

DESIGN STANDARD MANUAL

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Design Standard Manual City of Camas

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Transportation Impact Study and Neighborhood Traffic Management Guidelines

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Transportation Impact Study Guidelines City of Camas

PURPOSE

A Transportation Impact Study documents the adequacy of the transportation system to serve a proposed development and the expected impacts of the proposal on the surrounding transportation system. This review is in conformance with the Growth Management Act concerning requirements and provides the City a standard set of information for assessing land use changes in Camas. The transportation impact study guidelines are used by the City of Camas to establish uniform guidelines for conducting transportation impact studies for proposed development activities, whether new or existing, which require access or modification of access to the City's street system. These guidelines are used to ensure consistent and proper traffic planning and engineering practices in conjunction with land use actions being considered in the City.

PROCESS

A transportation impact study will be required when a proposed development generates 200 vehicles per day (vpd) or more. For developments generating under 200 vpd, a transportation impact report may be required for conditions such as non-single family development in single family residential areas, developments impacting known safety problems, or other situations where a study is deemed necessary by the City. In these cases, the City Engineer will decide if a transportation impact study is required.

Trip generation for proposed development:

200 vpd or more – transportation impact study required.

199 vpd or less – transportation impact study may be required.

STANDARD POLICY ISSUES

1. Half-street improvements required on all frontages. This shall include 5-foot sidewalk, 6-inch curb and gutter, saw cut at existing and full street section 20-foot width, and storm drainage.
2. Left turn storage lanes are required on all arterial and collector streets.
3. All lots shall be provided full street access at the time of development. If directed by the City, a minimum of 24-foot half street shall be provided for streets centered on property lines.
4. Direct lot access to collector and arterial level streets is subject to approval by the City of Camas and is discouraged where reasonable alternatives exist.

TRANSPORTATION IMPACT STUDY REQUIREMENTS

The preparer of the transportation impact study shall contact the Public Works Director to discuss study area limits (including the number of intersections to be analyzed, and key project issues) for their specific project prior to beginning the study. The preparing engineer is responsible to define key study variables with the City prior to completing work. A site plan indicating proposed access locations, development size, number of parking stalls and on-site circulation must be provided by the developer before beginning the transportation impact study. The transportation impact report shall be prepared under the supervision of a Registered Civil Engineer in the State of Washington with a traffic engineering background. Studies that do not address the guidelines adequately shall be returned to the engineer for modification. The attached checklist will be used for review by City Staff in accepting transportation studies for public review.

Peak hour traffic counts will be conducted at study area intersections. Intersections of arterials or collectors should be considered in determining study intersections (use of AM, mid-day, PM or weekend peak hour will depend on proposed use¹. Existing traffic counts may be utilized provided they were conducted within the previous 12 months. A 24-hour traffic count and speed survey will be conducted near proposed project site points. If two project access points are located on the same roadway, and are within 2,000 feet, then one ADT/speed survey on the subject roadway will be required. Accident data at all study area intersections covering the most current three years should be obtained² and summarized in table format in the final report.

The following is a list of the minimum information required when conducting a transportation impact study in the City of Camas:

Executive Study with recap of the following:

1. A **project description** including site location map and characteristics as well as all existing and proposed land uses for the site.
2. A **study area description** including description of roadway (roadway classification, posted speed, ADT volumes, number of lanes, traffic control, width of road, pedestrian/ bicycle facilities), transit stops and service, parking conditions, existing geometric deficiencies, accident data at study area intersections³, and other pertinent features. Planned roadway improvements identified in the City's Comprehensive Plan or in the Washington State Department of Transportation Capital Construction Program should be identified. A figure showing the study area as well as a figure showing existing AM and PM peak hour intersection turn movement volumes should be provided.

¹ For example, residential and employment uses (office, warehouse, manufacturing and industrial) will consider MA and PM periods, schools will consider AM and afternoon periods, retail will consider PM and mid-day (for retail projects over 70,000 sf – access issues of driveway turn land storage for site and adjacent intersections will be reviewed on Saturdays. As a minimum, the analysis shall analyze the period of greatest traffic for adjacent study intersections and determine the period of greatest trip generation for the project.

² Accident data shall be obtained from WSDOT, Traffic Office, SW Regional Traffic Engineer.

³ An average of 2 accidents per year over the most recent 3 years at a particular intersection shall mandate further study of the intersection.

3. **Intersection level of service** should be determined for study area intersections for the peak hours using the latest revision of the *Highway Capacity Manual*⁴.
4. **Project-related trip analysis** should include expected trip generation, trip distribution, and trip assignment. A table should be provided identifying the type and size of each proposed land use, daily and peak hour (AM and PM) vehicle trip rates⁵ and the total number of daily and peak (AM and PM) vehicle trips. A figure showing Project Trip Distribution (in percentages) should be provided.
5. **An evaluation of the project site plan** should include site access locations, vehicle queue storage, left turn/right turn lane needs, pedestrian circulation and conflicts, parking, existing deficiencies, and efficiency of proposed vehicular circulation/facilities, and recommendations for on-site channelization and traffic controls.
6. **An evaluation of project impacts** on roadway operating conditions to include:
 - a. An analysis of level of service and volume/capacity at study area intersections and project access points. Intersection analysis should be conducted for the following scenarios:
 - Existing Plus Project on existing roadways.
 - Existing Plus Project Plus Approved (traffic from projects which have been approved by the City but not constructed) on the existing roadways plus any roadway that has secure funding for construction within two years.
 - Future Year or End Year Comprehensive Plan Plus Project on the same roadway networks as noted above Mitigated Future Year, if needed.

Figures showing AM and PM peak hour traffic volumes used in each analysis described above should be included. The level of service results for study area intersections and access points should be shown in a table with the level of service calculation sheets provided in the appendix of the report. Approved projects should be those projects approved by the City yet not constructed. The City should provide a listing of approved projects.

- b. Operational analysis should include turning conflicts and queue spill-back locations, which may adversely affect adjacent intersections or driveways. Turn lane warrants should be evaluated for project access points and all unsignalized study area intersections.
- c. A discussion of traffic safety impacts.

⁴ Highway Capacity Manual, Special Report 209, Transportation Research Board, latest revision.

⁵ Based upon Trip Generation, Institute of Transportation Engineers most current edition or actual similar site surveys/counts.

- Signal warrant analysis and four-way stop analysis based on the *Manual on Uniform Traffic Control Devices for Streets and Highways* (MUTCD) should be conducted at study area unsignalized intersections.
- Left turn lane requirements for different scenarios should utilize *A Policy on Geometric Design of Highways and Streets, (AASHTO) 1990, page 791*. If storage lanes are required, the study will include the length of the storage lane needed and its storage capacity. Provision of turn lanes will be consistent with policy for arterial and collector streets.
- Project access should be evaluated including sight distance requirements based on AASHTO, page 762.
- Access spacing to adjacent driveways/public streets (including both sides of the street) shall be documented.
- Pedestrian and Bicycle safety issues. The study should address the safety of pedestrians leaving and entering the site. For residential projects it should address provision of a safe walking environment for students leaving the site and traveling to the nearest Elementary and Middle/Junior High Schools, or to the nearest school bus stop(s) serving these and High Schools. The study will also address when and where the school bus stop is provided. The school district shall be contacted to discuss locations for bus pullouts⁶. Safe pedestrian and bicycle access to the nearest transit stop (if within ½ mile of the project site) should be addressed.
- Bicycle access for the site should be identified indicating the closest bicycle lane (existing or comprehensive plan) and their status in terms of connectivity within the City.
- The transit accessibility of the project shall be described and evaluated. Planned transit system changes/modifications shall be documented including bus stop locations⁷.

7. **Mitigation measures for site access and transportation system improvements.**

The location, nature, and extent of all project specific and area-wide mitigation measures should be described to achieve acceptable operating conditions for both the short-term and long-term analysis years should be identified. The level of service and impacts associated with these improvements should be identified.

Transportation demand management programs (as required by county and state) should be outlined for the project.

⁶ Contact Camas School District Maintenance and Transportation Department Director.

⁷ Contact C-Tran Planning Department Planner.

METHODOLOGY

Trip Generation Analysis – Trip generation should be determined using the current edition of *Trip Generation, Institute of Transportation Engineers*, unless more appropriate local data is available. If trip generation rates other than those given by ITE are used they must be approved by the City Engineer.

On zone change and conditional use cases, a comparison table between trip rates for proposed use and uses permitted under the current zoning should be provided.

Trip Distribution and Assignment – Traffic generated from the development should be logically distributed and assigned at the access point(s) and study area intersections. The traffic distribution should be based on recently collected traffic data, the surrounding land use pattern census data and/or available travel demand model information. All assumptions and data sources used to determine trip distribution and assignment should be documented in the report, including a figure showing distribution percentages.

Capacity Analysis – Capacity analysis procedures provided in the *1994 Highway Capacity Manual* (or updated version) must be used. A table showing the results of the level of service analysis (volume-to-capacity ratio, LOS, average delay) for each scenario should be presented.

Design Standards – The city comprehensive plan indicates the widths (number of lanes) for streets in Camas. These widths should not be exceeded. A minimum level of service of C on minor and local streets, and D on collector/arterials or better should be maintained for traffic operations. Site related traffic which contributes to traffic levels exceeding the level of service D indicates the need for roadway improvements or mitigation measures to be included in the recommendations. Mitigation requiring street widths beyond those identified in the comprehensive plan will require City approval. New streets outlined in the comprehensive plan should be discussed, indicating project needs for new streets and when they will be built. If a project would be served by a future comprehensive plan roadway, it should be discussed.

REPORT OUTLINE

The transportation impact report should include the following sections:

Executive Summary

Introduction and Summary. Include trip generation, summary of transportation operation and mitigation.

Existing Conditions. This section should include a study area description and existing study area level of service.

Impacts. This section should include a brief review of the site plan including a site plan layout, project related trip analysis, and an evaluation of the project site plan. A figure showing the assumed Future Year roadway network (number and type of lanes at each intersection) should be provided.

Mitigation. Project specific and area-wide specific mitigation measures should be recommended.



