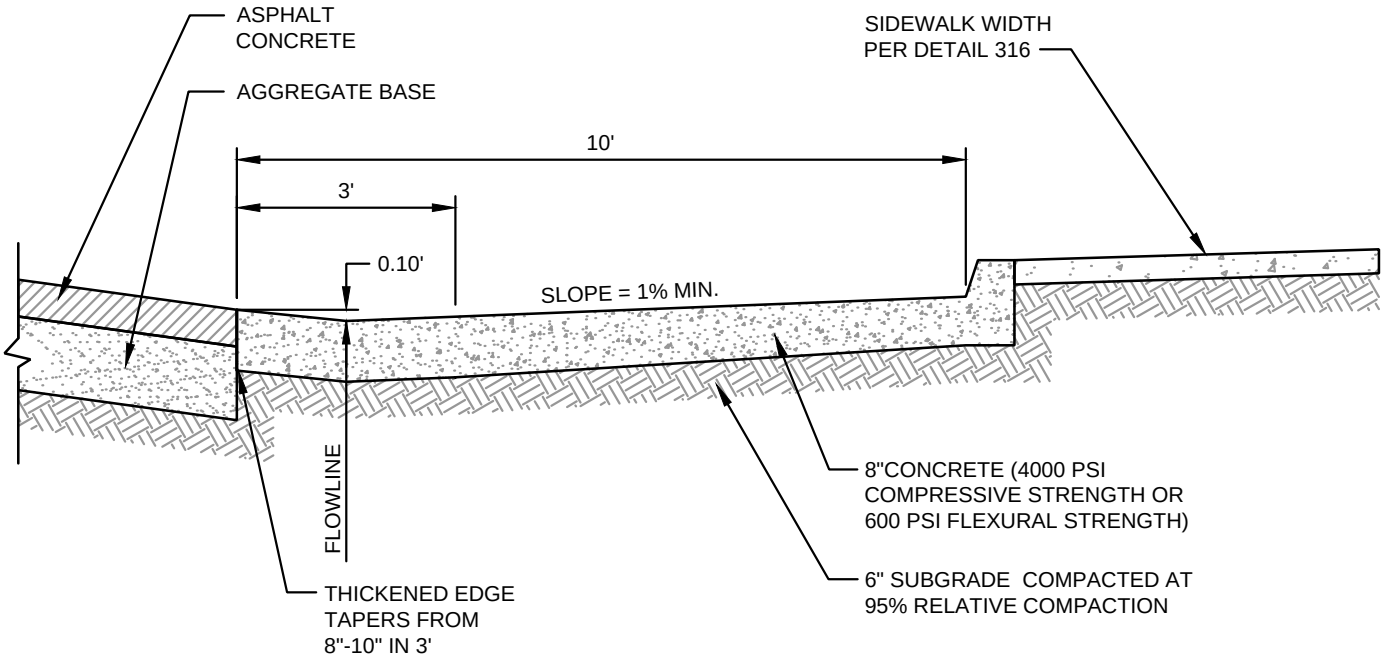
1. NO ADDITIONAL SHELTER PAD NEEDED FOR SIDEWALKS WIDER THAN 10'
2. SHELTER PAD AND SHELTERS MUST BE WIDE ENOUGH TO MEET ADA REQUIREMENTS
3. FLOOR AREA WITHIN SHELTER PERIMETER 48" X 30" CLEAR
4. THE OFFSET LINE IS WHERE THE PERPENDICULAR CONTROL JOINTS INTERSECT
5. THE TIEBAR OFFSET DISTANCE IS FROM THE OUTER SLAB EDGE AND FROM THE BACK OF CURB

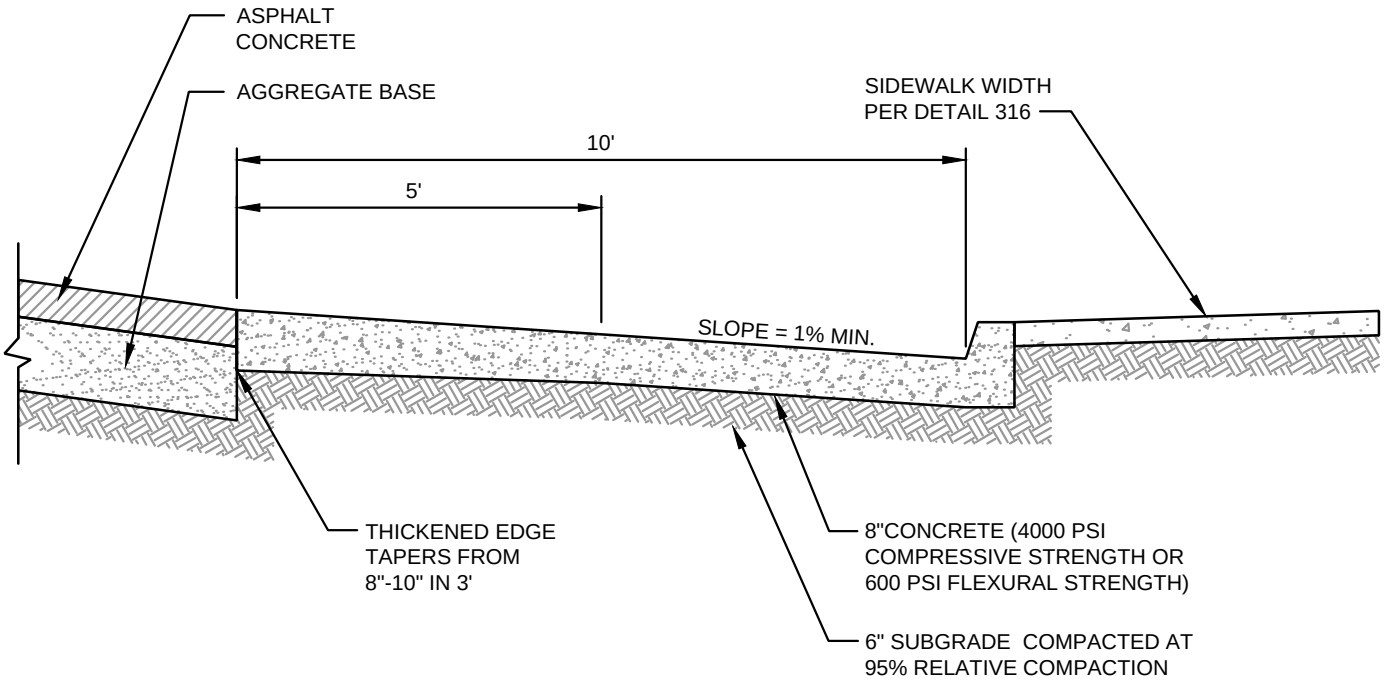
CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

William F. Kull
CITY ENGINEER - WILLIAM F. KULL

BUS TURNOUT

DRAWN BY:	DATE:	SCALE:	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
GK	7/21/15	NTS	3-10-15	314
REVISIONS: NONE	SECTION: STREETS	DRAWING NAME: 314.DWG		





SECTION A-A
TYPICAL BUS TURNOUTS

NOT TO SCALE

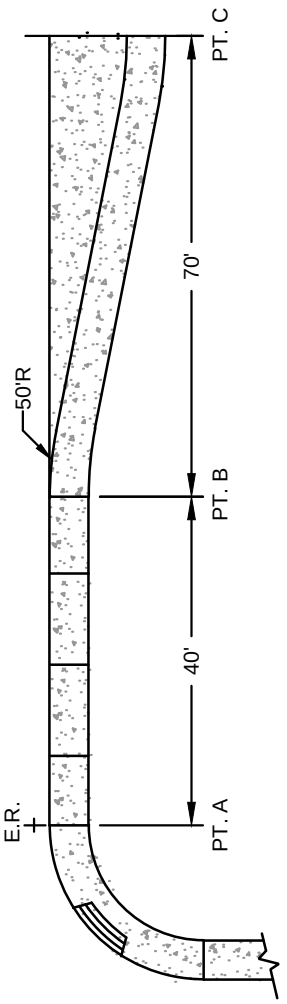
CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

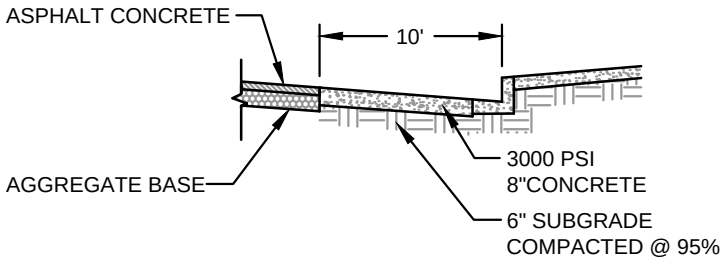
William F. Kull

CITY ENGINEER - WILLIAM F. KULL

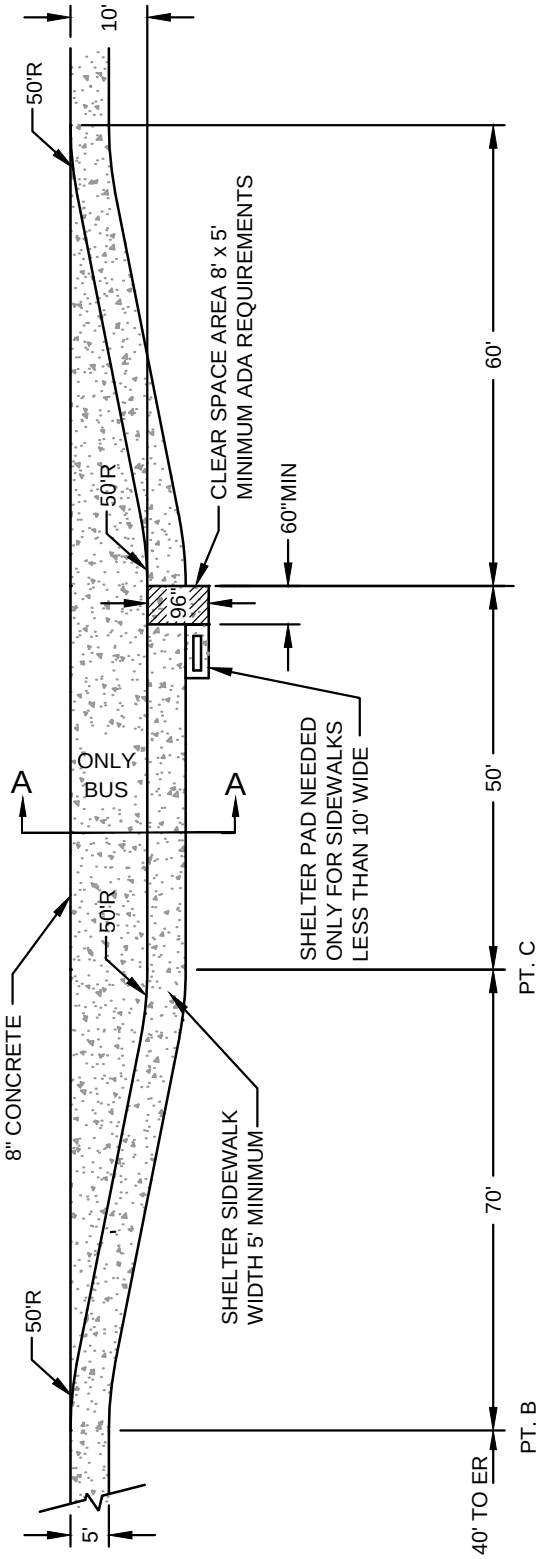
BUS TURNOUT

DRAWN BY:	DATE:	SCALE:	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
GK	7/21/15	NTS	3-10-15	315
REVISIONS: NONE	SECTION: STREETS	DRAWING NAME: 315.DWG		





SECTION A-A



NOTES:

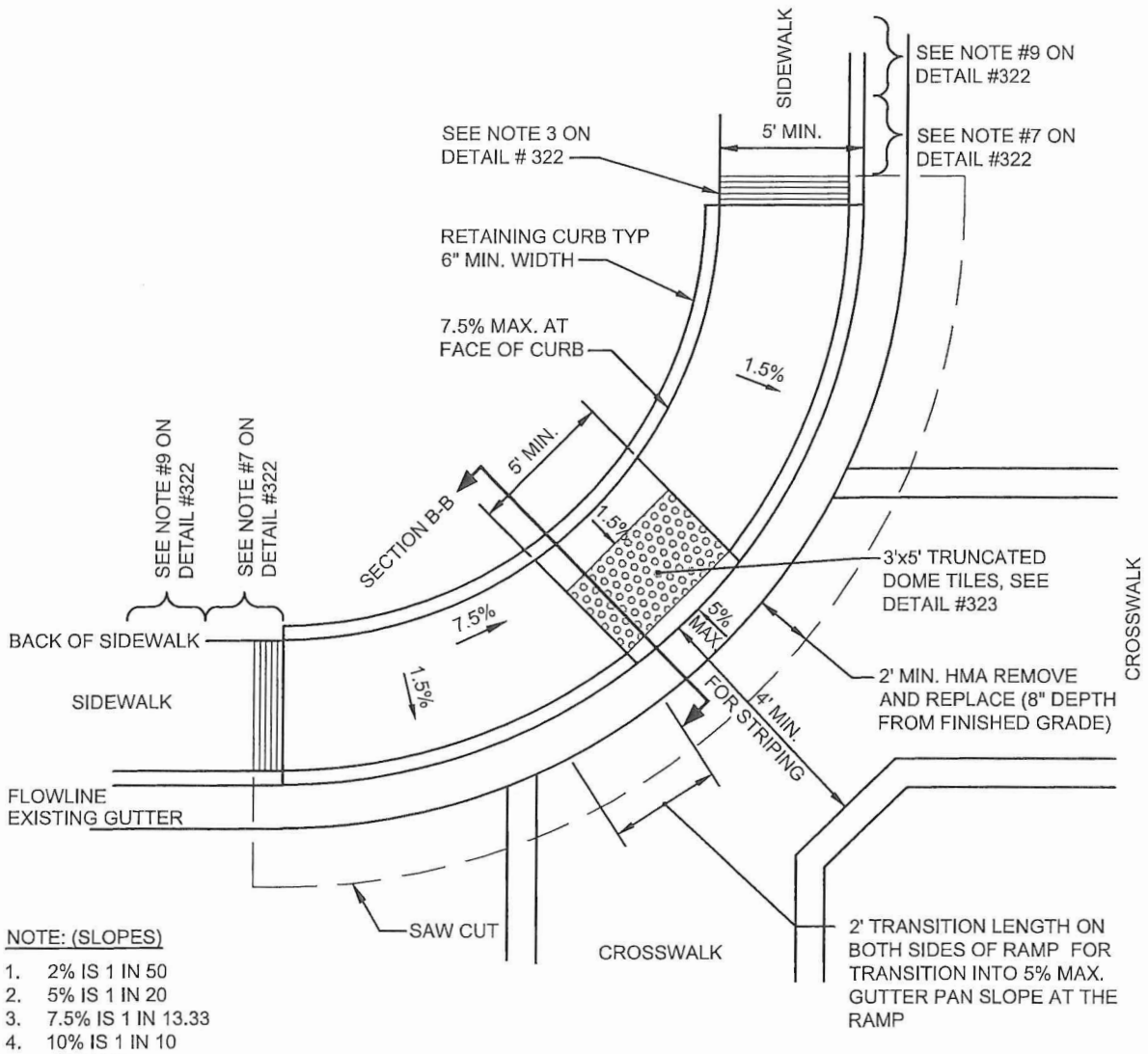
1. NO ADDITIONAL SHELTER PAD NEEDED FOR SIDEWALKS WIDER THAN 10'
2. SHELTER PAD AND SHELTERS MUST BE WIDE ENOUGH TO MEET ADA REQUIREMENTS, 48"x30" CLEAR FLOOR AREA WITHIN SHELTER PERIMETER.

CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

FARSIDE BUS TURNOUT

William F. Kull
CITY ENGINEER - WILLIAM F. KULL

DRAWN BY:	DATE:	SCALE:	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
GK	7/21/15	NTS	3-10-15	316
REVISIONS: NONE	SECTION: STREETS	DRAWING NAME: 316.DWG		



NOTE: (SLOPES)

1. 2% IS 1 IN 50
2. 5% IS 1 IN 20
3. 7.5% IS 1 IN 13.33
4. 10% IS 1 IN 10
5. 2% MAX SLOPE @ LANDING AND TURNING SPACE.
6. A.C. FLUSH WITH LIP OF GUTTER AT PEDESTRIAN ACCESS.

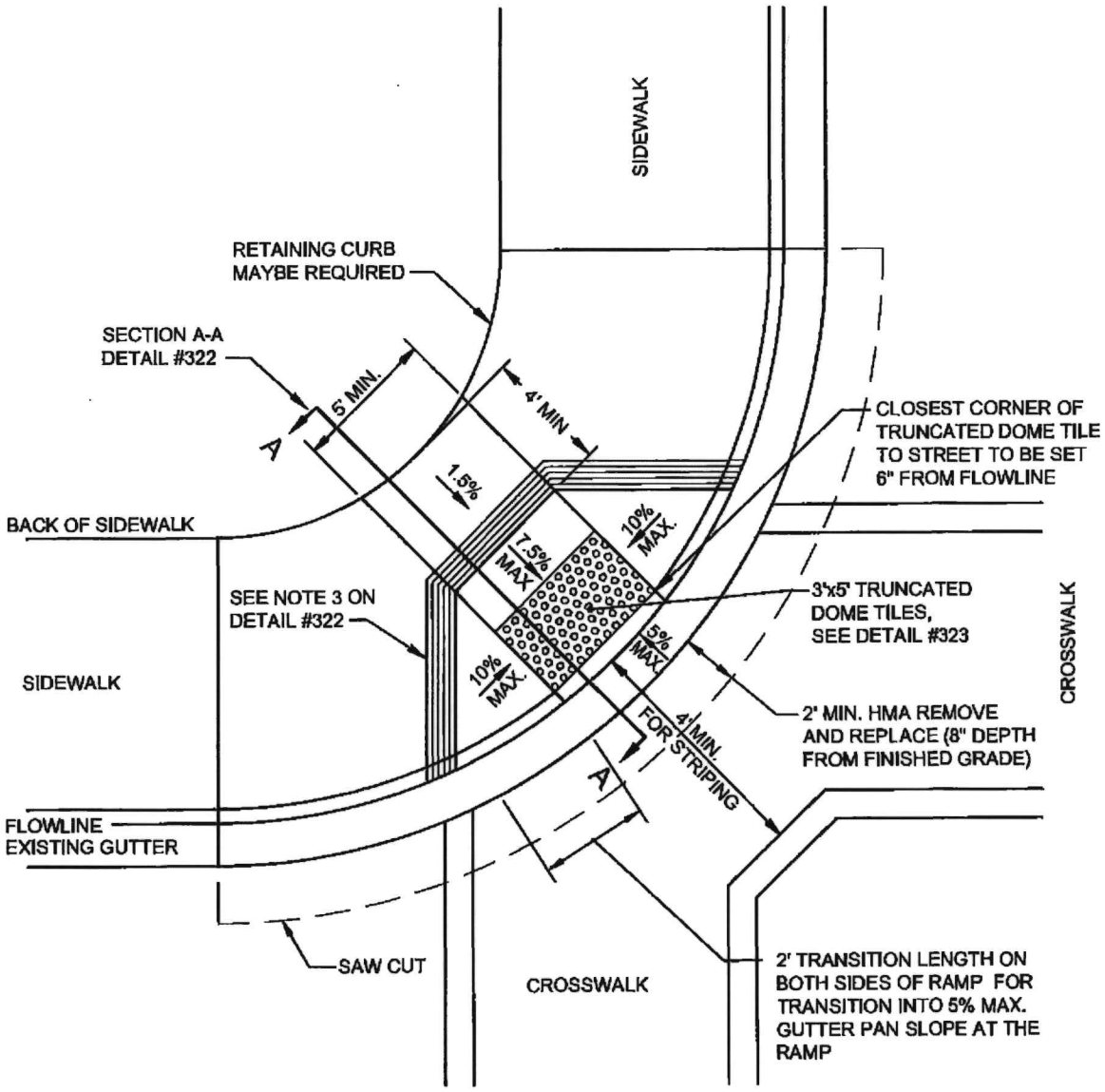
CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

William F. Kull

CITY ENGINEER - WILLIAM F. KULL

CURB RAMP
CASE A

DRAWN BY:	DATE:	SCALE:	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
GK	7/21/15	NTS	3-10-15	317
REVISIONS: NONE	SECTION: STREETS	DRAWING NAME: 317.DWG		



NOTE: (SLOPES)

1. 2% IS 1 IN 50
2. 5% IS 1 IN 20
3. 7.5% IS 1 IN 13.33
4. 10% IS 1 IN 10
5. A.C. FLUSH WITH LIP OF GUTTER AT PEDESTRIAN ACCESS

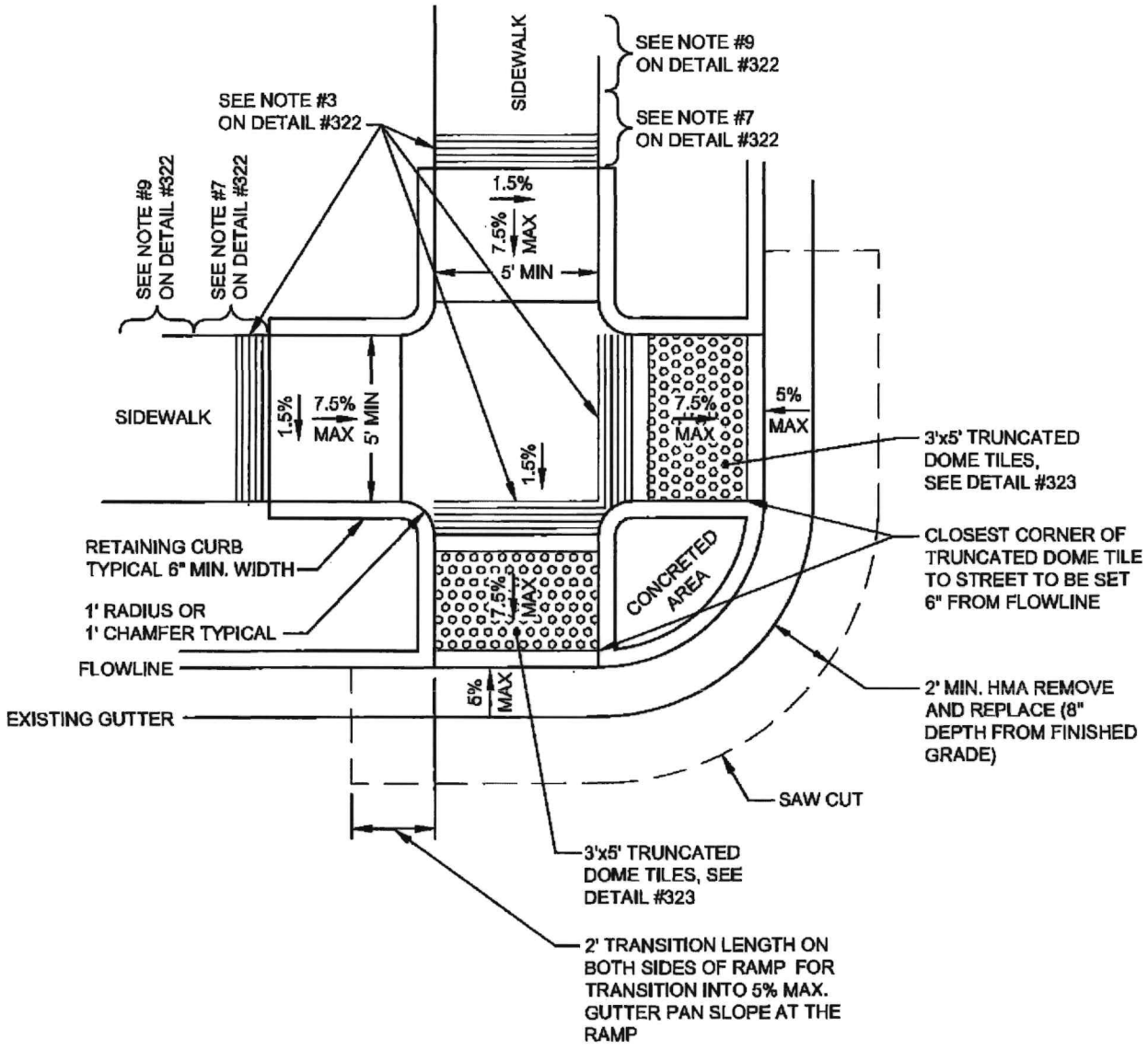
CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

William F. Kull

CITY ENGINEER - WILLIAM F. KULL

CURB RAMP
CASE B

DRAWN BY:	DATE:	SCALE:	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
GK	7/21/15	NTS	3-10-15	318
REVISIONS:	SECTION:	DRAWING NAME:		
NONE	STREETS	318.DWG		



NOTE: (SLOPES)

1. 2% IS 1 IN 50
2. 5% IS 1 IN 20
3. 7.5% IS 1 IN 13.33
4. 10% IS 1 IN 10
5. 2% CROSS SLOPE @ GUTTERPAN
6. A.C. FLUSH WITH LIP OF GUTTER AT PEDESTRIAN ACCESS

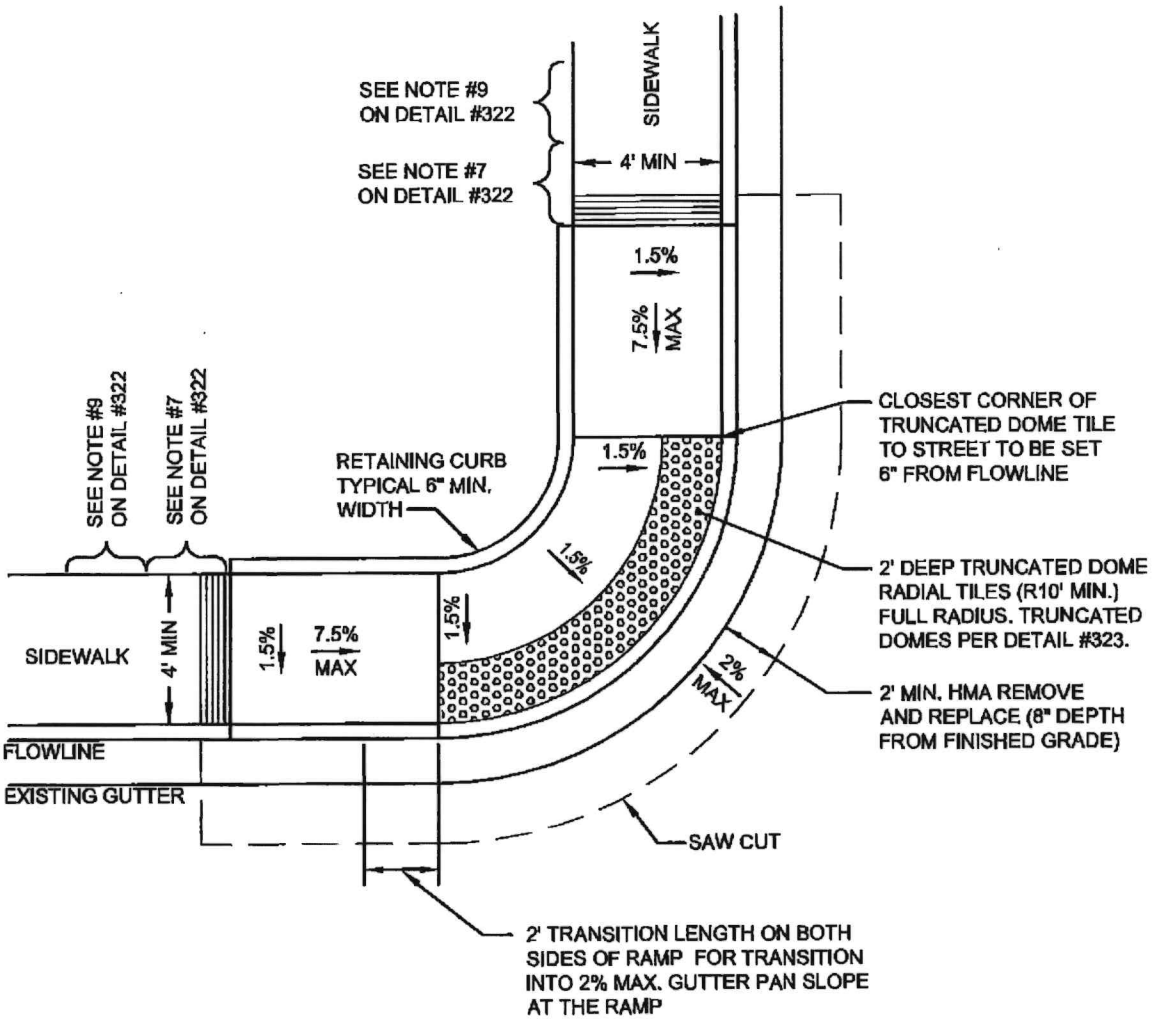
CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

William F. Kull

CITY ENGINEER - WILLIAM F. KULL

CURB RAMP
CASE C

DRAWN BY:	DATE:	SCALE:	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
GK	7/21/15	NTS	3-10-15	319
REVISIONS: NONE	SECTION: STREETS	DRAWING NAME: 319.DWG		



NOTE: (SLOPES)

1. 2% IS 1 IN 50
2. 5% IS 1 IN 20
3. 7.5% IS 1 IN 13.33
4. 10% IS 1 IN 10
5. 2% MAX CROSS SLOPE @ GUTTER PAN.
6. A.C. FLUSH WITH LIP OF GUTTER AT PEDESTRIAN ACCESS

NOTE:

THIS RAMP IS FOR LOCATIONS WITH RIGHT-OF-WAY ISSUES AND RADIUS LARGER THAN 10'.

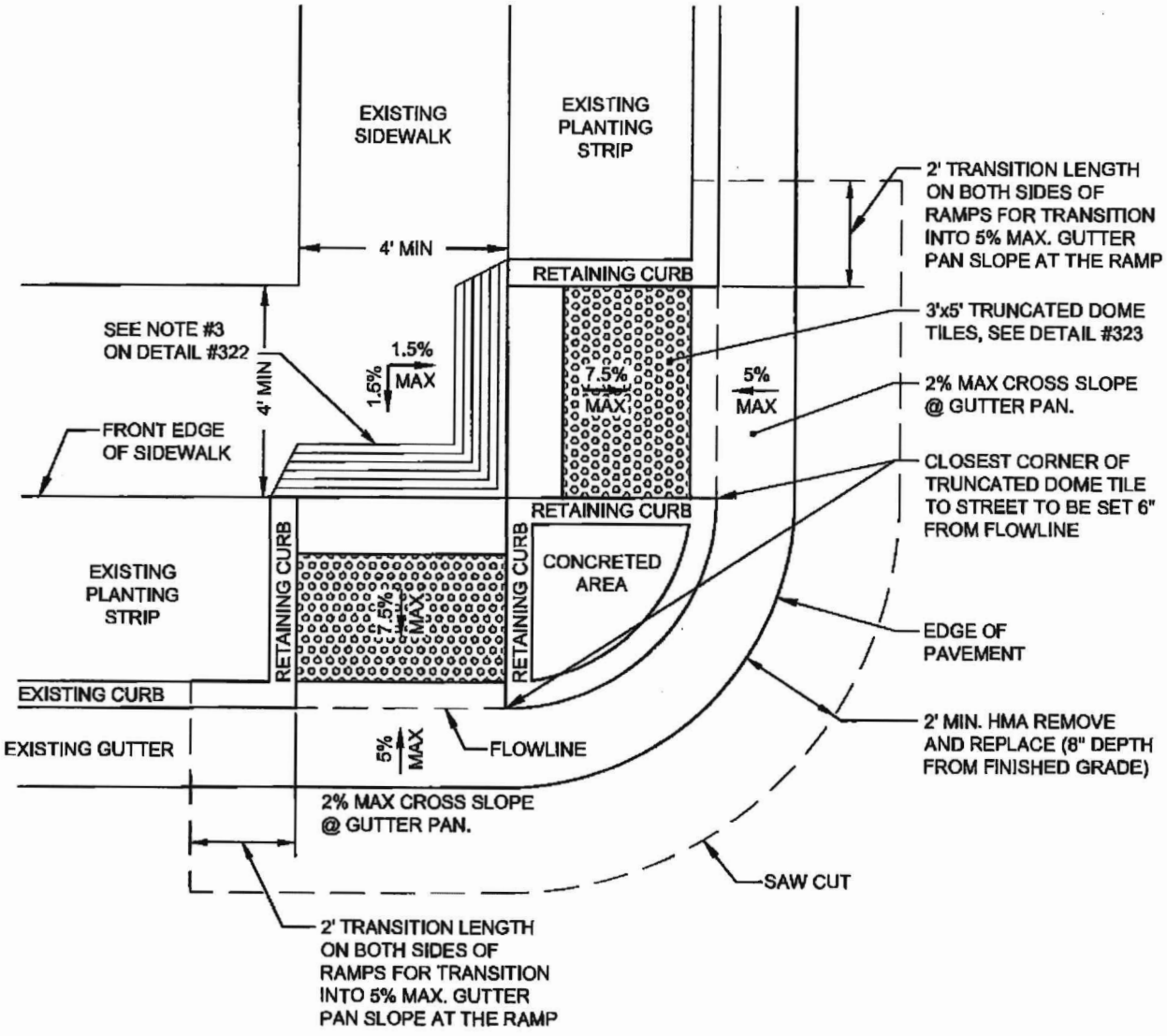
CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

William F. Kull

CITY ENGINEER - WILLIAM F. KULL

CURB RAMP
CASE D

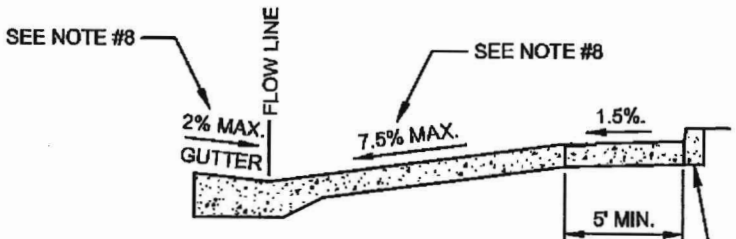
DRAWN BY:	DATE:	SCALE:	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
GK	7/21/15	NTS	3-10-15	320
REVISIONS: NONE	SECTION: STREETS	DRAWING NAME: 320.DWG		



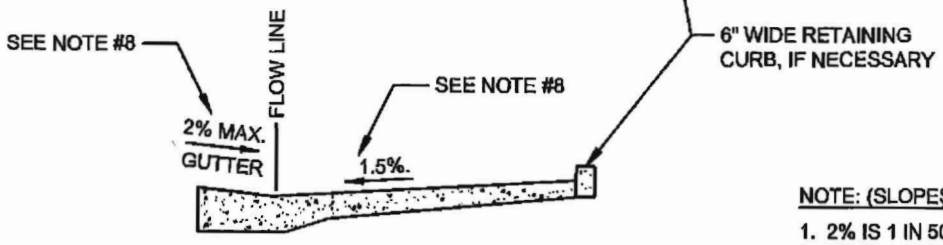
NOTE: (SLOPES)

1. 2% IS 1 IN 50
2. 5% IS 1 IN 20
3. 7.5% IS 1 IN 13.33
4. 10% IS 1 IN 10
5. A.C. FLUSH WITH LIP OF GUTTER AT PEDESTRIAN ACCESS.

CITY OF RIVERBANK DEPARTMENT OF PUBLIC WORKS			CURB RAMP CASE E	
William F. Kull CITY ENGINEER - WILLIAM F. KULL				
DRAWN BY: GK	DATE: 7/21/15	SCALE: NTS	ADOPTED BY THE CITY COUNCIL: 3-10-15	DRAWING NO. 321
REVISIONS: NONE	SECTION: STREETS	DRAWING NAME: 321.DWG		



SECTION A-A



SECTION B-B

NOTE: (SLOPES)

1. 2% IS 1 IN 50
2. 5% IS 1 IN 20
3. 7.5% IS 1 IN 13.33
4. 10% IS 1 IN 10

GROOVING DETAIL

NOTES:

1. THE LOWER END OF EACH RAMP SHALL BE FLUSH WITH GUTTER.
2. WHEN THE RAMP IS LOCATED IN THE CENTER OF THE CURB RETURN, CROSS WALK CONFIGURATION MUST BE SIMILAR TO THAT SHOWN ON THE PLAN TO ACCOMMODATE WHEELCHAIRS.
3. THE RAMP SHALL HAVE A 12" WIDE BORDER WITH 1/4" GROOVES APPROXIMATELY 3/4" O.C. (SEE GROOVING DETAIL) AT LOCATIONS INDICATED ON THE PLANS. THE SURFACE OF THE RAMP SHALL HAVE A TRANSVERSE BROOMED SURFACE TEXTURE ROUGHER THAN THE SURROUNDING SIDEWALK EXCEPT WHEN LOCATED IN THE CENTER OF CURB RETURN.
4. THE RAMPS SHALL HAVE TRUNCATED DOME TILES AS DETECTABLE WARNINGS AT THE END OF THE RUNNING SLOPE OF THE RAMP, AS INDICATED IN THE PLANS AND SPECIFICATIONS.
5. ALL CURB RAMPS SHALL BE 4" THICK CONCRETE.
6. 5% MAX. GUTTER PAN SLOPE, 2% MIN.
7. CONTRACTOR TO PROVIDE A LEVEL LANDING (4' LONG MIN. BY WIDTH OF SIDEWALK AT THE TOP OF THE RAMP WHICH SHALL BE AS WIDE AS THE RAMP WITH SLOPES AT 2% MAXIMUM, BOTH DIRECTIONS IF SIDEWALK CROSS SLOPE IS MORE THAN 2%
8. THE GRADE BREAK BETWEEN THE COUNTER SLOPES OF GUTTER AND/OR ROAD SURFACES WITHIN 24 INCHES OF THE CURB RAMP AND THE RUNNING GRADE OF THE CURB RAMP SHALL NOT EXCEED THE ALGEBRAIC DIFFERENCE OF 11 PERCENT. IF TWO OR MORE PLANE CHANGES ARE PRESENT, THEY SHALL BE SEPARATED BY 24 INCHES (2% MAX)
9. 4' LONG TRANSITION BY WIDTH OF SIDEWALK IS REQUIRED IF EXISTING SIDEWALK CROSS SLOPE IS MORE THAN 2%.
10. TRAFFIC SIGNAL PEDESTRIAN PUSH BUTTONS SHALL BE 40" MAX. VERTICAL FROM CLEAR 2% MAX. LANDING AREA, 6" MAX. HORIZONTAL FROM FRONT OF CURB ADJACENT TO LANDING AND 32" MIN. AWAY FROM EDGE OF CURB RETURN.

CITY OF RIVERBANK DEPARTMENT OF PUBLIC WORKS			CURB RAMP NOTES & DETAILS	
William F. Kull CITY ENGINEER - WILLIAM F. KULL				
DRAWN BY: GK	DATE: 7/21/15	SCALE: NTS	ADOPTED BY THE CITY COUNCIL: 3-10-15	DRAWING NO. 322
REVISIONS: NONE	SECTION: STREETS	DRAWING NAME: 322.DWG		

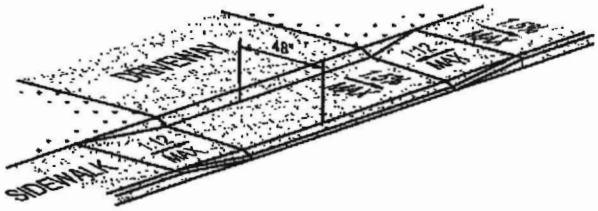
CALIFORNIA DEPARTMENT OF TRANSPORTATION DETECTABLE WARNING SURFACE AUTHORIZED MATERIAL LIST

THE FOLLOWING PRODUCTS HAVE BEEN FOUND ACCEPTABLE FOR USE ON STATE HIGHWAY CONTRACTS:

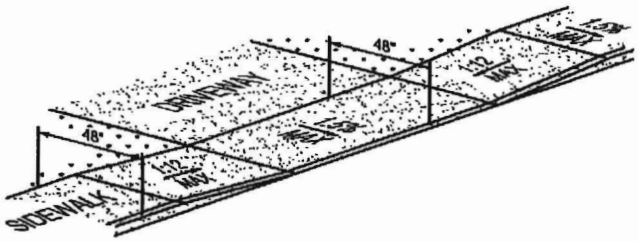
THREE D TRAFFIC WORKS 430 N. VARNEY STREET BURBANK, CA 91502 MR. SCOTT BEHM (877) 843-9757 www.trafficworks.com	DWT TOUGH-EZ TILE (PRESSURE SENSITIVE ADHESIVE)
ACCESS PRODUCTS, INC. 241 MAIN STREET, SUITE 100 BUFFALO, NY 14203 MS SHERRY MORRISON (630) 881-9320 www.accesstile.com	1. ACCESS TILE-CAST IN PLACE REPLACEABLE 2. ACCESS TILE-SURFACE APPLIED
CAPE FEAR SYSTEMS, III LLC. 215 SOUTH WATER STREET, SUITE 103 WILMINGTON, NC 2840 MR. ALEX MUNROE (877) 232-6287 www.AlertTile.com	ALERTCAST
ARMORCAST PRODUCTS COMPANY 13230 SATICOY STREET NORTH HOLLYWOOD, CA 91605 MR. ARI S. ALEONG (818) 982-3600 www.armorcastprod.com	1. ARMORCAST CAST-IN-PLACE DETECTABLE WARNING PANELS (WETSET) 2. ARMORCAST SURFACE APPLIED DETECTABLE WARNING TILE (RETROFIT)
STRONGGO INDUSTRIES, LLC. 3296 E. HEMISPHERE LOOP TUCSON, AZ 95706 MR. NIRANJAN VESCIO (520) 547-3510 www.stronggo.com	TEKWAY DOME-TILES
ADA SOLUTIONS, INC. 10 ELIZABETH DRIVE, UNIT #5 CHELMSFORD, MA 01824 MR. JOSEPH R. DUNNIGAN (800) 372-0519 www.adatile.com	CAST-IN-PLACE-WET-SET-TACTILE
ENGINEERED PLASTICS INC. 1104 CORPORATE WAY SACRAMENTO, CA 95831 MR. GERARD ANGELES (916) 844-4132 www.armor-tile.com	ARMOR-TILE CAST-IN -PLACE DETECTABLE WARNING TILE

FOR ADDITIONAL INFORMATION, PLEASE SEND E-MAIL TO David.Cordova@dot.ca.gov

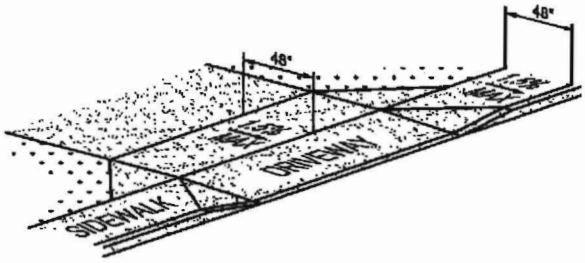
CITY OF RIVERBANK DEPARTMENT OF PUBLIC WORKS			CALIFORNIA D.O.T. DETECTABLE WARNING SURFACE AUTHORIZED MATERIAL LIST	
William F. Kull CITY ENGINEER - WILLIAM F. KULL				
DRAWN BY: GK	DATE: 7/21/15	SCALE: NTS	ADOPTED BY THE CITY COUNCIL: 3-10-15	DRAWING NO. 323
REVISIONS: NONE	SECTION: STREETS	DRAWING NAME: 323.DWG		



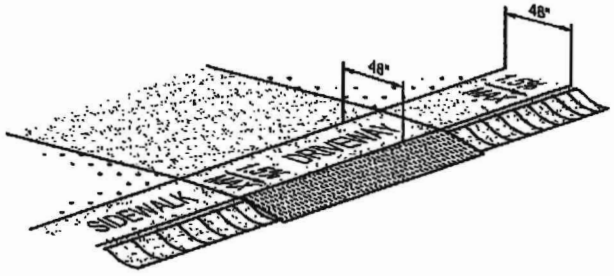
COMBINATION SIDEWALK



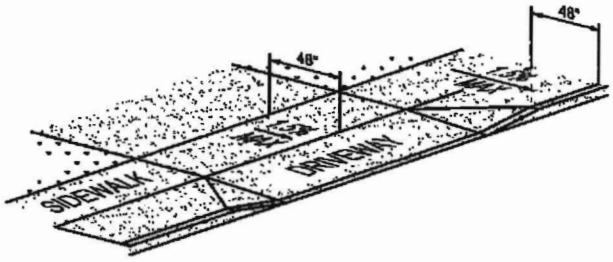
RAMP SIDEWALK



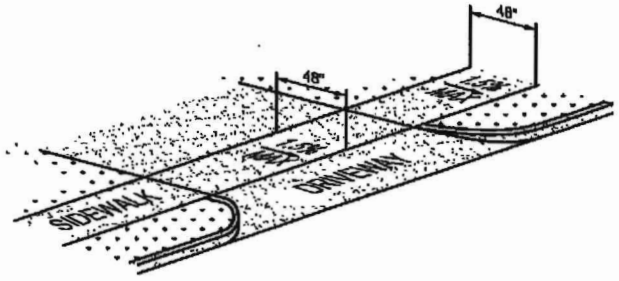
APRON OFFSET SIDEWALK



GUTTER BRIDGE PLATE

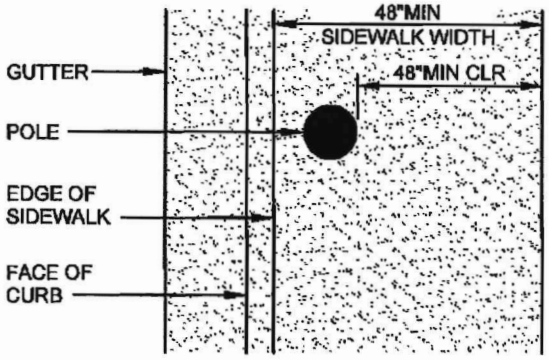


WIDE SIDEWALK



SETBACK SIDEWALK

SIDEWALK DRIVEWAY CONNECTIONS



SIDEWALK WIDTH

CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

William F. Kull

CITY ENGINEER - WILLIAM F. KULL

DRIVEWAY APPROACH

DRAWN BY:	DATE:	SCALE:	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
GK	7/21/15	NTS	3-10-15	324
REVISIONS: NONE	SECTION: STREETS	DRAWING NAME: 324.DWG		

CALIFORNIA DEPARTMENT OF TRANSPORTATION DETECTABLE WARNING SURFACE AUTHORIZED MATERIAL LIST

THE FOLLOWING PRODUCTS HAVE BEEN FOUND ACCEPTABLE FOR USE ON STATE HIGHWAY CONTRACTS:

THREE D TRAFFIC WORKS 430 N. VARNEY STREET BURBANK, CA 91502 MR. SCOTT BEHM (877) 843-9757 www.trafficworks.com	DWT TOUGH-EZ TILE (PRESSURE SENSITIVE ADHESIVE)
ACCESS PRODUCTS, INC. 241 MAIN STREET, SUITE 100 BUFFALO, NY 14203 MS SHERRY MORRISON (630) 881-9320 www.accesstile.com	1. ACCESS TILE-CAST IN PLACE REPLACEABLE 2. ACCESS TILE-SURFACE APPLIED
CAPE FEAR SYSTEMS, III LLC. 215 SOUTH WATER STREET, SUITE 103 WILMINGTON, NC 2840 MR. ALEX MUNROE (877) 232-6287 www.AlertTile.com	ALERTCAST
ARMORCAST PRODUCTS COMPANY 13230 SATICOY STREET NORTH HOLLYWOOD, CA 91605 MR. ARI S. ALEONG (818) 982-3600 www.armorcastprod.com	1. ARMORCAST CAST-IN-PLACE DETECTABLE WARNING PANELS (WETSET) 2. ARMORCAST SURFACE APPLIED DETECTABLE WARNING TILE (RETROFIT)
STRONGGO INDUSTRIES, LLC. 3296 E. HEMISPHERE LOOP TUCSON, AZ 95706 MR. NIRANJAN VESCIO (520) 547-3510 www.stronggo.com	TEKWAY DOME-TILES
ADA SOLUTIONS, INC. 10 ELIZABETH DRIVE, UNIT #5 CHELMSFORD, MA 01824 MR. JOSEPH R. DUNNIGAN (800) 372-0519 www.adatile.com	CAST-IN-PLACE-WET-SET-TACTILE
ENGINEERED PLASTICS INC. 1104 CORPORATE WAY SACRAMENTO, CA 95831 MR. GERARD ANGELES (916) 844-4132 www.armor-tile.com	ARMOR-TILE CAST-IN -PLACE DETECTABLE WARNING TILE

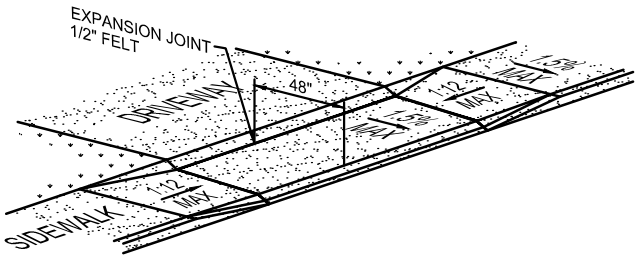
FOR ADDITIONAL INFORMATION, PLEASE SEND E-MAIL TO David.Cordova@dot.ca.gov

CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

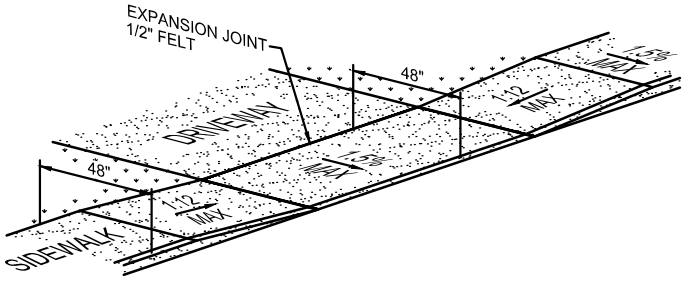
William F. Kull
CITY ENGINEER - WILLIAM F. KULL

CALIFORNIA D.O.T.
DETECTABLE WARNING SURFACE
AUTHORIZED MATERIAL LIST

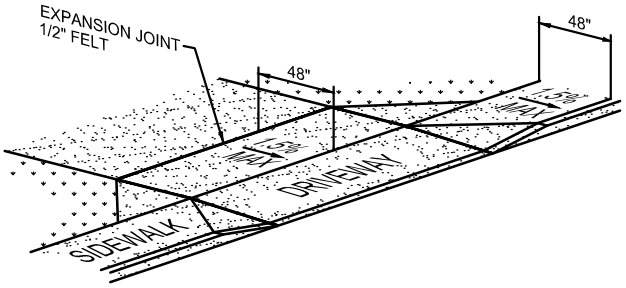
DRAWN BY:	DATE:	SCALE:	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
GK	7/21/15	NTS	3-10-15	325
REVISIONS: NONE	SECTION: STREETS	DRAWING NAME: 325.DWG		



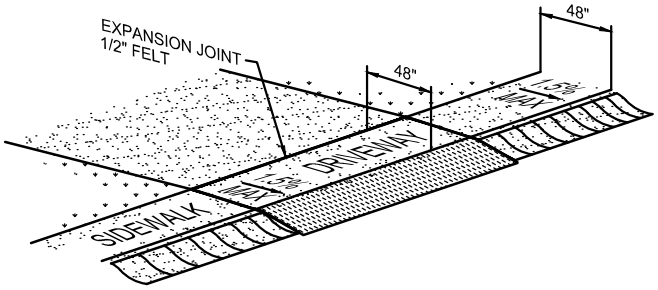
COMBINATION SIDEWALK



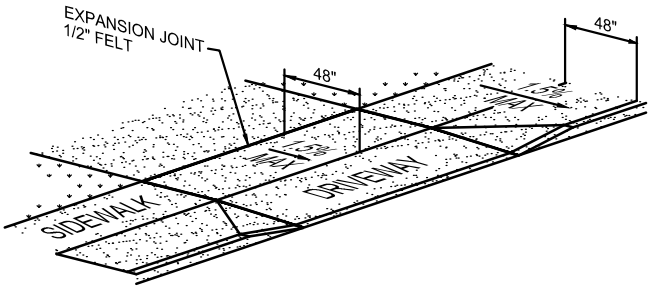
RAMP SIDEWALK



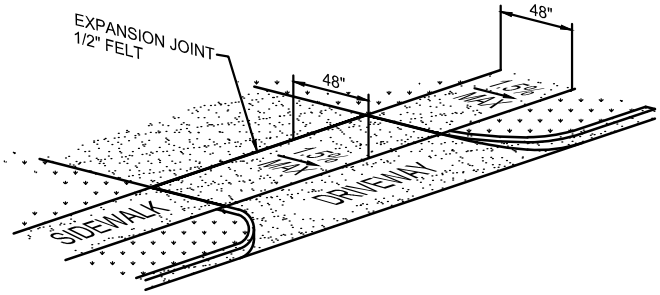
APRON OFFSET SIDEWALK



GUTTER BRIDGE PLATE

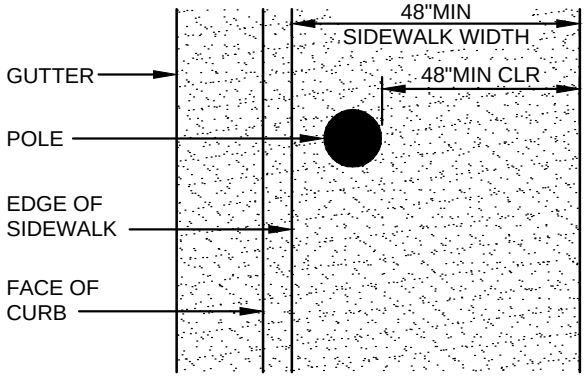


WIDE SIDEWALK



SETBACK SIDEWALK

SIDEWALK DRIVEWAY CONNECTIONS



SIDEWALK WIDTH

NOTES:

1. ALL SLOPES MUST BE IN A SINGLE PLANE
2. WEAKENED PLANE JOINTS AT ALL GRADE BREAKS
3. EXPANSION JOINTS AT RIGHT OF WAY WITH $\frac{1}{2}$" FELT
4. DRIVEWAYS SHALL BE PLACED A MINIMUM OF 10 FEET FROM CURB RETURNS.

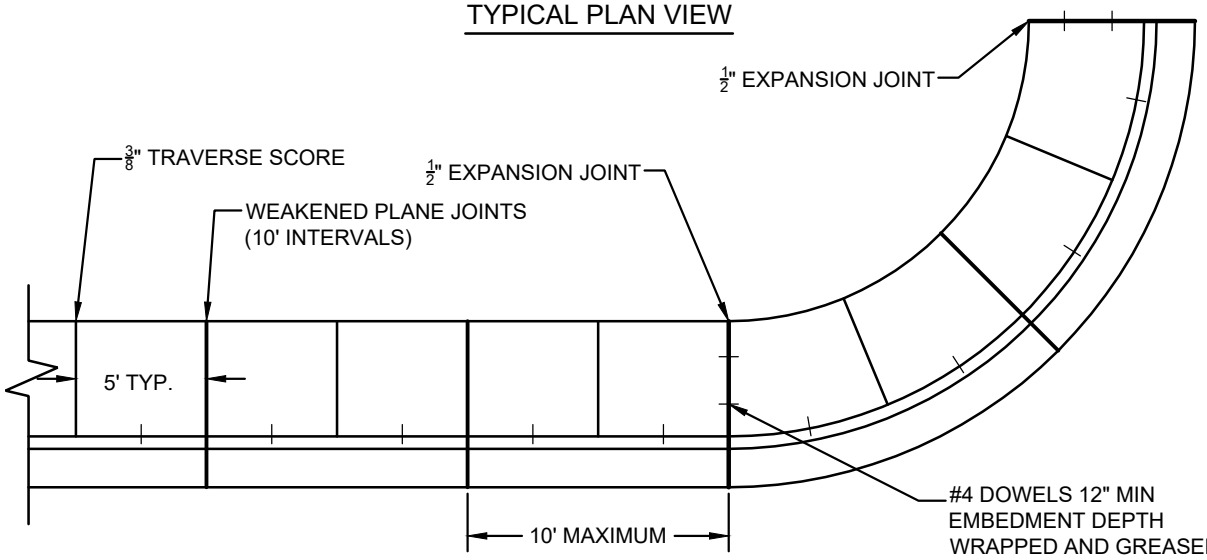
CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

DRIVEWAY APPROACH

William F. Kull
CITY ENGINEER - WILLIAM F. KULL

DRAWN BY:	DATE:	SCALE:	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
GK	12/6/17	NTS		326
REVISIONS: NONE	SECTION: STREETS	DRAWING NAME: 326.DWG		

TYPICAL PLAN VIEW



THICKNESS OF CONCRETE:

RESIDENTIAL DRIVEWAY ENTRANCE
6" MINIMUM

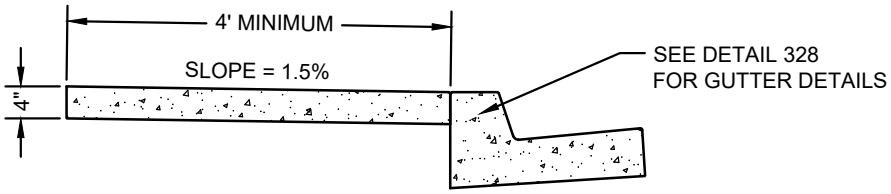
COMMERCIAL DRIVEWAY ENTRANCE
7-1/2" MINIMUM

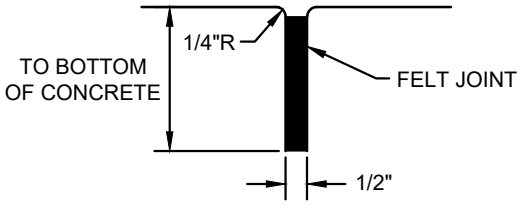
ALLEY ENTRANCE
6" MINIMUM

SIDEWALK PAST ALLEY RIGHT-OF-WAY
6" MINIMUM

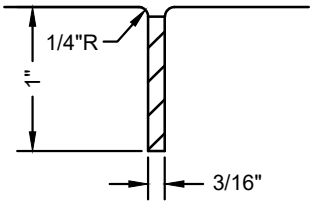
SCORING SHALL BE 5' LINEAR

TYPICAL PROFILE VIEW





EXPANSION JOINT



WEAKENED PLANE JOINT

NOTES:

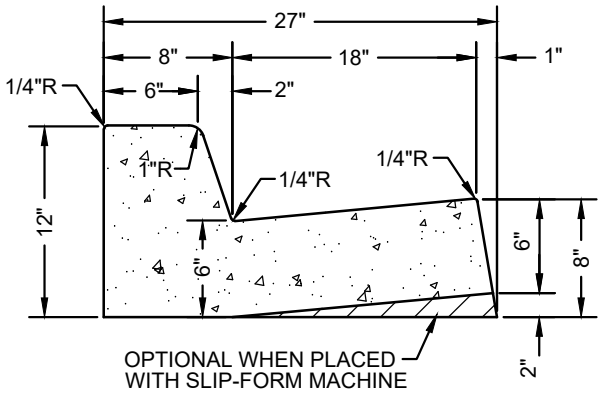
1. ALL CONCRETE SHALL BE CLASS "B".
2. SIDEWALK TO BE BROOM FINISHED.
3. NO COLORING ADDITIVES SHALL BE MIXED WITH CONCRETE.
4. QUICK JOINT OR FELT EXPANSION JOINTS MAY BE USED. FELT JOINTS SHALL BE AT 30' MAXIMUM INTERVALS, 15' MAXIMUM ON OTHERS.
5. PRIOR TO POURING OF SIDEWALK GROUND MUST BE FINE GRADED, COMPACTED, AND TESTED TO MEET REQUIREMENT OF 90% COMPACTION.
6. SIDEWALK MAY BE CONSTRUCTED AWAY FROM CURB IF APPROVED BY THE CITY ENGINEER.
7. SCORING LINES TO BE LOCATED AT 5' INTERVALS.
8. SIDEWALK TO BE REMOVED MUST BE SAWCUT.
9. WHEN CONNECTING TO EXISTING SIDEWALK, USE #4 DOWELS AT 12" ON CENTER, MINIMUM 6" EMBEDMENT DEPTH. DOWELS MUST BE WRAPPED AND GREASED.
10. SIDEWALK JOINTS MAY BE COLD JOINTS.
11. CONCRETE TO BE KEPT MOIST FOR 7 DAYS OR CURING COMPOUND USED.

CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

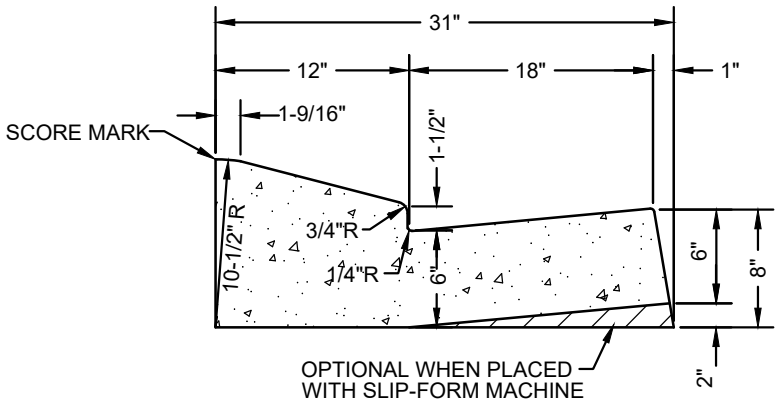
William F. Kull
CITY ENGINEER - WILLIAM F. KULL

STANDARD SIDEWALK

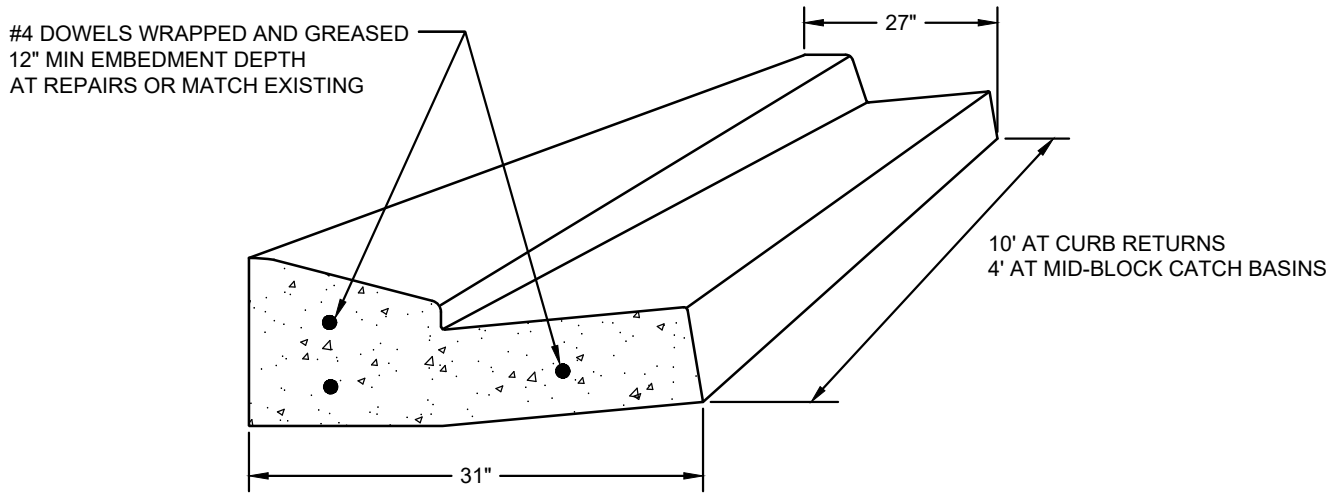
DRAWN BY:	DATE:	SCALE:	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
GK	12/6/17	NTS		327
REVISIONS:	SECTION:	DRAWING NAME:		
NONE	STREETS	327.DWG		



6" VERTICAL CURB AND GUTTER

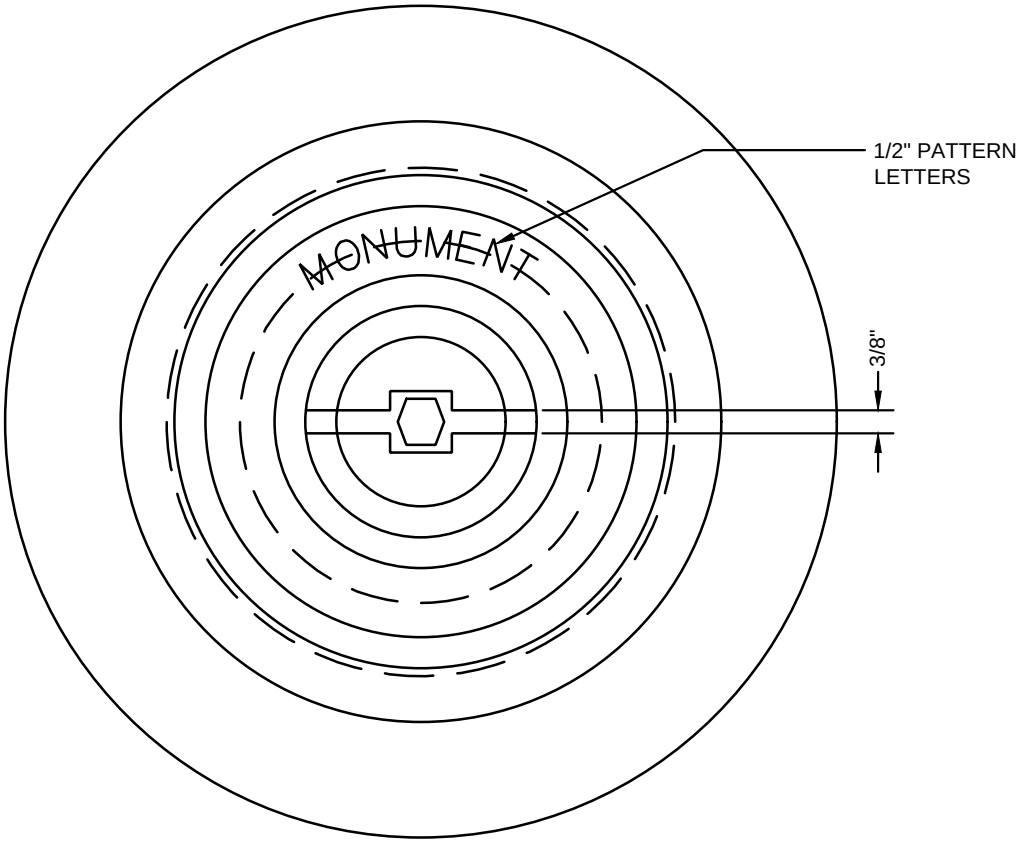


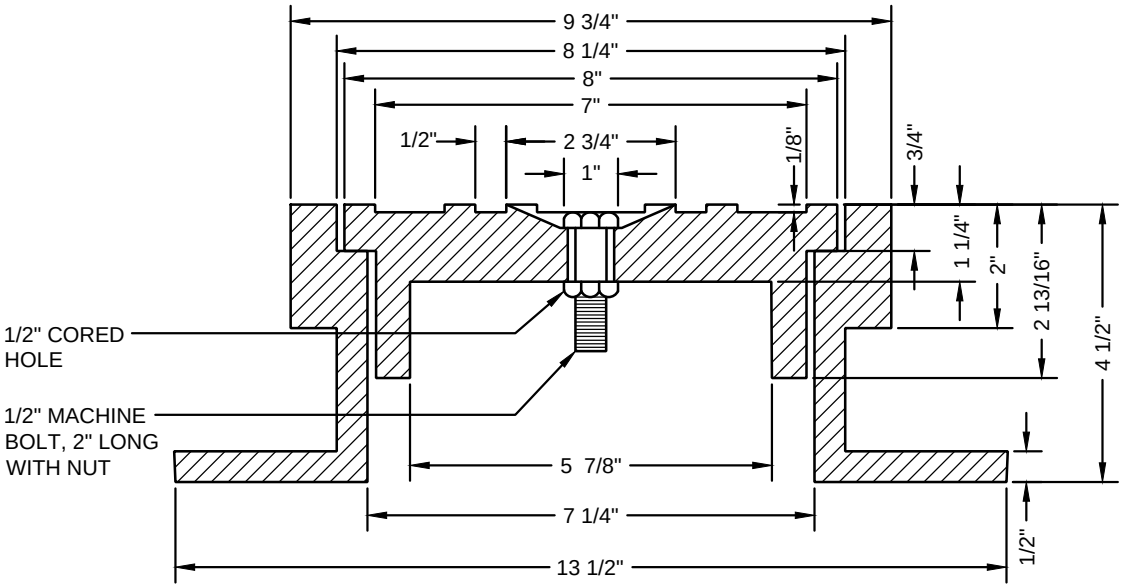
4 1/2" DRIVE OVER CURB AND GUTTER



DRIVE OVER CURB TO 6" VERTICAL CURB TRANSITION

CITY OF RIVERBANK DEPARTMENT OF PUBLIC WORKS			CURB & GUTTER DETAILS	
William F. Kull CITY ENGINEER - WILLIAM F. KULL				
DRAWN BY: GK	DATE: 12/6/17	SCALE: NTS	ADOPTED BY THE CITY COUNCIL:	DRAWING NO. 328
REVISIONS: NONE	SECTION: STREETS	DRAWING NAME: 328.DWG		



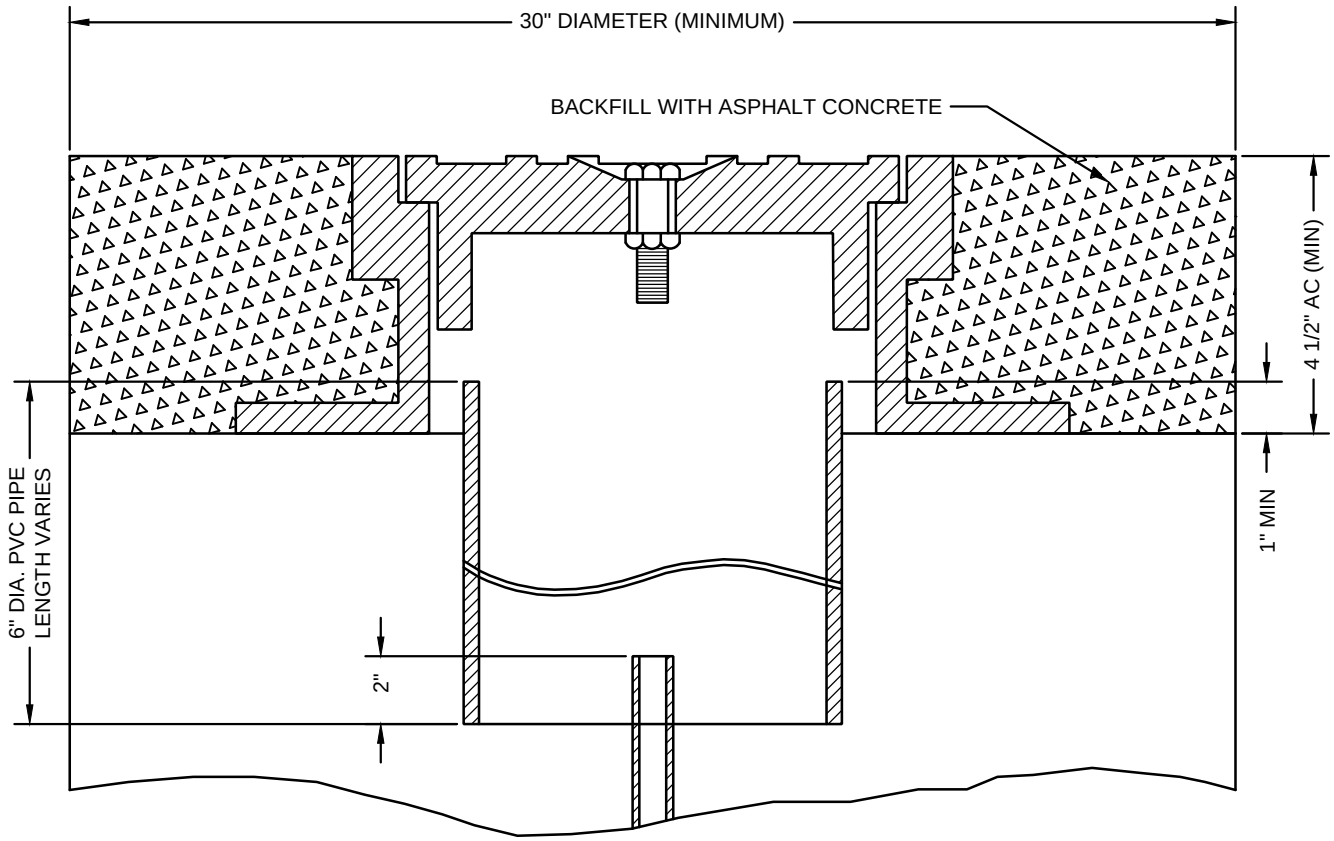


CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

William F. Kull
CITY ENGINEER - WILLIAM F. KULL

ROAD MONUMENT
SHEET 1 OF 2

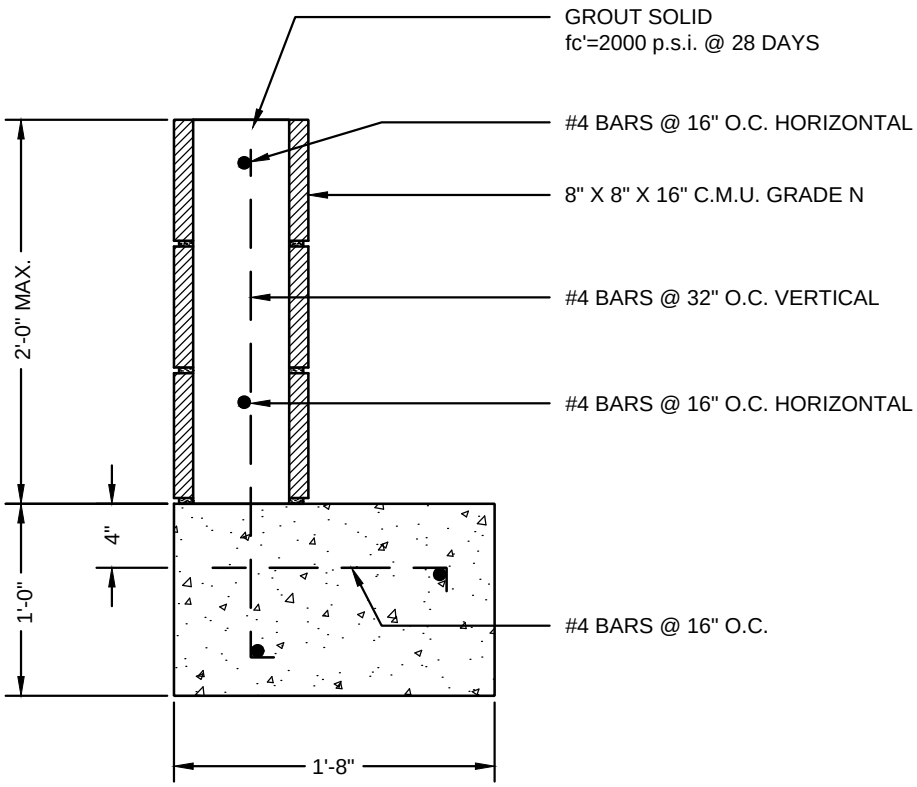
DRAWN BY:	DATE:	SCALE:	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
GK	9/14/17	NTS		329
REVISIONS:	SECTION:	DRAWING NAME:		
NONE	STREETS	329.DWG		



NOTES:

1. MONUMENT BOX SHALL RESEMBLE CAST IRON COVER IN DETAIL 1-E2 OR APPROVED EQUAL.
2. MONUMENT COVER SHALL BE MARKED "MONUMENT".
3. THE MONUMENT SHALL BE A NEW 3/4 INCH X 24 INCH LONG GALVANIZED IRON PIPE.
4. THE MONUMENT SHALL BE TAGGED AND IDENTIFIED AS REQUIRED BY THE STATE OF CALIFORNIA LAND SURVEYOR'S ACT. REFER TO MANUAL OF INSTRUCTIONS FOR PLSS MONUMENTS.
5. ALL GOVERNMENT CORNERS SHALL BE 2 INCH X 24 INCH GALVANIZED IRON PIPE WITH IDENTIFICATION CAP. THE CITY WILL PROVIDE PIPE AND CAP UPON REQUEST.
6. MONUMENTS SHALL BE SET AT LEAST 1 FOOT BELOW THE FINISHED GRADE IN UNPAVED AREAS

CITY OF RIVERBANK DEPARTMENT OF PUBLIC WORKS			ROAD MONUMENT SHEET 2 OF 2	
William F. Kull CITY ENGINEER - WILLIAM F. KULL				
DRAWN BY: GK	DATE: 9/14/17	SCALE: NTS	ADOPTED BY THE CITY COUNCIL:	DRAWING NO. 330
REVISIONS: NONE	SECTION: STREETS	DRAWING NAME: 330.DWG		

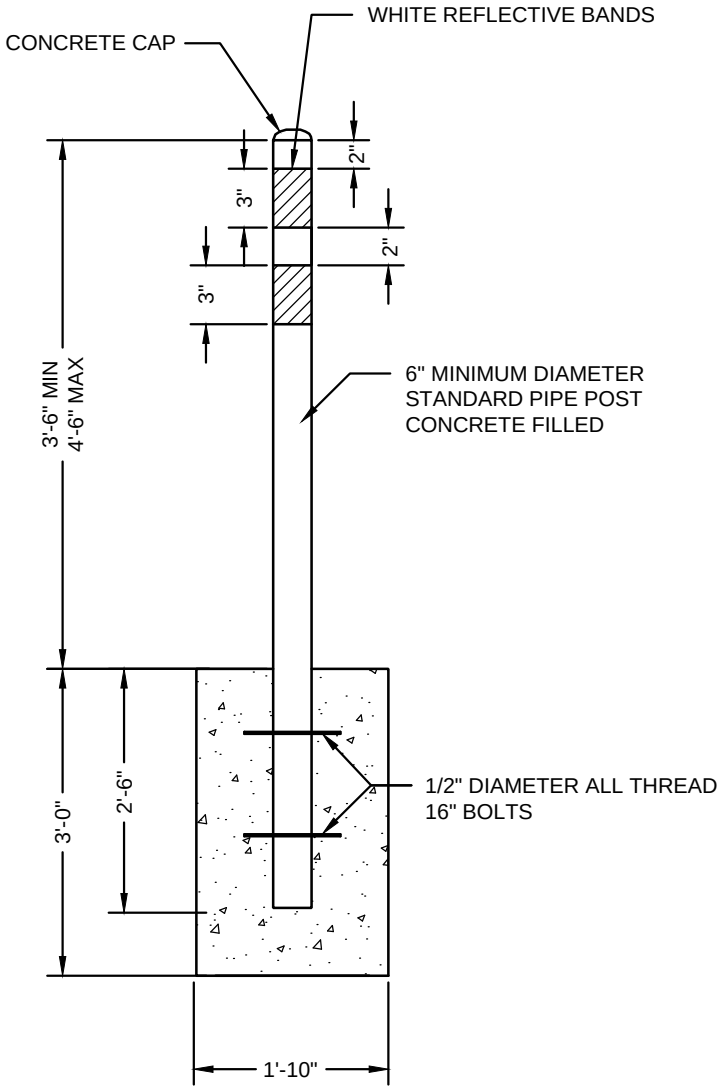


CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

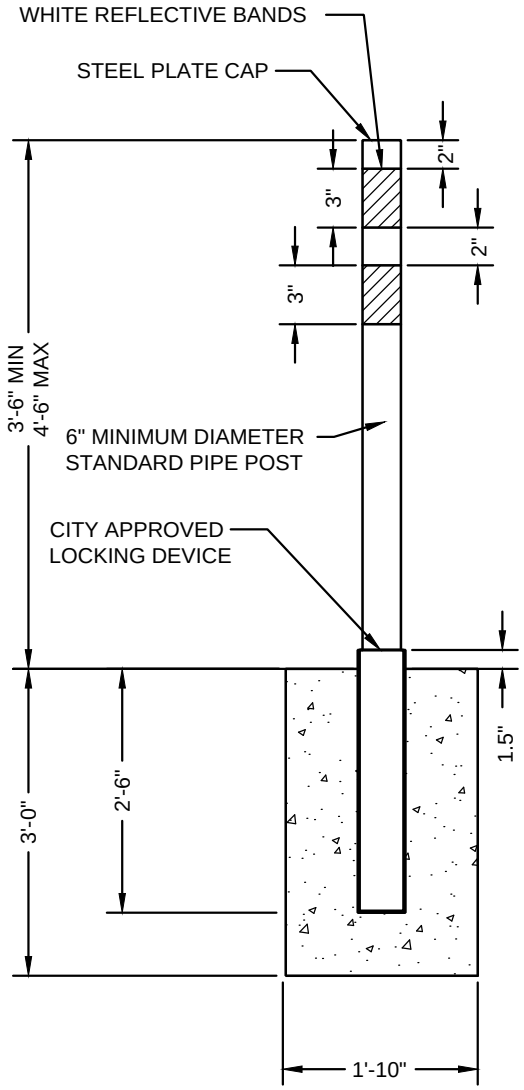
RETAINING WALL

William F. Kull
CITY ENGINEER - WILLIAM F. KULL

DRAWN BY:	DATE:	SCALE:	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
GK	9/14/17	NTS		331
REVISIONS:	SECTION:	DRAWING NAME:		
NONE	STREETS	331.DWG		



PERMANENT BOLLARD



REMOVABLE BOLLARD

NOTES:

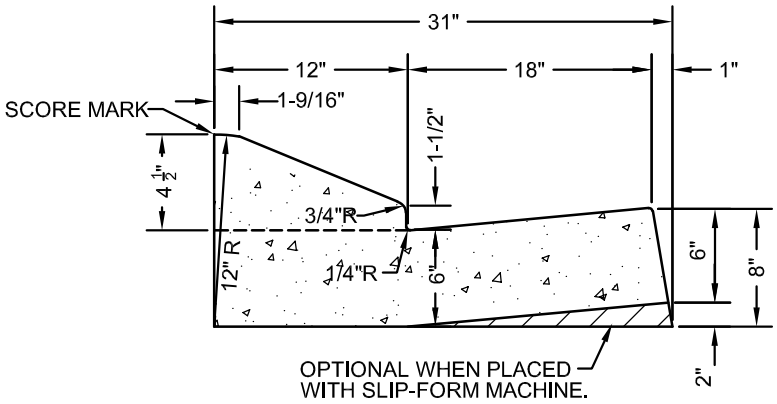
1. GALVANIZED STEEL SLEEVE TO BE CONSTRUCTED WITH A DIAMETER 1/10" LARGER THAN POST. WALL THICKNESS TO BE SAME AS POST OR LARGER.
2. CONTRACTOR MAY SUBMIT ALTERNATIVE DETAILS FOR APPROVAL BY THE CITY ENGINEER.

CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

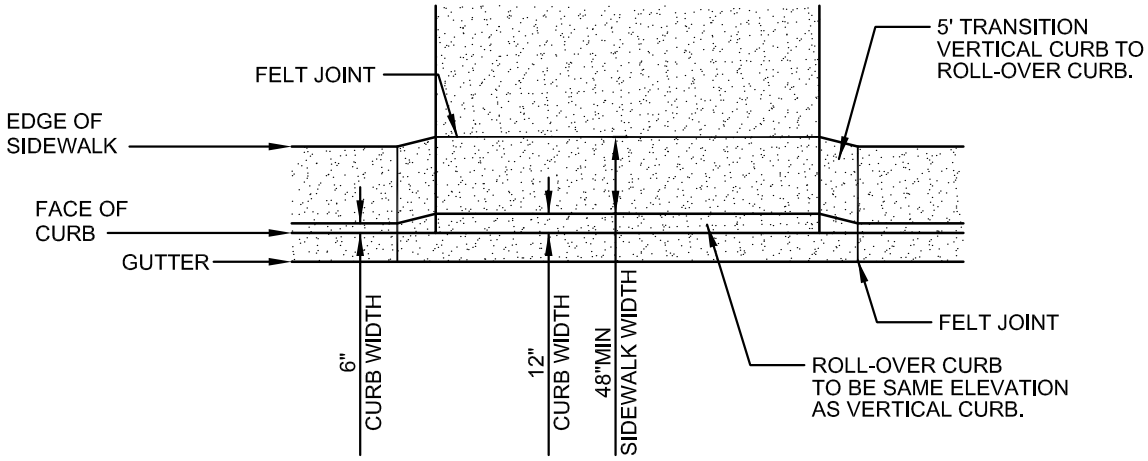
BOLLARDS

William F. Kull
CITY ENGINEER - WILLIAM F. KULL

DRAWN BY:	DATE:	SCALE:	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
GK	12/6/17	NTS		332
REVISIONS: NONE	SECTION: STREETS	DRAWING NAME: 332.DWG		



6" DRIVE OVER CURB AND GUTTER



VERTICAL TO ROLL-OVER DRIVEWAY ENTRANCE

NOTES:

1. ALL SLOPES MUST BE IN A SINGLE PLANE.
2. WEAKENED PLANE JOINTS AT ALL GRADE BREAKS.
3. EXPANSION JOINTS AT RIGHT OF WAY WITH $\frac{1}{2}$" FELT.
4. DRIVEWAYS SHALL BE PLACED A MINIMUM OF 10 FEET FROM CURB RETURNS.

CITY OF RIVERBANK DEPARTMENT OF PUBLIC WORKS			VERTICAL CURB TO ROLL-OVER CURB DRIVEWAY APPROACH	
William F. Kull CITY ENGINEER - WILLIAM F. KULL				
DRAWN BY: ARDURRA	DATE: 2/11/2025	SCALE: NTS	ADOPTED BY THE CITY COUNCIL: 3-11-25	DRAWING NO. 333
REVISIONS: NONE	SECTION: STREETS	DRAWING NAME: 333.DWG		

City of Riverbank
DESIGN STANDARDS

LIGHTING

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SECTION 4: LIGHTING

4.100 General

4.101 Scope

Street lighting shall be installed to conform to these Standards by the Developer or City Contractor holding an appropriate license for such work under the provisions of the State of California Business and Professions Code. In the development of the plans, the City Engineer shall be consulted. The Developer is responsible for coordination with the electrical distribution system as proposed by Pacific Gas & Electric (PG & E).

4.102 Design

The lighting system shall be designed to best serve the area and to minimize the length of service runs from the points of connection to the street lights, as approved by the City Engineer. The lighting system will be designed with traffic and pedestrian safety as the foremost objective, with consideration given to connectivity to parks, trails, bike paths, mail receptacles, and local commercial projects.

The Consulting Engineer shall show the proposed street lighting system or park trail lighting system on the project Improvement Plans. The plans shall include the following items:

1. Location of electroliers
2. Intensity of luminaries
3. Location of service points (As-Built)
4. Location of pull boxes (As-Built)
5. Location of conduit runs (As-Built)

The Consulting Engineer shall submit three (3) copies of the street light plans to the City of Riverbank for preliminary review in the initial submittal.

Guidelines for street light spacing and location are as follows:

1. Street lights shall be placed at street intersections and curves.
2. Pole height and arm length shall be as shown in the Standard Details.
3. If possible, street lights shall be located within 3' of a property line.
4. On streets with separated sidewalks, street lights shall be centered 18 inches behind the curb.
5. On streets with monolithic curb, gutter and sidewalk, street lights shall be centered 18 inches behind the walk
6. T intersections - a street light shall be located on the through street within 20' of the projected centerline of the intersection street (placed on the crosswalk side).

7. Cul-de-sac – a street light shall be located at the end of the bulb if longer than 150 feet (from centerline of intersecting street to center of bulb).
8. Four-way intersection of major streets – a street light shall be located on each corner (4 total) per Standard Detail 407.
9. Four-way intersection of major and minor streets – a street light shall be located at the far right curb returns of the major street in the direction of travel (2 total) per Standard Detail 407.
10. Four-way intersection of minor streets – a street light shall be located at the far right curb return of the through street in the direction of travel (1 total) per Standard Detail 407.
11. Electroliers will normally be staggered on opposite sides of the street, however preference shall be given to the side of the street with fronting lots.
12. Electroliers are required at each knuckle. The electrolier shall be located on the property line that is closest to the midpoint of the outside of the knuckle.
13. Electroliers at roundabouts shall follow the same guidelines as 4-way intersections, based on street classifications, with emphasis on placement near crosswalks.

4.103 Foundations

Foundations for poles shall be constructed of Type II Portland cement concrete per State Specifications and located as shown on Standard Detail 402.

Foundations shall be placed monolithically to within 4 inches of sidewalk grade. After pole is installed, a 36 inch square cap shall be placed to bring the foundation to sidewalk grade.

4.104 As-Built Plans

The Developer or Contractor shall supply the City of Riverbank with sepia mylars of the as-built plans of the City maintained conduits and conductors from their points of service to the electroliers prior to requesting final acceptance by the City Engineer.

City of Riverbank
STANDARD PLANS

LIGHTING

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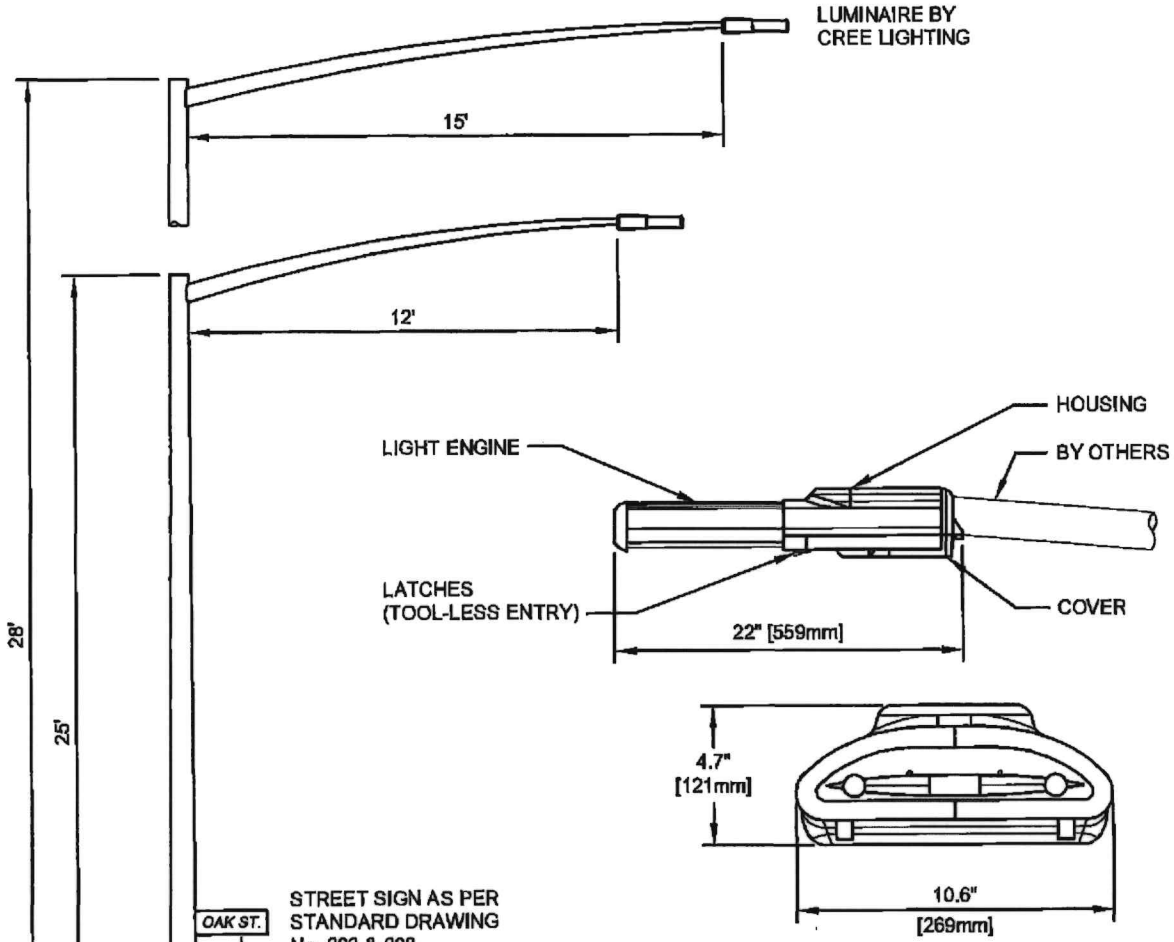


FOR POLE FOUNDATION REFERENCE
SEE STANDARD DRAWING No. 402.