Transportation Impact Study Guideline Technical Completeness Checklist City of Camas

Project Name: _____
City Reference Code: _____

TRAFFIC REQUIREMENT

- Yes No Traffic generated greater than 200 vehicles per day
- Yes No Study Required Comment: _____ Date: _____

BACKGROUND INFORMATION

- Yes No Washington PE Stamp and Signature

INTRODUCTION AND SUMMARY

- Yes No

EXISTING CONDITIONS

- Yes No Roadway Network – summary of roadway classifications and description of study area
- Yes No Analysis Period Correct (AM, Mid-day, PM and/or Saturday)
- Yes No Existing Traffic Operations (Existing Level of Service, traffic volumes, speeds, accident data, etc.)

IMPACTS

- Yes No Trip Generation – Daily, peak hour trips generated by site development: ITE Trip Generation Manual/Survey
- Yes No Trip Distribution
- Yes No Level of Service Analysis – projected LOS with site build out, existing traffic, and background traffic growth (Identify existing and projected LOS deficiencies)
- Yes No Signal Warrant Analysis
- Yes No Turn Lane Warrant Analysis
- Yes No Analysis of sight distance at frontage road access point(s)
- Yes No Identify safe route to school or school bus stop (contact with school district)
- Yes No Analysis of safe pedestrian/bicycle access to nearest transit stop (if within 1/2 mile of project site)
- Yes No Identify accessibility to public transit
- Yes No Neighborhood Traffic Management – On and Off Site

MITIGATION

- Yes No Identify need for right/left turn lanes, storage capacity and length
- Yes No Identify possible corrections of any LOS deficiencies
- Yes No Identify any access deficiencies (including pedestrian/bicycle connections)
- Yes No Neighborhood Traffic Management – On and Off Site

FIGURES

- Yes No Vicinity Map
- Yes No Site Plan
- Yes No Existing peak hour turn movement volumes (counts conducted within previous 12 months)
- Yes No Trip Distribution (%) including Added Project Peak Hour Traffic Volumes (see sample)
- Yes No Project Completion Year Peak Hour Traffic Volumes (see sample)
- Yes No Comprehensive Plan Future Year turn movement volumes
- Yes No Programmed transportation improvements and transportation mitigation outlined in study

TABLES

- Yes No Intersection Performance Existing Conditions
- Yes No Project Trip Generation
- Yes No Intersection Level of Service

OTHER

- Yes No Technical appendix – sufficient material to convey complete understanding of traffic issues (e.g., HCM analyses, trip generation calculations, signal warrant analyses, turn lane warrant analyses, etc.)

Completed By: _____ Date: _____



Land Use Review Process Guidelines Including Neighborhood Traffic Management City of Camas

The most opportune time to address neighborhood needs is at the point of development (when the streets are built). Whether it is a residential subdivision, commercial development or a transportation project, incorporating of Neighborhood Traffic Management¹ (NTM) elements into the design, development, and mitigation of the off-site impacts of a project assures that the inventory of neighborhood problems does not grow. To best address this through policy, a two tiered approach is recommended. The first tier is aimed at new residential development planning and the second tier is focused on mitigating impacts of new land use or transportation development. If in either case it is desired to consider a NTM measure that is not part of the tool box, the applicant (using a registered professional engineer) will be required to provide and certify the appropriate performance and design standards.

Tier 1: Design of New Residential Street System. Any new streets built with development should incorporate NTM in design. An additional level of analysis should be added into the Traffic Impact Analysis guidelines for proposed projects. A map should be prepared that identifies all nearby streets (especially category "C" streets) that the proposed land use action may create or impact. On all projects, any internal street reaching the threshold of 700 vehicles per day will enter the NTM process at Step 6 and demonstrate how speed and volume will be kept at 25 mile per hour to the satisfaction of the Department of Public Works prior to approval. In project review, this criteria will be evaluated and if adequate measures are not identified, staff can request that the site plan be modified to reflect the future neighborhood needs for NTM measures.

Tier 2: Mitigating the Impact of New Development. All new major land developments will be required to provide information in their Traffic Impact Analysis (TIA) that identifies the potential impact on neighborhoods or local streets. This goes beyond the capacity analysis that is conducted presently. A section would be added to the TIA that assesses the impact of a land use or transportation project on neighborhood routes or local streets (all nearby category "C" streets). The TIA should identify if the project adds more than 25 vehicles per hour (two way – AM, PM and/or retail peak hours) to a street and the street volume is projected to be larger than 700 vehicles per day. An estimate will be made of the potential (in the future at build-out of nearby lands) for a neighborhood or local street to exceed 700 vehicles per day. Determination of potential streets for consideration for each project should be reviewed with city staff prior to submitting the TIA.

¹ The Neighborhood Traffic Management Plan in its entirety is available on request or visit our website at www.ci.camass.wa.us.

If a project exceeds this threshold, they will be required to enter the NTM process at the end of step 4 (Prioritization). At this point, the developer will have the option of working with the public and continuing through the NTM process or providing a cash contribution, equivalent to the applicant's fair share impacts, to the NTM program to be used as the impact neighborhood sees fit to mitigate impacts. The cash contribution shall be a minimum of \$25,000 (or greater if determined by City Staff) to address measures implemented by the City. Working with the public in Step 5, the project team (which may include the developer or their representative) will determine the appropriate NTM measures to mitigate the project impacts. Following completion of Steps 5, 6, and 7 the City shall refund any remaining funds to the developer.

Standards for NTM

Implementing NTM measures can impact several stakeholders that use public streets – from utilities to garbage companies, delivery companies to school buses, from emergency services to maintenance, from the postal service to the school district. The needs of all the stakeholders should be considered in any NTM measure. To best address the input of key stakeholders, it is recommended that a series of design standards be developed, reviewed and approved for inclusion in the *City of Camas Street Design Standards*. This process will allow critical input and review by the stakeholders at one point, rather than having to seek each stakeholders input for each NTM project that is contemplated.

The benefit of developing design standards is that NTM can be uniformly applied in Camas. The standardization of NTM elements also helps keep the costs down. Most importantly, by going through a process of adopting the design standards with stakeholder input, the potential liability to the City is significantly reduced.

The development of standards can build off experience in Washington and Oregon with NTM and throughout the United States in tailoring a set of standards that meet Camas's needs. As long as the standard of design are adhered to, the stakeholders can be assured of the character and nature of what may impact the street related to their operational needs.

The Manual of Uniform Traffic Control Devices (MUTCD) provides a reference for most traffic signing and striping needs. While MUTCD does not address many of the NTM measures outlined in the tool box, many other cities, and Camas itself, have working design experience with many of the measures. The following standards should be developed for the City of Camas. In some cases, samples from other cities are attached for reference.

- Speed Humps (City of Portland has the most recognized standards in the area – also need spacing criteria)
- Circle
- Medians
- Street Width (several cities in the Vancouver-Portland region have extensive experience with 28 and 32 foot streets)

- Street Curvature (possibly 50 foot radius, reversing curves for curvilinear)
- Chicane
- Curb Extensions
- Pavement Texture

Other Issues

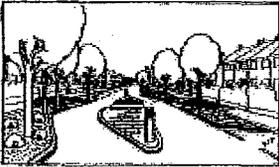
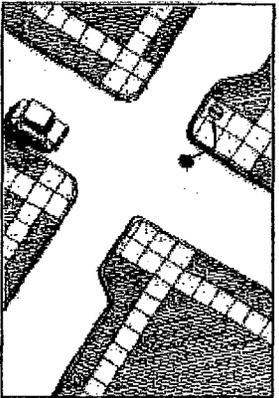
During the development of the NTM plan, the issue of photo enforcement or automated enforcement was raised. These measures have been used in communities (Vancouver, Portland, and Beaverton are examples) to address speeding in neighborhood areas and school zones. Elsewhere in the United States, automated enforcement is being used to address red light running of traffic signals and violating at-grade railroad crossing controls. In Europe, the use of the speed-reader board trailers has developed into permanent speed reader signs in critical locations. These measures would need legislative action for implementation in Camas and may be considered in the future to be included in the NTM Tool Box should the necessary legislative issues be adequately address such that judges will support its appropriate use.



SAMPLE NTM MEASURES



Sample Neighborhood Traffic Management Measures

Measure	Sample	What is it?	What does it do?	How much does it cost?
Chicane		Channelization or curb extension that realign the straight path of a street, deflection straight vehicle movement.	Speed reduction (3 - 4 MPH) Low volume reduction and diversion	\$3,000 to \$20,000
Choker (curb extension)		A roadway narrowing. This could be a curb extension at an intersection (also called bulb outs, neckdowns and throating) to reduce the roadway width at a selected location.	Speed reduction (3.3 MPH) Moderate volume reduction and diversion	\$5,000 to \$15,000



Sample Neighborhood Traffic Management Measures

Measure	Sample	What is it?	What does it do?	How much does it cost?
Choker (median)		<p>A roadway narrowing. With a median, the narrowing of the roadway comes from placing an island in the middle of the road. Some cities have used large raised pavement markers on the centerline at intersections to reduce speed of turning traffic. Medians can also be used for pedestrian refuge and/or access control to restrict turning movements. For access control it is important that medians are long enough to effectively create right-in/right-out restriction.</p>	<p>Speed reduction (3.3 MPH) Moderate volume reduction and diversion</p>	<p>\$3,000 to \$10,000</p>
Choker (pinch point)		<p>A roadway narrowing. Curb lines are extended into the street area (usually landscaped islands or pedestrian extensions) to narrow the roadway.</p>	<p>Speed reduction (3.3 MPH) Moderate volume reduction and diversion</p>	<p>\$5,000 to \$15,000</p>

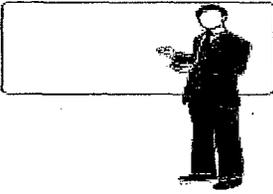


Sample Neighborhood Traffic Management Measures

Measure	Sample	What is it?	What does it do?	How much does it cost?
Circles		A round island in the middle of an intersection	Speed reduction (5.7 MPH), Low volume reduction and diversion	\$5,000 to \$15,000
Curvilinear		Similar to a chicane but over a longer distance or segment of street. Typically reversing curves designed to 25 MPH speed. Still provides direct connectivity with little out of direction travel.	Speed reduction (similar to chicane) Low volume reduction	Generally designed into original plans.
Diverters		Channelization or islands that restricts movements at an intersection. Typically, allows right turns, not through traffic. There are full and partial diverters depending upon the number of movements restricted or diverted at an intersection.	Minor speed reduction (0.4 MPH) High volume reduction, high diversion impact	\$3,000 to \$15,000

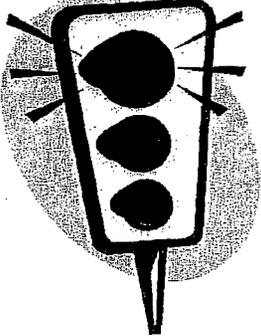
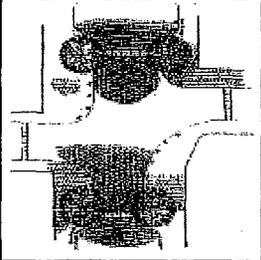


Sample Neighborhood Traffic Management Measures

Measure	Sample	What is it?	What does it do?	How much does it cost?
Enforcement (selective)		Police issuing tickets to vehicles violating speed zones. Can be effectively combined with other NTM elements such as education, public awareness, speed trailer and signs/banners.	Minor speed reduction documented (2 MPH)	Redirects enforcement resources from other policing activities
Enforcement (automated)		Use of photo or video enforcement to ticket violators of speed zones. Also red light running photo enforcement is being developed. Requires legislative change.	Speed reduction (limited data)	Revenue from tickets can pay for system (depending upon fund allocation). Portland's system does not pay for itself.
Education		Providing training in drivers education, courses for ticketed drivers, mailings (handouts/flyers), public service advertisements	No data on results	\$2,000 to \$50,000/year
Enhance Arterial and Collector Performance/		Providing adequate capacity, spacing and connectivity for	Speed reduction can be moderate - mostly due to	Street Improvements are VERY expensive

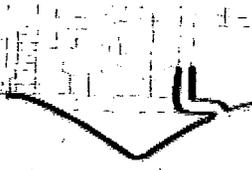
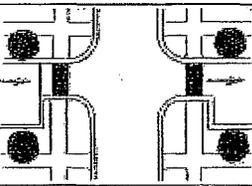


Sample Neighborhood Traffic Management Measures

Measure	Sample	What is it?	What does it do?	How much does it cost?
Coordinate Signal Timing		<p>arterials and collectors allow longer trips to stay on these facilities and not on neighborhood routes. Coordinated traffic signals can also be effective in keeping through traffic on arterials. In some cases, coordinated signal timing can reduce the amount of green signal time given to side streets. While this can be viewed as an impact to some, it can deter cut through traffic.</p>	<p>removing faster traveling through moving traffic from neighborhood routes.</p> <p>Can significantly reduce volume where congestion exists.</p>	<p>Typically not considered NTM projects</p>
Entry Treatments		<p>Generally use of landscaping and architectural elements at the roadway entrance to a neighborhood. Can include curb extensions and pavement texturing.</p>	<p>Similar to chokers</p>	<p>\$5,000 to \$25,000</p>
Humps		<p>Raising of pavement surface about 3" over about 10 to 20</p>	<p>Speed reduction (7 MPH) Low volume reduction or</p>	<p>\$3,000 to \$5,000</p>

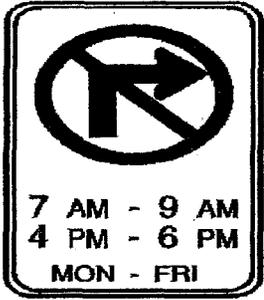


Sample Neighborhood Traffic Management Measures

Measure	Sample	What is it?	What does it do?	How much does it cost?
		feet (an undulation). Similar to this measure are speed tables, raised pedestrian crossings and raised intersections.	diversion	
Intersection Realignments/ Route Modification		Takes a standard 3 or 4 leg intersection and skews it to deflect traffic while maintaining safe design characteristics. Modify a route to make it less direct.	Similar to Circles	\$4,000 to \$20,000
One Way Streets		Takes the entry to a neighborhood area and makes the access road one way (typically out). Similar in some respects to a diverter. Can be used in connection with entry treatments.	Speed reduction (no data) Significant volume reduction and diversion	\$5,000 to \$30,000
Pavement Texture		Instead of smooth pavement	Limited speed reduction	

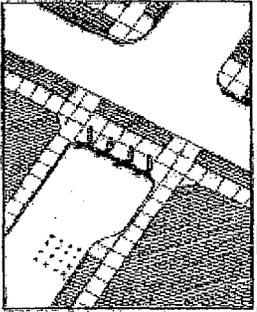


Sample Neighborhood Traffic Management Measures

Measure	Sample	What is it?	What does it do?	How much does it cost?
Pavement Markings		surface, create roughness by using raised markers, pavers, colored concrete with patterns. Can be used to emphasize pedestrian crossing location. Sometimes paint is used to create channelization or narrowing.	Limited volume change Increases driver awareness of changed conditions (entering a neighborhood or pedestrian zone).	\$1,000 to \$15,000
Parking On-street		Many streets less than 32' do not allow parking on one or both sides. By allowing parking, the traveled way is narrowed. Speeds must be slow for safe sight distance.	Speed reduction Limited volume reduction.	\$0 - \$1,000
Part Time Restrictions (PTR)		Use signs to limit vehicle movements during key times (typically school times or peak hours). Can be turn restriction, truck restrictions, through traffic restrictions, etc... Very difficult and expensive to enforce and can have high violation rates.	Moderate speed reduction (if through traffic removed) Moderate volume reduction (if restrictions enforced).	\$500 - \$5000
Public Awareness/Traffic		Campaigns typically	Speed reduction (limited)	\$1,000 to \$30,000 per year

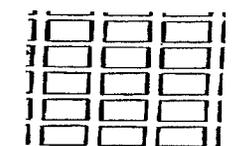
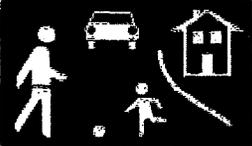


Sample Neighborhood Traffic Management Measures

Measure	Sample	What is it?	What does it do?	How much does it cost?
Watch		<p>organized by agency to involve neighbors. Speed watch can include neighbors using a radar speed measuring device to identify speeders who receive a standard letter. Public awareness can include education activities, but also banners, newsletters, yard signs, web page material, neighborhood organization activities, etc...</p>	<p>data)</p>	
Road Closure		<p>Uses islands or barricades to close the end of a street. Creates a cul-de-sac for vehicles, pedestrians and bicycles can go through. Contrary to emphasis on connectivity.</p>	<p>Speed reduction limited to site of closure. Significant volume reduction and diversion.</p>	<p>\$2,000 - \$15,000</p>
Shared Space		<p>A European concept where there are no curbs in the roadway right-of-way. The</p>	<p>Speed reduction Significant volume reduction and diversion.</p>	<p>\$10,000 - \$50,000</p>

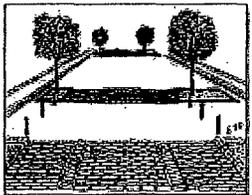
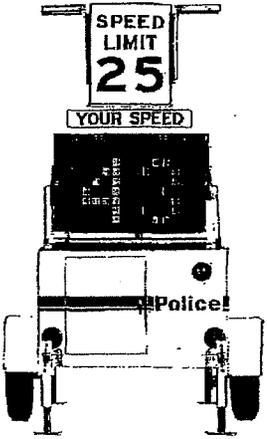


Sample Neighborhood Traffic Management Measures

Measure	Sample	What is it?	What does it do?	How much does it cost?
		road area is share among various users, using bollards, chokers and landscape elements to help define vehicle areas.		
Short Block Spacing		Shorter blocks create more streets with traffic distributed over more streets. The intersections created may require stop signs where warranted.	Limited speed reduction Significant volume reduction if done area wide	Typically part of original design and plans.
Signs		In the past "Slow Children" signs have been used. Yard signs have more recently been used (typically used as part of a public awareness or education program. Possible yard sign idea could include progressing signs that say 1) Did you Know, 2) That your Neighbors think, 3) You drive TOO FAST.	Speed reduction, however, the effectiveness (if any) diminishes (no data substantiating a benefit)	\$50 - \$500
Speed Cushions		A European device similar to a speed hump, but narrower	Speed reduction Little volume reduction	\$1,500 - \$3,000



Sample Neighborhood Traffic Management Measures

Measure	Sample	What is it?	What does it do?	How much does it cost?
		<p>to allow buses or emergency vehicles with larger wheel bases to pass over without impact.</p>		
<p>Speed Trailer</p>		<p>A trailer unit with a reader board that indicates the approaching vehicle speeds. Portable and can be moved from site to site. Can be reinforced with actual police enforcement on a selective basis.</p>	<p>Speed reduction (4.2 MPH) however, reduction occurs only when trailer is present. No volume reduction.</p>	<p>\$10,000 - \$25,000 + labor</p>

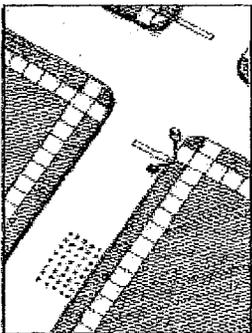


Sample Neighborhood Traffic Management Measures

Measure	Sample	What is it?	What does it do?	How much does it cost?
Speed Zone Changes		Typically, for collector and arterial streets, the 85 th percentile speed is used as a guide. Past studies have proven that unrealistically low speed zones are ignored by drivers.	Little speed or volume change (without enforcement)	\$20,000 (for signs and studies)
Street Narrowing		Different from chokers in that this would narrow an entire street rather than a point in the street. Street widths between 22 and 32 feet have been considered and used in some cities for specific applications.	Speed reduction (4.5 MPH) Low volume reduction or diversion	Typically done at construction of street or with reconstruction



Sample Neighborhood Traffic Management Measures

Measure	Sample	What is it?	What does it do?	How much does it cost?
Stop Signs		<p>Typically placed at intersections. Warrants determined by MUTCD. Significant research on unwarranted stop signs and their negative impact. MUTCD specifically indicates stop signs are not to be used for speed control. The volume warrant is for 500 vehicles entering the intersections for each of 8 hours.</p>	<p>Mixed findings on speed reduction (some up some down) Low volume reduction and diversion A device for traffic control and safety, generally not NTM</p>	<p>\$250 - \$2,500 (including studies, staff time and installation)</p>
Truck Restrictions		<p>No truck signs are posted at key cut through routes affecting through truck trips not local truck trips.</p>	<p>No speed reduction Significant truck volume reduction (if enforced)</p>	<p>\$ 250 - \$1,000</p>

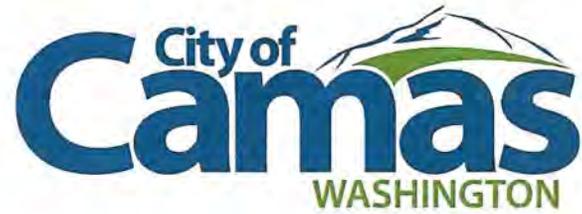
Source for graphics:

Traffic Calming, American Planning Association, Planning Advisory Service, Report Number 456, July 1995.