LEDway STREETLIGHT - TYPE II MEDIUM
STR-LWY-2M-HT - 60LED/120V
BY CREE LIGHTING - WWW.CREE.COM/LIGHTING

NOTES:

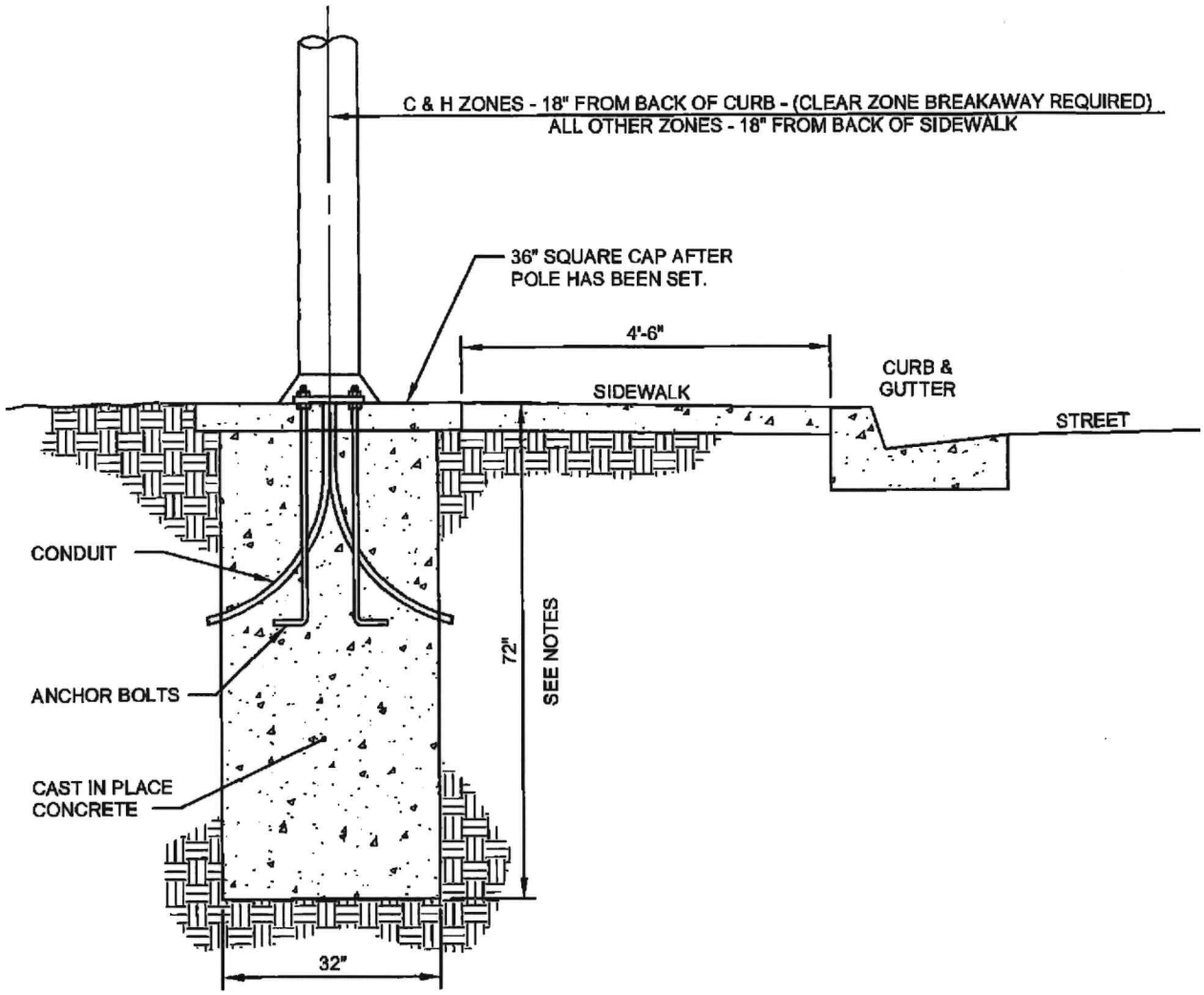
1. POLE BY DEVELOPER OR CITY CONTRACTOR.
2. P.G.& E. OR M.I.D. WILL COMPLETE CONNECTION OF 120V CIRCUIT UPON RECEIPT OF SIGNED APPLICATION FOR SERVICE FROM THE CITY OF RIVERBANK.
3. MINIMUM CONDUIT COVER 30" IN STREETS, ALLEYS AND EASEMENTS. 15" MINIMUM COVER IN PARK STRIPS.
4. CONTRACTOR SHALL SUPPLY "AS BUILTS" OF CONDUIT/ CONDUCTOR FROM THE POINT OF SERVICE TO THE ELECTROLIER.

CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

CITY ENGINEER - WILLIAM F. KULL

LIGHTING STANDARD

DRAWN BY:	DATE:	SCALE:	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
GK	6/09/15	NTS	3-10-15	401
REVISIONS: NONE	SECTION: LIGHTING	DRAWING NAME: 401.DWG		



NOTES:

1. TYPICAL FOR 25' AND 28' POLES.
2. FOUNDATIONS MAY BE 36" SQUARE AND 60" DEEP.
3. CONCRETE TO BE PLACED AGAINST UNDISTORBED EARTH.
4. GROUND WIRE SHALL BE USED.

CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

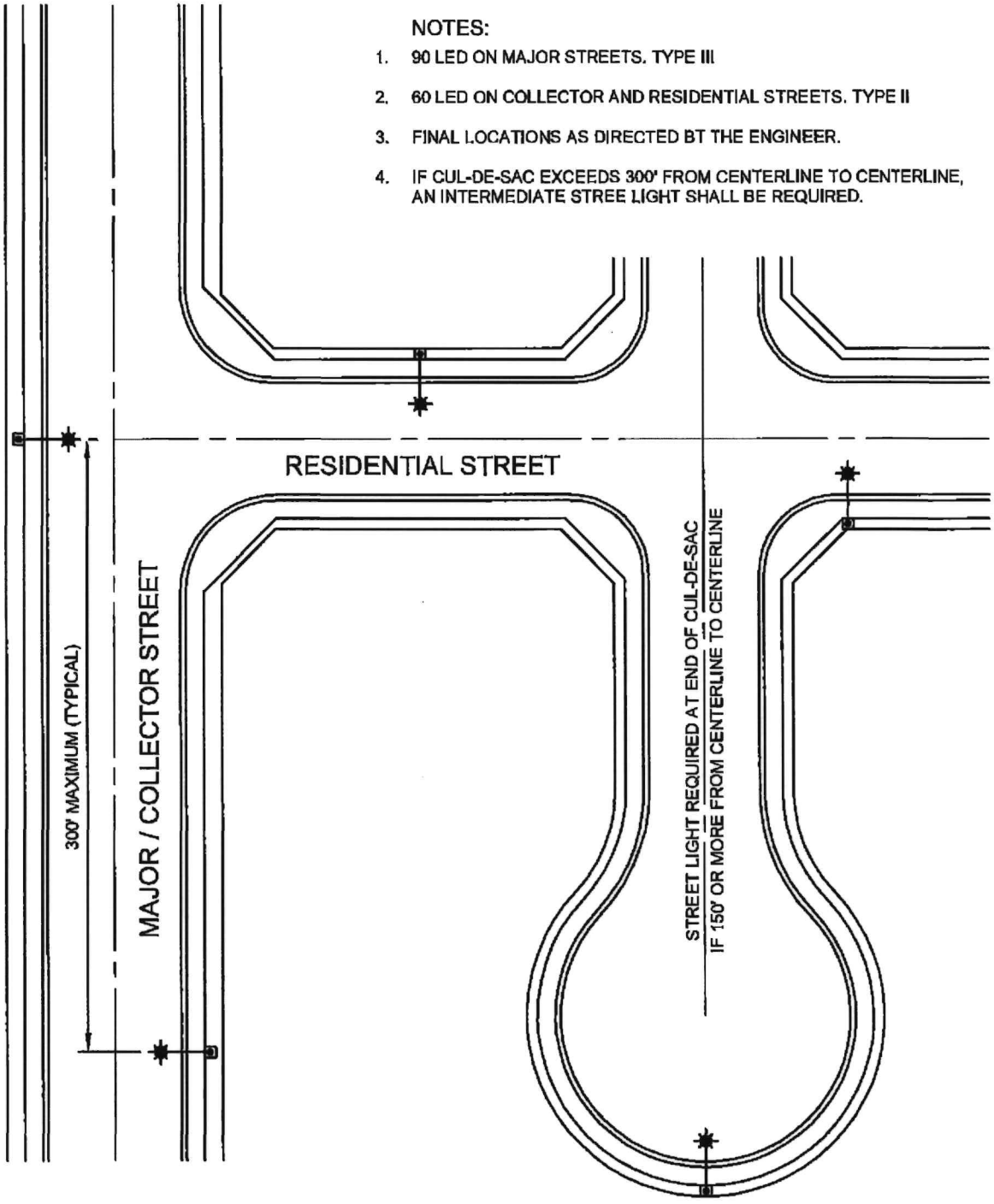
CITY ENGINEER - WILLIAM F. KULL

LIGHTING POLE FOUNDATION

DRAWN BY:	DATE:	SCALE:	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
GK	6/09/15	NTS	3-10-15	402
REVISIONS: NONE	SECTION: LIGHTING	DRAWING NAME: 402.DWG		

NOTES:

1. 90 LED ON MAJOR STREETS. TYPE III
2. 60 LED ON COLLECTOR AND RESIDENTIAL STREETS. TYPE II
3. FINAL LOCATIONS AS DIRECTED BT THE ENGINEER.
4. IF CUL-DE-SAC EXCEEDS 300' FROM CENTERLINE TO CENTERLINE, AN INTERMEDIATE STREE LIGHT SHALL BE REQUIRED.



CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

STREET LIGHT LOCATIONS

CITY ENGINEER - WILLIAM F. KULL

DRAWN BY:	DATE:	SCALE:	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
GK	6/09/15	NTS	3-10-15	403
REVISIONS: NONE	SECTION: LIGHTING	DRAWING NAME: 403.DWG		

City of Riverbank
DESIGN STANDARDS

WATER

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SECTION 5: WATER

5.100 General

5.101 Scope

These standards apply to all public water facilities designed for installation within a public right-of-way or PUE in the City, and are limited to mains and services 12" or less in diameter. Standards and requirements for larger sizes will be determined by the City Engineer on a case-by-case basis. In residential developments, on-site mains and hydrants for fire protection shall be public. Other on-site facilities, unless specifically noted in these Standards or as required as part of project approval, shall be private and shall be designed and constructed in accordance with the provisions of these Standards and the Uniform Plumbing Code, as adopted by the City.

5.200 Design Flow

5.201 Flow Demand

Unless actual field measurements or metering data are available, the following water demands shall be used:

		Peaking Factors	
Land Use	Unit Demand	Peak Day	Peak Hour
Residential	285 gpcd	2.24	3.28
Commercial/Office	2,750 gpad (floor area)	2.24	3.28
Parking Lots	200 gpad	2.24	3.28
Industrial	(detailed information regarding industrial water demand to be submitted)		

(gpcd = gallons per capita per day ; gpad = gallons per acre per day)

Per capita and density figures per Section 5.201 shall be used unless specific project information is available.

Fire flow for specific projects shall be based on the Insurance Services Organization (ISO) Guidelines for a Class I City, or as otherwise approved by the Stanislaus Consolidated Fire District. In lieu of the ISO guidelines, the following conservative minimum criteria may be used:

Land Use	Fire Flow
Low-Density Residential	1,000 gpm from each of 2 adjacent hydrants flowing simultaneously, or 2,000 gpm available
Multi-Family	1,500 gpm from each of 2 adjacent hydrants flowing simultaneously, or 3,000 gpm available at building service point (not simultaneously with hydrant flow).

Commercial	1,500 gpm from each of 2 adjacent hydrants flowing simultaneously, or 4,000 gpm available at building service point (not simultaneously with hydrant flow).
Industrial	Fire flow for industrial projects shall be based on a site-specific investigation using ISO guidelines. 4,000 gpm may be used for preliminary studies.

Fire flow for low-density residential areas can generally be obtained using the following guidelines for water main sizing:

a) 12" mains –1/2 mile looped grid
b) 8" mains –1/4 mile looped grid
c) 8" looped distribution system (internal to ½ mi and ¼ mi grids mentioned above)

5.202 Design Pressure

The system shall be designed to maintain a minimum residual pressure of 20 psi at the service point or fire hydrant under the worst case of either:

- Peak Day flow plus fire flow, or:
- Peak Hour flow

Calculations shall be based on actual flow tests performed by the Stanislaus Consolidated Fire District, or as otherwise approved by the City Engineer.

The Hazen-Williams formula should be used to calculate design flow, pressure loss, velocity and pipe diameter relationships. The coefficient of friction, "C", shall be 100 for pipes 6" and smaller, 120 for 8" and 10", and 130 for 12" and larger pipes. If losses due to fittings are calculated separately using equivalent length or other approved methods, a "C" of 130 may be used.

5.300 Pipe Design

5.301 Minimum Size

Minimum pipe sizing for public water mains shall be based on an approved Water Master Plan, regional modeling analysis, or similar document. Typically, these documents are prepared either at the Specific Plan or Tentative Mapping phases of a project, and are intended to provide sizing information for a relatively large region.

For new public water mains in areas that are not already covered by a regional water study or analysis (i.e. smaller "infill" projects), minimum sizing for public water mains shall be based on requirements as described in Section 5.200, or as otherwise directed by the City Engineer.

New onsite private water main sizing shall be based on the required fire flow and pressure, as described in section 5.200.
In addition to the above requirements, minimum pipe sizes for new water mains shall be as per the following table:

Location/Use	Min. Size
Fire hydrant laterals, max. length =100’	6”
Public water mains –1/2 mi. looped grid	12”
All other public water mains	8”
Residential dead end with fire hydrant*	8”
Residential dead end with no fire hydrant*	6”

* Looping of water mains is typically required on all projects, unless specifically approved otherwise by the City Engineer.

5.302 Vertical Alignment

There are no slope requirements for water mains. However, inverts of new public water mains shall be shown on the drawings. Combination air & vacuum release valves shall be placed at all substantial high points in newly constructed water mains.

Minimum cover on water mains shall be 36”. In special circumstances, minimum cover may be reduced below 36” using special backfill and/or special pipe materials. The requirements for reduced cover below 36” shall be considered on a case-by-case basis, and approved by the City Engineer.

When practical, new water mains shall be installed above wastewater or storm drain pipes with a minimum vertical clearance of 1' at crossing locations. However, if this is not a practical option, water main crossings shall be constructed using special construction in accordance with DHS Guidelines. Refer to Section 5.306 for vertical separation requirements for new public water mains.

5.303 Horizontal Alignment

Public water mains shall be installed within street rights of way unless an easement installation is specifically approved by the City Engineer. Alignment shall be parallel to the street centerline wherever possible.

Curved water mains may be constructed provided that joint deflections or pipe curvature does not exceed the pipe manufacturer’s recommendations.

See Section 5.306 regarding horizontal separation requirements from other utilities.

5.304 Pipe Materials

The following pipe materials shall be used for water main construction, and shall conform to the appropriate American Water Works Association (AWWA) standards (latest revision):

Pipe Material:

1. Polyvinyl Chloride (PVC) as per AWWA C900, Class 150 minimum.

2. Ductile Iron Pipe (DIP) as per AWWA C151, Class 50, with cement mortar lining in accordance with AWWA C104 and polyethylene encasement in conformance with AWWA C105.

These approved pipe materials apply to water mains up to 12" in diameter. Service materials shall be polyethylene tubing CTS or copper. The material for new water mains greater than 12" shall be determined be on a case-by-case basis as approved by the City Engineer.

5.305 Fittings and Thrust Blocking

Pipe fittings shall conform to AWWA C110 for flange fittings and AWWA C111 for mechanical joint fittings, and shall be cast iron or ductile iron, class 150. Joints in fittings and adapters shall be of the type with a seal ring groove for positively holding the rubber gaskets in place against the water pressure, and shall be similar to the specified joint for the pipe used.

Thrust blocking shall be installed at all bends, tees, dead ends, and changes in pipe diameter, and installed per City Standard Details. Thrust blocking shall be placed so that the joints of the pipe and fittings will be accessible for repair.

5.306 Separation Requirements

Public water mains shall have the required separation, both horizontal and vertical, from other utilities as per the current California Department of Health Services (DHS) Guidelines, as adopted by the City of Riverbank. The following are excerpts from the DHS Guidelines for separation requirements of public water mains from other utilities:

- 10' horizontal separation, and 1' vertically above parallel sanitary sewer lines, or pipelines carry other hazardous fluids (fuel, industrial wastes, etc..)
- 4' horizontal separation, and 1' vertically above parallel storm drain lines or disinfected tertiary recycled water.
- 4' horizontal separation, and 1' vertically above parallel new supply lines conveying raw water to be treated for drinking purposes.
- The vertical separation mentioned above for parallel pipelines does not apply if an 11' horizontal separation is maintained.
- Water mains crossing other utilities shall be 1' vertically above the other utility. If this is not attainable, then special construction shall be required in accordance with the April 14, 2003 guidance memorandum from DHS contained in the Appendix of these Standards.

The aforementioned requirements are excerpts from the DHS Guidelines, and are listed only as a convenience for common situations in water main layout and design. Refer to the Appendix for the April 14, 2003 memorandum from DHS for additional separation requirements for water mains and non-potable pipelines.

All separation requirements indicated above and in the April 14, 2003 DHS memorandum are to the outside edges of the pipe. If these separation requirements are not attainable, special construction shall be required in accordance with DHS guidelines, and as approved by the City Engineer.

5.400 Services

5.401 General

Each individual lot or parcel shall have a separate water service complete from the water main to the property. Larger parcels with multiple buildings may require additional services, as approved by the City Engineer. All water services from the public water main shall be metered in accordance with the standards contained herein, with the exception of dedicated fire service lines.

5.402 Domestic Services

The minimum size service is 1 inch polypropylene, and is to be installed in accordance with City Standard Details. Larger diameter services shall be per Standard Plan 505 (1 ½" & 2") and Standard Plan 506 (4" & larger). The size of service is to be determined by the design engineer for the parcel/land use being served, subject to requirements contained in these Design Standards.

Backflow prevention devices shall be provided as specified in these Standards, and as per the appropriate Standard Detail. Refer to Section 5.404 for additional information regarding backflow prevention.

All domestic service meter boxes shall be placed outside of driveways. Exceptions to this rule will be granted only when it is not feasible or practical to place service meter boxes outside driveways. Such exceptions will require specific approval by the City Engineer.

The preferred horizontal separation of water services and sewer laterals is 10'. However, sewer laterals and water services may have a minimum of 5' separation given prior approval by the City Engineer.

5.403 Fire Services

Private on-site fire protection systems include hydrants and building sprinkler systems, and shall be installed per the requirements of the City Building Code, these Standard Specifications, and the requirements of the Stanislaus Consolidated Fire District. Fire and domestic systems shall be kept separate on-site, and shall be valved such that either system can be shut-down without affecting the other. These Standards cover requirements imposed by the Public Works Department in its role as a water utility, mainly as they apply to maintenance and backflow prevention required by State Law. In addition, the Stanislaus Consolidated Fire District may have other design requirements pertaining to fire protection.

1. General: All on-site improvements shall conform to City Standards for public water mains, unless additional design or construction requirements are stipulated by the Stanislaus Consolidated Fire District. In addition, automatic sprinkler systems shall be installed in accordance with NFPA #13, or as required by the Stanislaus Consolidated Fire District.

2. Backflow Prevention: All private fire systems shall have backflow prevention as described in section 5.404.

3. Fire Hydrants: refer to Section 5.502 of these Standards

4. Domestic Services: It is preferable to keep domestic services separate from fire systems. However, given the approval of the City Engineer, domestic services may be taken from the fire service lateral provided that an additional backflow prevention device is installed and sufficient valving is in place to isolate the two systems.

5. Fire District Approval: The location and layout of all fire protection system components including, but not limited to: piping, fire department connections, indicator valves, detector check valves, booster pumps, fire hydrants and service risers shall be approved by the Stanislaus Consolidated Fire District.

6. Fire Department Connections (FDC) and Post-Indicator Valves (PIV): FDC's and PIV's shall be installed as per City Standard Details, in locations approved by the Stanislaus Consolidated Fire District.

7. Inspection: All private fire systems shall be inspected by the Fire District prior to backfill of trench. Testing shall also be performed in accordance with current NFPA standards, and as required by the Fire District, prior to acceptance.

5.404 Backflow Prevention

General: Backflow prevention devices shall be installed at new connections to the public water main as specified in these Standards. All backflow prevention assemblies shall be approved by the University of Southern California Foundation for Cross-Connection Control and Hydraulic Research (USC Foundation), and installed according to the manufacturer's specifications.

Domestic Services: New water services for potable uses, as well as landscape irrigation uses, shall require installation of a Reduced Pressure Principle Backflow Prevention Assembly (RPBP) as stated herein. Requirements for fire service lines are listed in a separate topic within this section.

Residential Uses: An RPBP, installed in accordance with City Standards, shall be required for water services that serve residential uses in each of the following cases:

- All services for multi-family dwellings of 2 units or more
- Services for single family dwellings of 3 stories or more.
- Separate water services used specifically for landscape irrigation in new residential developments.
- At service connections to the public main for private water systems serving 2 or more residential units.
- Water services for residential lots that use water from sources other than the City of Riverbank system, including reclaimed water, irrigation water (O.I.D., M.I.D.), or private on-site wells that have not been abandoned.
- Residential uses not specified above where a high hazard for contamination of the public water main is present, as deemed necessary by the City Public Works Department.

1" water services for standard single-family dwellings in the City will typically not require installation of a separate backflow prevention device, unless one of the aforementioned conditions is met.

Non-Residential Uses: All domestic and landscape water services for new commercial, industrial, public, institutional, or other non-residential uses shall require installation of an RPBP in accordance with City Standards.

Fire Services: Dedicated fire service lines 2" and under, including those serving single-family residences, shall require installation of an RPBP in accordance with City Standard Details.

Dedicated fire service lines 3" and above shall require installation of a Double Detector Check Assembly (DCDA) with Outside Stem and Yoke (OS&Y) valves in accordance with City Standard Details. This requirement includes private on-site water systems serving only fire hydrants.

RPBP's with detectors shall be required for fire service lines in the following instances:

a) Systems in which chemical additives may be used such as antifreeze or fire suppressants
b) Any building where a high hazard exists, as required by the City Engineer.

5.500 Valves, Fire Hydrants, and Other Appurtenances

5.501 Valves

Valves on mains shall be spaced and located in conformance with the following criteria:

- Valves shall have a minimum spacing of 500 ft.
- Valves shall be placed on each side of a water main crossing a separate right-of-way. Examples would include, but not be limited to: Canal crossings, aqueduct crossings, Caltrans highway crossings, and railroad crossings.
- At tees and crosses in public mains, valves shall be required at all legs. If there are minimal connections in between valves, valves may be eliminated at certain legs given the approval of the City Engineer.
- Private services extending from a tee in a public main shall require a valve on the service leg of the tee, and do not require valves on public main legs of the tee.
- At ends of mains or on stubs such that future extensions will not interrupt service.
- At fire hydrant laterals

5.502 Fire Hydrants

Fire hydrants shall be installed per City Standard Details. Where the main is located within 15 ft. of the hydrant location, the valve on the hydrant lateral shall be located at least 10 feet offset from the hydrant station and the lateral installed with 90 deg. elbows.

Fire hydrants shall be supplied from the largest available main, and shall be fed from 2 directions unless specifically approved otherwise by the City Engineer and the Stanislaus Consolidated Fire District. The exception to this would be hydrants placed at the end of cul-de-sacs.

Public fire hydrant spacing and distribution shall be as follows:

- 300 feet maximum spacing in high density, commercial, or industrial zoning.
- 500 feet maximum spacing in low density residential areas
- A fire hydrant shall be located within the bulb of all cul-de-sacs
- Hydrants shall be spaced as described above on both sides of an arterial street. On streets that are separated from buildings by a 6’ restrictive wall, hydrants shall be placed at all street intersections with a maximum spacing of 1000’ on both sides of the street.

Hydrant locations on all new projects, both public and private, shall be approved by the Stanislaus County Consolidated Fire District.

5.503 Blow-offs and Temporary Connections

Blow-offs per Standard Plan 520 shall be located at the ends of all dead-end mains, or as otherwise required by the City Engineer.

The location and type of temporary connections to the public main shall be approved by the City Engineer, and be installed as per the appropriate Standard Detail. The meter/backflow assembly shall be located to provide optimal flow for main flushing and to minimize disruption of public traffic upon device removal. The meter/backflow assembly is not required on new systems with less than 150 feet of 6” or smaller pipe.

5.504 Water Sampling Stations

Sampling stations shall be installed in new developments at the discretion of the City Engineer, and shall be constructed as per Standard Detail 521.

5.505 Tracer Wire

All non-conductive water mains shall be installed with a blue tracer wire in accordance with the Standard Details. The locating wire is to be laid at the top of the pipe, and bare wire shall not touch valves or fittings.

City of Riverbank
CONSTRUCTION STANDARDS

WATER

SECTION 5: DOMESTIC WATER FACILITIES

General: Domestic water facilities shall be furnished and installed in accordance with these Construction Specifications and as shown on the plans.

Payment: Full compensation for furnishing all labor, materials, tools, equipment, excavating, backfilling, testing, disinfecting and flushing and for doing all work involved in installing the water system shown on the plans and as specified in these Construction Specifications shall be included in the appropriate contract item and no additional compensation will be allowed therefore.

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5.100 Materials

5.101 Water Main Pipe

Water main pipe 4" through 12" shall be either ductile iron pipe (DIP) conforming to the requirements of AWWA Standard C-151, Class 51 (4") or Class 50 (6" thru 12") with cement-mortar lining per AWWA C-104, and polyethylene encased per AWWA C-105, or polyvinyl chloride (PVC) pipe conforming to the requirements of AWWA Standard C-900, Cast Iron (CI) O.D. Class 150 (DR18) with elastomeric gasket (solvent weld is unacceptable). DIP shall have "Tyton" joints, "Tyseal" joints, or approved equal.

In addition to the above, the following requirements apply to all pipe joints:

- Solvent welded PVC is not allowed
- Mechanical joints are only allowed at fittings
- Cast-iron repair/adapter couplings may be used where approved by the City Engineer
- Water service lines shall be per Section 5.103 of these specifications

5.102 Miscellaneous Fittings

Pipe fittings shall conform to AWWA Standard C110, latest revision, and shall be of ductile iron, match the make of pipe used, and be as specified by the manufacturer for use with the pipe specified. Joints in fittings and adapters shall be of the type with a seal ring groove for positively holding the rubber gaskets in place against the water pressure and shall be similar to the specified joint for the pipe used.

All ductile iron fittings shall be coated outside and inside with a bituminous coating as per Section 10-3 of AWWA Standard C110, latest revision.

Flanged fittings are allowed, and shall be used where shown on the plans. Mechanical joint fittings are allowed provided the Contractor follows proper assembly procedures.

Not all pipe fittings required to do the work are shown on the plans. The Contractor shall furnish and install all fittings as necessary to accomplish grade and adjustment changes in conformance with the pipe manufacturer's recommendations and as approved by the Engineer.

5.103 Valves

Valves 2" through 12" valves shall be resilient seated gate valves. Valves over 12" shall be butterfly valves. Resilient seated gate valves shall be Mueller RS, American Flow Control 2500, Clow RS or approved equal and shall conform to the requirements of AWWA Standard C509, latest revision.

Butterfly valves shall be MH 450, Mueller Lineseal III, Clow 450 or approved equal and shall conform to the requirements of AWWA Standard C504, latest revision.

All valves shall open left (clockwise to close) and be equipped with a 2-inch AWWA operating nut. All valves shall be coated for buried service per AWWA Standards. All valves shall be Class 150 minimum.

Valves requiring operating wrenches exceeding 4 feet in length shall have extensions and guides as provided by the valve manufacturer installed in the valve riser.

The valve boxes shall be Christy G5 with cast iron cover and extensions and shall conform to City of Riverbank Standard Details. Cover shall have a free fit in the box. All valve boxes shall be adjusted to grade by the paving contractor as per the appropriate Standard Plan.

5.104 Service Lines and Fittings

Service lines and fittings shall be polyethylene CTS or copper for services 3 inches and smaller and ductile iron or polyethylene for services 4 inches and larger. All water services shall conform to the requirements shown on the appropriate Standard Details.

5.105 Fire Hydrants

Fire hydrants shall be furnished and installed in accordance with the Standard Details.

5.106 Backflow Prevention Devices

Backflow prevention devices including double detector checks and reduced pressure principle devices, shall be of a type approved by University of Southern California Foundation for Cross-Connection Control and Hydraulic Research Foundation (USC Foundation), and installed according to the manufacturer's specifications.

5.200 Installation

Water main pipe shall be installed in accordance with the manufacturer's recommendations, City Standard Plans, these Special Provisions and the improvement plans.

5.201 General Requirements:

Water mains shall be installed with due regard for protection from sanitary hazards, including current spacing and crossing requirements of the California Administrative Code, Title 22. Minimum pipe cover shall be 3 feet.

Thrust blocking shall be installed per City Standard Details at all bends, tees, dead ends, and changes in pipe diameter. Thrust blocking shall be placed so that the joints of the pipe and fittings will be accessible for repair.

No piping shall be directly embedded in concrete. All pipe in concrete shall be wrapped in 20 mil visquine. All piping subject to corrosion shall be protected with 20 mil visquine over lap ends to be secured with compatible adhesive tape.

Trench width shall be 1.25 times the outside diameter of the pipe plus 12", or outside diameter of the pipe plus 16", whichever is greater.

The Contractor shall also take the necessary precautions to protect workers from asbestos fiber hazards. Reference is made to AWWA Manual M-16, "Work Practices for Asbestos-Cement Pipe." Use of any "non-recommended work practices" such as cutting any AC pipe with abrasive disc-dry tools is strictly forbidden.

Reference is made to AWWA Manual M23 "PVC Pipe - Design and Installation" and AWWA Standards C603 "Installation of Asbestos Cement Water Pipe", C600 "Installation of Gray and Ductile Cast-Iron Water Mains and Appurtenances", and C601 "Disinfecting Water Mains", and applicable California Department of Health Waterworks Standards.

The pipe must be kept exceptionally clean, and shall be protected from contamination during installation.

The City takes no responsibility for water quality downstream of temporary connections to the water system.

Hydrants installed but not in service shall be wrapped with burlap and wired and remain so until such time as the hydrants are in service. Holes may be cut in the burlap in order that the hydrant may be used for construction water.

5.202 Inspection

All water lines shall be inspected for proper installation by the City Engineer, prior to backfilling of trenches. If work is to be completed after normal business hours, Contractor shall call 209-869-3671 to arrange for an inspection to be made after normal business hours.

5.203 Disinfection

Refer to Section 5.302.5 "Disinfection Procedures"

5.204 Connections to Existing Water Mains

Under no circumstances shall anyone other than a representative of the City of Riverbank Public Works Department open or close any valve in the existing City water system. Requests for valve operation shall be made to the Engineer at least 48 hours in advance. In cases where customer service will be interrupted, the request shall be made at least 48 hours in advance and the Contractor shall make satisfactory preparation for the planned work to minimize the interruption. The procedure shall be reviewed and approved by the City prior to the start of construction.

5.205 Connection Details

Shall be made per the appropriate Standard Detail(s). The number and location of temporary connections with meter assembly shall be approved by the City Engineer.

Upon request, the City will open its valve to the new pipe after the mains and services have been installed and backfilled and thrust blocks have cured for 48 hours.

5.206 PVC Pipe

Shall not be bent more than as recommended by the manufacturer. Joint deflections are not allowed. The Contractor shall take extra precautions to follow the pipe manufacturer's recommendations regarding rubber rings, fittings, tapping and installation practices.

5.300 Testing:

Official test for acceptance shall normally be conducted after all backfill placed, and compacted as specified elsewhere in this specification has been completed.

5.301 Pressure Test

All piping shall be tested to a pressure of 150 pounds per square inch (psi). All material, equipment and labor for testing shall be approved by the City prior to testing and shall be furnished without cost to the City of Riverbank. The system will be tested as directed by the Engineer as a unit or in sections not to exceed 1,000 lineal feet. Each unit tested shall successfully meet the requirements herein specified. The water services shall be considered as part of the main for test purposes and no allowance for additional make-up water shall be made.

Unless otherwise directed by the Engineer, testing shall be accomplished by opening hydrants and service line cocks at the high points of the system and blowoffs at all dead ends. The valve controlling the admission of water into the section of pipe to be tested should be opened slowly and fully before closing the hydrants or blowoffs. After the system has been filled with water and all air expelled, all the valves controlling the section to be tested shall be closed, and the line remain in this condition for a period of not less than 24 hours.

The pipe shall then be refilled, if necessary, and subjected to a maintained pressure of not less than 150 pounds per square inch (psi) for a period of one hour.

Allowable make-up water allowance shall not exceed a rate in gallons per hour per 1000' lineal feet of pipeline of 0.25 multiplied by the pipe diameter in inches. (gph per 1000' < 0.25 * pipe dia).

All leaks that are found shall be immediately corrected and the system again subjected to the same test.

All repairs of any damage to the pipes and their appurtenances, or to any other structures, resulting from or caused by these tests, shall be performed by the Contractor as the Engineer may direct, all without cost to the City of Riverbank.

5.302 Bacteriological Test

5.302.1 Pipe Assembly Methods

All piping, valves, fittings, and appurtenances which become contaminated during installation shall be cleaned, rinsed with potable water, and then sprayed or swabbed with a 5% sodium hypochlorite disinfecting solution prior to installation, with City representative present. Pipes, fittings, valves, and all other components incorporated into connections with the City's existing system shall be spray disinfected or swabbed with a liquid chlorine solution in accordance with AWWA C651 and as specified herein.

5.302.2 Flushing Flowrates

Required Flow to Flush Pipelines

Pipe diameter (Inches)	Flow Required to Produce 3 ft. /sec Velocity minimum in Main* (GPM)
4	120
6	260
8	470
10	730
12	1060
16	1880

*(40 psi Residual Pressure in Water Main)

5.302.3 Materials

A. SODIUM HYPOCHLORITE (LIQUID).

Sodium hypochlorite is available in liquid form in glass or plastic containers, ranging in size from 1 qt. to 5 Gal. The solution contains approximately 10% to 15% available chlorine.

B. GRANULAR HYPOCHLORITE

Granular hypochlorite may be used when mixed into a solution containing approximately 10% to 15% available chlorine. When using granular hypochlorite in solution, follow the procedure for sodium hypochlorite solution in this section.

5.302.4 Chlorination Methods

A. SODIUM HYPOCHLORITE SOLUTION (LIQUID)

Sodium hypochlorite solution 1% minimum shall be used for cleaning and swabbing piping and appurtenances immediately prior to installation and for disinfecting all components of connections to the City's existing system.

Sodium hypochlorite solution may be used for the initial disinfection of newly installed water mains. The solution shall be applied at a terminus of the system to be chlorinated using an injector which can adjust the amount of solution being injected into the piping system. The solution shall be injected at the appropriate concentration to achieve the specified concentration range of chlorine throughout the entire piping system. If the system is greater than 1000 feet in length, the contractor may use a secondary chlorine injection site (e.g. hydrant, etc.). Where pumping equipment is used in conjunction with an injector, an integral backflow prevention device shall be installed and connected to the potable water supply.

Pumping equipment, piping, appurtenances, and all other equipment in contact with potable water shall be disinfected prior to use. Water trucks shall not be used for disinfection of pipelines.

Sodium hypochlorite solution may also be used to increase the total chlorine residual if the concentration from the initial chlorination of the system is found to be low. The solution shall be added to the system in sufficient amounts at appropriate locations to ensure that the disinfecting solution is present at a concentration within the specified range (50 to 100 mg/L) throughout the piping system.

5.302.5 Disinfection Procedures

The pipeline shall be filled at a rate not to exceed 300 GPM or a velocity of 1 foot per second (156 GPM in an 8-inch pipe), whichever is less.

At a point not more than 10 feet downstream from the beginning of the new main, dose the water entering the new main with chlorine fed at a constant rate such that the water will have not less than 50 mg/L and no more than 100 mg/L free chlorine. Measure the chlorine concentration at regular intervals to ensure that this concentration is provided. Measure chlorine in accordance with the procedures described in the current edition of the AWWA Manual M12 or of Standard Methods for the Examination of Water and Wastewater or with a calibrated digital high range Colorimeter. Disinfection shall result in an initial total chlorine concentration of 50 ppm to 100 ppm. This concentration shall be evenly distributed throughout the system to be disinfected.

All valves shall be operated with the disinfection solution present in the pipeline. All appurtenances such as air-vacuum relief valves, blowoffs, hydrants, backflow prevention devices, and water service laterals shall be flushed with the treated water for a sufficient length of time to ensure a chlorine concentration within the specified range in all components of each appurtenance.

The Contractor will verify the presence of the disinfection solution throughout the system by sampling and testing for acceptable chlorine concentrations at the various appurtenances and/or at the test ports

provided by the Contractor. Areas of the system found to be below the specified chlorine concentration level shall receive additional flushing as noted above and/or additional disinfection solution, as necessary. All testing will be done in the presence of the City representative.

The chlorinated water shall be retained in the system for a minimum of 24 hours. The City representative will test the total chlorine residual by a calibrated digital high range Colorimeter. The system shall contain a total chlorine residual of not less than 80% of the initial total chlorine residual before the 24-hour soaking period began. If the total chlorine residual has decreased more than 20%, the system may be soaked for an additional 24-hour period as determined by the City representative. If the total chlorine residual has not deceased after this additional 24-hour period, as determined by a calibrated digital high range Colorimeter, the system shall be flushed in accordance with the procedure detailed herein. If the total chlorine residual has decreased, as determined by a calibrated digital high range Colorimeter, the system shall be flushed in accordance with the procedure detailed herein and shall be re-disinfected. Following a successful retention period as determined by the City representative, the chlorinated water shall be flushed from the system at its extremities and at each appurtenance, using potable water from a source designated by the City. The minimum water velocity during flushing shall be 3 feet per second or as directed by the City.

Flushing shall continue until the replacement water in the new system is equal in chlorine residual to the potable source of supply as verified by the City representative.

5.302.6 Main Isolation

Potable water may be supplied from a temporary backflow-protected connection to the existing distribution system or other supply approved sources. The cross-connection control device shall be consistent with the degree of hazard for backflow protection of the active distribution system. The flow shall be at a constant, measured rate into the newly installed water main. In the absence of a meter, approximate the rate by placing a Pitot gauge in the discharge or measuring the time to fill a container of known volume. The main should undergo hydrostatic pressure testing prior to disinfection.

5.302.7 Wet or Flooded Trench Requirements

Water mains under construction that become flooded by storm water, runoff, ground water, or any other sources shall be cleaned by draining and flushing with metered potable water until clear water is evident. Upon completion, the entire main shall be disinfected using a method approved by the City. Bacteriological sampling will also be taken at a minimum of 200 feet intervals. The number and location of sample sites and areas effected by wet trench disinfection shall be determined by the City.

5.302.8 Bacteriological Sampling

A. At the Contractor's expense, a testing firm will perform bacteriological sampling and testing of all new system installations. The set of samples will include: 24-hr post flush, 48-hr post flush, and 7-Day post flush. The testing methodology employed shall be in accordance with AWWA C651. The Certified Laboratory will analyze the samples for the presence of coliform bacteria, enumerating and confirming members of the coliform group.

B. The evaluation criteria employed by the City for a passing test sample is as follows:

1. Coliform bacteria: no positive sample

If the initial disinfection fails to produce satisfactory bacteriological test results, the pipeline system shall be re-flushed and re-sampled. If the second set of samples does not produce satisfactory results, the pipeline system shall be re-chlorinated, flushed, and re- sampled. The chlorination, flushing, and sampling procedure shall continue until satisfactory results are obtained. Upon the second failure of a bacteriological test the contractor shall meet with the City to evaluate failed testing and provide a plan to proceed. Upon the fourth failure of any bacteriological test the contractor shall submit a written plan to the City of further measures to clean pipes and mains that shall include one or more of the following, hydro jetting, pigging, water jetting, air scouring, test for leaks or any other method to physically clean installed mains. All costs associated with additional disinfection, sampling, and flush water will be the responsibility of the Contractor.

5.302.9 Back Flow Disinfection

All backflow devices used to isolate installed mains from existing City Distribution system for chlorination or flushing shall be disinfected while under supervision of City Backflow Test Technician and then said backflow shall be tested by the City Backflow Test Technician.

5.302.10 Sampling Procedures

Upon a successful disinfection, the installed mains shall be flushed until the residual chlorine is equal to that of source water (0.05mg/L maximum). Source water will then be Bacteriological sampled and tested to certify a baseline for successful testing to follow. A twenty-four (24) hour period between the final flushing and the taking of bacteriological samples is required. No flushing or any movement of water in pipe is allowed during sampling phase. Following the 24-hour period, the Contractor shall have a City approved qualified testing firm take water samples for bacteriological tests. Following another 24 hours the City approved firm shall take additional water samples for bacteriological tests. Water samples for bacteriological tests will be taken again after 5 more days (120 hours), if any one of these tests results in a failure, then the installed mains will be flushed and disinfected again, and this process started again. All sampling

shall be done in the presence of the City representative. Contractor shall notify the City representative 48 hours in advance of sampling procedures. Such tests shall meet CDPH requirements for drinking water standards. The number and location of such samples will be as directed by the City; however, a minimum of one bacteriological test sample per 500 feet of main, one set from the end of each line, one set from each branch greater than one pipe length, and a minimum of 2 samples per day, per test section, are required. **One set of samples are required for two consecutive days, 24 hours apart then again after an additional 120 hours (5 Days). All samples, each day, must indicate absent for total coliform. Failure of any sample will require complete retesting, under these procedures, for seven consecutive days.** It is very important that all test results be submitted in writing to the City as soon as available. All sampling and laboratory testing shall be at the Contractor's expense. Original report of the test results shall be given directly to the City. Emailing the results to the City is preferable. It is the responsibility of the Contractor to accomplish this task. System connections cannot be scheduled until this report is submitted to the City. All results must be submitted to City Representative no later than three calendar days of sample date or risk resampling all samples. Upon successful completion of bacteriological testing, the pipeline will be accepted for use in the City potable water system; however, standard policy is to accept the water mains for use upon the City giving Notice of Acceptance of completed disinfection. No paving can be performed until disinfection complete and approval given by the City.

It is the sole responsibility of Contractor to construct a water main capable of passing the pressure and leakage test and to affect a disinfection of the water main. The fact that City provides inspection during the construction and testing of the water facilities and receives laboratory testing results does not relieve Contractor's responsibility in this regard.

It's the responsibility of Contractor to prevent the consumption of water for any and all uses from undisinfected mains whether by their workmen, subcontractors or any other person who may come in contact with the water from the undisinfected main.

Contractor shall indemnify and save the City harmless from any suits, claims, or actions brought by any person or persons for, or on account of, any sickness or death sustained or arising out of the consumption of water from the main until final acceptance by the City. The Contractor shall not operate any gate valve on any existing main.

The Contractor shall pay all rental and deposit fees for hydrant backflow meter devices checked out from the City plus charges for water used.

5.302.11 Weekend Work

All weekend work is subject to City approval and any request must be made 48 hours in advance and must include a description of all work to be

performed to be considered. In the event it is approved it will be the responsibility of the contractor to pay for all overtime for City staff involved with this work.

5.302.12 Failed Test Requirements

- If chlorine residual drops more than 20% at initial disinfection it will be at the Cities determination that the contractor will be required to flush and disinfect again before continuing with further testing.

- After any failed bacteriological test requires contractor to flush and repeat disinfection.

- At any time, the City can require a Heterotrophic Plate Count test at the cost of the contractor.

- Upon second failed bacteriological test contractor shall meet with the City to evaluate failed testing and provide a plan to proceed with approval of the City.

- Fourth failed bacteriological test contractor shall submit a written plan to the City for approval of further measures to clean pipes and mains that shall include one or more of the following: hydro jetting, pigging, water jetting, air scouring or any other method to physically clean installed mains.

5.303 Final Connections to Existing Mains

After notification of passing bacteriological tests, the connections to the existing mains shall be completed by the Contractor per Standard Plan 514. Requests for City valve operation shall be made per these specifications.

Removal of the meter assembly and replacement with the flanged spool shall be accomplished is a sanitary manner in the presence of City representative. The nearest valves on the newly installed main shall be closed to minimize the amount of water that will enter the excavation. No water shall be allowed to reenter the main.

As each connection is made, the main shall be flushed such that the flow is away from the existing water system. Each connection shall be flushed in this manner until the entire new water system is flushed, all under the direction of the Engineer. Burlap wrapping shall be removed from all hydrants. At this point, the City will take over operation of the water system. The contractor will be responsible for the cost of repairing any damage to the system until acceptance by the City Council.

5.304 Backflow Certification

All backflow prevention devices installed shall be certified and tested in accordance with current regulations of the California-Nevada Section of the American Water Works Association (AWWA). Certification shall be provided to

the City Public Works Department prior to acceptance of new backflow prevention devices.

In addition, the location of any backflow prevention device shall be field verified with the City Public Works Department, or their appointed representative, prior to installation.

City of Riverbank
STANDARD PLANS

WATER

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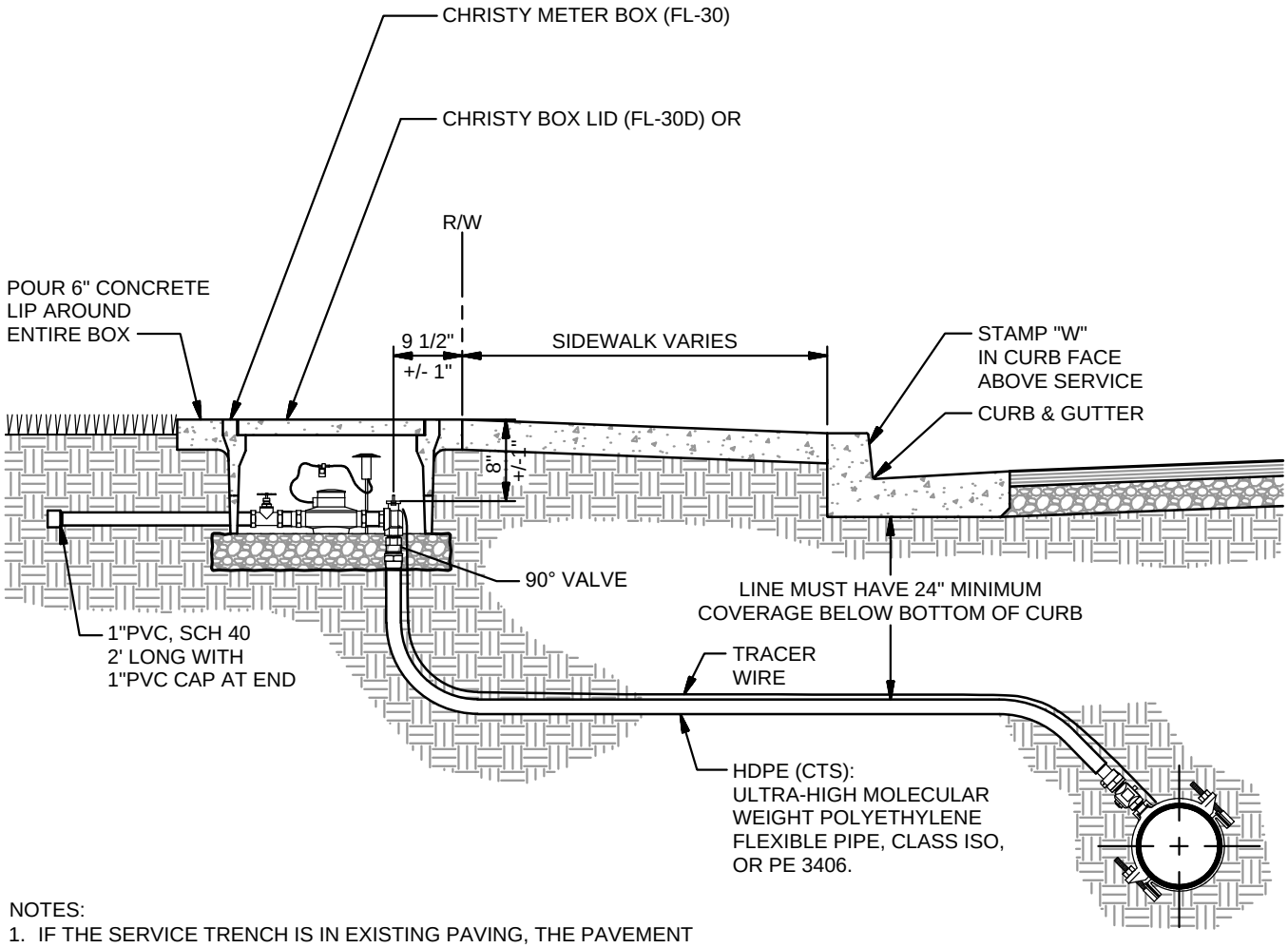


REFER TO (STD 502)

NOTES:

1. IF THE SERVICE TRENCH IS IN EXISTING PAVING, THE PAVEMENT SHALL BE REPLACED AS PER SPECIFICATIONS FOR MAIN LINE TRENCH.
2. CONTRACTOR/OWNER SHALL BE RESPONSIBLE FOR DAMAGE TO THE CURB, GUTTER AND SIDEWALK, INCLUDING DRAINAGE FROM SETTING THE TRENCH, IF THEY ARE INSTALLED PRIOR TO TRENCHING.
3. CURB, GUTTER AND SIDEWALK TO BE INSTALLED AFTER WATER SERVICE INSTALLATION, UNLESS OTHERWISE NOTED.
4. SERVICE LINE SHALL BE A MINIMUM OF 24" BELOW BOTTOM OF CURB.
5. ALL FITTINGS TO BE BRASS.

CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

William F. Kull

CITY ENGINEER - WILLIAM F. KULL

NEW 1" WATER SERVICE
RESIDENTIAL

DRAWN BY:	DATE:	SCALE:	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
GK	2/2/18	NTS	2-13-18	501
REVISIONS:	SECTION:	DRAWING NAME:		
NONE	WATER	501.DWG		

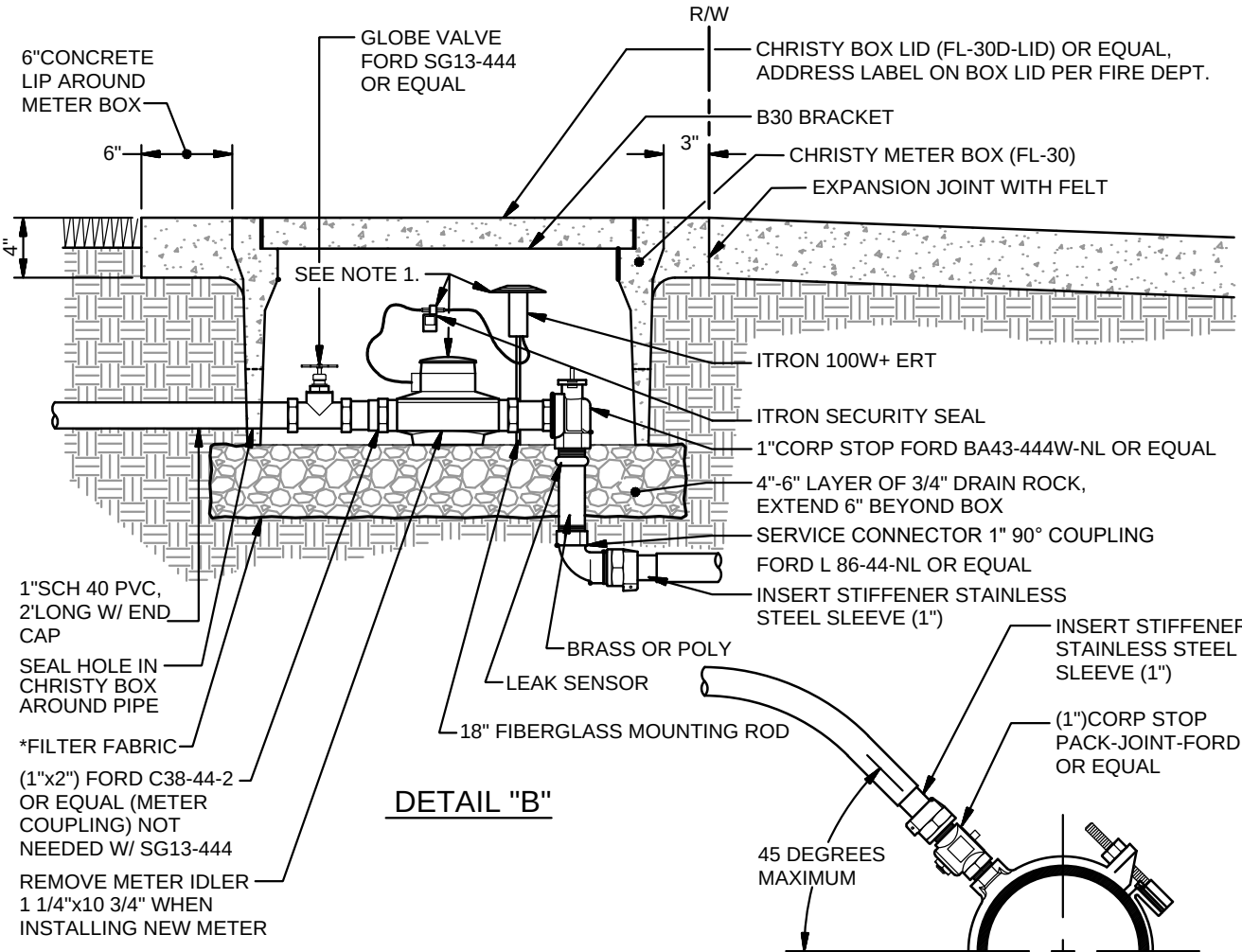
VENDOR:
CONTACT THE WATER SUPERVISOR
FOR VENDOR INFORMATION:
CITY OF RIVERBANK
6707 THIRD ST (MAILING)
2901 HIGH ST
RIVERBANK, CA 95367
PHONE (209)869-7128

METER INFORMATION:
1"BADGER METER MODEL 55
BRONZE DISK METER
HR-E 8 DIAL REGISTER WITH ILC
ITRON 100W+ ERT
ITRON LEAK SENSOR+ METERED IN GALLONS

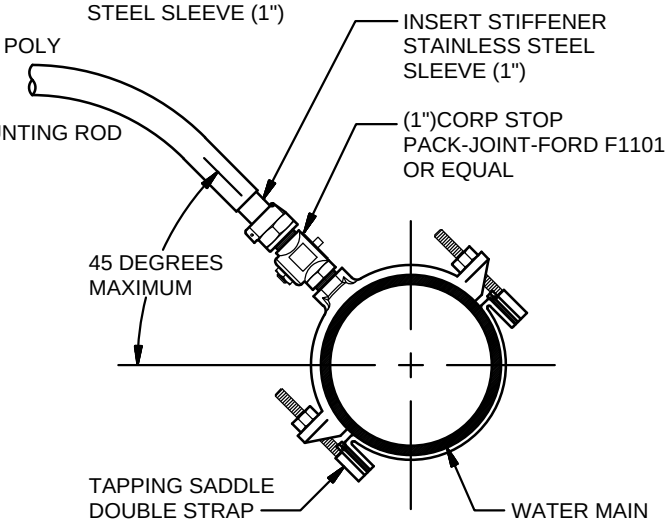
NOTES:
1. CONTRACTOR/OWNER TO FURNISH AND INSTALL NEW 1" WATER METER, SENDING UNIT, BRACKET AND SECURITY SEAL PER METER INSTALLATION MANUALS. REFER TO ATTACHED DETAILS.

2. CITY TO INSPECT INSTALLATION OF METER SENDING UNIT AND LEAK SENSOR, VERIFY METER NUMBER TO HOUSE ADDRESS PRIOR TO HOUSE OCCUPANCY.

3. CONTRACTOR TO TAKE SPECIAL CARE AS NOT TO CROSS THREAD BRASS FITTINGS ONTO PLASTIC METER. THIS WILL DAMAGE THE METER. PLEASE CONTACT THE PUBLIC WORKS DEPARTMENT AT (209)869-7128, IF YOU HAVE ANY INSTALLATION QUESTIONS.



DETAIL "B"



DETAIL "A"

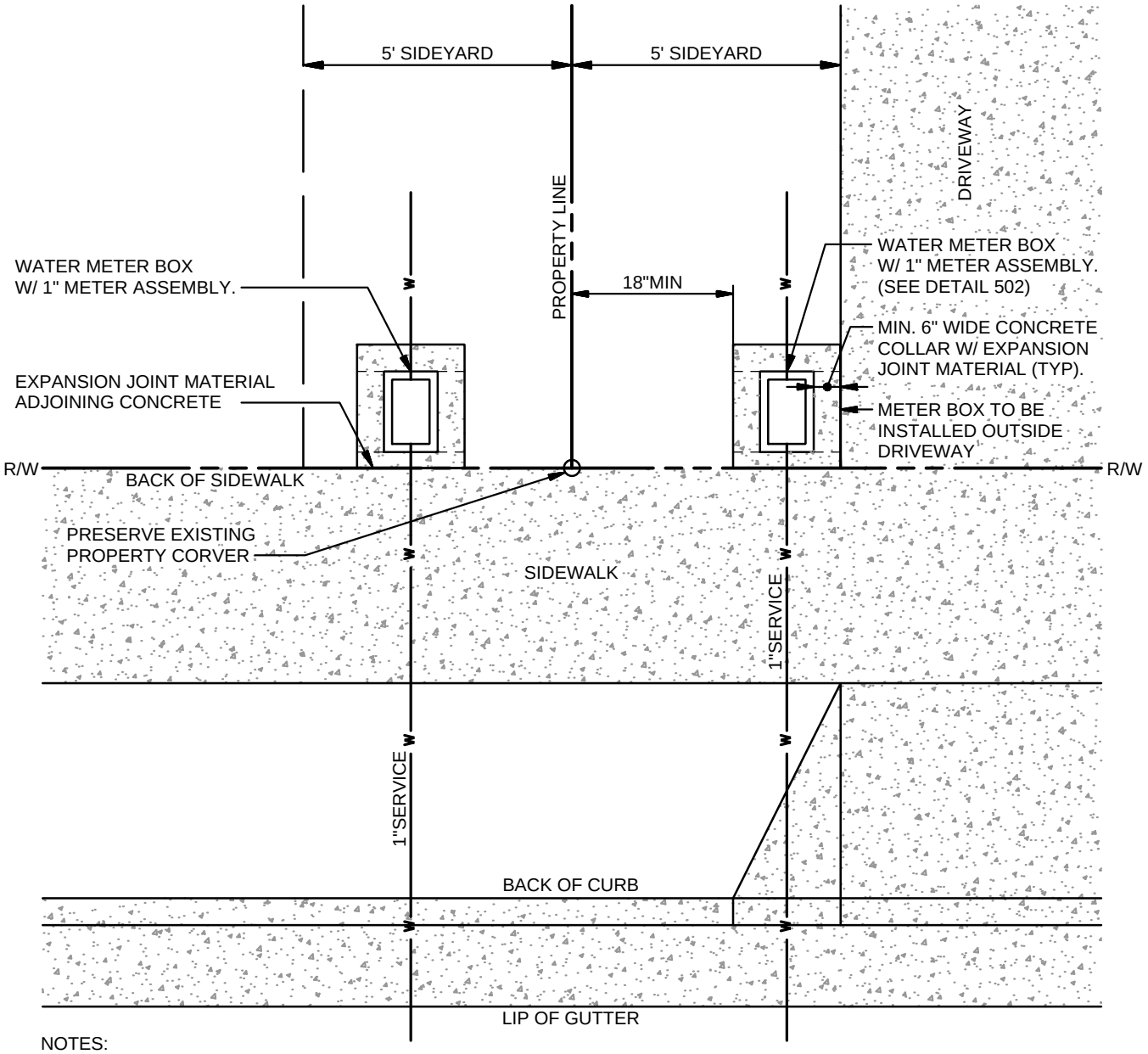
(* CALTRANS STANDARD H7 WOVEN WIRE CLOTH)

CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

William F. Kull
CITY ENGINEER - WILLIAM F. KULL

NEW 1" WATER SERVICE
RESIDENTIAL

DRAWN BY:	DATE:	SCALE:	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
GK	1/30/18	NTS	2-13-18	502
REVISIONS: NONE	SECTION: WATER	DRAWING NAME: 502.DWG		



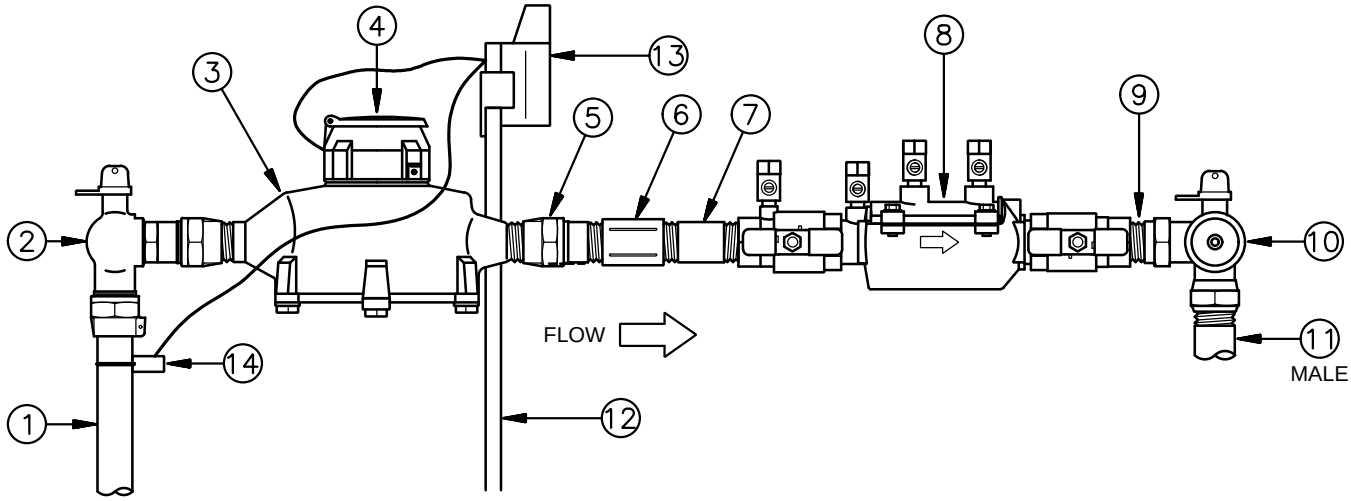
NOTES:

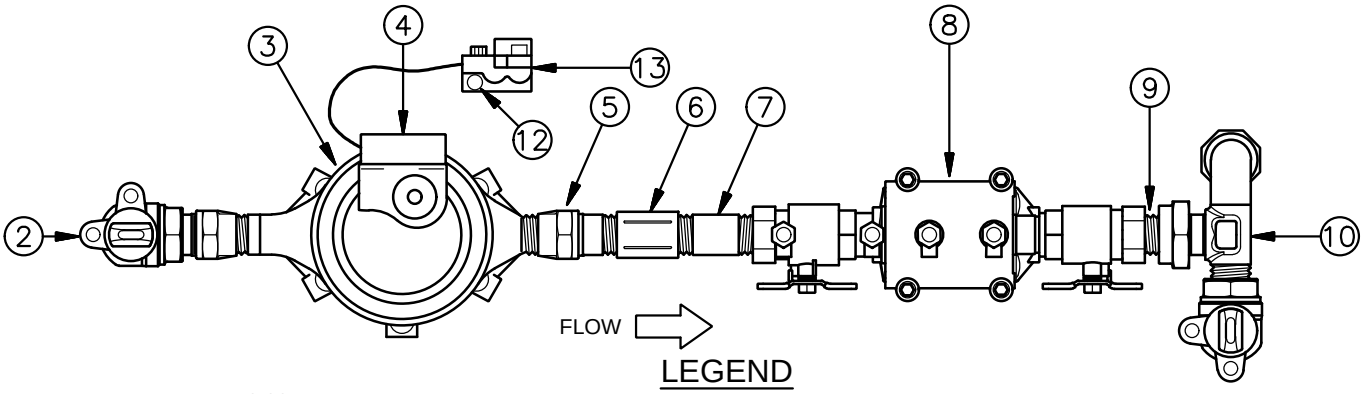
1. THE PREFERRED LOCATION FOR THE NEW RESIDENTIAL WATER SERVICE IS 18" TO 5 FEET OFF THE PROPERTY CORNER AND ON THE OPPOSITE SIDE OF THE LOT FROM JOINT TRENCH SERVICES (CABLE, GAS, ELECTRIC PHONE, AND SEWER). HOWEVER, THIS STANDARD LOCATION MAY BE SHIFTED FURTHER FROM THE PROPERTY LINE AS NECESSARY TO AVOID CONFLICTS WITH OTHER UTILITIES.

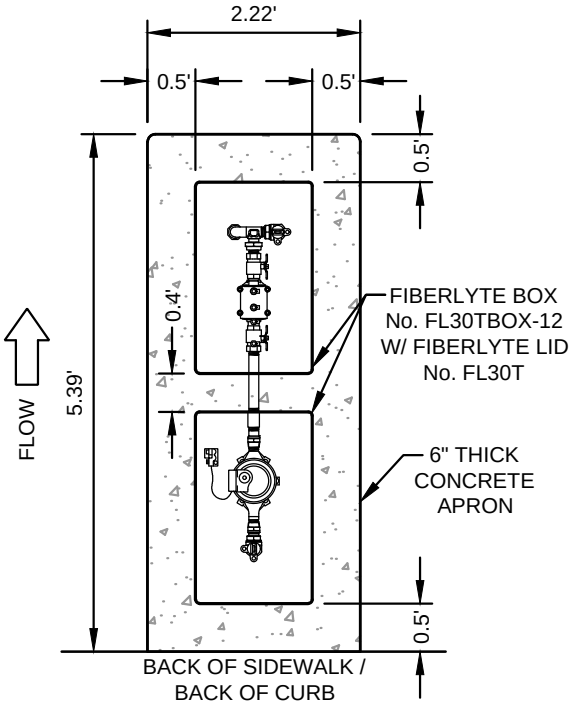
2. IN NO CASE SHALL A WATER SERVICE BOX BE LOCATED WITHIN DRIVEWAY, OR WITHIN OTHER AREAS OF ONSITE CONCRETE (i.e. SLABS, SIDEWALKS, DECORATIVE). EXCEPTIONS TO THIS RULE WILL BE GRANTED ONLY WHEN IT IS NOT PRACTICAL OR FEASIBLE TO KEEP THE SERVICE BOX OUT OF THE DRIVEWAY, AND SHALL REQUIRE SPECIFIC APPROVAL BY THE CITY ENGINEER. SERVICES WITHIN DRIVEWAYS, IF ALLOWED, WILL REQUIRE A TRAFFIC RATED BOX AND CAST IRON LID.

3. THE CONTRACTOR IS TO PRESERVE ALL PROPERTY CORNERS. DAMAGED OR REMOVED CORNERS WILL REQUIRE REPLACEMENT BY A LICENSED LAND SURVEYOR, AT THE CONTRACTOR'S EXPENSE.

CITY OF RIVERBANK DEPARTMENT OF PUBLIC WORKS			1" WATER SERVICE METER BOX LOCATION	
William F. Kull CITY ENGINEER - WILLIAM F. KULL				
DRAWN BY: GK	DATE: 7/21/15	SCALE: NTS	ADOPTED BY THE CITY COUNCIL: 2-13-18	DRAWING NO. 503
REVISIONS: NONE	SECTION: WATER	DRAWING NAME: 503.DWG		







LEGEND

1. 1" CTS(POLY PIPE) SUPPLY LINE FROM WATER MAIN.
2. FORD 1" ANGLE BALL VALVE - MODEL BA43-444W-NL.
3. BADGER METER - MODEL 55, 1" RECORDALL COLD WATER BRONZE DISC METER WITH BRASS BOTTOM.
4. BADGER METER - HR-E 8 DIAL ENCODER REGISTER WITH ITRON IN-LINE CONNECTOR, GALLONS.
5. FORD METER COUPLING - MODEL C38-44-2-NL.
6. 1" BRASS COUPLING
7. 1"SCH-80 PVC NIPPLE (ADJUST LENGTH TO SPAN SERVICE BETWEEN TWO FIBERLYTE BOXES)
8. WILKINS - DOUBLE CHECK VALVE ASSEMBLY - MODEL 950XLT2 OR 350XLT2.
9. 1" THREADED BRASS NIPPLE.
10. FORD ELL TEE FOR FIRESETTER,1"IN X 1"OUTLETS -MODEL LTBA 113-444W-AWT-NL, OR EQUIVALENT.
11. (2)1"SCH-40 SUPPLY LINES TO RESIDENCE - WATER SERVICE AND FIRE SERVICE, OR EQUIVALENT.
12. 18" FIBERGLASS MOUNTING ROD.
13. ITRON 100W+ ERT® COMMUNICATION MODULE, SHOULD BE MOUNTED ABOUT 2" BELOW FIBERLYTE, FL-30D LID.
14. ITRON LEAK SENSOR+

NOTE: WATER & FIRE SERVICE ASSEMBLY TO BE SET WITHIN TWO FIBERLYTE BOXES - No. FL30TBOX-12, WITH FIBERLYTE LIDS No. FL30T. BOXES TO BE INSTALLED IN LINE AND ALLOW ACCESS TO ALL VALVES. BLOCK BELOW BOX CUTOUTS WITH PRESSURE TREATED 2x'S.

CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

NEW 1" WATER & FIRE SERVICE - RESIDENTIAL

William F. Kull
CITY ENGINEER - WILLIAM F. KULL

DRAWN BY:	DATE:	SCALE:	ADOPTED BY CITY COUNCIL	DRAWING NO.
GK	12/6/17	NTS	2-13-18	504
REVISIONS: NONE	SECTION: WATER	DRAWING NAME: 504.DWG		

CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

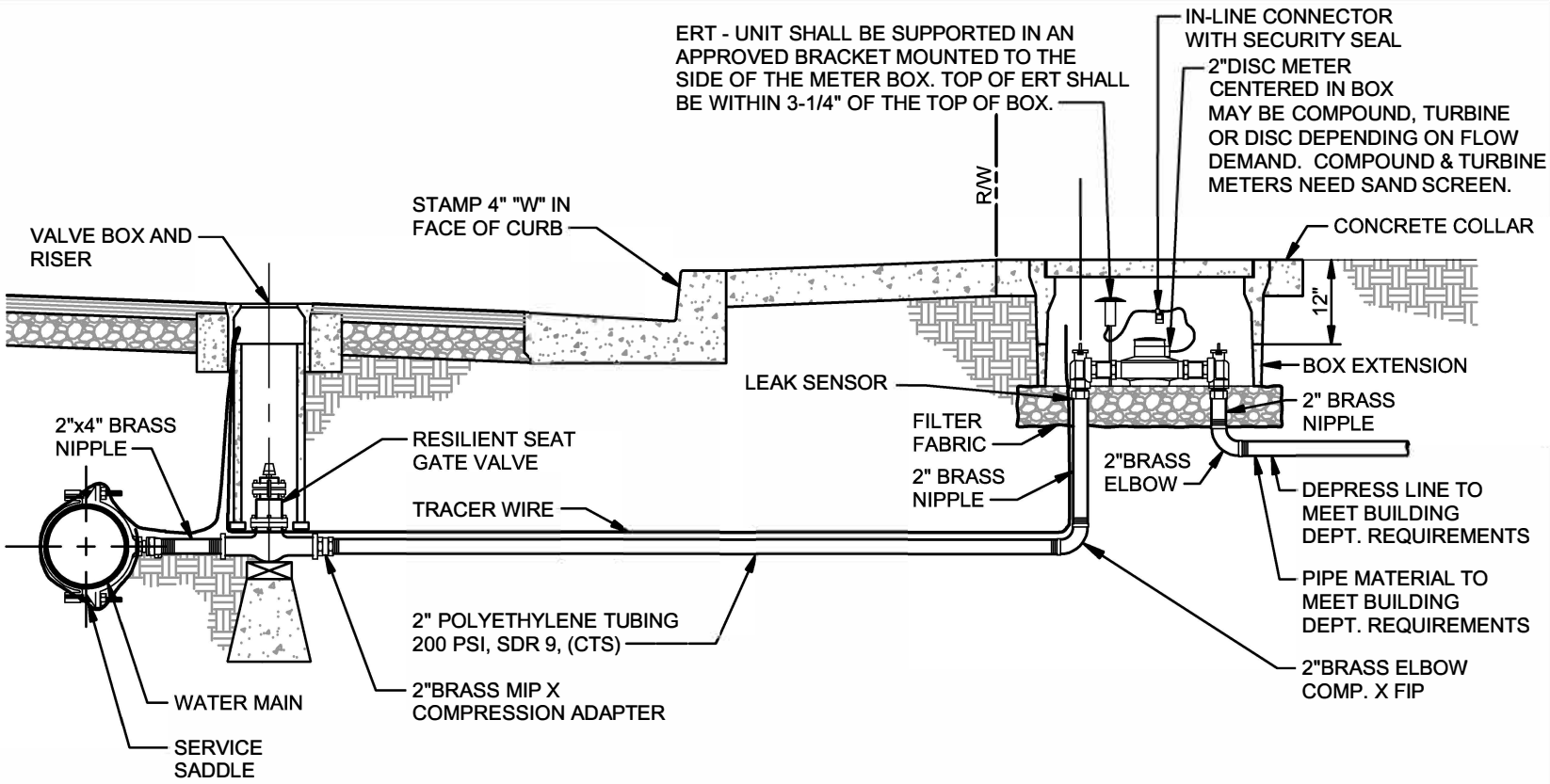
CITY ENGINEER - WILLIAM F. KULL

DRAWN BY: GK
DATE: 2/11/2025
SCALE: NTS
DRAWING NAME: 505.DWG
REVISIONS: NONE
SECTION: WATER

ADOPTED BY THE CITY COUNCIL: 3-11-25

DRAWING NO. 505

2" WATER SERVICE



BOX AND LID FOR COMMERCIAL SERVICE:
B36 OR FL36 & FL36D

NOTES:

1. ALL COMPRESSION FITTINGS SHALL HAVE STAINLESS STEEL INSERTS.
2. METER SHALL BE FURNISHED AND SET BY CONTRACTOR. PROVIDE ERT AND TRANSMITTING REGISTER WITH 5' LEAD.
3. SERVICE LATERAL AND BUILDING SUPPLY LINE SHALL BE INSTALLED UNDER BOX.
4. EXTEND BUILDING SERVICE LINE TO A MINIMUM OF EITHER 2' BEYOND BACK OF METER BOX OR 2' BEYOND BACK OF SIDEWALK AND CAP.
5. REFER TO CITY WATER STANDARDS FOR CONSTRUCTION STANDARDS, SPECIFICATIONS AND ENGINEERS LIST OF APPROVED MATERIALS.
6. NO FENCING SHALL BE INSTALLED BETWEEN STREET AND METER BOX.
7. DISTANCE BETWEEN BOX ENDS AND ANGLE BALL METER VALVES TO BE EQUAL.
8. CONNECT SERVICE TRACER WIRE TO THE TRACER WIRE ON THE MAIN. IN ABSENCE OF MAIN TRACER WIRE, WRAP SERVICE TRACER WIRE AROUND THE MAIN. RUN CONTINUOUS FROM MAIN TO METER BOX WITH LOOPS INTO EACH VALVE BOX.

CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

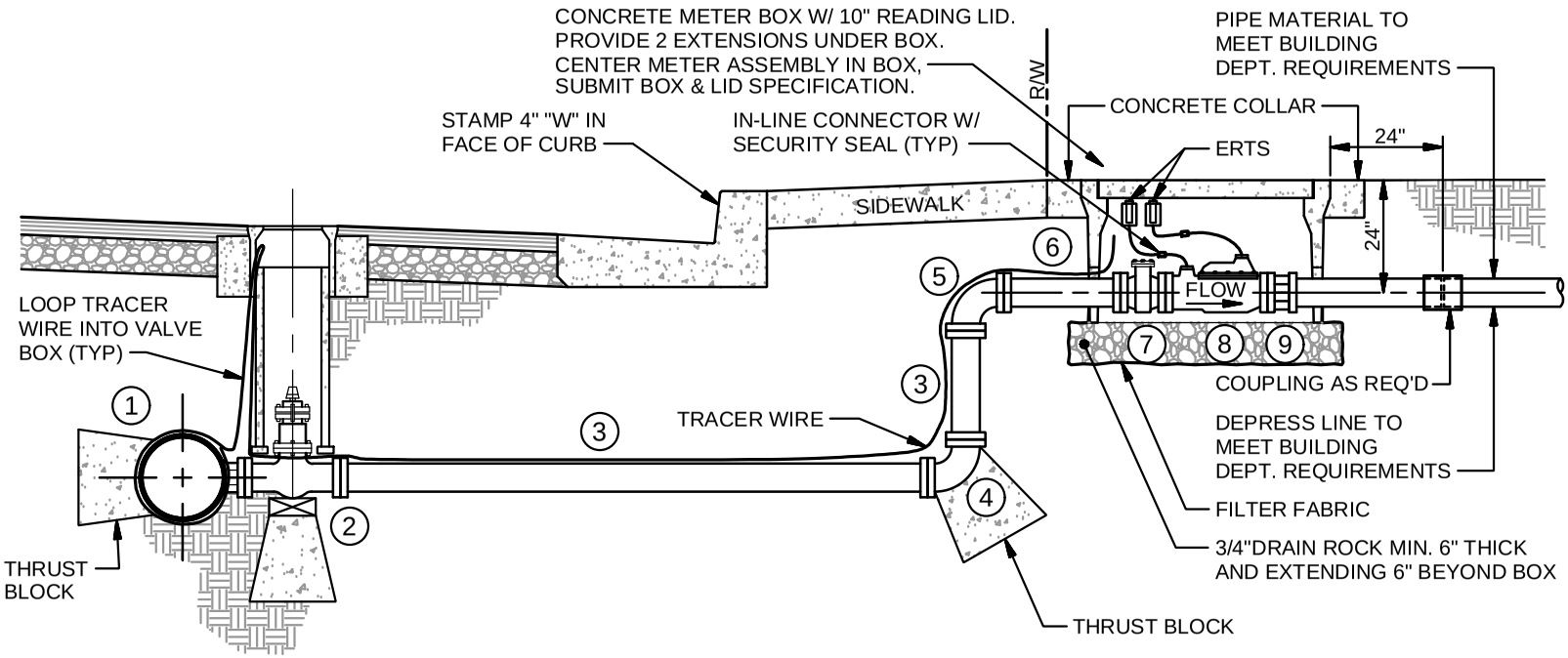
CITY ENGINEER - WILLIAM F. KULL

DRAWN BY: GK
DATE: 7/21/15
SCALE: NTS
DRAWING NAME: 506.DWG
REVISIONS: NONE
SECTION: WATER

WATER SERVICE
4" AND LARGER

ADOPTED BY THE CITY COUNCIL: 2-13-18

DRAWING NO. 506

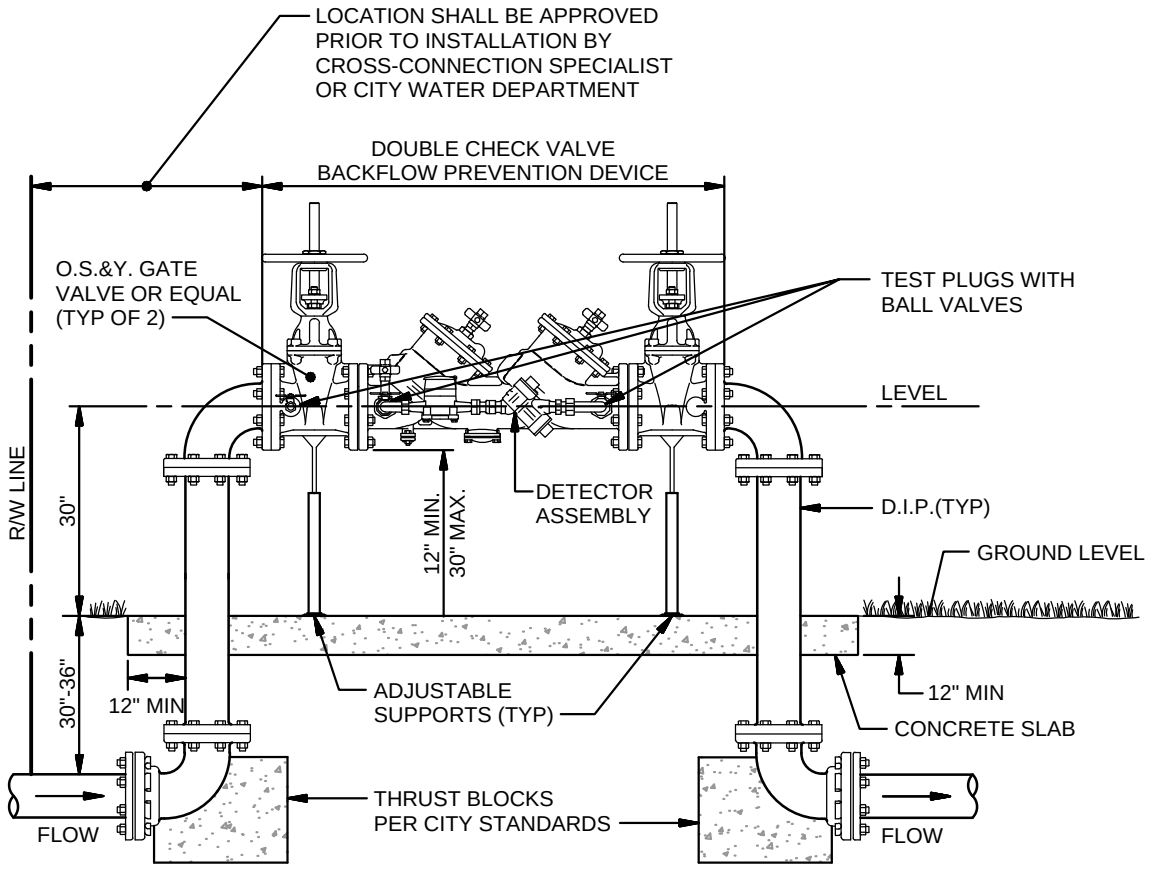


NOTES:

1. SET METER BOX FLUSH WITH FINISHED SURFACE.
2. METER ASSEMBLY SHALL BE FURNISHED AND INSTALLED BY CONTRACTOR. PROVIDE ERTS AND TRANSMITTING REGISTERS WITH 5 FT. LEADS.
3. REFER TO CITY STANDARD 515 FOR GATE VALVE INSTALLATION DETAILS. VALVES MAY BE INSTALLED IN SIDEWALK WHERE SPACE LIMITATIONS EXIST.
4. REFER TO CITY WATER STANDARDS FOR CONSTRUCTION STANDARDS, SPECIFICATIONS AND ENGINEER'S LIST OF APPROVED MATERIALS.
5. PIPE OPENINGS IN METER BOX SHALL BE CUT - DO NOT USE HAMMER. PRIOR TO BACKFILLING, PIPE OPENINGS AND BOX JOINTS SHALL BE GROUTED.
6. CONNECT SERVICE TRACER WIRE TO THE TRACER WIRE ON THE MAIN. IN ABSENCE OF MAIN TRACER WIRE, WRAP SERVICE TRACER WIRE AROUND THE MAIN. RUN CONTINUOUS FROM MAIN TO METER BOX WITH LOOPS INTO EACH VALVE BOX.
7. ERTS TO BE MOUNTED IN APPROVED BRACKET ATTACHED TO BOX WITH STAINLESS STEEL ANCHORS. THE TOP OF ERTS SHALL BE NO MORE THAN 3-1/4" BELOW TOP OF BOX.
8. NO FENCING SHALL BE INSTALLED BETWEEN STREET AND METER BOX.
9. ALL METER ASSEMBLIES SHALL BE BADGER MODEL FSAA-01.

METER INFORMATION:
FOR METER INFORMATION CONTACT NATIONAL METER AND AUTOMATION INC.

NO	ITEM DESCRIPTION
①	TEE OR TAPPING TEE WITH FLANGED OUTLET
②	GATE VALVE, FLG X MJ
③	DIP, PVC (LENGTH AS REQUIRED, INTERMEDIATE JOINTS RESTRAINED)
④	90° ELL, MJ W/MEGA-LUG RETAINER GLANDS
⑤	90° ELL, MJ W/MEGA-LUG RETAINER GLAND X FLG
⑥	DIP SPOOL, FLG (24" MIN. LENGTH)
⑦	PLATE STRAINER
⑧	COMPOUND METER W/ 2 TRANSMITTING REGISTERS AND 2 ERTS
⑨	FLANGED COUPLER ADAPTER



FIRE SERVICE-DOUBLE CHECK DETECTOR ASSEMBLY

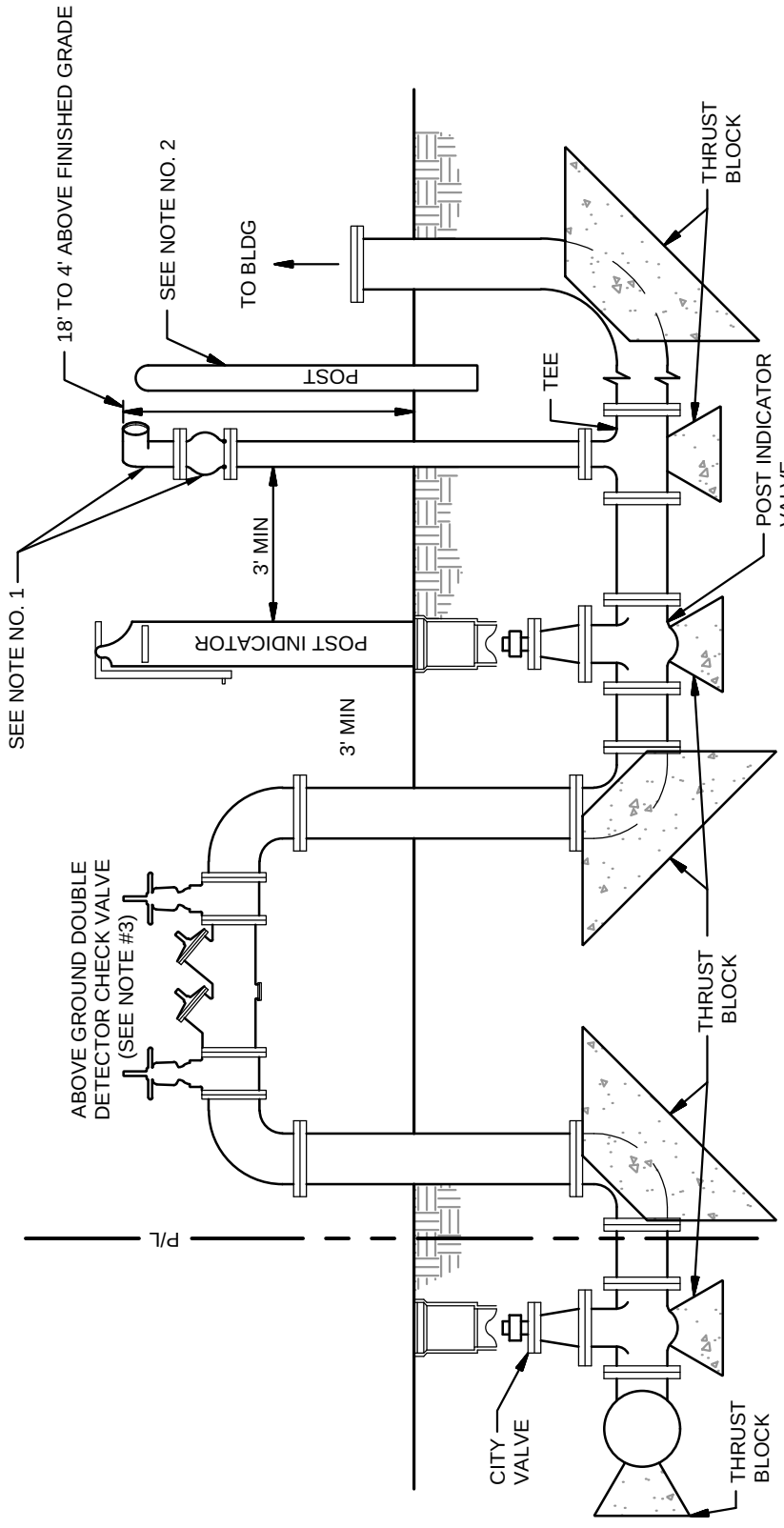
NOTES:

1. REQUIRED BY TITLE 17 OF THE CALIF. DEPT OF HEALTH SERVICES, MODEL OF BACKFLOW DEVICE TO BE DETERMINED FOR EACH INSTALLATION DEPENDING ON THE TYPE OF HAZARD AND UPON ALLOWABLE HEAD LOSS.
2. BARRIER POST SHALL BE LOCATED TO PROTECT PIPING AND VALVES. CURB AND PARKING BARRIERS CAN BE CONSIDERED PROTECTION IF EFFECTIVELY LOCATED.
3. DEVICE SHALL BE ACCESSIBLE FOR TESTING AND MAINTENANCE.
4. CERTIFICATION REQUIRED PRIOR TO ACCEPTANCE.
5. ALL DESIGN PLANS ARE TO BE SUBMITTED TO THE CROSS-CONNECTION SPECIALIST FOR APPROVAL AND A CROSS CONNECTION SURVEY IS TO COMPLETED TO EVALUATE HAZARDS THAT POSSIBLY EXIST.
6. ELECTRONICALLY MONITORED TAMPER SWITCHES ARE REQUIRED IN ACCORDANCE WITH NFPA72.

MATERIALS:

1. ALL STEEL PIPE SHALL BE AS PER AWWA C-200 WITH 1/4" WALL COATED AND LINED BY FUSION BONDED EPOXY AS PER AWWA C-213, 20 MILS MINIMUM
2. ALL STEEL FLANGES SHALL BE CLASS D AS PER AWWA C-207
3. ALL DUCTILE IRON FITTINGS SHALL MEET AWWA C-153 CLASS 150. THE INTERIOR SHALL BE MORTAR LINED AS PER AWWA C-104 AND BELOW GROUND EXTERIOR SHALL HAVE A COAL TAR COATING AS PER AWWA C-203.
4. ALL NUTS AND BOLTS BELOW GROUND SHALL BE POLYETHYLENE ENCASED AS PER AWWA C-105 AND TAPE WRAPPED AS PER AWWA C-209. 20 MILS MINIMUM IN BOTH CASES.
5. STEEL CAGE & BLANKET REQUIRED.

CITY OF RIVERBANK DEPARTMENT OF PUBLIC WORKS			FIRE SERVICE DOUBLE DETECTOR CHECK VALVE	
William F. Kull CITY ENGINEER - WILLIAM F. KULL				
DRAWN BY: GK	DATE: 12/6/17	SCALE: NTS	ADOPTED BY THE CITY COUNCIL: 2-13-18	DRAWING NO. 507
REVISIONS: NONE	SECTION: WATER	DRAWING NAME: 507.DWG		



NOTES:

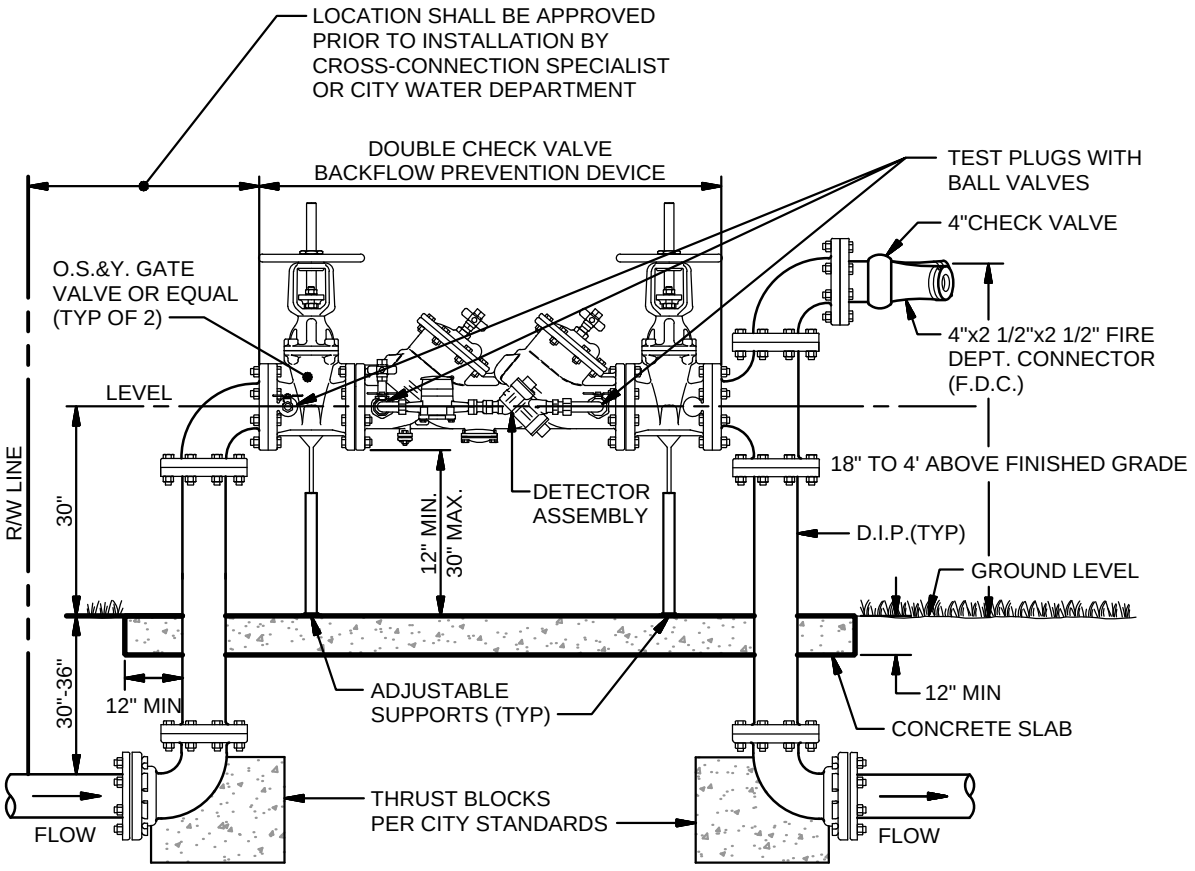
1. LISTED AND APPROVED FIRE DEPT. CONNECTION WITH CHECK VALVE PER CITY OF RIVERBANK FIRE DEPT. REQUIREMENTS.
2. GUARD POSTS AS REQUIRED.
3. DOUBLE CHECK VALVE WITH VALVES DETERMINED BY FIRE SPRINKLER DESIGNER WITH APPROVAL BY THE CITY CROSS CONNECTION SPECIALIST. ALSO REQUIRED FOR FIRE HYDRANTS ON PRIVATE PROPERTY.
4. CLASS 3-6 FIRE SPRINKLER SYSTEMS SHALL REQUIRE A REDUCED PRESSURE DEVICE. PLANS SHALL BE APPROVED BY THE CROSS CONNECTION SPECIALIST.
5. CLASS 200, C-900 PIPE.
5. BLANKET AND CAGE REQUIRED ON ALL INSTALLATIONS

CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

William F. Kull
CITY ENGINEER - WILLIAM F. KULL

FIRE SERVICE DOUBLE DETECTOR CHECK VALVE WITH P.I.V. AND F.D.C.