Handbook for Walkable Communities, Burden & Wallwork.

Civilised Streets: A Guide to Traffic Calming, Environmental & Transport Planning, Brighton, Great Britain, 1992.

Note: Cost Estimates are in 2000/2001 dollars. Average construction cost inflation per year based on 10-year data is 2-3% per year.

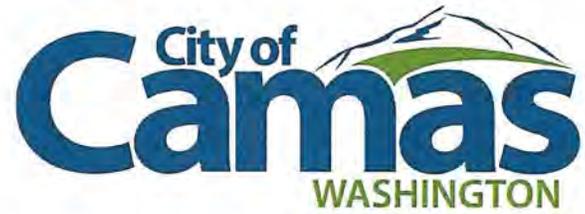


Miscellaneous Reports / Studies

City of Camas
616 NE Fourth Avenue
P.O. Box 1055
Camas, WA 98607
www.cityofcamas.us

Phone: (360) 834-6864
Fax: (360) 834-1535

Creation Date: 10/28/02
Revision Date: 10/21/14 (Partial)



Engineering Design and Submittal Requirements

City of Camas
616 NE Fourth Avenue
P.O. Box 1055
Camas, WA 98607
www.cityofcamas.us

Phone: (360) 834-6864
Fax: (360) 834-1535

Creation Date: 10/28/02
Revision Date: 10/21/14 (Partial)



Material Reference List City of Camas

The latest revisions of the following materials **shall** be used for design:

Camas Comprehensive Plan including, but not limited to:

The Transportation Element – Traffic Impact Fee Study

Parks, Recreation, Open Space, and Trail / Bikeway Plan

Public Facilities, Utilities, Services Element, Water System Comprehensive Plan,
and General Sewer Plan

Camas Neighborhood Traffic Management Plan

Camas Plant Materials for City Rights-of-Way

Camas Public Works Landscape Standards

Clark Public Utilities Lighting Standards

North Dwyer Creek Master Plan, when applicable.

RCWs and WACs

Manual on Uniform Traffic Control Devices

WSDOT Standard Specifications for Road, Bridge, and Municipal Construction

WSDOE Stormwater Management Manual for Erosion Only

The latest revisions of the following materials should be used as a guide:

AASHTO a Policy on Geometric Design of Highways and Streets

WSDOT Construction Manual

WSDOT Design Manual

WSDOT Standard Plans

ENGINEERING DESIGN SUBMITTAL REQUIREMENTS

Drawing submittals

Drawings shall be submitted on standard 24" x 36" bond paper. Each sheet shall be numbered and titled. Each sheet shall have a 1" border with a minimum text height of 0.10 inches.

Cover Sheet

Minimum information required shall include a vicinity map, site map, project title, sheet index, owner/developer address and phone number, revision block, engineers stamp, city signature block and engineer information. General notes, legend, and a table stating the total lineal footages of street, storm mains, water mains, and sewer mains shall also be shown on this sheet.

Existing Conditions Sheet

All pertinent as-built and existing utility information on and adjacent to the project shall be noted on this sheet. Existing utilities shall include: all manhole rim and invert flow line elevations, existing street lighting, gas mains, valves and services, water mains, valves and services, sanitary mains and services, electrical, TV, phone lines, power pole locations, utility risers and transformers, curb lines, catch basins, driveways, sidewalks, curb ramps and sign locations. All existing wells, septic drainfields, irrigation systems, and any other private or public service lines or easements shall be shown on this sheet. All sensitive lands, archeological sites, wetlands, stream courses and buffers including existing contours shall be shown.

Grading and Erosion Sediment Control Sheet (see design std's. for grading/ESC)

Information shown shall include a legend showing shaded or hatched cut and fill locations and erosion control BMP's. Existing contours screened back and proposed contours shall be shown including any grading associated with the storm water facilities. Locations of stripping stockpiles, building envelopes, and areas to be protected from damage shall be shown. Grading and Erosion control notes shall also be shown on this sheet. A table listing the total cubic yards of cut, fill and strippings shall also be shown.

Street and Storm Plan Sheet (see design std's. for street and storm)

Information shown shall include the proposed storm system including manhole locations, catch basin locations and types. The rim, grate and pipe invert in and out elevations shall be listed to the hundredth of a foot. All pipe runs and catch basin lateral lines shall list pipe size, length, slope, and pipe material. The required street information shall include street centerline stationing and centerline curve information including radius, length, and central angle. Centerline tangent bearings shall be listed. All high and low points shall be identified. Curb return information shall include radius, length, and central angle. Sidewalk and curb ramp locations shall be shown. Street and Storm construction notes shall be included on this sheet.

Water and Sewer Plan Sheet (see design std's. for water and sewers)

Information shown shall include the proposed water and sewer system and service line locations. Water and Sewer main line lengths, sizes, material types, and where appropriate, slopes shall be listed. Sewer manhole rim and pipe invert elevations in and out shall be listed to the hundredth of a foot. All water and sewer system appurtenances including AARV's, cleanouts, blowoffs, hydrants, valves and PRV's shall be called out on the plans. The water and sewer construction notes shall be included on this sheet.

Street and Storm Profile Sheet

Profile sheets shall include the street centerline proposed vertical alignment and vertical curve information including PVI station and elevation, high and low point station and elevation, vertical curve length, begin and end stationing, grades in and out of the vertical curve, algebraic differences, and "K" values shall be listed. Proposed finished grade and existing ground lines shall be shown. Where curb elevations left and right are not the same due to shed sections or cul-de-sac's, the left and right top of curb profiles shall also be shown on the profile sheet. Street intersections shall be identified. The proposed storm system shall be shown including manhole and catch basin stations and elevations of all pipe inverts, rims and grates. All pipe runs and laterals shall have line sizes, pipe diameters, slopes and materials labeled or noted. All proposed and existing utility crossings shall be shown.

Water and Sewer Profile Sheet

The proposed finished grade and existing ground lines shall be shown. Street intersections shall be identified. The proposed water system shall be shown including blowoff, hydrant, valve, PRV and AARV locations and minimum depth of cover requirements. The proposed sewer system shall be shown including stations and elevations of all manholes, pipe inverts, rims and cleanouts. All pipe runs and laterals shall have line sizes, pipe diameters, slopes and materials labeled or noted. All proposed and existing utility crossings shall be shown.

Detail Sheets

The detail sheets shall show specific city standard details for water, sewer and storm system appurtenances as proposed on the engineering drawings. The typical street width sections and structural section requirements shall also be shown. Other detail sheets may include street intersection details, stormwater detention and treatment facility details, trail location, section and construction details, sanitary sewer pump station facility details, landscaping layout, irrigation and planting detail and or street signage and striping details.

Miscellaneous

Based on submittal review the engineering department may require additional information to provide a complete understanding of the project. These requirements are provided as a minimum for a timely review.

ENGINEERING DESIGN STANDARDS FOR GRADING/ESC PLAN

Drawing submittals

Drawings shall be submitted on standard 24" x 36" bond paper for engineering review and approval. Each sheet shall be numbered and titled. Each sheet shall have a 1" border with a minimum text height of 0.10 inches. Each sheet shall be clearly labeled as "Grading" or "Grading/Erosion Control".

Subdivisions & Short Plats (see engineering design submittal requirements)

The required minimum information to be shown on the grading plan shall include existing 2-foot contour intervals screened back with listed elevations. The proposed finished grade 2-foot contour intervals with listed elevations shall also be shown. Sod stripping stockpile locations, proposed street and lot layout configurations, a quantities table listing the total cut, fill and stripping amounts, hatching or shading of the cut and fill locations, any tree removal or preservation and the grading notes shall also be shown.

The required minimum information to be shown on the erosion control plan shall include inlet protection on all proposed catch basins on site and any adjacent existing catch basins off site, sediment trap locations, silt fence locations, gravel construction entrance locations. The details of the required erosion control measures shall be shown. All stream courses and buffer areas shall be identified and protected.

If an NPDES, HPA, FPA, or an Erosion Control Bond are required for the project there shall be a note to that requirement along with the erosion control and grading notes.

ENGINEERING DESIGN STANDARDS FOR STREETS

Drawing submittals

Drawings shall be submitted on standard 24" x 36" bond paper for engineering review and approval. Each sheet shall be numbered and titled. Each sheet shall have a 1" border with a minimum text height of 0.10 inches. Each sheet shall be clearly labeled as "Street" or "Street/Storm".

Subdivisions and Short Plats

- Design of the proposed streets shall incorporate the recommendations of the traffic study if one was required and shall meet the requirements of the current AASHTO A Policy on Geometric Design for Highways and Streets manual and the current MUTCD manual.
- Neighborhood Traffic Management (NTM) elements may be required on the existing or proposed streets based on projected traffic volumes.
- The pavement design and structural section shall be based on the soil type and the recommendations of the geotechnical report and shall not be less than the current City standard minimum.
- Alleys, half street improvements and private streets shall meet the minimum City standard structural section.

Commercial, multifamily or Industrial

- The City engineer will give specific recommendations on pavement design, width, geometric requirements, safety, and pavement markings based on the submitted proposal.

GENERAL GUIDELINES FOR GEOMETRY OF ROADWAY

ITEM	ALLEY	2 LANE LOCAL SPRINKLERED	2 LANE LOCAL - NEIGHBORHOOD	2 LANE ² COLLECTOR - ARTERIAL	3 LANE COLLECTOR - ARTERIAL	5 LANE ARTERIAL
R.O.W. WIDTH	25 FEET (PRIVATE TRACT)	52 FEET	60 FEET	60 FEET	72 FEET	100 FEET
STREET WIDTH	20 FEET (PRIVATE TRACT)	28 FEET	36 FEET	36 FEET	48 FEET	74 FEET
CUL-DE-SAC RADIUS	N/A	N/A	SEE TABLE 17.19.040-2, CMC 17.19.040	SEE TABLE 17.19.040-1, CMC 17.19.040	N/A	N/A
SIDEWALK WIDTH	N/A	5 FEET	5 FEET	6 FEET	6 FEET	6 FEET
BIKE LANES	N/A	N/A	N/A	5 FEET	5 FEET	6 FEET
MIN. CENTERLINE RADIUS	70 FEET	100 FEET	100 FEET	200 FEET	300 FEET ³	300 FEET ³
CLEAR ZONE*	1.5 FEET MIN.	1.5 FEET	1.5 FEET MIN.	1.5 FEET MIN.	1.5 FEET MIN.	AS DIRECTED
ACCESS CONTROL	N/A	N/A ¹	N/A ¹	YES	YES	YES
LIGHTING REQUIRED	NO	YES	YES	YES	YES	YES
INTERSECTION SPACING	N/A	270 FEET	270 FEET	COLLECTOR: MIN. 330 FEET; MAX. 660 FEET ARTERIAL: MIN. 660 FEET; MAX. 1,000 FEET	COLLECTOR: MIN. 330 FEET; MAX. 660 FEET ARTERIAL: MIN. 660 FEET; MAX. 1,000 FEET	MIN. 660 FEET MAX. 1,000 FEET
INTERSECTION SETBACK	N/A	N/A	N/A	COLLECTOR: MIN. 100 FEET ARTERIAL: MIN. 300	COLLECTOR: MIN. 100 FEET ARTERIAL: MIN. 300	MIN. 300 FEET

* LAG MANUAL, WSDOT DESIGN MANUAL

¹ POSSIBLE BY COUNCIL MANDATE LIMITING CERTAIN LOTS DURING DEVELOPMENT REVIEW

² LEFT TURN LANES REQUIRED AT INTERSECTIONS

³ MUST MEET AASHTO GUIDELINES FOR SPEED AND SIGHT DISTANCE

ENGINEERING DESIGN STANDARDS FOR STORM SYSTEM

Drawing submittals

Drawings shall be submitted on standard 24" x 36" bond paper for engineering review and approval. Each sheet shall be numbered and titled. Each sheet shall have a 1" border with a minimum text height of 0.10 inches. Each sheet shall be clearly labeled as "Street" or "Street/Storm".

Subdivisions & Short Plats (see engineering design submittal requirements)

- Design of the proposed stormwater treatment and detention system shall be in accordance with the 2005 Stormwater Management Manual for Western Washington.
- All main line locations shall be located within the proposed or existing street right of way where ever possible unless otherwise approved.
- All roof drainage shall be directed to the stormwater facility for detention, except as follows: Lots adjacent to streams, wetlands and wetland/stream management zones are to be evaluated on the basis of aquifer recharge and fish and wildlife issues. When considered necessary roof, french, and foundation drains are to be directed, by approved means, back into the wetland or stream.
- If runoff from the proposed building envelope is not directed to the stormwater facility an approved house connection plan for roof and foundation drains will be required. Method and location of discharge must have prior approval.
- French drains may be required along proposed roadways depending on location and site conditions.
- Spacing between catch basins shall be a maximum of 400 feet and shall be located at all intersections. Catch basins shall be tied into manholes at a minimum slope of 1%. Flow calculations may be required to analyze curb flow depths and widths.
- Stormwater main lines shall not be laid flatter that 0.4% slope. Slopes over 20% will require pipe anchors.
- The stormwater design report shall include a project overview stating any assumptions made. Requests to deviate from the stormwater manual shall be fully stated and the reasons clearly outlined. The pervious and non pervious acreage totals, site maps, soil maps and full size basin maps showing the actual basin even if beyond the project limits shall be included. Isopluvial charts for the 2, 10 and 100 year 24 hour storm events, runoff curve numbers and down stream impact analysis shall be included. The results of the design reports shall be integrated with the City's Fisher Basin Model.

ENGINEERING DESIGN STANDARDS FOR WATER SYSTEMS

Drawing submittals

Drawings shall be submitted on standard 24" x 36" bond paper for engineering review and approval. Each sheet shall be numbered and titled. Each sheet shall have a 1" border with a minimum text height of 0.10 inches. Each sheet shall be clearly labeled as "Water" or "Water/Sewer".

Subdivisions & Short Plats (see engineering design submittal requirements)

- All main line locations shall be located within the proposed or existing street right of way where ever possible unless otherwise approved.
- Each lot shall have a water meter box location shown on the plan. The locations shall be near lot lines and shall maintain 10 feet of horizontal separation between sewer services.
- Irrigation service meter box locations and backflow prevention devices shall be shown on the plan for all landscape islands, open space tracts or other areas as identified on the plan.
- Fire hydrant locations shall be shown on the plan and shall be located as nearly as possible to lot lines or as directed by the Fire Department.
- AARV's, low point blowoffs, valve cluster locations and dead end blowoffs shall be called out on the plans and profile sheets.
- The system design may require sizing analysis for fire flow capacity, pressure zones and or pressure reducing valve vault locations upstream or downstream of the project site at the City's discretion.
- Possible line upsizing may be required for future extensions at the City's discretion.
- Any existing services not used or existing main lines that will be replaced or relocated may require abandonment and or removal at the City's discretion.

Commercial, Multifamily, or Industrial

In addition to the above requirements, the following requirements may apply for these types of uses.

- Fire flow calculations/analysis for fire sprinkler systems.
- The locations of fire department connection ports shall be shown.
- Individual domestic water main lines and fire system main lines may be required.

ENGINEERING DESIGN STANDARDS FOR PRESSURE REDUCING VALVE STATIONS

When a water system PRV station is required as part of a residential development, the following minimum components shall be included with the PRV submittal.

1. An existing water system area plan shall be submitted by the developer's engineer. The area plan shall show the elevation and location of existing PRV's adjacent to the development site. High side and low side pressures shall be included. The plan shall also show the proposed development layout with elevation of all street intersections, lots, and other high and low points within the site.
2. The PRV station shall be a pre-assembled, pre-tested, and packaged system from G.C. Systems or approved equal.
3. The PRV station shall include a catch basin located adjacent to the station and tied to the stormwater system for the 3" pressure relief bypass flows.
4. There shall be a minimum 9" air gap from the bypass pipe to the catch basin. And acceptable bug screen shall be included on the end of the bypass pipe.
5. A vault drain or sump pump tied into the storm system will be required.
6. The valve vault access shall be a spring assisted 36" x 72" double door lockable diamond plated hatch centered over the largest PRV.
7. The PRV station shall be located within the right-of-way in a widened planter strip or located outside of the right-of-way in an easement dedicated to the City.
8. The City of Camas reserves the right to determine the size of the PRV devices and the vault.
9. All interior piping shall be schedule 40, 306 stainless steel with flanges, and Victaulic coupling as required for disassembly.

ENGINEERING DESIGN STANDARDS FOR SEWERS

Drawing submittals

Drawings shall be submitted on standard 24" x 36" bond paper for engineering review and approval. Each sheet shall be numbered and titled. Each sheet shall have a 1" border with a minimum text height of 0.10 inches. Each sheet shall be clearly labeled as "Sewer" or "Water/Sewer".

Subdivisions & Short Plats (see engineering design submittal requirements)

- All main line locations shall be located within the proposed or existing right of way where ever possible unless otherwise approved.
- Service lateral locations shall be located in the planter strip for STEP systems and 8 feet past the right of way line for gravity or STEF systems.
- Main line grades shall not be designed flatter than 0.5% slope. Slopes over 20% will require pipe anchors.
- AARV, cleanout, valve, odor control, and manholes shall be shown on the plan and profile sheets.
- The system design may require sizing analysis for line size and capacity. The system may also require a pump station based on the type of sewer system being proposed, the location of the project, or other factors. Future pump station upsizing may also be required.
- There may be downstream capacity analysis required for the project depending on project location and the type of sewer system proposed.
- Additional odor control analysis and or measures may be required.
- Septic tank sizing if required shall be based on the proposed use and in conformance with the CC&R's. If pools are allowed then tank sizes may increase.

Commercial, Multifamily or Industrial

- Tank sizing submittal documentation and material submittals will be required.
- Material submittals, materials list and supplier information will be required prior to construction.
- Required as-built information shall include the depth of service, location of main lines, AARV's, odor control, cleanouts, manholes, and valve locations.

ENGINEERING DESIGN STANDARDS FOR PUMP STATIONS

When a sanitary sewer pump station is required as part of a residential development, the following minimum components shall be included with the pump station submittal.

1. A basin plan shall be submitted. The proposed development flows and any contributing basin flows shall be identified in the plan. The calculation of flows shall be consistent with the City's current Wastewater Facilities Plan. If the station is sized to include the off-site contributing basin, the station improvement shall be late comer agreement eligible.
2. The Pump Station shall include an odor control system approved by the City.
3. The Pump Station shall have a secondary diesel powered Onan generator, or approved equal, sufficiently sized to run the pump station during power outages. The fuel tank shall be sized to run the station for a minimum of 24 hours.
4. The Pump Station shall be a Romtec pre-packaged station, or approved equal, to include two submersible Flygt pumps with one pump equipped with a mix-flush valve, multitrode liquid level sensors with Monitor Pro controls. The discharge piping shall be stainless steel. The access cover shall be an H20 rated Flygt aluminum Safe-T-Hatch. The wet well shall be protected with Raven 405 hydrogen sulfide resistant lining.
5. The check valve vault shall consist of two Kennedy swing check valves with eccentric plug valve and 2" operating nuts, one eccentric plug valve with hand wheel operator and a cam-lock bypass port. Adjustable pipe supports, wafer style diaphragm pressure sensor, H20 rated spring assist hatch covers with a gravity sump drain and p-trap draining back to the wet well.
6. The control panel shall have a standard City approved canopy cover over an all-weather NEMA 4 rated control enclosure with dual pump hour monitors, pump controls, and two additional 110 volt outlets as required. There shall be an automatic transfer switch cabinet, PUD meter and main power switch.
7. The Pump Station shall be equipped with Sonitrol monitoring equipment acceptable to the City.
8. The station shall include area and cabinet lighting acceptable to the City including extra 10 volt receptacles (2 min.)
9. The Pump Station shall be paved, fenced and landscaped in a manner acceptable to the City. The station shall be located on a separate tract of land dedicated to the City along with the recording of the development plat.
10. The Pump Station capacity and configuration shall be designed for a maximum of four pump start cycles per hour with a minimum of 9 minutes of volume storage from high level alarm to the lowest inflow invert elevation.

ENGINEERING DESIGN STANDARDS FOR COMMUNITY S.T.E.F. TANKS

When a community S.T.E.F. tank system is proposed for a residential development to retain sanitary sewer solids, the following minimum requirements shall apply.