DRAWN BY:	DATE:	SCALE:	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
GK	1/30/18	NTS	2-13-18	508
REVISIONS: NONE	SECTION: WATER	DRAWING NAME: 508.DWG		



FIRE SERVICE-DOUBLE DETECTOR CHECK VALVE WITH FIRE DEPARTMENT CONNECTION

NOTES:

1. REQUIRED BY TITLE 17 OF THE CALIF. DEPT OF HEALTH SERVICES, MODEL OF BACKFLOW DEVICE TO BE DETERMINED FOR EACH INSTALLATION DEPENDING ON THE TYPE OF HAZARD AND UPON ALLOWABLE HEAD LOSS.
2. BARRIER POST SHALL BE LOCATED TO PROTECT PIPING AND VALVES. CURB AND PARKING BARRIERS CAN BE CONSIDERED PROTECTION IF EFFECTIVELY LOCATED.
3. DEVICE SHALL BE ACCESSIBLE FOR TESTING AND MAINTENANCE.
4. CERTIFICATION REQUIRED PRIOR TO ACCEPTANCE.
5. ALL DESIGN PLANS ARE TO BE SUBMITTED TO THE CROSS-CONNECTION SPECIALIST FOR APPROVAL AND A CROSS CONNECTION SURVEY IS TO COMPLETED TO EVALUATE HAZARDS THAT POSSIBLY EXIST.
6. ELECTRONICALLY MONITORED TAMPER SWITCHES ARE REQUIRED IN ACCORDANCE WITH NFPA72.

MATERIALS:

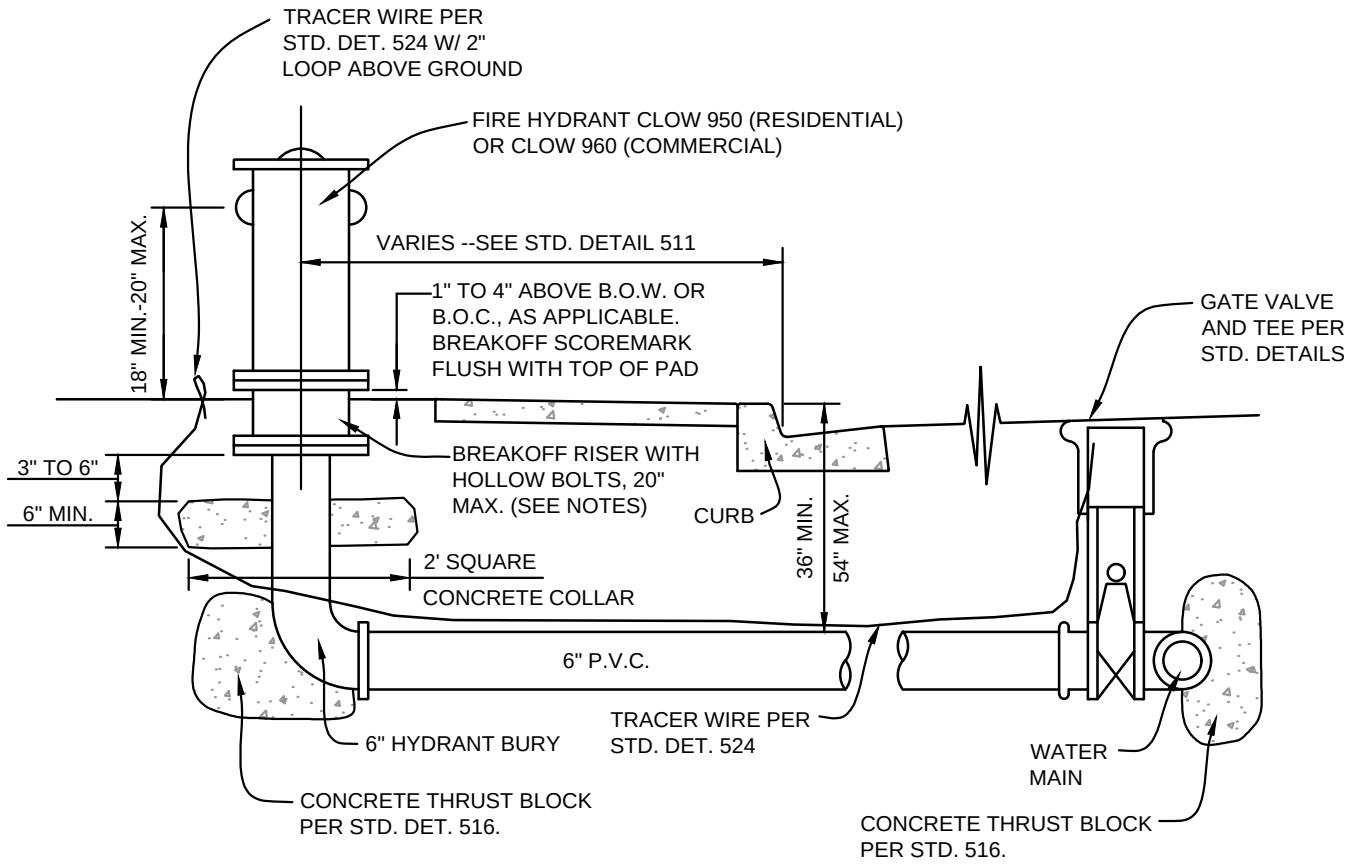
1. ALL STEEL PIPE SHALL BE AS PER AWWA C-200 WITH 1/4" WALL COATED AND LINED BY FUSION BONDED EPOXY AS PER AWWA C-213, 20 MILS MINIMUM
2. ALL STEEL FLANGES SHALL BE CLASS D AS PER AWWA C-207
3. ALL DUCTILE IRON FITTINGS SHALL MEET AWWA C-153 CLASS 200. THE INTERIOR SHALL BE MORTAR LINED AS PER AWWA C-104 AND BELOW GROUND EXTERIOR SHALL HAVE A COAL TAR COATING AS PER AWWA C-203.
4. ALL NUTS AND BOLTS BELOW GROUND SHALL BE POLYETHYLENE ENCASED AS PER AWWA C-105 AT TAPE WRAPPED AS PER AWWA C-209. 20 MILS MINIMUM IN BOTH CASES.
5. STEEL CAGE AND BLANKET REQUIRED.

CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

William F. Kull
CITY ENGINEER - WILLIAM F. KULL

FIRE SERVICE DOUBLE DETECTOR CHECK VALVE WITH F.D.C.

DRAWN BY:	DATE:	SCALE:	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
GK	1/30/18	NTS	2-13-18	509
REVISIONS: NONE	SECTION: WATER	DRAWING NAME: 509.DWG		



NOTES:

1. ALL FIRE HYDRANTS ARE TO HAVE HOLLOW BOLTS LOCATED THROUGH THE FIRE HYDRANT FLANGE WITH THEM POINTING DOWN.

2. ALL FIRE HYDRANTS WILL BE INSTALLED SO THAT THE DISTANCE BETWEEN THE CENTER OF THE 4 1/2" OUTLET AND THE TOP OF SIDEWALK OR CURB IN ALL ZONES WILL BE NO LESS THAN 18" AND NO GREATER THAN 20".

3. ALL HYDRANTS SHALL BE PAINTED SAFETY YELLOW AT THE FACTORY AND FURNISHED WITH NATIONAL STANDARD HOSE THREAD OUTLETS AND CAST IRON CAPS.

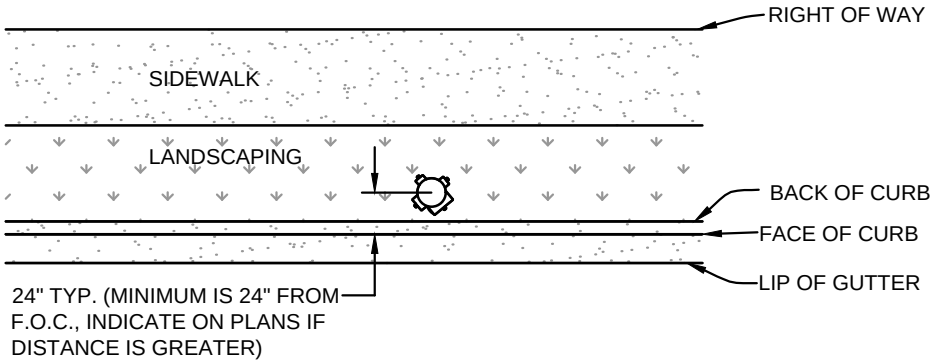
4. INSTALL GUARD POSTS WHERE HYDRANTS ARE INSTALLED IN PAVED AREAS ACCESSIBLE TO TRAFFIC, OR AS OTHERWISE DIRECTED BY THE CITY ENGINEER.

5. ALL FIRE HYDRANTS WHEN INSTALLED, POSITIONED OR REPOSITIONED SUCH THAT THE 4 1/2" DISCHARGE IS 45 DEGREES FROM THE RUN OF THE STREET. IF LOCATED ON A CORNER, 4 1/2" DISCHARGE SHALL BE 45 DEGREES FROM RUN OF NEAREST STREET.

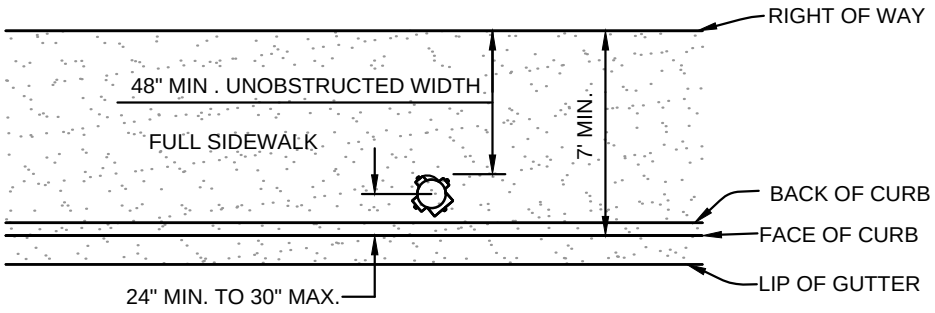
6. HYDRANTS SHALL HAVE ONE 4-1/2" OUTLET, AND TWO 2-1/2" OUTLETS MINIMUM, AND SHALL BE OF A TYPE APPROVED BY THE STANISLAUS CONSOLIDATED FIRE DISTRICT.

7. EACH HYDRANT SHALL BE INSTALLED WITH A BLUE RETROREFLECTIVE PAVEMENT MARKER, INSTALLED 6" FROM THE ADJACENT CENTERLINE OF THE ROADWAY. IF ON A CORNER, MARKERS WILL BE PLACED ON BOTH ADJACENT STREETS.

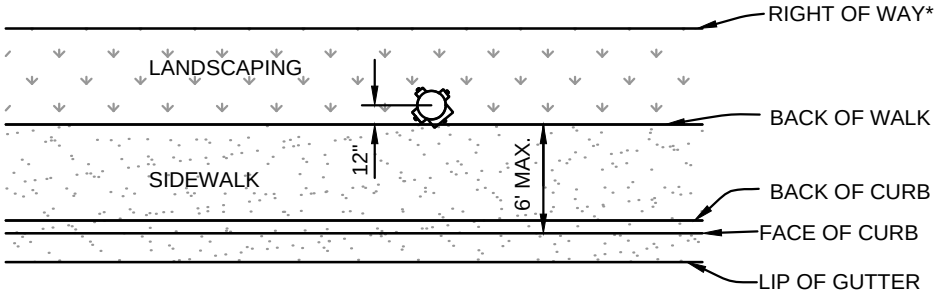
CITY OF RIVERBANK DEPARTMENT OF PUBLIC WORKS			FIRE HYDRANT INSTALLATION	
William F. Kull CITY ENGINEER - WILLIAM F. KULL				
DRAWN BY: GK	DATE: 7/21/15	SCALE: NTS	ADOPTED BY THE CITY COUNCIL: 2-13-18	DRAWING NO. 510
REVISIONS: NONE	SECTION: WATER	DRAWING NAME: 510.DWG		



SPLIT LANDSCAPE / SIDEWALK



FULL SIDEWALK



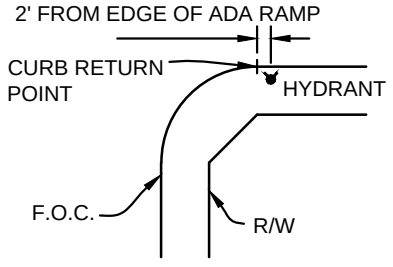
SIDEWALK ADJACENT TO CURB

* NOTE: EASEMENT OR ADDITIONAL R/W DEDICATION WILL BE REQUIRED IF SUFFICIENT LANDSCAPE AREA IS NOT AVAILABE WITHIN R/W FOR INSTALLATION OF HYDRANT.

NOTES:
1. MAINTAIN 48" MIN. CLEAR UNOBSTRUCTED TRAVEL WAY ON SIDEWALKS AND 24" MIN. CLEARANCE FROM F.O.C. IN LOCATIONS WITH DIFFERENT WIDTHS THAN SHOWN ABOVE.

2. HYDRANTS SHALL BE INSTALLED A MIN. OF 5' FROM THE EDGE OF RESIDENTIAL DRIVEWAYS, AND 10' FROM COMMERCIAL DRIVEWAYS. (DISTANCE TAKEN FROM DRIVEWAY THROAT)

3. THE PREFERRED LOCATION FOR HYDRANTS ARE ON CURB RETURNS. HYDRANTS ON STRAIGHT RUNS SHALL BE LOCATED ON PROPERTY LINES WHENEVER POSSIBLE.



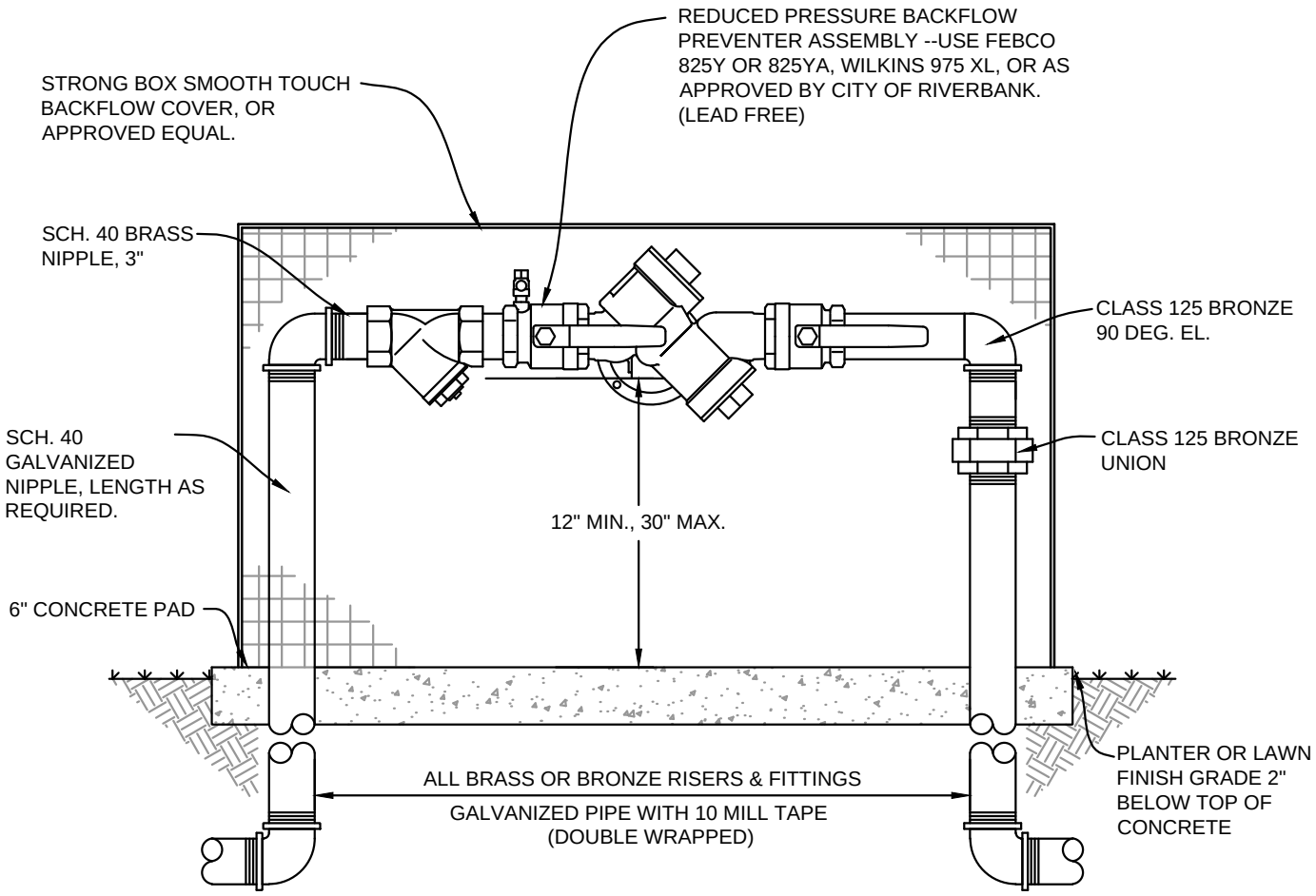
CURB RETURN LOCATION

CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

William F. Kull
CITY ENGINEER - WILLIAM F. KULL

FIRE HYDRANT LOCATION

DRAWN BY:	DATE:	SCALE:	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
GK	7/21/15	NTS	2-13-18	511
REVISIONS: NONE	SECTION: WATER	DRAWING NAME: 511.DWG		



NOTES:

1. INSTALL APPROPRIATELY SIZED WEATHER BLANKET AND CAGE TO ALL BACKFLOW PREVENTION DEVICES.

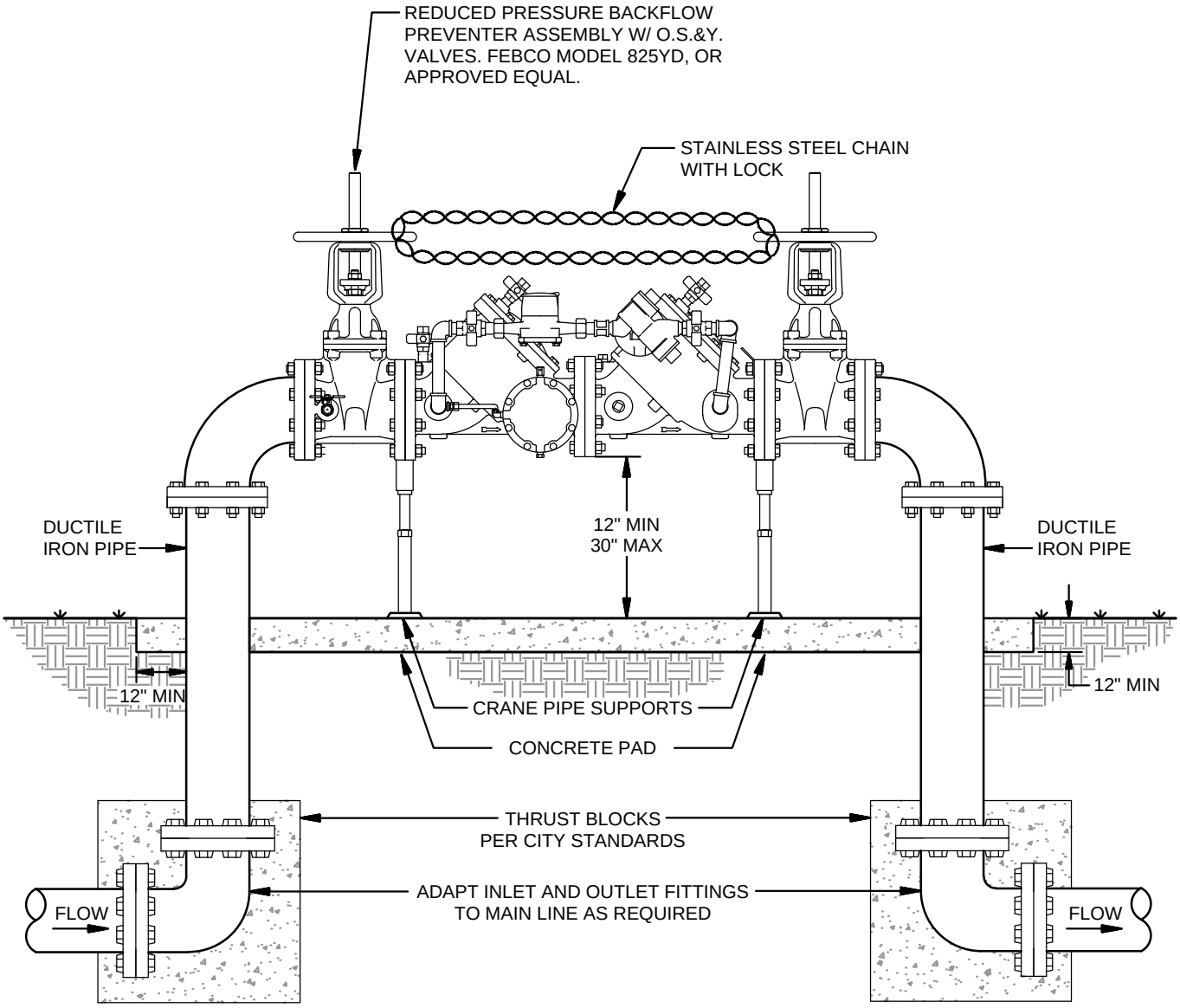
2. BACKFLOW PREVENTERS SHALL BE PLACED IN LANDSCAPE AREAS, A MIN. OF 24" CLEAR FROM ADJACENT CURBS. BACKFLOW PREVENTERS NOT PLACED IN CURBS SHALL REQUIRE GUARD POSTS TO THE SATISFACTION OF THE CITY ENGINEER.

CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

William F. Kull
CITY ENGINEER - WILLIAM F. KULL

REDUCED PRESSURE PRINCIPLE BACKFLOW PREVENTION ASSEMBLY 1" TO 2 1/2" SIZE

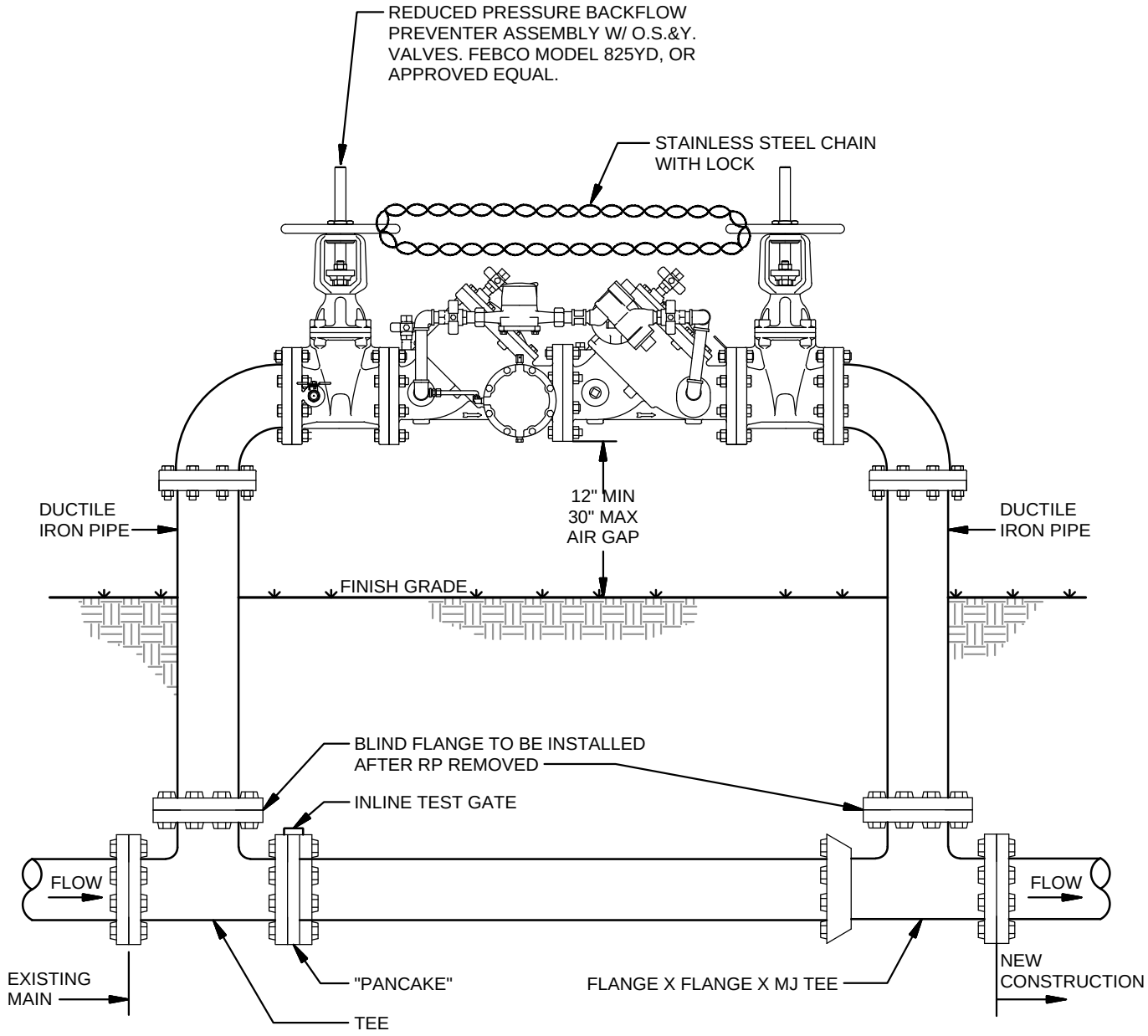
DRAWN BY:	DATE:	SCALE:	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
GK	7/21/15	NTS	2-13-18	512
REVISIONS: NONE	SECTION: WATER	DRAWING NAME: 512.DWG		



NOTES:

1. INSTALL 12" AIR GAP MINIMUM (CONSULT LOCAL CODE)
2. ALL CONNECTIONS ON ASSEMBLY TO BE FLANGED.
3. BACKFLOW ASSEMBLY SHOULD BE PLACED IN A PLANTER SO THAT PLAN MATERIAL WILL SCREEN VIEW OF THE ASSEMBLY FROM THE STREET.
4. INSTALL APPROPRIATELY SIZED WEATHER BLANKET AND CAGE.

CITY OF RIVERBANK DEPARTMENT OF PUBLIC WORKS			REDUCED PRESSURE PRINCIPLE BACKFLOW PREVENTION ASSEMBLY FOR 3" & LARGER	
William F. Kull CITY ENGINEER - WILLIAM F. KULL				
DRAWN BY: GK	DATE: 7/21/15	SCALE: NTS	ADOPTED BY THE CITY COUNCIL: 2-13-18	DRAWING NO. 513
REVISIONS: NONE	SECTION: WATER	DRAWING NAME: 513.DWG		



NOTES:

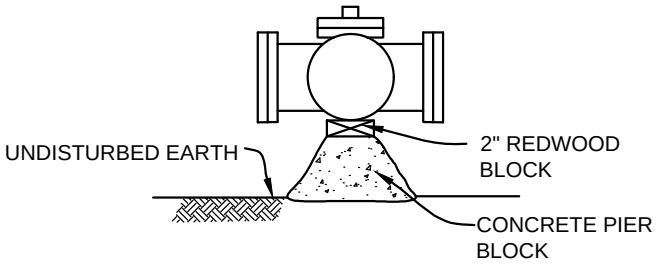
1. BACKFLOW DEVICE TO BE SAME SIZE AS EXISTING MAIN.
2. CONTRACTOR TO PROVIDE INLINE METER REQUIRED BY CITY.
3. CONSTRUCTION METER REQUIRED BY CITY.

CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

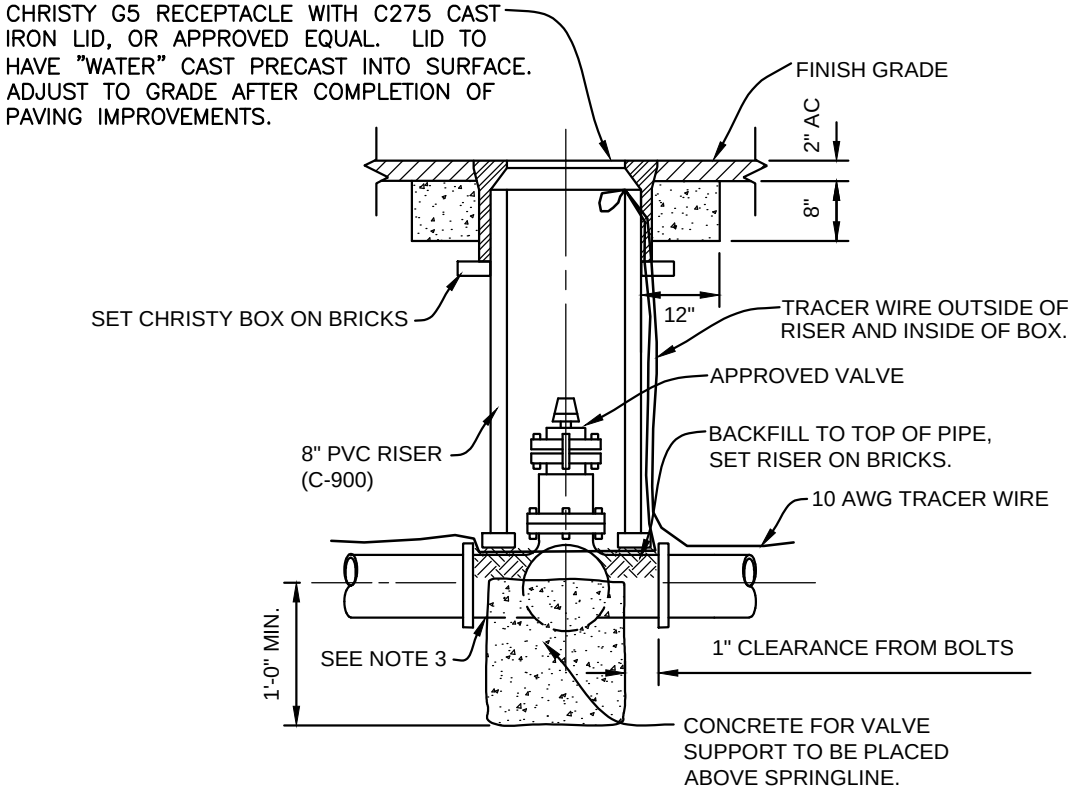
William F. Kull
CITY ENGINEER - WILLIAM F. KULL

TEMPORARY BACKFLOW PREVENTION ASSEMBLY FOR 3" & LARGER

DRAWN BY:	DATE:	SCALE:	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
GK	1/30/18	NTS	2-13-18	514
REVISIONS: NONE	SECTION: WATER	DRAWING NAME: 514.DWG		



HOT TAP VALVE SUPPORT



NOTES:

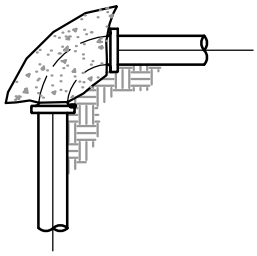
1. INSTALL EXTENSION STEM WHEN DISTANCE FROM VALVE COVER TO OPERATING NUT IS GREATER THAN 48"

2. VALVES SHALL HAVE FLANGED FITTINGS AT ALL TEES AND CROSSES UNLESS OTHERWISE APPROVED BY THE CITY ENGINEER.

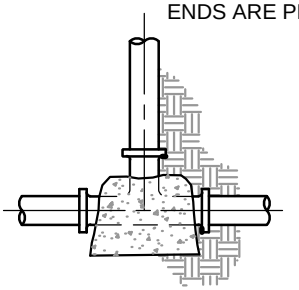
3. PLACE VISQUEEN AROUND VALVES BEFORE PLACEMENT OF CONCRETE SUPPORTS.

4. VALVES SHALL BE RESILIENT SEAT GATE FOR LINES 12" OR LESS, AND BUTTERFLY VALVES FOR LINES GREATER THAN 12".

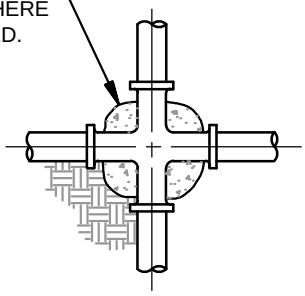
CITY OF RIVERBANK DEPARTMENT OF PUBLIC WORKS			WATER VALVE INSTALLATION	
William F. Kull CITY ENGINEER - WILLIAM F. KULL				
DRAWN BY: GK	DATE: 12/6/17	SCALE: NTS	ADOPTED BY THE CITY COUNCIL: 2-13-18	DRAWING NO. 515
REVISIONS: NONE	SECTION: WATER	DRAWING NAME: 515.DWG		



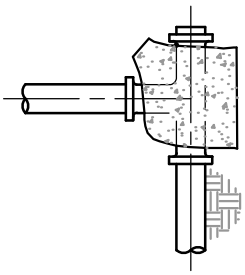
90° BEND



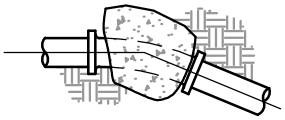
TEE



CROSS

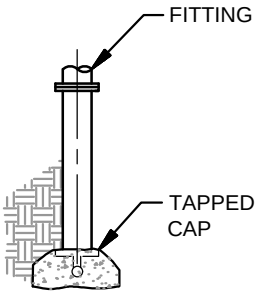


PLUGGED TEE

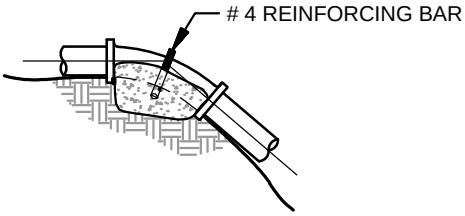


45° OR 22 1/2°

HORIZONTAL BEND

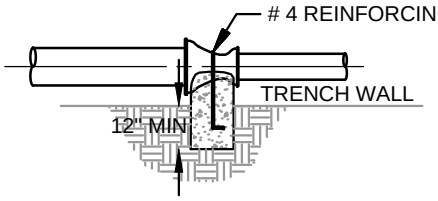


BLOW OFF

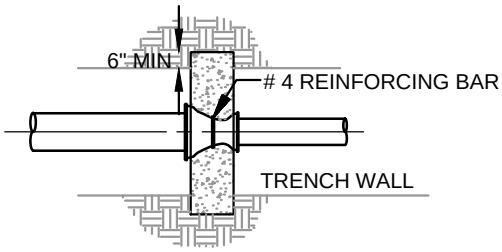


VERTICAL BEND

MINIMUM THRUST BLOCK BEARING AREAS IN SQUARE FEET				
PIPE SIZES	90°	45°	22 1/2°	TEES & BLOWOFF
6"	3	2	2	2
8"	4	3	2	3
10"	6	4	3	4
12"	8	5	3	6
14"	12	7	4	8



PROFILE



PLAN

REDUCERS

NOTES:

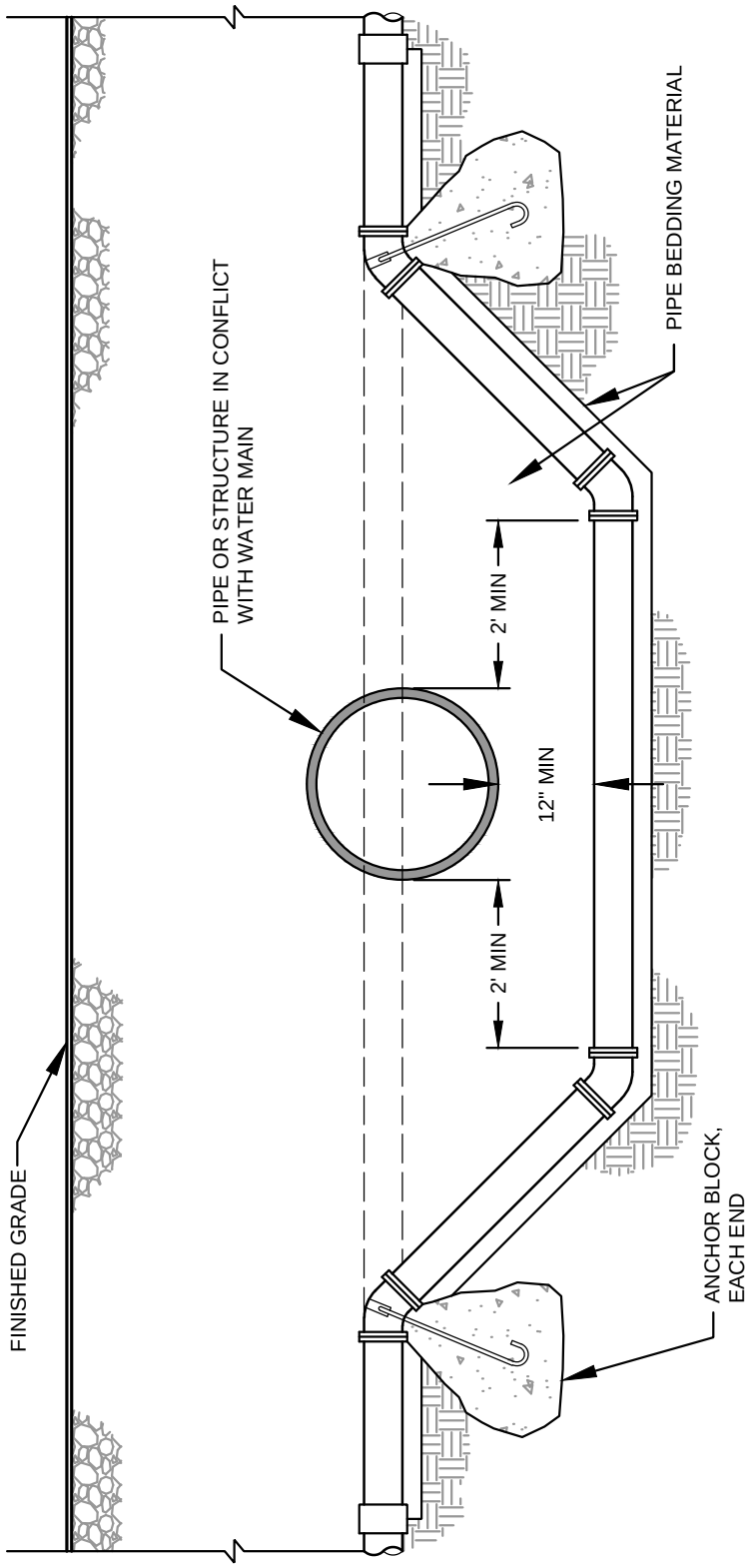
1. CONCRETE SHALL BE 2000 PSI MINIMUM AT 28 DAYS.
2. THRUST BLOCKS SHALL BE PLACED AGAINST UNDISTURBED EARTH.
3. ALL FITTINGS SHALL BE SUPPORTED IN CONCRETE.
4. FOR FIRE HYDRANT THRUSTING SEE 90° BEND.
5. DON'T COVER FLANGE BOLTS WITH CONCRETE.
6. WRAP ALL FITTINGS AND FLANGES WITH VISQUEEN.
7. USE RESTRAINT LENGTH CALCULATOR FOR ADDITIONAL JOINTS.

CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

William F. Kull
CITY ENGINEER - WILLIAM F. KULL

THRUST BLOCK REQUIREMENTS

DRAWN BY:	DATE:	SCALE:	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
GK	12/6/17	NTS	2-13-18	516
REVISIONS: NONE	SECTION: WATER	DRAWING NAME: 516.DWG		



NOTES:

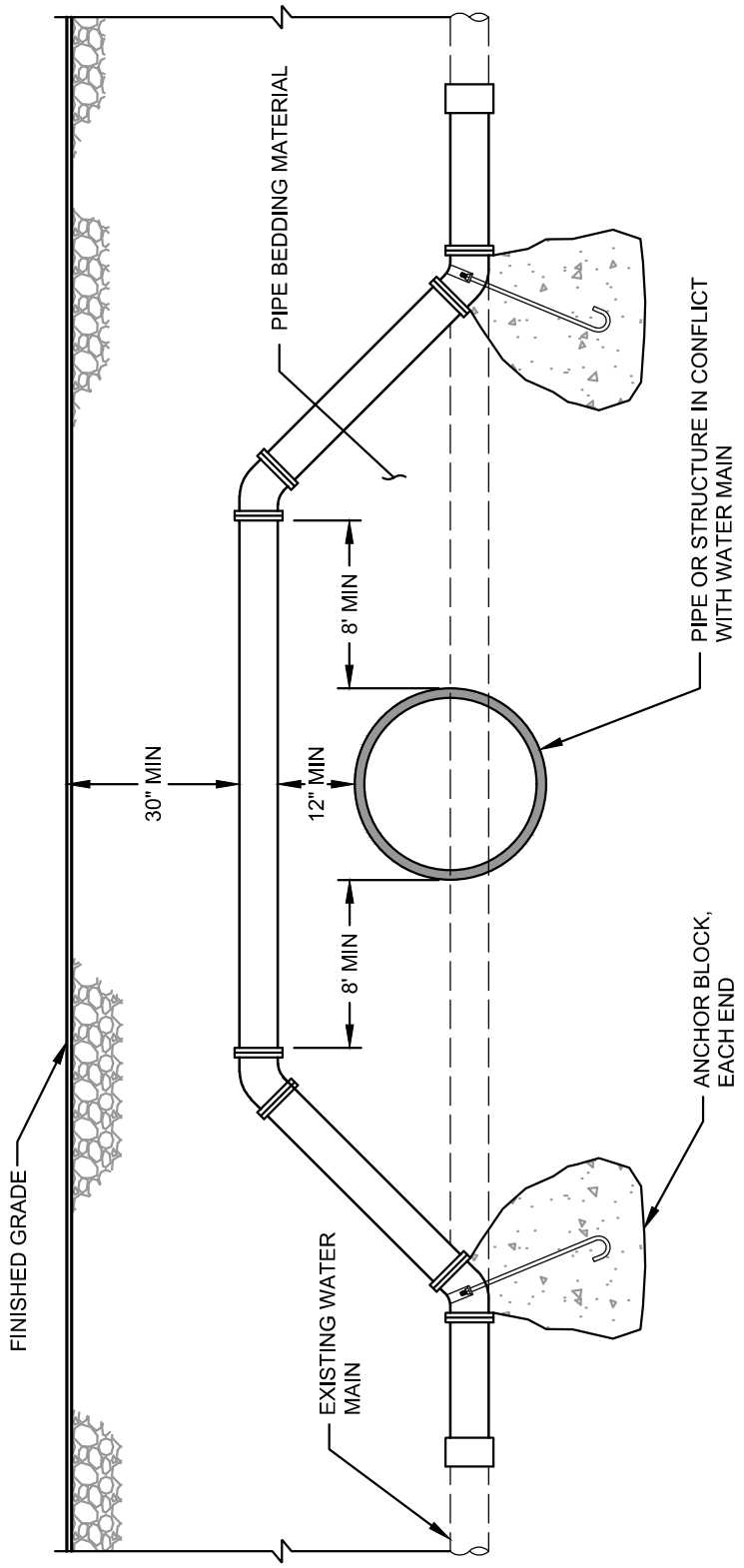
1. ALL PIPE AND FITTINGS SHALL BE DUCTILE IRON & SHALL BE WRAPPED IN POLYETHYLENE - PER CITY OF RIVERBANK STD CONSTRUCTION SPECIFICATIONS.
2. ONLY MECHANICAL JOINT FITTINGS WITH RESTRAINED JOINTS MAY BE USED.
3. ALL BENDS SHALL BE 45° OR 22-1/2° FITTINGS.
4. USE RESTRAINT LENGTH CALCULATOR FOR ADDITIONAL JOINTS.

CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

William F. Kull
CITY ENGINEER - WILLIAM F. KULL

WATER MAIN LOWERING

DRAWN BY:	DATE:	SCALE:	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
GK	7/21/15	NTS	2-13-18	517
REVISIONS: NONE	SECTION: WATER	DRAWING NAME: 517.DWG		



NOTES:

1. ALL PIPE AND FITTINGS SHALL BE CLASS-200 C-900 OR EQUIVALENT PER AWWA STANDARDS
2. ONLY MECHANICAL JOINT FITTINGS WITH RESTRAINED JOINTS MAY BE USED.
3. ALL BENDS SHALL BE 45° OR 22-1/2° FITTINGS. - NO 90° BENDS ALLOWED.
4. IF A MINIMUM COVER OF 30" CAN NOT BE ACHIEVED, THE NEW WATER LINE SHALL BE INCASED WITH CONCRETE (SEE STD. DWG. NO. W-10) 2 FEET PAST BOTH EXISTING UTILITY PIPE EDGE.

CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

William F. Kull
CITY ENGINEER - WILLIAM F. KULL

WATER MAIN CROSSING OVER EXISTING UTILITY

DRAWN BY:	DATE:	SCALE:	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
GK	7/21/15	NTS	2-13-18	518
REVISIONS: NONE	SECTION: WATER	DRAWING NAME: 518.DWG		

NOTES:

1. AIR RELEASE VALVES SHALL HAVE 1" THREADED INLETS UNLESS OTHERWISE SHOWN ON PLANS
2. SEE ENGINEER'S APPROVAL LIST FOR ALL PARTS

CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

AIR AND VACCUM / AIR RELEASE VALVE

William F. Kull
CITY ENGINEER - WILLIAM F. KULL

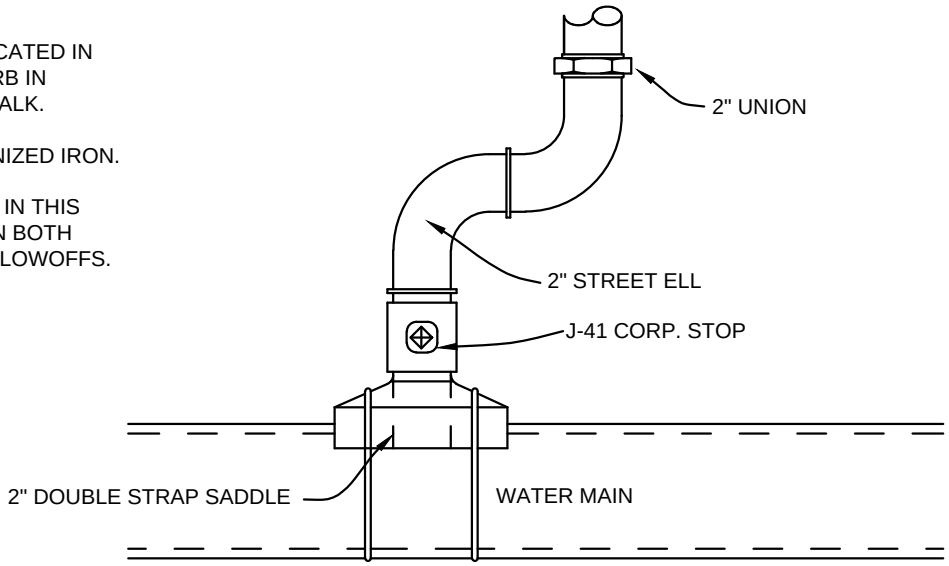
DRAWN BY:	DATE:	SCALE:	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
GK	7/21/15	NTS	2-13-18	519
REVISIONS: NONE	SECTION: WATER	DRAWING NAME: 519.DWG		

NOTES:
1. BLOW-OFF SHALL NOT BE LOCATED IN SIDEWALK. LOCATE BEHIND CURB IN LANDSCAPING IF IN SPLIT SIDEWALK.

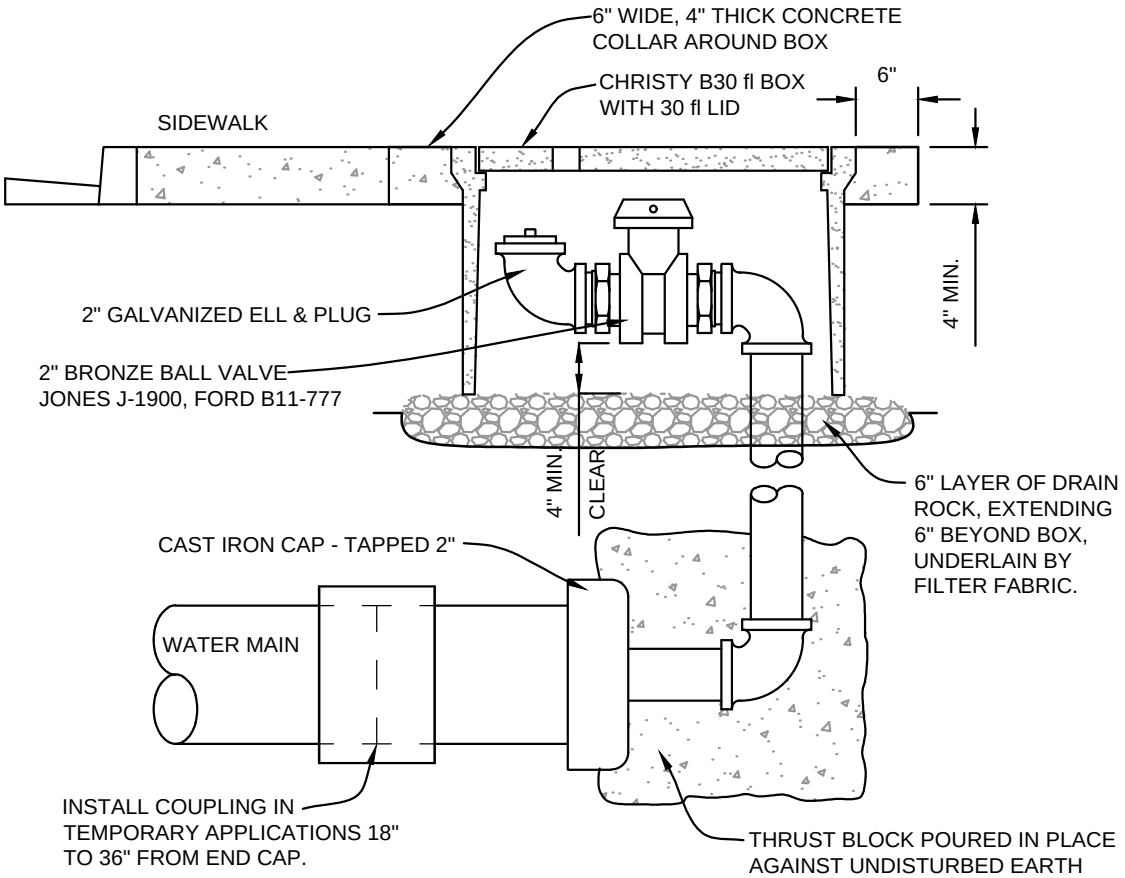
2. ALL FITTINGS TO BE 2" GALVANIZED IRON.

3. ALL APPURTENANCES SHOWN IN THIS DETAIL ARE TO BE INSTALLED ON BOTH TEMPORARY AND PERMANENT BLOWOFFS.

4. TRACER WIRE REQUIRED.



INLINE INSTALLATION



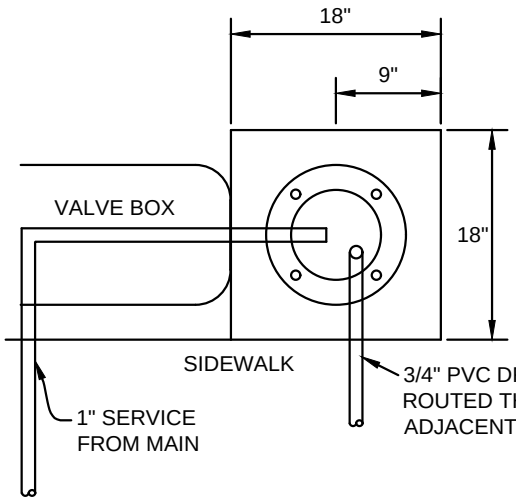
END OF PIPE INSTALLATION

CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

William F. Kull
CITY ENGINEER - WILLIAM F. KULL

WATER BLOWOFF

DRAWN BY:	DATE:	SCALE:	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
GK	7/21/15	NTS	2-13-18	520
REVISIONS: NONE	SECTION: WATER	DRAWING NAME: 520.DWG		



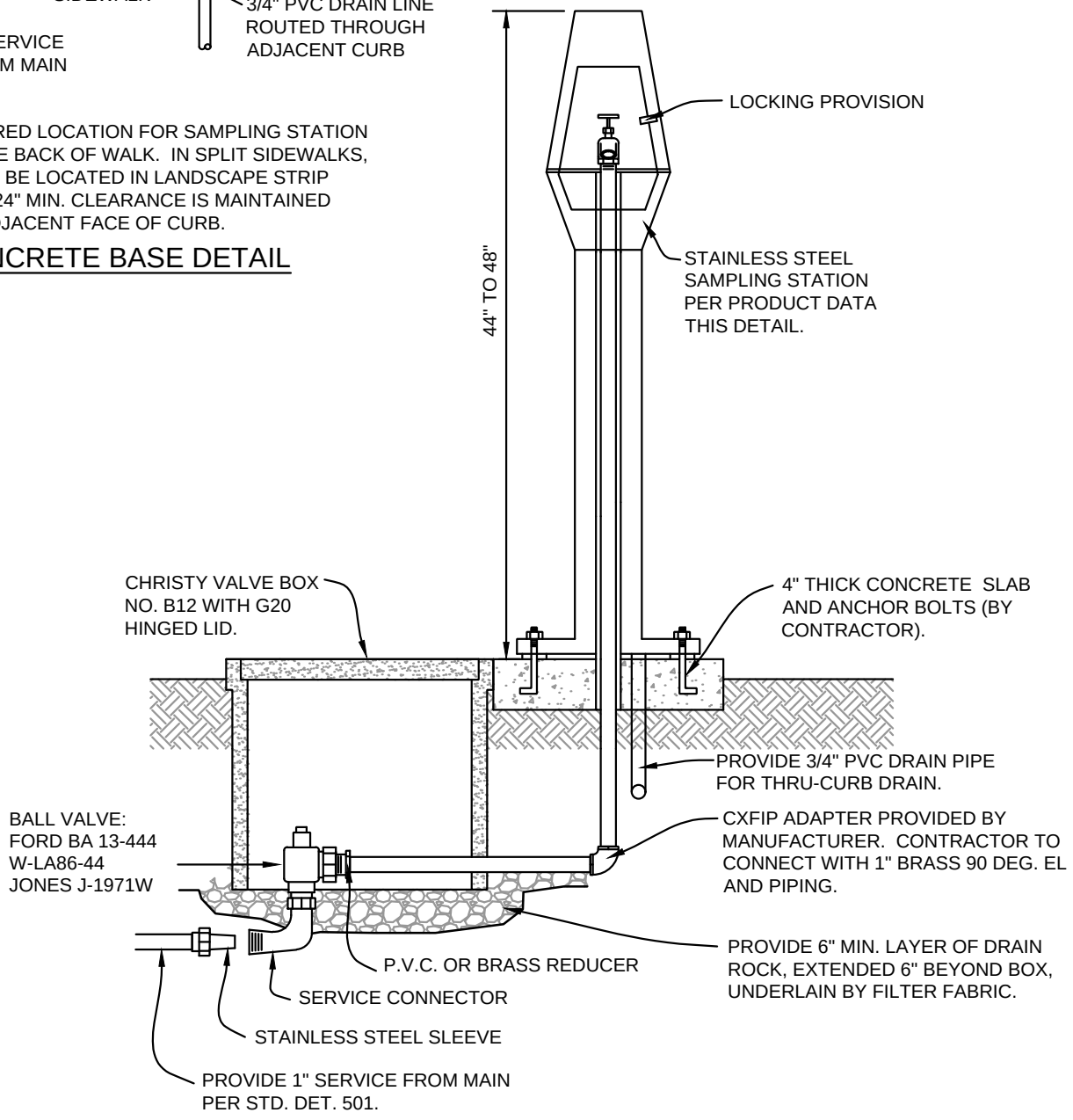
PRODUCT DATA

MODEL: MX 3000 SAMPLING STATION
VENDOR: STEEL SOURCE CONSTRUCTION
ADDRESS: 20885 REDWOOD RD.
CASTRO VALLEY, CA 94546
PHONE: 510-582-2700
FAX: 510-582-2750
www.steelsourceco.com

NOTE: ALTERNATE MANUFACTURERS AND MODELS MAY BE SUBSTITUTED GIVEN THE APPROVAL OF THE CITY PUBLIC WORKS DEPT.

THE PREFERRED LOCATION FOR SAMPLING STATION IS BEHIND THE BACK OF WALK. IN SPLIT SIDEWALKS, STATION MAY BE LOCATED IN LANDSCAPE STRIP PROVIDED A 24" MIN. CLEARANCE IS MAINTAINED FROM THE ADJACENT FACE OF CURB.

CONCRETE BASE DETAIL

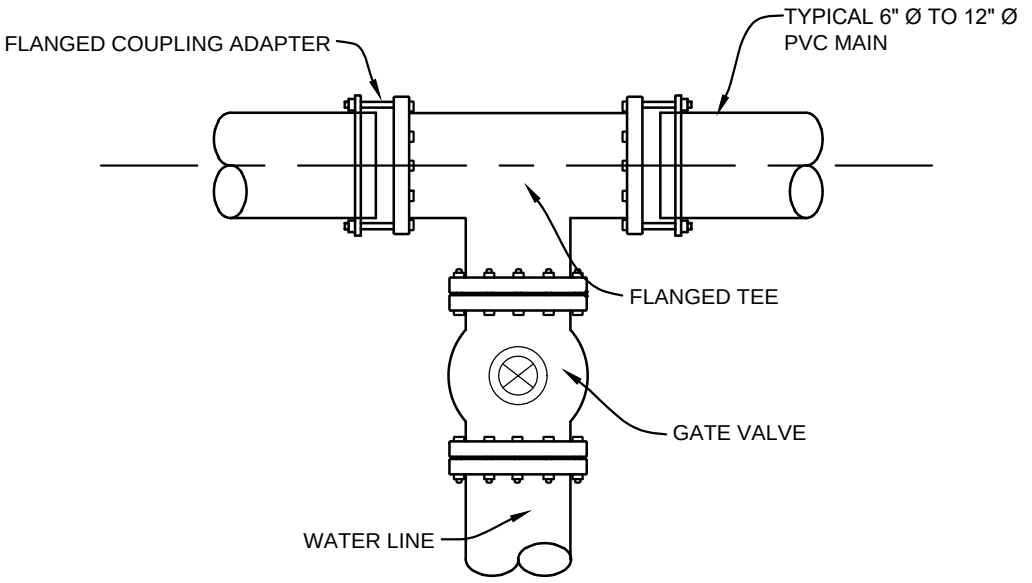


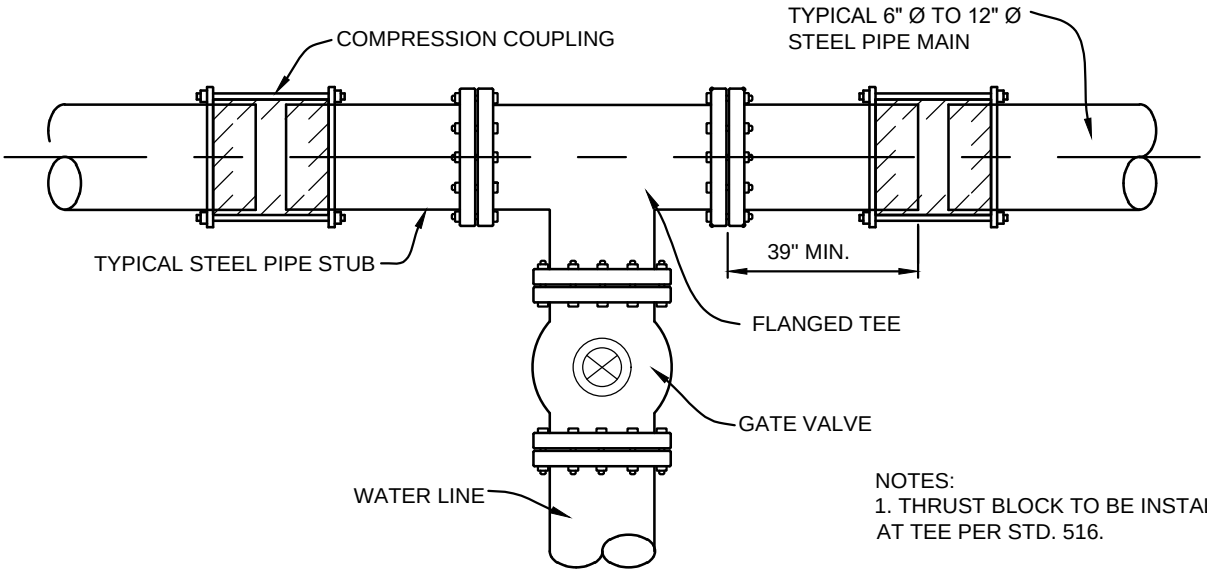
CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

William F. Kull
CITY ENGINEER - WILLIAM F. KULL

WATER SAMPLING STATION

DRAWN BY:	DATE:	SCALE:	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
GK	7/21/15	NTS	2-13-18	521
REVISIONS:	SECTION:	DRAWING NAME:		
NONE	WATER	521.DWG		





NOTES:
1. THRUST BLOCK TO BE INSTALLED AT TEE PER STD. 516.

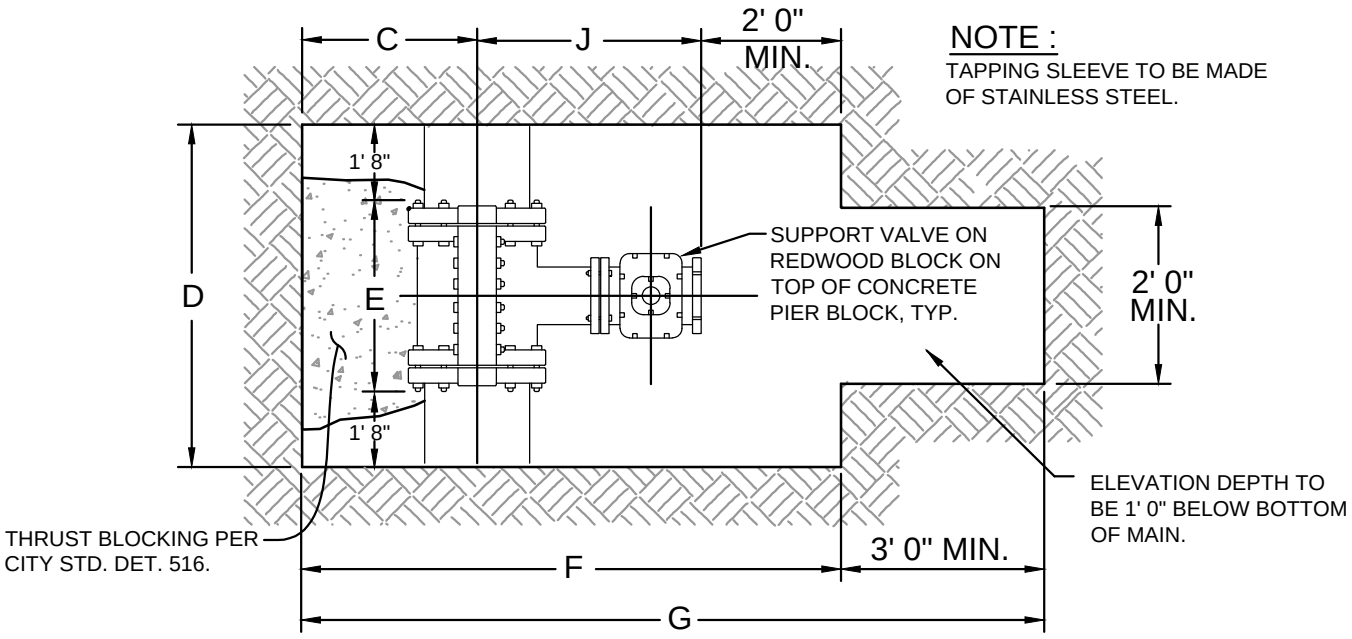
2. GATE VALVE TO BE SUPPORTED ON CONCRETE PIER BLOCK PER STD.515.

CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

William F. Kull
CITY ENGINEER - WILLIAM F. KULL

TEE & GATE VALVE INSTALLATION ON EX. MAIN

DRAWN BY:	DATE:	SCALE:	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
GK	7/21/15	NTS	2-13-18	522
REVISIONS: NONE	SECTION: WATER	DRAWING NAME: 522.DWG		



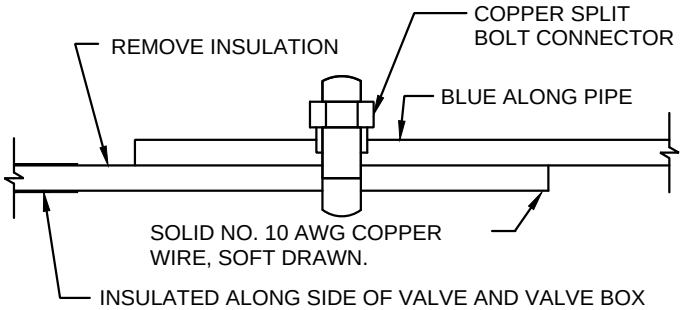
TAPPING SLEEVE SIZE	C	D	E	F	G	J
4 X 2"	1' 3"	4' 9"	16 1/2"	4' 5"	7' 5"	14 1/32"
4 X 3"	1' 3"	4' 9"	16 1/2"	4' 6"	7' 6"	14 3/4"
4 X 4"	1' 3"	4' 9"	16 1/2"	4' 10"	7' 10"	18 9/16"
6 X 2"	1' 4"	4' 10"	18 3/8"	4' 7"	7' 7"	15 5/32"
6 X 3"	1' 4"	4' 10"	18 3/8"	4' 8"	7' 8"	15 7/8"
6 X 4"	1' 4"	4' 10"	18 3/8"	5' 0"	8' 0"	20 3/8"
6 X 6"	1' 4"	4' 10"	18 3/8"	5' 1"	8' 1"	21 7/16"
8 X 2"	1' 5"	4' 11"	19 1/4"	4' 10"	7' 10"	16 17/32"
8 X 3"	1' 5"	4' 11"	19 1/4"	4' 10"	7' 10"	17 1/4"
8 X 4"	1' 5"	4' 11"	19 1/4"	5' 2"	8' 2"	21 1/16"
8 X 6"	1' 5"	4' 11"	19 1/4"	5' 4"	8' 4"	22 13/16"
8 X 8"	1' 5"	5' 1"	21 1/4"	5' 6"	8' 6"	24 5/8"
10 X 2"	1' 6"	4' 11"	19"	5' 0"	8' 0"	17 25/32"
10 X 3"	1' 6"	4' 11"	19"	5' 1"	8' 1"	18 1/2"
10 X 4"	1' 6"	4' 11"	19"	5' 5"	8' 5"	22 9/16"
10 X 6"	1' 6"	5' 11"	19"	5' 6"	8' 6"	23 13/16"
10 X 8"	1' 6"	5' 3"	23"	5' 7"	8' 7"	25 5/16"
10 X 10"	1' 6"	5' 3"	23"	5' 9"	8' 9"	26 3/8"
12 X 2"	1' 7"	4' 11"	19"	5' 2"	8' 2"	18 29/32"
12 X 3"	1' 7"	4' 11"	19"	5' 3"	8' 3"	19 5/8"
12 X 4"	1' 7"	4' 11"	19"	5' 7"	8' 7"	23 9/16"
12 X 6"	1' 7"	4' 11"	19"	5' 8"	8' 8"	24 13/16"
12 X 8"	1' 7"	5' 1"	21"	5' 9"	8' 9"	25 5/16"
12 X 10"	1' 7"	5' 5"	25"	5' 10"	8' 10"	27 3/8"
12 X 12"	1' 7"	5' 5"	25"	5' 11"	8' 11"	27 1/2"
14 X 4"	1' 8"	5' 8"	27 3/4"	5' 9"	8' 9"	24 5/8"
14 X 6"	1' 8"	5' 8"	27 3/4"	5' 10"	8' 10"	25 7/16"
14 X 8"	1' 8"	5' 8"	27 3/4"	6' 0"	9' 0"	27 15/16"
14 X 10"	1' 8"	5' 8"	27 3/4"	6' 1"	9' 1"	29"
14 X 12"	1' 8"	5' 8"	27 3/4"	6' 1"	9' 1"	29 1/8"
14 X 14"	1' 8"	6' 2"	33 1/2"	6' 2"	9' 2"	30 1/4"

CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

William F. Kull
CITY ENGINEER - WILLIAM F. KULL

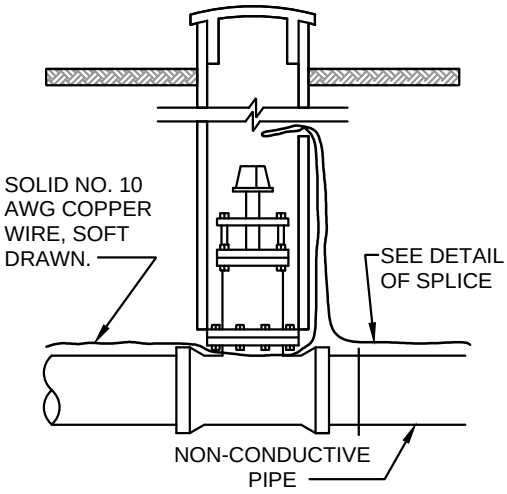
TAPPING SLEEVE INSTALLATION

DRAWN BY:	DATE:	SCALE:	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
GK	7/21/15	NTS	2-13-18	523
REVISIONS: NONE	SECTION: WATER	DRAWING NAME: 523.DWG		

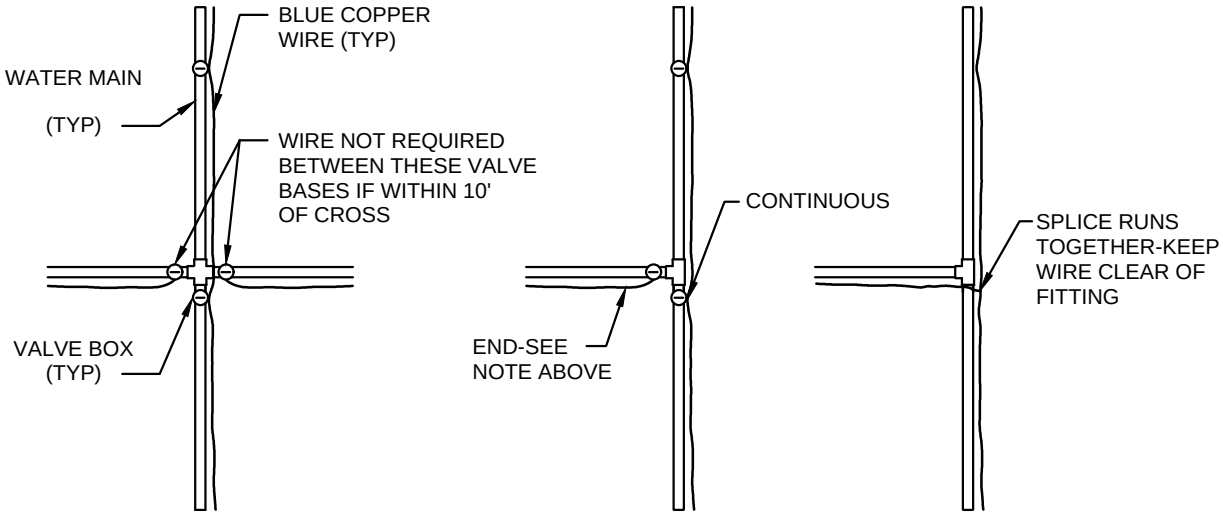


NOTE: IF WIRE ENDS AT VALVE BOX, RUN SINGLE INSULATED LEAD UP TO 10' BELOW GROUND.

DETAIL OF CONNECTION



INSTALLATION AT VALVE BOX



TYPICAL PLACING AT MAIN INTERSECTIONS

NOTES:

1. WIRE TO BE CONTINUOUS BETWEEN VALVE BOXES, EXCEPT WHERE BOXES ARE WITHIN TEN (10') FEET OF PIPE INTERSECTION.
2. BLUE WIRE NOT TO TOUCH VALVE OR FITTINGS. (COATED WIRE ONLY)
3. LOCATING WIRE TO BE LAID AT TOP OF PIPE.
4. SECURE TO TOP OF PIPE WITH TAPE AT 6' INTERVALS

CITY OF RIVERBANK DEPARTMENT OF PUBLIC WORKS			TRACER WIRE INSTALLATION	
William F. Kull CITY ENGINEER - WILLIAM F. KULL				
DRAWN BY: GK	DATE: 1/30/18	SCALE: NTS	ADOPTED BY THE CITY COUNCIL: 2-13-18	DRAWING NO. 524
REVISIONS: NONE	SECTION: WATER	DRAWING NAME: 524.DWG		

ALLOWABLE GALLONS LOST IN ONE HOUR AT 150 PSI

PIPE LENGTH (FT)	PIPE DIAMETER					
	4"	6"	8"	10"	12"	15"
25	0.03	0.04	0.05	0.06	0.08	0.09
50	0.05	0.08	0.10	0.13	0.15	0.19
75	0.08	0.11	0.15	0.19	0.23	0.28
100	0.10	0.15	0.20	0.25	0.30	0.38
125	0.13	0.19	0.25	0.31	0.38	0.47
150	0.15	0.23	0.30	0.38	0.45	0.56
175	0.18	0.26	0.35	0.44	0.53	0.66
200	0.20	0.30	0.40	0.50	0.60	0.75
225	0.23	0.34	0.45	0.56	0.68	0.84
250	0.25	0.38	0.50	0.63	0.75	0.94
275	0.28	0.41	0.55	0.69	0.83	1.03
300	0.30	0.45	0.60	0.75	0.90	1.13
325	0.33	0.49	0.65	0.81	0.98	1.22
350	0.35	0.53	0.70	0.88	1.05	1.31
375	0.38	0.56	0.75	0.94	1.13	1.41
400	0.40	0.60	0.80	1.00	1.20	1.50
425	0.43	0.64	0.85	1.06	1.28	1.59
450	0.45	0.68	0.90	1.13	1.35	1.69
475	0.48	0.71	0.95	1.19	1.43	1.78
500	0.50	0.75	1.00	1.25	1.50	1.88
525	0.53	0.79	1.05	1.31	1.58	1.97
550	0.55	0.83	1.10	1.38	1.65	2.06
575	0.58	0.86	1.15	1.44	1.73	2.16
600	0.60	0.90	1.20	1.50	1.80	2.25
625	0.63	0.94	1.25	1.56	1.88	2.34
650	0.65	0.98	1.30	1.63	1.95	2.44
675	0.68	1.01	1.35	1.69	2.03	2.53
700	0.70	1.05	1.40	1.75	2.10	2.63
725	0.73	1.09	1.45	1.81	2.18	2.72
750	0.75	1.13	1.50	1.88	2.25	2.81
775	0.78	1.16	1.55	1.94	2.33	2.91
800	0.80	1.20	1.60	2.00	2.40	3.00

NOTE:

IN ACCORDANCE WITH CITY CONSTRUCTION STANDARDS, NEW WATERLINES SHALL BE HYDROSTATICALLY TESTED TO A MINIMUM OF 150 PSI, FOR A PERIOD OF NOT LESS THAN 2 HOURS. NO PIPE INSTALLATION SHALL BE ACCEPTED IF LEAKAGE FOR THE SECTION EXCEEDS A RATE IN GALLONS PER HOUR PER ONE THOUSAND FEET (GPH/1000') OF 0.25 MULTIPLIED BY THE PIPE DIAMETER IN INCHES. (GPH/1000' < 0.25xPIPE DIA.) THIS CHART COMPUTES MAXIMUM ALLOWABLE LEAKAGE RATES FOR VARIOUS LENGTHS OF PIPE BASED ON THIS STANDARD, AND IS INTENDED AS A CONVENIENCE, ONLY.

CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

William F. Kull
CITY ENGINEER - WILLIAM F. KULL

WATER HYDROSTATIC PRESSURE / LOSS

DRAWN BY:	DATE:	SCALE:	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
GK	7/21/15	NTS	2-13-18	525
REVISIONS: NONE	SECTION: WATER	DRAWING NAME: 525.DWG		

ALLOWABLE GALLONS LOST IN ONE HOUR AT 150 PSI

PIPE LENGTH (FT)	PIPE DIAMETER					
	4"	6"	8"	10"	12"	15"
825	0.83	1.24	1.65	2.06	2.48	3.09
850	0.85	1.28	1.70	2.13	2.55	3.19
875	0.88	1.31	1.75	2.19	2.63	3.28
900	0.90	1.35	1.80	2.25	2.70	3.38
925	0.93	1.39	1.85	2.31	2.78	3.47
950	0.95	1.43	1.90	2.38	2.85	3.56
975	0.98	1.46	1.95	2.44	2.93	3.66
1000	1.00	1.50	2.00	2.50	3.00	3.75
1025	1.03	1.54	2.05	2.56	3.08	3.84
1050	1.05	1.58	2.10	2.63	3.15	3.94
1075	1.08	1.61	2.15	2.69	3.23	4.03
1100	1.10	1.65	2.20	2.75	3.30	4.13
1125	1.13	1.69	2.25	2.81	3.38	4.22
1150	1.15	1.73	2.30	2.88	3.45	4.31
1175	1.18	1.76	2.35	2.94	3.53	4.41
1200	1.20	1.80	2.40	3.00	3.60	4.50
1225	1.23	1.84	2.45	3.06	3.68	4.59
1250	1.25	1.88	2.50	3.13	3.75	4.69
1275	1.28	1.91	2.55	3.19	3.83	4.78
1300	1.30	1.95	2.60	3.25	3.90	4.88
1325	1.33	1.99	2.65	3.31	3.98	4.97
1350	1.35	2.03	2.70	3.38	4.05	5.06
1375	1.38	2.06	2.75	3.44	4.13	5.16
1400	1.40	2.10	2.80	3.50	4.20	5.25

NOTE:

IN ACCORDANCE WITH CITY CONSTRUCTION STANDARDS, NEW WATERLINES SHALL BE HYDROSTATICALLY TESTED TO A MINIMUM OF 150 PSI, FOR A PERIOD OF NOT LESS THAN 2 HOURS. NO PIPE INSTALLATION SHALL BE ACCEPTED IF LEAKAGE FOR THE SECTION EXCEEDS A RATE IN GALLONS PER HOUR PER ONE THOUSAND FEET (GPH/1000') OF 0.25 MULTIPLIED BY THE PIPE DIAMETER IN INCHES. (GPH/1000' < 0.25xPIPE DIA.) THIS CHART COMPUTES MAXIMUM ALLOWABLE LEAKAGE RATES FOR VARIOUS LENGTHS OF PIPE BASED ON THIS STANDARD, AND IS INTENDED AS A CONVENIENCE, ONLY.

CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

William F. Kull
CITY ENGINEER - WILLIAM F. KULL

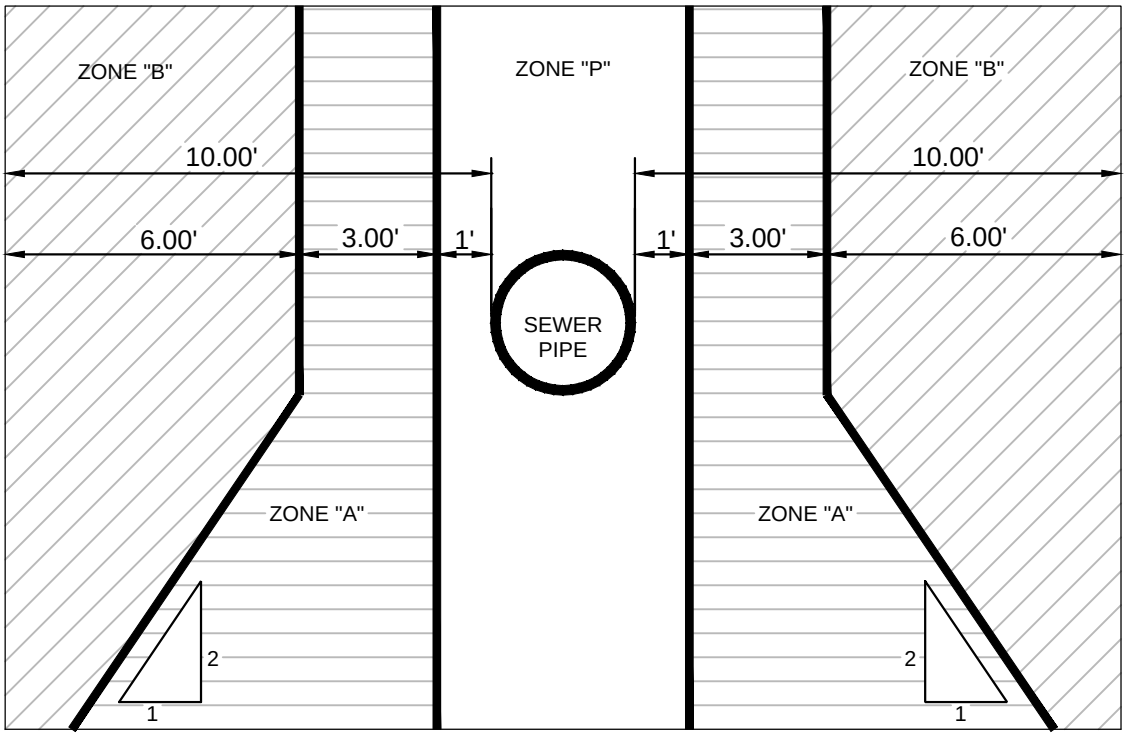
WATER HYDROSTATIC PRESSURE / LOSS

DRAWN BY:	DATE:	SCALE:	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
GK	7/21/15	NTS	2-13-18	526
REVISIONS: NONE	SECTION: WATER	DRAWING NAME: 526.DWG		

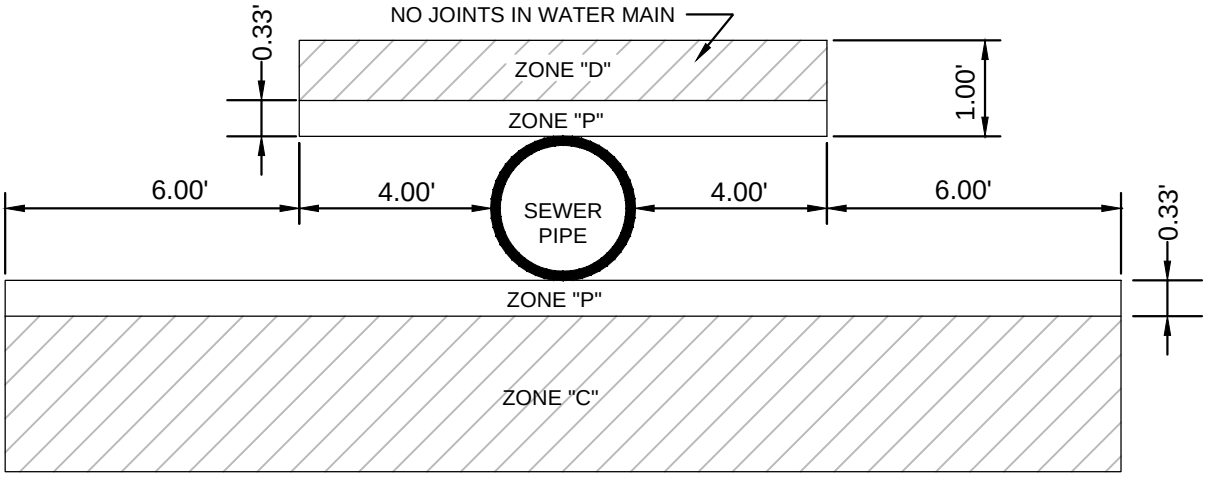
ALTERNATE DESIGN FOR REDUCED SEPERATION

(TO BE USED ONLY WHERE REQUIRED 10 FT. SEPARATION CANNOT BE OBTAINED)

NEW WATER LINE BEING INSTALLED



PARALLEL CONSTRUCTION



PERPENDICULAR CONSTRUCTION

NOTES:

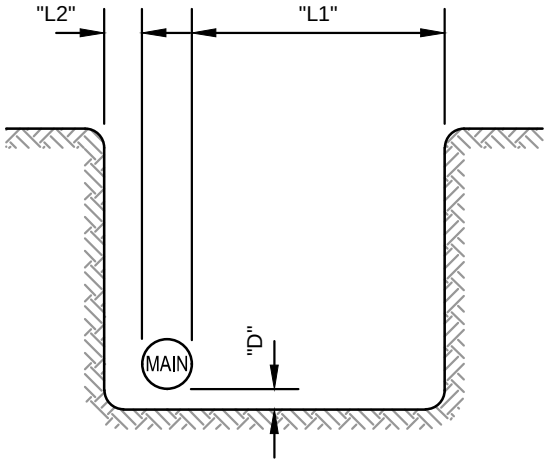
1. ZONE "A" REQUIRES SPECIAL PIPE AND SPECIAL PERMISSION FROM THE PUBLIC HEALTH AGENCY
2. ZONE "B" REQUIRES SPECIAL PIPE
3. ZONE "C" REQUIRES SPECIAL PIPE AND PIPE JOINTS ARE NOT ALLOWED
4. ZONE "D" REQUIRES STANDARD PIPE AND PIPE JOINTS ARE NOT ALLOWED
5. ZONE "P" IS A PROHIBITED ZONE.

CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

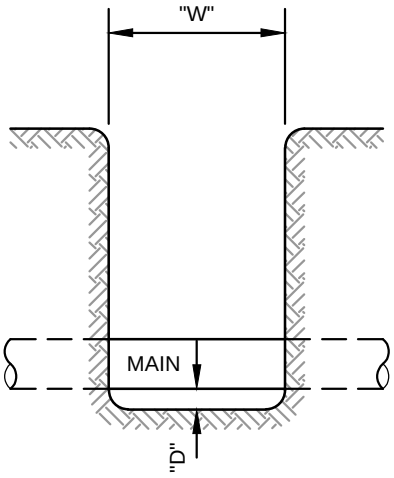
William F. Kull
CITY ENGINEER - WILLIAM F. KULL

WATER MAIN SEPARATION REGULATIONS

DRAWN BY:	DATE:	SCALE:	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
GK	7/21/15	NTS	2-13-18	527
REVISIONS: NONE	SECTION: WATER	DRAWING NAME: 527.DWG		



PERPENDICULAR TO EXISTING MAIN



PARALLEL TO EXISTING MAIN

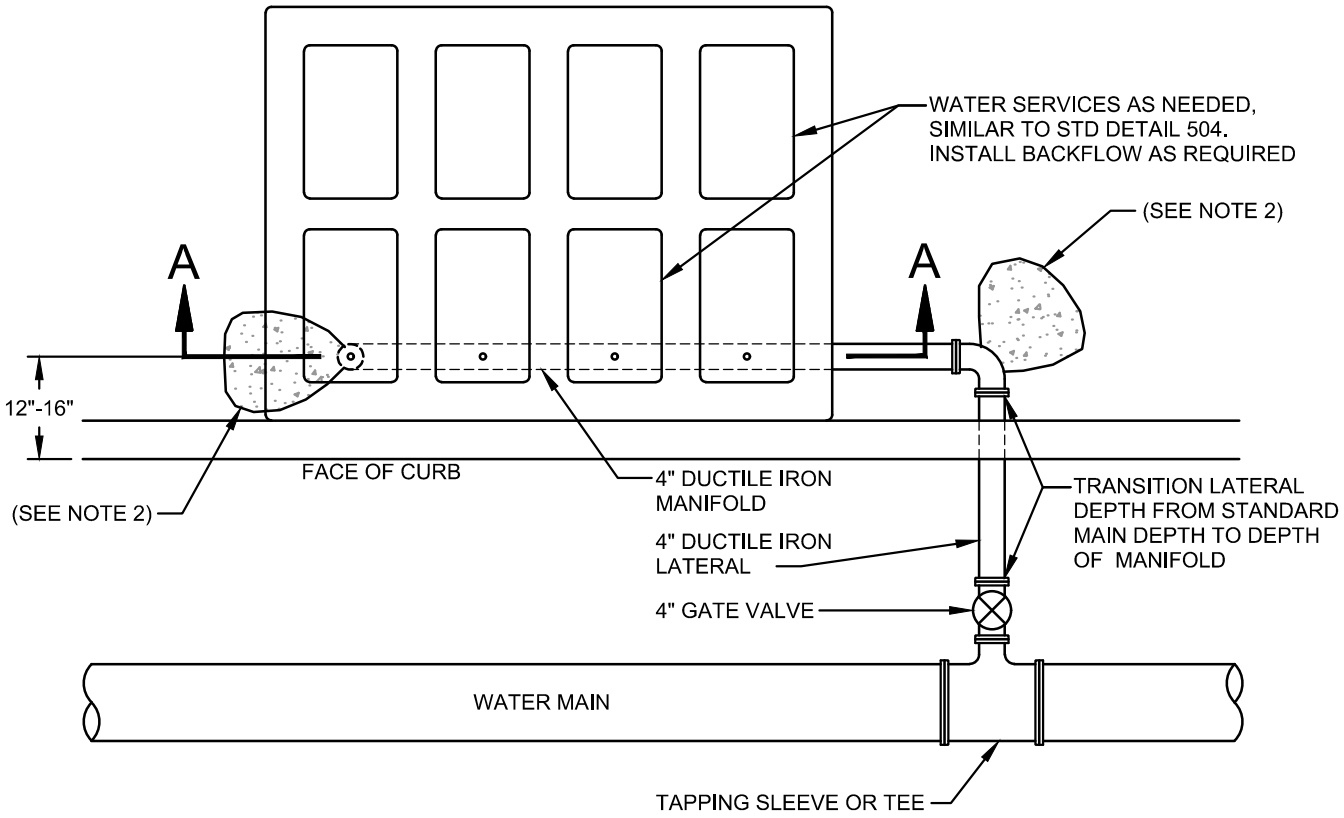
EXCAVATION REQUIREMENTS FOR CONNECTIONS TO EXISTING WATER MAINS				
EXISTING PIPE SIZE	W	D	L1	L2
4"	3'-0"	0'-6"	7'-0"	1'-0"
6"	4'-0"	1'-0"	7'-0"	1'-0"
8"	5'-0"	1'-6"	7'-0"	1'-0"
10"	6'-0"	2'-0"	7'-0"	1'-6"
12" OR LARGER	6'-0"	2'-0"	7'-0"	1'-6"

CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

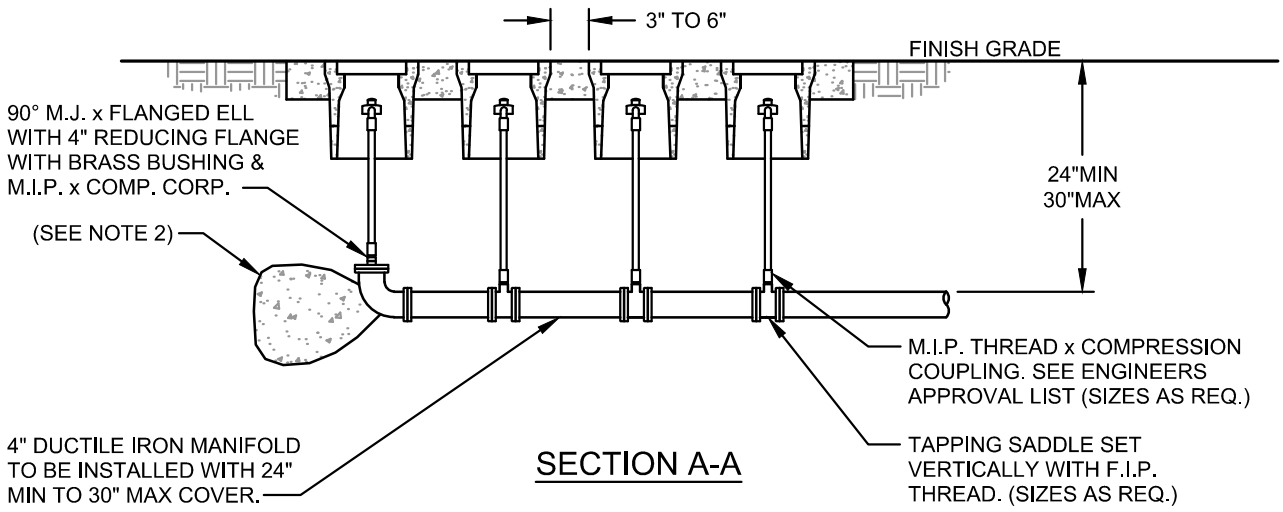
William F. Kull
CITY ENGINEER - WILLIAM F. KULL

EXCAVATION REQUIREMENTS FOR CONSTRUCTION

DRAWN BY:	DATE:	SCALE:	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
GK	7/21/15	NTS	2-13-18	528
REVISIONS: NONE	SECTION: WATER	DRAWING NAME: 528.DWG		



PLAN VIEW



SECTION A-A

NOTES:

1. THIS STANDARD MAY BE ADAPTED FOR CONNECTION TO A COMBINATION WATER SERVICE PER STD DETAIL 504.
2. RESTRAINED JOINTS ARE REQUIRED FOR ALL NEW CONSTRUCTION FROM GATE VALVE TO END OF 4" MANIFOLD. THRUST BLOCKS ARE ONLY REQUIRED WHERE EXISTING SERVICES ARE BEING MODIFIED AND RESTRAINED JOINTS ARE NOT USED.

CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

William F. Kull
CITY ENGINEER - WILLIAM F. KULL

4" DUCTILE IRON MULTI-SERVICE MANIFOLD

DRAWN BY:	DATE:	SCALE:	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
GK	7/21/15	NTS	2-13-18	529
REVISIONS: NONE	SECTION: WATER	DRAWING NAME: 529.DWG		

RESTRAINED JOINTS

NOTES:

1. THE LENGTHS OF RESTRAINED PIPE CALLED OUT IN THE FOLLOWING TABLES ARE FOR INSTALLATION OF MECHANICALLY RESTRAINED FITTINGS AND ARE CALCULATED BASED ON THE FOLLOWING PARAMETERS:

   A. ALL DUCTILE IRON (DI) IS POLYETHYLENE ENCASED.

   B. THE SOIL TYPE IS "GP" AS DEFINED BY THE UNITED SOIL CLASSIFICATIONS, ASTM STANDARD D2487.

   C. THE TEST PRESSURE OF THE WATER SYSTEM IS TWO HUNDRED POUNDS PER SQUARE INCH (200 PSI).

   D. THE TRENCH IS TYPE 5, AS PER ANSI/AWWA C150/A21.5, TRENCH CONDITIONS.

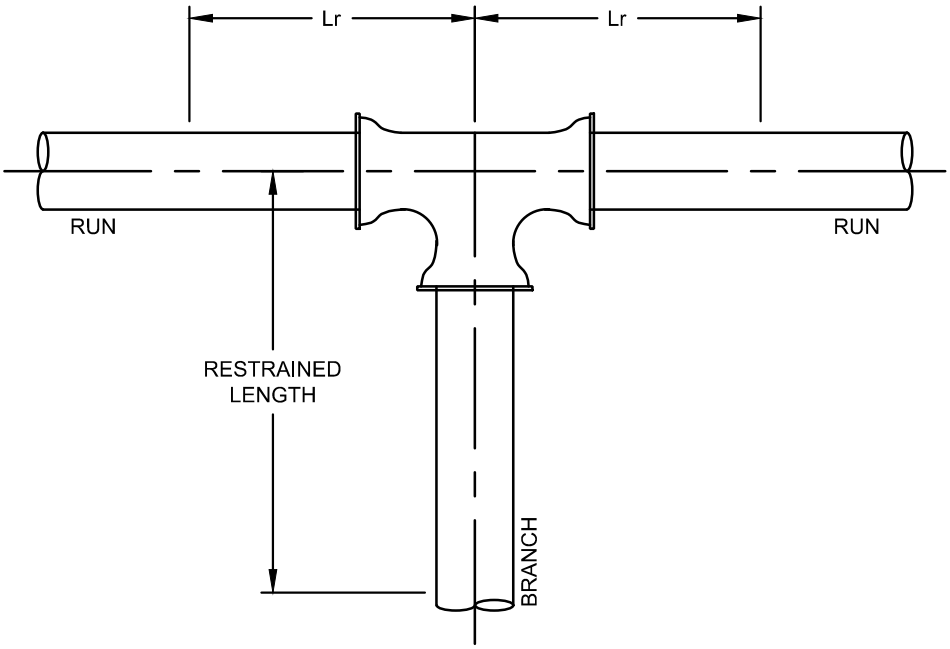
   E. THE DEPTH OF COVER IS TWO FEET (2').

   F. THE SAFETY FACTOR SHALL BE 1.5

2. IF THE FIELD CONDITIONS VARYING SIGNIFICANTLY FROM THESE PARAMETERS ARE ENCOUNTERED, THE CONTRACTOR SHALL IMMEDIATELY ADVISE THE CITY OF RIVERBANK FIELD INSPECTOR. THE CITY OF RIVERBANK FIELD INSPECTOR WILL ADVISE THE CONTRACTOROF THE REQUIRED LENGTH OF RESTRAINED PIPE NECESSARY TO MEET THE EXISTING CONDITIONS.

3. THE CONSULTANT OR DESIGN FIRM SHALL SPECIFY SOIL TYPE, TEST PRESSURE, TRENCH TYPE, AND DEPTH OF COVER IN THE WATER DISTRIBUTION PLANS. IF THE CITY JUDGES THAT THE REQUIRED RESTRAINED LENGTH EXCEEDS THAT SPECIFIED IN THE TABLES, OR IF THE PIPE DIAMETER EXCEEDS 12", A PROFESSIONAL CIVIL ENGINEER REGISTERED IN CALIFORNIA SHALL PREPARE AND SUBMIT FOR APPROVAL APPROPRIATE RESTRAINED LENGTH CALCULATIONS.

CITY OF RIVERBANK DEPARTMENT OF PUBLIC WORKS			RESTRAINED JOINTS NOTES	
William F. Kull CITY ENGINEER - WILLIAM F. KULL				
DRAWN BY: GK	DATE: 9/28/17	SCALE: NTS	ADOPTED BY THE CITY COUNCIL: 2-13-18	DRAWING NO. 530
REVISIONS: NONE	SECTION: WATER	DRAWING NAME: 530.DWG		



TEES

THE MINIMUM ATTACHED LENGTH OF PIPE (Lr) TO EXTEND IN EACH DIRECTION ALONG THE RUN OF THE TEE SHALL BE A SOLID PIPE WITHOUT JOINTS, FITTINGS, ETC. THE LENGTH OF THE RESTRAINED BRANCH SHALL BE DERIVED FROM THE FOLLOWING TABLE.

TEE SIZE & PIPE MATERIAL		MINIMUM ATTACHED LENGTH OF PIPE (Lr)										
		0'	2'	4'	6'	8'	10'	12'	14'	16'	18'	20'
		LENGTH OF RESTRAINED BRANCH										
PVC PIPE	4x4	74'	64'	53'	42'	32'	21'	11'	1'	1'	1'	1'
	6x4	74'	58'	42'	26'	11'	1'	1'	1'	1'	1'	1'
	6x6	104'	93'	82'	71'	61'	50'	39'	28'	18'	7'	1'
	8x4	74'	53'	31'	10'	1'	1'	1'	1'	1'	1'	1'
	8x6	104'	89'	75'	60'	46'	31'	17'	3'	1'	1'	1'
	8x8	135'	124'	113'	102'	91'	80'	69'	59'	48'	37'	26'
	12x4	74'	41'	7'	1'	1'	1'	1'	1'	1'	1'	1'
	12x6	104'	81'	58'	35'	13'	1'	1'	1'	1'	1'	1'
	12x8	135'	118'	101'	83'	66'	49'	32'	15'	1'	1'	1'
	12x12	189'	177'	166'	155'	144'	132'	121'	110'	98'	87'	76'
DI POLY WRAP	4x4	112'	96'	80'	64'	48'	32'	17'	1'	1'	1'	1'
	6x4	112'	88'	64'	40'	16'	1'	1'	1'	1'	1'	1'
	6x6	157'	141'	124'	108'	92'	75'	59'	43'	27'	10'	1'
	8x4	112'	80'	48'	15'	1'	1'	1'	1'	1'	1'	1'
	8x6	157'	135'	113'	91'	70'	48'	26'	4'	1'	1'	1'
	8x8	204'	187'	171'	154'	138'	121'	105'	88'	72'	55'	39'
	12x4	112'	61'	11'	1'	1'	1'	1'	1'	1'	1'	1'
	12x6	157'	122'	88'	54'	19'	1'	1'	1'	1'	1'	1'
	12x8	204'	178'	152'	126'	100'	74'	48'	22'	1'	1'	1'
	12x12	284'	267'	250'	233'	216'	199'	182'	165'	148'	131'	114'

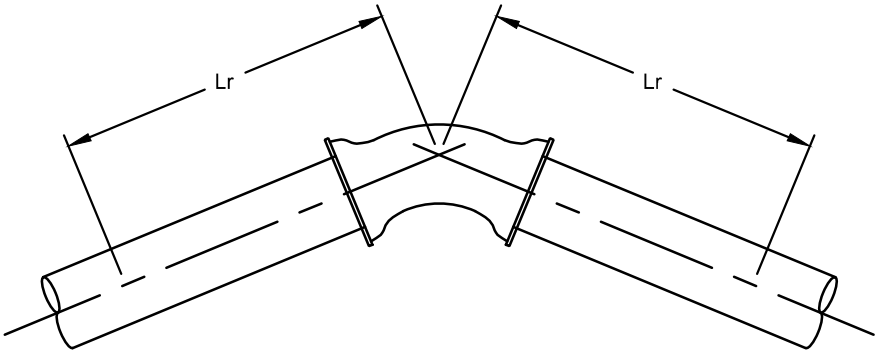
CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

William F. Kull

CITY ENGINEER - WILLIAM F. KULL

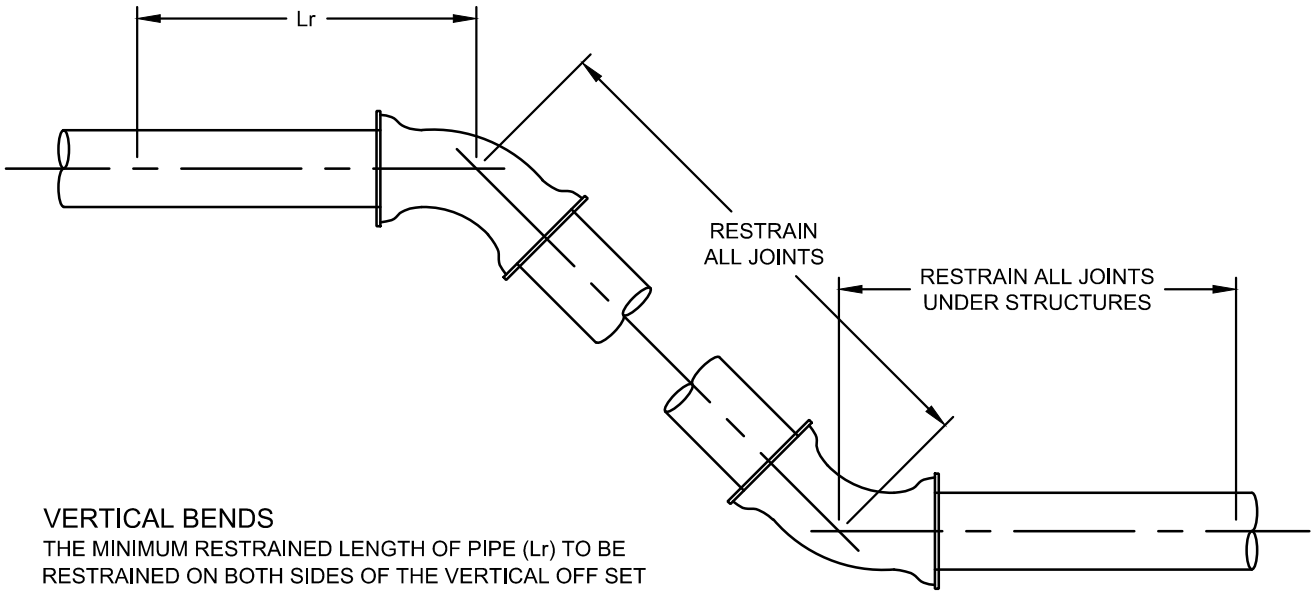
RESTRAINED JOINTS
TEE

DRAWN BY:	DATE:	SCALE:	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
GK	9/28/17	NTS	2-13-18	531
REVISIONS: NONE	SECTION: WATER	DRAWING NAME: 531.DWG		



HORIZONTAL BENDS

THE MINIMUM ATTACHED LENGTH OF PIPE (Lr) TO EXTEND IN EACH DIRECTION FROM THE HORIZONTAL BEND SHALL BE DERIVED FROM THE FOLLOWING TABLE



VERTICAL BENDS

THE MINIMUM RESTRAINED LENGTH OF PIPE (Lr) TO BE RESTRAINED ON BOTH SIDES OF THE VERTICAL OFF SET SHALL BE DERIVED FROM THE FOLLOWING TABLE

PIPE SIZE & MATERIAL		HORIZONTAL BENDS				VERTICAL BENDS			
		11 1/4°	22 1/2°	45°	90°	11 1/4°	22 1/2°	45°	90°
PVC PIPE	4"	3'	5'	11'	27'	7'	15'	31'	*
	6"	4'	7'	15'	37'	10'	21'	43'	*
	8"	5'	10'	20'	48'	13'	27'	56'	*
	12"	6'	13'	27'	65'	19'	38'	78'	*
DI POLY	4"	3'	6'	13'	31'	11'	22'	46'	*
	6"	4'	8'	18'	42'	15'	31'	65'	*
	8"	5'	11'	23'	54'	20'	41'	84'	*
	12"	7'	15'	31'	74'	28'	57'	118'	*

* NOT RECOMMENDED

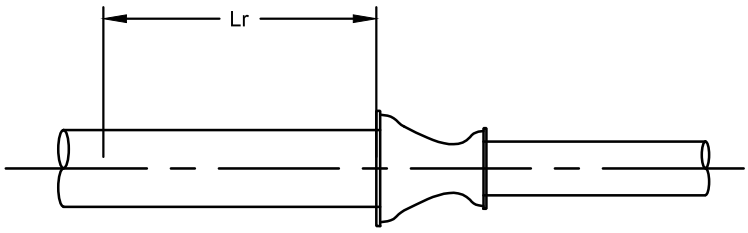
CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

William F. Kull
CITY ENGINEER - WILLIAM F. KULL

RESTRAINED JOINTS
BENDS

DRAWN BY:	DATE:	SCALE:	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
GK	9/28/17	NTS	2-13-18	532
REVISIONS: NONE	SECTION: WATER	DRAWING NAME: 532.DWG		

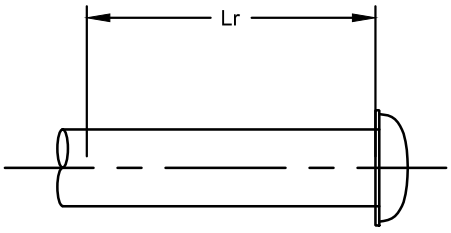
REDUCER SIZE & PIPE MATERIAL		MINIMUM RESTRAINED LENGTH
PVC PIPE	6x4	53'
	8x4	97'
	8x6	56'
	12x4	164'
	12x6	137'
	12x6	100'
DI POLY WRAP	6x4	81'
	8x4	147'
	8x6	85'
	12x4	247'
	12x6	207'
	12x6	151'



REDUCERS

THE MINIMUM LENGTH OF PIPE (Lr) TO BE RESTRAINED ON THE LARGE SIDE OF THE REDUCER SHALL BE DERIVED FROM THE TABLE ABOVE

DEAD END SIZE & PIPE MATERIAL		MINIMUM RESTRAINED LENGTH
PVC PIPE	4	74'
	6	104'
	8	135'
	12	189'
DI POLY	4	112'
	6	157'
	8	204'
	12	284'



DEAD ENDS

THE MINIMUM LENGTH OF PIPE (Lr) TO BE RESTRAINED ON A DEAD END SHALL BE DERIVED FROM THE ABOVE TABLE.

OR CONCRETE MAY BE USED WITH PERMISION FROM THE ENGINEER.

ALL VALUES SHALL BE CONSIDERED DEAD ENDS IN BOTH DIRECTIONS

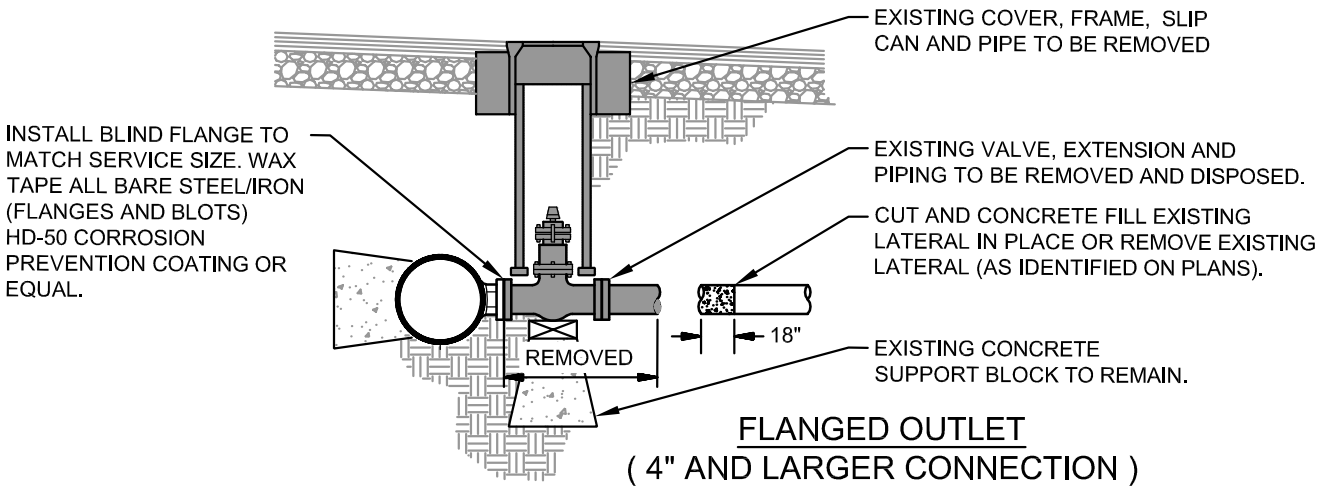
CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

William F. Kull

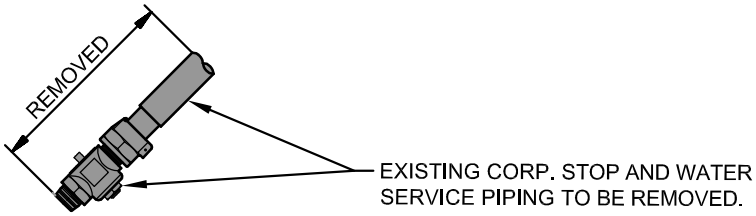
CITY ENGINEER - WILLIAM F. KULL

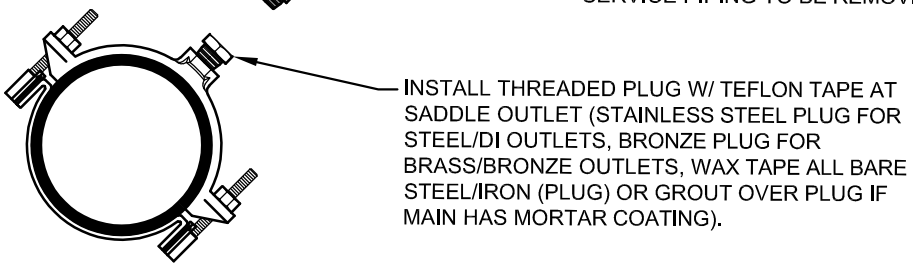
RESTRAINED JOINTS
REDUCERS & ENDS

DRAWN BY:	DATE:	SCALE:	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
GK	9/28/17	NTS	2-13-18	533
REVISIONS: NONE	SECTION: WATER	DRAWING NAME: 533.DWG		



FLANGED OUTLET
(4" AND LARGER CONNECTION)





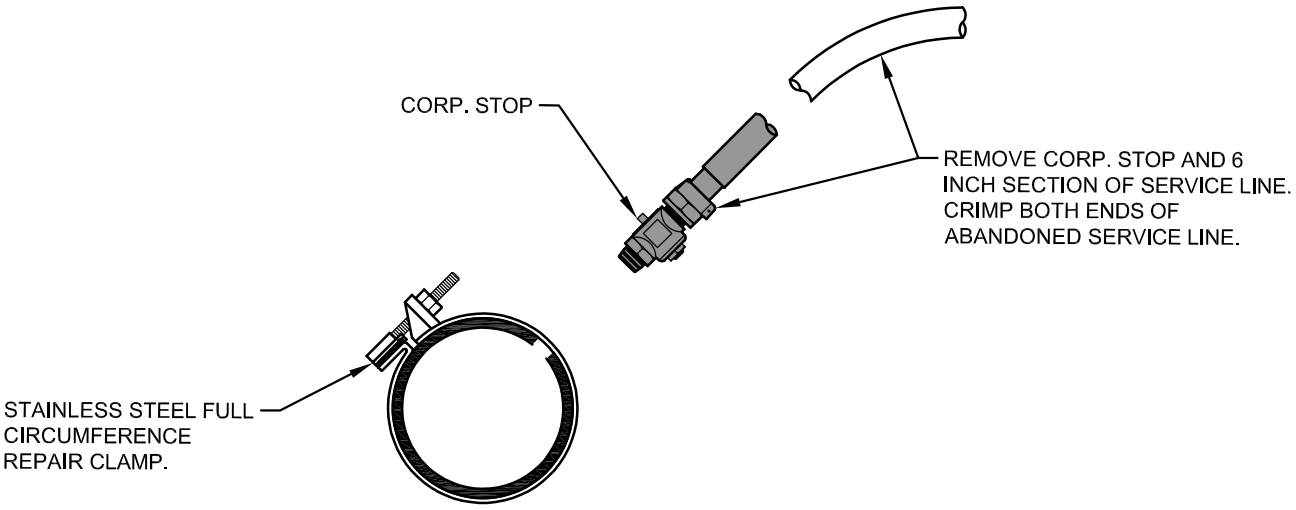
SADDLE/THREADED OUTLET
(3/4" THRU 2" CONNECTION)

NOTES:
THE FOLLOWING SHALL BE THE STEPS TAKEN TO ABANDON EXISTING WATER APPURTENANCES

1. PRIOR APPROVAL FROM CITY OF RIVERBANK SHALL BE OBTAINED IN THE FORM OF APPROVED PLANS, INSPECTION PACKAGE, AND SERVICE ABANDONMENT AGREEMENT BETWEEN CITY AND PROPERTY OWNER.

2. CONTRACTOR SHALL:
   - 2.1. COORDINATE WITH CITY OF RIVERBANK TO REMOVE EXISTING METERS ON WATER SERVICES AND FIRE DETECTOR ASSEMBLIES.
   - 2.2. COORDINATE WITH CITY OF RIVERBANK TO SHUT-DOWN/ISOLATE MAIN FROM SERVICE.
   - 2.3. EXCAVATE DOWN TO GAIN ACCESS TO CONNECTION POINT AT MAIN AND LATERAL FOR REMOVAL.
   - 2.4. CUT AND CRIMP EXISTING COPPER SERVICES 12" TO 18" AWAY FROM THE SERVICE CONNECTION AND LEAVE IN PLACE. MAINS LARGER THAN 2" SHALL BE CUT 18" TO 28" FROM SERVICE CONNECTION AND HAVE REMAINING 18" OF THE PIPE PLUGGED WITH CONCRETE AND ABANDONED IN PLACE UNLESS PLANS SPECIFY THE REMOVAL OF THE REMAINING PIPE.
   - 2.5. EXCAVATE DOWN TO AND REMOVE THE RISER TO THE WATER METER OR FIRE SERVICE. CUT AND CRIMP, OR PLUG WITH CONCRETE (18" MIN), THE REMAINING SERVICE LINES.
   - 2.6. BACKFILL AND COMPACT THE EXCAVATIONS IN ACCORDANCE WITH CITY OF RIVERBANK STANDARDS AND SPECIFICATIONS AND/OR ENCROACHMENT PERMIT.
   - 2.7. REPAIR ANY REMOVED PAVEMENT MATERIALS IN ACCORDANCE WITH ENCROACHMENT PERMIT REQUIREMENTS OR CITY OF RIVERBANK STANDARDS.
   - 2.8. CONTACT CITY OF RIVERBANK TO RECHARGE THE WATER MAIN AFTER SERVICE HAS BEEN ABANDONED.

CITY OF RIVERBANK DEPARTMENT OF PUBLIC WORKS			ABANDONMENT OF WATER SERVICE, SADDLE ACCEPTABLE CONDITION	
William F. Kull CITY ENGINEER - WILLIAM F. KULL				
DRAWN BY: GK	DATE: 2/11/2025	SCALE: NTS	ADOPTED BY THE CITY COUNCIL: 3-11-25	DRAWING NO. 534
REVISIONS: NONE	SECTION: WATER	DRAWING NAME: 534.DWG		



NOTES:

1. CUSTOMER MUST REQUEST 24 HOUR NOTICE TO TURN OFF FOR METER REMOVAL FROM CUSTOMER SERVICE.

2. LOCATION OF CORPORATION STOP TO BE DETERMINED BY CONTRACTOR.

3. REMOVE ABANDONED ANGLE METER STOP.

4. WATER METER BOX TO BE REMOVED:
   a. FILL HOLE WITH CLEAN DIRT, COMPACT, AND GRADE LEVEL
   b. SIDEWALK - SAWCUT TO THE CLOSEST SCORE MARK ON EACH SIDE OF METER BOX AND POUR SIDEWALK TO MEET CITY STANDARDS.

5. CONTRACTOR SHALL SUBMIT TO CITY FOR APPROVAL A NOTIFICATION LETTER AT LEAST 5 WORKING DAYS PRIOR TO SHUTDOWN. THE CONTRACTOR SHALL BE RESPONSIBLE FOR DE-WATERING AND SENDING NOTIFICATION LETTER TO ALL AFFECTED USERS 3 WORKING DAYS PRIOR TO OUTAGES. THE CITY CANNOT GUARANTEE A COMPLETE WATER SHUTDOWN OF EXISTING MAIN. CONTRACTOR IS RESPONSIBLE FOR DE-WATERING IF NECESSARY. CONTRACTOR SHALL EXCAVATE 1 WORKING DAY IN ADVANCE OF ABANDONMENT AND PLATE EXCAVATION.

CITY OF RIVERBANK DEPARTMENT OF PUBLIC WORKS			ABANDONMENT OF WATER SERVICE, SADDLE NOT ACCEPTABLE CONDITION	
William F. Kull CITY ENGINEER - WILLIAM F. KULL				
DRAWN BY: GK	DATE: 2/11/2025	SCALE: NTS	ADOPTED BY THE CITY COUNCIL: 3-11-25	DRAWING NO. 535
REVISIONS: NONE	SECTION: WATER	DRAWING NAME: 535.DWG		

City of Riverbank
DESIGN STANDARDS

WASTEWATER

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SECTION 6: WASTEWATER

6.100 General

6.101 Scope

These standards apply to all public wastewater facilities designed for installation within a public right-of-way or PUE in the City and are limited to sewer mains and laterals 18 inches or less in diameter. Standards and requirements for larger sizes will be determined by the City Engineer on a case-by-case basis. Except where specifically noted in these Standards, or as required as part of project approval, all wastewater facilities installed on private property for private use and ownership shall be designed and constructed in accordance with the provisions of the Uniform Plumbing Code, as adopted by the City.

Wastewater lines shall be designed in accordance with acceptable engineering principles, California OSHA Standards (legal min.), and State of California Title 22 requirements (legal min,), and shall conform to City Standards. Storm water collection facilities shall not be connected to a wastewater line. Industrial waste sources may be connected or discharged into a wastewater line with approval of the City Engineer.

These Standards do **not** cover all the applicable City, State and Federal requirements for wastewater quality and monitoring.

6.200 Design Flow

Wastewater facilities shall be designed on a peak flow basis in accordance with the following formula:

$$Q_D = (P_F * Q_A) + I$$

Where:

Q_D = Design Wastewater Flowrate
Q_A = Average Wastewater Flowrate - See section 2.201
P_F = Peaking Factor - See section 2.202
I = Infiltration - See section 2.203

6.201 Average Wastewater Flowrate

Average wastewater flows for residential areas shall be based on 100 gallons per capita per day (gpcpd), with an assumed population of 3.0 capita per single family dwelling unit, and 2.0 capita per multifamily dwelling unit. (Note: duplexes, “patio” homes, condominiums and townhomes shall be considered multifamily dwellings when determining wastewater flowrates).

For studies in which the exact unit count has not yet been determined, the average wastewater flowrate shall be determined based on gross area, as summarized in the following table:

Zoning	Land Use	Units/Acre	Avg. Flow (gal./acre/day)
R1	Single Family Residential	5	1500
R2	Duplex Residential	12.5	2500
R3	High Density Residential	20	4000
C1 and C2	Commercial	-	1760
CM, M1, M2	Industrial (See Note 1)	-	1500

Notes:

1. The average flows listed for industrial areas shall be used in preliminary studies, only. Additional data on anticipated wastewater flows for industrial projects shall be provided and considered on a case-by-case basis prior to the final design/improvement plan phase of the project.
2. Wastewater flows for areas of Planned Development (PD) zoning shall be based on the underlying zoning and land uses as indicated in the project's Master Plan, if exact unit counts are not yet known.
3. Average wastewater flows from schools shall be based on 20 gallons per attendant per day.

6.202 Peaking Factor

Peak flow shall be based on land use, and obtained by multiplying the average flow by the following peak factors:

- Commercial: 3.0
- Industrial: 2.0
- Residential: 3.0, for upstream service populations up to 10,000 persons. For populations greater than 10,000, the following formula may be used to determine the peaking factor:

  $P_F = (18+x^{1/2}) / (4 + x^{1/2})$

  Where "x" = population in thousands

6.203 Infiltration and Inflow

Infiltration and inflow shall be determined on a gross acreage basis, at a rate of 1000 gallons per acre per day.

6.300 Pipe Design

6.301 Minimum Size

New gravity wastewater lines shall be 8 inches or greater in nominal diameter. Terminal runs that have no potential for further extension, such as in cul-de-sacs, may be 6" in diameter.

6.302 Design Depth of Flow

All gravity wastewater lines shall be designed to flow at a maximum of 70% full under the design flow conditions.

6.303 Slope

All sewers shall be designed to provide a minimum velocity of 2.0 feet per second at the flowing full condition, using Manning's equation with an "n" of 0.013. Summarized below are minimum slopes, design capacities and flowing full capacities for different pipe sizes:

Size	Minimum Slope (ft/ft)	Design Cap. (gpm)	Full Cap. (gpm)
6	0.0050	149	178
8	0.0035	269	320
10	00025	412	492
12	0.0020	599	715
15	0 0015	940	1123

Designs in which downstream mains do not meet these velocity standards shall be specifically approved by the City Engineer.

Maximum velocity shall not exceed 10 feet per second at the design flowrate. Sewers shall be designed with uniform slope between manholes.

6.304 Vertical Alignment

The minimum cover for wastewater lines shall be 3 feet from the existing or planned final grade, whichever is lower, to the top of the sewer pipe. Laterals shall have a nominal cover of 30 inches at the property line or at a point 5 feet outside the curb face or edge of paving, whichever is the greater distance from the roadway centerline. Minimum cover requirements may be reduced if special backfill and/or special piping are used. See §2.401 for additional information regarding service lateral cover and §5.701 for structural considerations.

When crossing a water main, the wastewater line shall be installed below the water main with a clearance of at least 12 inches where this separation cannot be maintained, the City Engineer may approve reduced clearances based on the California Dept. of Health Services Guidelines. A minimum vertical clearance of at least 3 inches shall be maintained between a wastewater line and a storm drain. Separation distances shall be measured from the nearest edges of the facilities

At points of convergence of pipes of various sizes, the pipe crown of the inflowing pipe(s) shall be no lower in elevation than the crown of the outflowing pipe. Exceptions to this may be granted at the discretion of the City Engineer if this is not practical (cover requirements, clearance issues, etc…) See §2.502 regarding drop manholes for additional information.

6.305 Horizontal Alignment

Wastewater Lines shall be placed within street rights-of-way unless placement in an easement is specifically approved by the City Engineer. Alignment shall be parallel to the street centerline whenever possible.

The horizontal alignment of wastewater lines in new streets, easements and private streets shall be as shown on the appropriate City of Riverbank Standard Plan. In existing streets and other special cases (such as looped streets in which the utilities may be located concentrically to avoid crossings), the alignment may vary from the Standard Plans, but in no case shall there be less than 10 feet horizontal clearance to a water main, except as specifically approved by the City Engineer in accordance with State Department of Health Services policies.

Curved sewers are allowed. However, joint deflections or pipe curvature shall not exceed the pipe manufacturer's recommendations. The following table may be used as a conservative guide. If a shorter radius is desired, the appropriate design information (i.e. short pipe lengths, radius fittings, etc) shall be shown on the plans.

Minimum Radius of Bending Circle (ft.)

Pipe Size	Ductile Iron	PVC	VCP
4	190	160	200
6	190	160	200
8	190	210	200
10	190	270	200
12	190	320	200
15	n/a	390	260

Wastewater lines, including laterals, or other sanitary hazards shall not be constructed adjacent to any existing or proposed well site. California State Department of Health Services requirements shall be the minimum required separation, however these may be increased where the well location is not fixed or redrilling is planned.

6.306 Pipe Materials

The following standard pipe materials shall be used for gravity flow wastewater line construction and shall conform to the appropriate American Society of Testing and Materials (ASTM) and American Water Works Association (AWWA) specifications (latest revision):

Pipe Material	Specification
Ductile iron pipe	ASTM A746
w/polyethylene lining &	ASTM D1248, Class C, 30 mil thickness
polyethylene encasement*	AWWA C105
PVC sewer pipe and fittings	ASTM D3034 SDR 26
Vitrified clay pipe	ASTM C700 (extra strength)
laterals only:	
Cast iron soil pipe (4" & 6")	ASTM A74, service weight

* polyethylene encasement may be omitted if a corrosivity soils report provided per Appendix A of AWWA C105 indicates encasement is not needed. Alternate linings may be approved on a case-by-case basis,

New main sewers and/or laterals servicing exclusively industrial and commercial development may be limited to vitrified clay pipe depending on the proposed use.

Trench and pipe strength design shall be shown on the improvement plans per §5.700.,

6.307 Joints and Fittings

Joints and fittings shall be selected and installed to minimize infiltration and to prevent the entrance of roots throughout the life of the system. Ductile iron pipe joints and fittings shall conform to AWWA C110 or other approved joint for wastewater applications. Joints for PVC pipe shall be flexible elastomeric type conforming to ASTM D3212, Solvent welded joints for PVC pipe are not permitted. Joints for vitrified clay pipe shall conform to ASTM C425.

Joining of pipe sections of unlike materials shall be accomplished using approved flexible band seals. Other joining methods shall not be used unless approved by the City Engineer.

6.400 Services

6.401 General

One service is typically allowed per parcel being served. Additional services may be specifically approved by the City Engineer in order to eliminate the need for on-site pumps, excessive trenching, or in other circumstances.

The minimum diameter for services (lateral sewers) shall be 4 inches.

A lateral sewer installed concurrently with a main sewer shall be of the same type and class of pipe material as the sewer main except where land use, cover or water main separation requirements indicate otherwise. For new services on existing mains, the lateral sewer may be of any approved pipe material as specified in §2,306,,

Size and depth of services is to be determined by the design engineer for the parcel being served subject to minimums contained in City Standards. Particular attention should be given to large, deep parcels.

Storm drainage shall not be permitted to discharge into the sanitary sewer system.

6.402 Monitoring Structures

Sanitary sewer monitoring structures and/or sampling manholes shall be installed on new development projects if so directed by the City Engineer. Typically, monitoring structures will not be required on residential developments, but may be necessary on industrial and commercial projects. Monitoring structures shall be in a location that is accessible to City personnel at all times, and may be considered a cleanout in lieu of a separate required cleanout.

6.403 Traps and Waste Interceptors

Appropriate traps and waste interceptors shall be installed on services on-site as required by the City Engineer in conformance with the Uniform Plumbing Code, as adopted by the Riverbank Municipal Code, and the Standard Plans. Grease traps and/or sand/oil interceptors shall be installed on sewer services for any facility whose operation will result in oil, grease, sand or other solids being discharged into the City's sanitary sewer system.

6.500 Manholes and Miscellaneous Structures

6.501 Manholes

Manholes shall be located in areas accessible to cleaning equipment and at:

- the end of each line
- all changes in pipe grade, size, or alignment
- all junctions of sewer mains and/or laterals 6 inches or greater in diameter
- distances not greater than 400 feet

24" diameter risers may be used in lieu of standard 48" manholes where the depth to the invert is less than 42 inches.

Manholes/risers may be required for inspection purposes at the end of stubs exceeding 25 feet in length

6.502 Drop Manholes

Drop manholes per City Standard Details shall be provided where the inflowing pipe crown elevation is more than 2 feet above the crown elevation of the outflowing pipe.

6.600 Lift Stations

6.601 General

All lift stations shall be specifically approved by the City Engineer after consideration of all reasonable gravity flow alternatives, and shall be designed in accordance with the standards contained herein.

Lift station structures, electrical, and mechanical equipment shall be located and designed such that they are protected from physical damage by the 100-year flood and will remain fully operational and accessible during the design storm.

The lift station shall be located off the traveled way of streets and alleys, and shall be provided with paved vehicular access and appropriate security as required by the City Engineer.

6.602 Design

Lift stations shall be designed to be compatible with current City equipment, systems, and operational/maintenance practices. As each lift station will be a unique design, developers and design engineers are highly recommended to consult with the City Engineer prior to final design of the new lift station

In areas of corrosive soils, impressed current cathodic protection is required and shall be designed by a qualified corrosion control engineer.

California OSHA standards shall be observed in the design of all pumping station access structures

Pumps:

Pumps in all new lift stations shall be of a manufacturer and model approved by the City Engineer.

At least two pumps shall be provided for each pumping station. If only two units are provided (duplex), they shall have the same capacity, and each be capable of handling the design flow. Where three or more units are provided, they shall be of such capacity that with any one unit out of service, the remaining units will have capacity to handle maximum design flows.

Design pumping rate shall be the design wastewater flowrate (see section 2.200) for the ultimate tributary area. For lift stations that are intended to serve a relatively large, phased tributary area, initial lower flow rates shall be considered in the design. It may be necessary to provide an interim design with fewer or smaller capacity pumps. In these instances, the plans shall indicate what the ultimate pumps shall be, as well as the ultimate design

discharge flowrate and total dynamic head. The station and site should be designed for ultimate conditions, and for maximum ease of transition from interim to ultimate design.

Wetwells:

The wetwell size and control setting shall be appropriate to avoid heat buildup in the pump motors due to frequent starting, and to avoid septic conditions due to excessive detention time. Wetwells and controls shall be such that sewage detention time is limited to 2 hours. Detention time in excess of 2 hours shall require provisions for odor control. Total pump starts shall be limited to no more than 10 per hour. Volume available in upstream sewer mains may not be considered to be part of the available wet well storage volume.

Wetwells shall be reinforced concrete and lined in accordance with the Construction Specifications. The type of lining shall be indicated on the plans.

The wetwell floor shall have a minimum slope of 1 to 1 to a hopper bottom The horizontal area of the hopper bottom shall not be greater than necessary for proper installation and function of the pump inlet.

Wetwell covers and access hatches shall be H-20 traffic rated.

Valving:

Each pump discharge shall be equipped with the following valves:

Gate Valves: Gate valves shall be resilient wedge, flanged joints. All resilient wedge gate valves shall conform to the applicable requirements of ANSI/AWWA C509, and shall be handled and installed in accordance with the recommendations set forth in the appendix to ANSI/AWWA C509, and the recommendations of the manufacturer. All interior and exterior ferrous metal surfaces of valves and accessories shall be shop coated for corrosion protection. Approved manufacturers: Clow F-6100, Mueller A-2370, Kennedy 4561/4701, and American Flow Control –Series 2500

Check Valves: Check valves shall be installed immediately downstream of the gate valves, and shall be swing type with an external lever and minimum pressure rating of 250 psi. Approved manufacturers: Clow F5345, Mueller #2600-6-01, Kennedy IBBM Swing Check Valve, American “50” Line with Weight and Lever

Valves shall be contained underground in a separate precast concrete box, with a traffic rated lid.

Electrical Equipment:

All wetwell electrical equipment shall be explosion proof and meet National Electrical Code Class 1, Division 2, Group D requirements. All drywell electrical equipment shall be NEMA 4.

Telemetry and level sensing equipment compatible with the City's latest SCADA equipment shall be provided. Alarms shall be activated in cases of high water, power failure, pump failure, use of the lag pump, unauthorized entry, or any cause of pump station malfunction.

Standby Power:

Pump stations of greater than 1.0 mgd peak flow capacity shall include permanent installation of an emergency standby power generator with an automatic transfer switch. Engines shall be provided with silencing equipment appropriate for the adjacent land use per zoning and General Plan requirement. The location and tank design of the generator fuel tank shall be reviewed and approved by the fire department.

Smaller capacity stations, where approved, shall provide dual, manually switchable electrical feeds from a separate transformer.

Potable Water Service:

A potable water service with a reduced pressure backflow prevention device (Febco Model 825) is required for all pump stations.

Site / Location:

Lift stations shall not be located within the traveled way of streets, and shall be easily accessible for maintenance personnel. All lift stations shall be fenced, and lift station items within the fenced area shall be set back per the appropriate code, or as required for site access.

Lift station sites shall be paved with a durable surface as required for access by maintenance vehicles, as approved by the City Engineer. Storm drainage shall be provided for the lift station site, as required.

Instructions and Equipment:

Three complete sets of operational instructions (including emergency procedures and maintenance schedules), special tools, and such spare parts (i.e., mechanical seals, wear rings, filters, etc.) as may be necessary shall be provided for all pump station equipment.

6.603 Force Mains

At average pump flow, a velocity of at least 2 feet per second shall be maintained. Maximum velocity shall be limited to 8 feet per second.

To maximize pump efficiency, it is preferable to provide a force main design that gradually slopes upward from the pump station discharge, to the point of downstream connection. Low points or sumps in the force main are not allowed. High points in the force main shall be avoided. An automatic air relief valve shall be placed at high points in the force main to prevent air locking.

Force mains shall enter the gravity sewer system at a point not more than 1 foot above the flow line of the receiving manhole.

The force main and fittings, including thrust blocking, shall be designed to withstand normal pressure and pressure surges (water hammer).
The following standard pipe materials shall be used for force-main construction and shall conform to the applicable ASTM or AWWA specification (latest revision)

Pipe Material	Specification
Ductile iron pipe	AWWA C151
w/ polyethylene lining &	ASTM D1248, Class C, 30 mil thickness
Polyethylene encasement*	AWWA C105
PVC Plastic Pipe	AWWA C900

* polyethylene encasement may be omitted if a corrosivity soils report provided per Appendix A of AWWA C105 indicates encasement is not needed Alternate linings may be approved on a case-by-case basis.

Pipe strength (Class) shall be determined by accepted engineering principles and the pipe specification based on the design pressure.

Friction losses through force mains shall be based on the Hazen-Williams' formula with a value for "C" equal to 120.

Separation from Water Mains

Force main separation from water mains shall conform to applicable State Dept. of Health Services regulations (legal min), and City Standards. The appropriate construction details shall be shown on the plans.

City of Riverbank
CONSTRUCTION STANDARDS

WASTEWATER

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SECTION 6: SANITARY SEWER

6.100 Materials

6.101 General

The City Engineer shall approve the source and supply of materials.

6.102 Gravity Sewer Pipe

1. Vitrified Clay Pipe shall be extra strength, bell and spigot end compression joint pipe, conforming to ASTM C700 as it applies to unglazed vitrified clay pipe.

2. Ductile Iron Pipe shall be Pressure Class 350 and shall conform to ANSI/AWWA C151. All DIP shall be protected by a polyethylene encasement meeting the requirements of ANSI/AWWA C105. Fittings shall conform to ANSI/AWWA C110.

   Ductile Iron Pipe for use in gravity sewer systems shall be lined with Protecto 401 Ceramic Epoxy Liner or equal.

3. Polyvinylchloride Pipe (PVC) shall be SDR 26, conforming to the requirements of ASTM D3034. Joints shall be gasketed, bell-and-spigot, push-on type with elastomeric seals conforming to ASTMD3212. Gaskets may be factory installed or field installed, as recommended by pipe manufacturer.

6.103 Service Laterals

Pipe shall be the same type and class as that used for the main.
Joints and Couplings for laterals shall be the same type and specifications as those used for the main.

6.104 Manholes

1. Standard Precast:
   Sanitary sewer section manholes shall be precast reinforced concrete conforming to ASTM C 478. The manhole base, risers and cone shall have a minimum compressive strength of 3,000 psi at 28 days. Manholes shall be constructed in accordance with the Standard Details.

2. Lined Manholes:
   When required by City Standards or indicated on the plans, manholes shall be SuperCoat or Polyurethane lined. The scope of the lining shall include, unless otherwise shown on the plans, all unlined interior concrete surfaces of the manhole. The Contractor shall provide submittal data for review and approval by the Public Works Department prior to application.

   Polyurethane Lining: The lining material shall be an epoxy base coat under a polyurethane finish coat. The material shall be Sancon 100, or equivalent.
   The epoxy base coating shall be applied to a minimum thickness of 3 mils.

The polyurethane shall be applied to a thickness of 125 mils (1/8”) in one (1) continuous coat, without seams, free from any holes or defects.

SuperCoat Lining: SuperCoat lining by Lafarge aluminates. The lining shall be applied by a licensed SuperCoat applicator and in accordance to the product recommendations. The depth of the application shall be ¾” to 1” minimum.

Lining System Warranty:
Lining System shall be warranted for five (5) years against any type of failure. The Contractor shall remove and replace all failures at his expense.

6.105 Castings

Iron castings for manhole covers and frames shall conform to ASTM A 48, Class 25 and be of the dimensions and makes/models shown on the Standard Details.

All castings shall be sound and free from shrinkage cracks, blowholes, and other defects. All fins and burnt sand must be removed. Excessive porosity and spongy surfaces will constitute causes for rejection.

The manhole cover shall seat evenly and firmly in the frame. Cast iron frames and covers shall be dipped or painted with asphalt, which will form a tough, tenacious, non-scaling coating which does not have a tendency to become brittle when cold or sticky when hot.

6.106 Cleanouts

Cleanout frames and covers shall be manufactured, tested and otherwise furnished in accordance with the Standard Specification of Fray Iron Castings ASTM A 48, Class 30. The contact surfaces of frames and cover shall be machine surfaced to eliminate rattling and other movement under traffic. Castings shall be equal in materials and construction to Christy F14, or equal. Concrete shall be Class II and have a 28-day compressive strength of 3,000 psi.

6.107 Carrier or Casing Pipe

Pipe used as a conductor pipe under a highway or railroad shall be welded steel pipe. The Pipe shall conform to the Standard Specifications for Public Works Construction (Greenbook) Section 207-10, “Steel Pipe”. The protective lining and coating, if any, shall be as shown on the plans or specified in the Special Provisions.

When the conductor pipe is to be installed by boring and jacking, the wall thickness shall be ¼" for sizes up to and including 24" in diameter, and 5/16" for sizes 27" to 36" in diameter, unless otherwise specified.

6.108 Pipe to Manhole Connections

A Waterstop grouting ring or seal shall be used for pipe penetrations into cast-in-place manhole bases. Flexible rubber boot connections with stainless steel components shall be used for pipe penetrations into the walls of the manhole, or into pre-cast bases. Connections shall be installed as per the manufacturer’s recommendations, and shall meet the requirements of ASTM C 923.

6.200 INSTALLATION

6.201 Sanitary Sewer Installation

1. All sanitary sewer pipe installations shall be accomplished as specified herein except where modified by the requirements specific to the various types of pipeline materials specified under Section 5.03.

2. All pipes shall be laid to conform to the prescribed line and grade as shown on the plans and each pipe length checked to the grade line, which the Contractor establishes from the grade stakes.

3. Each length of pipe shall be laid on compacted, approved bedding material as specified and shall have full bearing for its entire length between bell holes excavated in said bedding material to allow for unobstructed assembly of all bell and spigot joints. “Stabbing”, “Swinging In”, or “Popping On” spigot ends of pipe into bell ends will not be permitted. After jointing is accomplished, all spaces between pipe and bell holes shall be packed with bedding material, taking care not to damage, move or lift the pipe from its bedding support.

4. Adjustments of pipe to line and grade shall be made by scraping away or filling in and tamping approved material under the body of the pipe. No wedging or blocking to support the pipe will be permitted.

5. A sewer line, unless otherwise approved by the Inspector, shall be laid, without break, upgrade from point of connection to existing sewer and with the bell end forward or upgrade. Pipe shall not be laid when the Inspector determines that the condition of the trench or the weather is unsuitable. When pipe laying is not in progress, the forward end of the pipe shall be kept effectively closed with an approved temporary plug or cap.

6. Sewer pipes, branches, stubs, or other open ends which are not to be immediately connected, shall be plugged or capped with a standard watertight plug or cap, as approved by the Inspector for use in the particular installation. The plug or cap shall be placed on a standard end.

7. Pipe entering or leaving manholes or other structures shall have joints within 2½'of the manhole base.

8. In all cases, flexibility of joints at the manhole base shall be preserved to prevent damage to the pipe by differential settlement.

9. All sewer line connections to manholes, trunk sewers, main sewers, or side sewers shall be left uncovered until after the inspection has been made. After approval of the connection, the trench shall be backfilled as specified.

10. If the sewer is to be laid in an area that is to be filled, and the cover prior to filling is less than 5', the pipe shall not be laid until the area has been filled to a level 5' above the proposed pipe and compacted to 90% relative compaction, unless otherwise authorized by the City Engineer.

6.202 Service Connections

Attention is directed to the Standard Details for additional requirements pertinent to lateral installations.

1. Where indicated on the plans, a cut-in wye shall be used with plain ends along the “run” of the pipe. Tees shall not be used. Cut-in wyes shall be allowed on existing mains, only. For new mains under construction, the wyes shall be connected to the main using standard bell-and-spigot joints. The first pipe segment downstream from the wye shall then be cut (beveled) to the required length so as to fit into the bell of the next downstream pipe end.

2. Cut-in wye connections are only allowed in mains less than 12", otherwise a manhole in accordance with the Standard Details is required.

3. When cutting in a wye, make three (3) initial cuts in the main, 2" to 6" inches apart, and remove the rings. Cut the main to the required length to insert wye.

4. Use well graded, crushed stone or crushed gravel, meeting the requirements of ASTM C 33, Gradation 67 (3/4 to No. 4) shall be placed under the main line and the sewer service lateral within the right-of-way.

5. When joining the cut ends of the existing main to the wye, a “BAND SEAL” with stainless steel shear type sewer repair couplings, or equal; shall be used. Calder couplings, No-Hub couplings or plastic will not be permitted on the “run” of the pipe.

6. Whenever possible, all connections at new and existing manholes shall be made with matching crowns.

7. That portion of any lateral line to be placed under an existing curb and gutter and/or sidewalk shall be done by boring or cutting and replacing the existing curb and gutter and/or sidewalk.

8. The lateral line shall have a clean-out at back edge of sidewalk as shown on the Standard Details. A box shall be installed as noted on detail. Said cleanout shall consist of a combination wye and eighth bend. Laterals and cleanouts shall not be located in the driveway, unless specifically approved by the City Engineer.

9. The wye branches, unless otherwise specified, shall be inclined at an angle of 45 degrees from the horizontal. In no case shall the springline of the lateral be lower than the springline of the main line.

10. The end of the lateral service shall extend a minimum of 24" beyond cleanout wye/riser combination.

11. The location of every sewer service shall be marked with an “S” directly above the service on the face of the curb; the “S” shall be 2" in height and ¼" in depth.

6.203 Manholes

1. Precast Manhole Construction -Excavation and backfill for all precast manholes shall be in conformance with the requirements of Section 19-3 of the State Specifications and installed as specified herein. All embedment materials under, around and at least 3" over all pipelines located within five feet of structure bases shall be compacted without jetting prior to section placements. All precast manholes shall be constructed to subgrade prior to adjoining sewer pipeline trench and/or structure backfill where such method of compaction is permitted and used.

2. Manholes installed in areas outside of developed areas shall have bolted manhole covers. Rim elevations shall be a minimum of 1'above ground. The exposed manhole above existing ground shall be constructed entirely of grade rings and noted on the plan sheets. If the manhole outside an existing street is in a future street area, then grade rings shall extend below ground at least 18".

3. All joint surfaces of precast sections and face of manhole base shall be thoroughly clean prior to setting precast sections. These various sections shall be set in preformed plastic sealing gaskets of material conforming to the requirements of FEDERAL SPECIFICATION SS-S-00210.

    a. Installation of gaskets -Apply one (1) coat of primer to clean, dry joint surface (both tongue and groove) and of the two-piece wrapper on the gasket. The outside paper will protect the gasket and assure against stretching. Before setting the manhole section in the trench, attach the plastic gasket strips end-to-end to the tongue or groove of each joint, forming a continuous gasket around the entire circumference of the manhole joint.

    b. Handling of barrel sections after the plastic gasket has been affixed shall be carefully controlled to avoid bumping the gasket and thus displacing it or contaminating it with dirt or other foreign material. Any gaskets so disturbed shall be removed and replaced if damaged and repositioned if displaced.

    c. Care shall be taken to properly align the manhole section with the previously set section before it is lowered into position.

    d. During cold or wet weather, pass direct heat over the concrete joint surface lightly until ice, frost and moisture are removed and surface to be primed is dry and warm immediately before application of primer. Direct heat shall also be passed over plastic gasket strips immediately prior to

attaching them to joint surfaces and immediately prior to insertion of tongue into groove.

e. After manhole section has been set, the excess joint gasket shall be neatly trimmed away, and each joint shall be neatly grouted along the manhole wall, inside and out.

4. The cast-in-place base shall be Class II, 3,000 psi, 28-day concrete with 1½" maximum size aggregate. It shall rest on firm, undisturbed soil, and shall be the dimensions shown on the Standard Details. Where sewer lines pass through manholes, the pipe shall be laid continuously as a whole pipe. Waterstop gaskets, or equivalent, flexible rubber gaskets shall be installed at each pipe penetration into the manhole base. After the manhole base and precast sections have been placed and sufficient time has elapsed to allow all concrete and grout to set, the top half of pipe within the manhole shall be carefully cut off and the sides mortared. All channels so formed form a smooth flowing channel at all flow depths.

5. Temporary covers of 3/8" steel plate of sufficient size to adequately cover the opening shall be placed on the cone until the base is complete and the manhole casting shall then be installed. Suitably located ribs shall be welded to the underside of the cover to hold it in place during any grading operations.

6. The throat of the manhole shall be made of precast concrete rings of the proper inside diameter. The minimum depth of throat permitted shall be one 3" ring between the cone and the frame. The maximum depth permitted shall be 12" of rings between the cone and frame.

7. When adjusting the manhole frame and cover to grade, the frame shall be wired to a 2" x 4" of sufficient length to span the excavation and the throat completed to the right level. Whenever the space between the bottom of the frame and the top of a ring is less than 3" inches, the void may be filled with concrete, poured against a suitable form on the inside of the structure.

8. When adjusting an existing manhole to grade and the total depth of the throat from the top of the frame to the bottom of the throat exceeds 18", the upper portion of the manhole shall be removed to the first full-size manhole section. The upper portion shall then be reconstructed as outlined above.

9. Penetrations for connections to existing manholes shall be core drilled or neatly sawcut by the contractor. Use of a pneumatically powered chipping hammer for use in the removal of the sections of the manhole wall or base shall l be on a case-by-case basis and only with the prior approval of the onsite inspector. The surface edge of the opening shall be ground or milled as necessary, with all reinforcing wire ground to the level of the surrounding concrete wall of the opening. Reinforcing wire shall be removed and not be permitted to remain in the cut. Bent wire left in cut shall not be permitted.

10. Sealing the pipe shall be accomplished through the use of either a mechanically installed, flexible watertight boot connection, a cast-in-place watertight flexible boot connection, or a similar flexible sealing gasket. Boot connections shall use stainless steel bands and components, and shall conform to the requirements of ASTM C923. Contractor shall provide submittal data prior to construction for review and approval by the onsite inspector. All sealing gaskets and/or boot connections shall be installed in accordance with the manufacturer's recommendations.

11. Before any work is started on adjusting or repairing a manhole, the channels in the base shall be covered with strips of wood, and the entire base covered with a heavy piece of canvas. This cover shall be kept in place during all work. Upon completion of the work the wood strips and the canvas shall be removed from the manhole, allowing no debris to fall or remain in the manhole.

12. Lined Manholes
    Installation of the SuperCoat, or Polyurethane lining shall conform to the requirements as specified by manufacturer.

    a. Field Joints:
       All joints between lined pipe and lined structures shall be either Type C-1 or Type C-2 as defined in Section 311-1 of the Standards Specifications for Public Works Construction (SSPWC). Field joints between sections of lined pipe shall be Type P-1 as defined in Section 311-1 of the SSPWC specifications. When transitioning between lined and unlined pipe, a factory "turn back" shall be used or a type 316 stainless steel band and neoprene gasket/termination secured with type 316 stainless steel wedge anchors provided at the transition for the full pipe circumference. Contractor shall provide transition details to the Engineer for review prior to installation. Unless shown otherwise, field joints in lined structures shall be one (1) of the following types defined in the SSPWC: Type C-1, Type C-2 or Type C-3.

    b. Field Welding and Testing:
       Field welding and testing of the lining of structures and between pipe and structures shall be made in strict conformance with lining manufacturer's instructions and recommendations. All tests shall be performed by the contractor in the presence of the City inspector. The inspector shall be notified at least 24 hours in advance of a scheduled test.

    c. Polyurethane Lining Surface Preparation:
       The Contractor shall furnish all labor, material and equipment necessary for the preparation of surfaces, application of lining, safety procedures, protection of existing surfaces, equipment and cleanup.

       All new concrete surfaces shall be grit blasted to provide proper adhesion of coating system. All debris produced from the blasting operation shall be removed from the structure prior to coating. No debris shall be allowed

to enter the sewer system. The concrete surfaces shall be air dried prior to installation of the liner.

All unnecessary holes in structure shall be sealed prior to lining with acid resistant sealant recommended for surfaces being sealed.

d. Lining Installation:
The lining application shall be performed only by workmen trained and experienced with the specified material. The lining shall be applied by high pressure airless equipment approved by the lining manufacturer. The equipment shall be in good working order to insure correct proportioning and mixing of the components.

The polyurethane shall be applied to a thickness of 125 mils (1/8") in one (1) continuous coat, without seams, free from any holes or defects. The lining shall be installed over dry concrete below the water level by using appropriate bypass equipment.

During the lining application the Contractor shall take wet gage thickness readings as required to insure correct lining thickness.

The finished coating shall be free from porosity, without bubbles or pinholes and uniform in color. All areas in question shall be removed and reworked to the satisfaction of the Engineer.

Application of the lining shall not take place when exposed to rain, fog or high winds. It is the Contractor's responsibility to insure protection of the work from the above-mentioned conditions.

e. Lining System Warranty:
Lining System shall be warranted for five (5) years against any type of failure. Contractor shall remove and replace all failures at his expense.

6.300: Inspection and Testing of Sewer Lines

All testing indicated herein shall be performed after backfill and compaction of the trench, grading and compaction of subgrade, after installation of curb and gutter, and prior to placement of aggregate base and AC paving. Compacted subgrade shall have passed the applicable compaction tests required by these Construction Specifications prior to sewer line testing. All tests shall be performed under the supervision of the City Public Works Department, or their appointed representative. Testing, and any required re-testing, shall be at the expense of the Contractor.

6.301 Cleaning and Flushing

Prior to performing a leakage test, the pipe installation shall be thoroughly cleaned. Cleaning shall be performed by the Contractor by means of an inflatable rubber ball. The ball shall be of a size that will fit snugly into the pipe to be flushed. The ball shall be placed in the last cleanout or manhole on the pipe to be

cleaned, and water introduced behind it. The ball shall pass through the pipe with only the pressure of the water impelling it. All debris flushed out ahead of the ball shall be removed at the first manhole where its presence is noted. If any wedged debris or damaged pipe shall stop the ball, the Contractor shall remove the obstruction. When a new sewer is connected to an existing line, cleaning and flushing shall be carried out to the first existing manhole downstream from the point of connection.

6.302 Low-Pressure Air Test

After completing backfill of a section of sewer line, the Contractor shall at his/her expense, conduct a Line Acceptance Test using low-pressure air. The test shall be performed using the equipment listed below, according to stated procedures and under the supervision of the City Engineer.

PROCEDURE:

The section of pipe to be tested shall be isolated by completely blocking all outlets in the section under test. Careful attention must be given to the bracing of all plugs, as the line will be under pressure. One (1) of the plugs used at the manhole must be equipped for an air inlet to fill the line from the air compressor. The air compressor which feeds air into the pipe section must be equipped to control the air entry rate and to prevent the pressure from exceeding 5.0 psig. The air compressor shall be fitted with a blow-off valve to operate at 5.0 psig to prevent an increase in pressure, which could be hazardous to the pipeline.

After the pipe has been wetted, the air shall be allowed to slowly fill the pipeline until a constant pressure of 4.0 psig is maintained. At this point, the air compressor shall be controlled so that the internal pressure in the line is maintained between 4.0 and 3.5 psig for at least two (2) minutes to permit the temperature of the entering air to equalize with the temperature of the pipe wall. If it is necessary to bleed off the air to repair a faulty plug, a new two (2) minute interval must be allowed when the line has been refilled.

When the temperature of the air has reached equilibrium with that of the pipe wall, the air source shall be disconnected. Before disconnecting the air supply, the pressure shall be at 4.0 psig. The gauge is then watched until the air pressure reaches 3.5 psig. When the pressure has reached 3.5 psig, a stopwatch will be started and stopped when the pressure has reached 2.5 psig. The portion of line being tested shall be considered “Acceptable” if the time required in minutes for the pressure to decrease from 3.5 to 2.5 psig is not less than the time shown for the given diameters in the following table:

SPECIFICATION TIME REQUIRED FOR A 1.0 PSIG PRESSURE DROP FOR SIZE AND LENGTH OF PIPE INDICATED

Pipe Dia. (in)	Min. Time (min:sec)	Length for Min. time (ft)	Time for Longer Length(ft)	Specification Time for Length Shown Length (ft), Time (min:sec)						
				100	150	200	250	300	350	400
4	3:46	597	.360L	3:46	3:46	3:46	3:46	3:46	3:46	3:46
6	5:40	396	.854L	5:40	5:40	5:40	5:40	5:40	5:40	5:42
8	7:34	296	1.520L	7:34	7:34	7:34	7:34	7:36	8:52	10:08
10	9:26	239	2.374L	9:26	9:26	9:26	9:53	11:52	13:51	15:50
12	11:20	199	3.418L	11:20	11:20	11:23	14:14	17:05	19:56	22:47
15	14:10	159	5.342L	14:10	14:10	17:49	22:16	26:43	31:10	35:37
18	17:00	133	7.692L	17:00	19:14	25:38	32:03	38:28	44:52	51:17

The air test shall be performed after the completion of backfill and compaction and prior to final paving and pouring of the curbs, gutters and sidewalks.

The Contractor shall furnish all equipment needed to complete this test.

If the installation fails to meet this requirement, the Contractor shall, at his/her own expense, determine the source of leakage. He/she shall then repair or replace all defective materials and/or workmanship and perform the air test as many times as necessary to achieve an acceptable test.

6.303 Televised Inspection

The Contractor shall inspect all new pipelines with closed circuit television and furnish a CD/DVD of the inspection, along with a hard copy report to the City. The Contractor shall give the City Engineer at least two (2) working days notice prior to performing the TV work so a city representative can verify the work.

The Contractor shall clean all lines of dirt and other debris, clean manholes, remove broken pipe, compact trench, raise manhole rims to grade, and pass the air test prior to television inspection. Areas adjacent to manholes shall be leveled and made accessible to the television trailer.

Defects such as high and low spots, joint separations, offset joints, chipped ends, cracked or damaged pipe, infiltration points and debris in lines shall be corrected by the contractor at their expense. For joint separations, low spots and chipped ends, the following maximum acceptable limits will apply for new sanitary sewer lines:

Joint separations -½"

Low spots:

Pipe size	Depth tolerance of trapped water
6	0.93 in.
8	1.25 in.
10"	1.50 in
12"	1.87 in.
15”	2.25 in.
18”	2.75 in.

Chipped ends – ¼" (VCP, only)

Prior to the end of the one-year warranty period, the City may require televised inspection of the new sanitary sewer laterals for the project at the Contractor's expense.

6.304 Deflection Testing

A deflection test on all new gravity sewer mains 6" and larger shall be performed using a pre-sized, rigid mandrel device approved by the City Engineer. The mandrel shall be clearly labeled and sized so as to provide a diameter of at least 95% of the Base Internal Diameter as defined in ASTM D-3034 for PVC SDR 26 gravity sewer pipe.

The mandrel shall be drawn through the pipe using only the force that can be exerted by one man on the end of a rope, using no mechanical advantage. Under no circumstances shall the mandrel device be attached to the cleaning ball.

Pipe exceeding 5% deflection shall be repaired or replaced, and shall be remandreled in the presence of the City Engineer (or appointed representative). Mechanical re-rounding will not be acceptable.

6.400 Measurement and Payment

6.401 Pipe

Payment for sanitary sewer pipe complete in place shall be per linear foot measured from center of manhole to center of manhole following a line parallel to the grade of the sewer. Payment shall include the furnishing of all labor, materials, water, tools, and equipment required to construct and complete the installation of the sewer pipe in accordance with the plans and these specifications.

6.402 Structures & Manholes

The unit of measure for payment shall be per each unit. Payment shall be made at the bid price per item for each structure complete in place and shall include the cost of excavation, backfill, frames, covers, plates, or reinforcing steel where required.

City of Riverbank
STANDARD PLANS

WASTEWATER

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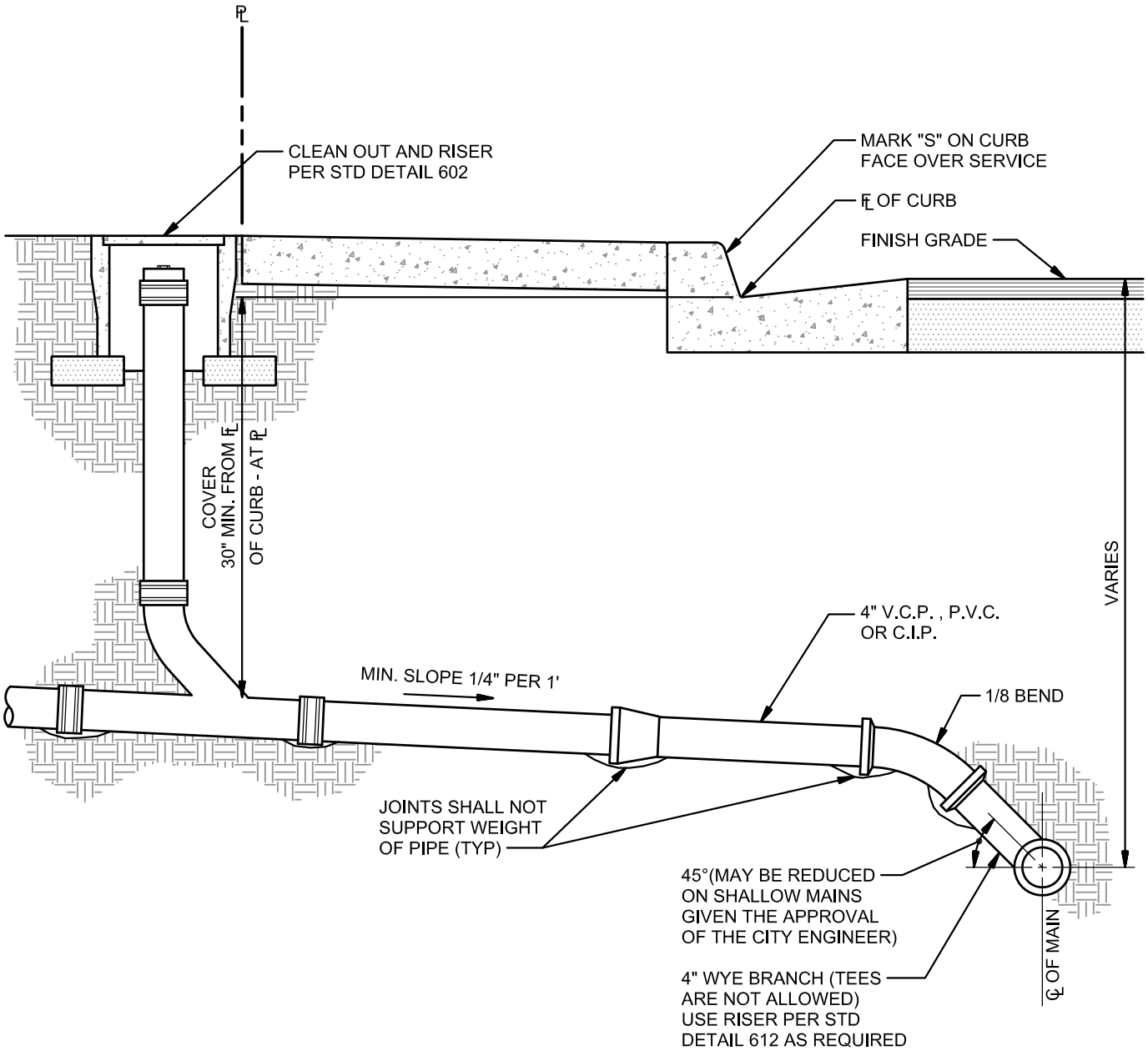


NOTES:

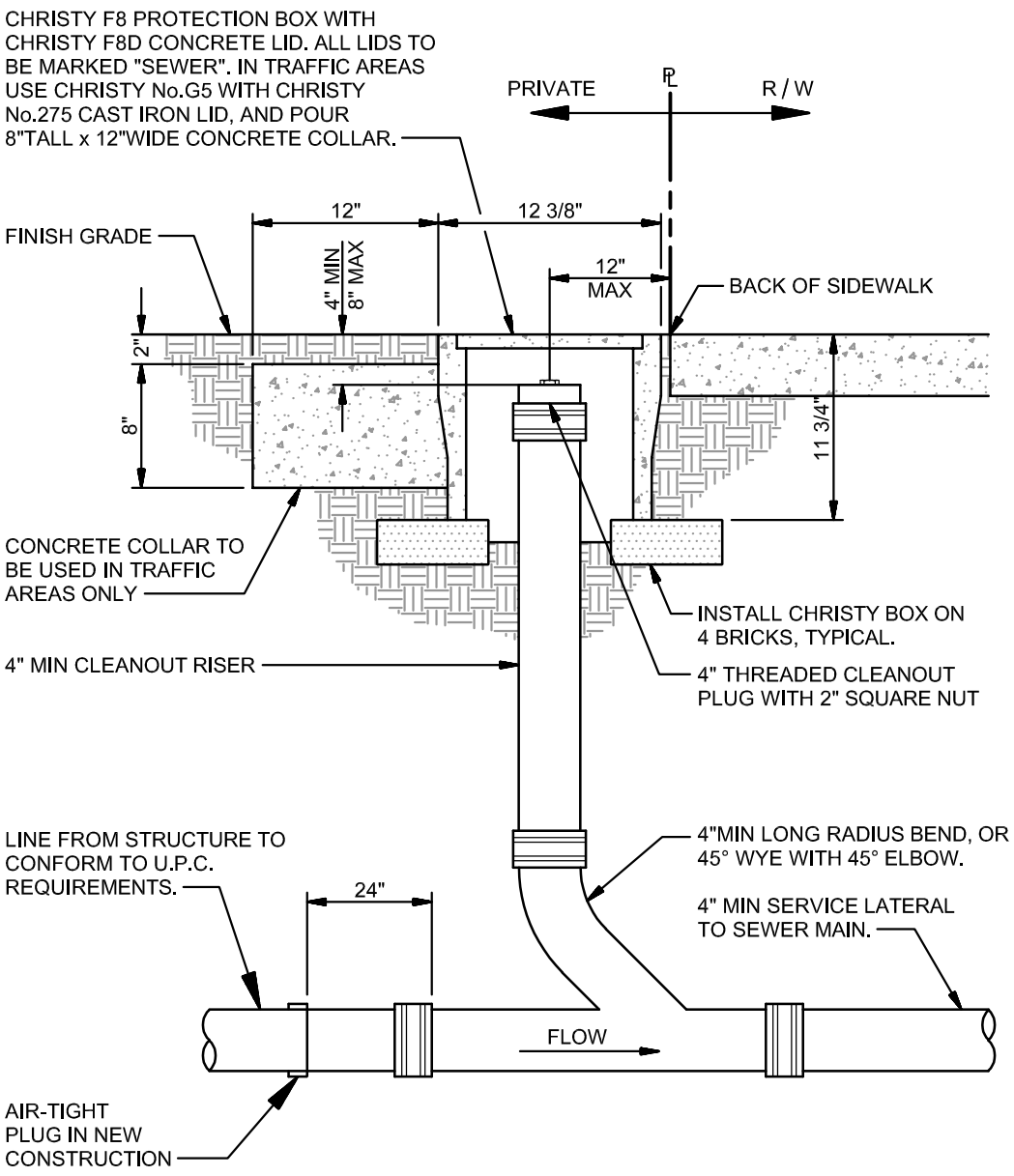
1. IN STREETS WHERE FLOWLINE OF MAIN SEWER IS MORE THAN 5 FEET BELOW FINISHED GRADE, A RISER WITH A 45° ELBOW MAY BE USED UP TO A POINT 5 FEET BELOW CURB GRADE, OR HOUSE CONNECTION MAY BE PLACED ON A UNIFORM SLOPE UP TO A POINT 5'-0" BELOW TOP OF CURB.
2. IF COVER IS LESS THAN 2'-6", ENCASE PIPE IN CONCRETE MINIMUM OF 4" THICK.
3. SEE SECTION 1000 REGARDING BEDDING AND BACKFILL REQUIREMENTS.

CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

William F. Kull
CITY ENGINEER - WILLIAM F. KULL

SEWER LATERAL

DRAWN BY:	DATE:	SCALE:	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
GK	7/21/15	NTS	9-23-14	601
REVISIONS: NONE	SECTION: SEWER	DRAWING NAME: 601.DWG		



NOTES:

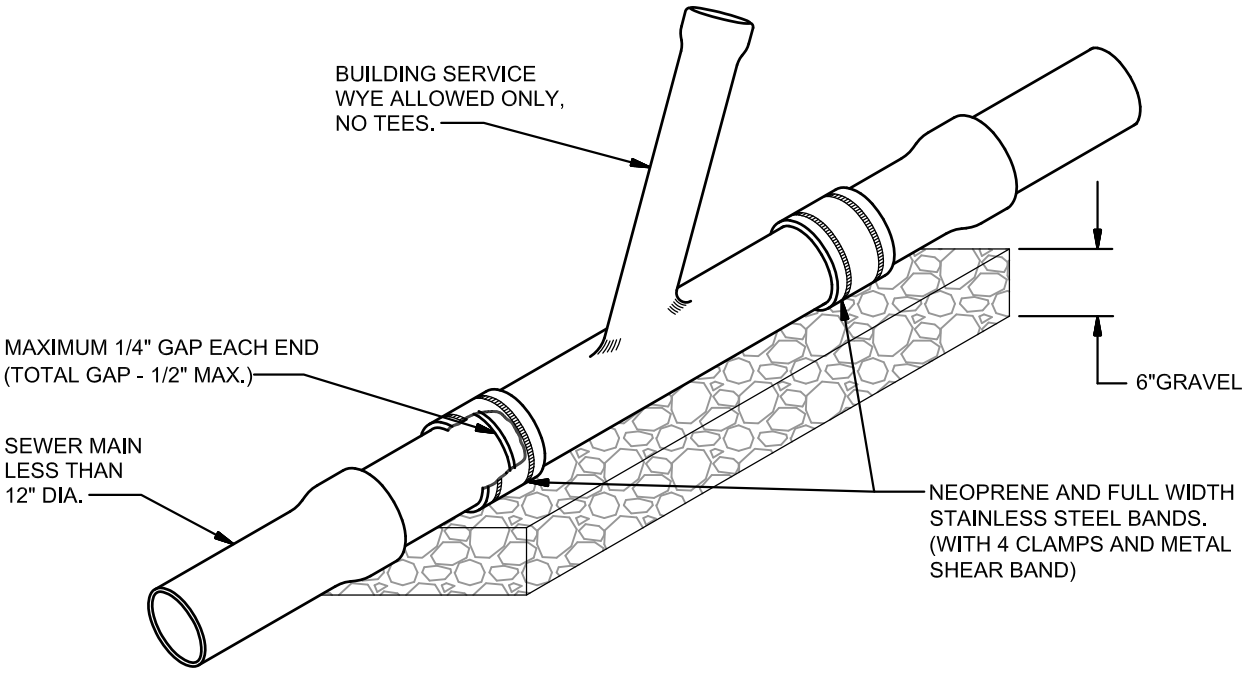
1. CLEANOUT RISER SHALL BE THE SAME SIZE AS THE SEWER LATERAL.
2. CLEANOUT SHALL BE LOCATED JUST BEHIND THE R/W LINE OUTSIDE THE R/W.
3. WYE AND CLEANOUT RISER COMBINATION MAY BE CAST IRON, PVC(SDR 26) OR VITRIFIED CLAY PIPE.
4. ALL COUPLINGS SHALL HAVE STAINLESS STEEL BANDS. (WITH 4 CLAMPS AND METAL SHEAR BAND)

CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

CLEANOUT

William F. Kull
CITY ENGINEER - WILLIAM F. KULL

DRAWN BY:	DATE:	SCALE:	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
GK	7/21/15	NTS	9-23-14	602
REVISIONS: NONE	SECTION: SEWER	DRAWING NAME: 602.DWG		



NOTES:

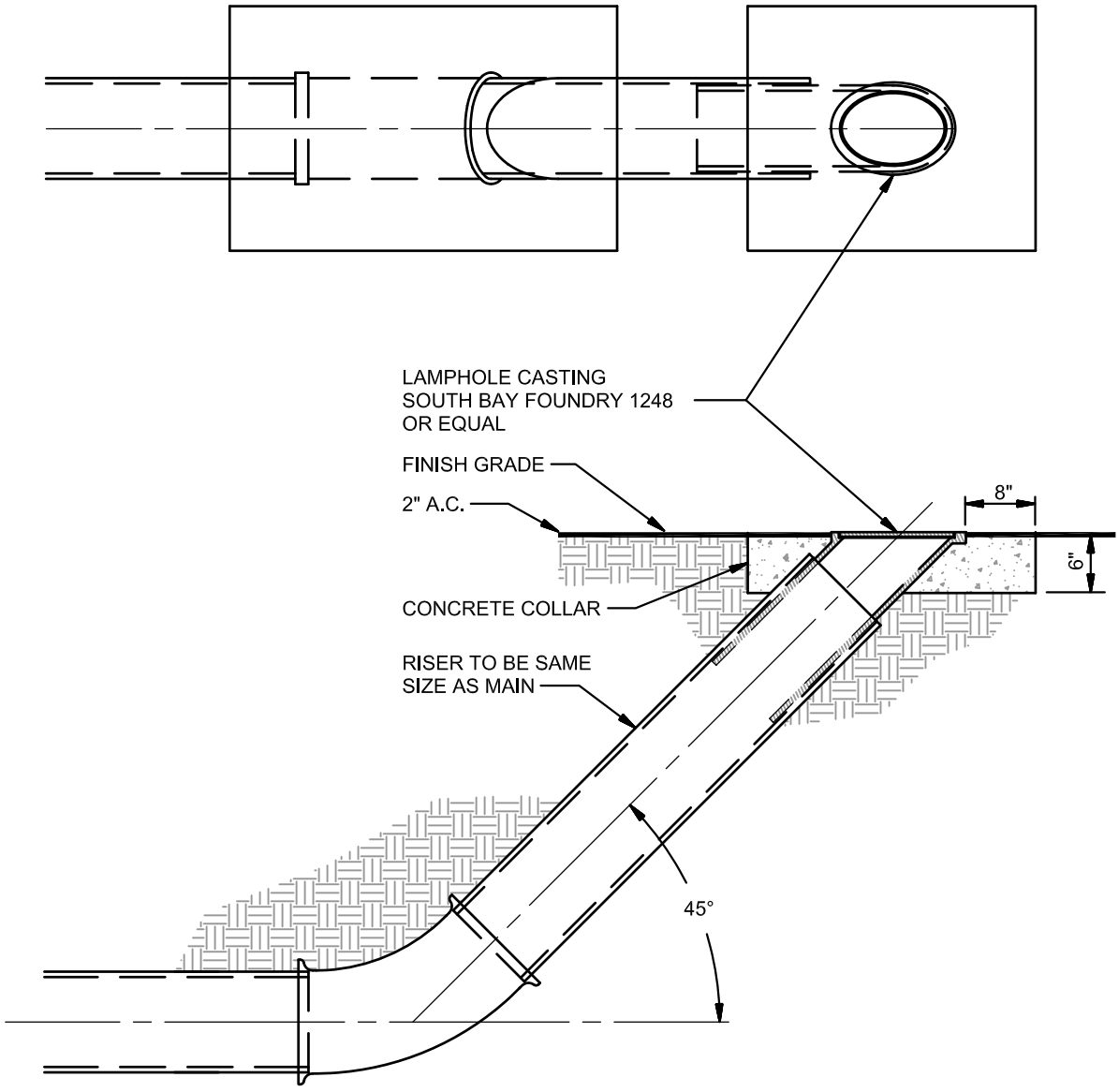
1. CUTS ARE TO BE MADE WITH A PIPE CUTTING TOOL.
2. SHEAR RINGS OF A TYPE APPROVED BY THE CITY ENGINEER SHALL BE INSTALLED ON ALL JOINTS.
3. TO BE USED ON EXISTING MAINS ONLY.

CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

William F. Kull
CITY ENGINEER - WILLIAM F. KULL

CUT - IN - WYE

DRAWN BY:	DATE:	SCALE:	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
GK	7/21/15	NTS	9-23-14	603
REVISIONS: NONE	SECTION: SEWER	DRAWING NAME: 603.DWG		



NOTE:

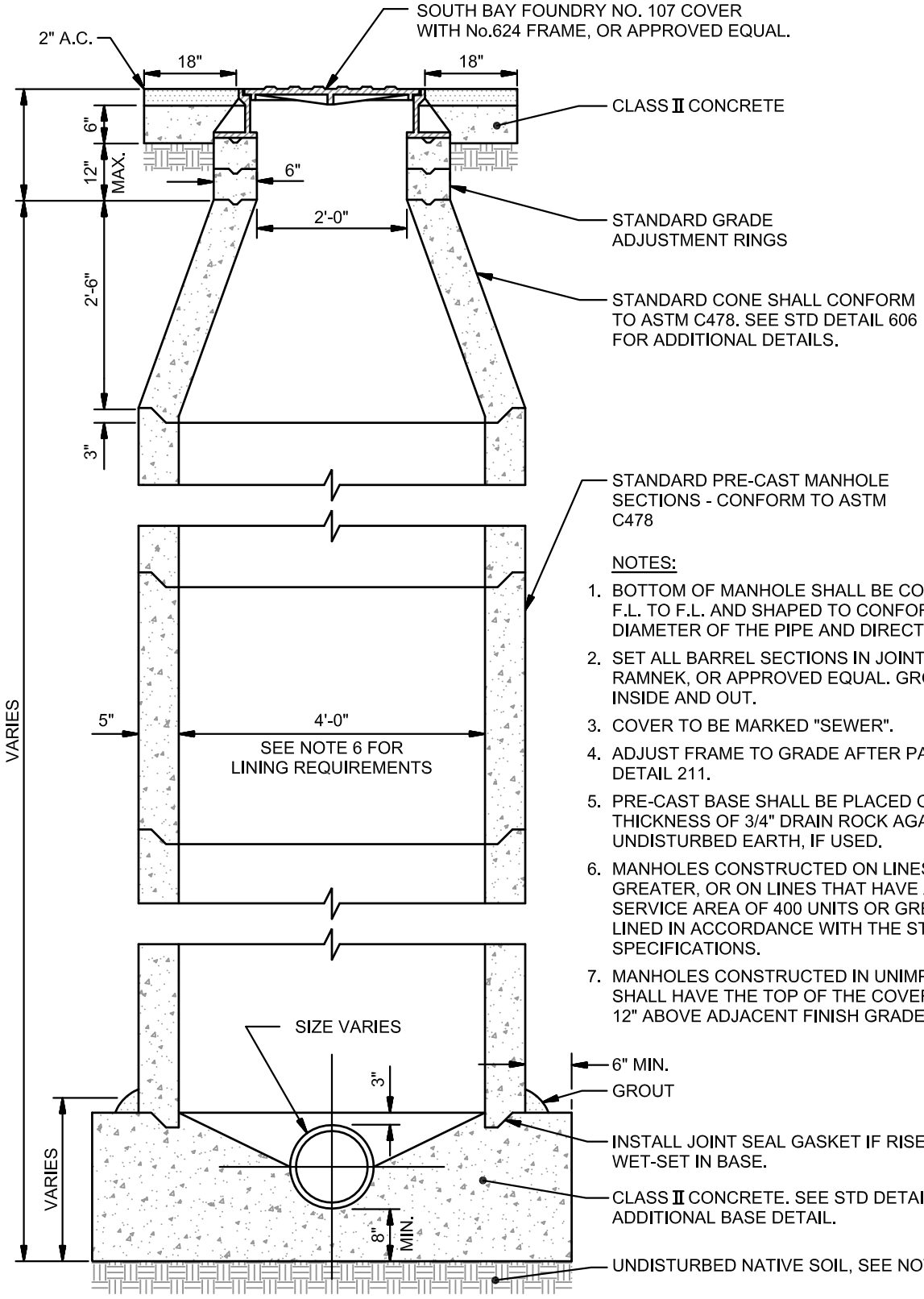
1. LAMPHOLE TO BE USED AT DISCRETION OF CITY ENGINEER AT THE ENDS OF SHORT MAINS OR WHEN A SMALL NUMBER OF SERVICES ARE CONNECTED TO MAIN.
2. LAMPHOLES MAY BE INSTALLED AT SEWER LINES STUBBED FOR FUTURE EXTENSION.

CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

William F. Kull
CITY ENGINEER - WILLIAM F. KULL

LAMPHOLE

DRAWN BY:	DATE:	SCALE:	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
GK	7/21/15	NTS	9-23-14	604
REVISIONS: NONE	SECTION: SEWER	DRAWING NAME: 604.DWG		



NOTES:

1. BOTTOM OF MANHOLE SHALL BE CONSTRUCTED FROM F.L. TO F.L. AND SHAPED TO CONFORM WITH THE DIAMETER OF THE PIPE AND DIRECTION OF FLOW.
2. SET ALL BARREL SECTIONS IN JOINT GASKETS, RAMNEK, OR APPROVED EQUAL. GROUT ALL JOINTS INSIDE AND OUT.
3. COVER TO BE MARKED "SEWER".
4. ADJUST FRAME TO GRADE AFTER PAVING, PER STD DETAIL 211.
5. PRE-CAST BASE SHALL BE PLACED ON 6" MINIMUM THICKNESS OF 3/4" DRAIN ROCK AGAINST UNDISTURBED EARTH, IF USED.
6. MANHOLES CONSTRUCTED ON LINES OF 12"DIA OR GREATER, OR ON LINES THAT HAVE AN UPSTREAM SERVICE AREA OF 400 UNITS OR GREATER, SHALL BE LINED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.
7. MANHOLES CONSTRUCTED IN UNIMPROVED AREAS SHALL HAVE THE TOP OF THE COVER APPROXIMATELY 12" ABOVE ADJACENT FINISH GRADE.

CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

STANDARD MANHOLE

William F. Kull
CITY ENGINEER - WILLIAM F. KULL

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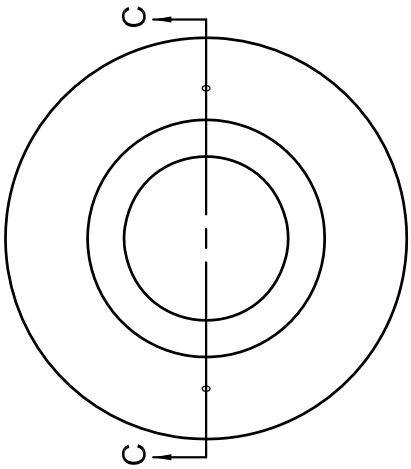
GK	7/21/15	NTS	9-23-14	605
REVISIONS: NONE	SECTION: SEWER	DRAWING NAME: 605.DWG		

CONCENTRIC SHORT CONE



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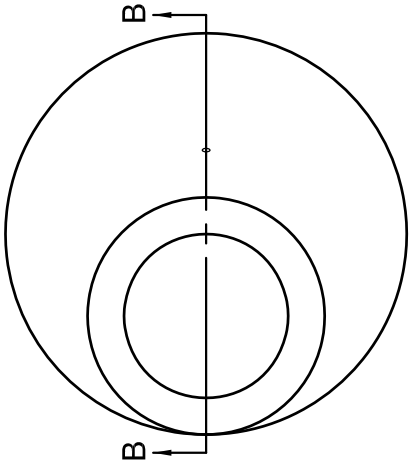

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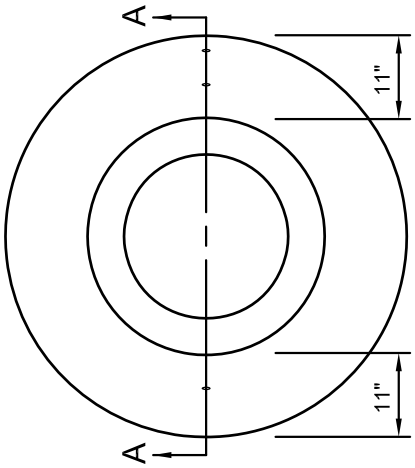
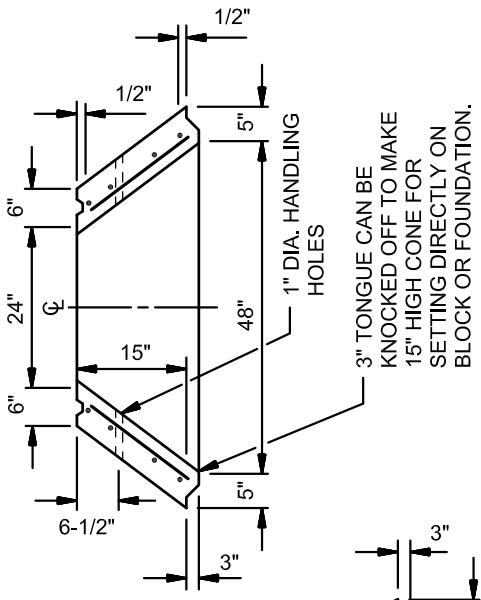


SECTION C-C



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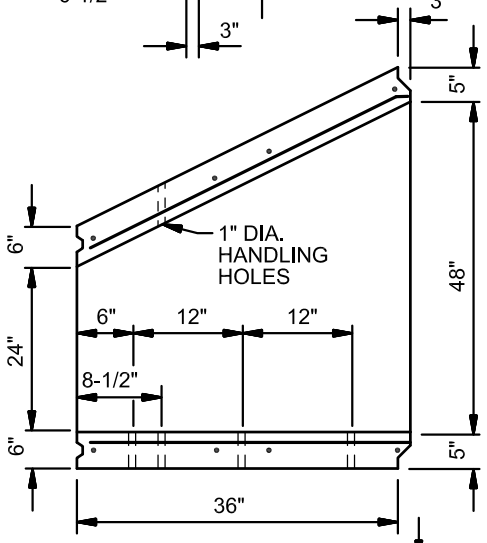
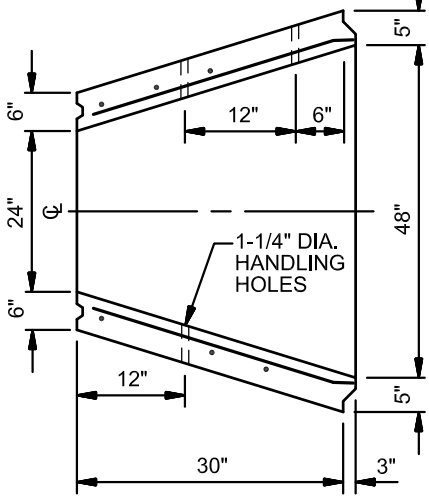


SECTION A-A

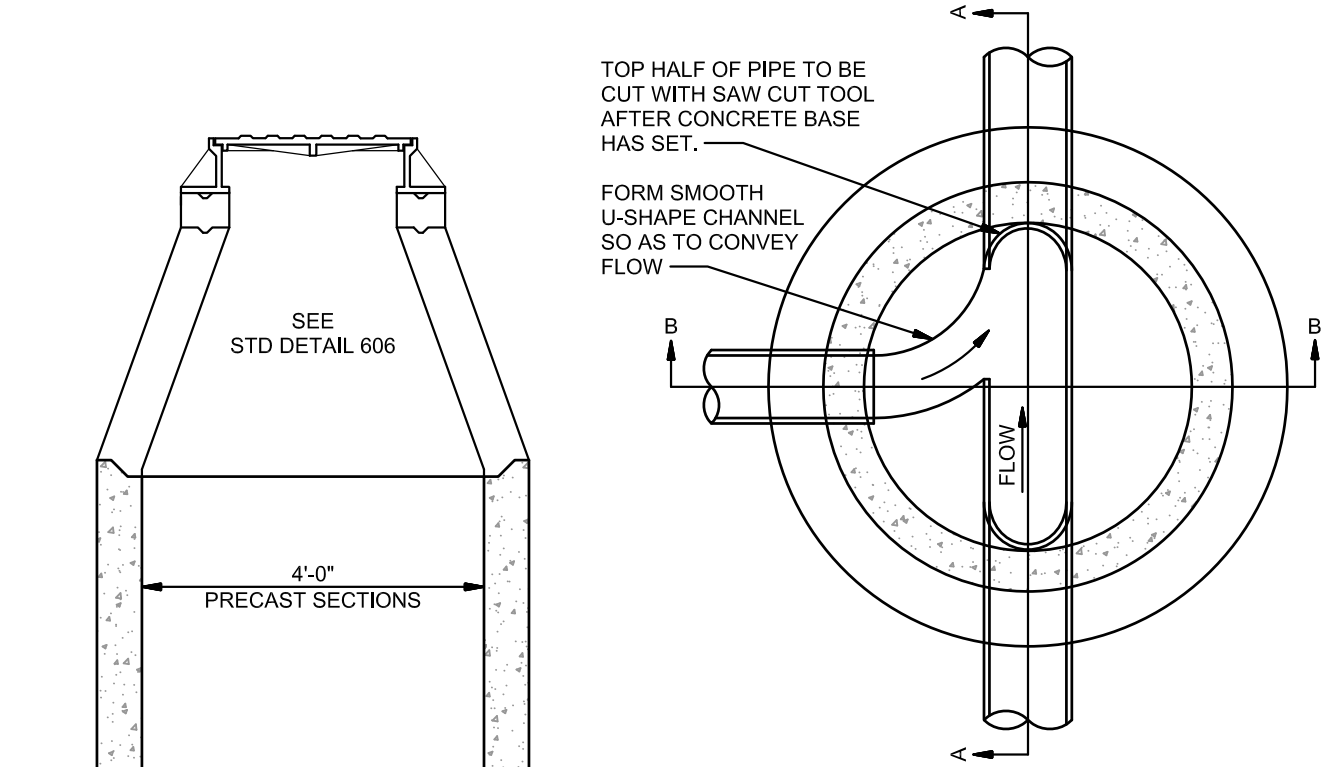


CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

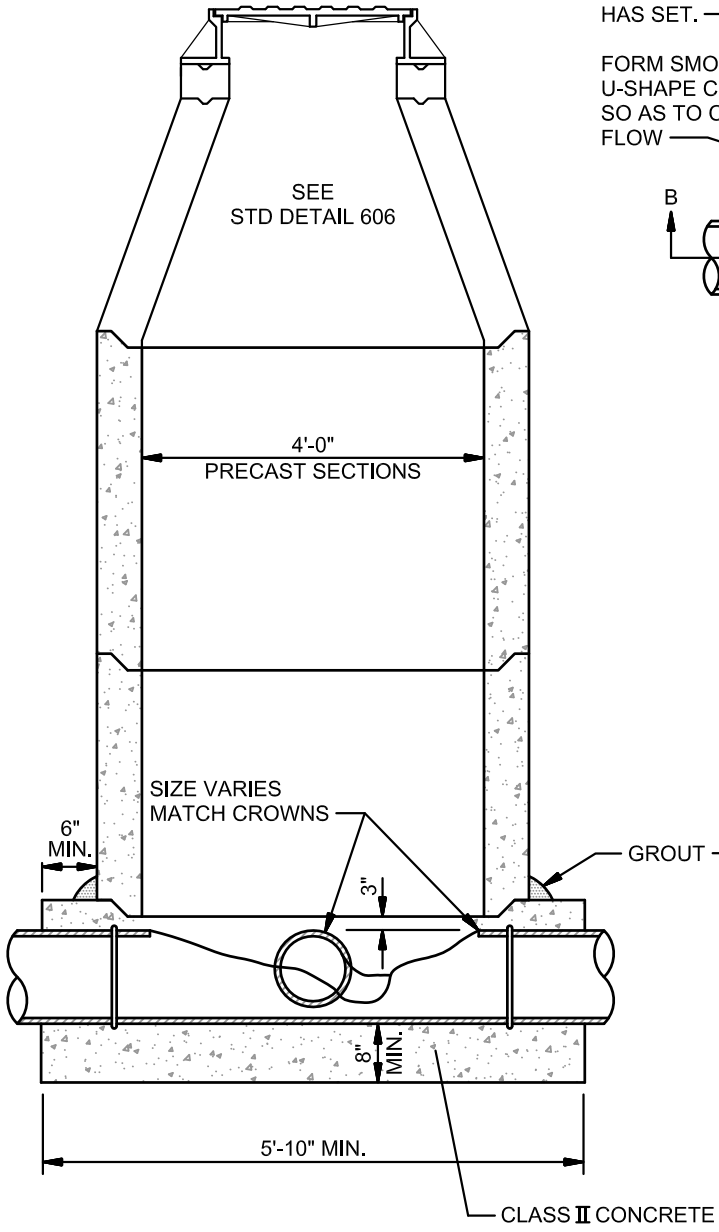
MANHOLE CONE

William F. Kull
CITY ENGINEER - WILLIAM F. KULL

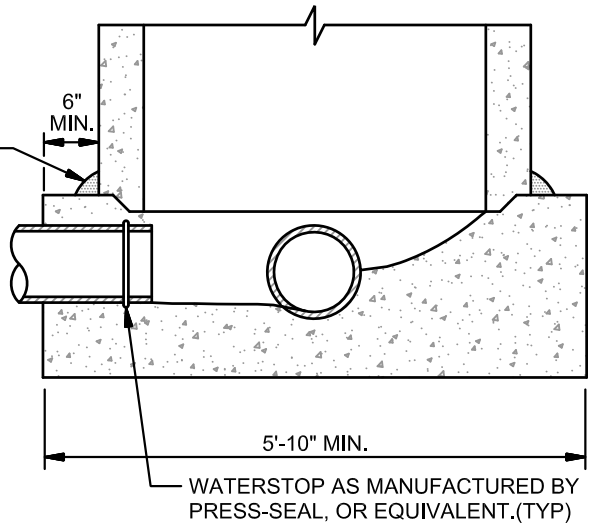
DRAWN BY:	DATE:	SCALE:	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
GK	7/21/15	NTS	9-23-14	606
REVISIONS: NONE	SECTION: SEWER	DRAWING NAME: 606.DWG		



PLAN



SECTION A-A



SECTION B-B

NOTES:

1. PIPE TO BE LAID THROUGH MANHOLE AND TOP HALF REMOVED AFTER CONCRETE HAS SET.
2. POUR IN PLACE BASES TO BE POURED AGAINST UNDISTURBED NATIVE SOIL. PRE CAST BASES SHALL BE SET ON A 6"MIN LAYER OF 3/4" DRAIN ROCK ON UNDISTURBED NATIVE SOIL.
3. FLEXIBLE RUBBER MANHOLE GASKETS SHALL BE INSTALLED AT ALL PIPE PENETRATIONS INTO THE BASE. USE PRESS-SEAL WATERSTOPS, OR SIMILAR.

CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

MANHOLE BASE

William F. Kull
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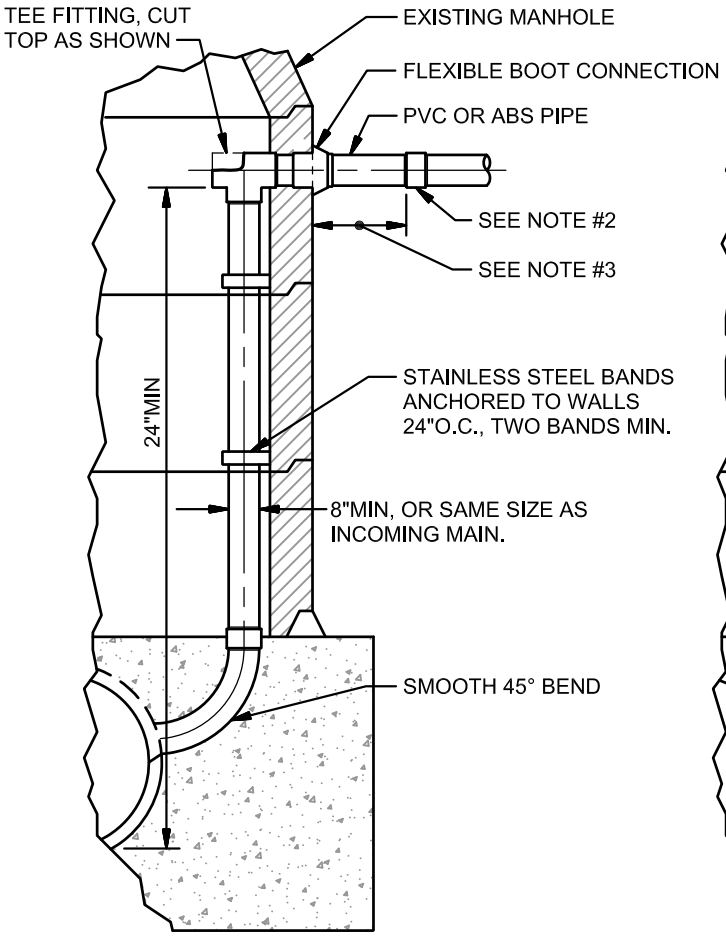
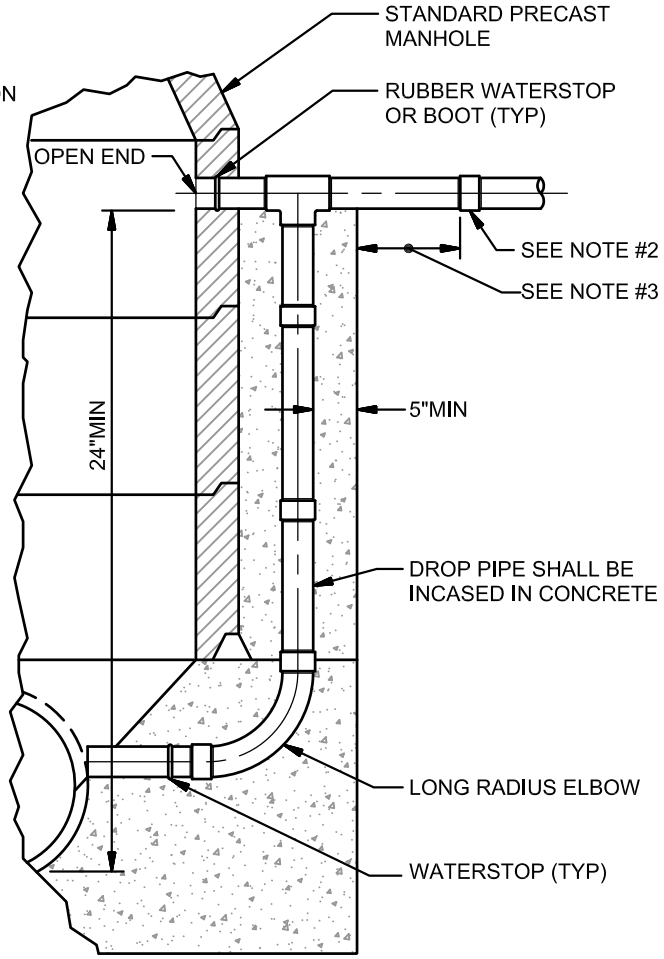
DRAWN BY:	DATE:	SCALE:	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
GK	7/21/15	NTS	9-23-14	607
REVISIONS: NONE	SECTION: SEWER	DRAWING NAME: 607.DWG		

SANITARY SEWER DROP IN EXISTING MANHOLE



THIS TYPE OF DROP CONNECTION SHOULD BE USED ONLY ON EXISTING MANHOLES, AS APPROVED BY THE CITY ENGINEER.

SANITARY SEWER DROP MANHOLE

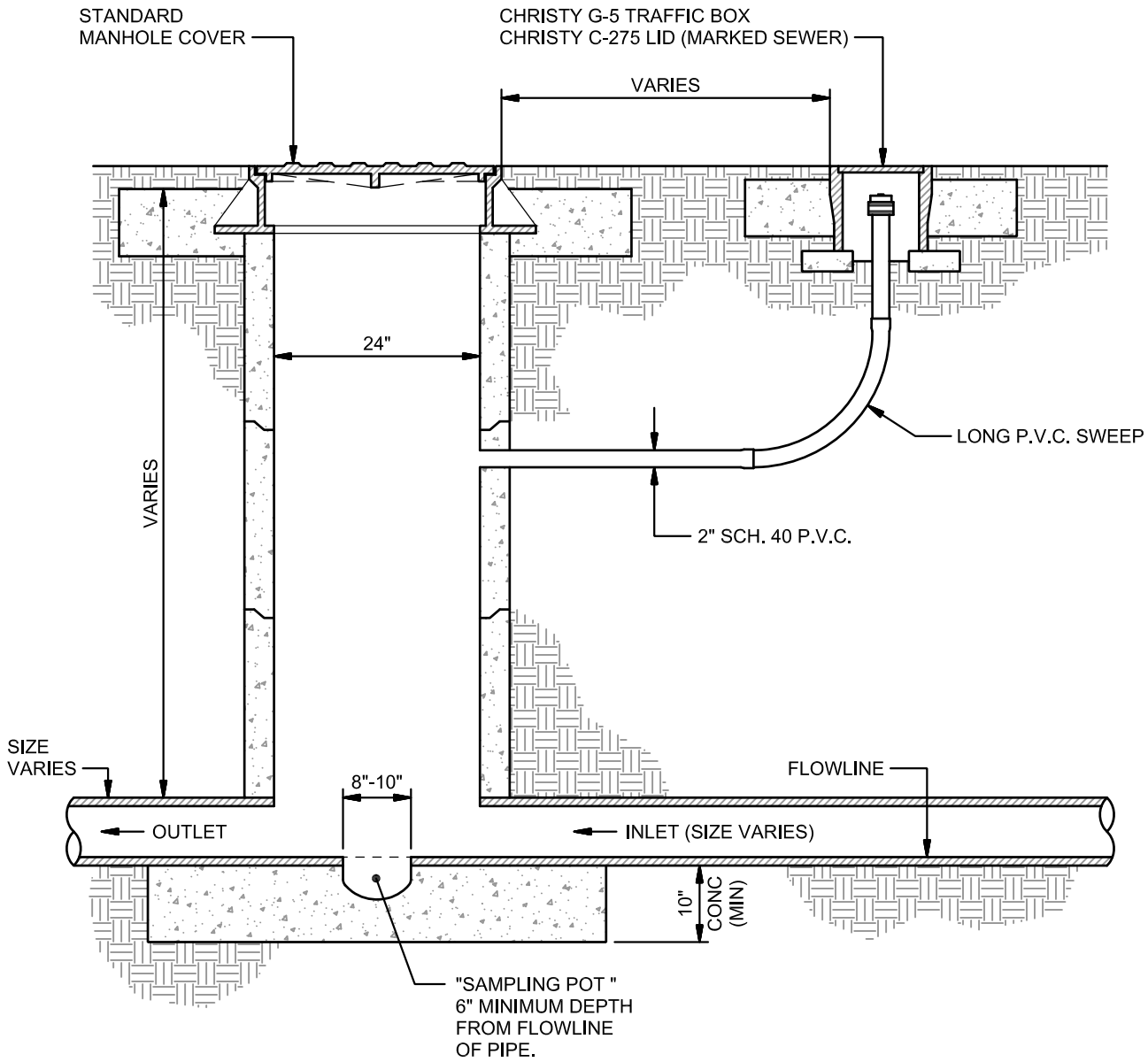


THIS TYPE MANHOLE SHALL BE USED WHERE THE DIFFERENCE IN ELEVATION BETWEEN THE TOP OF THE OUTLET PIPE AND THE INVERT OF THE FEEDER OR COLLECTOR SEWER EXCEEDS 24"

NOTES:

1. MORE THAN A 2' DROP FOR AN INCOMING PIPE SHALL REQUIRE A DROP CONNECTION.
2. FLEXIBLE JOINT-BELL & SPIGOT OR ADJUSTABLE REPAIR COUPLING (ARC). SOLVENT WELDED NOT PERMITTED.
3. 12" MAX. FOR 8" OR LARGER PIPE. 24" MAX. FOR PIPES LESS THAN 8".
4. INSIDE DROP CONNECTIONS NOT PERMITTED ON NEW MANHOLES.

CITY OF RIVERBANK DEPARTMENT OF PUBLIC WORKS			SANITARY SEWER DROP IN EXISTING MANHOLE & DROP MANHOLE	
William F. Kull CITY ENGINEER - WILLIAM F. KULL				
DRAWN BY: GK	DATE: 7/21/15	SCALE: NTS	ADOPTED BY THE CITY COUNCIL: 9-23-14	DRAWING NO. 608
REVISIONS: NONE	SECTION: SEWER	DRAWING NAME: 608.DWG		



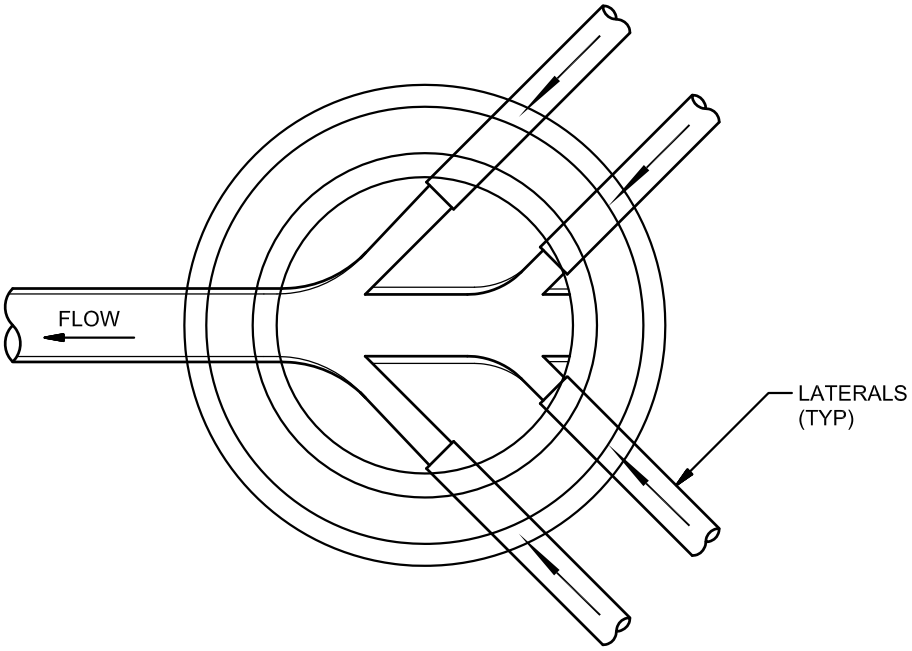
CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

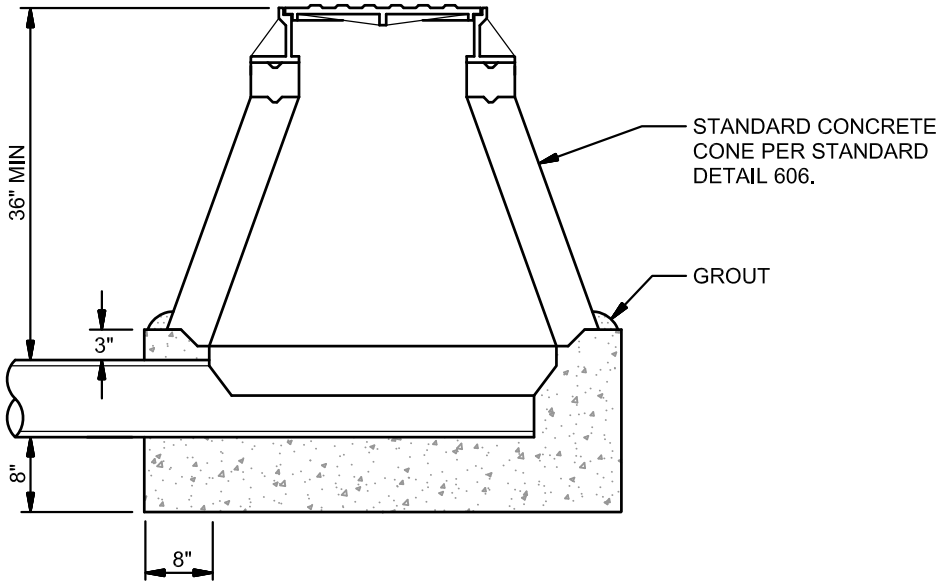
William F. Kull

CITY ENGINEER - WILLIAM F. KULL

SAMPLING MANHOLE

DRAWN BY:	DATE:	SCALE:	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
GK	7/21/15	NTS	9-23-14	609
REVISIONS: NONE	SECTION: SEWER	DRAWING NAME: 609.DWG		





NOTES:

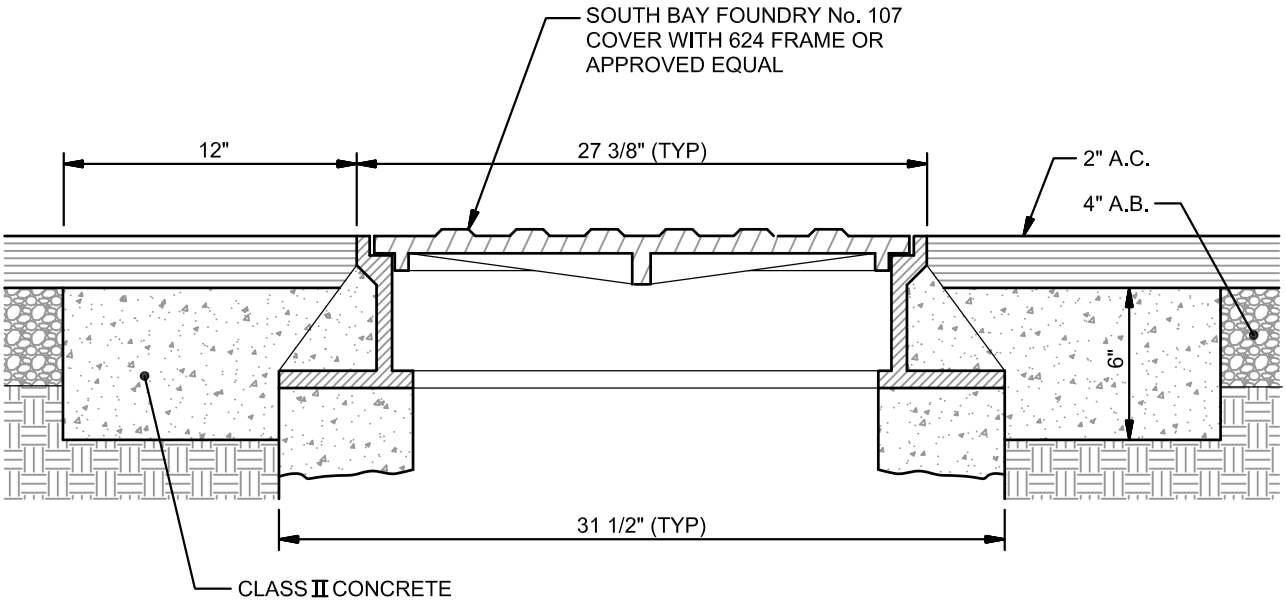
1. ALL SEWER LATERALS SHALL BE CONNECTED TO THE MAIN.
2. A MAXIMUM OF 4 LATERALS SHALL CONNECT INTO A TERMINAL MANHOLE.

CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

TERMINAL MANHOLE

William F. Kull
CITY ENGINEER - WILLIAM F. KULL

DRAWN BY:	DATE:	SCALE:	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
GK	7/21/15	NTS	9-23-14	610
REVISIONS: NONE	SECTION: SEWER	DRAWING NAME: 610.DWG		



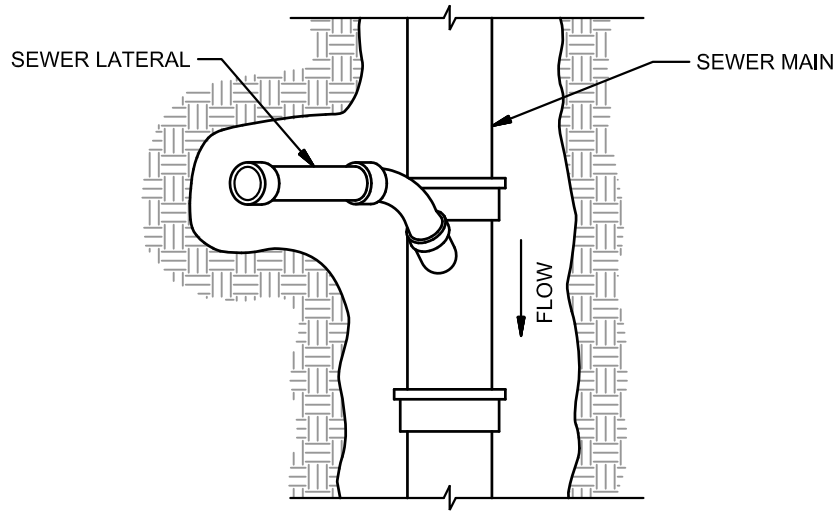
CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

William F. Kull

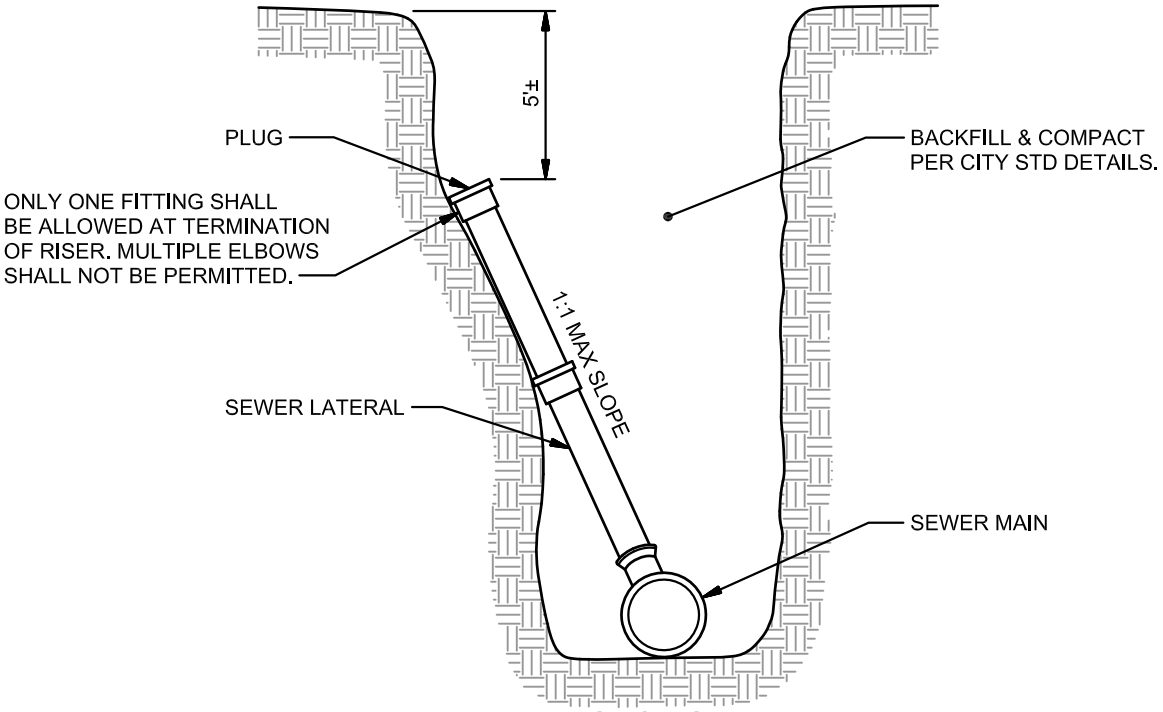
CITY ENGINEER - WILLIAM F. KULL

MANHOLE COVER TO NEW GRADE

DRAWN BY:	DATE:	SCALE:	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
GK	7/21/15	NTS	9-23-14	611
REVISIONS: NONE	SECTION: SEWER	DRAWING NAME: 611.DWG		



PLAN



SECTION

NOTE:

SEWER RISER TO BE USED IN CONJUNCTION WITH SEWER LATERAL PER STD DETAIL 601 AS NECESSARY. MAINS EXCEEDING 12' OF COVER SHALL REQUIRE A FLYLINE FOR LATERALS.

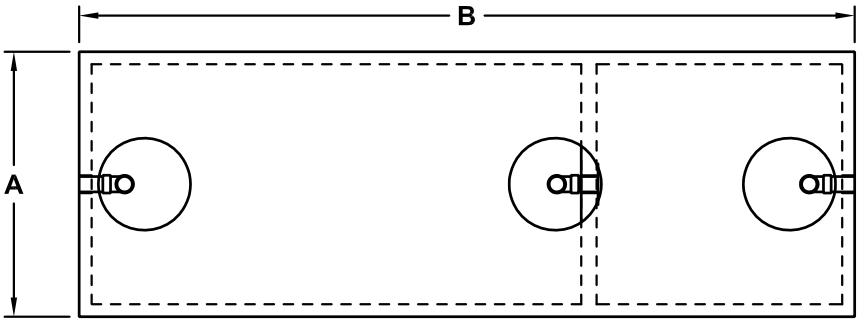
CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

William F. Kull

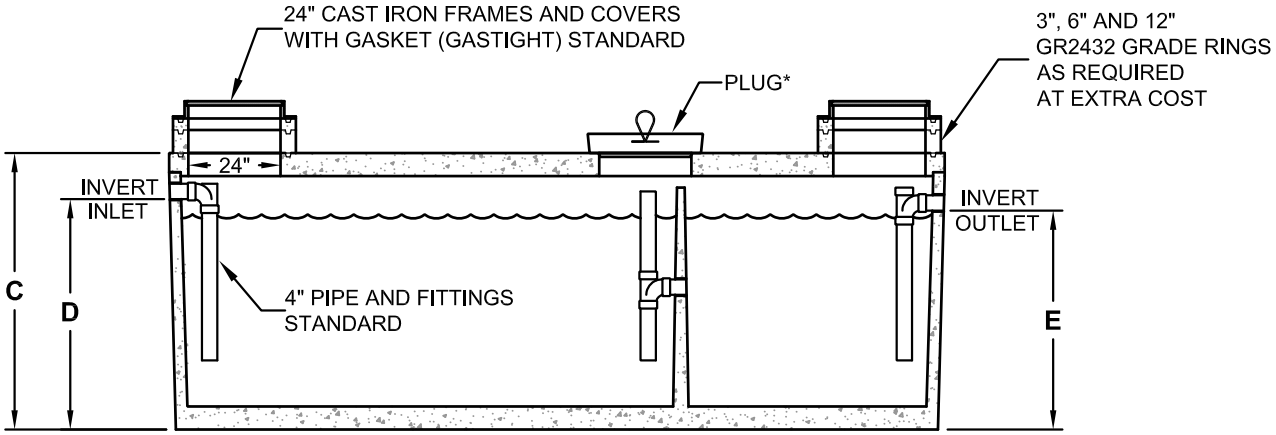
CITY ENGINEER - WILLIAM F. KULL

SEWER RISER

DRAWN BY:	DATE:	SCALE:	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
GK	7/21/15	NTS	9-23-14	612
REVISIONS: NONE	SECTION: SEWER	DRAWING NAME: 612.DWG		



TOP VIEW (COVERS AND RINGS REMOVED)



SIDE SECTION VIEW

*EXCEPT MODELS 320 & 500

MODEL NUMBER	LIQUID CAPACITY (GALLONS)	DIM A	DIM B	DIM C	DIM D	DIM E	MINIMUM EXCAVATION WIDTH	MINIMUM EXCAVATION LENGTH	DEPTH OF BURY
JP320EE-G	320	3'-0"	7'-0"	4'-6"	3'-7"	3'-4"	4'-0"	8'-0"	1' TO 8'
JP500EE-G	500	4'-0"	6'-0"	5'-10"	4'-10"	4'-7"	5'-0"	7'-0"	1' TO 6'
JP750EPE-G	750	4'-0"	8'-1"	6'-3"	5'-0"	4'-9"	5'-3"	9'-1"	1' TO 6'
JP1000EPE-G	1000	5'-1"	8'-2"	6'-3"	5'-0"	4'-9"	6'-4"	9'-2"	1' TO 6'
JP1200EPE-G	1200	5'-9"	8'-6"	6'-6"	5'-0"	4'-9"	7'-0"	9'-6"	1' TO 6'
JP1500EPE-G	1500	5'-7"	10'-8"	6'-3"	5'-0"	4'-9"	6'-10"	11'-8"	1' TO 6'
JP2000EPE-G	2000	4'-11"	15'-11"	6'-0"	5'-0"	4'-9"	5'-11"	16'-11"	1' TO 6'
JZ2500EPE-G	2500	5'-9"	16'-10"	6'-0"	5'-0"	4'-9"	6'-9"	17'-10"	1' TO 5'
JZ3000EPE-G	3000	5'-9"	16'-10"	6'-9"	5'-9"	5'-6"	6'-9"	17'-10"	1' TO 5'
JZ4000EPE-G	4000	7'-8"	16'-7"	6'-9"	5'-6"	5'-3"	8'-8"	17'-7"	1' TO 5'
JZ5000EPE-G	5000	7'-8"	16'-7"	7'-11"	6'-9"	6'-6"	8'-8"	17'-7"	1' TO 4'

DESIGN LOAD: H-20 TRAFFIC WITH DRY SOIL CONDITIONS (WATER LEVEL BELOW TANK.)

BEDDING NOTE: SUITABLE SUB-BASE BEDDED WITH GRANULAR MATERIAL SHALL BE PREPARED TO HANDLE ANTICIPATED LOADS.

FOR COMPLETE DESIGN AND PRODUCT INFORMATION CONTACT JENSEN PRECAST.

Jensen Precast reserves the right to make changes to product design and/or dimensions without notice. Please contact Jensen Precast whenever necessary for confirmation or advice on product design.

JENSEN PRECAST

CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

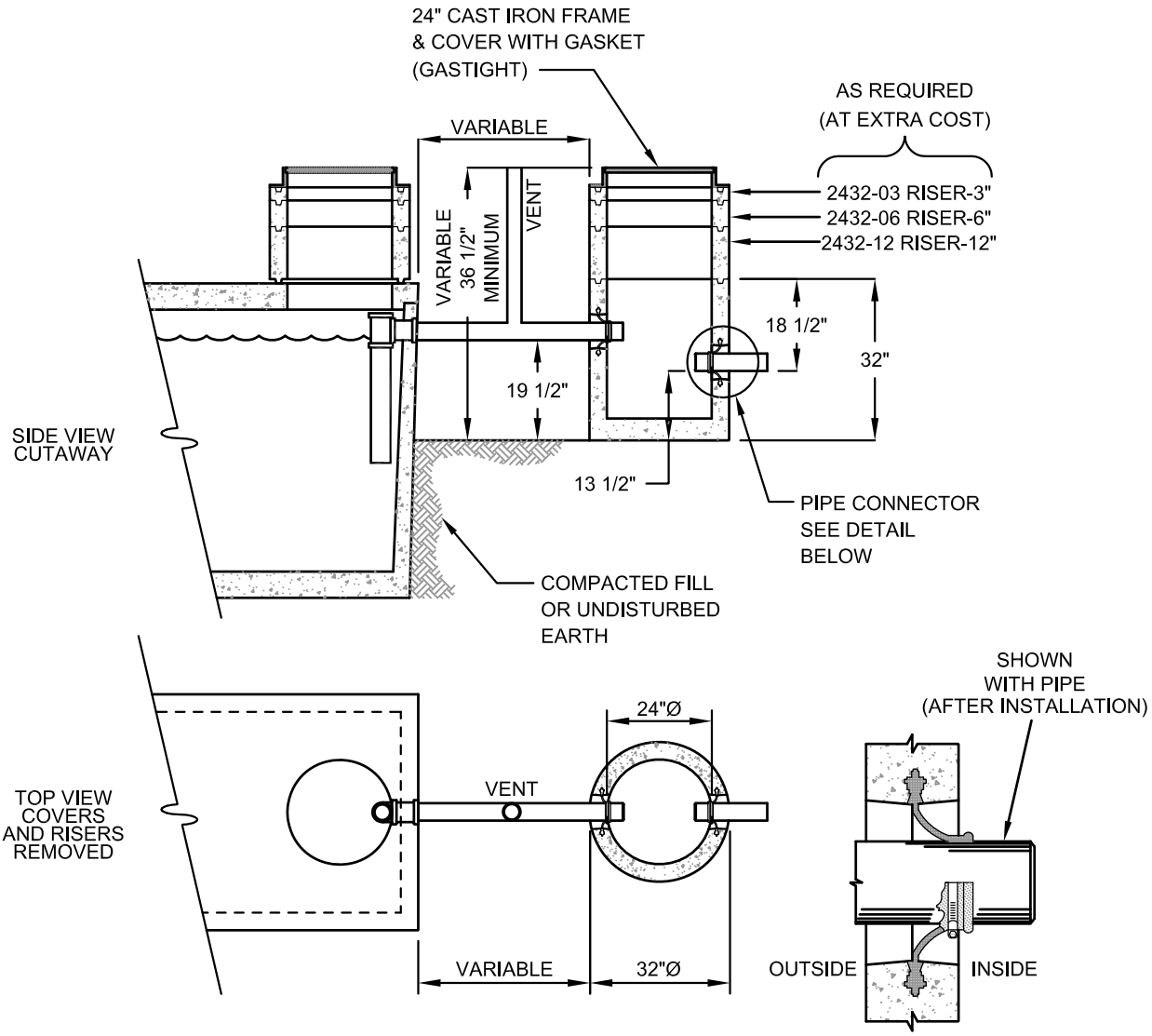
William F. Kull

CITY ENGINEER - WILLIAM F. KULL

320-5000 GALLON GREASE INTERCEPTOR

NORTHERN CALIFORNIA

DRAWN BY:	DATE:	SCALE:	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
GK	7/21/15	NTS	9-23-14	613
REVISIONS: NONE	SECTION: SEWER	DRAWING NAME: 613.DWG		



DETAIL
PIPE CONNECTOR
(Z-LOK)

BOX WEIGHT: 1250 LBS.
BOX DESIGN LOAD: H-20 TRAFFIC

SAMPLE BOX MUST BE PLACED ON SUITABLE BASE OF COMPACTED SOIL OR UNDISTURBED EARTH IN TRAFFIC CONDITION. FOR COMPLETE DESIGN AND PRODUCT INFORMATION, CONTACT JENSEN PRECAST.

PIPE CONNECTOR CAST INTEGRALLY IN WALL. WILL ACCEPT PIPE O.D. (INCHES)

MIN.	MAX.
4.25	6.25

SEE Z-LOK PIPE CONNECTOR PAGE FOR ADDITIONAL INFORMATION

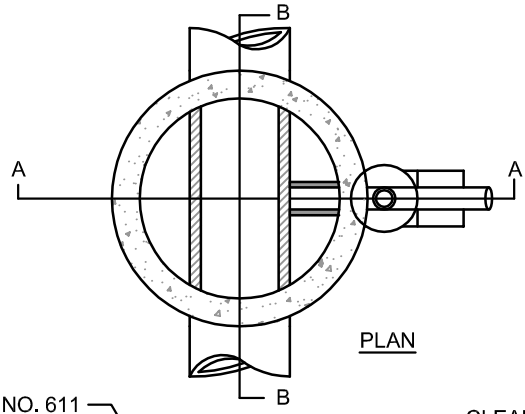
JENSEN PRECAST

CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

William F. Kull
CITY ENGINEER - WILLIAM F. KULL

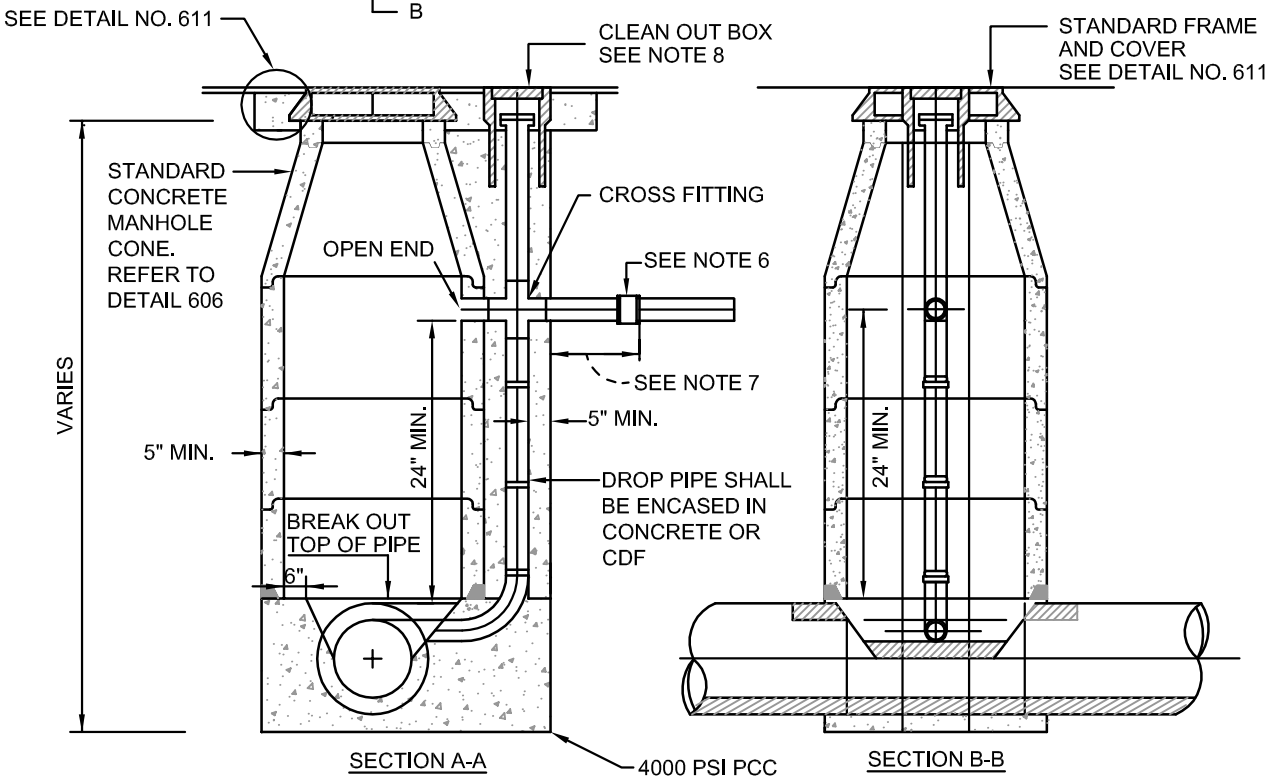
SAMPLE BOX
WITH PIPE CONNECTORS
MODEL 2432 NLV

DRAWN BY:	DATE:	SCALE:	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
GK	7/21/15	NTS	9-23-14	614
REVISIONS: NONE	SECTION: SEWER	DRAWING NAME: 614.DWG		



PLAN

THIS TYPE MANHOLE SHALL BE USED WHERE THE DIFFERENCE IN ELEVATION BETWEEN THE TOP OF THE OUTLET PIPE AND THE INVERT OF THE INLET SEWER EXCEEDS 24".



SECTION A-A

SECTION B-B

NOTES:

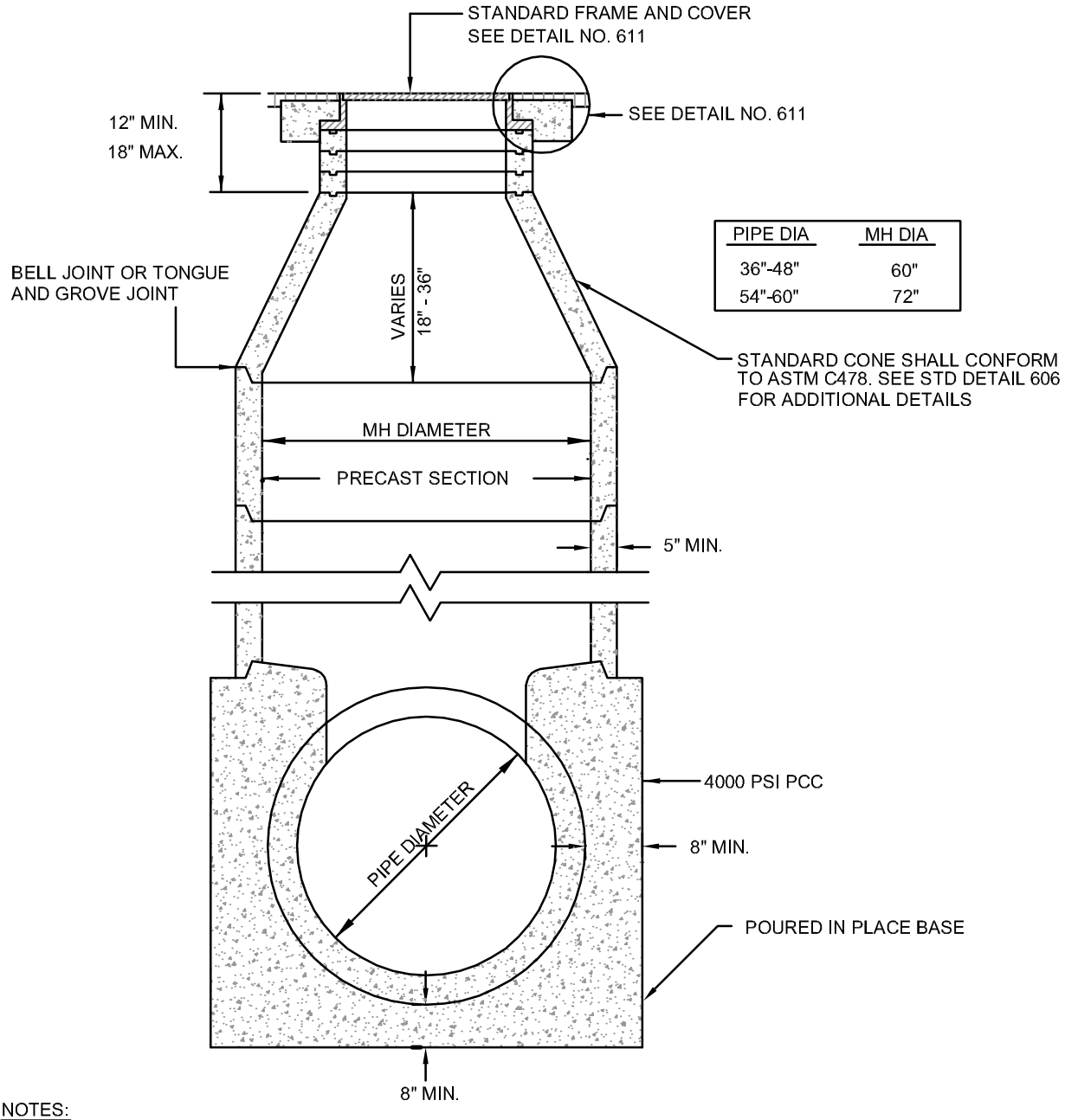
1. FOR VCP AND RCP, PIPE TO BE LAID THROUGH MANHOLE AND TOP PORTION REMOVED AFTER CONCRETE HAS SET. FOR PVC AND DIP, PIPE SHALL ENTER MANHOLE 2" AND HAVE WATER TIGHT GASKETS.
2. MORTAR ALL JOINTS INSIDE AND OUT. ALL INTERIOR SURFACES OF THE PRECAST MANHOLE SECTIONS FOR SUBTRUNK AND TRUNK MANHOLES SHALL BE LINED PER CITY STANDARD.
3. ADJUST FRAME TO GRADE AFTER PAVING.
4. ALL PRECAST CONCRETE SHALL BE DESIGNED TO WITHSTAND H2O LOADING.
5. IN TRAFFIC AREAS CONCRETE COLLAR SHALL BE MADE WITH 3000 PSI PCC, HIGH EARLY STRENGTH. BARRICADES SHALL BE REMOVED IN 24 HOURS.
6. FLEXIBLE JOINT-BELL & SPIGOT OR ADJUSTABLE REPAIR COUPLING (ARC). SOLVENT WELDED NOT PERMITTED.
7. 12" MAX. FOR 8" OR LARGER PIPE. 24" MAX. FOR PIPES LESS THAN 8".
8. CLEANOUT BOX SHALL BE A CHRISTY F8, OR APPROVED EQUAL, WITH CAST IRON COVER WITH KEY, MARKED "C.O."

CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

EXTERNAL DROP MANHOLE

CITY ENGINEER

DRAWN BY:	DATE:	SCALE:	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
GK	3/25/16	NTS		615
REVISIONS: NONE	SECTION: SEWER	DRAWING NAME: 615.DWG		



NOTES:

1. FOR VCP AND RCP, PIPE TO BE LAID THROUGH MANHOLE AND TOP PORTION REMOVED AFTER CONCRETE HAS SET.
2. INCOMING SMALLER PIPES SHALL MATCH CROWNS OF THE LARGER PIPE.
3. A CHANGE IN DIRECTION OF FLOW IN A MANHOLE REQUIRES A .10' FALL (MIN.).
4. ADJUST FRAME TO GRADE AFTER PAVING.
5. ALL PRECAST CONCRETE SHALL BE DESIGNED TO WITHSTAND H2O LOADING. IN TRAFFIC AREAS CONCRETE COLLAR SHALL BE MADE WITH 3000 PSI PCC, HIGH EARLY STRENGTH. BARRICADES SHALL BE REMOVED IN 24 HOURS.
6. ALL INTERIOR SURFACES OF THE PRECAST MANHOLE SECTIONS SHALL BE LINED WITH PVC LINER OR HDPE EMBEDMENT LINER, PER CITY STANDARD.
7. FOR PARALLEL LINE (FLY-LINE) INSTALLATION SEE DETAIL 607.

CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

TRUNK MANHOLE

CITY ENGINEER

DRAWN BY:	DATE:	SCALE:	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
GK	3/25/16	NTS		616
REVISIONS: NONE	SECTION: SEWER	DRAWING NAME: 616.DWG		

City of Riverbank
DESIGN STANDARDS

STORM DRAIN

SECTION 7: STORM DRAIN DESIGN STANDARDS
TABLE OF CONTENTS

7.100 General

These standards apply to all public storm water facilities designed for installation within a public right-of-way or PUE within the City. Except where specifically noted in these standards, or as required as part of project approval, all storm drainage facilities installed on private property for private use and ownership shall be designed and constructed in accordance with these standards, as well as the provisions of the Uniform Plumbing Code, as adopted by the City.

Storm drainage lines shall be designed in accordance with acceptable engineering principles and California OSHA Standards (legal min.), and shall conform to City Standards. Storm water collection facilities shall not be connected to a wastewater line except where specifically required by the City Engineer. Industrial waste sources shall not be connected or discharged into a storm water line without a specific discharge permit.

These standards are not intended to cover applicable storm water discharge requirements of any agencies of the State or Federal Government, such as U.S. Dept. of Fish and Wildlife, F.E.M.A., Army Corps of Engineers, or State Dept. of Fish and Game.

7.200 Hydrologic Design Criteria

The criteria presented in this section shall be used for design of all new storm drainage facilities, both public and private, within the City of Riverbank.

7.201 Method

When designing storm drainage facilities, the runoff determination method will be based on the upstream tributary area served by that facility.

For tributary areas of two hundred (200) acres or less, design runoff peak flow shall be determined using the Rational Method (Q = CIA) as further described in this chapter. Storm water runoff volume shall be determined using a similar methodology (V = CAR / 12).

7.202 Rational Method – Peak Flow Determination

The Rational Method shall be used to determine peak flow for storm drainage facilities using the formula Q = CIA, where:

Q = Peak Flow (cfs)
C = Runoff Coefficient
I = Rainfall Intensity (in/hr)
A = Tributary Area (acres)

Runoff Coefficient (C):
Summarized below are design runoff coefficients based on land use of the tributary area:

Standard Composite Runoff Coefficients

Land Use	Runoff Coefficient
Parks	0.20
Very Low Density Residential (½ acre lots or larger)	0.40
Low-Density Residential (density greater than 4.0 units per acre and less than 6.0 units per acre)	0.55
Medium Density Residential ("cluster" housing, condominiums, townhomes)	0.70
High Density Residential (apartments)	0.85
Commercial	0.90
Industrial	0.90

For tributary areas with land uses that do not meet the descriptions given in the above table, weighted runoff coefficients may be proposed using the Basic Runoff Coefficients indicated below:

Basic Runoff Coefficients

Surface	Runoff Coefficient ©
Pavement and roofs	0.95
Compacted earth w/o pavement	0.70
Lawns, pasture, crops, open space	0.20

Rainfall Intensity (I):

The rainfall intensity for a given design storm event shall be determined using the IDF curve on Standard Detail 701, and based on the computed time of concentration (Tc) for the watershed. Tc shall be determined using the following parameters and assumptions:

- 20 minute initial Tc (overland flow time from lot to street) for Low Density Residential watersheds.
- 10 minute initial Tc for Commercial, Industrial, Medium and High Density Residential Projects.
- 2.0 foot per second gutter flow time from high point to drainage inlet. (This is a conservative estimate for streets with less than 1% average longitudinal slopes. Lower values may be proposed if sufficient calculations are provided.)

- Pipe travel time shall be based on actual flow.

- Initial Tc's for relatively large or undeveloped watersheds shall be considered on a case-by-case basis using formulas or methods approved by the City Engineer.

7.203 Rational Method –Runoff Volume Determination

The design volume shall be computed using the formula: V = CAR / 12, where:

V = Design Volume (acre-feet)

C = Runoff Coefficient (see section 7.201)

A = Tributary Area (acres)

R = Total Runoff for the Design Storm (in)

100-yr, 24 hour: R_{100} = 3.1 in.

50-yr, 24 hour: R_{50} = 2.8 in.

10-yr, 24 hour: R_{10} = 2.24 in.

(Runoff depths were computed using methods presented in the 2007 edition of the Stanislaus County Standards & Specifications)

7.300 Pipe Design

7.301 Materials

The following standard pipe materials are acceptable for storm drainage facilities within the City of Riverbank:

Reinforced Concrete Pipe (RCP):
RCP shall conform to the standards of ASTM C76, and shall use rubber gasket joints in accordance with ASTM C443. Class III RCP shall normally be used for pipes with burial depths between 3 ft. and 14 ft., unless special conditions exist which require a different pipe class. Class V RCP shall be used when pipes with burial depths in excess of 14 ft, or when pipes lie partially within the road base material. The classification of pipe shall be indicated on the improvement plans.

Polyvinyl chloride (PVC) Pipe:
PVC pipe used for gravity storm drainage shall be the same materials as required for PVC gravity sewer pipe as further described in Chapter 200 of these Standards. (SDR 26, ASTM D3034, with elastomeric gasket joints conforming ASTM D3212.)

Force mains shall be the same materials, installation methods, and testing as required for sewer force mains. (AWWA C900 or C905)

Asbestos Cement Pipe, High Density Polyethylene (HDPE), and Cast-in-Place Concrete Pipe are not allowed within the City of Riverbank.

7.302 Minimum Size

The minimum size for publicly maintained storm drainage pipes in the City of Riverbank shall be 18". Short catch basin lateral connections may be 12", with prior approval by the City Engineer. Privately maintained on-site piping (landscape drainage, roof leaders) may be smaller than 12", at the discretion and judgment of the City Engineer, and as allowed by the Uniform Plumbing Code.

7.303 Horizontal Alignment

Whenever practical, storm drain piping shall run parallel with the street centerline in new developments, and not underneath curb, gutter, or sidewalk.

Curved alignments are allowed. However, pipe joints shall not exceed 80% of the manufacturer's recommended deflection. The City Engineer at his discretion may request tabulations, drawings, or other evidence from the Design Engineer to demonstrate acceptable joint deflection on curved alignments.

In new residential developments, it is recommended that the storm drainage pipe be placed on the opposite side of the street of the water line. When this is not practical, the storm drainage and water line horizontal alignment shall conform to the separation guidelines contained in the State D.H.S. Memorandum, located in the Water Design Standards. This will require a minimum 4' horizontal and 1' vertical separation between storm drainage and water pipe lines.

7.304 Vertical Alignment

The minimum cover for storm drainage piping shall be 3.0 feet from the existing or planned final grade to the outside top of the pipe. Minimum cover requirements may be reduced if special backfill and/or special piping are used, as approved by the City Engineer.

Storm drainage piping shall be installed below waterlines with a minimum clearance of 12 inches. If this is not practical, then special construction is required in accordance with the State DHS Guidelines for separation of water mains. (See Appendix for guidelines).

Minimum slopes shall be as required for conveyance of the design flow, as further described in this chapter. However, minimum slopes shall not be less than as shown in the following table:

Minimum Pipe Slopes

Pipe Diameter (in.)	Min. Slope (ft/ft)
12"	0.0020
18"	0.0013
24" and above	0.0010

Pipes shall be designed with a uniform slope between structures with no vertical curves. Siphons or sumps are not permitted in storm drainage piping in new development projects.

7.305 Hydraulic Design

Hydraulic calculations shall use the Manning's formula, with an "n" value equal to 0.013 for all storm drainage piping.

Pipe Capacity:

Pipes shall be designed such that the flowing full capacity based on Manning's equation is greater than the peak flow for the 10-year design storm. It is important to note that this computation is not intended to replace a hydraulic grade line (HGL) analysis for the pipe network.

New storm drainage networks will need to meet the pipe capacity criteria described above, as well as the HGL requirements described later in this section.

Velocities:

Pipes shall be designed to achieve a velocity not less than 2.0 fps when flowing full, unless otherwise approved by the City Engineer. Additional slope requirements are noted in the Vertical Alignment section. It is recognized that actual flows might not produce velocities of 2.0 fps or greater in all instances. In these instances, the Design Engineer is encouraged to maximize the available slope to increase velocities.

Pipelines with actual velocities of 10 fps or greater shall require detailed analysis to evaluate and mitigate the effects of erosion and energy dissipation.

Hydraulic Grade Line (HGL):

Storm drainage piping shall be designed such that the hydraulic grade line (HGL) from the 10-year storm event is at least 1.0 ft. below the adjacent gutter or rim elevation.

For drainage piping connecting into a basin in a new development, the starting downstream HGL shall be the high-water elevation for the 10-year storm volume, or the crown of the outlet pipe –whichever is greater. It is recognized that new systems will sometimes connect into existing drainage systems which may not have an HGL determined by a previous study. In these instances the starting HGL shall be determined by the Design Engineer using reasonable methods and assumptions, as approved by the City Engineer.

HGL calculations shall include the effects of minor losses at junctions. In general, minor losses shall be computed using the following formula:

$H_m = K (V^2 / 2g)$
Where:
H_m = minor loss (ft)
K = loss coefficient
V = Actual velocity (fps)
G = gravitational constant, 32.2ft/sec^2

Summarized below are estimates of the loss coefficient “K” for various situations:

Typical Loss Coefficients, “K”

K Value	Description
0.15	Manhole or structure, straight run
1.10	45 degree bend at structure
1.50	90 degree bend at structure
1.00	Outlet at basin w/trash rack

Full discussion and values of coefficients are given in several different civil engineering references. Other values and methods used for determining minor losses in storm drainage piping shall be accepted, as approved by the City Engineer.

7.400 Catch Basins

Catch basins shall be spaced along a street alignment so as to prevent the gutter flow from encroaching into the traveled way of the adjacent street. In addition, a maximum of 500 lineal feet of gutter flow shall be permitted to drain to a single catch basin. City Standard Detail 715 provides a reference for gutter spread based on gutter slope and runoff flowrate.

Catch basins shall be constructed as per City Standard Details. However, certain situations may require construction of a non-standard catch basin, such as a “double” catch basin. In these situations, the Design Engineer shall provide the appropriate engineering details and capacity calculations to the satisfaction of the City Engineer.

Catch basin laterals shall drain to a manhole. However, short lateral runs (<100’) may be permitted to drain catch basin to catch basin, given the approval of the City Engineer. A typical example of where this is acceptable would be at an intersection with two or more catch basins in close proximity.

7.500 Manholes

Storm drain manholes shall be required at all pipe intersections, changes in horizontal and vertical alignment, and at all changes in pipe size. Manholes shall have a maximum spacing of 450 feet, and shall be constructed at ends of all pipes.

Manholes shall be constructed in accordance with City Standard Details, based on the size of the pipes entering and exiting the structure. The type of manhole shall be noted on the plans. It is important to note that manholes with relatively large diameter (>72 in. dia.) pipes, with multiple large penetrations, or in other circumstances may require special design. In these situations, the Design Engineer shall provide the engineering details on the improvement plans, to the satisfaction of the City Engineer.

7.600 Percolation Facilities

It is preferable to provide positive discharge for storm drainage in new developments, as opposed to percolation facilities. In general, percolation facilities shall be deemed acceptable for new developments only if no other reasonable means of positive discharge exist. If allowed, percolation facilities shall conform to the standards contained herein. A plan for ultimate positive discharge shall be incorporated into all designs, if practicable.

7.601 Percolation Testing

Percolation facilities shall be based on percolation test results performed by a licensed Geotechnical Engineer. Test locations and corresponding design percolation rates shall be in the same location, both horizontally and vertically, as the location of the proposed percolation facility.

The recommendations for the design percolation rate shall include an appropriate Factor of Safety, as recommended by the Geotechnical Engineer. After application of the required Factor of Safety, the maximum allowable percolation rate to be used in design and calculations is 50.0 gallons per sq. ft. per day (gpsfd). This maximum value shall be held even if much higher values are encountered during testing.

If soil conditions that are encountered during construction are significantly different from those explained in the Geotechnical Report, the City may request additional percolation testing, or analysis of the design percolation rate.

7.602 Horizontal Drains (French Drains)

Horizontal drains shall be constructed in accordance with City Standard Details and these Design Standards. Refer to the Construction Specifications for additional requirements for testing and inspection.

Materials:

Allowable Pipe materials are as follows:

- Perforated or slotted PVC
- Perforated or slotted CMP
- Perforated or slotted HDPE in non-traffic areas only

  Additional materials will be considered by the City Engineer for approval on a case-by-case basis.

Filter Fabric:

Horizontal drains shall be wrapped in a layer of engineered filter fabric, or as directed by the geotechnical engineer.

Drain Rock:

3/4 in. to 2 ½ in. clean, crushed drain rock shall be used in the horizontal drain trenches.

Layout:

The following basic layout and construction criteria apply to all horizontal drains (French drains) installed within the City of Riverbank.

- Horizontal drains shall have a minimum pipe size of 18 in.
- The bottom of the drain rock trench shall be no less than five (5) feet above the ground water table.
- For horizontal drains installed in basin bottoms, it is preferable to provide a single continuous line of trench, as opposed to a gridded layout. This prevents reduction of percolation capacity due to over-saturation of the adjacent soil. However, if it is necessary to have a gridded layout, then the trenches shall be designed to maximize horizontal separation.
- With respect to the above, horizontal drains shall have a minimum separation as recommended by the Geotechnical Engineer, but not less than twice the trench depth (bottom of rock trench to finish grade), or less than 20 ft – whichever is greater. Separation measurements are to the nearest edges of the trench walls.
- Horizontal drains within basin bottoms shall be constructed clear of basin side slopes.
- All inlets to proposed horizontal drains shall utilize an “inverted siphon” to a manhole as shown in the Standard Details.
- Adequate separation per the sewer and water design standards shall be maintained from horizontal drains. Water lines shall be a minimum of 4 ft. from the outside edge of the rock trench when parallel. Water lines crossing a horizontal drain shall do so at right angles, and no joints shall be permitted within 4 ft. of the rock trench.

Percolation Criteria:

Horizontal drains shall be capable of emptying the volume of the 10-year 24-hour storm within a 48 hour period. For basin applications, runoff volume from the 10-year storm may remain in the underground system for an additional 24 hours, provided that the basin itself is empty within the 48 hour period.

7.603 Additional Considerations and Restrictions for Percolation Facilities

- The following items are additional design parameters, restrictions and items to be incorporated into the design of all new percolation facilities in the City of Riverbank:
- The following design parameters shall be adhered to for horizontal drain calculations:
- Only the sides of the trench may be considered for allowable percolation area. Bottoms of trenches shall not be included in the calculations.
- A design void ratio of 25% is allowed in the rock trench when determining available storage volume.
- Bottoms and side slopes of basins shall not be considered for allowable percolation area in percolation calculations.
- Vertical drains (drywells or rockwells) are not permitted for use within the City of Riverbank.

- All hydraulic grade line and volume storage design criteria that are presented in other sections of this standard shall apply when percolation facilities are the primary means of storm drainage for new developments.

7.700 Basin Design

7.701 General

This section contains design requirements for both Dual-Use, and Non-dual use storm drainage basins in the City of Riverbank. Storm drainage basins shall typically be planned for on a regional basis, meaning fewer basins to serve larger areas. The type of basin (dual-use or non-dual use) should be determined during the early planning stages of new developments, and shall be subject to the approval of Public Works Department, and the Community Development Department.

Each basin design shall be considered unique, with the layout and design evaluated on a case-by-case basis --subject to the minimum requirements contained herein. For this reason, the designer is encouraged to consult with the City Engineer during all phases of planning and design of new basins in the City of Riverbank.

New basins that use percolation facilities shall be designed to include provisions for a future connection to a positive discharge system, to the maximum extent practicable.

7.702 Design Volume

All new storm drainage basins within the City of Riverbank shall be designed to contain the runoff from the 50-year, 24-hour storm event. The design High Water Level (HWL) from this event shall be no less than 6 in. below the lowest tributary inlet rim elevation. Volume requirements shall be met assuming no outlet, percolation, or other available disposal of runoff. Storage volume contained in underground piping and horizontal drain systems may be considered in the available storage volume calculation.

7.703 Dry-Weather Runoff (Nuisance Water)

All basins shall be designed and constructed with infrastructure for disposal of dry-weather runoff, such as runoff from landscape irrigation. The basin surface shall be inundated only during storm events. Percolation facilities (i.e. Horizontal drains) are recommended for this purpose. However, pump discharge may be utilized given the approval of the City Public Works Department, as well as any other agencies involved with receiving waters.

The design of the nuisance water system shall be based on an estimate of the amount of dry-weather flows from the tributary area, and shall include an appropriate Factor of Safety.

7.704 Storm Water Treatment Control Devices

All new basins shall be designed and constructed with infrastructure for the removal of pollutants from runoff entering the basin. In addition, certain treatment control devices may be required by outside agencies with jurisdiction over receiving waters. All treatment devices and methods shall be considered on a case-by-case basis for approval by the City of Riverbank, and any other applicable outside agencies.

All devices are to be designed for functionality and ease of maintenance, and shall meet with the approval of the City Public Works Department. At a minimum, devices shall be in place to prevent sediment, debris, and trash from entering the basin and percolation system or pump discharge, to the maximum extent practicable. A variety of methods and devices are available for this purpose including, but not limited to:

- Pre-manufactured devices, such as CDS units or Contech StormVaults
- Specially fabricated trash racks
- Grass-lined or vegetated swales

The City encourages the use of innovative and unique design solutions for storm water treatment. Accordingly, the list of devices above is not intended to be prohibitive of other methods or devices of storm water treatment.

7.705 Inlet / Outlet Structures

Basin inlet and outlet structures shall be constructed so as to provide ease of accessibility for maintenance purposes. At the same time, inlet/outlet structures shall be designed to be secure and prohibit access by small children and the general public.

If below grade, or “bubble-up”, basin inlet structures are used, precautions shall be made to prevent uplifting of the grates and/or rims due to high inlet flows and velocities. Supporting calculations may be necessary for these instances, at the discretion of the City Engineer.

Metal components of inlet/outlet structures shall be of a corrosion resistant material, such as galvanized steel, stainless steel, or powder-coated steel. Powder coated steel is recommended for dual-use basins due to its more pleasing aesthetic appearance.

Basin inlets shall be designed to include energy dissipation elements such as concrete baffles or rip-rap so as to prevent scouring near the inlet.

7.706 Non-Dual Use Basins

Non-dual use basins, when allowed, shall be subject to the minimum layout and design criteria contained herein:

Side Slopes: Side slopes shall be no steeper than 3h:1v. Side slopes in excess of 5h:1v shall be lined with gunite or shotcrete, and reinforced with welded wire fabric.

Maximum Depth: Basins shall have a maximum depth of 12 ft., from bottom of slope to top of slope.

Bottom Slopes: Basin bottoms shall have a minimum of 1% slope to an inlet leading to an underground pipe system for nuisance water and/or discharge.

Access: A 12 ft. wide minimum access ramp shall be constructed from the top of the basin to the bottom, with a maximum slope of 10%. The access ramp shall consist of a 10 ft. wide concrete section with 12 in. compacted shoulders on either side. Concrete shall be a 5-sack mix, 8" minimum thickness, reinforced with welded wire fabric, on native soils compacted to 90% relative dry density.

Basins shall have a 15 ft. minimum flat area between the top of the basin slope and the adjacent fence or wall. A minimum 45' inside turning radius shall be provided around the top of the basin.

Paved access shall be provided to and around basin infrastructure such as pump stations and electrical equipment, to the satisfaction of the City Public Works Department.

Fencing: Non-dual use basins shall be sufficiently fenced and screened from public viewing and access to the satisfaction of the City Public Works and Community Development Departments.

7.707 Dual-Use Basins

Dual-Use Basins are intended to provide flood control storage during storm events, while providing space for recreational or visual amenities during dry periods. Dual-use basins shall be subject to the minimum layout and design criteria contained herein:

Landscaping: All dual-use basins shall be landscaped to the satisfaction of the Public Works and Community Development Departments. Landscaping Improvement Plans shall be prepared by a licensed Landscape Architect and approved by the Public Works and Community Development Departments.

Amenities: Dual-use basins shall include visual and recreational amenities, to the satisfaction of the Community Development Department and the Parks & Recreation Department. The type of amenities should typically be determined during the master-plan level of new developments. Play structures, restrooms, drinking fountains, lighted areas, and other "active" recreational amenities, if provided, shall be located above the 100-yr, 24-hour flood elevation.

Side slopes: Dual use basin side slopes shall be no steeper than 5h:1v.

Maximum depth: Dual use basins shall have a maximum depth of 6', as measured from the lowest adjacent curb elevation to the toe of slope.

Bottom Slopes: Landscaped areas of dual-use basin bottoms shall have minimum slopes of 2.0% to an inlet which leads to an underground conveyance or percolation system.

Fencing: Fencing around the dual-use basin perimeter shall typically not be allowed. However, fencing around certain basin infrastructure, such as pump stations or electrical equipment, may be necessary. In these instances, fencing shall be of a type to maximize aesthetic appeal, while maintaining security of basin infrastructure. All fencing and/or walls shall be approved by the Public Works and Community Development Department.

Access: Ideally, dual-use basins should be constructed with street frontages on all sides, without fencing, to maximize viewing from the street and adjacent properties. This will not only increase public safety, but will allow access for maintenance personnel. In these situations, and where parking is available on the adjacent streets, a 15 ft. minimum flat area between the top of slope and the adjacent face of curb or edge of pavement is required. Sidewalk and/or street landscaping may be included in this distance.

Driveways from the adjacent streets to the dual-use basin shall be provided at the discretion of the Public Works Department. Driveways to the basin shall be constructed with removable bollards or locked gates to prevent unauthorized vehicular access.

In situations where a basin is directly adjacent to a wall or fence, a 15 ft. minimum flat area shall be provided between the wall or fence, and the top of the basin slope.

A.D.A. access shall be required for all “upland” recreational amenities. The need for A.D.A. access for bottom portions of dual-use basins shall be evaluated on a case-by-case basis, at the discretion of the City Engineer and the Community Development Department.

7.708 Lift Stations

Storm drainage lift stations shall generally conform to the same design requirements indicated in the Sanitary Sewer Design Standards, Section 2.600. In addition, the following are requirements specifically for storm drainage lift stations:

- Storm drainage lift station wet wells will typically not need to be lined with polyurethane as per the Sanitary Sewer Design Standards.
- Storm drainage lift stations shall contain a trash rack or similar mechanism to prevent debris from entering the pump chamber.

7.800 Additional Design Considerations

7.801 National Pollution Discharge Elimination System (NPDES) Requirements

In order to comply with the City's general storm water permit, as well as state and federal NPDES requirements, all construction projects of one (1) acre or more shall be required to prepare, implement, and maintain a Storm Water Pollution Prevention Plan (SWPPP). In addition, improvement plans shall include an Erosion and Sedimentation Control Plan (ESCP) for construction activities.

Notice of Intent (NOI): Prior to improvement plan approval, the Developer shall prepare and submit an NOI, and the appropriate fee, to the State Water Resources Control Board. The date of the submitted NOI and the Water Department Identification (WDID) Number shall be noted on the plans. To obtain a copy of this form, and for information on required attachments and fees, the State Water Resources Control Board may be contacted at:

State Water Resources Control Board
Division of Water Quality
Attn: Storm Water
1001 I Street
Sacramento, CA 95814
Ph: 916-341-5537
Fax: 916-341-5543
Web: www.swrcb.ca.gov/stormwtr/construction.html

Storm Water Pollution Prevention Plan (SWPPP): A SWPPP shall be prepared, implemented and maintained for all construction projects of one (1) acre or more. The SWPPP shall indicate the appropriate Best Management Practices (BMP's) for the project, as well as post-construction measures for the prevention of storm water pollution. A copy of the SWPPP shall be maintained on-site at all times.

SWPPP's shall be prepared and implemented in accordance with the guidelines contained in the California Best Management Practices Handbook, as published by the California Storm Water Quality Association (CASQA). For further information, contact CASQA at:

California Storm Water Quality Association
PO Box 2105
Menlo Park, CA 94026
Ph: 650-366-1042
Fax: 650-365-8678
Web: www.casqa.com
Or visit www.cabmphandbooks.com for SWPPP preparation guidelines.

Erosion and Sedimentation Control Plan (ESCP): An ESCP shall be prepared and included in the improvement plans which identifies the types and locations of BMP's to be used during construction. This ESCP shall reference the approved WDID number issued by the State Water Resources Control Board, as well as the SWPPP prepared for the project.

Notice of Termination (NOT): Upon completion of construction, the Developer shall be required to prepare and submit an NOT to the State Water Resources Control Board. Contact the State Water Resources Control Board for further information.

7.802 Private On-site Drainage Systems

The following requirements apply to privately owned and maintained storm drainage systems constructed with on-site developments:

- Ideally, on-site developments that connect into the City drainage system should be considered on a regional basis, as part of a storm drainage master plan or study. However, oftentimes this is not the case –especially with infill development. In these instances, the design engineer shall evaluate the downstream system and proposed development to the satisfaction of the City Engineer.
- Private on-site storm drainage systems shall connect into the City underground system at a manhole. If it is not practical to connect into the City underground system, then the development shall include a percolation system designed in accordance with the Design Standards contained herein.
- If volume storage for the development was not previously included in a storm drain master plan for a larger plan area, then sufficient volume storage shall be provided on-site to reduce peak discharge to pre-development levels.
- Storm Water Treatment Control Devices shall be required for all new developments, if they are not already included as part of a regional, master-planned storm drainage system. Treatment Control Devices shall be designed to reduce runoff pollutants to the Maximum Extent Practicable (MEP), to the satisfaction of the City Engineer.

City of Riverbank
CONSTRUCTION STANDARDS

STORM DRAIN

TABLE OF CONTENTS

SECTION 7: STORM DRAIN

7.100 MATERIALS

7.101 General

The City Engineer shall approve the source and supply of all materials.

7.102 Gravity Storm Drain Pipe

Reinforced Concrete Pipe (RCP): RCP shall conform to the specifications of ASTM designation C76 and shall be Class II, IV, or V. Reinforcing shall be the minimum requirements for circular reinforcing wire mesh cages as specified in ASTM designation C76. Portland Cement used in the manufacture of reinforced concrete pipe shall conform to the requirements of the specifications for Type II Portland Cement, ASTM designation C150.

Contractor shall submit to the City Public Works Dept. the pipe manufacturer's "Certificate of Compliance" guaranteeing that the pipe meets the requirements of ASTM C76.

Polyvinyl Chloride Pipe (PVC): PVC shall be the same materials as used for gravity sanitary sewer applications, further described in Chapter 6: Sanitary Sewers, of these Construction Specifications.

7.103 Manholes

Manholes shall be constructed per City Standard Drawings, and constructed using the same materials as described in Section 6: Sanitary Sewer. Manhole covers shall be manufactured from ductile iron, and be marked "Storm" on the cover.

7.104 Catch Basins

Catch basin materials shall be constructed per City Standard Drawings. Cast-in-place catch basins shall be constructed using 3000 psi concrete with 1" maximum aggregate. If pre-cast sections are used, Contractor shall provide manufacturer data to the City Public Works Dept. for approval prior to installation. Catch basin grates and hoods shall be hot-dip galvanized, after fabrication.

7.105 Horizontal Drains

Filter fabric shall be Mirafi 400N, or an approved equal. Drain rock shall be ¾ in. to 2 ½" clean, crushed rock. Contractor shall provide the gradation of the proposed drain rock to the City Public Works Dept. for approval prior to installation.

7.200 INSTALLATION

7.201 Reinforced Concrete Pipe

Pipe shall be laid in accordance with manufacturer's recommendations, unless otherwise directed by the City Engineer. The pipe shall be laid in conformity with the prescribed lines and grades, which shall be obtained by means of a laser beam. All adjustments of the pipe to line and grade shall be made by scraping away or filling in, and tamping under the body of the pipe. Wedging or blocking is not allowed.

Pipe shall be laid with bell end upstream, and shall be laid starting at the downstream end of the system towards the upstream structure. A minimum of 3 grade stakes per 100 lineal feet of pipe shall be provided to establish alignment and grade. Stakes shall not be removed until directed by the City Engineer.

7.202 PVC Pipe

Gravity flow PVC Storm Drain Pipe shall be installed as directed in Section 6: Sanitary Sewers, of these Construction Specifications.

7.203 Manholes

Storm drain manholes shall be installed as per Section 6: Sanitary Sewers, of these Construction Specifications, unless otherwise indicated. Manhole frames and covers shall be adjusted to finish grade after paving improvements are complete.

7.204 Catch Basins

Catch Basins shall be installed as per City Standard Details. Pre-cast bases, if used, shall be installed on a minimum 6 in. thick layer of ¾ in. drain rock. Poured in place bases shall be constructed on undisturbed native soil. If pre-cast sections are used, all joints shall be grouted, or sealed with Ram-nek, or an approved equivalent.

Unless a sump is indicated on the plans, the bottom of the catch basin shall be grouted to direct all flow to the outgoing pipe.

7.205 Horizontal Drains

Horizontal Drains shall be laid to the elevations and alignments per plan. Prior to placement of filter fabric, the trench shall be inspected to verify that the soil type matches the soils shown in plans, soils report, and calculations. Additional percolation testing and calculations may be requested by the City Engineer if it appears that actual soils encountered during the excavation do not match soil types indicated in the original soils report, percolation tests and boring logs.

Drain rock shall be installed at the depths and widths indicated on the plans. The City Engineer shall be notified at least 48 hours prior to placement of drain rock in order to verify width and depth conformance with the plans.

Drain rock shall not be placed in the trenches until so directed by the City Engineer.

7.300 TESTING AND INSPECTION:

7.301 General

Prior to backfill of the trench, the Contractor shall notify the City Engineer for inspection of the installed pipe and structures. Backfill of the trenches shall not proceed until so directed by the City Engineer.

Testing for compaction and for control of the concrete shall be performed under the direction of the City Engineer, at the Contractor's expense.

7.302 Televised Inspection

The Contractor shall inspect all new pipelines with closed circuit television and furnish a CD/DVD of the inspection, along with a hard copy report to the City. The Contractor shall give the City Engineer at least two (2) working days notice prior to performing the TV work so a city representative can verify the work.

The Contractor shall clean all lines of dirt and other debris, clean manholes, remove broken pipe, compact trench, raise manhole rims to grade, and pass the air test prior to television inspection. Areas adjacent to manholes shall be leveled and made accessible to the television trailer.

Defects such as high and low spots, joint separations, offset joints, chipped ends, cracked or damaged pipe, infiltration points and debris in lines shall be corrected by the contractor at their expense. For joint separations, low spots and chipped ends, the following maximum acceptable limits will apply for new sanitary sewer lines:

Joint separations -½"

Low spots:

Pipe size	Depth tolerance of trapped water
6	0.93 in.
8	1.25 in.
10"	1.50 in
12"	1.87 in.
15"	2.25 in.
18"	2.75 in.

Chipped ends – ¼" (VCP, only)

Prior to the end of the one-year warranty period, the City may require televised inspection of the new sanitary sewer laterals for the project at the Contractor's expense.

7.303 Testing of PVC Storm Drains

PVC storm drain piping shall be mandrel tested in accordance with Section 6: Sanitary Sewers, of these Construction Specifications. Air testing will normally not be required, but may be requested if deemed necessary by the City Engineer.

7.304 Defects and Deficiencies

All defects and deficiencies discovered during the inspection shall be corrected by the Contractor to the satisfaction of the City Engineer. The following shall be considered defects and shall be corrected prior to acceptance, to the satisfaction of the City Engineer:

- Depth of trapped water exceeds 10% of pipe diameter.
- Broken, cracked or damaged ends of pipe shall be rejected. Minor chipped ends of ¼" or less shall be permitted provided cracking and excessive damage is not evident.
- Debris in pipe or structures.
- Joint separations or offset joints.
- Other obvious deficiencies when compared to the approved Plans, Specifications, and the City of Riverbank Standard Specifications.

7.400 MEASUREMENT AND PAYMENT:

7.401 Pipe

Payment for storm drain pipe complete in place shall be per lineal foot, measured from the center of manhole or catch basin, or to the wall of an outlet structure, as appropriate.

Payment shall include the furnishing of all labor, materials, tools and equipment required to construct and complete the installation of storm drain piping in accordance with the plans and these Standard Specifications.

7.402 Horizontal drains

Payment for horizontal drains complete in place shall be per lineal foot, measured from the center of manhole or cleanout, to center of manhole, as appropriate. Payment shall include the cost of filter fabric, drain rock, perforated or slotted pipe, excavation, and backfill.

Payment shall include the furnishing of all labor, materials, tools and equipment required to construct and complete the installation of storm drain piping in accordance with the plans and these Standard Specifications.

7.403 Manholes, Catch Basins, and other Structures

The unit of measure for payment shall be per each unit. Payment shall be made at the bid price per item for each structure complete in place, and shall include the cost of excavation, backfill, frames, covers, plates, and reinforcing steel, as applicable.

Full compensation for all incidentals arising from this work shall be considered as included in the price paid per each unit, and no further compensation shall be allowed.

7.404 Basins

Excavation for basins shall be measured for payment by cubic yard. Access roads, ramps, and landscaping shall be measured by square foot of material laid. Fencing and walls shall be measured by linear foot.

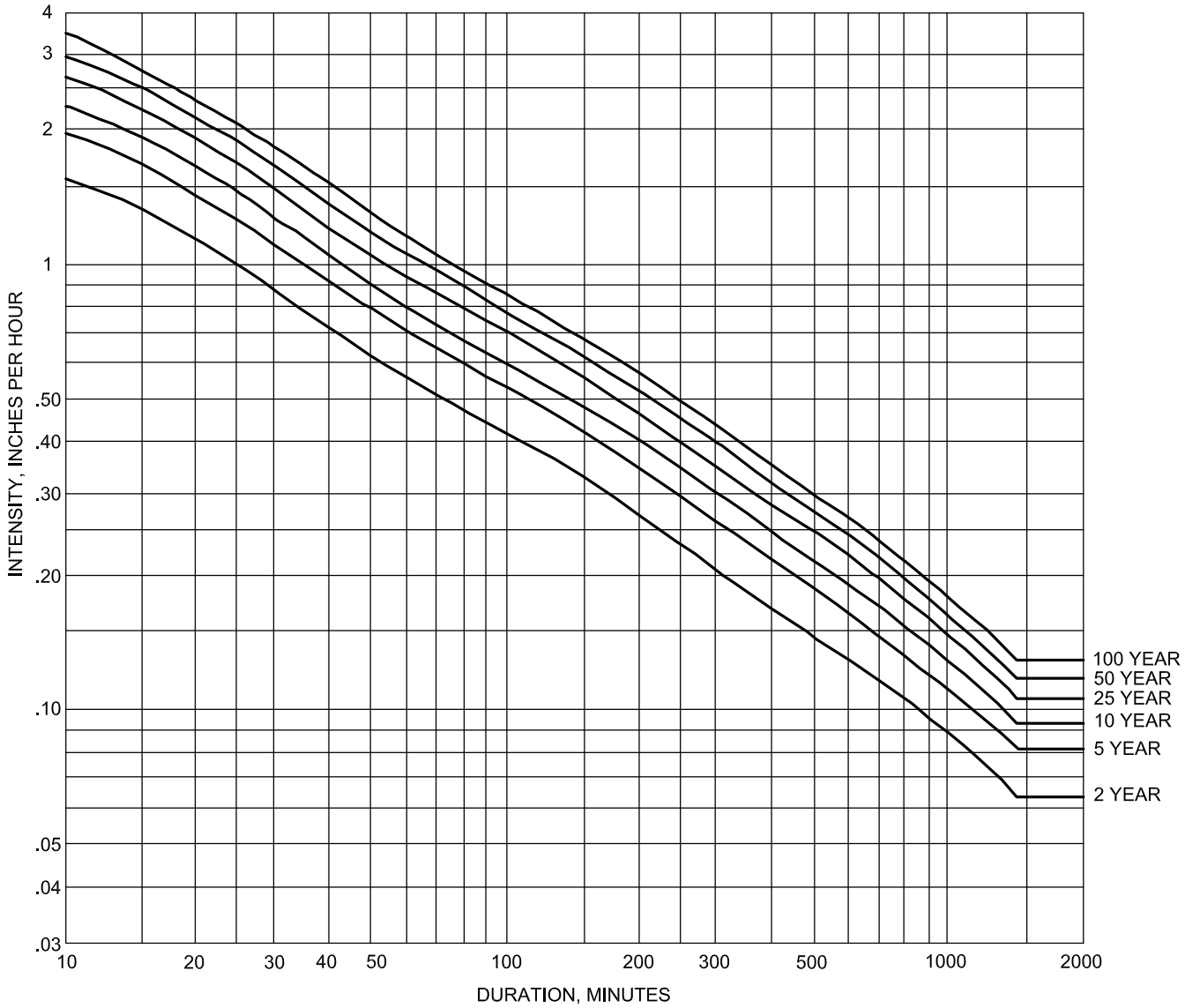
Payment shall include the furnishing of all labor, materials, tools and equipment required to construct and complete the installation of items in accordance with the plans and these Standard Specifications.

City of Riverbank
STANDARD PLANS

STORM DRAIN

SECTION 7 - STORM

Drawing No	Description
701	RAINFALL INTENSITY CURVE
702	CATCH BASIN
703	HOOD DETAIL
704	FRAME & GRATE DETAIL
705	CURB THROUGH DRAIN
706	OPEN AREA DRAIN
707	CONCENTRIC MANHOLE
708	TRUNK MANHOLE
709	GUTTER CAPACITY
710	TYPICAL HORIZONTAL DRAIN LAYOUT
711	SAMPLE DRAINAGE MAP
712	SAMPLE DRAINAGE CALCULATION WORKSHEET
713	SAMPLE DRAINAGE CALCULATION WORKSHEET COLUMN DESCRIPTIONS
714	REMOVED
715	REMOVED
716	LATERAL MANHOLE
717	POURED-IN-PLACE TRUNK MANHOLE
718	CAST-IN-PLACE TRUNK MANHOLE
719	REMOVED
720	MANHOLE FRAME AND COVER FOR FEDERAL PROJECTS
721	HORIZONTAL DRAIN
722	HORIZONTAL DRAIN PIPE
723	ROCK WELL/VERTICAL DRAIN
724	ROCK WELL/VERTICAL DRAIN CORE PIPE



THESE CURVES ARE BASED ON CALIFORNIA
DEPARTMENT OF WATER RESOURCES DATA
FOR THE RIVERBANK RAINFALL GAUGING STATION
WITH ADJUSTMENTS FOR M.A.P.

CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

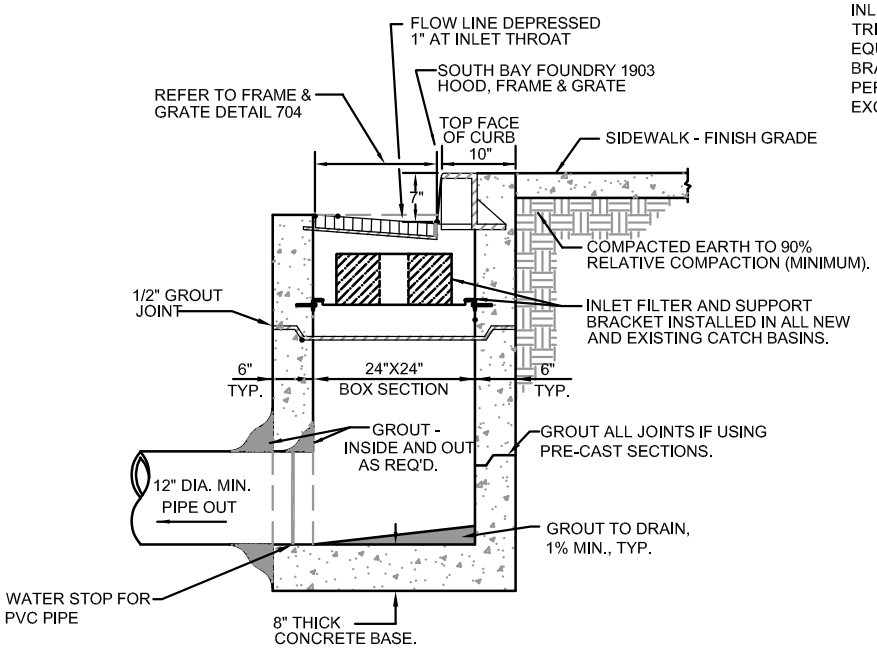
William F. Kull

CITY ENGINEER - WILLIAM F. KULL

RAINFALL INTENSITY CURVE

DRAWN BY:	DATE:	SCALE:	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
GK	1/05/16	NTS	1-26-16	701
REVISIONS: NONE	SECTION: STORM	DRAWING NAME: 701.DWG		

NOTE: WITHIN THE PROJECT LIMITS, ALL NEW AND EXISTING STORM DRAIN CATCH BASINS SHALL HAVE INLET FILTERS INSTALLED. INLET FILTERS SHALL BE TRITON SQUARE TOP HAT SERIES, OR APPROVED EQUIVALENT. CATCH BASIN SHALL HAVE SUPPORT BRACKETS INSTALLED IN CATCH BASIN BOX SECTION PER MANUFACTURES SPECIFICATIONS UNLESS AN EXCEPTION IS ALLOWED PER THE CITY ENGINEER.