1. The community tanks will only be allowed if lot sizes are 4,000 S.F. or less. For lots over 4,000 S.F. an individual 1,500 gallon minimum tank will be required on each individual lot.
2. The community tank(s) shall be a fiberglass reinforced single walled Xerxes tank or approved equal. The tank submittal shall include buoyancy calculations with minimum factor of safety of 1.5 for dead man sizing.
3. An approved odor control system is required for the tanks. If the development includes a pump station, a vent line from the tank(s) to the odor control system will be required. If no pump station is proposed, chemical injection, soil filter beds, or other odor control systems acceptable to the City shall be included in the design.
4. A minimum of one permanent ground water monitoring and dewatering well(s) acceptable to the City shall be included in the design and site construction.
5. An Orenco liquid level alarm, AMAHW or AMLAHW series, high level alarm and float system, or approved equal, will be required on each tank that contains bio tube filters. A 12" wide by 18" tall sign shall be included to read as follows: THIS BOX IS THE PROPERTY OF THE CITY OF CAMAS PUBLIC WORKS DEPARTMENT. IT IS TO BE OPENED BY AUTHORIZED PERSONNEL ONLY. ALARM – IF THE ALARM SOUNDS, PRESS THE RED LAMP COVER TO SILENCE, THEN CALL CAMAS OPERATIONS CENTER AT 817-1563 (DAYS) OR 696-0777 (NIGHTS, WEEKENDS OR HOLIDAYS). The sign and alarm panel shall be mounted at the tank location in accordance with the City requirements.
6. Tank sizing requirements shall be as determined by the City of Camas.
7. The tank(s) shall be located in such a fashion as to allow for the future excavation and replacement of the tank(s) if necessary. Building foundation, infrastructure main line utilities, and other facilities including streets and street intersections, stormwater facilities, retaining walls or other improvements shall not be located within the future excavation zone of the installed tank(s).
8. A water service with an approved backflow protection device is required at the tank location as directed by the City.
9. The tank location shall include an area light if no street light is within 50 feet.
10. The tank(s) shall be accessible for future solids pumping and maintenance.

ENGINEERING DESIGN STANDARDS FOR STREET LIGHTING

ALL INFORMATION IS INTENDED TO PRODUCE A LIGHTING DESIGN WITH LUMINANCE LEVELS AND LUMINANCE UNIFORMITY WHICH MEETS OR EXCEEDS THOSE IN THE I.E.S. "RECOMMENDED MAINTAINED LUMINANCE FOR ROADWAYS" FROM THE I.E.S. LIGHTING HANDBOOK. INSTALLATION OF ADDITIONAL LIGHTS MAY BE NECESSARY TO MEET THE INTENT OF THIS STANDARD.

1. WHERE THE AVERAGE RESIDENTIAL DENSITY IS GREATER THAN 12 DWELLING UNITS PER ACRE, USE COMMERCIAL OR INTERMEDIATE FOR LAND USE.
2. AVERAGE MAINTAINED LUMINANCE IS MEASURED IN FOOT CANDELAS PER SQUARE METER.
3. AT SIGNALIZED INTERSECTIONS, THE AVERAGE MAINTAINED LUMINANCE SHALL BE OF THE AVERAGE FOR THE TWO INTERSECTING STREETS.
4. LUMINANCE UNIFORMITY IS THE RATIO OF AVERAGE OR MAXIMUM MAINTAINED LUMINANCE TO MINIMUM LUMINANCE. LUMINANCE VALUES OUTSIDE THE ROADWAY SHALL NOT BE INCLUDED IN THE RATIO. ALL SIDEWALK AREAS AND THE AREA BETWEEN THE SIDEWALK AND THE STREET CURB SHALL BE INCLUDED WHEN DETERMINING THE MAINTAINED LUMINANCE.
5. LIGHTING LAYOUTS WILL REQUIRE APPROVAL AND POSSIBLE ADJUSTMENT TO MEET THE CITY OF CAMAS LIGHTING OBJECTIVES AND I.E.S. STANDARDS. THIS MAY INCLUDE ADJUSTMENT TO THE POLE SPACING AS LISTED AND MAY RESULT IN ADDITIONAL OR FEWER LIGHTS.
6. ALL LIGHTING FIXTURES SHALL BE LIGHT EMITTING DIODE (LED). LIGHTING CIRCUITS SHALL BE 120 VOLTS.
7. THE MOUNTING HEIGHT OF THE FIXTURE IS MEASURED FROM THE ROADWAY SURFACE TO THE CENTER OF THE LIGHT SOURCE WITH THE FIXTURE LOCATED OVER THE BIKE LANE LINE OR SIX FEET FROM THE FACE OF CURB.
8. ALTERNATIVE LIGHTING LAYOUTS MAY BE SUBMITTED FOR REVIEW. WHERE LIGHTING IS REQUIRED ON BOTH SIDES, DESIGNS SHALL BE "OPPOSITE LIGHTING" ON MAJOR ROADWAYS 46 FEET OR GREATER IN WIDTH. THE USE OF STAGGERED LIGHTING SHALL ONLY BE USED WHERE "OPPOSITE LIGHTING" IS NOT PRACTICAL. LIGHTING LAYOUTS ON LOCAL RESIDENTIAL STREETS WITHIN A SUBDIVISION MAY VARY FROM SIDE TO SIDE.
9. COBRA STYLE LIGHT POLES ARE REQUIRED ON ALL COLLECTOR AND ARTERIAL ROADWAYS.
10. MAXIMUM POLE HEIGHT SHALL BE LIMITED TO 30 FEET.
11. A LIGHTING DESIGN CONSISTENT WITH THESE REQUIREMENTS AND APPROVED BY CLARK PUBLIC UTILITY DISTRICT SHALL BE SUBMITTED FOR FINAL REVIEW AND APPROVAL TO THE CITY PRIOR TO INSTALLATION.
12. STREET LIGHTS ON LOCAL AND NEIGHBORHOOD LEVEL STREETS SHALL BE LOCATED AT PROPERTY LINES.
13. THE STREET LIGHTS SHALL BE LOCATED IN THE PLANTER STRIP UNLESS OTHERWISE APPROVED BY THE CITY.

14. STREET LIGHT SPACING:

LAND USES	ARTERIAL ROADWAY		COLLECTOR ROADWAY		NEIGHBORHOOD ROADWAY		LOCAL ROADWAY	
	COMMERCIAL INDUSTRIAL	RESIDENTIAL	COMMERCIAL INDUSTRIAL	RESIDENTIAL	COMMERCIAL INDUSTRIAL	RESIDENTIAL	PUBLIC	PRIVATE
MAX. POLE SPACING (A)	170	160	130	160	150	170	N/A	N/A
MAX. POLE SPACING (B)	N/A	N/A	N/A	N/A	150	150	150	150

(A) STANDARD COBRA STYLE

(B) POLE TOP STYLE

15. PEDESTRIAN CROSSINGS AND VERTICAL SAG CURVES SHALL BE ILLUMINATED.
16. STREET LIGHTING IS REQUIRED ON ALL PRIVATE STREETS OVER 100 FEET IN LENGTH AND SERVING MORE THAN FIVE DWELLING UNITS.
17. PRIVATE STREETS WITH STREET LIGHTING SHALL HAVE A SEPARATE METER THAT THE HOME OWNERS ASSOCIATION WILL BE RESPONSIBLE FOR.

GENERAL PLAN REVIEW CHECKLIST
ENGINEERING DEPARTMENT
CITY OF CAMAS, WASHINGTON



Project/Development Name: _____

City Project Number: _____

Reviewer's Initials and Date: _____

Please mark completed items in the space provided. Mark N/A if not applicable. Items left blank are incomplete.

COVER SHEET AND GENERAL REVIEW

- Project Name (Title) and Past Project Names
- Owner's / Developers Name, Address, & Phone Number
- Engineer's Name, Address and Phone Number
- Architect's Name, Address and Phone Number
- City of Camas Approval Block
- Vicinity Map
- Legend
- General Notes
 - Reference to Standard Specifications
 - City of Camas/County
 - WSDOT/APWA
- North Arrow and Scale
- Signed State of Washington Engineer's Stamp
- Total Linear Feet of Improvements
 - Street
 - Water
 - Storm
 - Sanitary
- Sheet Index
- Benchmark, Datum Elevations
- Boundary Review Board Approval Required
- Master Plan Checked
- Complies with Request for Utility Services (R.U.S.)
- Complies with Council's Decision (Attach Notice of Final Decision)
- Submitted Four Sets of Plans
- Testing Requirements / Frequency Matrix

Comments: _____

GENERAL PLAN REVIEW CHECKLIST
ENGINEERING DEPARTMENT
CITY OF CAMAS, WASHINGTON



Project/Development Name: _____

City Project Number: _____

Reviewer's Initials and Date: _____

Please mark completed items in the space provided. Mark N/A if not applicable. Items left blank are incomplete.

GRADING & EROSION CONTROL

- ___ Signed State of Washington Engineer's Stamp
- ___ North Arrow and Scale
- ___ Legend
- ___ Standard City of Camas Erosion Prevention & Sediment Control Detail Sheets
- ___ Special Details Required
- ___ Easement(s) Required, Shown, Called Out
- ___ City of Camas EPSC and Grading Notes
- ___ Existing and Proposed Property Lines / Adjoining Tax Lots Shown
- ___ Street Names
- ___ Proposed Right of Way
- ___ Erosion Control Measures
 - ___ Construction Entrance ___ Silt Fence ___ Cut-off Ditches
 - ___ Inlet Protection ___ Slope Stability ___ Temp. Sediment Ponds
 - ___ Temp. Stockpile Area(s) Shown w/ Protection
- ___ Identify All Sensitive Areas (Wetlands and Buffers, Floodplains, Tree Resource Area, Streams, Creeks, Springs, etc.)
- ___ Existing and Finished Contours
- ___ Existing Area of Potential Slope Instability and Structures
- ___ Location of 100 Year Flood Plain & Shoreline Management Area Limits on the Site
- ___ Proposed Impervious Surfaces Other than Streets and Sidewalks
- ___ Drainage Flow Routes and Existing Discharge Points to and from Site
- ___ Edge of Pavement
- ___ Existing Trees, Trees to be Removed (w/ Diameter), Utility Poles, Wells, Septic Tanks, Drainage Structures, Fire Hydrants, Street Lights, Etc.)
- ___ Site Acreage
- ___ Area of Cut/Fill
- ___ Quantity of Cut/Fill
- ___ Wetland Area and Buffers – Cannot be Used for Treatment or Detention
- ___ Permits (Federal and State) Received Prior to Signing
 - ___ NPDES ___ Erosion Control Bond
- ___ Location of Buildable Lot Area
- ___ Fill Compaction Requirements

Comments: _____

GENERAL PLAN REVIEW CHECKLIST
ENGINEERING DEPARTMENT
CITY OF CAMAS, WASHINGTON



Project/Development Name: _____

City Project Number: _____

Reviewer's Initials and Date: _____

Please mark completed items in the space provided. Mark N/A if not applicable. Items left blank are incomplete.