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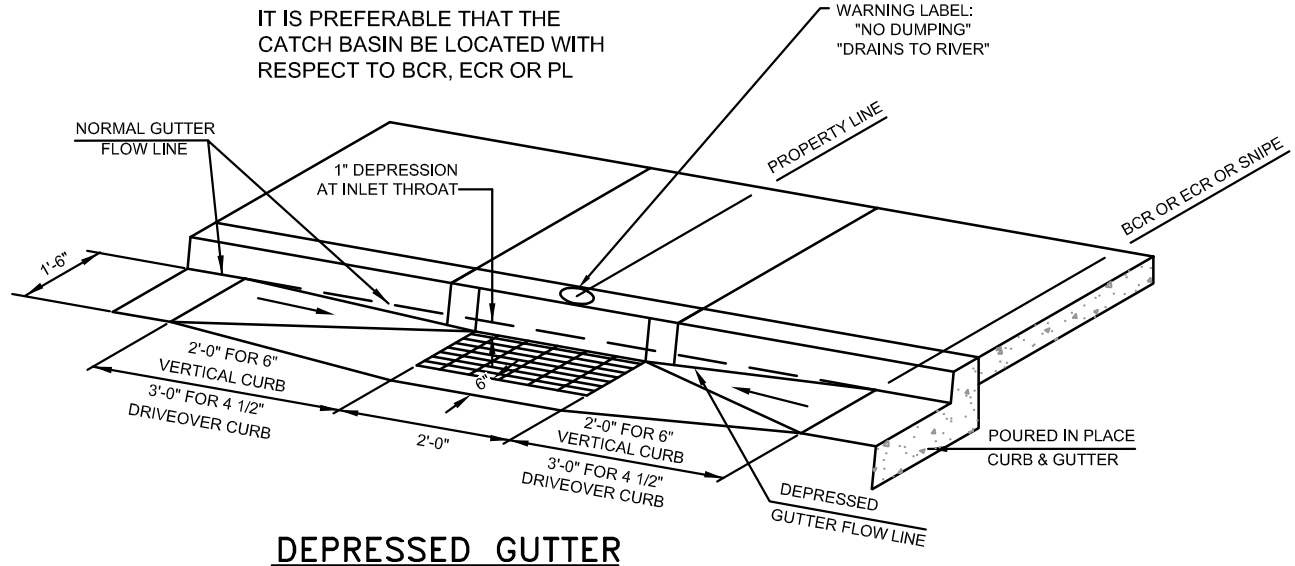


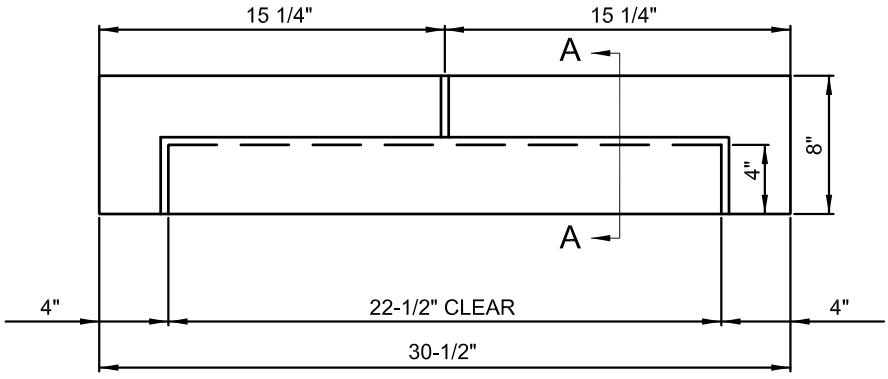
DEPRESSED GUTTER

CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

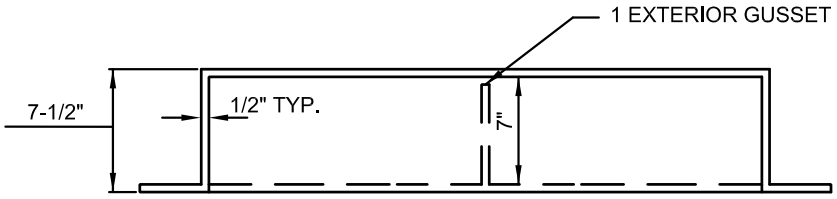
William F. Kull
CITY ENGINEER - WILLIAM F. KULL

CATCH BASIN

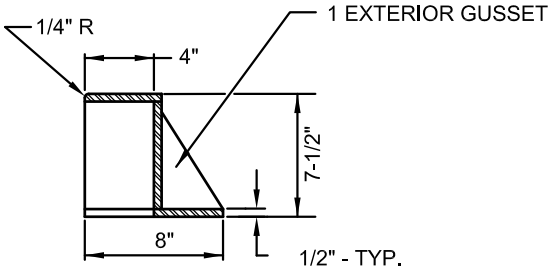
DRAWN BY:	DATE:	SCALE:	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
GK	2/11/2025	NTS	3-11-25	702
REVISIONS: NONE	SECTION: STORM	DRAWING NAME: 702.DWG		



PLAN VIEW



FRONT VIEW

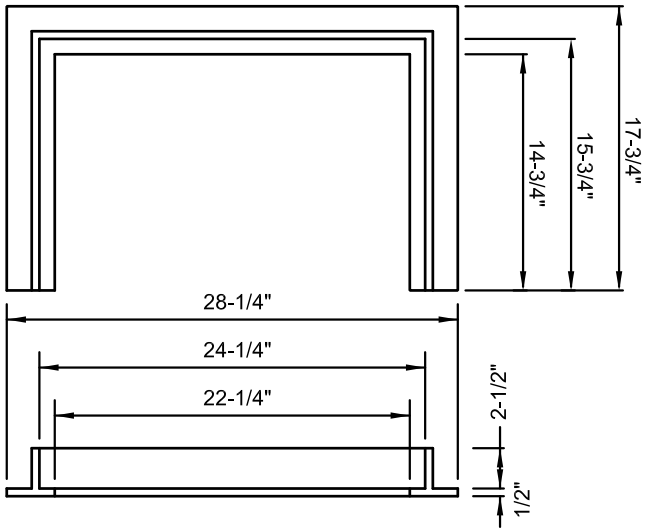


SECTION A-A

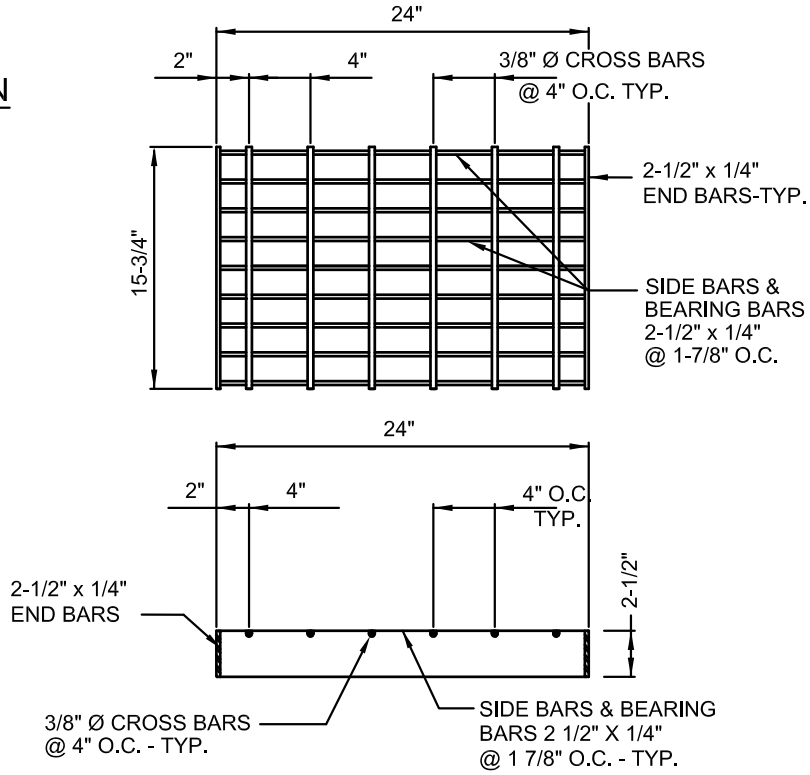
NOTES:

1. HOOD, FRAME & GRATE SHALL BE SOUTH BAY FOUNDRY 1903 OR EQUAL.
2. MATERIAL SHALL CONFORM TO ASTM 48, CLASS 35B.
3. FRAME & COVER SHALL BE RATED FOR H-20 LOADING.
4. CASTINGS SHALL BE HOT-DIPPED GALVANIZED AFTER FABRICATION

CITY OF RIVERBANK DEPARTMENT OF PUBLIC WORKS			HOOD DETAIL	
William F. Kull CITY ENGINEER - WILLIAM F. KULL				
DRAWN BY: GK	DATE: 1/05/16	SCALE: NTS	ADOPTED BY THE CITY COUNCIL: 1-26-16	DRAWING NO. 703
REVISIONS: NONE	SECTION: STORM	DRAWING NAME: 703.DWG		



FRAME PLAN VIEW
AND FRONT ELEVATION



GRATE PLAN VIEW AND FRONT ELEVATION

NOTES:

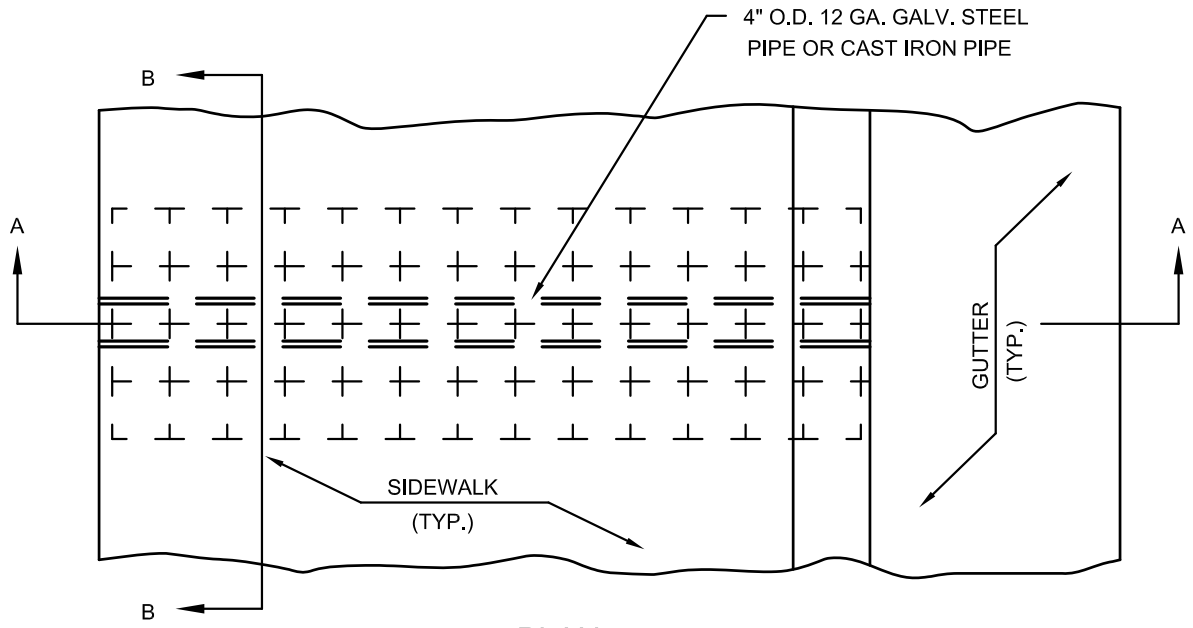
1. FRAME/GRATE SHALL BE SOUTH BAY FOUNDRY 1903 OR EQUAL.
2. MATERIAL SHALL CONFORM TO ASTM 48, CLASS 35B.
3. FRAME & COVER SHALL BE RATED FOR H-20 LOADING.
4. CASTINGS SHALL BE HOT-DIP GALVANIZED, AFTER FABRICATION.
5. 12" LENGTHS OF 1/4" GALVANIZED CHAIN CONNECTING GRATE TO FRAME AT CORNER.

CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

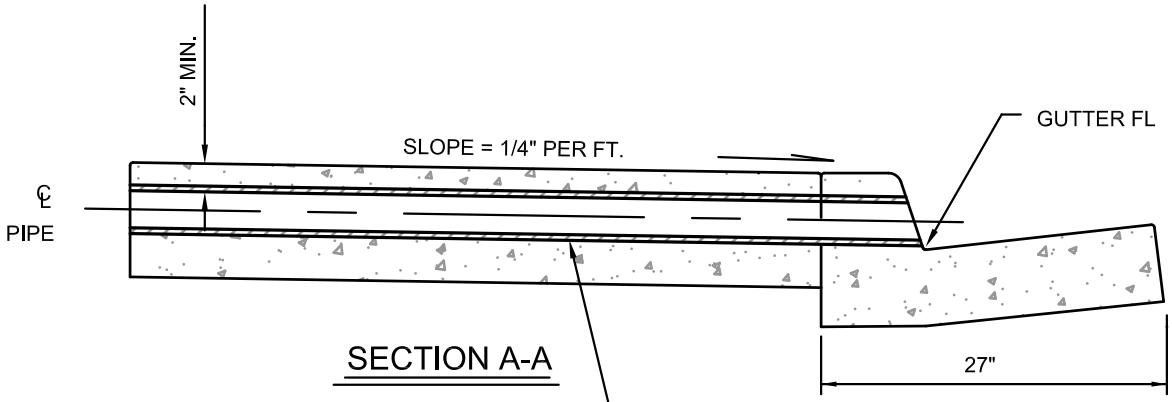
William F. Kull
CITY ENGINEER - WILLIAM F. KULL

FRAME & GRATE DETAIL

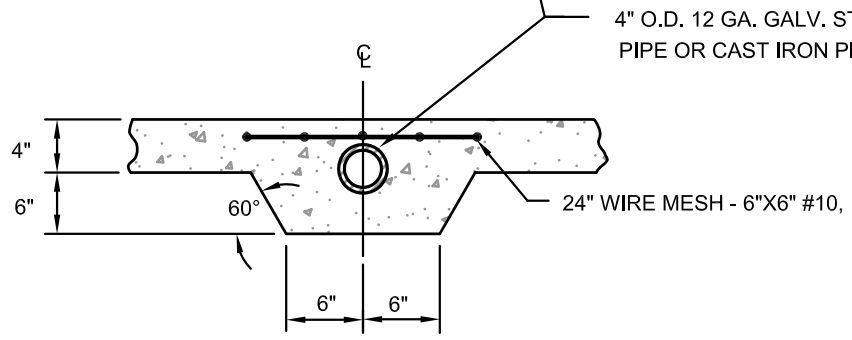
DRAWN BY:	DATE:	SCALE:	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
GK	1/05/16	NTS	1-26-16	704
REVISIONS: NONE	SECTION: STORM	DRAWING NAME: 704.DWG		



PLAN



SECTION A-A



SECTION B-B

CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

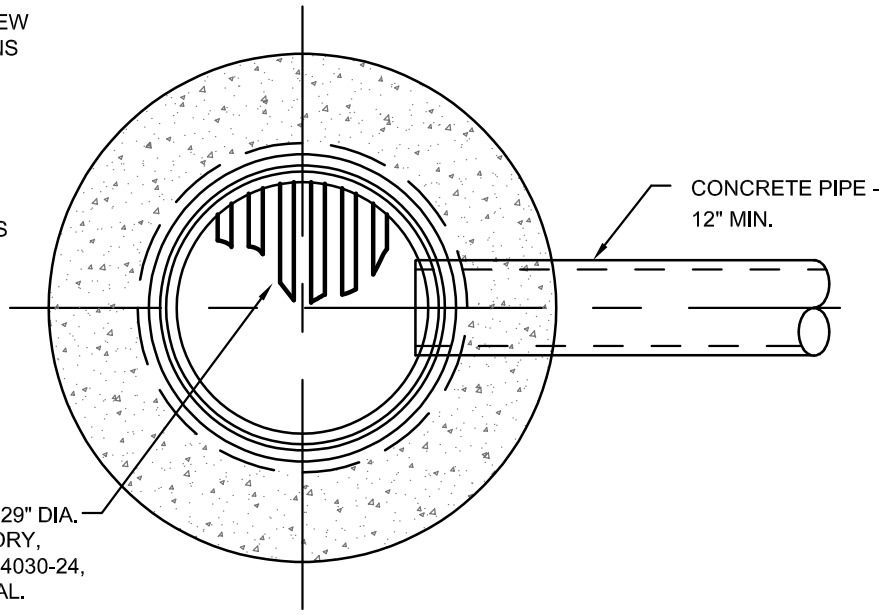
William F. Kull

CITY ENGINEER - WILLIAM F. KULL

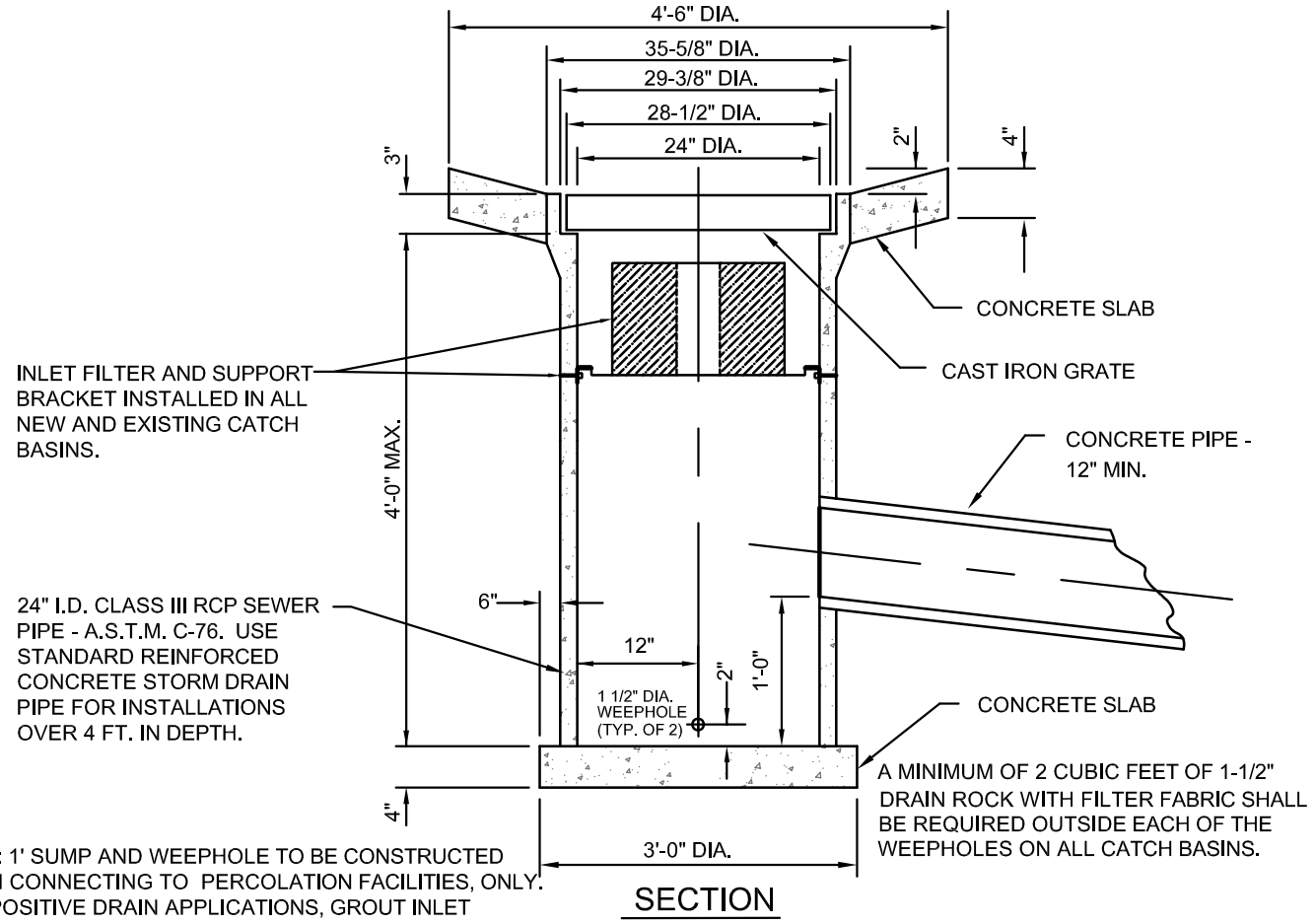
CURB THROUGH DRAIN

DRAWN BY:	DATE:	SCALE:	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
GK	1/05/16	NTS	1-26-16	705
REVISIONS: NONE	SECTION: STORM	DRAWING NAME: 705.DWG		

NOTE: WITHIN THE PROJECT LIMITS, ALL NEW AND EXISTING STORM DRAIN CATCH BASINS SHALL HAVE INLET FILTERS INSTALLED. INLET FILTERS SHALL BE TRITON SQUARE TOP HAT SERIES, OR APPROVED EQUIVALENT. CATCH BASIN SHALL HAVE SUPPORT BRACKETS INSTALLED IN CATCH BASIN BOX SECTION PER MANUFACTURES SPECIFICATIONS UNLESS AN EXCEPTION IS ALLOWED PER THE CITY ENGINEER.



PLAN



NOTE: 1' SUMP AND WEEPHOLE TO BE CONSTRUCTED WHEN CONNECTING TO PERCOLATION FACILITIES, ONLY. FOR POSITIVE DRAIN APPLICATIONS, GROUT INLET FLOOR TO DRAIN TO OUTGOING PIPE INVERT.

SECTION

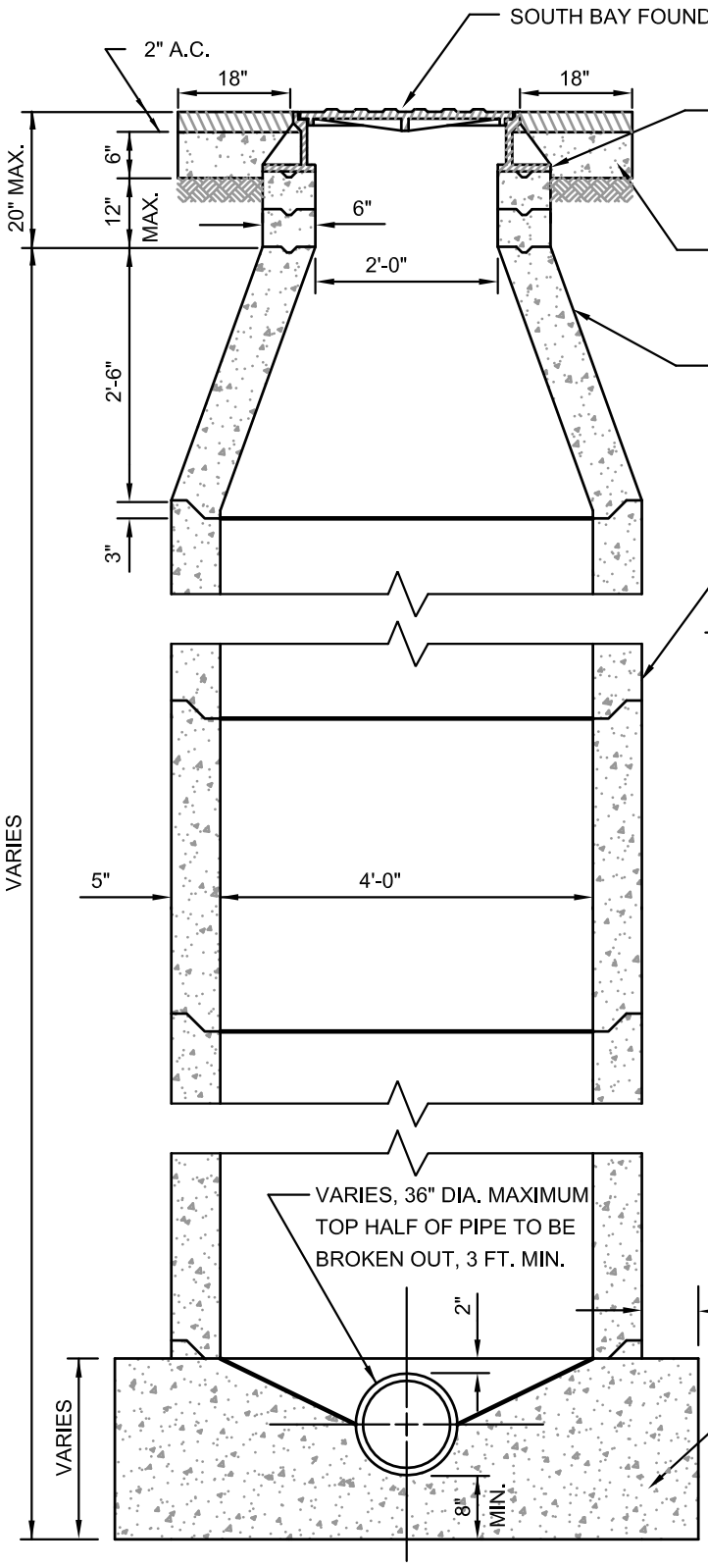
CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

William F. Kull

CITY ENGINEER - WILLIAM F. KULL

OPEN AREA DRAIN

DRAWN BY:	DATE:	SCALE:	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
GK	2/11/2025	NTS	3-11-25	706
REVISIONS: NONE	SECTION: STORM	DRAWING NAME: 706.DWG		



NOTES:

1. BOTTOM OF MANHOLE SHALL BE CONSTRUCTED FROM F.L. TO F.L. AND SHAPED TO CONFORM WITH THE DIAMETER OF THE PIPE AND DIRECTION OF FLOW.

2. BARREL, CONE AND GRADE RING SECTIONS SHALL CONFORM TO ASTM C478, LATEST REVISION.

3. BASE SHALL CONSIST OF CAST-IN-PLACE CLASS II CONCRETE PER SEC. 90 CALTRANS STD. SPECS.

4. COVER TO BE MARKED "STORM DRAIN".

5. RUBBER RING WATERSTOP OR MANHOLE ADAPTER REQUIRED FOR PVC PIPE INSTALLATIONS.

6. BACKFILL AROUND MANHOLE SHALL BE COMPACTED TO 95% RELATIVE COMPACTION MINIMUM.

7. ALL BARREL JOINTS SHALL BE GROUTED INSIDE AND OUTSIDE, OR SEALED RAM-NEK OR APPROVED EQUAL.

8. ADJUST FRAME TO GRADE AFTER PAVING.

9. LADDER RUNGS TO BE CONSTRUCTED ON ALL MANHOLES 6' IN DEPTH, OR GREATER.

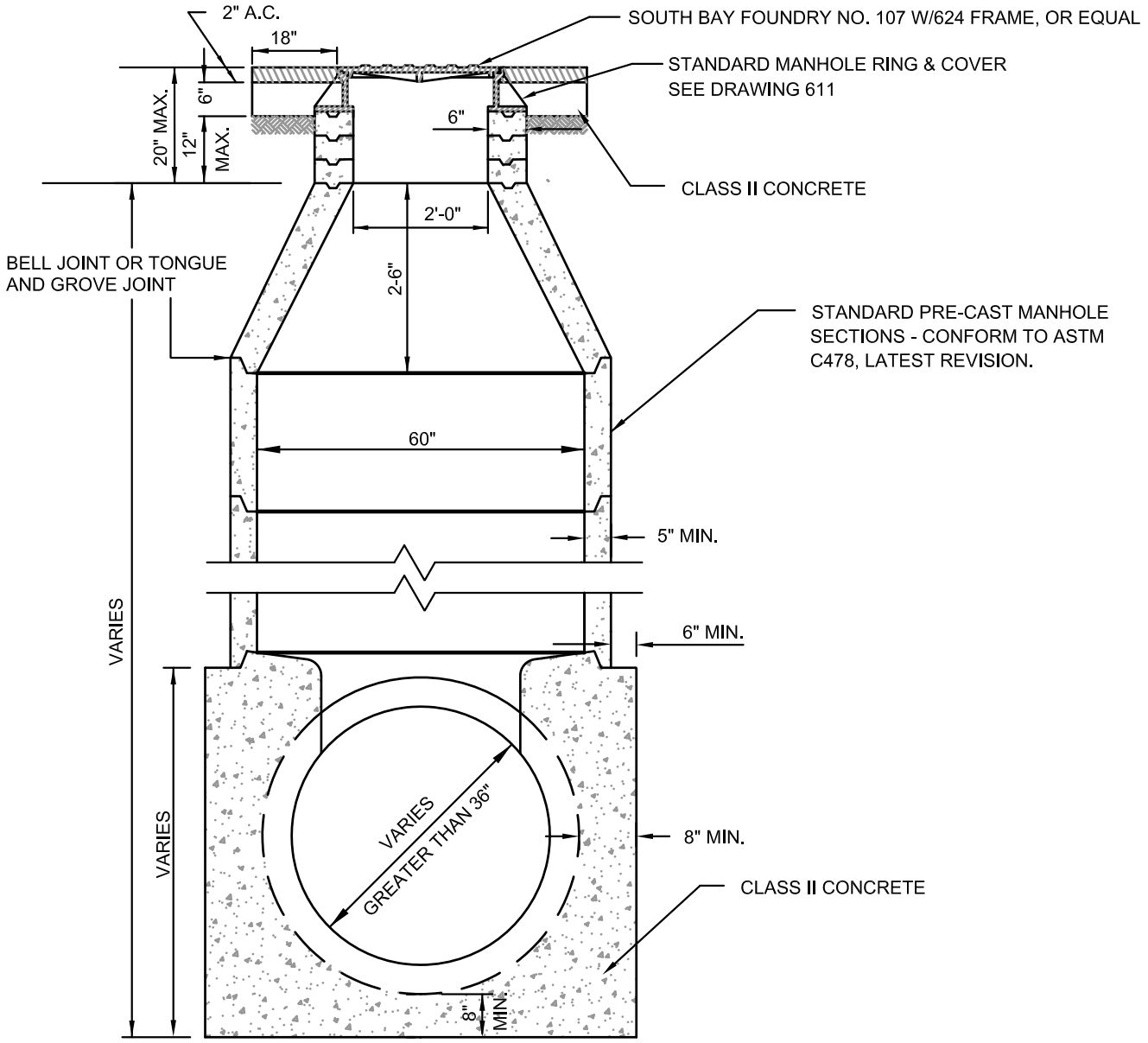
CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

William F. Kull

CITY ENGINEER - WILLIAM F. KULL

CONCENTRIC MANHOLE

DRAWN BY:	DATE:	SCALE:	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
GK	1/05/16	NTS	1-26-16	707
REVISIONS: NONE	SECTION: STORM	DRAWING NAME: 707.DWG		



NOTE:

1. BOTTOM OF MANHOLE SHALL BE CONSTRUCTED FROM F.L. TO F.L. AND SHAPED TO CONFORM WITH THE DIAMETER OF THE PIPE AND DIRECTION OF FLOW.
2. BARREL, CONE AND GRADE RING SECTIONS SHALL CONFORM TO ASTM C478, LATEST REVISION.
3. BASE SHALL CONSIST OF CAST-IN-PLACE CLASS II CONCRETE PER SEC. 90 CALTRANS STANDARD SPECIFICATIONS.
4. COVER TO BE MARKED "STORM DRAIN".
5. PIPE TO BE LAID THROUGH MANHOLE AND TOP PORTION REMOVED AFTER CONCRETE HAS SET.
6. BACKFILL AROUND MANHOLE SHALL BE COMPACTED TO 95% RELATIVE COMPACTION MIN.
7. ALL BARREL JOINTS SHALL BE GROUTED INSIDE AND OUTSIDE, OR SEALED RAM-NEK OR APPROVED EQUIVALENT.
8. ADJUST FRAME TO GRADE AFTER PAVING.
8. LADDER RUNGS TO BE CONSTRUCTED ON ALL TRUNK MANHOLES.

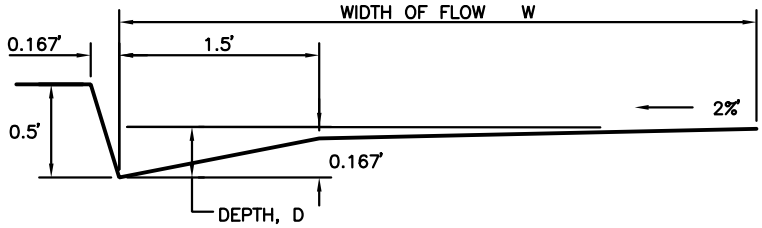
CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

William F. Kull

CITY ENGINEER - WILLIAM F. KULL

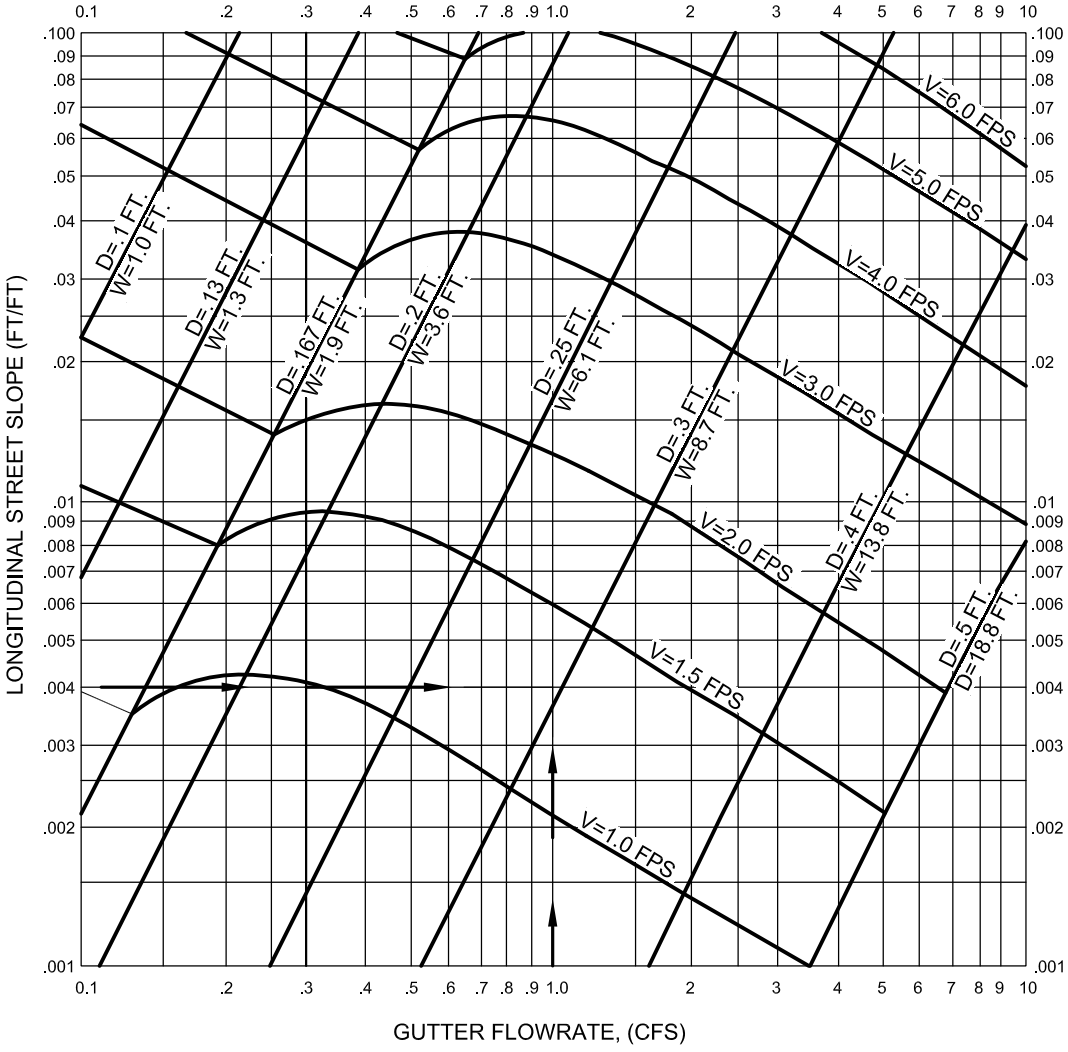
TRUNK MANHOLE

DRAWN BY:	DATE:	SCALE:	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
GK	1/05/16	NTS	1-26-16	708
REVISIONS: NONE	SECTION: STORM	DRAWING NAME: 708.DWG		



GIVEN: Q = 1.0 CFS, S=0.004

RESULTS: DEPTH=0.3 FT., WIDTH = 8.7 FT., VELOCITY = 1.3 FPS



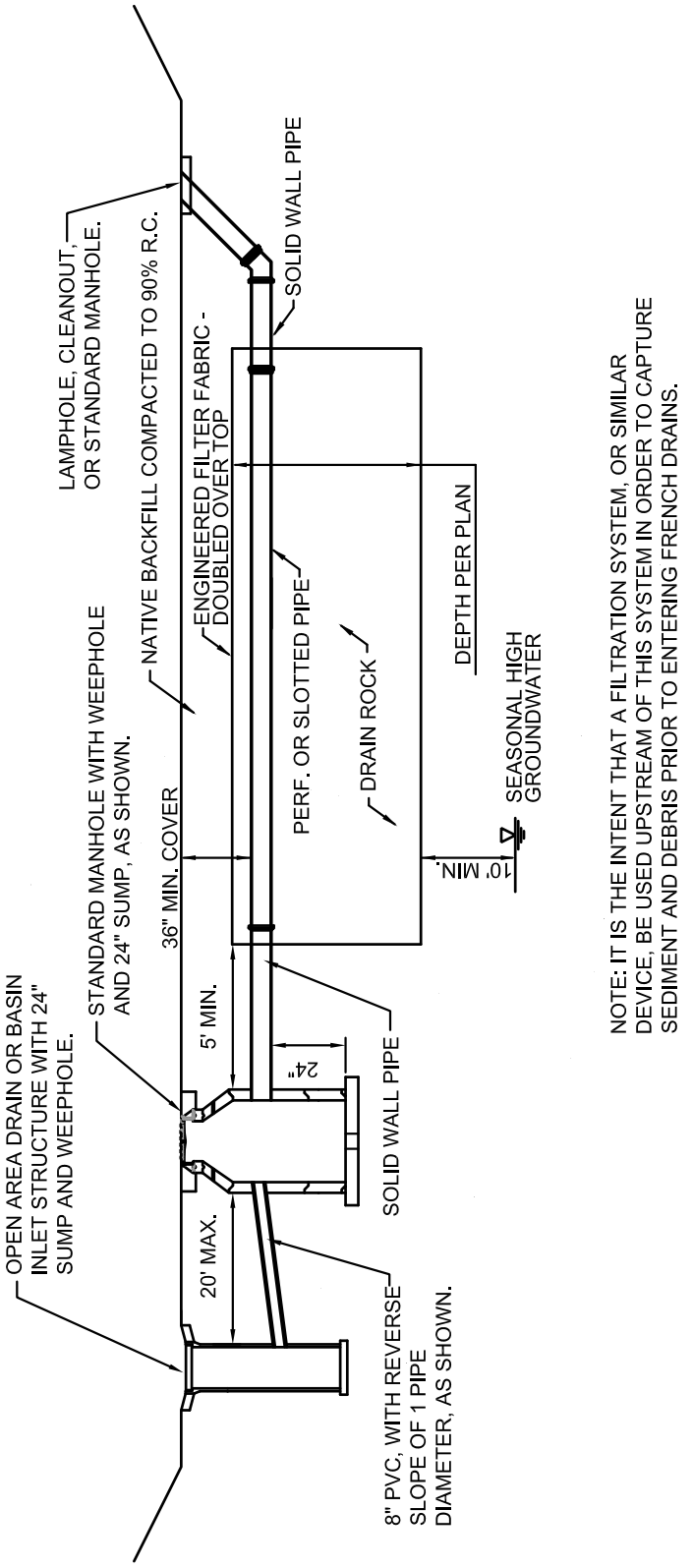
CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

GUTTER CAPACITY

William F. Kull

CITY ENGINEER - WILLIAM F. KULL

DRAWN BY:	DATE:	SCALE:	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
GK	1/05/16	NTS	1-26-16	709
REVISIONS: NONE	SECTION: STORM	DRAWING NAME: 709.DWG		



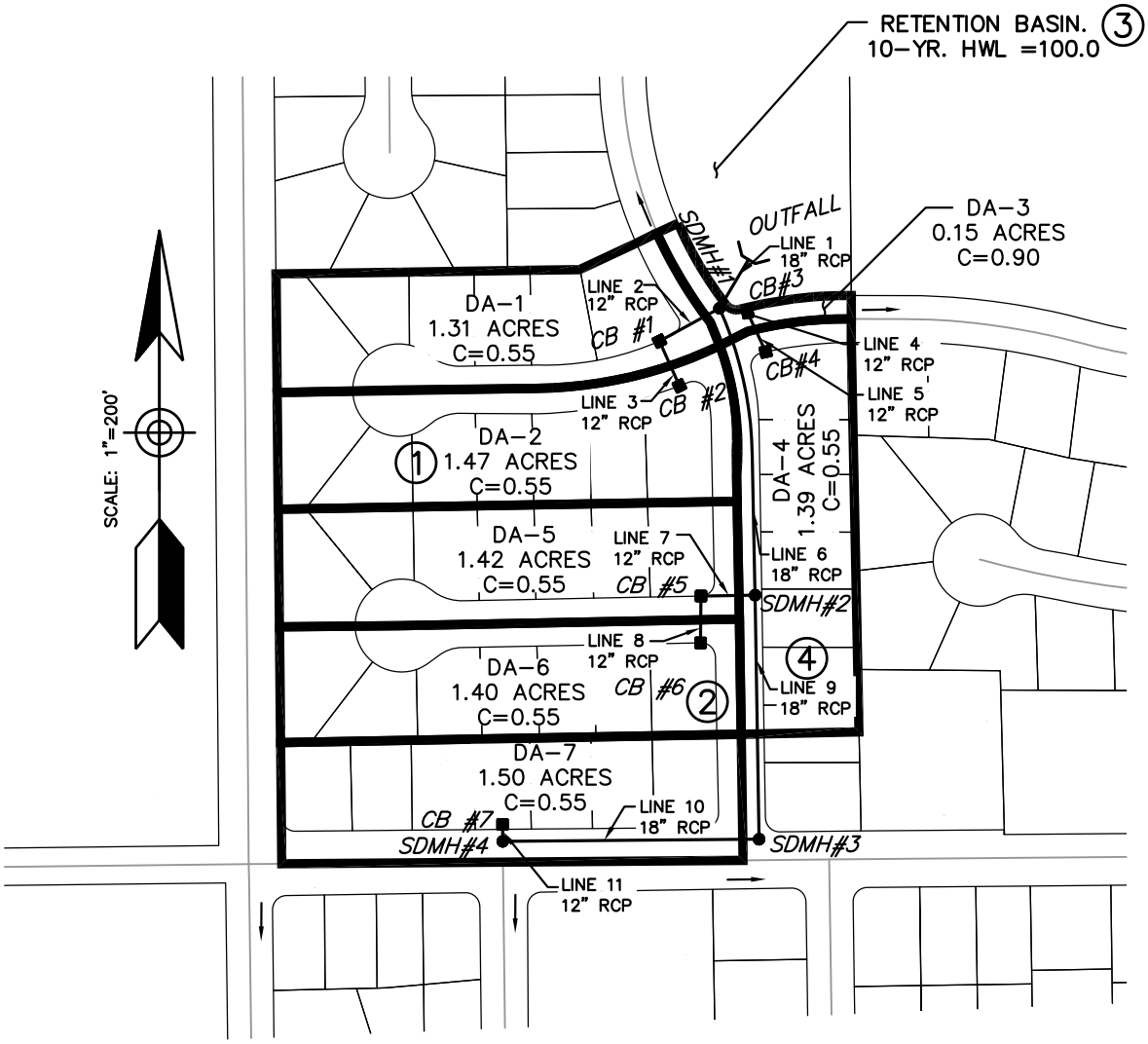
NOTE: IT IS THE INTENT THAT A FILTRATION SYSTEM, OR SIMILAR DEVICE, BE USED UPSTREAM OF THIS SYSTEM IN ORDER TO CAPTURE SEDIMENT AND DEBRIS PRIOR TO ENTERING FRENCH DRAINS.

CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

TYPICAL HORIZONTAL DRAIN LAYOUT

William F. Kull
CITY ENGINEER - WILLIAM F. KULL

DRAWN BY:	DATE:	SCALE:	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
GK	1/05/16	NTS	1-26-16	710
REVISIONS: NONE	SECTION: STORM	DRAWING NAME: 710.DWG		



NOTES:

① LABEL EACH DRAINAGE AREA NUMBER, SIZE, AND RUNOFF COEFFICIENT.

② LABEL EACH STRUCTURE NUMBER. NUMBERS SHALL MATCH IMPROVEMENT PLANS.

③ LABEL DRAINAGE BASIN H.W.L., IF APPLICABLE.

④ LABEL LINE NUMBER REFERENCED IN CALCULATIONS AND PIPE DIAMETER.

CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

SAMPLE DRAINAGE MAP

William F. Kull
CITY ENGINEER - WILLIAM F. KULL

DRAWN BY:	DATE:	SCALE:	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
GK	1/05/16	NTS	1-26-16	711
REVISIONS: NONE	SECTION: STORM	DRAWING NAME: 711.DWG		

CITY OF RIVERBANK STORM DRAINAGE CALCULATION WORKSHEET

City Of Riverbank
Department of Public Works

Date:
Project Title:
des. by:
chk. by:

NOTES:
- Starting HGL based on basin H.W.L.=100.0 per previous calculations ①
- Manning n = 0.013
- Rainfall intensities based on 10-year recurrence interval From the City of Riverbank Standard Detail 701 ②

Design Engineer Stamp and Signature

	HYDROLOGY										
(A) LINE No.	(B) UP STRM STRUCTURE	(C) DRAINAGE AREA I.D.	(D) Acres	(E) Runoff Coef	(F) CxA	(G) Sum Acres	(H) Sum CxA	(I) Tc (min)	(J) rainfall (in/hr)	(K) Q=cia (cfs)	(L) total Q (cfs)
1	SDMH #1			0.55		8.64	4.80	35	1.10		5.28
2	CB #1	DA-1	1.31	0.55	0.72	2.78	1.53	21	1.62	1.17	2.48
3	CB #2	DA-2	1.47	0.55	0.81	1.47	0.81	20	1.65	1.33	1.33
4	CB #3	DA-3	0.15	0.90	0.14	1.54	0.90	20	1.62	0.22	1.46
5	CB #4	DA-4	1.39	0.55	0.76	1.39	0.76	20	1.65	1.26	1.26
6	SDMH #2			0.55		4.32	2.38	32	1.12		2.66
7	CB #5	DA-5	1.42	0.55	0.78	2.82	1.55	21	1.62	1.27	2.51
8	CB #6	DA-6	1.40	0.55	0.77	1.40	0.77	20	1.65	1.27	1.27
9	SDMH #3			0.55		1.50	0.83				1.36
10	SDMH #4			0.55		1.50	0.83				1.36
11	CB #7	DA-7	1.50	0.55	0.83	1.50	0.83	20	1.65	1.36	1.36
(A) LINE No.	(B) UP STRM STRUCTURE	(C) DRAINAGE AREA I.D.	(D) Acres	(E) Runoff Coef	(F) CxA	(G) Sum Acres	(H) Sum CxA	(I) Tc (min)	(J) rainfall (in/hr)	(K) Q=cia (cfs)	(L) total Q (cfs)

	CAPACITY							LOSSES				HYDRAULIC GRADE LINE				
(A) LINE No.	(M) pipe dia. (inches)	(N) pipe area (sq ft)	(O) pipe slope (ft/ft)	(P) pipe cap. (cfs)	(Q) pipe velocity (fps)	(R) pipe length (feet)	(S) route time (min)	(T) friction slope	(U) friction loss (feet)	(V) "K"	(W) Minor Loss (ft)	(X) HGL elev DN	(Y) HGL elev UP	(Z) grnd / rim El. Dn.	(AA) grnd / rim El. Up	(BB) freeboard (upstrm) ft.
1	18	1.77	0.005	7.43	2.99	60	0.33	0.003	0.15	1.00	0.14	100.14	100.29	102.50	102.50	1.98
2	12	0.79	0.005	2.52	3.15	74	0.39	0.005	0.36	1.50	0.23	100.52	100.88	102.50	102.50	1.55
3	12	0.79	0.010	3.56	1.70	52	0.51	0.001	0.07	1.50	0.07	100.95	101.02	102.50	102.50	1.48
4	12	0.79	0.010	3.56	1.86	30	0.27	0.002	0.05	1.50	0.08	100.37	100.42	102.50	102.50	2.02
5	12	0.79	0.010	3.56	1.61	46	0.48	0.001	0.06	1.50	0.06	100.48	100.54	102.50	102.50	1.96
6	18	1.77	0.003	5.75	1.51	312	3.45	0.001	0.20	1.10	0.04	100.33	100.53	102.50	102.50	1.73
7	12	0.79	0.005	2.52	3.20	58	0.30	0.005	0.29	1.50	0.24	100.77	101.06	102.50	102.50	1.38
8	12	0.79	0.010	3.56	1.62	50	0.52	0.001	0.06	1.50	0.06	101.12	101.18	102.50	102.50	1.32
9	18	1.77	0.003	5.75	0.77	262	5.67	0.000	0.04	0.15	0.00	100.53	100.58	102.50	102.50	1.91
10	18	1.77	0.003	5.75	0.77	274	5.93	0.000	0.05	1.50	0.01	100.59	100.63	102.50	102.50	1.80
11	12	0.79	0.010	3.56	1.73	12	0.12	0.001	0.02	1.50	0.07	100.70	100.72	102.50	102.50	1.78
(A) LINE No.	(M) pipe dia. (inches)	(N) pipe area (sq ft)	(O) pipe slope (ft/ft)	(P) pipe cap. (cfs)	(Q) pipe velocity (fps)	(R) pipe length (feet)	(S) route time (min)	(T) friction slope	(U) friction loss (feet)	(V) "K"	(W) Minor Loss (ft)	(X) HGL elev DN	(Y) HGL elev UP	(Z) grnd / rim El. Dn.	(AA) grnd / rim El. Up	(BB) freeboard (upstrm) ft.

NOTES:

① INDICATE SOURCE OF STARTING H.G.L.

② SEE STD. DETAIL 713 FOR EXPLANATION OF COLUMN HEADINGS.

SAMPLE SHOWN IS INTENDED AS A GUIDELINE, ONLY, AND MAY NEED TO BE AMENDED TO MEET CERTAIN PROJECT CONDITIONS.

SAMPLE IS REDUCED TO 8.5"x11" SIZE FOR CONVENIENCE ONLY. ACTUAL CALCULATION SUBMITTALS SHOULD BE ON 11"x17" PAPER

CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

William F. Kull
CITY ENGINEER - WILLIAM F. KULL

SAMPLE DRAINAGE CALCULATION WORKSHEET

DRAWN BY:	DATE:	SCALE:	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
GK	1/05/16	NTS	1-26-16	712
REVISIONS: NONE	SECTION: STORM	DRAWING NAME: 712.DWG		

COLUMN HEADING	DESCRIPTION
A.	LINE # AS SHOWN ON DRAINAGE MAP. (DOES NOT NEED TO BE IN PLANS)
B.	UPSTREAM STRUCTURE OF LINE NUMBER
C.	DRAINAGE AREA NUMBER SHOWN ON DRAINAGE MAP
D.	ACREAGE OF INDIVIDUAL DRAINAGE AREA AT INLET
E.	RUNOFF COEFFICIENT PER CITY STDS. OF INDIVIDUAL DRAINAGE AREA
F.	E*D
G.	TOTAL UPSTREAM TRIBUTARY AREA
H.	G*E
I.	TIME OF CONCENTRATION: INCLUDES TRAVEL TIME FOR UPSTREAM PIPE RUNS, IF APPLICABLE
J.	BASED ON CITY STD. IDF CURVE FOR OBTAINED TC
K.	RUNOFF CALCULATION FOR INDIVIDUAL DRAINAGE AREAS, ONLY. (F * J)
L.	TOTAL PEAK FLOW AT NODE. (J * H)
M.	PIPE DIAMETER
N.	PIPE X-SECTIONAL AREA
O.	PIPE INVERT SLOPE PER PLAN
P.	MANNING'S CAPACITY BASED ON FULL FLOW AT GIVEN SLOPE, DIAMETER AND "N". Q = A*1.486*N*R^(2/3)*S^.5
Q.	SINCE THIS EXAMPLE SHOWS A SUBMERGED CONDITION, THE PIPE VELOCITY IS THE TOTAL FLOW DIVIDED BY THE AREA (L / N). IN AN UNSUBMERGED CONDITION, THE ACTUAL PIPE VELOCITY WILL NEED TO BE OBTAINED USING MANNING'S FORMULA.
R.	IPE LENGTH PER PLAN
S.	INDIVIDUAL PIPE TRAVEL TIME (Q / R)
T.	SLOPE OF THE HYDRAULIC GRADE LINE BASED ON TOTAL FLOW, PIPE DIA., AND MANNING'S N. ASSUMES SUBMERGED CONDITION FOR THIS EXAMPLE. S={Q*N /[A*1.486*R^(2/3)]}^2
U.	FRICTION SLOPE * PIPE LENGTH (T*R)
V.	MINOR LOSS COEFFICIENT OF DOWNSTREAM CONDITION (90DEG ANGLE, STRAIGHT RUN, ETC...)
W.	MINOR LOSS = K*(V2 / 2G) USE (=V * (Q^2 / 64.4)) NOTE THAT OTHER METHODS OF COMPUTING MINOR LOSSES, SUCH AS THOSE USED BY VARIOUS SOFTWARE PROGRAMS, WILL BE CONSIDERED FOR APPROVAL BY THE CITY ENGINEER.
X.	HYDRAULIC GRADE LINE ELEVATION OF DOWNSTREAM END. ADD MINOR LOSS (COL. W) TO UPSTREAM HGL OF THE NEXT DOWNSTREAM PIPE.
Y.	HGL OF UPSTREAM END OF PIPE –ADD FRICTION LOSS TO DOWNSTREAM HGL. (Y + X)
Z. AND AA.	(DOWNSTREAM AND UPSTREAM RIM ELEVATIONS OF STRUCTURES, PER PLAN)
BB.	FREEBOARD AT UPSTREAM END OF PIPE. USE HIGHEST HGL AT STRUCTURE –WILL NEED TO HGL ANALYZE DOWNSTREAM END OF NEXT UPSTREAM PIPE, AS APPLICABLE.

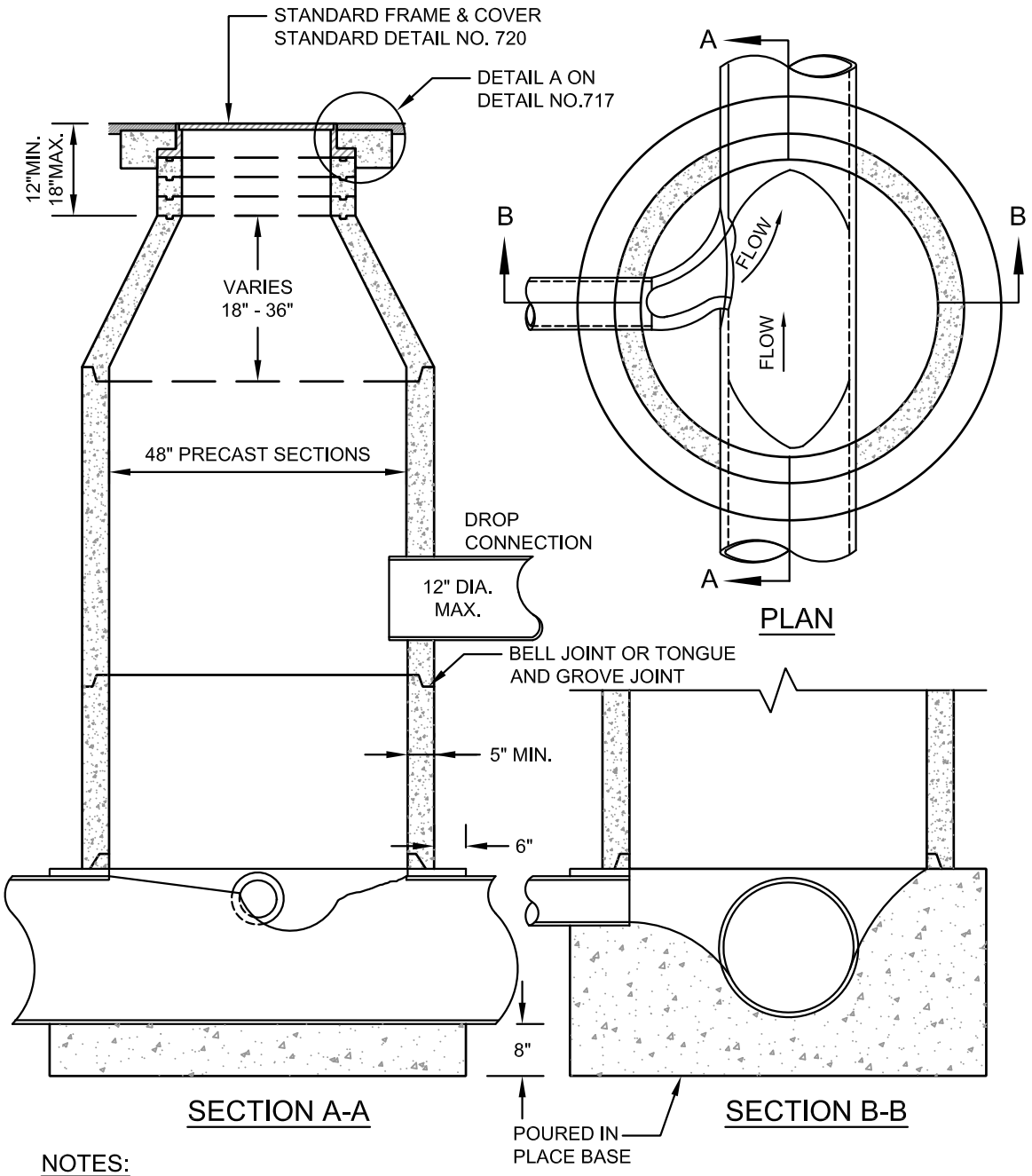
CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

William F. Kull

CITY ENGINEER - WILLIAM F. KULL

SAMPLE DRAINAGE CALCULATION WORKSHEET COLUMN DESCRIPTIONS

DRAWN BY:	DATE:	SCALE:	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
GK	1/05/16	NTS	1-26-16	713
REVISIONS: NONE	SECTION: STORM	DRAWING NAME: 713.DWG		



NOTES:

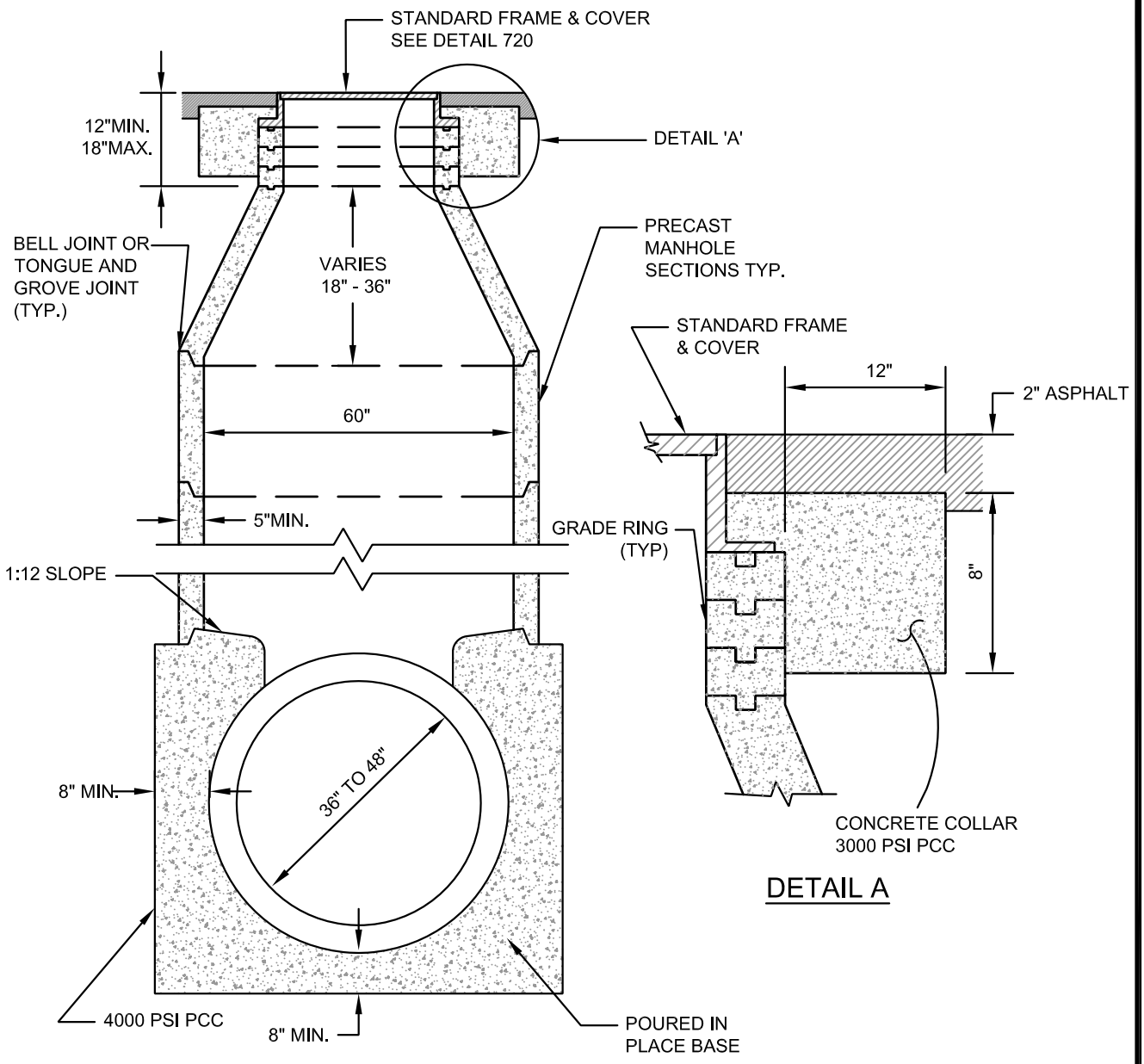
1. PIPE TO BE LAID THROUGH MANHOLE AND TOP PORTION REMOVED AFTER CONCRETE HAS SET.
2. MORTAR ALL JOINTS INSIDE AND OUT.
3. INCOMING SMALLER PIPES SHALL MATCH CROWNS OF THE LARGER PIPE.
4. ADJUST FRAME TO GRADE AFTER PAVING.
5. ALL PRECAST CONCRETE SHALL BE DESIGNED TO WITHSTAND H2O LOADING.
6. IN TRAFFIC AREAS CONCRETE COLLAR SHALL BE MADE WITH 3000 PSI PCC, HIGH-EARLY STRENGTH BARRICADES TO BE REMOVED IN 24 HOURS.
7. PRECAST BASES ARE NOT PERMITTED.

CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

William F. Kull
CITY ENGINEER - WILLIAM F. KULL

LATERAL MANHOLE

DRAWN BY:	DATE:	SCALE:	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
GK	1/05/16	NTS	1-26-16	716
REVISIONS: NONE	SECTION: STORM	DRAWING NAME: 716.DWG		



NOTES:

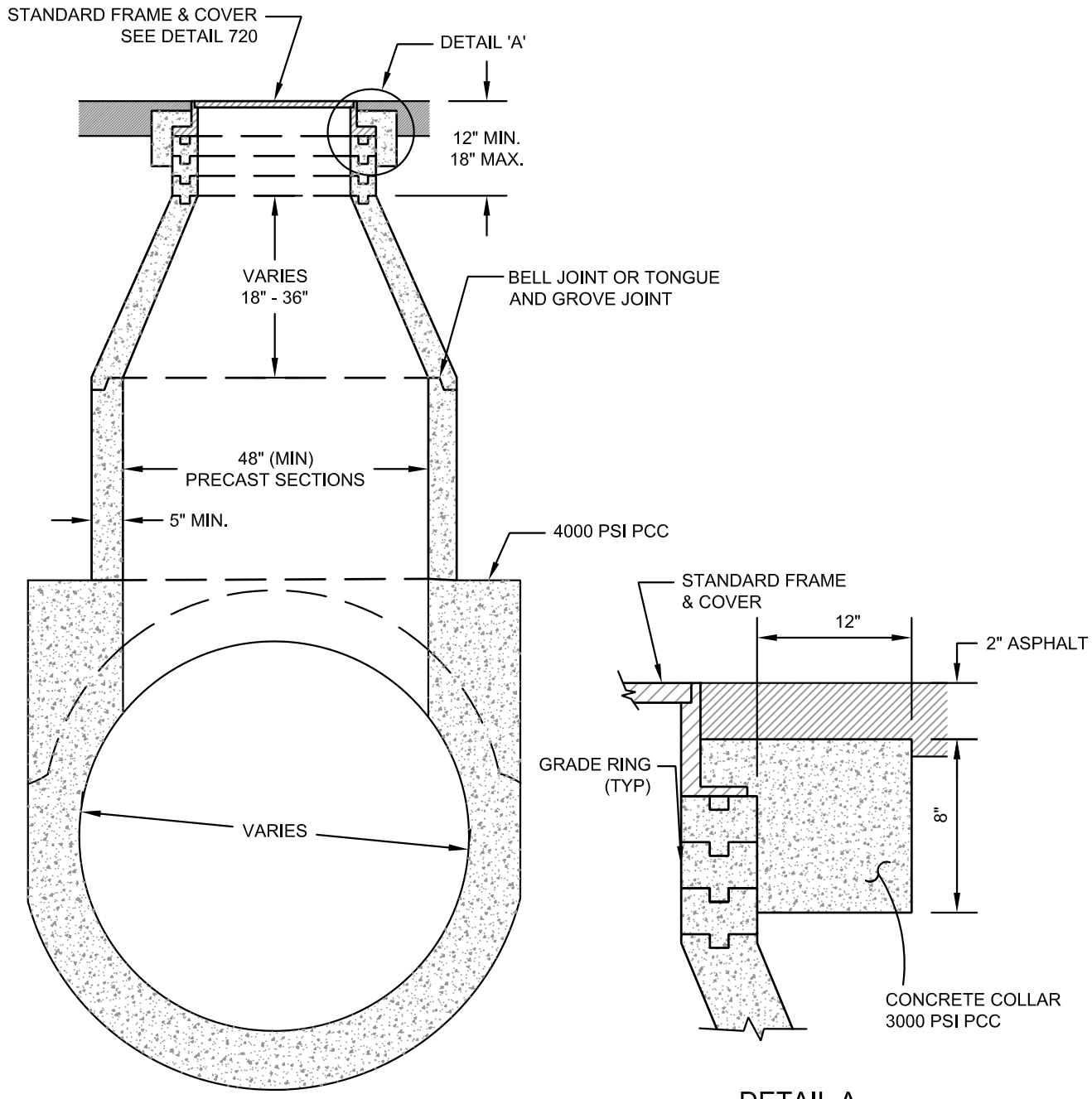
1. PIPE TO BE LAID THROUGH MANHOLE AND TOP PORTION REMOVED AFTER CONCRETE HAS SET.
2. MORTAR ALL JOINTS.
3. INCOMING SMALLER PIPES SHALL MATCH CROWNS OF THE LARGER PIPE.
4. ADJUST FRAME TO GRADE AFTER PAVING.
5. ALL PRECAST CONCRETE SHALL BE DESIGNED TO WITHSTAND H2O LOADING.
6. IN TRAFFIC AREAS, CONCRETE COLLAR SHALL BE MADE WITH 3000 P.S.I. PCC, HIGH-EARLY STRENGTH. BARRICADES SHALL BE REMOVED IN 24 HOURS.
7. PRECAST BASES ARE NOT PERMITTED.

CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

William F. Kull
CITY ENGINEER - WILLIAM F. KULL

POURED-IN PLACE TRUNK MANHOLE

DRAWN BY:	DATE:	SCALE:	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
GK	1/05/16	NTS	1-26-16	717
REVISIONS: NONE	SECTION: STORM	DRAWING NAME: 717.DWG		

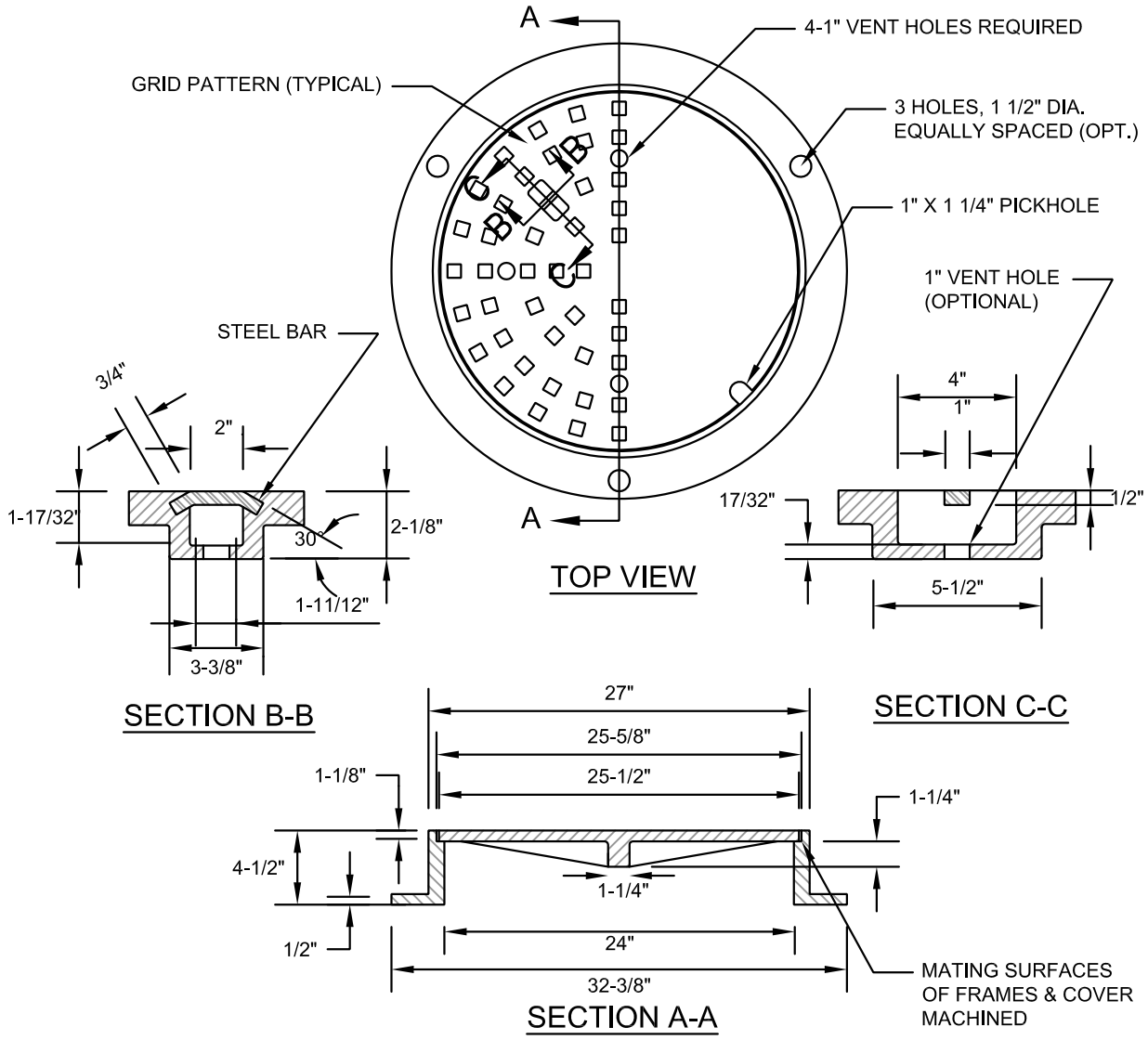


DETAIL A

NOTES:

1. MAKE MANHOLE OPENING IN TOP OF PIPE BEFORE CONCRETE SETS AND PLACE BARREL WITHIN 7 DAYS.
2. MORTAR ALL JOINTS.
3. ADJUST FRAME TO GRADE AFTER PAVING.
4. ALL PRECAST CONCRETE SHALL BE DESIGNED TO WITHSTAND H2O LOADING.
5. IN TRAFFIC AREAS, CONCRETE COLLAR SHALL BE MADE WITH 3000 P.S.I. PCC, WITH HIGH-EARLY STRENGTH CEMENT. BARRICADES TO BE REMOVED IN 24 HOURS.
6. PRECAST BASES ARE NOT PERMITTED.

CITY OF RIVERBANK DEPARTMENT OF PUBLIC WORKS			CAST-IN-PLACE TRUNK MANHOLE	
William F. Kull CITY ENGINEER - WILLIAM F. KULL				
DRAWN BY: GK	DATE: 1/05/16	SCALE: NTS	ADOPTED BY THE CITY COUNCIL: 1-26-16	DRAWING NO. 718
REVISIONS: NONE	SECTION: STORM	DRAWING NAME: 718.DWG		



NOTES:

1. DIMENSIONS FOR FRAME AND COVER SHALL MATCH. MATING SURFACES OF FRAME AND COVER SHALL BE MACHINED TO INSURE NO-ROCK FIT.

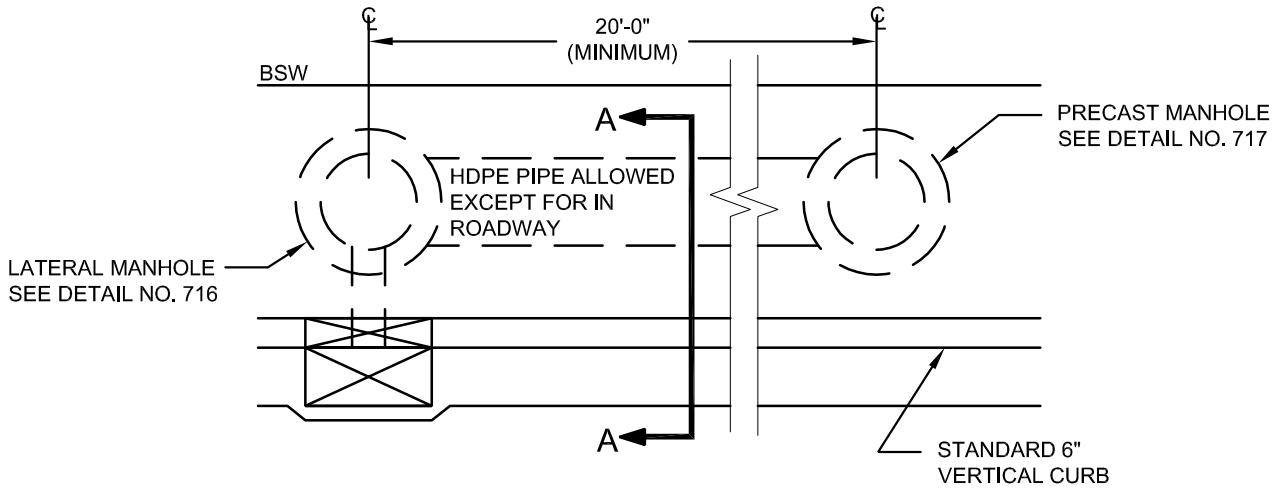
2. COVER SHALL HAVE VERTICAL SIDES. NO TAPERED COVERS SHALL BE INSTALLED.

3. WEIGHT OF COVER SHALL BE NO LESS THAN 130 POUNDS. WEIGHT OF FRAME SHALL BE NO LESS THAN 140 POUNDS.

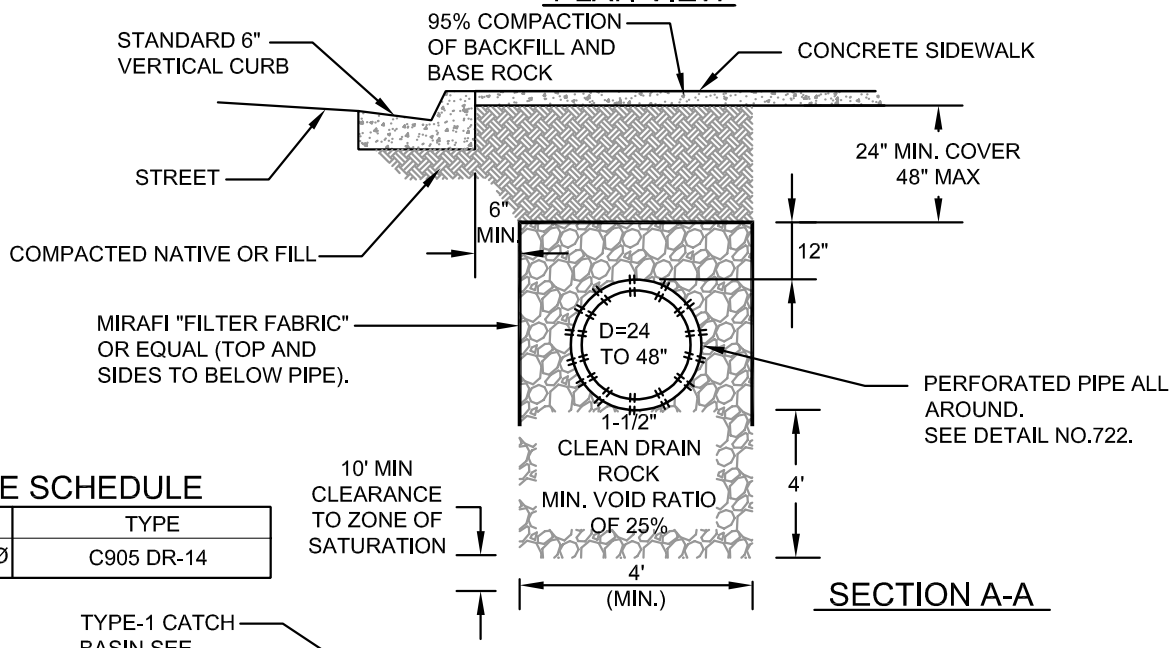
4. SOUTH BAY FOUNDRY SBF 624 FRAME AND COVER OR APPROVED EQUAL.

5. EACH MANHOLE COVER SHALL BE STAMPED "STORM DRAIN" WITH 1" TO 2" LETTERING.

CITY OF RIVERBANK DEPARTMENT OF PUBLIC WORKS			MANHOLE FRAME AND COVER FOR FEDERAL PROJECTS	
William F. Kull CITY ENGINEER - WILLIAM F. KULL				
DRAWN BY: GK	DATE: 1/05/16	SCALE: NTS	ADOPTED BY THE CITY COUNCIL: 1-26-16	DRAWING NO. 720
REVISIONS: NONE	SECTION: STORM	DRAWING NAME: 720.DWG		



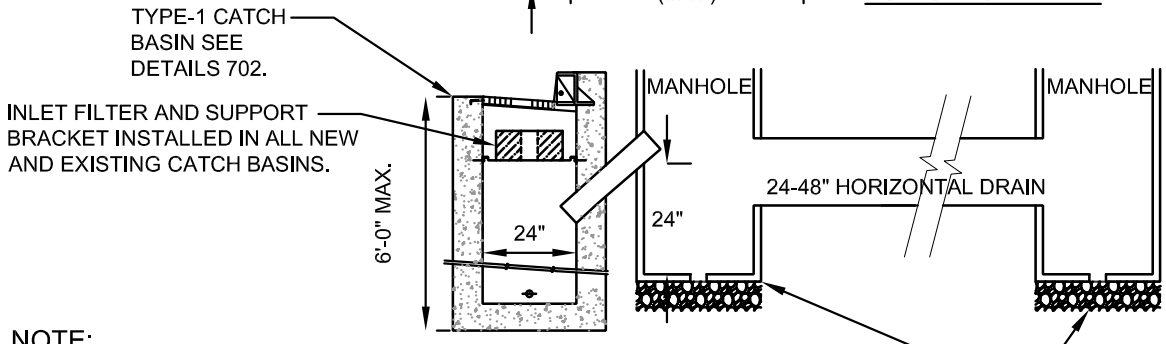
PLAN VIEW



PIPE SCHEDULE

SIZE	TYPE
24"-48"Ø	C905 DR-14

SECTION A-A



NOTE:

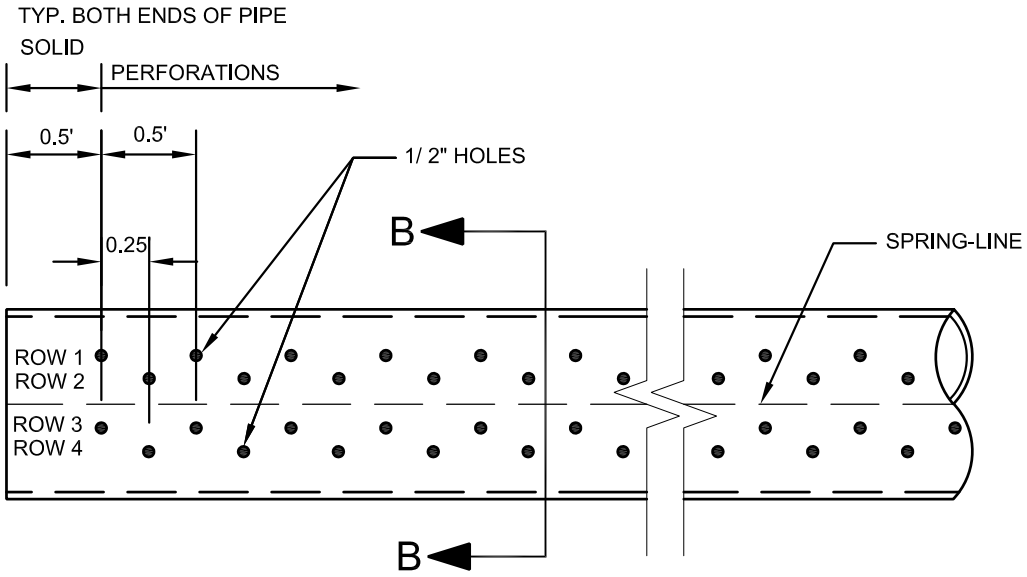
THIS HORIZONTAL DRAIN SYSTEM HAS BEEN DESIGNED FOR DEVELOPMENT AND INFILL AREAS WHICH HAVE NO ROOM FOR ON-SITE BASINS. ENGINEERING AND CALCULATIONS ARE REQUIRED AND SHALL MEET THE DESIGN STANDARD VOLUME REQUIREMENTS. CITY SHALL APPROVE ALL SUBMITTALS PRIOR TO CONSTRUCTION.

CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

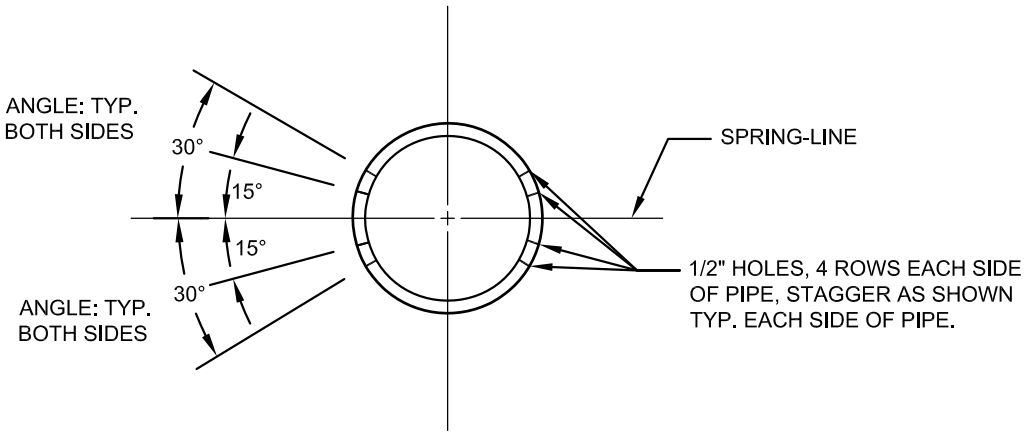
HORIZONTAL DRAIN

William F. Kull
CITY ENGINEER - WILLIAM F. KULL

DRAWN BY:	DATE:	SCALE:	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
GK	2/11/2025	NTS	3-11-25	721
REVISIONS: NONE	SECTION: STORM	DRAWING NAME: 721.DWG		



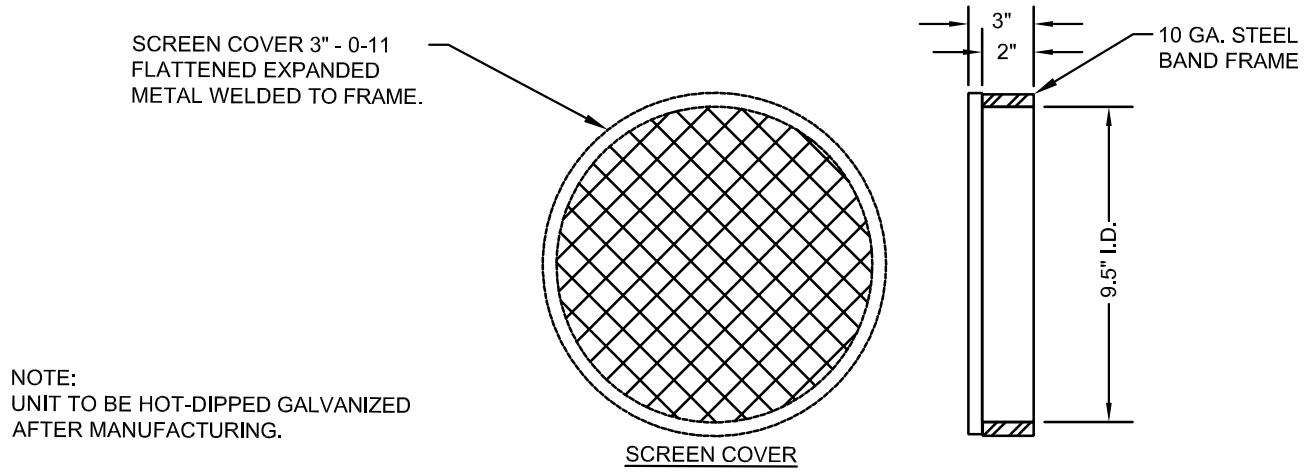
PERFORATED HORIZONTAL PIPE

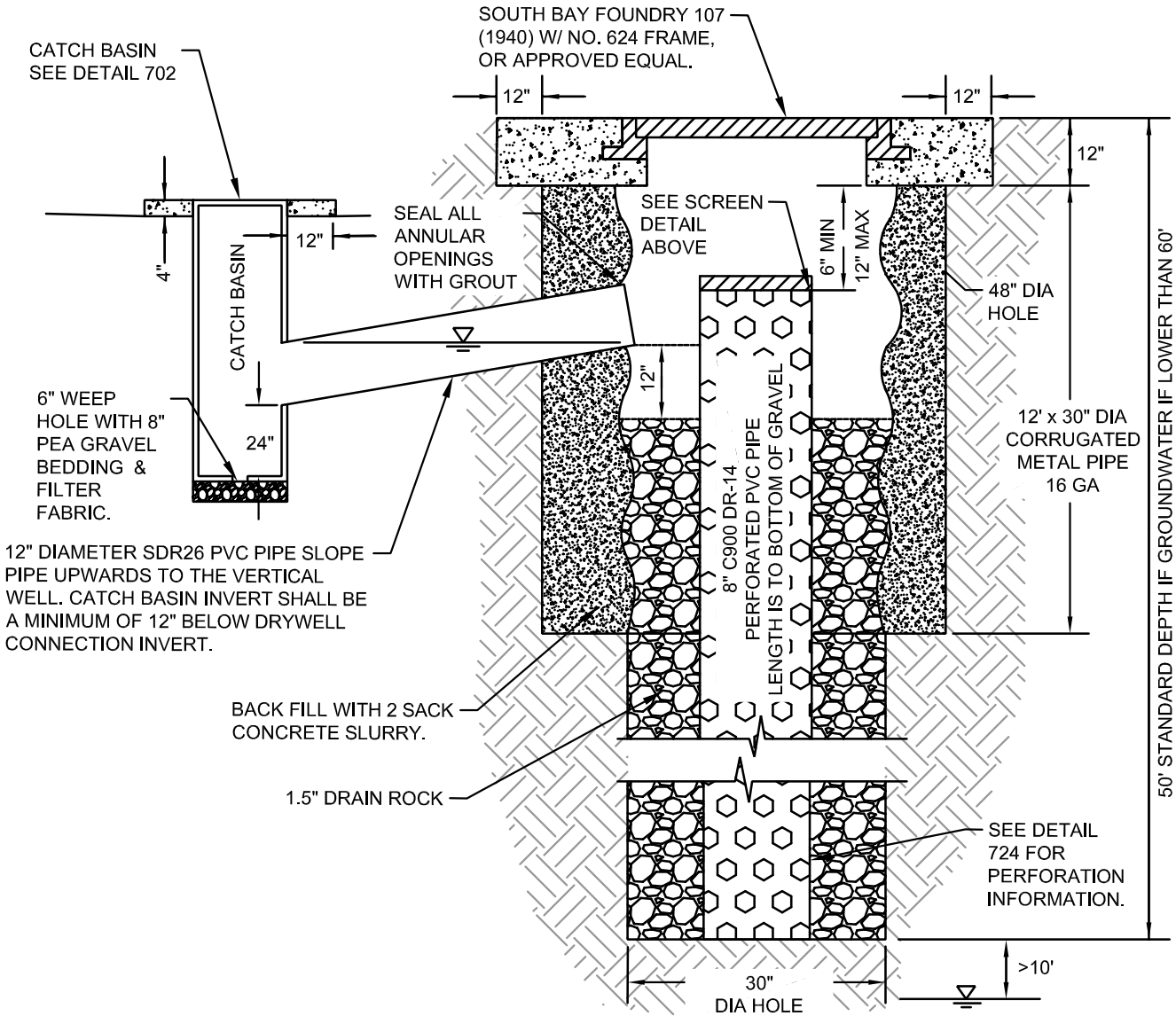


NOTES:
PRE-FABRICATED PERFORATED PIPE WILL BE ALLOWED WITH CITY ENGINEER APPROVAL.

PIPE SECTION B-B

CITY OF RIVERBANK DEPARTMENT OF PUBLIC WORKS			HORIZONTAL DRAIN PIPE	
William F. Kull CITY ENGINEER - WILLIAM F. KULL				
DRAWN BY: GK	DATE: 1/05/16	SCALE: NTS	ADOPTED BY THE CITY COUNCIL: 1-26-16	DRAWING NO. 722
REVISIONS: NONE	SECTION: STORM	DRAWING NAME: 722.DWG		



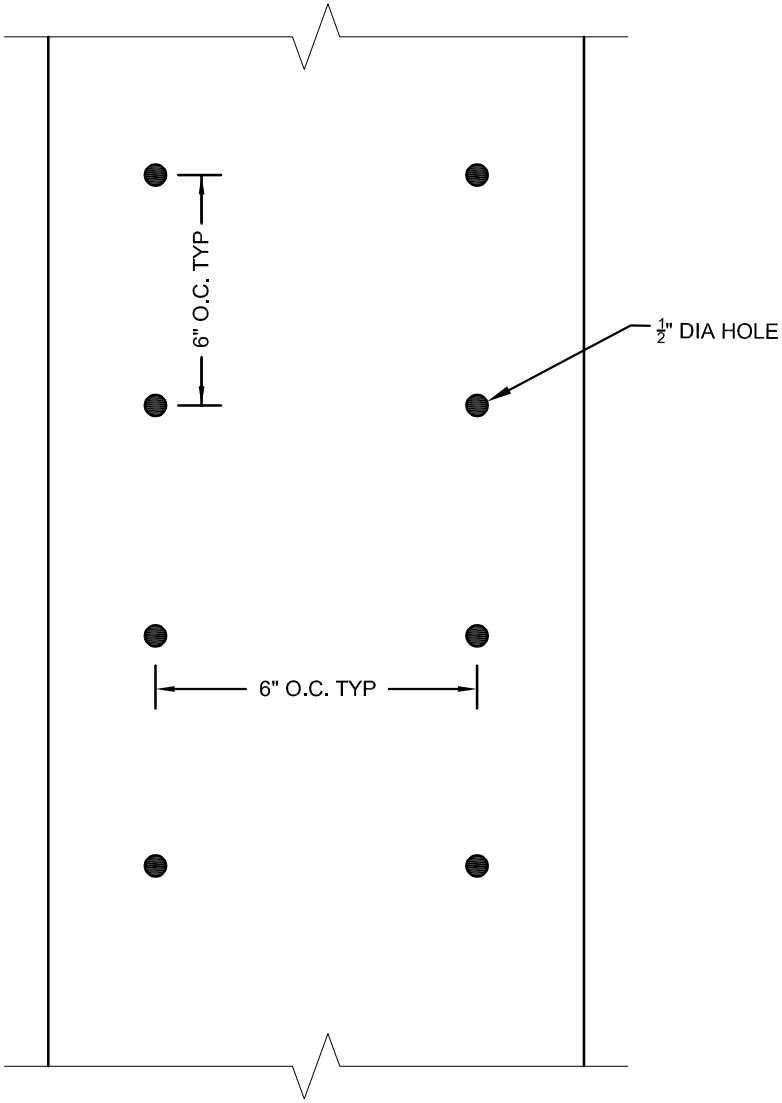


CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

ROCK WELL/VERTICAL DRAIN

William F. Kull
CITY ENGINEER - WILLIAM F. KULL

DRAWN BY:	DATE:	SCALE:	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
GK	2/11/2025	NTS	3-11-25	723
REVISIONS:	SECTION:	DRAWING NAME:		
NONE	STORM	723.DWG		



CITY OF RIVERBANK ROCK WELL/VERTICAL DRAIN SHALL HAVE A ±50', 8" C900 DR-14 PVC PERFORATED CORE PIPE. THE PERFORATIONS SHALL BE ½" DIAMETER HOLES, AT 90°. THERE SHALL BE 4 ROWS OF PERFORATIONS VERTICALLY AT 6" O.C. AND 6" FROM EITHER END. CORE PIPES SHALL BE INSTALLED BELL END UP.

CITY OF RIVERBANK DEPARTMENT OF PUBLIC WORKS			ROCK WELL/VERTICAL DRAIN CORE PIPE	
William F. Kull CITY ENGINEER - WILLIAM F. KULL				
DRAWN BY: GK	DATE: 2/11/2025	SCALE: NTS	ADOPTED BY THE CITY COUNCIL: 3-11-25	DRAWING NO. 724
REVISIONS: NONE	SECTION: STORM	DRAWING NAME: 723.DWG		

City of Riverbank
DESIGN SPECIFICATIONS

PARKING
OFF-STREET

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SECTION 6: PARKING, OFF-STREET

8.100 Parking Design Guide

To aid in the design of parking layouts, the following information is offered as a guide to meet the minimum requirements for off-street parking in the layout design of driver- parking lots under normal use conditions.

The following factors should be considered:

1. Sizes and Access: Each standard size off-street parking space shall have dimensions of not less than nine feet (9') width and nineteen feet (19') depth exclusive of access drives or aisles, and shall be of usable shape, location, and condition. Compact spaces having dimensions not less than seven and one-half feet (7-1/2') width and fifteen feet (15') depth, exclusive of access drives and aisles, shall be permitted, not to exceed thirty percent (30%) of the total required parking stalls. Small car spaces shall have "compact" or "small car" painted on the pavement at the entrance of each stall.

2. Entrances and exits - also location of nearest intersection, in each direction.

3. The width of the parking area normally determines the parking angle to be used.

4. Right angle (90 degree) parking is usually more efficient and provides for two-way movement in the aisles and shorter cruise distance. However, it generally requires more effort in such spaces.

5. Angle parking (other than 90 degrees) affords greater ease in parking and allows for narrower aisles but it requires one-way circulation.

6. Parking Space: An accessible and usable space on a building site of at least nine feet by nineteen feet (9' x 19') with access for the parking of automobiles. The length of the space may be reduced by two feet (2') if landscaped planters of sufficient width are used as curb stops.

7. With these factors in mind, an accurate drawing of the proposed parking area should be prepared showing such details as sidewalks, curb cuts for driveways, use of abutting properties, immovable obstacles, flow of on-street traffic in the area, and other pertinent information. This drawing can then be used to aid in the determination of a layout pattern based on selection of the best of all possible parking arrangements. The best arrangement should provide the maximum number of parking spaces with aisles and stalls designed for one-turn driver-parking.

8.200 Disabled Parking Requirements

1. Each parking area associated with any type of land use listed in the Riverbank Zoning Code, except for single-family and two-family residential dwellings, shall include a number of parking spaces specifically reserved for vehicles licensed or authorized by the State of California for use by physically challenged/disabled drivers in accordance with the following:

Total Spaces in Parking Area		Minimum Number of Spaces Required for Physically Challenged/Disabled Drivers
1	40	1
41	80	2
81	120	3
121	160	4
161	300	5
301	450	6
451	600	7

One (1) space for each 200 spaces thereafter.

2. Such parking spaces shall be located within a reasonable proximity of any conveniently accessible entrance to the building served by the parking area.

3. Where single spaces are provided, they shall be fourteen feet (14') wide and outlined to provide a nine foot (9') parking area and a five foot (5') loading/ unloading area. When more than one (1) space is provided, in lieu of providing a fourteen foot (14') wide space for each parking space, two (2) spaces can be provided within a twenty-three foot (23') wide area lined to provide a nine foot (9') wide parking area on each side of a five foot (5') wide loading I unloading area in the center. The minimum length of each parking space shall be nineteen feet (19'). Parking spaces required by this section shall be identified per State Law requirements.

City of Riverbank
STANDARD PLANS

PARKING

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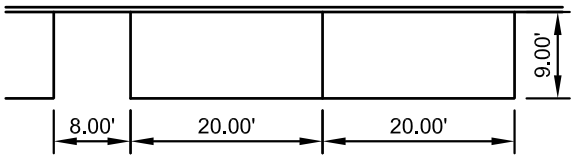
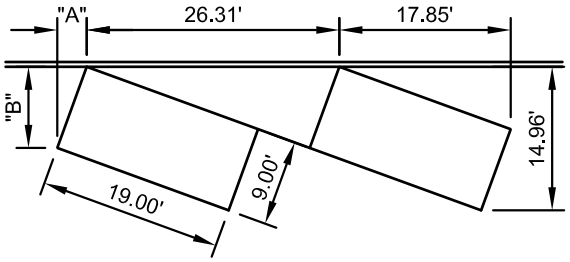
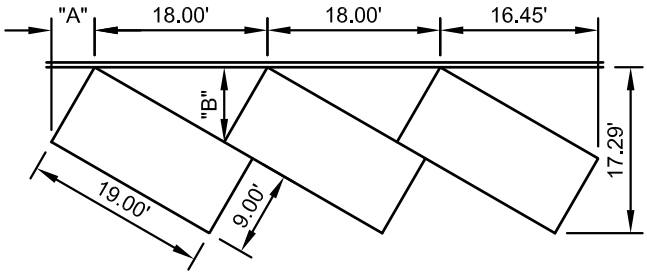


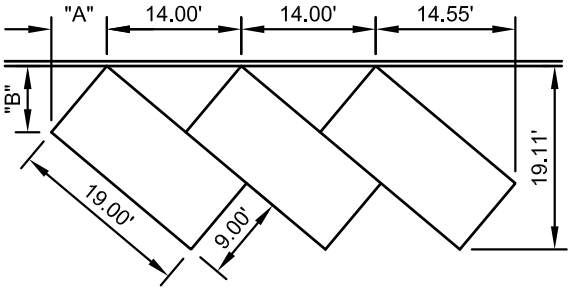
PARK ANGLE	STALL WIDTH	CURB LENGTH PER CAR	STALL DEPTH	MIN AISLE WIDTH
0°	7.5'	20.00'	7.5'	12.0'
	8.0'	20.00'	8.0'	12.0'
	9.0'	20.00'	9.0'	12.0'



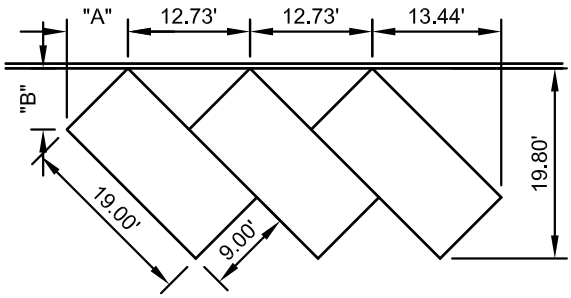
PARK ANGLE	STALL WIDTH	CURB LENGTH PER CAR	STALL DEPTH	MIN AISLE WIDTH	"A"	"B"
20°	7.5'	21.93'	13.55'	11.0'	2.57'	7.05'
	8.0'	23.39'	14.02'	11.0'	2.74'	7.52'
	9.0'	26.31'	14.96'	11.0'	3.08'	8.46'



PARK ANGLE	STALL WIDTH	CURB LENGTH PER CAR	STALL DEPTH	MIN AISLE WIDTH	"A"	"B"
30°	7.5'	15.00'	16.00'	11.0'	3.75'	6.50'
	8.0'	16.00'	16.43'	11.0'	4.00'	6.93'
	9.0'	18.00'	17.29'	11.0'	4.50'	7.79'



PARK ANGLE	STALL WIDTH	CURB LENGTH PER CAR	STALL DEPTH	MIN AISLE WIDTH	"A"	"B"
40°	7.5'	11.67'	17.96'	12.0'	4.82'	5.75'
	8.0'	12.45'	18.34'	12.0'	5.14'	6.13'
	9.0'	14.00'	19.11'	12.0'	5.79'	6.89'



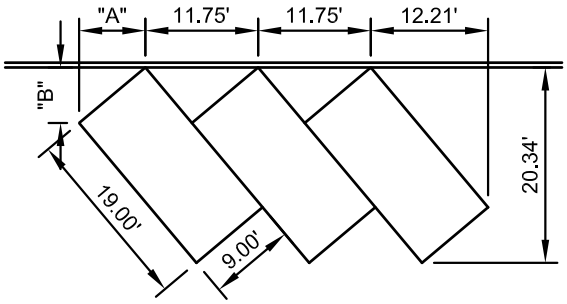
PARK ANGLE	STALL WIDTH	CURB LENGTH PER CAR	STALL DEPTH	MIN AISLE WIDTH	"A"	"B"
45°	7.5'	10.61'	18.74'	13.5'	5.30'	5.30'
	8.0'	11.31'	19.09'	13.5'	5.66'	5.66'
	9.0'	12.73'	19.80'	13.5'	6.36'	6.36'

CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

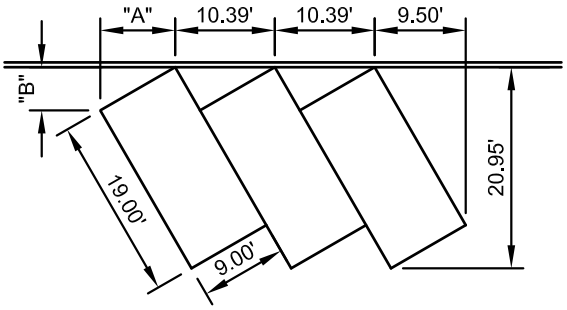
William F. Kull
CITY ENGINEER - WILLIAM F. KULL

PARKING DESIGN

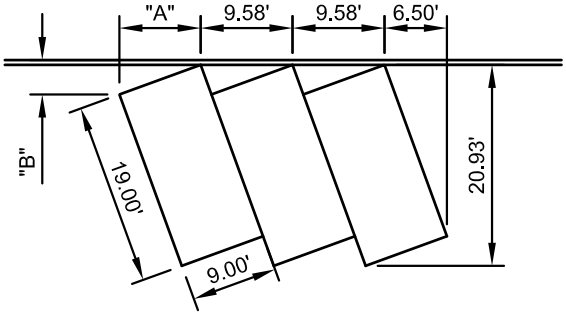
DRAWN BY:	DATE:	SCALE:	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
GK	6/09/15	NTS	1-26-16	801
REVISIONS: NONE	SECTION: PARKING	DRAWING NAME: 801.DWG		



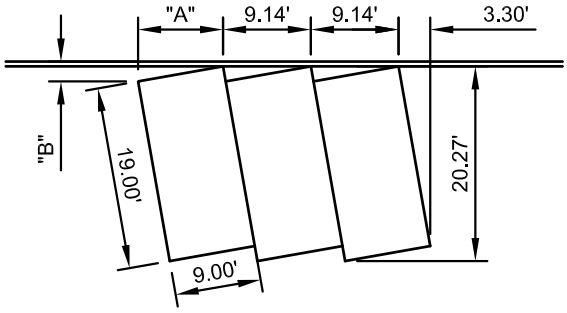
PARK ANGLE	STALL WIDTH	CURB LENGTH PER CAR	STALL DEPTH	MIN AISLE WIDTH	"A"	"B"
50°	7.5'	9.79'	19.38'	12.5'	5.75'	4.82'
	8.0'	10.44'	19.70'	12.5'	6.13'	5.14'
	9.0'	11.75'	20.34'	12.5'	6.89'	5.79'



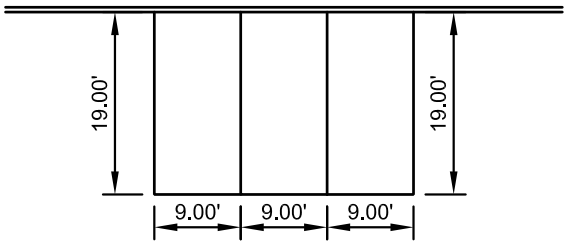
PARK ANGLE	STALL WIDTH	CURB LENGTH PER CAR	STALL DEPTH	MIN AISLE WIDTH	"A"	"B"
60°	7.5'	8.66'	20.20'	18.5'	6.50'	3.75'
	8.0'	9.24'	20.45'	18.5'	6.93'	4.00'
	9.0'	10.39'	20.95'	18.5'	7.79'	4.50'



PARK ANGLE	STALL WIDTH	CURB LENGTH PER CAR	STALL DEPTH	MIN AISLE WIDTH	"A"	"B"
70°	7.5'	7.98'	20.42'	19.5'	7.05'	2.57'
	8.0'	8.51'	20.59'	19.5'	7.52'	2.74'
	9.0'	9.58'	20.93'	19.5'	8.46'	3.08'



PARK ANGLE	STALL WIDTH	CURB LENGTH PER CAR	STALL DEPTH	MIN AISLE WIDTH	"A"	"B"
80°	7.5'	7.62'	20.01'	24.0'	7.39'	1.30'
	8.0'	8.12'	20.10'	24.0'	7.88'	1.39'
	9.0'	9.14'	20.27'	24.0'	8.86'	1.56'



PARK ANGLE	STALL WIDTH	CURB LENGTH PER CAR	STALL DEPTH	MIN AISLE WIDTH
90°	7.5'	7.5'	19.0'	25.0'
	8.0'	8.0'	19.0'	25.0'
	9.0'	9.0'	19.0'	25.0'

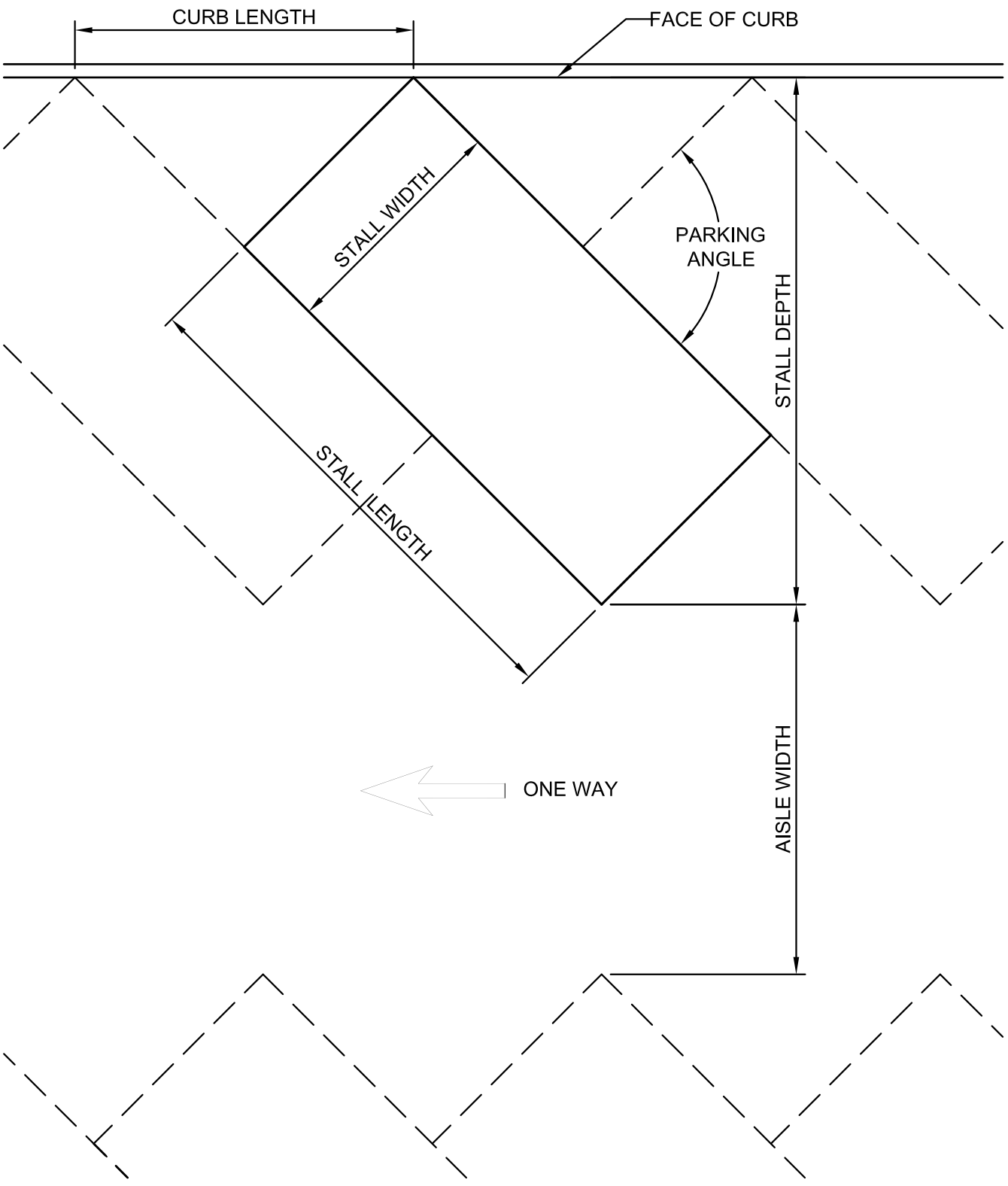
CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

William F. Kull

CITY ENGINEER - WILLIAM F. KULL

PARKING DESIGN

DRAWN BY:	DATE:	SCALE:	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
GK	6/09/15	NTS	1-26-16	802
REVISIONS: NONE	SECTION: PARKING	DRAWING NAME: 802.DWG		

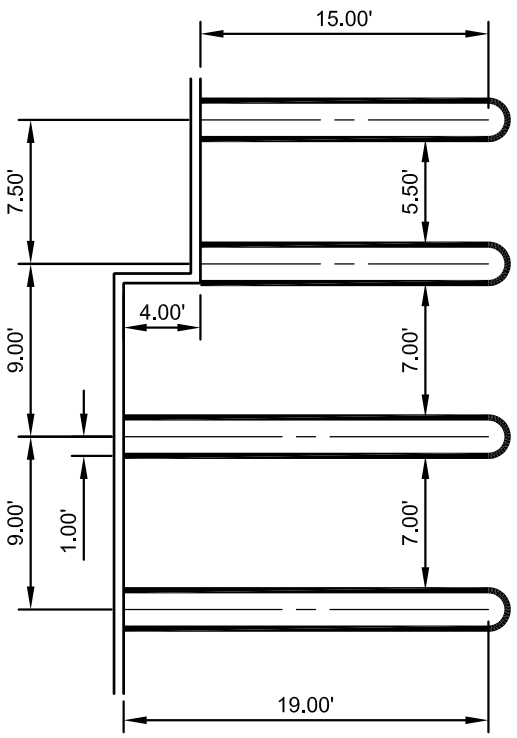


CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

William F. Kull
CITY ENGINEER - WILLIAM F. KULL

PARKING DESIGN

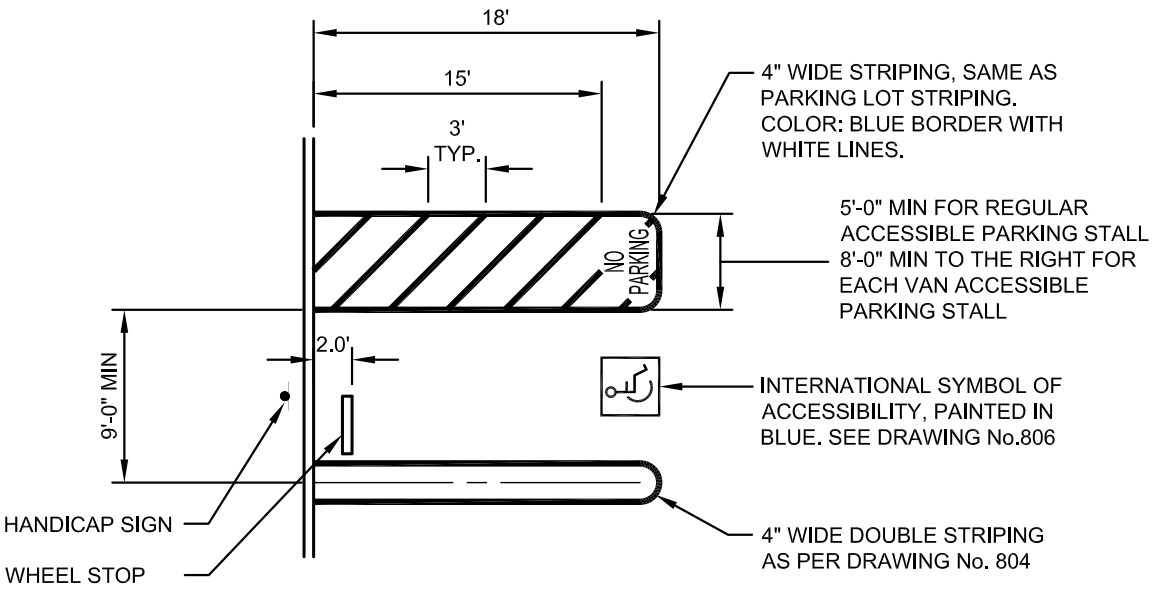
DRAWN BY:	DATE:	SCALE:	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
GK	6/09/15	NTS	1-26-16	803
REVISIONS: NONE	SECTION: PARKING	DRAWING NAME: 803.DWG		



STRIPING: ALL PARKING SPACES SHALL BE MARKED BY EITHER STRIPING BUTTONS OR SIMILAR DEVICE TO DELINEATE SPACES. SPACES SHALL BE PAINTED WITH A LINE WIDTH OF FOUR INCHES (4"). BUTTONS SHALL BE A MINIMUM OF THREE AND ONE-HALF INCHED (3 1/2") IN DIAMETER, SPACED NO MORE THAN THREE FEET (3') ON CENTER. SPACES SHALL BE DOUBLE STRIPED WITH ONE FOOT (1') OF STRIPING LINE WITHIN EACH STALL, NINETEEN FEET (19') FOR EACH FULL SIZED SPACE AND FIFTEEN FEET (15') FOR SMALL CAR SPACE, NOT EXCLUDING THE SEMI-CIRCLE CAP.

PAINT: ALL PAINT SHALL BE WHITE LATEX BASE CONFORMING TO FEDERAL SPECIFICATION TT-P-1952.

CITY OF RIVERBANK DEPARTMENT OF PUBLIC WORKS			TYPICAL STRIPING	
William F. Kull CITY ENGINEER - WILLIAM F. KULL				
DRAWN BY: GK	DATE: 6/09/15	SCALE: NTS	ADOPTED BY THE CITY COUNCIL: 1-26-16	DRAWING NO. 804
REVISIONS: NONE	SECTION: PARKING	DRAWING NAME: 804.DWG		



OFF -STREET PARKING

TOTAL NUMBER OF PARKING SPACES PROVIDED IN PARKING FACILITY	MINIMUM NUMBER OF REQUIRED ACCESSIBLE PARKING SPACES
1 - 25	1
26 - 50	2
51 - 75	3
76 - 100	4
101 - 150	5
151 - 200	6
201 - 300	7
301 - 400	8
401 - 500	9
501 - 1000	2 PERCENT OF TOTAL
1001 AND OVER	20 PLUS 1 FOR EACH 100 OR FRACTION THEREOF OVER 1000

1 IN EVERY 6 ACCESSIBLE SPACES SHALL BE VAN ACCESSIBLE.

NOTE:
EACH PARKING AREA ASSOCIATED WITH ANY TYPE OF LAND USE LISTED IN THE RIVERBANK ZONING CODE SHALL INCLUDE A NUMBER OF PARKING SPACES SPECIFICALLY RESERVED FOR VEHICLES LICENSED OR ATHORIZED BY THE STATE OF CALIFORNIA FOR USE BY PHYSICALLY CHALLENGED/DISABLED DRIVERS. SEE SECTION 8.200 FOR DISABLED PARKING REQUIREMENTS.

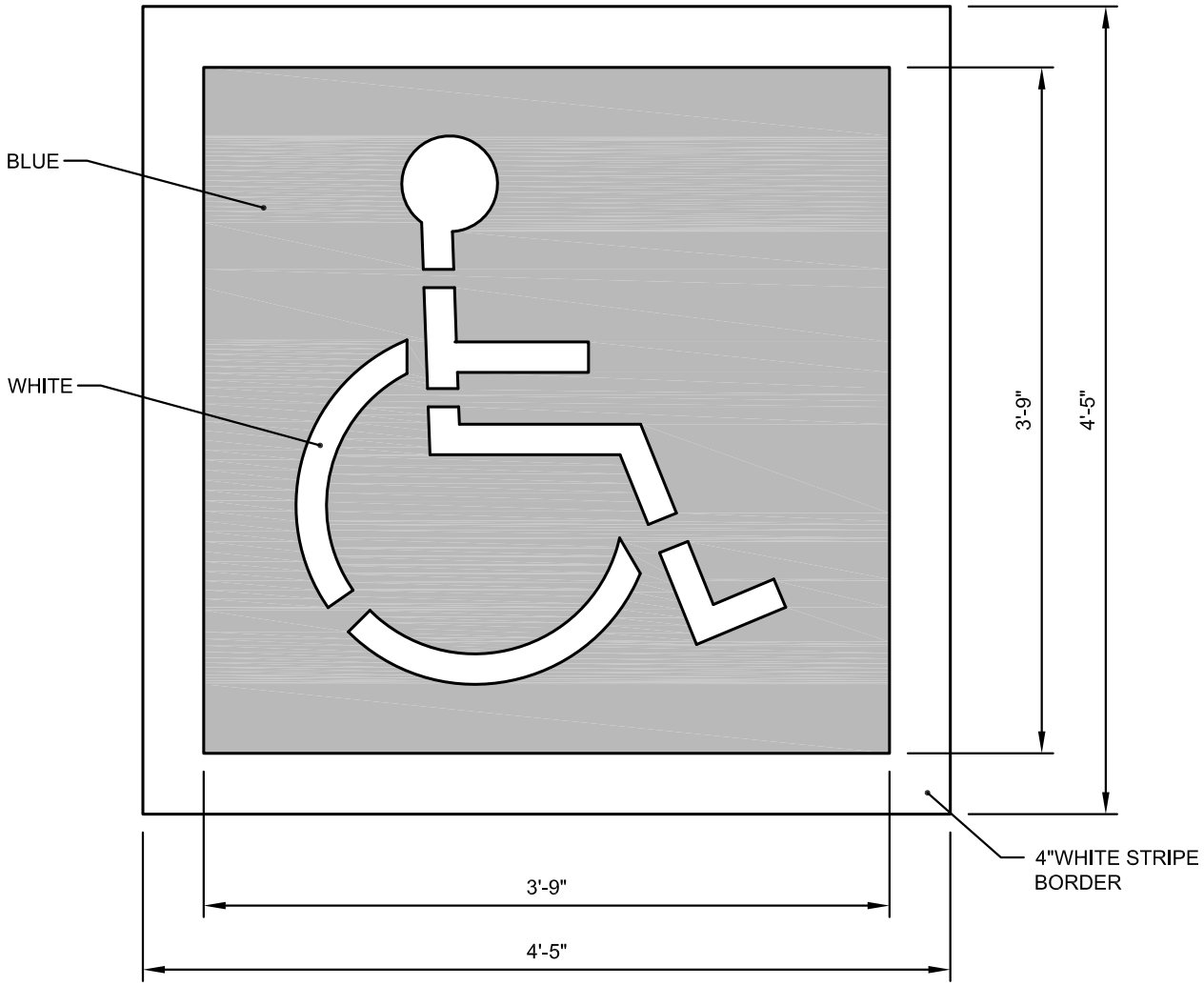
CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

William F. Kull
CITY ENGINEER - WILLIAM F. KULL

DISABLED STRIPING

DRAWN BY:	DATE:	SCALE:	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
GK	9/25/15	NTS	1-26-16	805
REVISIONS: NONE	SECTION: PARKING	DRAWING NAME: 805.DWG		

TYPICAL DISABLED STALL



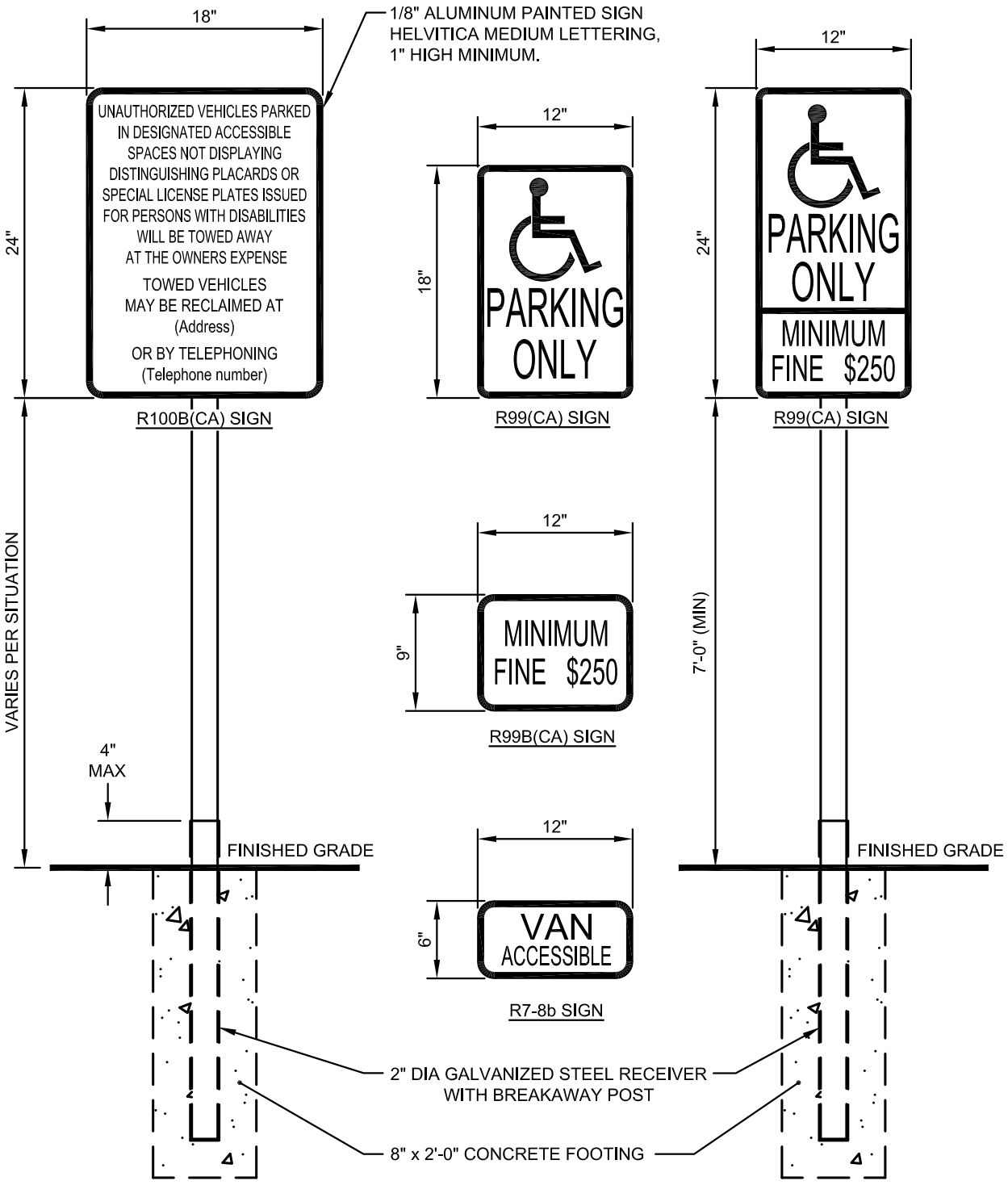
DISABLED PARKING STALL SYMBOL:

SYMBOL PAINTED HIGHWAY WHITE WITH 2" STRIPES.

BACKGROUND PAINTED BLUE, EQUAL TO COLOR No. 15090 IN FEDERAL STANDARDS 595A.

BACKGROUND MEASURES 3'-9" SQUARE.

CITY OF RIVERBANK DEPARTMENT OF PUBLIC WORKS			INTERNATIONAL SYMBOL	
William F. Kull CITY ENGINEER - WILLIAM F. KULL				
DRAWN BY: GK	DATE: 9/25/15	SCALE: NTS	ADOPTED BY THE CITY COUNCIL: 1-26-16	DRAWING NO. 806
REVISIONS: NONE	SECTION: PARKING	DRAWING NAME: 806.DWG		



CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

William F. Kull
CITY ENGINEER - WILLIAM F. KULL

TYPICAL DISABLED PARKING LOT & STALL SIGNAGE

DRAWN BY:	DATE:	SCALE:	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
GK	9/25/15	NTS	1-26-16	807
REVISIONS: NONE	SECTION: PARKING	DRAWING NAME: 807.DWG		

City of Riverbank
STANDARD PLANS

GRADING

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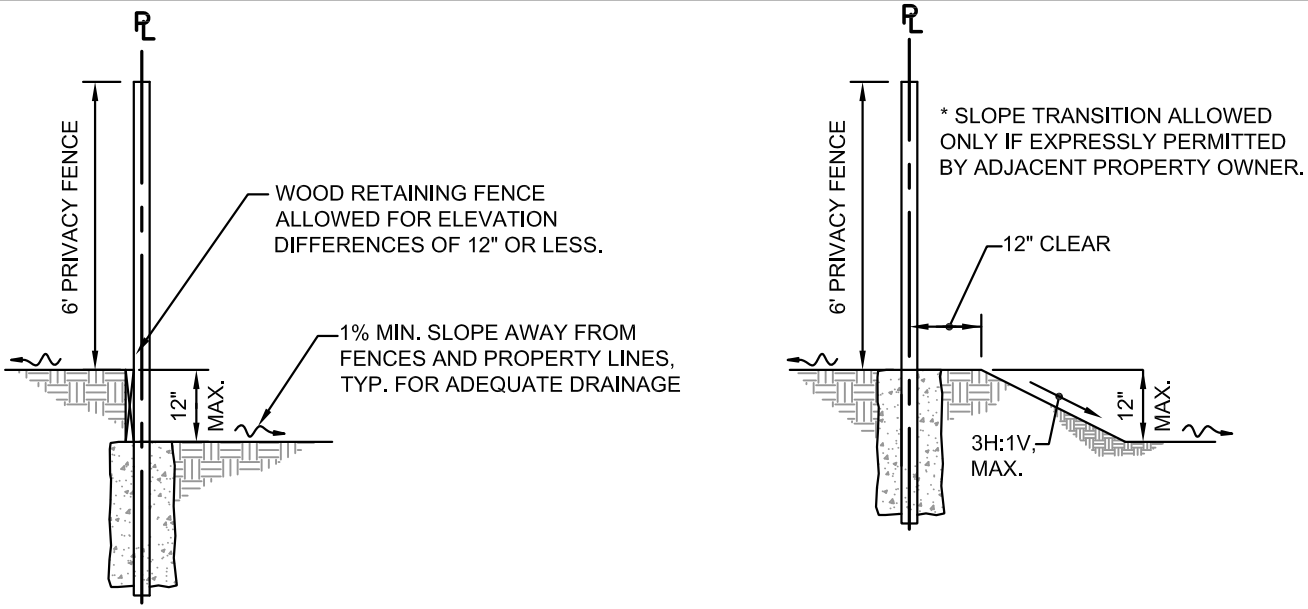
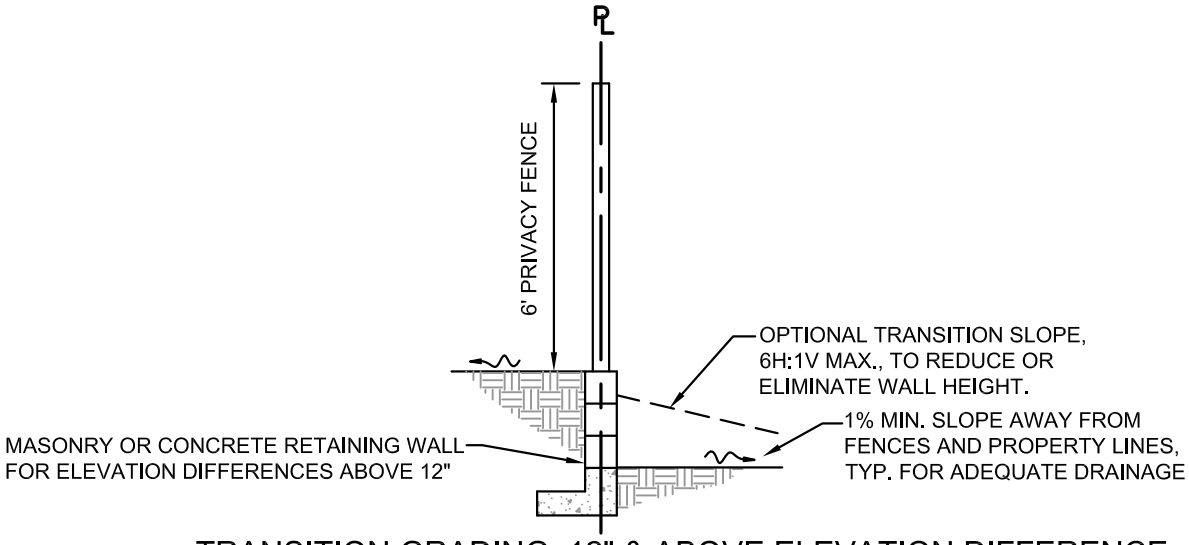


TRANSITION GRADING: 0' TO 12" ELEVATION DIFFERENCE



TRANSITION GRADING: 12" & ABOVE ELEVATION DIFFERENCE

NOTES:

1. THE DESIGN AND CALCULATIONS OF ALL RETAINING WALLS SHALL BE REVIEWED AND APPROVED BY THE CITY OF RIVERBANK. IF NOT SHOWN ON IMPROVEMENT PLANS, RETAINING WALLS SHALL BE CONSTRUCTED UNDER SEPARATE PERMIT.

2. EXCEPTIONS TO THE REQUIREMENTS HEREIN MAY BE GRANTED WHEN THE LOWER ELEVATION IS ON THE PUBLIC R/W, IF IT IS DEMONSTRATED THAT A SIGNIFICANT REDUCTION IN WALL HEIGHT WILL BE ACHIEVED. SUCH EXCEPTIONS SHALL BE GRANTED ON A CASE-BY-CASE BASIS BY THE CITY ENGINEER.

3. THE PREFERRED LOCATION FOR WALLS AND FENCES IN NEW DEVELOPMENTS IS CENTERED ON THE PROPERTY LINE. HOWEVER, THIS MAY NOT BE FEASIBLE WHEN CONSTRUCTING ADJACENT TO EXISTING PROPERTIES. THE RELATIONSHIP TO THE PROPERTY LINE AND ANY WALLS, FENCES, OR TRANSITIONS SHALL BE CLEARLY SHOWN ON THE IMPROVEMENT PLANS.

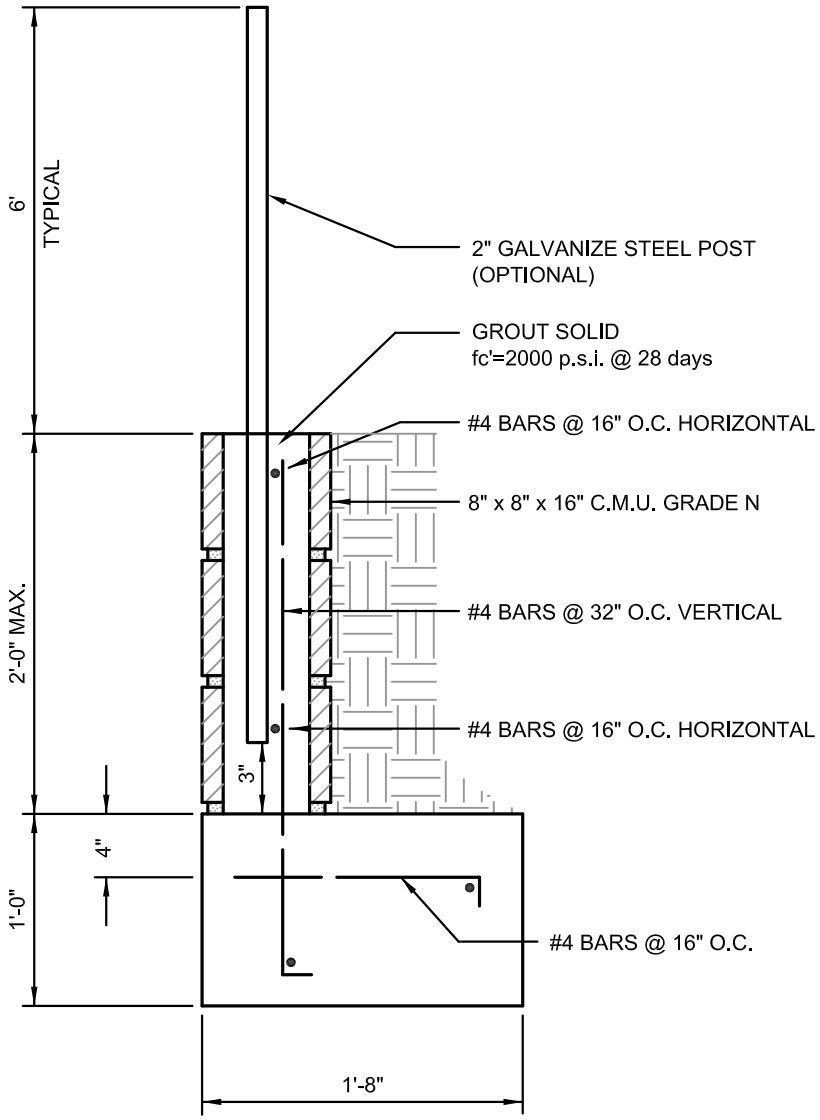
4. RETAINING WALLS AND FENCES ARE SUBJECT TO THE REVIEW AND APPROVAL OF BOTH THE PUBLIC WORKS AND COMMUNITY DEVELOPMENT DEPARTMENTS.

CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

William F. Kull
CITY ENGINEER - WILLIAM F. KULL

TYPICAL TRANSITION GRADING REQUIREMENTS

DRAWN BY:	DATE:	SCALE:	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
GK	10/08/15	NTS	1-26-16	901
REVISIONS: NONE	SECTION: GRADING	DRAWING NAME: 901.DWG		

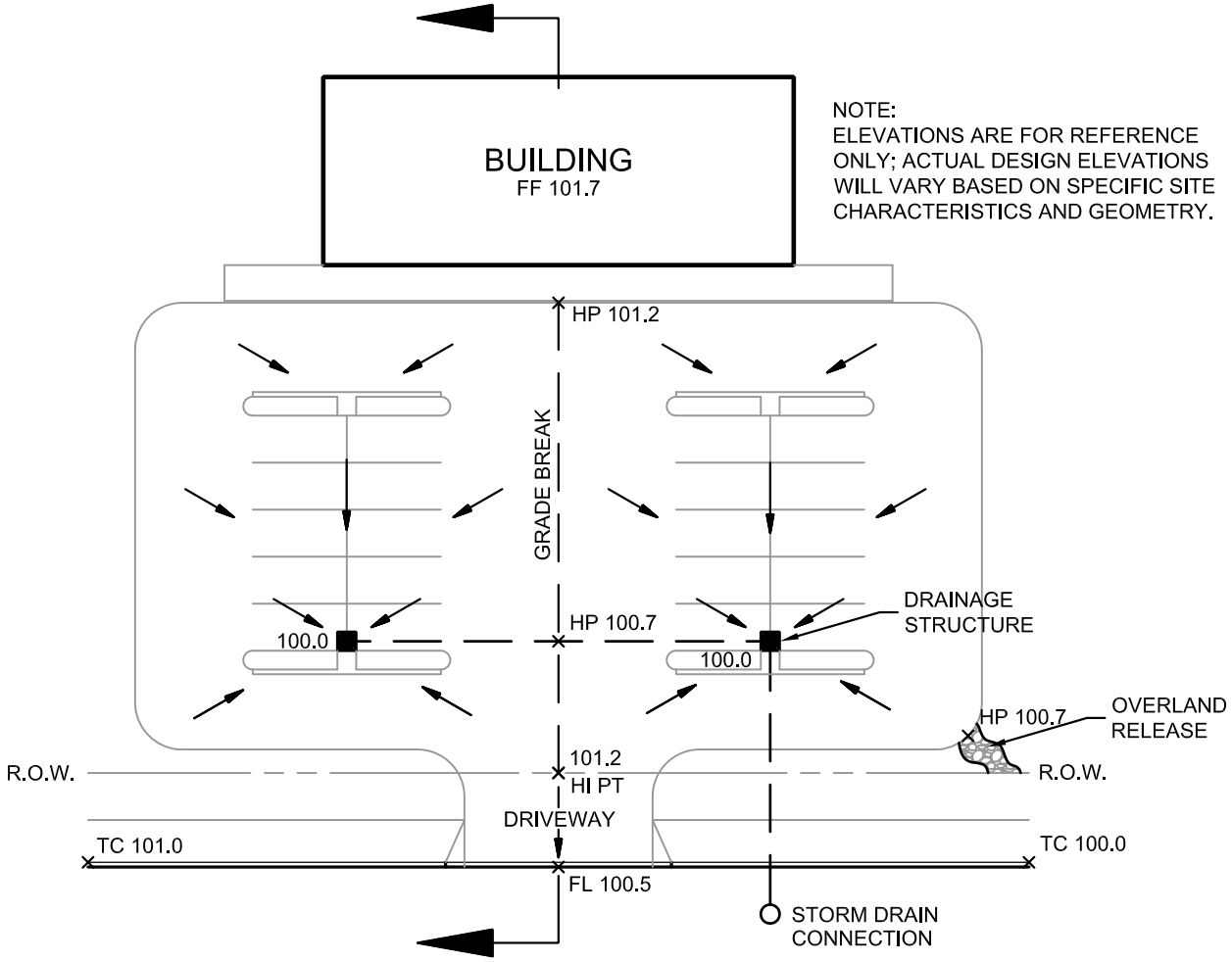


WALL SECTION

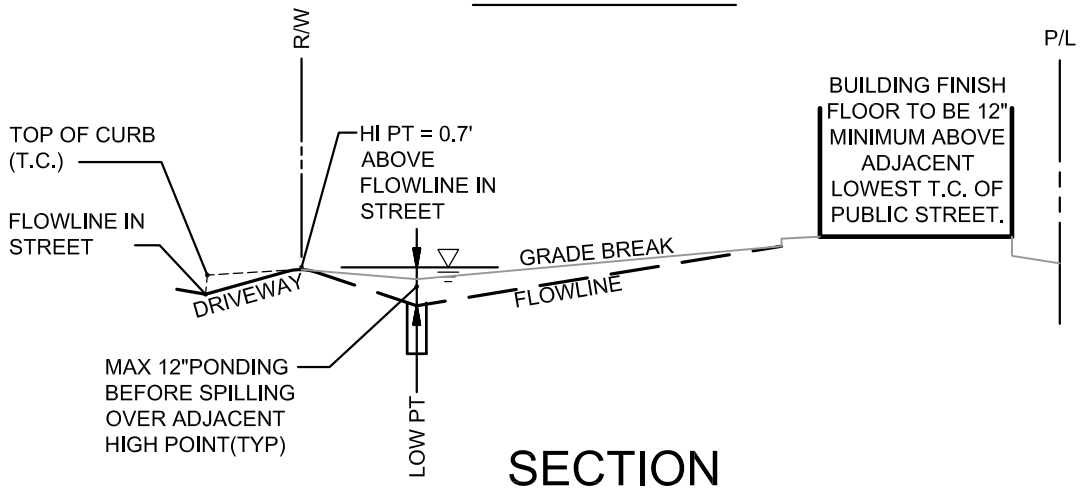
NOTE:

THIS DETAIL IS PROVIDED AS A CONVENIENCE TO DESIGNERS AND BUILDERS, ONLY, AND IS NOT INTENDED TO PROHIBIT OTHER TYPES OF RETAINING WALLS. ALL RETAINING WALLS SHALL BE SUBJECT TO THE REVIEW AND APPROVAL OF THE CITY PUBLIC WORKS DEPARTMENT AND COMMUNITY DEVELOPMENT DEPARTMENT.

CITY OF RIVERBANK DEPARTMENT OF PUBLIC WORKS			TYPICAL MASONRY UNIT RETAINING WALL	
William F. Kull CITY ENGINEER - WILLIAM F. KULL				
DRAWN BY: GK	DATE: 10/08/15	SCALE: NTS	ADOPTED BY THE CITY COUNCIL: 1-26-16	DRAWING NO. 902
REVISIONS: NONE	SECTION: GRADING	DRAWING NAME: 902.DWG		



PLAN VIEW



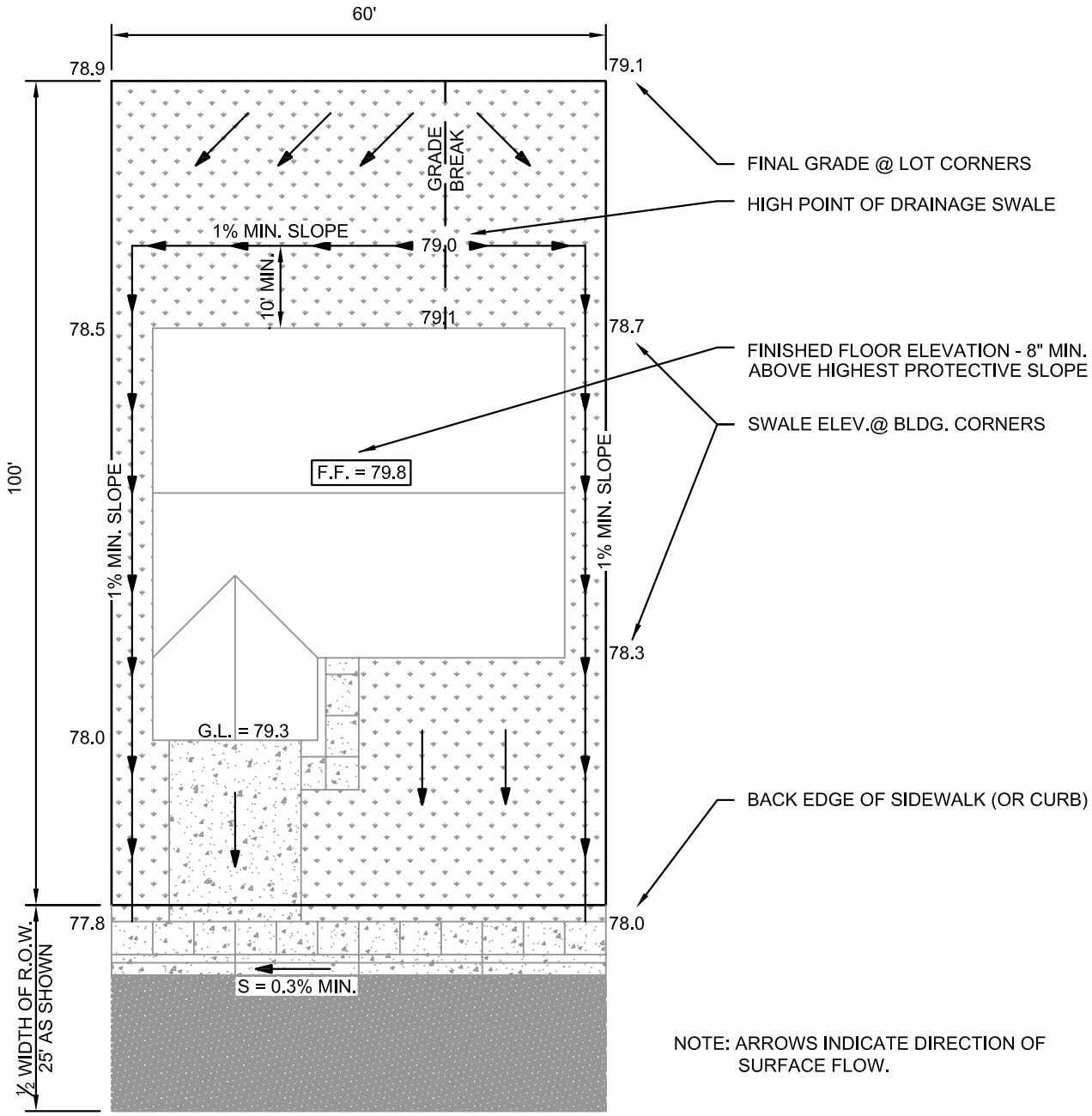
SECTION

CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

William F. Kull
CITY ENGINEER - WILLIAM F. KULL

TYPICAL ONSITE GRADING REQUIREMENTS

DRAWN BY:	DATE:	SCALE:	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
GK	10/08/15	NTS	1-26-16	903
REVISIONS: NONE	SECTION: GRADING	DRAWING NAME: 903.DWG		



GENERAL NOTES:

1. FINISHED GRADING IS TO BE COMPLETED BY OTHERS AFTER HOUSE IS CONSTRUCTED.
2. PAD ELEVATIONS ARE DESIGNED FOR 12" SLAB & BASE ROCK FOUNDATION SECTIONS OR AS RECOMMENDED BY A LICENSED GEOTECHNICAL ENGINEER IN THE SITE SPECIFIC SOILS REPORT.
3. PAD ELEVATIONS ARE DESIGNED SUCH THAT 1% MINIMUM SWALES ARE ACCOMODATED IN THE REAR AND SIDE YARDS IN ACCORDANCE WITH CITY OF RIVERBANK STANDARDS.
4. ACTUAL FINISHED LOT GRADING IS TO BE DESIGNED WITH THE HOUSE PLOT PLAN AND MAY VARY FROM THIS STANDARD DETAIL, BASED ON LOT SIZE, ORIENTATION & TYPE OF HOUSE CONSTRUCTED.

CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

William F. Kull
CITY ENGINEER - WILLIAM F. KULL

TYPICAL FINISHED LOT GRADING DETAIL

DRAWN BY:	DATE:	SCALE:	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
GK	10/05/15	NTS	1-26-16	904
REVISIONS: NONE	SECTION: GRADING	DRAWING NAME: 904.DWG		

City of Riverbank
DESIGN STANDARDS

Utilities

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SECTION 10: Utilities

10.100 General

10.101 Scope

This chapter establishes uniform locations and construction procedures for all underground utilities. If conflicts occur between this chapter and other utility-specific chapters within the City Standards, those specific chapters govern over this chapter. The City will not reimburse any cost incurred in conforming to these standards. In addition to these standards, any standards set forth by the individual utility companies shall be adhered to.

10.102 Encroachment Permits

1. All utilities shall obtain an encroachment permit a minimum of 2 business days prior to commencement of work, except for emergency work or emergency utility repair work which must obtain a permit within 48 hours after the start of work. The request shall be accompanied by a plan showing location, quantities, and sizes of all work in the existing right-of-way and easements including new subdivisions and parcel splits.

2. A minimum 48-hour notice is required for all City inspections. To schedule an inspection, call City of Riverbank Public Works at (209) 869-7128.

10.103 Traffic Control

1. Proper traffic controls and covering of trenches must be approved prior to implementation and maintained in accordance with the City of Riverbank Standard Specifications.

10.200 Design

10.201 Standard Location

1. Utilities in a common trench shall be located as shown in Standard Details 1006 & 1007. Revisions to these locations or separate utilities in an existing right-of-way should be noted on the plan submitted with the encroachment permit request, and shall be approved by the City Engineer.

2. Street crossings in new subdivisions shall be as shown in Standard Detail 1001.

10.202 Potholing for Design and Construction Purposes

1. Exploratory excavations within the public right of way require an encroachment permit. The method of excavation must be done by potholing to discover or verify the actual horizontal and vertical location and size of

existing underground utilities and structures. Potholing must expose underground utilities and structures to sufficiently determine:

a. Elevation of existing finished grade at center of pothole;
b. Elevation at the top and bottom of the utility or utility structure;
c. State plane coordinates of center of pothole (or horizontal distance to 3 fixed, permanent infrastructure features);
d. Utility type and owner;
e. Outside diameter of utility or width of duct bank/structure; and
f. Utility material, condition, coating or protection (i.e. cathodic protection).

2. The vertical position of the exposed underground utility must be tied to a survey benchmark.

3. The maximum size of a pothole shall be 12-inch diameter or 12-inch square.

10.203 Horizontal Alignment

1. Alignments shall be parallel to the street centerline wherever possible. In new developments, the horizontal alignment of joint trench shall be parallel to the centerline within the Public Utility Easement (PUE).

10.204 Overhead Utility Lines

1. Utility overhead lines are discouraged. Wherever reasonable, utility companies forced to relocate lines by street dedication or widening shall underground the facility. In the case where a pole facility cannot be economically undergrounded, other facilities may remain on the pole during and after relocation. For example, relocating a 69 KVA line underground may not be economically feasible, therefore, a 12 KVA line on the same set of poles would not be required to relocate underground. The utility lines must be consolidated as much as possible. A 69 KVA on one side of the street and a 12 KVA on the other side will be combined onto one set of poles.

2. Where utility poles are permitted, poles shall be located behind sidewalk wherever possible. Where a separated sidewalk is proposed or existing, the pole shall be placed a minimum of 18 inches behind the back of curb. Where the entire area behind curb is concrete, the pole shall be a minimum of 54 inches behind the back of curb.

10.205 Boring within Public Right-of-Ways

1. Improvement Plans shall show proposed boring locations, size conduit, and bore pit locations,

2. Improvement Plans shall show and correctly label existing utilities in the streets and within 10 feet of the proposed boring locations

3. Traffic control plans shall show bore pit locations.

4. All City Storm Drain and Sanitary Sewer utilities within 5 feet of the proposed bore locations are required to be video inspected (CCTV) before and after line installation.

5. A copy of the CCTV on a CD or DVD and recorded in an unprotected digital format (.mpg or .avi) shall be provided to the City of Riverbank inspector within 1 week after the video inspection was completed.

Table 10.1 Non-City Utility Horizontal Alignment

Condition	Alignment
Extending or repairing an existing service through urbanized areas.	Trench and install conduit at either behind walk, under walk or within 3 feet of existing lip of gutter but in no case shall installation be closer than 36 inches to an existing sewer, water or storm drain line (outside wall to outside wall of conduits
Extending new service through a new area with a minimum of 10 feet of sidewalk and/or landscaping.	Install conduit behind curb, gutter and sidewalk.
Extending new service through rural areas with only 40 feet of right-of-way.	Install conduit(s) a minimum of 12 inches away from the existing right-of-way. All junction boxes shall be installed in easements outside the right-of-way. Utilities must negotiate the construction and permanent easement
Extending new service through right-of-way less than 40 feet and congested areas with 45 feet of right-of-way or less.	City Engineer shall engineer a location based on the master plan of utilities. In most cases with less than 40 feet of right-of-way, Developer or utility will acquire easement

City of Riverbank
CONSTRUCTION STANDARDS

Utilities

SECTION 10: UTILITIES

General: Utilities shall be furnished and installed in accordance with these Construction Specifications and as shown on the plans.

Payment: Full compensation for furnishing all labor, materials, tools, equipment, excavating, backfilling, testing, disinfecting and flushing and for doing all work involved in installing the utilities shown on the plans and as specified in these Construction Specifications shall be included in the appropriate contract item and no additional compensation will be allowed therefore.

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10.100 Materials

10.101 Description

1. Excavation for appurtenant structures such as, but not limited to, manholes, transition structures, junction structures, vaults, valve boxes, catch basins, thrust blocks, and boring pits shall be deemed to be in the category of trench excavation.

2. Excavation for the installation of conduit shall be by open trench unless otherwise specified or shown on the drawings. However, should the Contractor elect to tunnel, or bore and jack any portion not so specified, he/she shall first obtain written approval from the City Engineer.

10.102 Maximum Length of Open Trench

1. The maximum length of open trench where prefabricated pipe is to be laid shall be the distance necessary to accommodate that amount of pipe which can be installed in a single day, or 400 feet, whichever is less. The distance is the collective length at any location, including open excavation, pipe laying and appurtenant construction and backfill which has not been temporarily resurfaced. Use of steel plates as open trench covers may be allowed only with prior approval of the City Engineer.

10.103 Minimum Width of Trench

1. PVC Gravity Pipe

    a. The clear width of the trench at the top of the pipe shall be the greater of the outside diameter plus 16 inches or 1.25 times the outside diameter plus 12 inches at any point.

2. All Other Pipe

    a. The clear width of the trench at the top of the pipe shall be the outside diameter of the pipe at any point plus minimum of 1 foot and no more than a maximum of 2 feet. Trenches wider than the maximum may be permitted only with written approval by the City Engineer.

3. If the pipe is installed in a compacted embankment, then the pipe embedment shall be compacted to a point of at least 2.5 pipe diameters from the pipe on both sides of the pipe or to the trench walls, whichever is greater.

10.104 Bracing Excavations

1. All trenches shall be shored or protected in accordance with OSHA and other state and federal safety codes, regulations, and ordinances. The manner of bracing excavations shall be as set forth in the rules, orders, and regulations of the Division of Industrial Safety of the State of California. In addition, the

Contractor shall utilize shoring methods as necessary to prevent undermining of adjacent roadways, fences, utilities, and structures.

2. After the pipeline has been installed and sufficiently backfilled to protect the pipe, all shoring, bracing and sheeting shall be removed. All voids left by the removal of such bracing shall be carefully filled with suitable material compacted in place.

10.105 Trench Section

1. Existing, unsuitable soil material shall be excavated and replaced with acceptable material for that zone.

2. Foundation

    a. Where required based on utility pipe material and use (for example PVC, gravity), provide foundation material conforming to the requirements of Table 8.3 at a minimum depth of 4 inches below the bottom of the pipe on compacted trench bottom.

        1) Where filter fabric is required by these specifications, the fabric shall be installed between the compacted trench bottom and the foundation material.

    b. If soft, spongy, unstable, or similar other material is encountered upon which the bedding material or pipe is to be placed, this unsuitable material shall be removed to a minimum depth of 4 inches below the pipe. This overexcavated depth shall be backfilled with acceptable pervious material or other foundation material listed in these specifications and compacted to the specified relative compaction. Sufficient foundation material shall be installed to provide a stable base accepted by the City Engineer prior to installation of the utility, pipe, or structure.

    c. When water is encountered, the trench shall be kept dry until laying and jointing of the pipe and placing of the bedding material has been completed, inspected, and approved. The Contractor shall place a minimum of 6 inches of foundation material and dewater the trench in a manner which has received prior written approval by the City Engineer.

3. Bedding

    a. Bedding material shall be sand, aggregate base, controlled density fill, or native material conforming to the gradation requirements of Table 10.3. When the Contractor requests to use native material, the City Engineer requires testing of the native material by an independent, state-certified testing laboratory to confirm the material meets the City’s criteria. Materials testing is paid for by the Contractor. The bedding shall be free of rocks and clods greater than 3 inches in

diameter and shall be free of organic material and other the unsuitable material.

b. For PVC gravity pipe, a registered Geotechnical Engineer shall provide soil boring results of existing soil conditions to determine which bedding material per Table 8.3 shall be used.

1) Where existing soil conditions are classified as ASTM D2321 Soil Class 3, 4 or 5, the Contractor must use “PVC – Case 1” material with filter fabric. Filter fabric shall be nonwoven-type material and conform to Section 88-1.03 “Filter Fabric” in the State Standards. Filter fabric must be installed to prevent infiltration of fines as specified in Section 68-1.028 “Filter Fabric” in the State Standards.

2) Where existing soil conditions are classified as ASTM D2321 Soil Class 1 or 2, the Contractor may use “PVC – Case 1” or “PVC – Case 2” material without filter fabric.

c. Bedding material shall first be placed so that the pipe is supported for the full length of the barrel with full bearing on the bottom segment of the pipe equal to a minimum width of 40 percent of the outside diameter of the barrel. The remainder of the bedding shall be carefully placed to the proper depth.

d. Bedding material shall be compacted to a minimum relative compaction of 90 percent.

e. Where pipe is to be installed in new embankment, the embankment shall first be constructed to a height of 12 inches above the top of pipe and for a distance on each side of the pipe location of not less than 5 times the diameter of the pipe, after which the trench shall be excavated with sides nearly vertical and the pipe installed.

f. When installing potable water facilities and infrastructure, the open ends of the pipe shall be closed by using an acceptable pipe cap or blind flange to prevent entrance of water and dirt into the pipe. Adequate backfill shall be deposited on the pipe to prevent floating. Pipe which has floated shall be removed from the trench and reinstalled as directed by the City Inspector.

g. All existing gas pipes, water pipes, conduits, sewers, drains, fire hydrants and other structures shall be carefully supported and protected from damage which may be a result of dewatering by the Contractor. If damage occurs, the Contractor shall restore the damaged areas, without additional compensation, to their original condition.

h. When crossing an existing irrigation pipe, the bedding material shall be an acceptable CDF. This includes the entire area under the irrigation

pipe, 2 feet on both sides and a minimum of 12 inches on top of the pipe.

4. Backfill

   a. Backfill, for cast-in-place structures such as, but not limited to, manholes, transition structures, junction structures, vaults, valve boxes and reinforced concrete box conduits shall start at the surface upon which the base of the structure rests.

   b. When crossing an existing irrigation pipe, the backfill material shall be compacted with a pneumatic tamper. The backfill shall be compacted to a minimum of 95 percent relative compaction.

   c. Backfill material shall be native material or select backfill. Native material shall be free of all organic material, rubbish, debris, large rocks, clay chunks, and other objectionable material. When satisfactory compaction of the native material cannot be obtained, select backfill shall be required.

   d. Except where the pipe must remain exposed for force main leakage tests and subject to the provisions herein, the Contractor shall proceed as soon as possible with backfilling operations. Care shall be exercised to ensure the utility will not be damaged or displaced.

   e. The Contractor shall not place backfill against or over the top of any cast-in-place pipe or structures for a period of 7 days or the concrete has attained a compressive strength equal to or greater than 85 percent of the specified design strength.

   f. Where it becomes necessary to excavate beyond the limits of normal excavation lines in order to remove boulders or other interfering objects, the voids remaining after the removal of the boulders shall be backfilled as specified herein, or as otherwise approved by the City Engineer.

      1) Where the void is below the subgrade for bedding conduits or structures, backfill shall be compacted bedding material.

      2) Where the void is in the side of the trench, it shall be backfilled with suitable material and compacted as approved by the City Engineer.

   g. The cost for the removal of all boulders or other interfering objects and the backfilling of voids left by such removals shall be at the expense of the Contractor and no direct payment for the cost of such work will be made.

5. Backfill Placement Requirements

   a. Existing Streets shall be backfilled as shown in Standard Detail 1005.

1) Placement of aggregate base shall be in a maximum of 12-inch lifts, evenly placed and mechanically compacted to the specified relative compaction. Compaction testing shall be required at the discretion of the City Inspector. Costs related for passing tests within the City right-of-way or PUE will be paid for by the City of Modesto. The Contractor is responsible for the costs of failed tests.

2) Placement of CDF will not require compaction testing.

b. Previously undeveloped land (new construction) shall be backfilled in accordance with Standard Detail 1002 & 1003 unless otherwise specified herein this specification.

c. Unimproved or non-street right-of-way areas, the area of the trench between the bedding zone and the top of trench shall be backfilled with acceptable backfill material. Compaction shall be done mechanically in uniform lifts to attain a minimum relative compaction of 90 percent.

6. Control Density Fill (CDF) Requirements

a. The CDF shall meet this design criteria and material requirements. With prior written approval from the City Engineer, CDF may be used for the Foundation, Bedding and Backfill zones. The Contractor shall submit compressive strength test data for the CDF mix design to the Engineer for approval prior to excavating the trench for which the controlled density fill material is proposed for use. CDF shall be batched and supplied by a ready-mixed concrete plant. CDF shall be non-segregating, highly flowable, self-consolidating, low shrink material that flows into place without leaving voids and cures into a stiff, non-plastic material. The intent of the CDF design mix is for the controlled density fill to be capable of future excavation using hand tools. Wire shall not touch valves or fittings.

b. Table 10.2 CDF Design Mix

Description	Criteria	Materials	
Compressive Strength	25-100 psi at 28 days	ASTM D4832	
Cement	50-100 pounds per cubic yard	Type 1 or 2 Portland Cement conforming to ASTM C150	
Fly Ash	200-500 pounds per cubic yard	Conform to ASTM C618, Class C or F	
Water	325-600 pounds per cubic yard	Free of oil, salt, acid, alkali, sugar, vegetable matter, or other substances injurious to the finished product.	
Fine Aggregate or Sand	2,000-3,500 pounds per cubic yard	Conform to the gradation in ASTM C33	
		3/8-inch	100
		No. 4	95-100
		No. 8	80-100
		No. 16	50-85
		No. 30	25-50
		No. 50	5-30
		No. 100	0-10
Entrained Air, (maximum)	20 percent		
Slump, (minimum)	7 inches		

c. CDF shall be placed equally into the areas on both sides of the pipe, against the trench walls and over the top of the pipe. The CDF pour shall be made in 1 continuous lift and made equally to both sides of the pipe to prevent side thrust movement or displacement of the new pipe. CDF shall be discharged from the transit mixer truck into the areas to be filled. CDF shall cure for a minimum period of 48 hours or until a compressive strength of 15 psi is obtained before placement of the hot mix asphalt above it. The Contractor shall be responsible for providing evidence to the Engineer that the CDF has reached the above compressive strength.

7. Trench Materials Gradation Requirements

a. The materials used for the various trench zones shall meet these design criteria and material requirements.

b. Table 10.3 Trench Zone Materials

	TRENCH ZONES (PERCENT PASSING)									
	FOUNDATION				BEDDING					BACKFILL
SIEVE SIZE	VCP (Gravity)	PVC* – Case 1 (Gravity)	PVC (Pressure)	Dewatered Areas	VCP (Gravity)	PVC* – Case 1 (Gravity)	PVC – Case 2 (Gravity)	PVC (Pressure)	All Other Materials	Native or Select
1.5-inch	-	100	Not Required (Unless trench requires dewatering)	-	-	100	100	-	-	-
1-inch	-	-		-	-	-	-	-	-	-
0.75-inch	100	-		-	100	-	-	100	100	-
0.5-inch	90-100	-		-	90-100	-	-	-	-	-
0.375-inch	40-70	0-25		-	40-70	0-25	-	-	100	-
No. 4	0-15	0-15		-	0-15	0-15	0-100	35-55	70-100	35-100
No. 8	0-5	-		-	0-5	-	-	-	-	-
No. 30	-	-		-	-	-	-	-	20-100	20-100
No. 50	-	-		0-100	-	-	-	-	-	-
No. 100	-	-		0-8	-	-	-	-	-	-
NO. 200	-	0-12		0-4	-	0-12	0-12	3-9	0-15	-
Sand Equivalent, CT 217 (min)	-	-		-	-	-	-	30	30	20

*REQUIRES FILTER FABRIC

8. Compaction

a. After the placing of backfill has been started, the Contractor shall proceed as soon as practicable with compaction. Backfill shall be mechanically compacted by means of tamping rollers, “sheepsfoot” roller, pneumatic rollers, vibrating rollers, rammers, or other mechanical tampers. The City Engineer shall approve all size and type of such equipment.

b. Permission to use specific compaction equipment shall not be construed as guaranteeing or implying that the use of such equipment will not result in damage to adjacent ground, existing improvements, or improvements installed under the contract. The Contractor shall make his/her own determination in this regard.

c. Tests for compaction shall be made in accordance with California Test Method 216 or 231. Backfill material in undeveloped streets shall be free of unsuitable material, such as vegetation, large clods, asphalt, and concrete material. Passing compaction tests shall be paid for by the City. Frequency of compaction testing is at the discretion of the City of Riverbank Inspector.

d. Material for mechanical compacted backfill shall be placed in lifts which, prior to compaction, shall not exceed the depths specified below for the various types of equipment:

1) Impact, free-fall, or “stomping” equipment, and jetting or ponding are NOT permitted as a means of compaction.

2) Vibratory equipment, vibratory smooth-wheel rollers, and vibratory pneumatic-tired rollers: maximum lift depth 24 inches.

3) Rolling equipment, including sheepsfoot (both vibratory and nonvibratory), grid, smooth-wheel (not vibratory), pneumatic tired (nonvibratory), and segmented wheels: maximum lift depth of 12 inches.

4) Hand-directed mechanical tampers, including vibratory plates: maximum lift depth of 8 inches.

e. Mechanically compacted backfill shall be placed in horizontal layers of such depths (not exceeding those depths specified) compatible to the material being placed and the type of equipment being used. Each layer shall be evenly spread, moistened (or dried, if necessary), and then tamped or rolled until the specified relative compaction has been attained.

10.106 Restoring Surface

1. The existing asphalt concrete or Portland cement concrete pavement shall be sawcut full depth to the minimum trench width. Cutting the existing pavement with a jack hammer or drop hammer is not permitted. Final cut in street pavement will vary based on the location of the utility trench in the street, but not less than required in Detail 1005. Final cut shall be sawcut in neat parallel lines.

2. The surface of all trenches shall be filled and compacted so that the surfaces will conform to the condition of the surrounding ground. The repaving requirements of the plans shall be met regardless of type of existing surfacing.

3. All trenches shall be backfilled and temporarily paved at the end of each working day.

    a. The Contractor must submit current California licensed civil or structural engineer-stamped calculations for minimum plate design thickness for the City Engineer to consider permitting the use of steel plates. The use of steel plates must be approved in writing by the City Engineer at least 48 hours prior to use.

4. Aggregate Base

    a. Aggregate base shall be Class 2 compacted to 95 percent relative compaction. Aggregate base shall have 3/4-inch maximum combined grading.

5. Temporary Trench Pavement

    a. The Contractor shall install and maintain a temporary trench pavement wherever excavation is made through the pavement, sidewalk, or driveway. The temporary trench pavement shall be placed and compacted with a vibratory plate or steel drum roller to grade immediately following trench backfill. Wheel rolling is NOT permitted.

    b. Temporary bituminous surfacing (cold mix, cut back) shall be placed and mechanically compacted immediately above the trench following compaction and approved by the City Engineer.

    c. Temporary trench pavement shall be a minimum of 2 inches thick in vehicle and pedestrian traffic areas and maintained to the grade of the adjacent pavement by the Contractor until permanent pavement is placed. Material, which is placed by the Contractor for convenience, is at no cost to the City.

6. Permanent Trench Pavement

a. Hot Mix Asphalt, Prime Coats, Paint Binders and Tack Coats shall be per the requirements of the Street Design Chapter of these Standard Specifications.

b. Final paving above the trench section shall be placed within 14 calendar days of its backfill and compaction. Extension may be granted by the City Engineer due to weather conditions. In the event permanent paving is not done within 14 calendar days, the City will consider this as incomplete work and will take necessary action in accordance with the prevailing City ordinances and policies.

c. Temporary cut back shall be completely removed before placement of final paving. Final paving shall be placed on undisturbed and previously inspected and compacted subgrade. Recompaction shall be required for any disturbed base or surface.

d. For a parallel trench longer than one half the length of the block,

1) and Pavement Condition Index (PCI) between 70 – 100, a slurry seal course is required; or

2) and PCI between 0 – 69, a microsurface seal course is required. The seal shall be applied to the entire half of the street where the trench is located. For streets with multiple lanes in one direction, the seal shall be the width of the entire lane, but not less than 12 feet wide and run the full length of the trench section.

e. Permanent pavement section shall be the depth specified in the Street Design Chapter of these Standard Specifications.

7. Portland Cement Concrete

a. Unless noted on the plans, Portland cement concrete pavement, where required for alley approaches, driveways, and valley gutters, shall consist of a minimum of 8 inches of concrete over a minimum of 16 inches of aggregate base compacted to 95 percent relative compaction. Concrete shall conform to the requirements of the Street Design Chapter of these Standard Specifications.

8. Sidewalks, Curbs, Gutters, Curb Ramps, and Driveways

a. All cuts to existing concrete shall be made and replaced from a score line or isolation joint. Any cuts to existing driveways will result in the removal and replacement of the full drive approach (or from existing score line to score line).

b. Replacement of concrete shall be in kind with existing surrounding area.

City of Riverbank
STANDARD PLANS

Utilities

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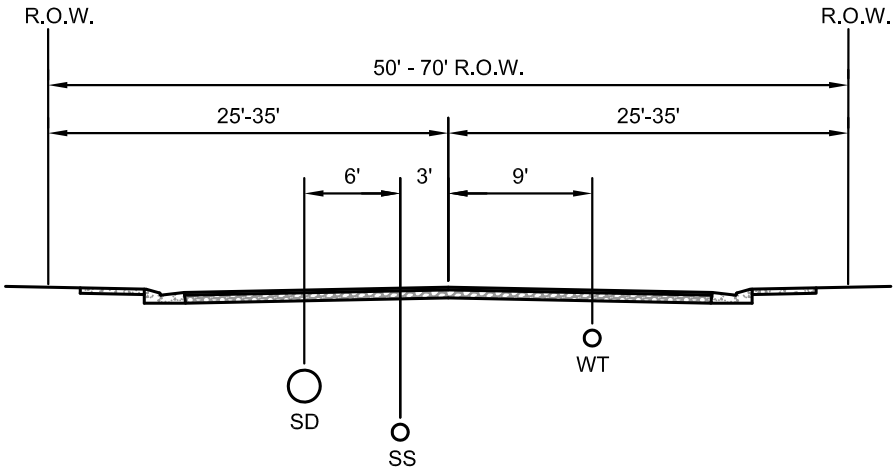
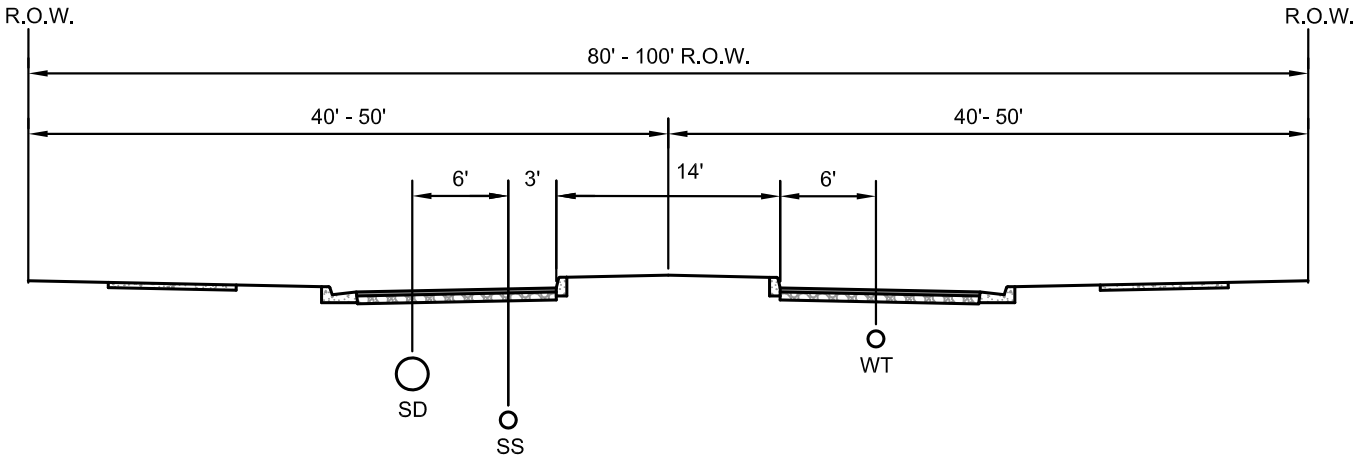




NOTE:

UTILITY SEPARATION IS TO BE IN CONFORMANCE WITH STATE DEPARTMENT OF HEALTH SERVICES REQUIREMENTS AT ALL TIMES WITHIN THE PUBLIC RIGHT-OF-WAY. GENERAL GUIDELINES ARE AS FOLLOWS:

1) 10 FEET MIN. HORIZONTAL SEPARATION FROM OUTSIDE OF WATER TO OUTSIDE OF SANITARY SEWER
2) 1 FOOT MIN. VERTICAL SEPARATION AT ALL CROSSINGS
3) SANITARY SEWER CROSSINGS ABOVE WATER MAINS REQUIRE SPECIAL PIPE WITH NO JOINTS WITHIN 10 FEET OF THE WATER MAIN
4) SANITARY SEWER MAINS WITH LESS THAN 3 FEET OF COVER SHALL BE DUCTILE IRON PIPE

UTILITY SEPARATION OR MATERIALS THAT DO NOT MEET THESE GENERAL REQUIREMENTS SHALL REQUIRE APPROVAL OF THE CITY ENGINEER AND DIRECTOR OF PUBLIC WORKS.

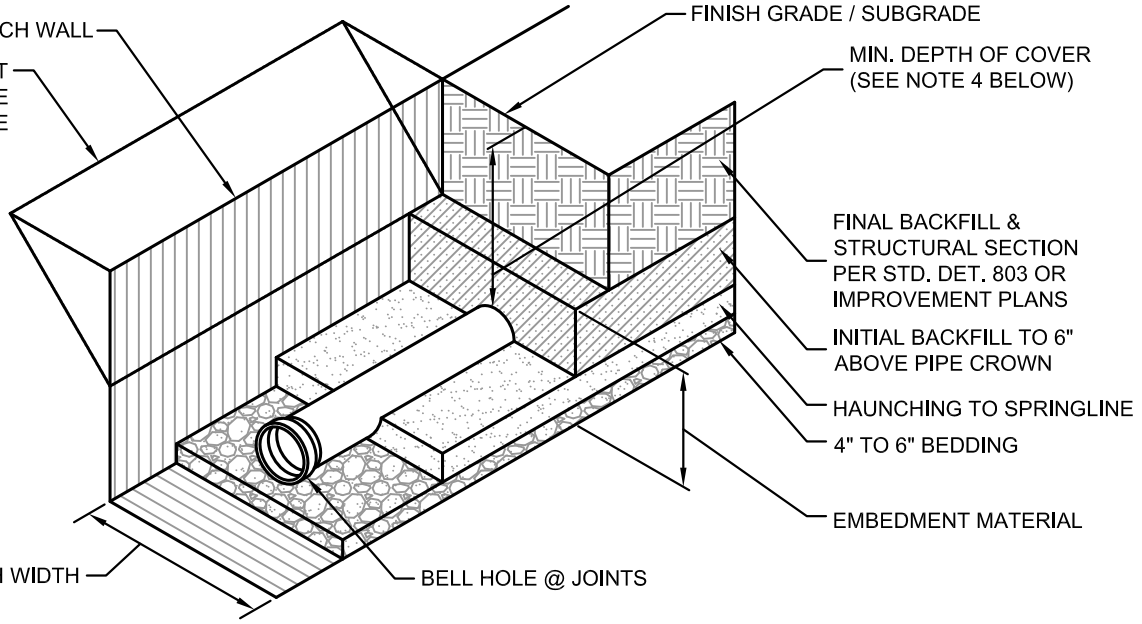
CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

William F. Kull

CITY ENGINEER - WILLIAM F. KULL

STANDARD UTILITY LOCATION IN STREETS

DRAWN BY:	DATE:	SCALE:	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
GK	10/08/15	NTS	1-26-16	1001
REVISIONS:	SECTION:	DRAWING NAME:		
NONE	STREETS	1001.DWG		



PIPE SIZE	MIN. WIDTH
4	18
6	18
8	24
10	24
12	30
15	36
18	42
24	48
30	60
36	72
48	84
60	96

NOTE:

1) THIS STD. DETAIL IS FOR PVC SDR 35, C-900, & DUCTILE IRON PIPE CONFORMING TO CITY OF RIVERBANK DESIGN STANDARDS AND SPECIFICATIONS.
2) CLASS 1 EMBEDMENT MATERIAL SHALL BE USED UNLESS SPECIFIED OTHERWISE ON THE PLANS.
3) THIS STD. DETAIL IS APPLICABLE ONLY FOR STABLE TRENCH WALLS WHERE NO STANDING WATER OR GROUND-WATER IS ANTICIPATED. SPECIAL DETAILS ARE REQUIRED FOR UNSTABLE SOIL IDENTIFIED IN SITE SPECIFIC SOILS REPORT. FOR MINOR OCCURENCES OF INSTABILITY (SAND POCKETS, ETC.) VOIDS IN THE EMBEDMENT ZONE SHALL BE FILLED WITH THE SPECIFIED EMBEDMENT MATERIAL TO AT LEAST TWO (2) PIPE DIAMETERS ALL AROUND THE PIPE.
4) MINIMUM DEPTH OF COVER FOR MAINS IS 3 FEET TO FINISH GRADE (INCLUDING PAVEMENT SECTION); SERVICE LATERALS PER PLANS.
5) WITH CRUSHED ROCK EMBEDMENT, INSTALL A CUT-OFF DAM OF 3 FEET MIN. THICKNESS OF APPROVED MATERIAL EVERY 100 FEET OF TRENCH. CRUSHED ROCK SHALL MEET ¾" OR ½" MAX. AGGREGATE BASE SPECIFICATIONS OR AS APPROVED BY THE CITY ENGINEER.
6) FOR WATER PIPES, USE NATIVE MATERIAL FOR BACKFILL.

	CLASS I	CLASS II	CLASS III	CLASS IV	CLASS V
DESCRIPTION USC SOIL TYPES	CRUSHED ROCK 3/4" TO 1/4" WELL GRADED (SEE NOTE 5)	COARSE SAND & GRAVEL GW, GP, SW, SP	FINE SAND MIXTURES GM, GC, SM, SC	SILT, SILTY CLAYS MH, ML, CH, CL	ORGANIC SOILS OL, OH, PT
FOUNDATION	IF REQUIRED, PER SPECIAL DESIGN TO BE SHOWN ON IMPROVEMENT PLANS.				
BEDDING HAUNCHING	CONSOLIDATE WITH VIBRATOR OR FLAT SHOVEL "SLICING" (SEE NOTE 5)	COMPACT TO 85% MIN. R.C. CUT-OFF DAM (SEE NOTE 5)	COMPACT TO 90% MIN. R.C. COMPACT TO 90% MIN. R.C. - TWO LIFTS	SPECIAL DESIGN	NOT PERMITTED
INITIAL BACKFILL	PER CLASS II OR III OR USE CRUSHED ROCK PER ABOVE	COMPACT TO 85% MIN. R.C. - TWO LIFTS	COMPACT TO 90% MIN. R.C. - TOW LIFTS		
MAXIMUM DEPTH OF COVER "D" WITHOUT SPECIAL DESIGN	20 FT	20 FT	20 FT		

CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

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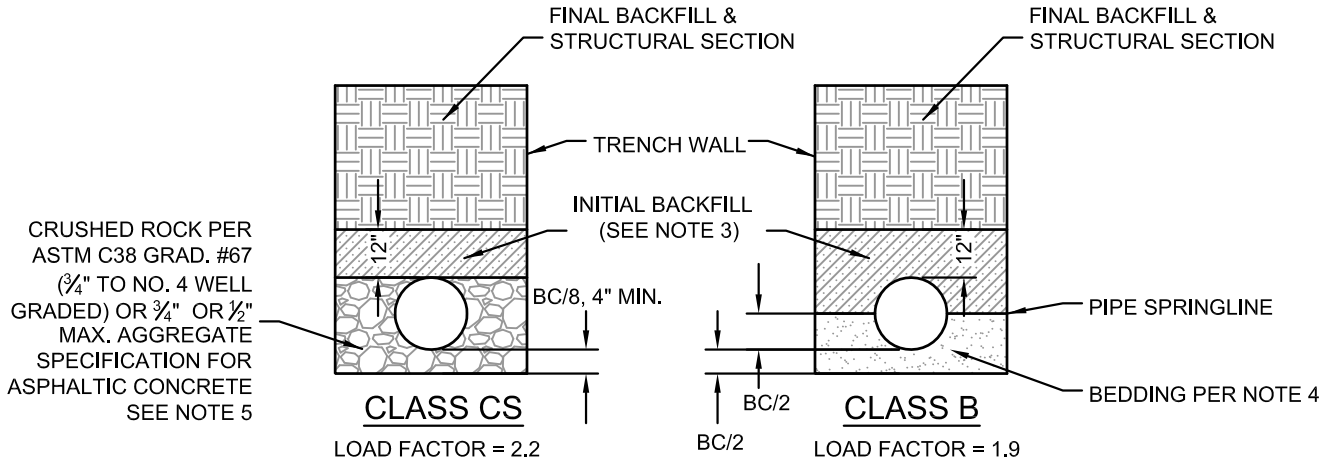
CITY ENGINEER - WILLIAM F. KULL

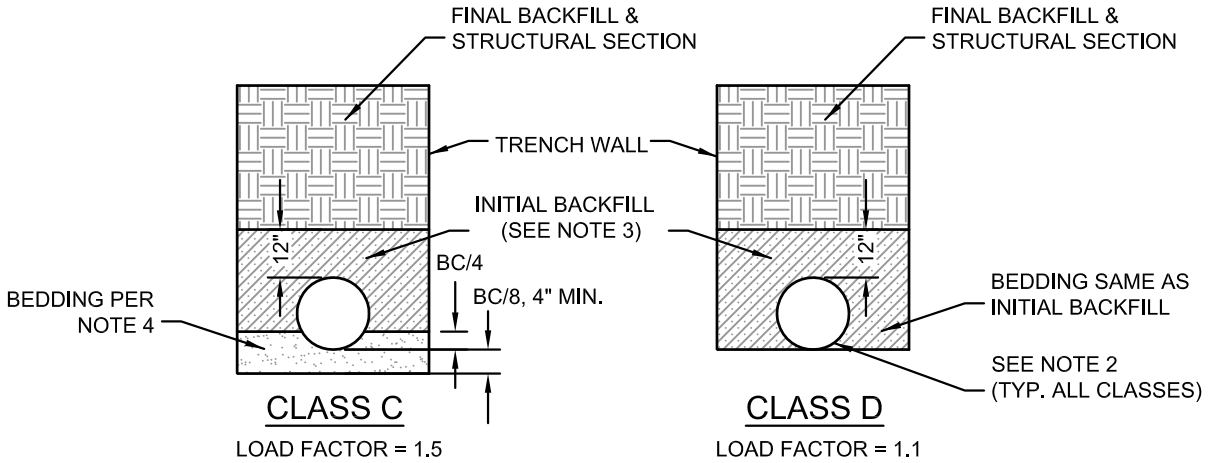
FLEXIBLE PIPE TRENCH SECTION

DRAWN BY:	DATE:	SCALE:	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
GK	10/08/15	NTS	1-26-16	1002
REVISIONS: NONE	SECTION: UTILITIES	DRAWING NAME: 1002.DWG		

LEGEND:

D = NOMINAL PIPE INSIDE DIAMETER (IN)
BC = PIPE OUTSIDE DIAMETER (IN)
BD = TRENCH WIDTH @ TOP OF PIPE = BC + 8" MIN. EACH SIDE





NOTE:

1) THIS STD. DETAIL IS FOR RIGID PIPE 4" AND LARGER, CONFORMING TO CITY OF RIVERBANK DESIGN STANDARDS AND CONSTRUCTION SPECIFICATIONS. USE TRENCH CLASS AS SHOWN ON THE PLANS; IF NOT SPECIFIED, USE APPROPRIATE CLASS PER PIPE MATERIAL AND DEPTH OF COVER PER STD. DETAIL 1004.
2) PROVIDE UNIFORM & CONTINUOUS SUPPORT OF PIPE BARREL BETWEEN BELL OR COUPLING HOLES.
3) INITIAL BACKFILL SHALL BE SELECTED SANDY MATERIAL PER CONSTRUCTION SPECIFICATIONS @ 90% R.C.
4) CLASS B & C BEDDING MATERIAL TO BE CRUSHED ROCK PER CLASS CS OR SAND AS SPECIFIED ON THE PLANS.
5) WITH CRUSHED ROCK BEDDING, INSTALL A CUT-OFF DAM OF 3 FT. OF APPROVED MATERIAL EVERY 100 FEET.

CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

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RIGID PIPE TRENCH SECTION

DRAWN BY:	DATE:	SCALE:	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
GK	10/08/15	NTS	1-26-16	1003
REVISIONS:	SECTION:	DRAWING NAME:		
NONE	UTILITIES	1003.DWG		

PIPE MATERIAL	CLASS	SIZE	MINIMUM TRENCH CLASS PER STD. DETAIL 1003 DEPTH OF COVER (FT) 3	4	5	6	7	8	9	10
ASBESTOS CEMENT, AWWA C401	150	4 THRU 14	D							
NON-REINFORCED CONCRETE ASTM C-14	2	12 15 18 21 24	D			C			B	CS
	3	12 15 18 21 24	D				C			B
REINFORCED CONCRETE ASTM C-76	III	12 15 18 21 24 27 30	C D				B			CS
	IV	12 15 18 21 24 27 30	D					C		
	V	12 15 18 21 24 27 30	D							
VITRIFIED CLAY PIPE ASTM C700 EXTRA STRENGTH		4 6 8 10 12 15	D						C	

CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

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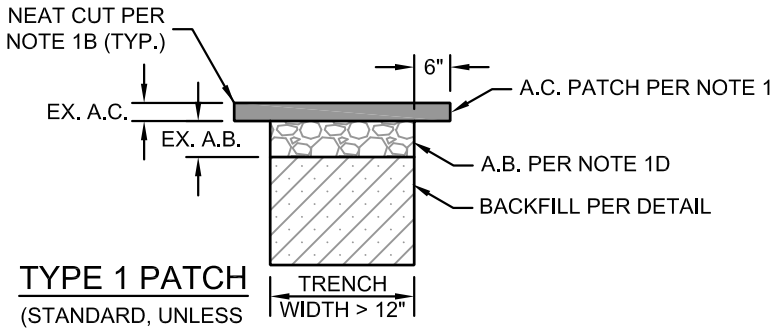
RIGID PIPE BEDDING REQUIREMENTS

DRAWN BY:	DATE:	SCALE:	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
GK	10/08/15	NTS	1-26-16	1004
REVISIONS: NONE	SECTION: UTILITIES	DRAWING NAME: 1004.DWG		

PAVEMENT REPLACEMENT



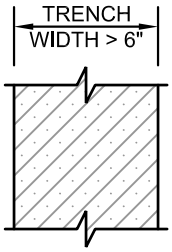
TYPE 1 PATCH

(STANDARD, UNLESS OTHERWISE SPECIFIED)

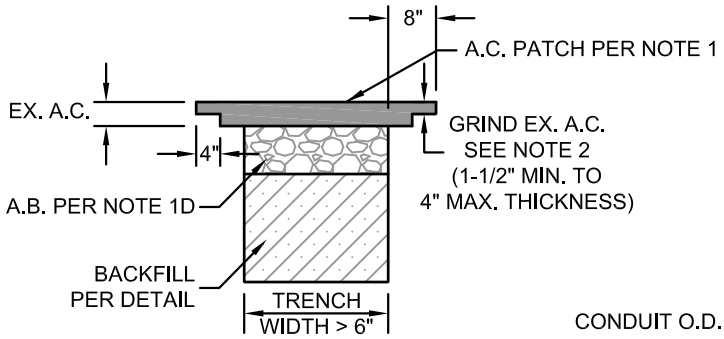
BACKFILL

BACKFILL:
NATIVE MATERIAL @ 90% R.C. EXCEPT APPROVED SELECT MATERIAL OR A.B.

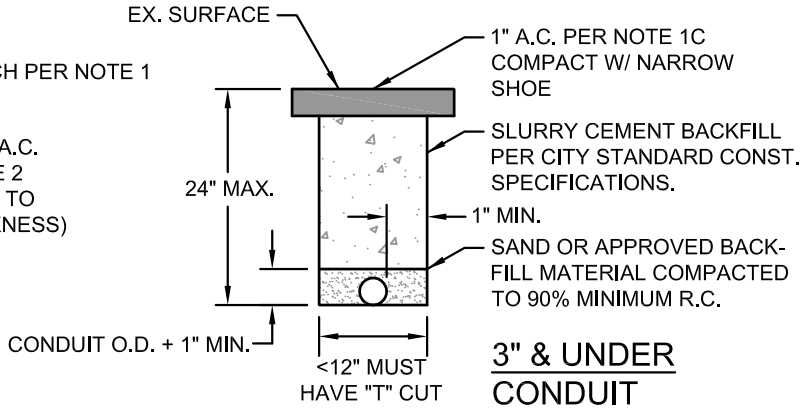
CLASS 2 @ 95% R.C. REQUIRED FOR:
A) TYPE 2 PATCH
B) EXCAVATION LESS THAN 3 FT. X 3 FT.



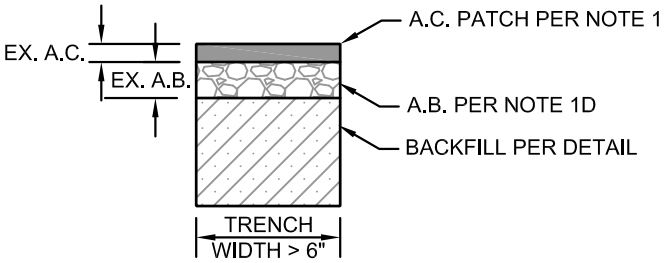
PIPE BEDDING PER STD. DET. 1002



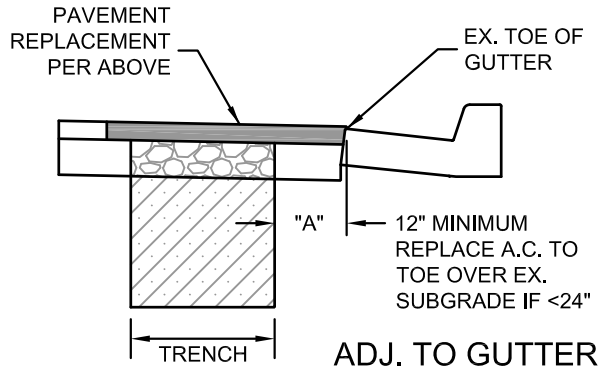
TYPE 2 PATCH



3" & UNDER CONDUIT



TYPE 3 PATCH



ADJ. TO GUTTER

NOTES:

1) TYPE 1 PATCH:
   - A) TOTAL A.C. THICKNESS TO MATCH EXISTING PLUS 1", 3" MINIMUM APPLIED IN TWO (2) LIFTS.
   - B) DROP HAMMER OR OTHER ROUGH CUT ALLOWED FOR INITIAL CUT ALONG TRENCH WALL. FINAL A.C. REMOVAL TO BE SAWCUT PER STANDARD CONSTRUCTION SPECIFICATIONS.
   - C) AC REPLACEMENT PER CITY OF RIVERBANK STANDARD CONSTRUCTION SPECIFICATIONS.
   - D) A.B. THICKNESS PER PLANS; A.B. MAY BE REPLACED BY ADDITIONAL A.C. (50% OF REQUIRED A.B. THICKNESS).