SANITARY SEWER

- ___ Signed State of Washington Engineer's Stamp
- ___ North Arrow and Scale
- ___ Legend
- ___ Standard City of Camas Sewer Detail Sheets
- ___ Special Details Required
- ___ Easement(s) Required, Shown, Called Out
- ___ Construction Notes
- ___ Total Length of Sewer Main Improvements
- ___ Existing and Proposed Property Lines / Adjoining Tax Lots Shown
- ___ Street Names and Widths
- ___ Pipe size, Lengths, & Material meet City standards and are shown
- ___ Stationing
- ___ Existing and Proposed Utilities Shown
- ___ Existing and Possible Conflicts Shown (Structures, Trees, etc.)
- ___ Lateral Table
 - ___ Lateral Size ___ Length
 - ___ Depth ___ Pipe Material
- ___ Dimensioning (7' from South/West Curb)
- ___ Manhole Spacing (max. 400' for gravity system)
- ___ Cleanout Spacing (max. 200' or every 90° of Bend for STEF system)
- ___ All manholes with Coated Lining Called Out (STEP/STEF/Gravity)
- ___ Special Manhole Frame or Cover Required
- ___ Separation from Water Utility (10' horizontal, 18" vertical)
- ___ Invert Elevations
- ___ Rim Elevations
- ___ Check Slopes
- ___ Minimum Design Slopes (0.004 for gravity and STEF mains)
- ___ Minimum Depth and Cover (6' for gravity and STEF, 5' for STEP mains)
- ___ Concrete Pipe Anchors for Main Lines (Slopes greater than 20%)
- ___ Each Lot Served
- ___ Shown on Profile

Comments: _____

GENERAL PLAN REVIEW CHECKLIST
ENGINEERING DEPARTMENT
CITY OF CAMAS, WASHINGTON



Project/Development Name: _____

City Project Number: _____

Reviewer's Initials and Date: _____

Please mark completed items in the space provided. Mark N/A if not applicable. Items left blank are incomplete.

STORMWATER

Plans

- ___ Signed State of Washington Engineer's Stamp
- ___ North Arrow and Scale
- ___ Legend
- ___ Standard City of Camas Stormwater Detail Sheets
- ___ Special Details Required
- ___ Construction notes
- ___ Total Length of Sewer Main Improvements
- ___ Existing and Proposed Property Lines / Adjoining Tax Lots Shown
- ___ Street Names and Widths
- ___ Pipe size, Lengths, & Material meet City standards and are shown
- ___ Stationing
- ___ Existing and Proposed Utilities Shown
- ___ Existing and Possible Conflicts Shown (Structures, Trees, etc.)
- ___ Location and dimensions of proposed stormwater facilities, including typical cross sections of proposed facilities)
- ___ Stormwater profile for all systems in R.O.W.
- ___ Stormwater Profile for all Systems in R.O.W.
- ___ Drainage Flow Routes and Existing Discharge Points to and from site
- ___ Specify pipe size and material
- ___ Check All Pipe Slopes and Invert Elevations
- ___ All changes in pipe size, material, direction, or grade require catch basin or manhole per PSM.
- ___ Connections to Pipe Systems at Catch Basin or MH Only
- ___ Minimum Pipe Cover for Vehicular Loads per Manufacturer's Specifications (Verify ADS)
- ___ Catch Basins at Low Points, Not Located at Base of ADA Ramps

GENERAL PLAN REVIEW CHECKLIST
ENGINEERING DEPARTMENT
CITY OF CAMAS, WASHINGTON



STORMWATER Continued

WQ Treatment Facility

- Detail of any flow control structures
- Provide overflow structure in fine grained soils or if low percolation
- Check if Oil/water Separator is required
- Show sufficient dimensions on all stormwater facility(s) for construction
- Provide typ. Swale Cross section
 - 4:1 slopes preferred for mowing (Max. 3:1) Min. width 2'
 - 1' Freeboard on Ponds & Swales 0.5%-4% slope
- Minimum 6" topsoil mix for the swale grass if in permeable soils
- Permeable soils require impermeable liner or 1 ft clay liner under 6" topsoil layer in swale to be less than 2.4 in/hr to be field verified by design engineer prior to sodding or seeding.
- List swale seeding specifications
- Finish elevations on all outfall inverts, top of level spreader, top of grates
- Energy Dissipater at end of outfall piping
- If rip rap used, detail length, width, depth, and size
- Debris barrier/grate for all pipes entering a closed pipe system
- Retaining Walls – specify top and bottom of wall elevations, dimensions, type, backfill, installation, wall section, footing drainage, etc.
- Maintenance access to swale or pond from street (min. 15' wide, less than 20% slope, min. 15' easement)
- Barrier or fencing around the stormwater facility if safety is a concern (fence type, height (max. 6'), gate opening (10' min), top rail on fence)
- Label Stormwater facility as tract of land
- State whom is to maintain & operate the stormwater facility:
- Stenciling of all catch basins
- Types & Number of plantings around pond perimeter (See City of Camas Tree/Plant List)
- Operating and Maintenance Manual for Ponds
- Wetlands & Buffers (Sensitive areas labeled and shown)

Infiltration Facility

- Cross section of infiltration system
 - Drywells
 - Building roof drain
 - Perforated pipe trench
 - Infiltration pond

GENERAL PLAN REVIEW CHECKLIST
ENGINEERING DEPARTMENT
CITY OF CAMAS, WASHINGTON



STORMWATER Continued

- Check landscaping plan against stormwater facility (no trees in treatment area, etc.)
- Design Infiltration Rate & Contractors design table for length of perf. pipe required per 1000 sq. feet of roof area
- Roof Downspouts cannot drain to street or drainage structure, unless included in sizing calculations and must be noted and shown on plans.
- Pre-sedimentation manhole required for all drywells without water quality treatment
- For Privately maintained stormwater facilities, provide notarized covenant running with the land.
- Verify that no wells or other facilities are adjacent to infiltration pond.
- Provisions for Roof Drains For All Lots.

Comments:

GENERAL PLAN REVIEW CHECKLIST
ENGINEERING DEPARTMENT
CITY OF CAMAS, WASHINGTON



Project/Development Name: _____

City Project Number: _____

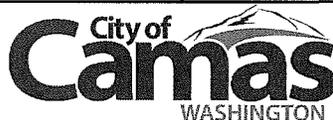
Reviewer's Initials and Date: _____

Please mark completed items in the space provided. Mark N/A if not applicable. Items left blank are incomplete.

Transportation Plan

- ___ Plan is consistent with traffic study recommendations; council conditions
- ___ Signing and striping Plan
- ___ Sight Distance Triangles and Calculations
- ___ Road Modifications
- ___ Pavement Design
- ___ Special Provisions
- ___ Signed State of Washington Engineer's Stamp
- ___ North Arrow and Scale
- ___ Legend
- ___ Easement(s) Required, Shown, Called Out
- ___ Construction Notes
- ___ Existing and Proposed Property Lines / Adjoining Tax Lots Shown
- ___ Street Names
- ___ Existing and proposed Right of Way
- ___ Stationing
- ___ Tangent Bearings
- ___ Curve Data
- ___ Curb
 - ___ Radii
 - ___ Elevation at Radius Returns (1/2's' 1/4's)
 - ___ Elevations at Lot Lines
- ___ Dimensions
 - ___ Streets ___ Hammerheads
 - ___ Cul-de-sacs ___ Temporary Turn-arounds
 - ___ Driveways
- ___ Driveway locations on all corner lots – Access control issue
- ___ Sight Distance Triangle Easements on all corner lots (label and Dimension)
- ___ Sidewalks
 - ___ Pedestrian Ramps (check alignment)
 - ___ Connectivity
- ___ Turning lanes
- ___ Traffic Signals
- ___ Sawcut existing pavement straight prior to paving
- ___ Vertical Curves per AASHTO (see "Policy on Geometric Design of Highway & Streets", Exhibit 3-76, page 274)

GENERAL PLAN REVIEW CHECKLIST
ENGINEERING DEPARTMENT
CITY OF CAMAS, WASHINGTON



Transportation Plan Continued

- K value Shown
- Superelevation
- Design Speed _____ mph; Posted speed _____ mph
- Typical Street Section
 - Street Classification _____
 - _____ ½ street improvement _____ ½ street overlay _____ resurfacing of ex.
 - Soil Classification _____
 - 2% Cross Slope; Max. 6% Shed
 - Controlled Density Fill (CDF)
 - Center Line
 - Width of Right of Way
 - Width of Street
 - Public Utility Easement (P.U.E.)
 - Subgrade and pavement including depth and type
 - Curb Type
 - Sidewalk location, width, depth, compacted subgrade
- Misc. Typical Sections
 - Standard Concrete Driveway
 - Concrete Vertical Curb
 - Concrete Curb and Gutter
 - ADA Curb Ramps
 - Ramp detectable warning detail
 - Barricade (Type III)
 - Sidewalk Cross Section
 - Mailbox Location
- Letter for Road Modification from Engineer
- Sign and Striping locations accordance with MUTCD
- Signs and Mailboxes located in planter strip (5' horizontal clearance; min. 7' vertical clearance).
- Street configuration and lot numbering conforms to preliminary plat.
- Bike lanes required
- Traffic signal plan or loop & conduit installation for future.
- Neighborhood Traffic Management Compliant

Comments:

GENERAL PLAN REVIEW CHECKLIST
ENGINEERING DEPARTMENT
CITY OF CAMAS, WASHINGTON



Project/Development Name: _____

City Project Number: _____

Reviewer's Initials and Date: _____

Please mark completed items in the space provided. Mark N/A if not applicable. Items left blank are incomplete.