2) TYPE 2 PATCH OPTIONAL, EXCEPT WHEN REQUIRED BY THE CITY ENGINEER. GRIND DEPTH "T" SHALL BE ADJUSTED TO MATCH EXISTING OVERLAY THICKNESS.

3) TYPE 3 PATCH TO BE USED WHEN SHOWN ON THE PLANS OR AS APPROVED BY THE CITY ENGINEER, GENERALLY ON STREETS TO BE OVERLAYED.

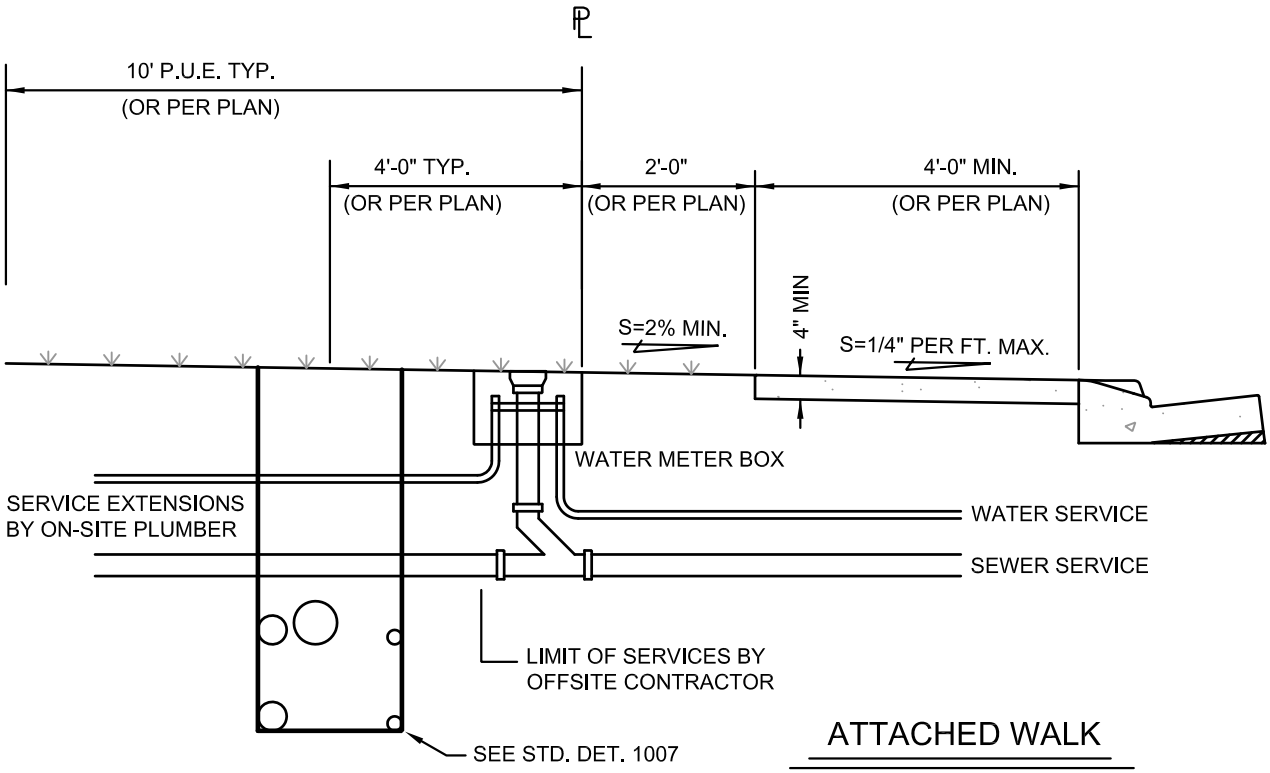
4) CONTROLLED DENSITY FILL (CDF) MAY BE USED FOR BACKFILL WITH PRIOR APPROVAL OF THE CITY ENGINEER.

CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

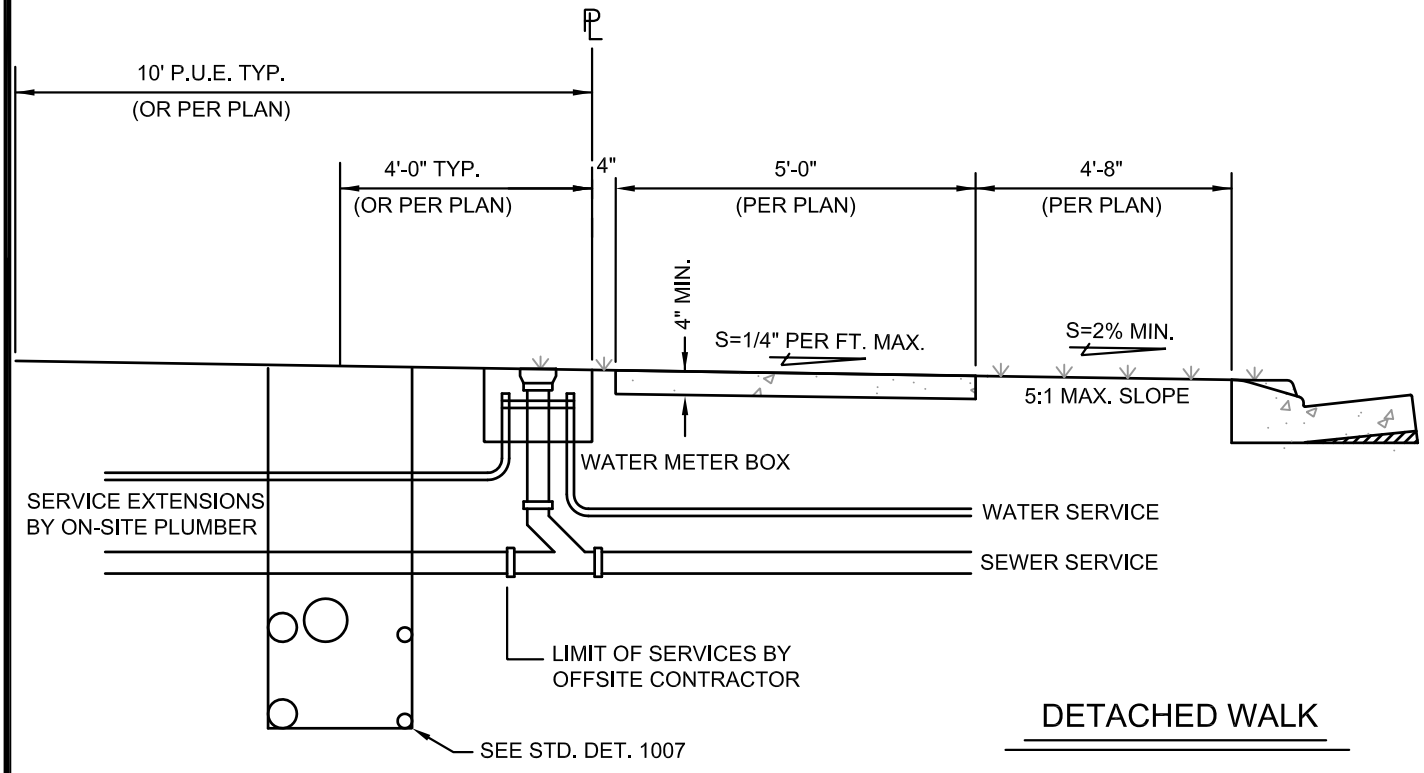
William F. Kull
CITY ENGINEER - WILLIAM F. KULL

TRENCH PATCH STRUCTURAL SECTION REQUIREMENTS

DRAWN BY:	DATE:	SCALE:	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
GK	10/08/15	NTS	1-26-16	1005
REVISIONS: NONE	SECTION: UTILITIES	DRAWING NAME: 1005.DWG		



ATTACHED WALK



DETACHED WALK

CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

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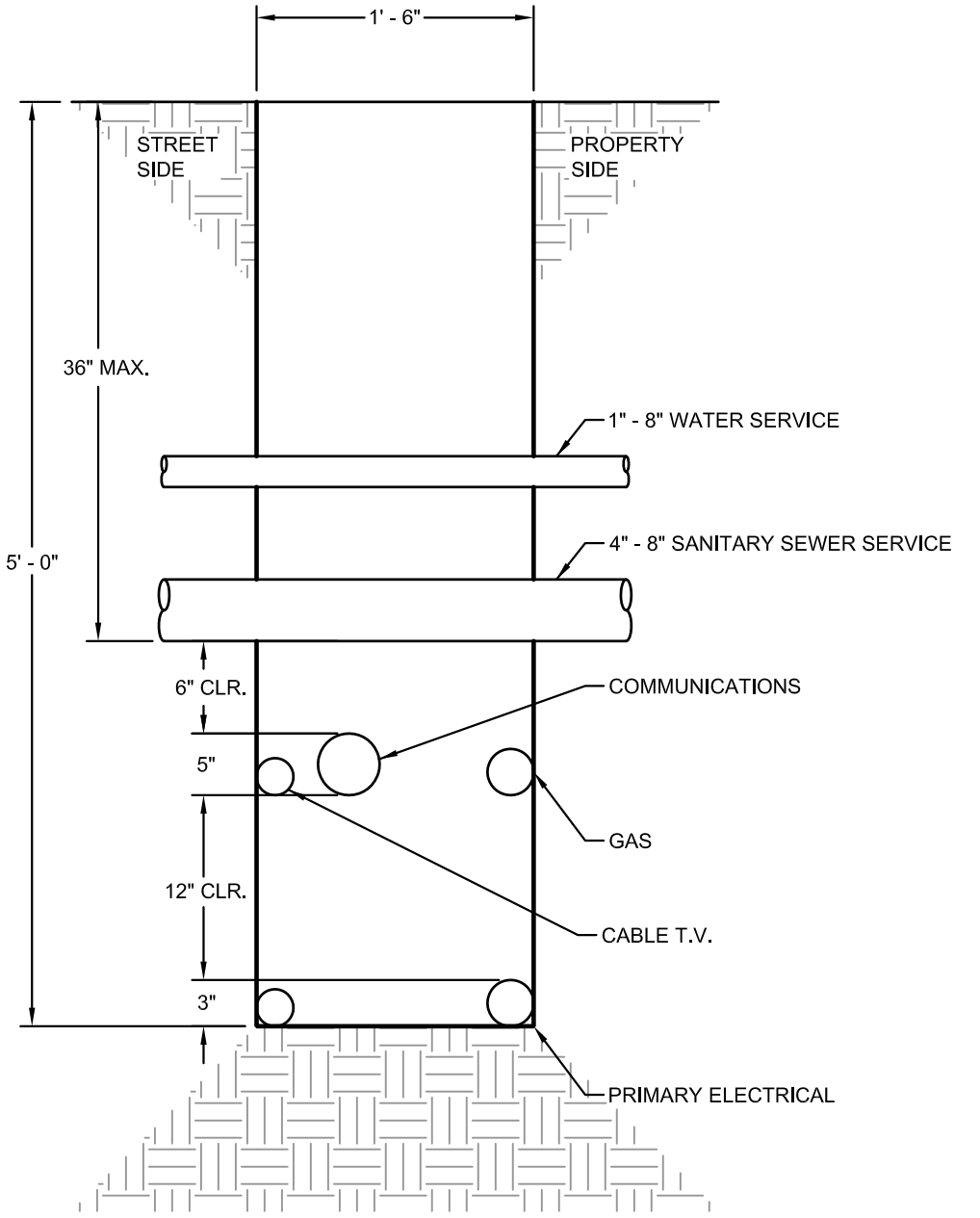
JOINT TRENCH DETAILS

DRAWN BY:	DATE:	SCALE:	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
GK	10/08/15	NTS	1-26-16	1006
REVISIONS: NONE	SECTION: UTILITIES	DRAWING NAME: 1006.DWG		



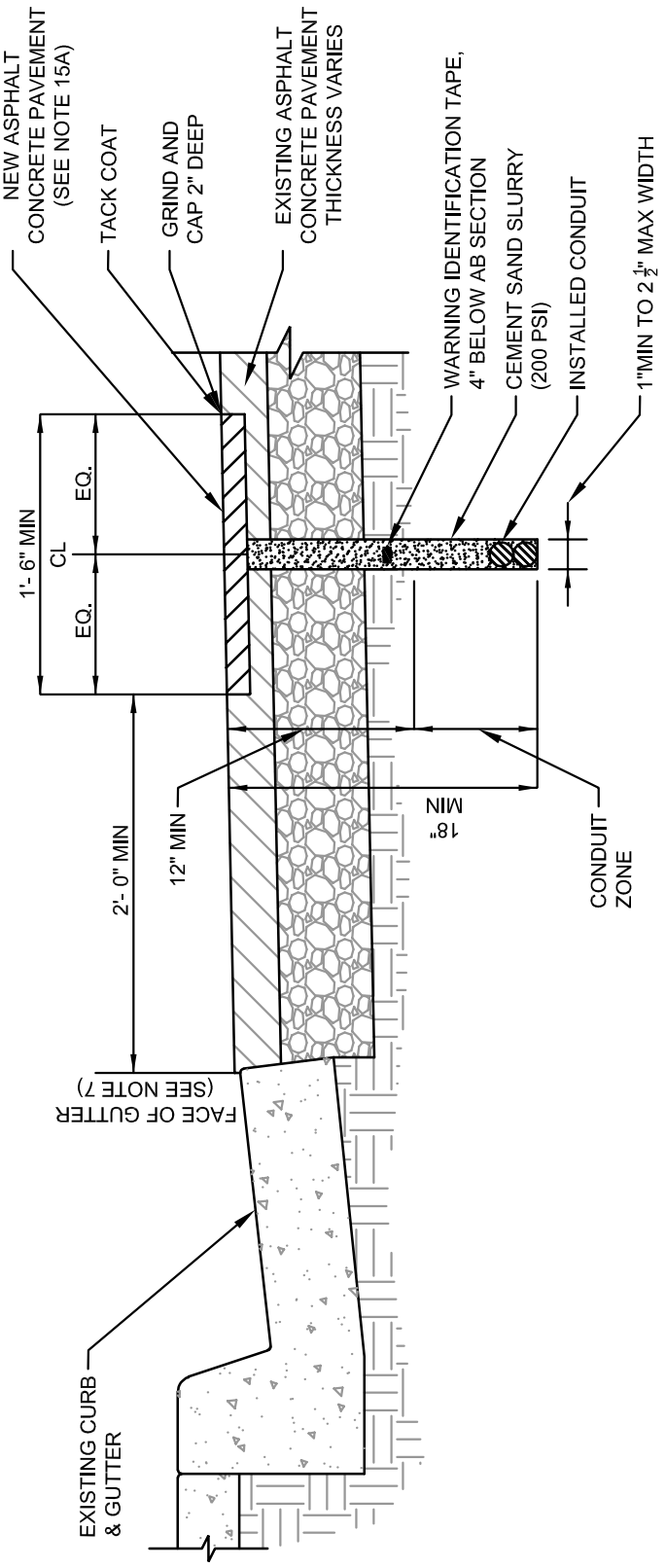
CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

William F. Kull

CITY ENGINEER - WILLIAM F. KULL

JOINT TRENCH SECTION DETAIL

DRAWN BY:	DATE:	SCALE:	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
GK	10/08/15	NTS	1-26-16	1007
REVISIONS: NONE	SECTION: UTILITIES	DRAWING NAME: 1007.DWG		



TYPICAL MICRO-TRENCH SECTION

CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

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CITY ENGINEER - WILLIAM F. KULL

MICRO-TRENCHING SECTION DETAIL

DRAWN BY:	DATE:	SCALE:	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
GK	2/11/2025	NTS	3-11-25	1008
REVISIONS: NONE	SECTION: UTILITIES	DRAWING NAME: 1008.DWG		

NOTES:
ALL WORK SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE LATEST STANDARD SPECIFICATIONS OF THE CITY OF RIVERBANK SPECIFICATIONS AND THE MOST CURRENT CALTRANS SPECIFICATIONS.

GENERAL

1. MICRO-TRENCHING SHALL ONLY BE USED TO INSTALL TELECOMMUNICATION CONDUITS.
2. MICRO-TRENCHING SHALL NOT BE ALLOWED IN CONCRETE PAVED STREETS, NOR SIDEWALKS, PARKWAYS, CURBS, AND GUTTERS.
3. THE CONTRACTOR SHALL IDENTIFY ALL EXISTING UTILITIES, INCLUDING SERVICE CONNECTIONS IN THE FIELD. THE CONTRACTOR SHALL CONTACT UNDERGROUND SERVICE ALERT (U.S.A.) AT LEAST 48 HOURS PRIOR TO START OF THE WORK. THE CONTRACTOR SHALL FURTHER SUPPLEMENT THE FINDINGS OF U.S.A. TO DETERMINE THE EXACT LOCATIONS AND DEPTHS OF ALL UTILITIES BY USING A MOBILE GROUND PENETRATING RADAR SYSTEM. THE CONTRACTOR SHALL POTHOLE ALL CROSSING UTILITIES AND PARALLEL UTILITIES WITHIN 24-INCHES OF THE PROPOSED ALIGNMENT TO A DEPTH OF 6-INCHES BELOW THE BOTTOM OF THE MICRO-TRENCH, TO DETERMINE THE EXISTING UTILITY ALIGNMENT AND ELEVATION. POTHOLES SHALL BE IMMEDIATELY BACKFILLED AND COMPACTED IN ACCORDANCE WITH THE SPECIFICATIONS OR RESTORED AS DIRECTED THE THE CITY INSPECTOR OR ENGINEER.
4. IF EXISTING UTILITIES ARE DAMAGED, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE CITY INSPECTOR, ENGINEER AND UTILITY OWNER TO PERFORM THE REPAIRS PROMPTLY ACCORDING TO THEIR REQUIREMENTS AND PER ASSOCIATED CITY PERMITS.
5. THE FOLLOWING ITEMS SHALL BE SUBMITTED BY THE CONTRACTOR TO THE ENGINEER FOR APPROVAL:
   - 5.1. PROVIDE A DETAILED SITE PLAN THAT SHALL INCLUDE THE DISTANCES OF MICRO-TRENCH AND EDGES OF GRIND AND CAP.
   - 5.2. A TYPICAL MICRO-TRENCH DETAIL THAT INCLUDES THE FOLLOWING INFORMATION:
     - 5.2.1. THE MAXIMUM ASPHALT CONCRETE (AC) ROADWAY THICKNESS BASE, DEPTH AND WIDTH OF MICRO-TRENCH, DEPTH OF TOPMOST CONDUIT, AND BACKFILL MATERIAL.
     - 5.2.2. AC REINSTATEMENT INCLUDING WIDTH AND DEPTH OF GRIND AND CAP.
     - 5.2.3. DETECTABLE WARNING TAPE.
   - 5.3. DETAIL SHOWING CONDUIT FROM MAIN MICRO-TRENCH ALIGNMENT TO LATERAL SURFACE CONNECTIONS INCLUDING TO ANY JUNCTION/PULL BOX. INCLUDE SPECIFIC INFORMATION OF DEPTH, SIZE, AND METHOD OF EXCAVATION BELOW EXISTING CURB AND GUTTER.
   - 5.4. CUT SHEETS OF THE PROPOSED EQUIPMENT PARTICULARLY SUITABLE FOR MICRO-TRENCHING, INCLUDING:
     - 5.4.1. MICRO-TRENCHER CAPABLE OF MEETING TARGET DEPTH AND WIDTH IN A SINGLE PASS WITH AN INTEGRAL HOOD AND ASSOCIATED VACUUM SYSTEM. SELECTION OF CUTTING WHEEL SHALL BE SUCH THAT IT MINIMIZED DAMAGE TO THE ADJACENT AC SURFACE.
     - 5.4.2. MOBILE CONCRETE/SLURRY PLACEMENT WITH AN ON-BOARD VIBRATOR AND NARROW TROUGH TO MATCH MICRO-TRENCH WIDTH.
     - 5.4.3. MOBILE GROUND PENETRATING RADAR SYSTEM THAT IS CAPABLE OF LOCATING BOTH METALLIC AND NON-METALLIC PIPES AND CABLES TO A DEPTH OF 24-INCHES.
   - 5.5. OTHER SITE SPECIFIC ITEMS AS REQUIRED BY THE CITY INSPECTOR OR ENGINEER.

LIMITS OF REMOVALS, TRENCH WIDTH, AND LOCATIONS

6. THE MICRO-TRENCH SHALL BE CONSTRUCTED WITH CONTINUOUS UNIFORM STRAIGHT AND NEAT EDGES.
7. MICRO-TRENCH ALIGNMENTS SHALL CONSIST OF RUNS PARALLEL TO THE CENTERLINE OF THE STREET. STREET CROSSING MAY BE DONE PROVIDED THE ALIGNMENT IS PERPENDICULAR TO THE STREET CENTERLINE TO THE EXTENT POSSIBLE.
8. THE EDGE OF THE MICRO-TRENCH SHALL BE A MINIMUM OF 36-INCHES FROM THE EXISTING FACE OF THE GUTTER, EXISTING CONCRETE STRUCTURE, OR CURB IF GUTTER IS NOT PRESENT.
9. THE MICRO-TRENCH WIDTH SHALL BE A MINIMUM OF 1-INCH AND A MAXIMUM OF $2\frac{1}{2}$-INCHES.
10. MICRO-TRENCHING MAY BE PERMITTED UPON THE ENGINEER'S DISCRETION ON SPECIAL PAVEMENTS SUCH AS DECORATIVE ASPHALT PAVING AND THROUGH EXISTING IMPROVEMENTS SUCH AS PERPENDICULAR TO SPEED BUMPS. SPECIAL PAVEMENTS AND EXISTING IMPROVEMENTS SHALL BE RESTORED IN KIND AS APPROVED BY THE ENGINEER. HOWEVER, MICRO-TRENCHING THROUGH EXISTING CURB, GUTTER, CROSS GUTTER, BUS PAD, SIDEWALK, FLOATING CURB EXTENSION, BUS BULB, TRUCK PILLOW, RAISED CROSSWALK, ISLAND, MINI-ROUNDABOUT, OR SIMILAR ELEMENTS IS NOT PERMITTED.
11. UP TO THREE (3) VERTICALLY STACKED CONDUITS CAN BE PLACED WITHIN A MICRO-TRENCH.
12. THE CONDUIT SHALL BE INSTALLED AT A MINIMUM DEPTH OF 12-INCHES BELOW THE EXISTING AC PAVEMENT SURFACE, AT LEAST 4-INCH BELOW THE BOTTOM OF THE AB SECTION, AND THE BOTTOM OF THE MICRO-TRENCH SHALL BE AT A MINIMUM DEPTH OF 18-INCHES BELOW THE EXISTING AC PAVEMENT SURFACE.

(CONTINUED)

CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

William F. Kull
CITY ENGINEER - WILLIAM F. KULL

MICRO-TRENCHING NOTES (1)

DRAWN BY:	DATE:	SCALE:	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
GK	2/11/2025	NTS	3-11-25	1009
REVISIONS:	SECTION:	DRAWING NAME:		
NONE	UTILITIES	1008.DWG		

(CONTINUED)

13. ANCHORS/SPACERS SHALL BE PLACED AT A MAXIMUM OF 10-FEET APART ALONG THE ALIGNMENT TO ENSURE THE CONDUIT DOES NOT RISE FROM THE BOTTOM OF THE MICRO-TRENCH AND DOES NOT TOUCH THE WALLS OF THE MICRO-TRENCH DURING INSTALLATION.

BACKFILL

14. ALL MICRO-TRENCHES SHALL BE COMPLETELY BACKFILLED WITH A CEMENT SAND SLURRY 200 PSI TO FINISH GRADE BY THE END OF THE WORK DAY.

GRIND AND RESURFACE SECTION

15. COMMENCEMENT OF SURFACE PREPARATION SUCH AS GRINDING/CHIPPING FOR ASPHALT CONCRETE PAVING REPLACEMENT WILL OCCUR NO SOONER THAN 48 HOURS AFTER SLURRY BACKFILL OF TRENCH. FIELD CONDITIONS OR MATERIAL USED MAY NECESSITATE A LONGER WAIT AS DETERMINED BY THE INSPECTOR.
16. AS SOON AS BACKFILL HAS CURED, NOT TO EXCEED 30 CALENDAR DAYS, ASPHALT CONCRETE SHALL BE GROUND AND CAPPED AS FOLLOWS:
    - 16.1 EXISTING AC AND SLURRY BACKFILL SHALL BE GROUND DOWN 2-INCHES, FOR A WIDTH OF 18-INCHES BUT TO LESS THAN 6-INCHES FROM BOTH EDGES OF THE MICRO-TRENCH AND RESURFACED WITH ASPHALT AND BINDER GRADE PER CALTRANS SPECIFICATIONS. WHEN THE CAP LIMIT IS WITHIN 3-FEET OR LESS FROM THE GUTTER FACE, CURB SLAB OR STRUCTURE, THE CAP LIMIT SHALL EXTEND TO THAT ITEM.
    - 16.2 TACK COAT ALL EDGES WITH EITHER SS-1H EMULSIFIED ASPHALT OR PG-64-10 PAVING ASPHALT IMMEDIATELY BEFORE THE ADJOINING ASPHALT CONCRETE IS PLACED.
    - 16.3 WHERE ANGULAR CROSSING OR ANY LENGTH-WISE CUTS OF A BIKE LANE OCCUR BY MICRO-TRENCHING, THE CAPING LIMITS SHALL EXTEND THE FULL WIDTH OF THE BIKE LANE. PERPENDICULAR CROSSINGS MAY RECEIVE TYPICAL CAPPING WIDTH PER NOTE 16.1. PAVEMENT MARKING SHALL BE RESTORED IN KIND, WHERE NO BIKE LANE MARKINGS EXIST, CONTRACTOR SHALL CONSULT WITH CITY INSPECTOR OR ENGINEER TO DETERMINE LOCATION OF ANY PLANNED BIKE LANES SO THAT IMPACT OF PAVEMENT SURFACE MAY BE AVOIDED.
    - 16.4 PAVEMENT SHALL BE LEVEL WITH ADJACENT ROADWAY ELEVATIONS AND SHALL PROVIDE A SMOOTH SURFACE AND SUBJECT TO ACCEPTANCE BY THE INSPECTOR.

VAULTS AND SERVICE CONNECTIONS

17. CONNECTION TO SERVICE LATERALS, JUNCTION BOXES, ETC., SHALL BE DONE SUCH THAT CURB AND GUTTER IS NOT DISTURBED, SETTLED OR DAMAGED. REMOVAL LIMITS OF SIDEWALK SHALL FOLLOW APPLICABLE STANDARDS AND REQUIREMENTS AS APPROVED BY THE CITY INSPECTOR OR ENGINEER.
18. THE USE OF HYDRO-JETTING IS NOT PERMITTED. TRENCHLESS METHODS SHALL NOT CREATE A VOID TWO TIMES GREATER THAN CONDUIT, VOID SHALL BE COMPACTED AND BACKFILLED WITH APPROVED CONTROLLED LOW-STRENGTH MATERIAL (CLSM).

IDENTIFICATION

19. EACH MICRO-TRENCH SHALL BE IDENTIFIED WITH A METAL IDENTIFICATION TAG LISTING THE OWNER YEAR OF CONSTRUCTION AND INCLUDE THE WORDS "NOT A SURVEY POINT". IF THE WORK IS MORE THAN 50 FEET IN LENGTH, PLACE THE TAG NEAR EACH END OF THE MICRO-TRENCH AND AT INTERVALS NOT TO EXCEED 50 FEET.

CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

William F. Kull
CITY ENGINEER - WILLIAM F. KULL

MICRO-TRENCHING NOTES (2)

DRAWN BY:	DATE:	SCALE:	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
GK	2/11/2025	NTS	3-11-25	1010
REVISIONS:	SECTION:	DRAWING NAME:		
NONE	UTILITIES	1010.DWG		

EXCAVATION WORK IN PUBLIC RIGHT-OF-WAY
GENERAL NOTES FOR STREET RESTORATION

1. NO PLANNED WORK SHALL BE EXECUTED IN ANY PART OF THE PUBLIC RIGHT-OF-WAY FOR THE INSTALLATION, REPAIR, OR REMOVAL OF ANY FACILITY, OR FOR ANY OTHER PURPOSE, WITHOUT FIRST OBTAINING A WRITTEN PERMIT IN ACCORDANCE WITH THE CITY OF RIVERBANK PERMIT ORDINANCE.

2. ALL WORK SHALL BE DONE IN ACCORDANCE WITH THE LATEST EDITION OF THE "CALTRANS STANDARD SPECIFICATIONS AND STANDARD PLANS", CITY OF RIVERBANK STANDARD DETAILS AND, SPECIAL PROVISIONS.

3. THE CITY HAS THE AUTHORITY TO APPROVE OR REJECT THE PLACEMENT AND ALIGNMENT OF UTILITY LINES IN THE PUBLIC RIGHT-OF-WAY TO AVOID OTHER UTILITIES OR OTHERWISE MANAGE THE PUBLIC RIGHT OF WAY, THE SCOPE OF STREET RESTORATION, AND THE LOCATION OF ABOVE GRADE INFRASTRUCTURE.

4. THE CONTRACTOR SHALL TAKE NECESSARY PRECAUTIONS TO PREVENT AVOIDABLE DAMAGE TO IMPROVEMENTS IN PUBLIC RIGHT-OF-WAY. IF THE CONTRACTOR DAMAGES THE PUBLIC RIGHT-OF-WAY OUTSIDE THE PLANNED LIMITS OF CONSTRUCTION, THE CITY WILL MARK THE REQUIRED LIMITS OF REMOVAL AND REPLACEMENT.

5. DIAGONAL TRENCHING ON ASPHALT CONCRETE IS NOT PERMITTED. THE PUBLIC WORKS INSPECTOR MAY ALLOW EXCEPTIONS ASPHALT CONCRETE BASED ON THE SPECIFIC CIRCUMSTANCES OBSERVED IN THE FIELD BUT WILL REQUIRE MORE EXTENSIVE/LARGER ASPHALT RESTORATION TO SQUARE THE AREA IN THE DIRECTION OF TRAVEL (I.E.DRIVE LANE OVERLAY.

6. THE CONTRACTOR SHALL PERFORM WORK IN COOPERATION WITH THE OTHER UTILITIES, INCLUDING BUT NOT LIMITED TO CONSIDERATION OF JOINT TRENCHING.

7. IN OPEN CUT AND/OR PIT AND BORE CONSTRUCTION, ALL EXISTING UNDERGROUND UTILITIES, INCLUDING SERVICE LATERALS WITHIN TWO (2) FEET OF THE EXCAVATION WORK, SHALL BE MARKED, POTHOLED, AND EXPOSED TO DETERMINE TYPE, ALIGNMENT, OFFSET DISTANCE, AND DEPTH.

8. THE CONTRACTOR SHALL PROTECT IN PLACE ALL UTILITIES THAT ARE IMPACTED AND SHALL SUBMIT FOR REVIEW AND APPROVAL TO THE PUBLIC WORKS INSPECTOR THE METHOD OF PROTECTING THE UTILITIES. HAND DIGGING IS REQUIRED WHEN CROSSING EXISTING UTILITIES.

9. BORING IS THE PREFERRED METHOD WHEN EXCAVATION WILL PASS THROUGH A CROSS GUTTER, DRIVEWAY APPROACH, ALLEY, APPROACH, OR BUS LANES AND BUS PADS. IF BORING IS NOT POSSIBLE, THE PUBLIC WORKS INSPECTOR WILL DETERMINE HOW THE AREA IS TO BE RESTORED.

10. WHERE POSSIBLE, UNDERGROUND CROSSING OF STREETS WILL BE INSTALLED BY BORING. SOME UTILITIES DUE TO THEIR STANDARDS WILL HAVE ALTERNATE METHODS OF INSTALLING.

11. EXCEPT IN AN EMERGENCY, THERE SHALL BE NO EXCAVATION IN STREETS OVERLAID OR RECONSTRUCTED BY THE CITY WITHIN THE PRECEDING FOUR (4) YEARS.

12. EXCEPT IN AN EMERGENCY, THERE SHALL BE NO EXCAVATION IN STREETS SLURRY SEALED BY THE CITY WITHIN THE PRECEDING TWO (2) YEARS. WHERE EXCAVATION IS NECESSARY OR APPROVED TO OCCUR IN A NEWLY SLURRY SEALED STREET, THE RESTORATION AFTER THE TRENCH PAVING SHALL INCLUDE SLURRY SEALING TWENTY FEET BEYOND THE LIMITS OF ALL TRENCHING OR CONSTRUCTION DAMAGE. PLEASE NOTE, THIS MAY NOT BE THE ONLY CONDITION UPON WHICH THE CITY MAY REQUIRE SLURRY SEAL TO PROPERLY RESTORE THE STREET.

CITY OF RIVERBANK DEPARTMENT OF PUBLIC WORKS			EXCAVATION WORK IN PUBLIC RIGHT-OF-WAY (1)	
William F. Kull CITY ENGINEER - WILLIAM F. KULL				
DRAWN BY: GK	DATE: 2/11/2025	SCALE: NTS	ADOPTED BY THE CITY COUNCIL: 3-11-25	DRAWING NO. 1011
REVISIONS: NONE	SECTION: UTILITIES	DRAWING NAME: 1011.DWG		

EXCAVATION WORK IN PUBLIC RIGHT-OF-WAY
GENERAL NOTES FOR STREET RESTORATION

(CONTINUED)

13. PUBLIC RIGHT-OF-WAY RESTORATION ****

	TRENCH PERPENDICULAR TO THE PATH OF TRAVEL	TRENCH PARALLEL TO THE PATH OF TRAVEL*	POTHOLE OR OTHER INDIVIDUAL CUT	MULTIPLE CUTS
ARTERIAL / COLLECTOR STREET	T-CUT TRENCH 12" EITHER SIDE OF CUT AND OVERLAY WITH ASPHALT PER DETAIL 1015 DETAIL 1016	COLD PLANE 10' CENTERED ON TRENCH/DRIVE LANE AND 10' BEFORE AND AFTER TRENCH ** OVERLAY WITH MATCHING ASPHALT *** DETAIL 1015	T-CUT 12" ON ALL SIDES OF POTHOLE AND OVERLAY WITH ASPHALT PER DETAIL 1015	PER THE DIRECTION OF PUBLIC WORKS INSPECTOR. E.G. EXCESSIVE BORE PITS MAY RESULT IN COLD PLANE 10' REQUIREMENT OR SLURRY SEAL DETAIL 1014
LOCAL STREET / ALLEY	T-CUT 12" EITHER SIDE OF CUT AND OVERLAY WITH ASPHALT PER DETAIL 1015 DETAIL 1016	COLD PLANE 5' CENTERED ON TRENCH AND 5' BEFORE AND AFTER TRENCH ** OVERLAY WITH MATCHING ASPHALT *** DETAIL 1015	T-CUT 12" ON ALL SIDES OF POTHOLE AND OVERLAY WITH ASPHALT PER DETAIL 1015	PER THE DIRECTION OF THE PUBLIC WORKS INSPECTOR DETAIL 1014
NEWLY PAVED STREET OR ALLEY (WITHIN 4 YEARS OF LAST OVERLAY)	COLD PLANE 10' CENTERED ON TRENCH AND 10' BEFORE AND AFTER TRENCH ** OVERLAY WITH MATCHING ASPHALT *** DETAIL 1015	COLD PLANE THE FULL LANE WIDTH FOR ALL IMPACTED LANES WITH END TRANSITION ** OVERLAY WITH MATCHING ASPHALT *** DETAIL 1015	COLD PLANE THE FULL LANE WIDTH FOR ALL IMPACTED LANES WITH END TRANSITIONS ** OVERLAY WITH MATCHING ASPHALT ***	PER THE DIRECTION OF THE PUBLIC WORKS INSPECTOR. E.G. EXCESSIVE BORE PITS MAY RESULT IN COLD PLANE 10' REQUIREMENTS
NEW SLURRY SEALED STREET OR ALLEY (WITHIN 2 YEARS OF LAST SLURRY SEAL)	CRACK AND SLURRY SEAL A MINIMUM OF 20' BEYOND THE LIMITS OF ALL TRENCHING OR CONSTRUCTION DAMAGE	CRACK AND SLURRY SEAL THE FULL LANE WIDTH FOR ALL IMPACTED LANES OR AS REQUIRED FOR RE-STRIPING LINES AND MARKINGS	CRACK AND SLURRY SEAL THE FULL LANE WIDTH FOR ALL IMPACTED LANES OR AS REQUIRED FOR RE-STRIPING LINES AND MARKINGS DETAIL 1015	CRACK AND SLURRY SEAL THE FULL LANE WIDTH FOR ALL IMPACTED LANES OR AS REQUIRED FOR RE-STRIPING LINES AND MARKINGS

* ALL TRENCHES MUST BE T-CUT 12" EITHER SIDE OF THE TRENCH, TO INCLUDE PARKING LANE.

** TOTAL DISTANCE OF THE TRANSITIONS WILL BE DETERMINED BY THE PUBLIC WORKS INSPECTOR.

*** OVERLAY ASPHALT THICKNESS SHALL BE A MINIMUM OF THREE TIMES THE NOMINAL AGGREGATE SIZE.

**** EXCAVATIONS SHALL COMPLY WITH TRENCH AND POTHOLE REQUIREMENTS FOR RESPECTIVE STREET TYPE.

PLEASE NOTE THAT THIS TABLE IS PART OF THE CITY OF RIVERBANK PUBLIC WORKS CONSTRUCTION STANDARD DETAILS. THE CITY MAY REQUIRE ADDITIONAL PUBLIC RIGHT-OF-WAY RESTORATION AS PART OF THE CONDITION OF APPROVAL ASSOCIATED WITH A DISCRETIONARY LAND USE APPROVAL.

CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

William F. Kull
CITY ENGINEER - WILLIAM F. KULL

EXCAVATION WORK IN PUBLIC RIGHT-OF-WAY (2)

DRAWN BY:	DATE:	SCALE:	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
GK	2/11/2025	NTS	3-11-25	1012
REVISIONS: NONE	SECTION: UTILITIES	DRAWING NAME: 1012.DWG		

(CONTINUED)

14. WHEN ASPHALT STREETS AND ALLEYS ARE CUT WITHIN THREE FEET OF A CURB, GUTTER, OR PAVEMENT COLD JOINT, THE CONTRACTOR SHALL REMOVE THE FULL THICKNESS OF THE REMAINING PAVEMENT SLIVER OR GRIND AND OVERLAY THIS AREA.

15. WHEN ASPHALT STREETS ARE CUT WITHIN STRIPED BICYCLE LANES, THE ENTIRE BICYCLE LANE WITH SHALL BE RESTORED WITHOUT ANY JOINTS IN THE LANE.

16. THE CONTRACTOR SHALL BE RESPONSIBLE FOR REPLACEMENT OF ANY DAMAGED TRAFFIC SIGNAL LOOPS, TRAFFIC STRIPING, AND STREET MARKINGS AT NO EXPENSE TO THE CITY.

17. SURVEY MONUMENTS, SURVEY NAILS AND TAGS, BENCHMARKS, AND THE LIKE THAT ARE DAMAGED, REMOVED, OR DISTURBED SHALL BE REPLACED AT THE SAME LOCATION WITH A SIMILAR MARKER BY A LICENSED LAND SURVEYOR UNDER CONTRACT TO THE PERMITTEE AND AT NO EXPENSE TO THE CITY. COPIES OF THE RESET DOCUMENTS (CALLED "CORNER RECORD") WILL BE PRESENTED TO THE PUBIC WORKS INSPECTOR AS PART OF THE FINAL INSPECTION AND MUST BE FILED WITH THE COUNTY OF STANISLAUS.

COLD PLANE & OVERLAY LIMITS

WITHIN 30 CALENDAR DAYS AFTER BACKFILLING, ASPHALT CONCRETE SHALL BE COLD PLANED AND OVERLAID/RESURFACED AS FOLLOWS:

18. EXISTING ASPHALT CONCRETE SHALL BE GROUND DOWN 2 INCHES, OR ONE-HALF THE EXISTING PAVEMENT THICKNESS WHICHEVER IS LESS, TO THE LIMITS SPECIFIED IN DRAWING NO. 1012.

19. WHERE POSSIBLE, COLD PLANE & OVERLAY SHALL BE PER EXAMPLES SHOWN ON DETAILS No. 1015 & 1016.

20. COLD PLANE & OVERLAY LIMITS SHALL EXTEND AT LEAST 2 FEET BEYOND THE TRENCH "T-CUT" LIMITS MINIMUM DIMENSIONS SHALL BE 5 FEET X 5 FEET.

21. "T-CUT" AND CORRESPONDING OVERLAY (AS APPLICABLE) IS REQUIRED FOR ALL EXCAVATIONS WITH A SURFACE AREA OF 2 SQUARE FEET OR GREATER.

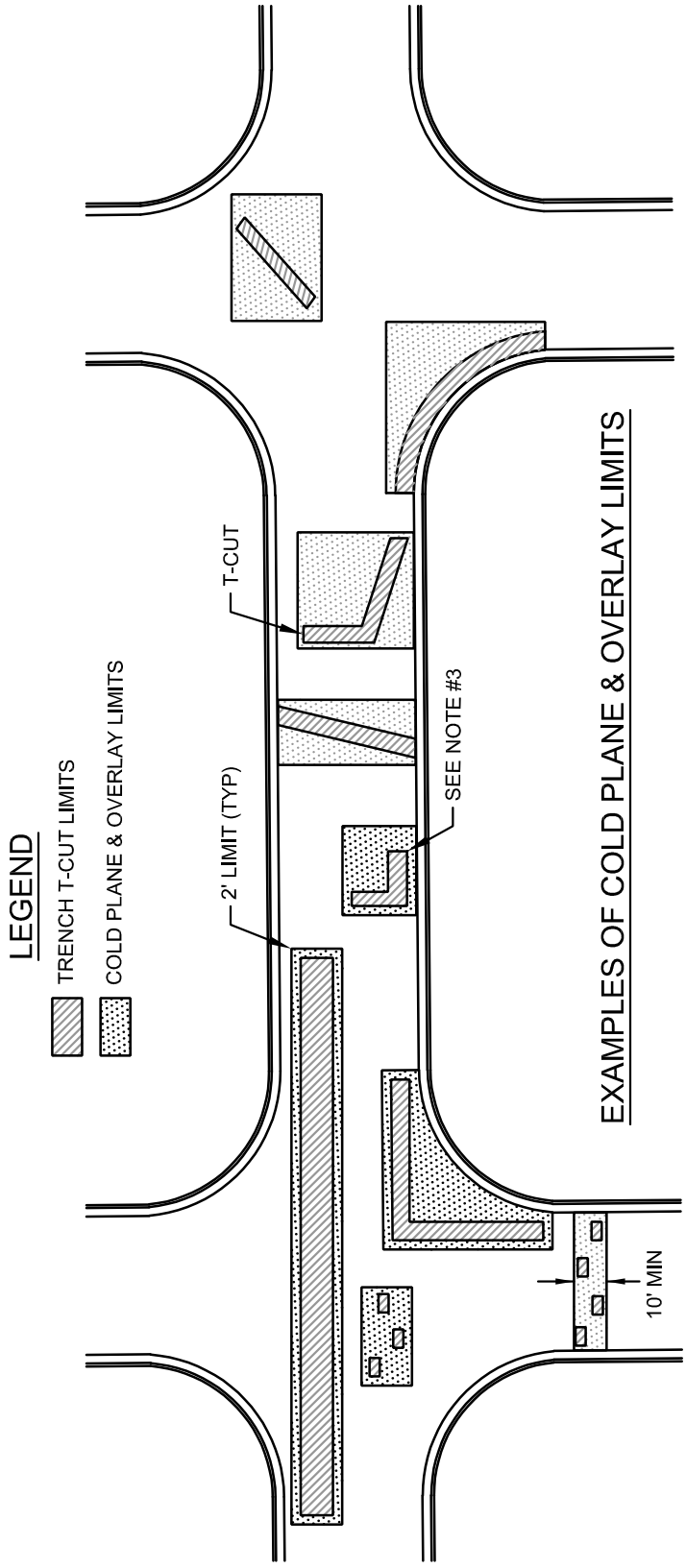
22. IMPACTED BIKE LANES - COLD PLANE AND OVERLAY LIMITS SHALL FULLY ENCOMPASS ANY BIKE LANE IMPACTED BY THE TRENCH, AND SHALL HAVE A LENGTH THAT EXTENDS AT LEAST 2 FEET BEYOND THE ASPHALT REMOVAL LIMITS IN THE DIRECTION OF BIKE TRAFFIC.

CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

William F. Kull
CITY ENGINEER - WILLIAM F. KULL

EXCAVATION WORK IN PUBLIC RIGHT-OF-WAY (3)

DRAWN BY:	DATE:	SCALE:	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
GK	2/11/2025	NTS	3-11-25	1013
REVISIONS:	SECTION:	DRAWING NAME:		
NONE	UTILITIES	1013.DWG		



NOTES:

1. WIDTH AND ANGEL OF THE TRENCH "T" CAN VARY DUE TO SITE CONDITIONS; EXACT WIDTH SHALL BE DETERMINED BY THE ENGINEER OR CITY INSPECTOR.
2. COLD PLANE & OVERLAY LIMITS SHALL BE SQUARE TO THE CURB FACE AND ROADWAY AND EXTEND A MINIMUM OF 2 FEET BEYOND THE "T-CUT" LIMITS.
3. PER DETAIL 1013, LINE 14: WHEN CUTTING WITHIN 3' OF A CURB, GUTTER OR PAVEMENT COLD JOINT.
4. NO JOINTS WILL BE LOCATED WITHIN THE WHEEL PATH OF VEHICULAR TRAFFIC.

CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

William F. Kull
CITY ENGINEER - WILLIAM F. KULL

EXCAVATION WORK IN PUBLIC RIGHT-OF-WAY (4)

DRAWN BY:	DATE:	SCALE:	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
GK	2/11/2025	NTS	3-11-25	1014
REVISIONS: NONE	SECTION: UTILITIES	DRAWING NAME: 1014.DWG		

TABLE A: A.C. DEPTH	
LOCAL STREETS / ALLEYS	0.33' A.C. / 0.50' AB MINIMUM
ARTERIAL / COLLECTOR STREETS	0.50' A.C. / 0.67' AB MINIMUM

NOTES:

1. FULL TACK COAT ON ALL VERTICAL AND HORIZONTAL SURFACES. USE SS1-h EMULSION.
2. WITH OF TRENCH "T" VARIES DUE TO SITE CONDITIONS; EXACT WIDTH SHALL BE DETERMINED BY THE ENGINEER OR CITY INSPECTOR.

CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

TRENCH PAVING REQUIREMENTS

William F. Kull
CITY ENGINEER - WILLIAM F. KULL

DRAWN BY:	DATE:	SCALE:	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
GK	2/11/2025	NTS	3-11-25	1015
REVISIONS: NONE	SECTION: UTILITIES	DRAWING NAME: 1015.DWG		

CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

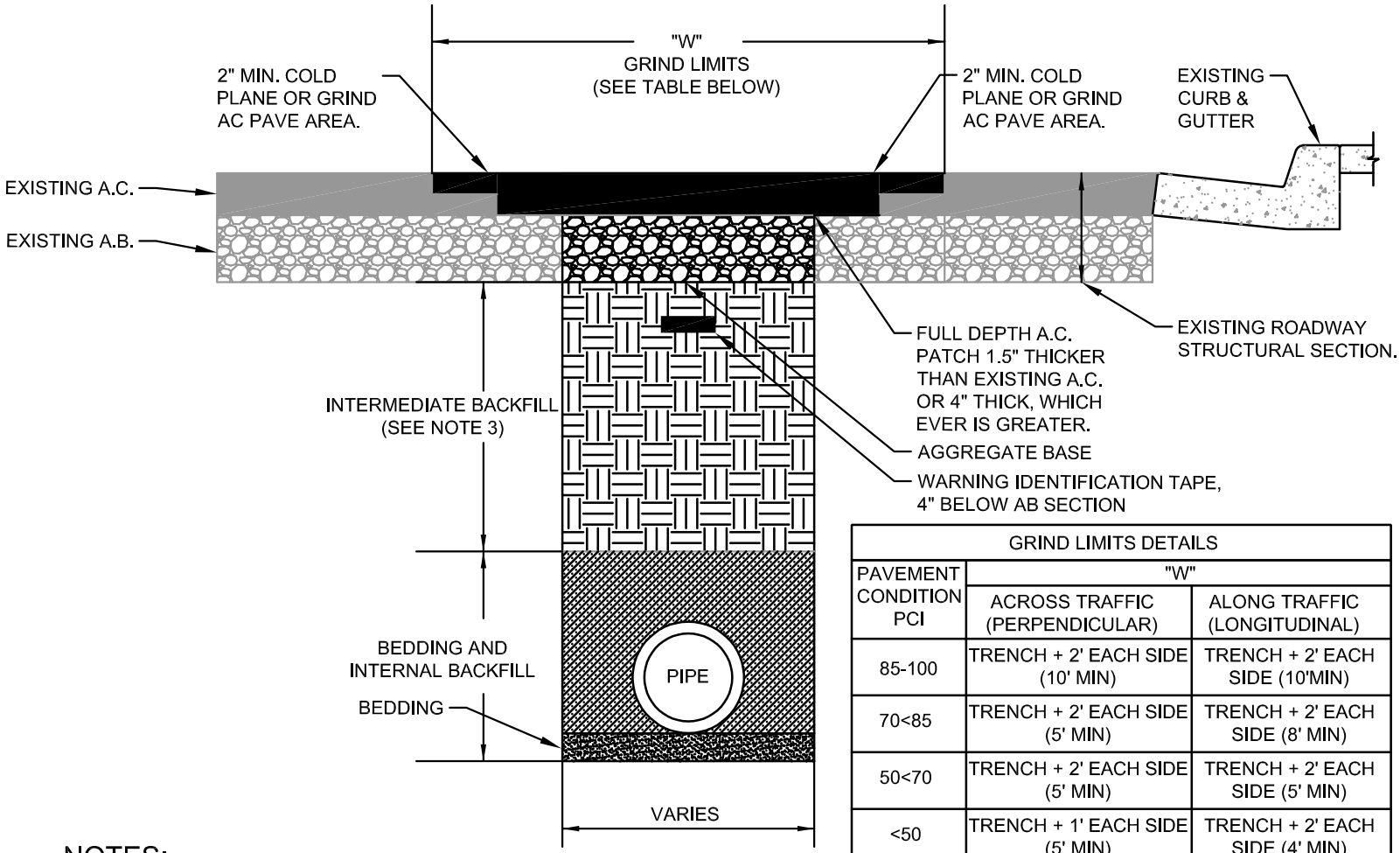
CITY ENGINEER - WILLIAM F. KULL

DRAWN BY: GK
DATE: 2/11/2025
SCALE: NTS
DRAWING NAME: 1016.DWG
REVISIONS: NONE
SECTION: UTILITIES

TRENCH BACKFILLING AND RESURFACING

ADOPTED BY THE CITY COUNCIL: 3-11-25

DRAWING NO. 1016



GRIND LIMITS DETAILS		
PAVEMENT CONDITION PCI	"W"	
	ACROSS TRAFFIC (PERPENDICULAR)	ALONG TRAFFIC (LONGITUDINAL)
85-100	TRENCH + 2' EACH SIDE (10' MIN)	TRENCH + 2' EACH SIDE (10'MIN)
70<85	TRENCH + 2' EACH SIDE (5' MIN)	TRENCH + 2' EACH SIDE (8' MIN)
50<70	TRENCH + 2' EACH SIDE (5' MIN)	TRENCH + 2' EACH SIDE (5' MIN)
<50	TRENCH + 1' EACH SIDE (5' MIN)	TRENCH + 2' EACH SIDE (4' MIN)

NOTES:

1. GRINDING / PAVEMENT JOINT SHALL BE LOCATED ALONG GUTTER LINES, LANE LINES, OR CENTER OF LANES AND SHALL NOT BE PLACED IN WHEEL LINES.
2. ENTIRE BIKE LANE SHALL BE RE-PAVED WHEN TRENCHING OCCURS IN BIKE LANE AREA.
3. INTERMEDIATE BACKFILL MATERIALS SHALL BE PER ENGINEER OR CITY INSPECTOR APPROVAL.
4. ADDITIONAL PAVEMENT REMOVAL: TO LANE STRIPE, LIP OF GUTTER, CURB, EXISTING PAVEMENT PATCH, OR TO AN EXISTING STREET FEATURE THAT IS WITHIN 3 FEET OF PROPOSED SAW CUT.
5. PCI OF ROADWAY SHALL BE BASED ON THE CITY OF RIVERBANK DATA BASE AND CAN BE REQUESTED FROM THE CITY INSPECTOR.

CITY OF _RIVERBANK__
DEPARTMENT OF PUBLIC SERVICE

ENGINEERING DIVISION

Steel Plates Requirements Used in Connection with Roadway Utility Excavations

NOVEMBER – 2016

Table of Contents

1. PURPOSE

The purpose of this document is to establish and promote uniform policies for the placement, identification and removal of steel plates over open excavations within the public right-of-way in the City of RIVERBANK.

2. OBJECTIVE

These requirements are intended to provide a high level of service of City streets by ensuring that the streets are left in the same condition in which they were found before the excavation, and establishing criteria for the use of steel plates during the cutting of pavement, excavating, backfilling and repairing of pavements cuts. This will reduce congestion and hazards along with increasing public service and safety in and out of construction sites.

3. BACKGROUND

Steel plates are used primarily in urban areas where an excavation is made in the roadway for utility work, such as installing or replacing utility lines, pipes and conduits. Steel plates are positioned on the roadway to cover the excavation and allow traffic to proceed when utility work is not underway. Motorcyclists and bicyclists are challenged when they traverse an unexpected plate.

The use of steel plates by utility companies and their contractors in the City of RIVERBANK as a temporary cover over an excavated area in a vehicular travel lane can present safety hazards and other problems if allowed to remain in place for extended periods and not properly secured. Some of the problems include:

- Plates being installed incorrectly resulting in the loud rattling of the plates.
- Plates not clearly marked in a location easily visible with no way of determining the owner of the plate.
- Plates being used as a permanent roadway fix.

The City of RIVERBANK grants permission for placement of all proposed utilities and for all construction and maintenance work in public rights-of-ways and easements by issuing a permit from the Engineering Division.

4. PERMIT APPLICATION AND NON-CONFORMANCE

4.1. Permitting

Any work in the street, alley, or right-of-way requires an engineering permit from the Engineering Division. This permit allows the utility company or a contractor hired by the utility company or an individual to conduct the work within the right-of-way. Approval of the Engineering Division is required prior to the starting the work. Construction drawings and a site specific traffic control plan issued by the City's Traffic and Transportation Department must be submitted with the permit application form.

4.2. Non-Conformance

Failure to comply with applicable permitting requirements would be considered a violation of City Ordinances.

5. USE OF STEEL PLATES IN THE TRAVELED WAY

When backfill operations of an excavation in the traveled way, whether transverse or longitudinal, cannot be properly completed within a work day, steel plate bridging manufactured with a non-skid surface with a nominal Coefficient of Friction (COF) of 0.35 as specified by ANSI, ASTM, NEPA and OSHA, will be required to preserve unobstructed traffic flow in City streets and roadways. In such instances the following applies:

5.1. Steel Plates Requirements

- Steel plates must be able to withstand HS-20-44 traffic loading without any movement.
- Steel plates shall be fabricated to meet ASTM A36 steel requirements.
- When two or more of plates are in place more than three consecutive days without the need to accomplish work or inspections, the plates shall be tack welded together at each

corner to reduce or eliminate vertical movement. Other alternative methods to accomplish this will be considered for approval.

- Steel plates shall be installed to resist bending, vibrations, etc., under traffic loads and when installed using a type 2 installation; shall be securely anchored with standard railroad spikes or other round smooth headed pins pre-drilled into the corners of the plate, and driven into the pavement section a minimum of 6". If these conditions are not met, the applicant will be required to backfill and pave the excavation daily.
- All steel plates within the right of way whether used in or out of the traveled way shall be without deformation. Inspectors can determine the trueness of steel plates by using a straight edge and should reject any plate that is permanently deformed.
- All steel plates shall be properly marked with the utility and contractor name, including a SC-PUPS identification color marking shown in Figures 1 and 2, using the method and materials of their choice. Identification markings must be permanent in nature.

UTILITY/ TYPE OF PRODUCT	IDENTIFICATION COLOR
GAS, OIL, STEAM, PETROLEUM	YELLOW
ELECTRIC	RED
POTABLE WATER	BLUE
COMMUNICATIONS, TV	ORANGE
SEWER AND DRAIN LINES	GREEN
RECLAIMED WATER, IRRIGATION	PURPLE
TEMPORARY SURVEY	PINK

Figure 1 – PUPS Identification Colors

- It is the responsibility of the permitee to perform and document daily inspections of all active plate(s) or unattended plate(s) location(s), and where necessary take appropriate measures to protect the public safety until work is completed. This documentation shall be available to the City inspector upon request. No un-plated excavation shall be left unattended overnight.
- In the event of improper installation of the steel plates that presents a nuisance or a public safety problem, the permitee shall respond to all excavation restoration requests by the City immediately upon notification. Non-responses will result in the required restoration work be done by the City, with all expenses to be paid by the permitee.
- Steel plates must extend a minimum of 12-inches beyond the edges of the excavation.
- Before steel plates are installed, the excavation shall be adequately shored to support the bridging and traffic loads.
- Temporary paving or cold-mix asphalt concrete (cutback) shall not be allowed to secure or to prevent movement of trench plates unless prior approval is given by the engineer. Other alternative methods to accomplish this will be considered for approval.
- When plates are removed, all anchor/pin holes in the pavement shall be backfilled with an asphalt mix to the satisfaction of the City Inspector.

5.2. Steel Plates Details

Typical drill holes pattern and identification markers affixed to the top of plate, details are shown below.

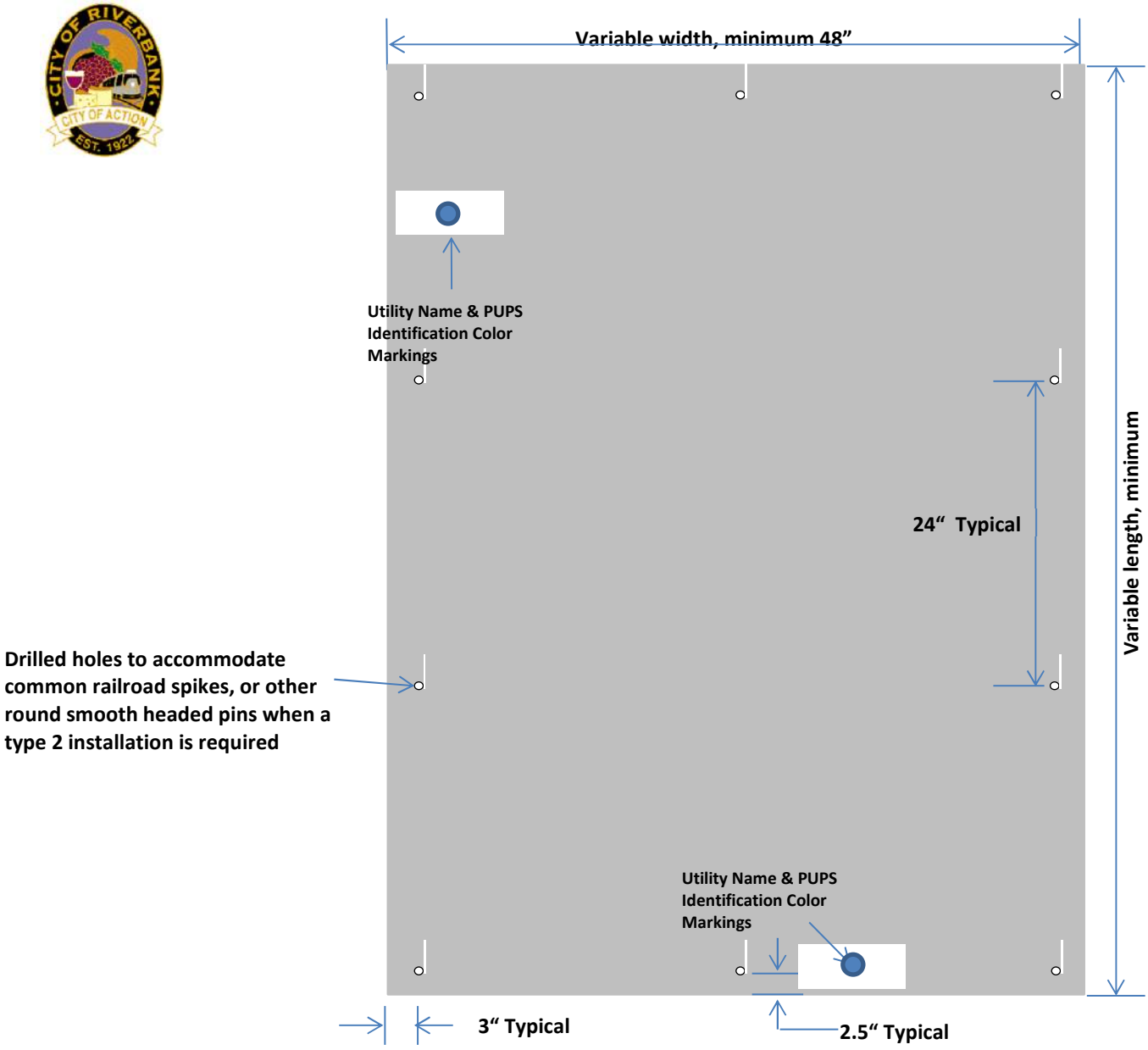


Figure 2 - Steel Plate Detail

5.3 Installation

For trenches and excavations with spans greater than four feet (4'), a structural design shall be prepared by a registered civil engineer and approved by the City. Steel plate placement on traverse and longitudinal excavations shall be in accordance with the following:

Steel Plate Installation	Street/Road Type	Posted Speed Limit
TYPE 1	Urban/Residential	45 MPH or Less
TYPE 2	Arterial/Collector	Greater than 45 MPH

HS-20-44 Loading	
Plate Thickness (Inches)	**Maximum Allowable Span (Feet)**
1”	4’ 0”
1 ¼”	7’ 0”
1 ½”	10’ 0”

5.3.1 Type 1 Installation

Type 1 installation shown in Figure 3, shall be used in areas where backfilling operations of an excavation in the traveled way, whether traverse or longitudinal cannot be properly completed within the same day, and the posted speed limit is 45 MPH or less. Steel plates shall be securely anchored around the entire perimeter with the Plate Locks™ road plate securing system or approved equal, per manufacturer's recommendation. Temporary paving or cold-mix asphalt concrete (cutback) shall not be allowed to secure or to prevent movement of trench plates unless prior approval is given by the engineer. Wedges or other non-asphaltic devices shall be used for leveling as required to eliminate rocking of the plates.

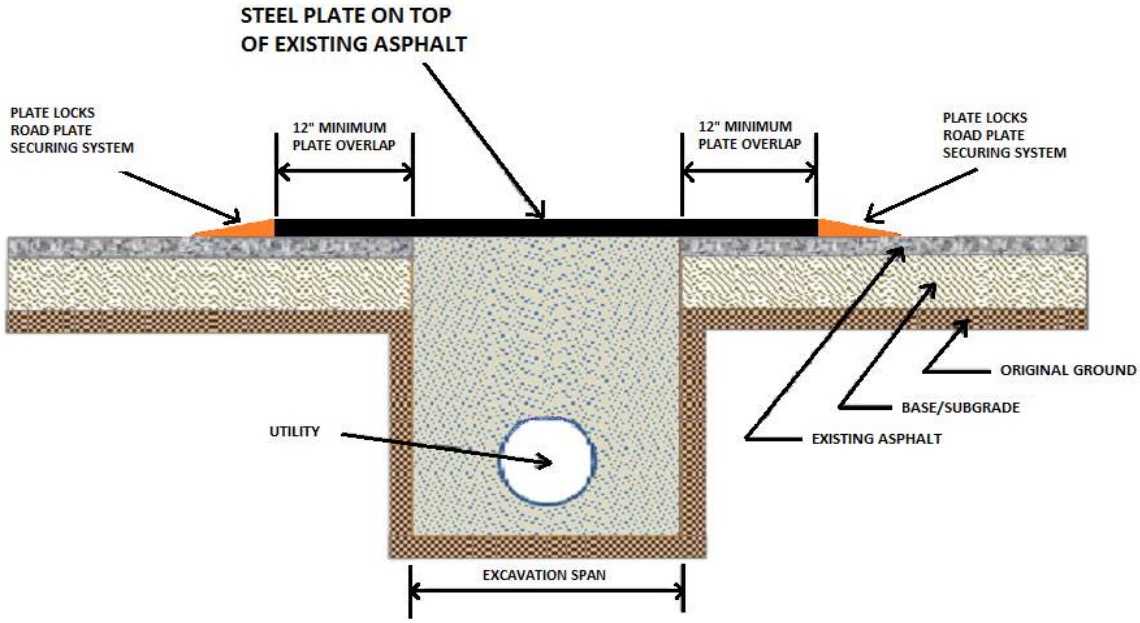


Figure 3 – Type 1 Installation Detail

5.3.2 Type 2 Installation

Type 2 installation shown in Figure 4, shall be used in areas where backfilling operations of an excavation in the traveled way, whether traverse or longitudinal cannot be properly completed within the same day and the posted speed limit is greater than 45 MPH. The steel plate for type 2 installations shall be recessed by milling into the existing asphalt to set flush with the surface of the existing asphalt. The pavement shall be cut and cold planed to a depth equal to the thickness of the plate and to a width and length equal to the dimensions of the plate. Full depth cutting of the asphalt section of excavation is not allowed. The steel plate shall be securely anchored with standard railroad spikes or other round smooth headed pins. Compacted temporary asphalt (cold mix) shall be used to fill the gap between the edge of the plate and the adjacent existing asphalt pavement. Wedges or other non-asphaltic devices shall be used for leveling as required to eliminate rocking of the plates.

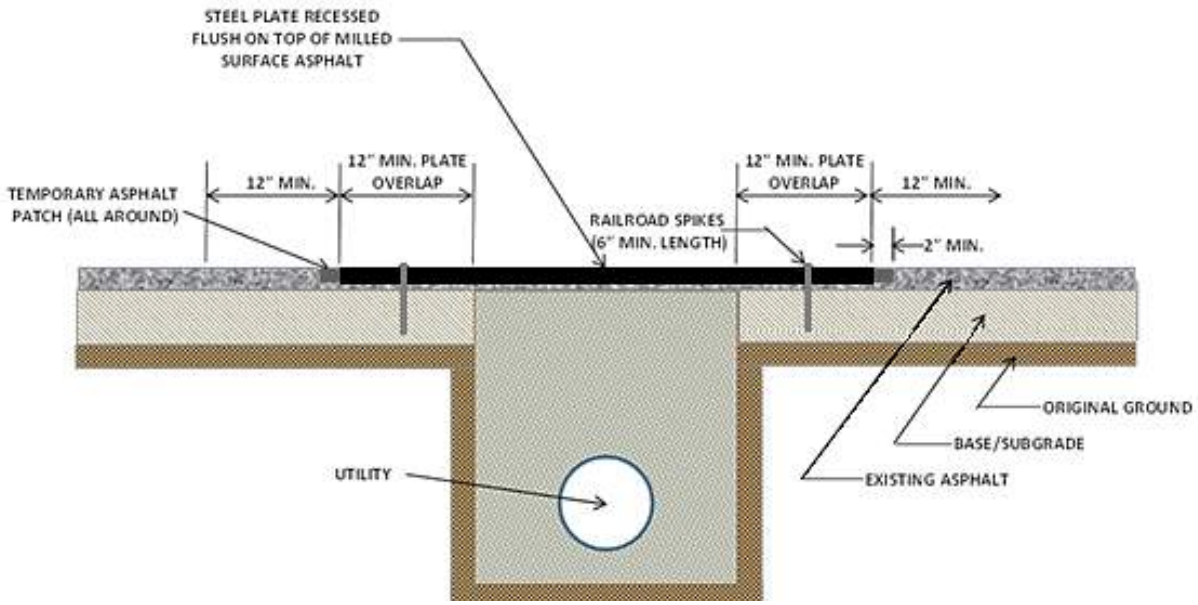


Figure 4 – Type 2 Installation Detail

6. SAFETY

Provisions should be made for the safety and protection of vehicular and pedestrian traffic during the construction period as follows:

- The permitee shall be responsible for the furnishing, erection and maintenance of all required traffic control devices. All signs and devices shall conform to the requirements of the current edition of the California Manual on Uniform Traffic Control Devices (CAMUTCD).
- When in the opinion of the City Inspector, the work constitutes a hazard to traffic in any area of the work, the permitee may be required to suspend operations during certain hours and to remove any equipment from the area of work
- The roadway surface shall be kept clean of debris at all times and should be thoroughly cleaned at the completion of the work.
- The permitee shall be responsible to replace all pavement markings in kind which have been disturbed as a result of the utility work

6.1 Signage

In addition of the traffic control devices required by the Engineering Division Permit, warning signs advising motorist that they should expect to encounter steel plates, shall be placed at approximately 100 feet in advance of the steel plate location. The W8-24 warning sign, “STEEL PLATES AHEAD” meeting the requirements of the CAMUTCD, is shown in Figure 5 below. Plates left overnight may require, at the discretion of the Engineering Division Inspector, that the sign be supplemented with a Type “A” Low-Intensity-flashing warning light mounted on the sign support.

6.2 Seasonal Requirements

When approved for use, between November 15 and April 15 steel plate corner limits shall be marked with a 2 inch square stake painted International Orange and extending at least 4 feet above the ground, placed adjacent to the plated edge of the roadway in consideration of snow plows.

W8-24
STEEL PLATE AHEAD

A	B	C	D	E	F	G	H	J	K	L	M	N
30	0.5	0.75	4 D	3	2.5	7.214	7.713	7.374	7.874	8.356	8.855	1.875
36	0.625	0.875	5 D	3.5	3.5	9	9.659	9.28	9.78	10.5	11.014	2.25
48	0.75	1.25	7 D	4.5	4.75	12.561	13.561	12.842	13.842	14.560	15.559	3

COLORS: LEGEND, BORDER – BLACK

Figure 5 - Steel Plate Ahead Sign Detail

7. UTILITY CUT RESTORATION

Pavement settlement occurring in and around utility cuts in the City is a common problem, resulting in uneven pavement surfaces, annoyance to drivers, and ultimately, further maintenance by the City. Factors influencing the performance of a patch include:

- Pavement material, soil conditions, climate, traffic and repair techniques.
- Poor construction techniques which damage the area adjacent to the cut and further degrade the patch and surrounding pavement.
- Pavement cut repairs made using quality materials and sound engineering and construction techniques tend to perform as well as the surrounding pavement.
- Poor performance of the patch tends to be a result of inadequate compaction of the materials, insufficient thickness of materials, poor quality of materials, and damage to the side of the cut.

7.1 Excavation/Backfill

- Prior to proceeding with the utility cut repair, the Engineering Division shall be notified by the permit applicant to approve the repair limits and agree on the repair procedures
- The surface of the roadway to be excavated for the utility work shall be saw-cut in reasonably straight and parallel lines. The cutting excavation should not be done with a backhoe, gradeall or any other type of ripping equipment.
- Existing pavements, bases, curbs/gutters and sidewalks shall be cut and brought to a neat line. Expansion joints removed shall be replaced. The cutting and replacement of concrete curbs/gutters and sidewalks shall be from joint to joint and of complete panels.
- Backfill material shall meet the applicable requirements of the current edition of the Standard Specifications for Highway Construction for backfill material. Unsuitable material will not be allowed for backfill.

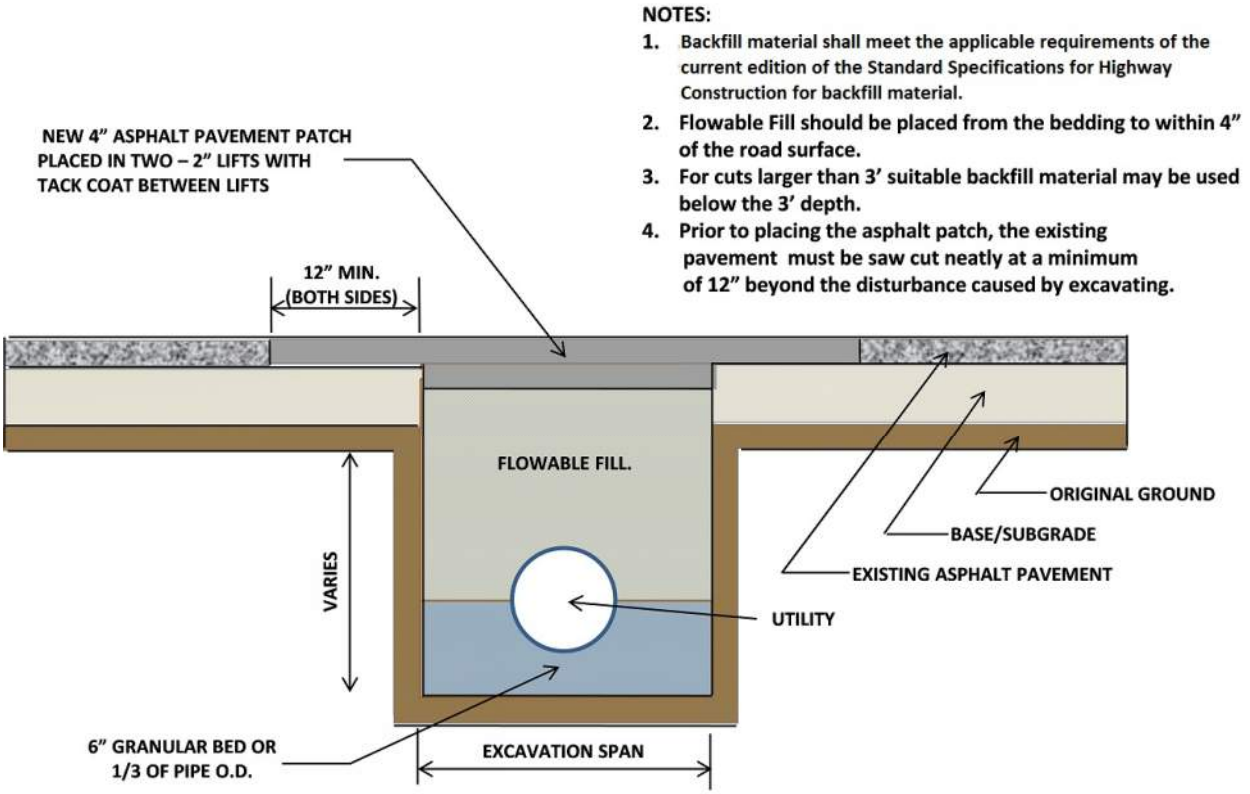
7.2 Pavement Restoration

The permitee shall be responsible to replace all pavement disturbed with a homogeneous and in-kind asphalt mix, and the details shown in Figure 5.

- All existing pavement surface should be swept clean of dirt, dust and debris prior of patching
- The existing vertical pavement shall be tack coated with an appropriate asphalt tacking material prior to patching

- When the pavement remaining between the excavation and the edge of the roadway is less than to 2 feet, the remaining area shall be removed in conjunction with the permanent repair.
- Placement of granular stone base or flowable fill shall not be performed until the excavation is inspected and approved by the Engineering Division inspection team.
- At the completion of the installation of the granular stone or flowable fill, the Engineering Division shall be requested to inspect the backfill. After acceptance of the backfill, the asphalt pavement can be applied.
- The work performed shall be free from workmanship defects for a period of one (1) year after date of acceptance by the Engineering Division.
- If permanent pavement restoration cannot be completed within three (3) days, then temporary patch of 2-inches of cold asphalt mix over compacted granular stone will be allowed. Permanent pavement repair to be completed within the time period required by the inspector.
- Any disturbed pavement markings must be restored to match adjacent striping.
- Crack seal around asphalt patch may be required at the discretion of the Inspector when there is a gap present.
- Spoil piles must be removed and the area must be cleaned and restored to like or better condition.
- Traffic control devices removed.

Figure 6 – Utility Cut Restoration Detail



UTILITY CUT RESTORATION DETAIL

City of Riverbank
STANDARD PLANS

Trash Enclosure

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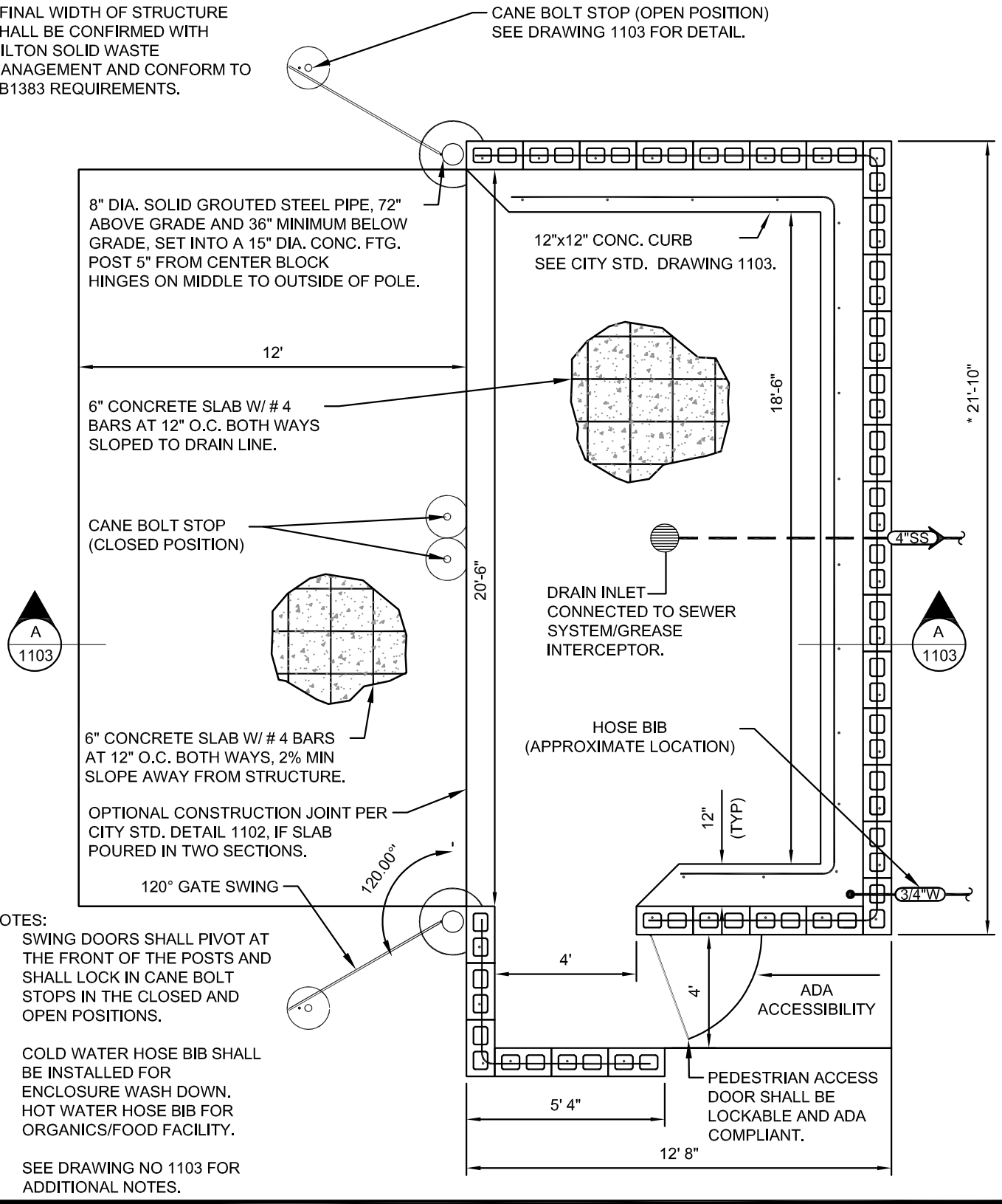


NOTES:

1. SWING DOORS SHALL PIVOT AT THE FRONT OF THE POSTS AND SHALL LOCK IN CANE BOLT STOPS IN THE CLOSED AND OPEN POSITIONS.
2. COLD WATER HOSE BIB SHALL BE INSTALLED FOR ENCLOSURE WASH DOWN. HOT WATER HOSE BIB FOR ORGANICS/FOOD FACILITY.
3. SEE DRAWING NO 1103 FOR ADDITIONAL NOTES.

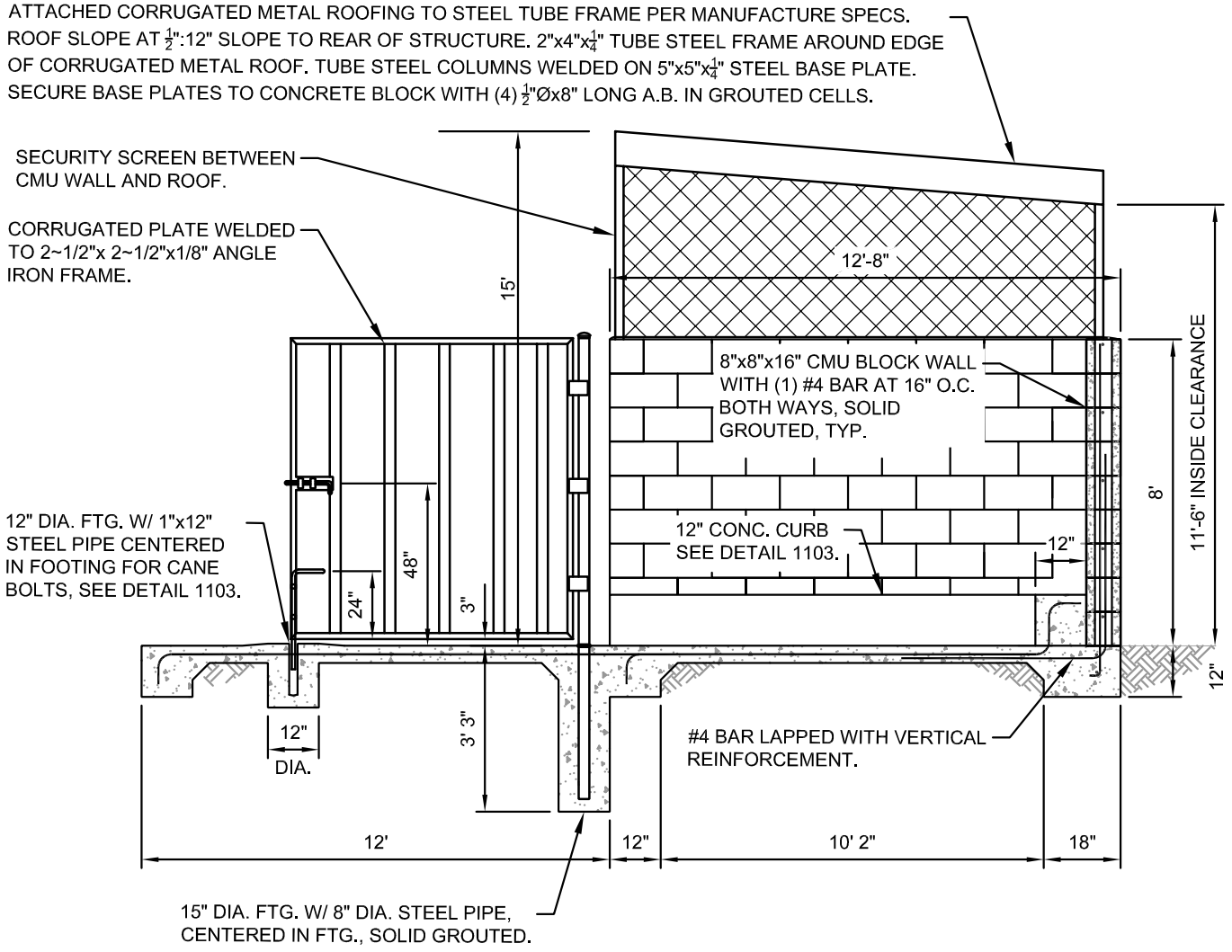
CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

William F. Kull

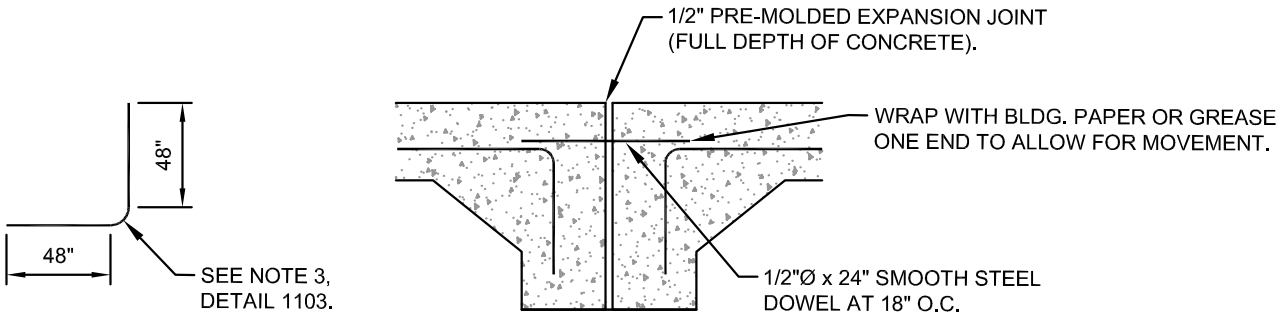
CITY ENGINEER - WILLIAM F. KULL

DUAL REFUSE & ORGANIC BIN ENCLOSURE

DRAWN BY:	DATE:	SCALE:	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
NWP	2/11/2025	NTS	3-11-25	1101
REVISIONS:	SECTION:	DRAWING NAME:		
NONE	TRASH	1101.DWG		



SECTION A-A



DOWELING DETAIL

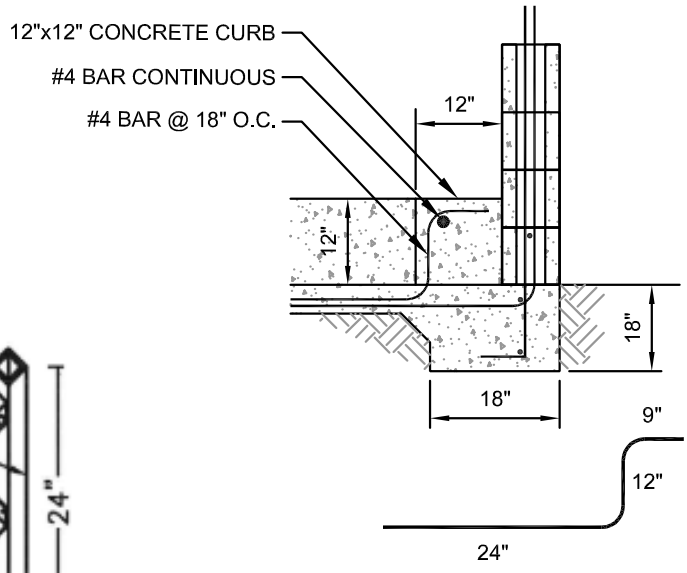
SEE DRAWING DETAIL No.1103 FOR ADDITIONAL INFORMATION.

CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

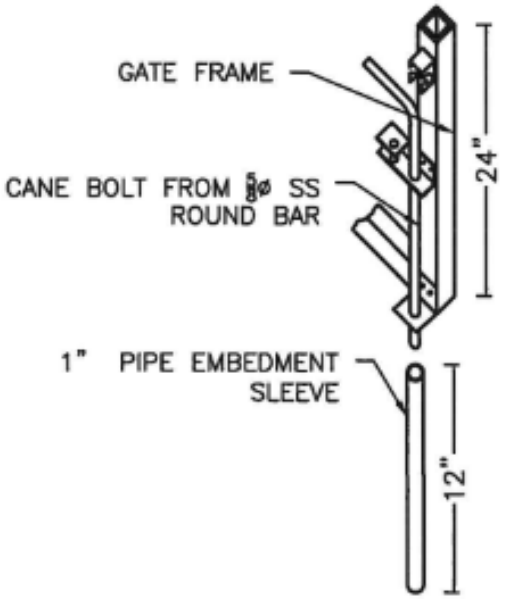
William F. Kull
CITY ENGINEER - WILLIAM F. KULL

DUAL REFUSE & ORGANIC BIN ENCLOSURE DETAILS

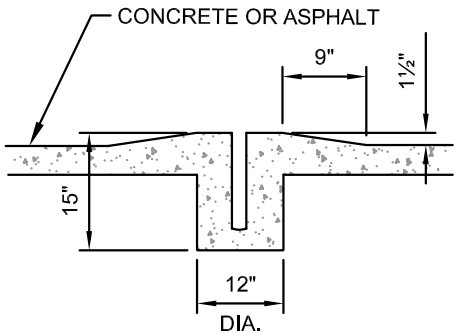
DRAWN BY:	DATE:	SCALE:	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
NWP	2/11/2025	NTS	3-11-25	1102
REVISIONS: NONE	SECTION: TRASH	DRAWING NAME: 1102.DWG		



12" RAISED CURB DETAIL



STOP BOLT DETAIL



CANE BOLT STOP DETAIL

NOTES:

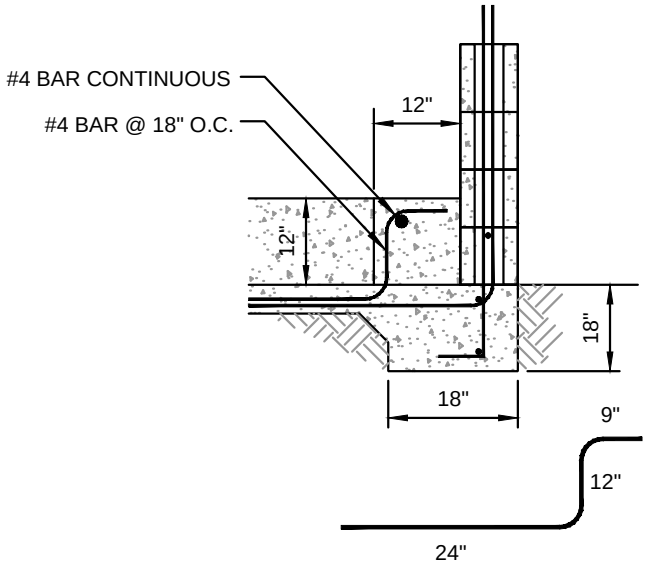
1. LAP ALL STEEL SPLICES 12" MIN.
2. MAINTAIN 3" CLEARANCE WHEN REBAR IS USED FOR REINFORCING CONC.
3. PROVIDE 3" INSIDE RADIUS BEND FOR #4 REBAR.
4. SEE CITY STANDARD 1101 AND 1102 FOR DETAILS NOT SHOWN.
5. INSTALL DRAIN INLET AND GRADE TO CENTER OF PAD. 2% MIN SLOPE .
6. EACH ENCLOSURE TO HAVE HOSE BIB AND SPRINKLER SYSTEM INSTALLED AS REQUIRED.
7. MUST INCLUDE ROOF PER DETAIL 1102.
8. SIDING AND ROOFING MATERIAL TO MATCH BUILDING.
9. ARCHITECTURAL SUBMITTAL REQUIRED FOR EACH PROJECT.
10. DOORS SHALL NOT SWING INTO TRAVEL WAY.
11. COLD OR HOT WATER TAPS SHALL BE INSTALLED PER STANISLAUS COUNTY ENVIRONMENTAL. RESOURCES REQUIREMENT.
12. ALL METAL FITTINGS FOR THE CANE STOP BOLT SHALL HAVE A GALVANIZED COATING.

CITY OF RIVERBANK
DEPARTMENT OF PUBLIC WORKS

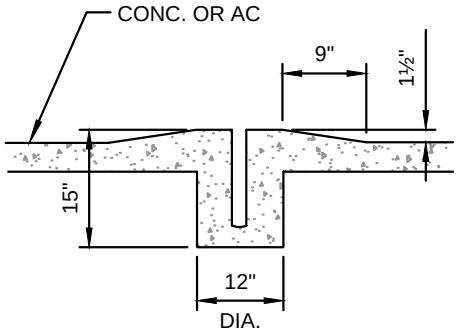
William F. Kull
CITY ENGINEER - WILLIAM F. KULL

DUAL REFUSE & ORGANIC BIN ENCLOSURE DETAILS

DRAWN BY:	DATE:	SCALE:	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
NWP	2/11/2025	NTS	3-11-25	1103
REVISIONS: NONE	SECTION: TRASH	DRAWING NAME: 1103.DWG		



12" RAISED CURB DETAIL



CANE BOLT STOP DETAIL

CITY OF RIVERBANK DEPARTMENT OF PUBLIC WORKS			REFUSE & RECYCLE BIN ENCLOSURE DETAILS	
William F. Kull CITY ENGINEER - WILLIAM F. KULL				
DRAWN BY: GK	DATE: 8/22/17	SCALE: NTS	ADOPTED BY THE CITY COUNCIL:	DRAWING NO. 1104
REVISIONS: NONE	SECTION: TRASH	DRAWING NAME: 1104.DWG		