Water Plan

- ___ Signed State of Washington Engineer's Stamp
- ___ North Arrow and Scale
- ___ Legend
- ___ Standard City of Camas Water Detail Sheets
- ___ Special Details Required
- ___ Easement(s) Required, Shown, Called Out
- ___ Construction Notes
- ___ Total Length of Water Main Improvements
- ___ Existing and Proposed Property Lines / Adjoining Tax Lots Shown
- ___ Street Names & Widths
- ___ Pipe Size, Lengths, & Material Per Standards
 - ___ 8" for F.H.
 - ___ 6" for Loop
 - ___ 4" 200' Max. Length
- ___ Stationing
- ___ Existing and Proposed Utilities Shown/Conflicts
- ___ Existing and Possible Conflicts Shown (Structures, Trees, etc.)
- ___ Dimensioning (6' from North/East Curb)
- ___ Fire Hydrant w/ Fire Marshal's Approval
 - ___ 400' Between Hydrants
 - ___ 600' from Property Lines
 - ___ No Fire Hydrant on Dead End 6"
- ___ Meet Conditions of Fire Dept. (Attach Copy of Fire Marshal's Review)
- ___ Valves: 3 on a Tee, 4 on a Cross, and Valves Every 600' (minimums)
- ___ Fittings / Blocks, Shown & Called Out
- ___ Pipe Deflection Checked for Pipe Sections
- ___ Blow-off (Standard or Construction)
- ___ Separation from Sanitary (10' Horizontal, 18" Vertical)
 - ~ or Incased in Concrete
 - ~ or Ductile Iron Sleeve, 10' Each Side of Crossing.
- ___ Water Depths and Crossings Shown on Profile
- ___ Water Meter Locations and Size
- ___ G.P.M. Available:
 - ___ Cross-Connection Control
 - ___ Each Lot Served
 - ___ Fire Permits (3 total)

GENERAL PLAN REVIEW CHECKLIST
ENGINEERING DEPARTMENT
CITY OF CAMAS, WASHINGTON



Water Plan (continued)

- Verify Correct Locations, Size, & Type of Existing Water Facilities (Booster Stations, Reservoirs, etc.)
- Engineered Vacuum Relief Locations for Large Water Mains
- Air / Vacuum Relief Location Shown - High Point Typical
- PRV Location / Settings

Comments:

ENGINEERING AS-BUILT SUBMITTAL REQUIREMENTS

Drawing submittals

Drawings shall be submitted on standard 24" x 36" bond paper for engineering review and approval. Each sheet shall be numbered and titled. Each sheet shall have a 1" border with a minimum text height of 0.10 inches. Each sheet shall be clearly labeled as "As-Built" or "Record Drawings". Shaded areas, satellite photography, or aerial photography is not acceptable due to reproducibility. Any hatched area shall be transparent or hatched at such a scale that it will not show as a black area after scanning. Upon engineering department review and approval, the "As-Built" shall be submitted on archival Mylar and in a PDF digital format on a CD-Rom disc. CAD files shall be submitted as directed below.

Required Information

As-Built elevations, if different than per design, of all rims, pipe inverts in and out of manholes, catch basins, and outfalls shall be labeled next to the crossed out design elevation. All as-built pipe lengths, depths and slopes shall be recorded next to the crossed out design information on the plan view sheet as well as on the appropriate profile and or detail sheet(s).

Stormwater detention and treatment facilities shall show as-built elevations of all pipe inverts, control structures and orifices, pond and swale lengths, depths, widths and slopes. Overflow structures, pond berms and access roads shall also show as-built information for slopes, heights, widths, lengths and locations.

A stormwater facility as-built verification note shall appear on the as-built sheet showing the facilities. The note shall state that the engineer has performed an as-built inspection of the facilities and shall verify that as constructed the facilities meet the design criteria per the storm water report for storm water treatment and detention requirements of the site.

A final site as-built grading/topographical site plan shall be submitted with the as-built plans. The site plan shall show final finished grade contours and elevations over all lot areas. The elevation of all lot corners shall also be noted on this site plan. The as-builts shall also reflect any change in the lot numbering or configurations from what was originally proposed or approved. This sheet shall also show physical distance ties to the sanitary sewer service laterals that are marked with a 10 foot long 2x4 board. There shall be a minimum of two distances to each lateral from adjacent lot corners or arks in the curb line.

CAD Drawings Required

1. All CAD drawings shall be in an AutoCAD DWG format – check for the City's current acceptable version.
2. Final Plat – To be submitted with a copy of the recorded mylar. Submit all features shown on recorded mylar.
3. As-Builts – To be submitted with your request for completion. Submit complete set with elevations and all features.

*** All submitted documents (digital & hard copy) shall be labeled to indicate what the document represents and dated. (Final Plat, As-Builts)**

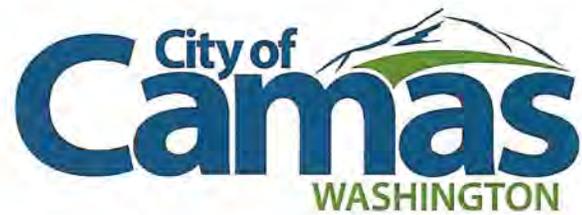
*** Include any special fonts, x-referenced drawings, and PCP file**

The following features shall be on an exclusive Layer

Property Lines*	Steep Slopes *
Property Pins	Development Boundary*
Section Corners	Water lines**
Easements	Water service lines
Basis of earing	Water valves
Lot numbers	Fire hydrants
Right-of-Way	Sanitary sewer lines**
Centerlines	Sanitary sewer service lines
Street text	Sanitary sewer valves
Homeowners open space areas *	Storm sewer lines**
City owned open space areas*	French drains
Wetlands Delineated *	Detention ponds*
National Wetlands Inventory*	Subdivision boundary*

* Polylines shall form closed polygons

** Continuous lines with layering or labeling to indicate type & size



Standard Engineering Details

Section Index

- General Engineering Details and Notes
- Erosion Control / Grading Details
- Street Details
- Street Light Details (Future)
- Storm Details
- Sewer Details
 - S.T.E.F. Details
 - S.T.E.P. Details
 - Gravity Details
- Water Details



General Engineering Details and Notes

City of Camas
616 NE Fourth Avenue
P.O. Box 1055
Camas, WA 98607
www.cityofcamas.us

Phone: (360) 834-6864
Fax: (360) 834-1535

Creation Date: 10/28/02
Revision Date: 10/21/14 (Partial)

City of Camas General Details ~ INDEX

<u>Detail No.</u>	<u>Detail Name</u>	<u>Rev.</u>	<u>Rev. Date</u>
G1	GENERAL CONSTRUCTION NOTES	4	10/21/14
G2	TYP. UTILITY TRENCH DETAIL (IN R.O.W.)	4	10/21/14
G3	TYP. UTILITY TRENCH DETAIL (OUTSIDE R.O.W.)	3	10/21/14
G4	STANDARD TESTING REQUIREMENTS	3	10/21/14
G5	UTILITY CROSSING	3	10/21/14
G6	SIGNATURE AND REVISION BLOCK	1	1/1/11
G7	UTILITY EASEMENT NOTES	1	10/21/14
G8	UTILITY EASEMENTS	1	10/21/14

GENERAL CONSTRUCTION NOTES:

1. ALL CONSTRUCTION MATERIALS AND WORKMANSHIP SHALL CONFORM TO THE MOST RECENTLY ADOPTED EDITION OF THE W.S.D.O.T./APWA "STANDARD SPECIFICATIONS FOR ROAD, BRIDGE, AND MUNICIPAL CONSTRUCTION" AND STANDARD DETAIL SHEETS ATTACHED HEREWITH.
2. THE CONTRACTOR SHALL BE RESPONSIBLE FOR DETERMINING THE LOCATION OF ALL EXISTING UNDERGROUND UTILITIES, INCLUDING THE INVERT AND TOP ELEVATIONS AT CROSSING LOCATIONS, PRIOR TO THE START OF CONSTRUCTION AND TO NOTIFY THE CITY ENGINEER OF ANY POTENTIAL CONFLICTS.
3. CONTRACTOR SHALL CALL CLARK COUNTY'S 24-HOUR UTILITY NOTIFICATION CENTER AT (360) 696-4848 OR (800) 553-4344 FOR UTILITIES LOCATE, A MINIMUM OF 48 HOURS PRIOR TO THE START OF CONSTRUCTION.
4. ALL EXISTING MONUMENTS, PROPERTY CORNERS AND SURVEY MARKERS SHALL BE PROTECTED. REPLACEMENT OF LOST, DESTROYED OR DAMAGED MARKERS SHALL BE DONE BY A LICENSED LAND SURVEYOR IN ACCORDANCE WITH R.C.W. 58.09 AT THE CONTRACTORS EXPENSE.
5. THE CONTRACTOR SHALL NOT EXCAVATE OVER FOUR FEET IN DEPTH WITHOUT USING ADEQUATE SAFETY MEASURES. THE CONTRACTOR IS REFERRED TO TITLE 296 W.A.C., PART N FOR EXCAVATION, TRENCHING AND SHORING REQUIREMENTS.
6. ALL UTILITIES SHALL HAVE A GRANULAR BACKFILL APPROVED BY THE CITY OF CAMAS. WATER SETTLEMENT OF UTILITY TRENCHES IS NOT ALLOWED. TRENCH LINES LOCATED WITHIN AN EXISTING ROADWAY SHALL BE PLATED OR TOPPED WITH COLD MIX. GRANULAR BACKFILL OVERNIGHT IS NOT ALLOWED. PLATES SHALL HAVE COLD MIX AROUND ALL EDGES.
7. ALL EROSION/SEDIMENT CONTROL MEASURES SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE EROSION/SEDIMENT CONTROL PLAN AND CITY OF CAMAS EROSION/SEDIMENT CONTROL DETAILS PRIOR TO ANY CLEARING OR THE START OF ANY CONSTRUCTION.
8. IF THE CITY INSPECTOR OR ENGINEER(S) HAS EVIDENCE OF POOR CONSTRUCTION PRACTICES OR EROSION CONTROL TECHNIQUES, A "STOP WORK" ORDER SHALL BE ISSUED UNTIL PROPER MEASURES HAVE BEEN TAKEN AND APPROVED BY THE CITY ENGINEERING STAFF.
9. THE CONTRACTOR SHALL SUBMIT A TRAFFIC CONTROL PLAN TO THE CITY OF CAMAS PUBLIC WORKS DEPARTMENT. APPROVAL SHALL BE OBTAINED PRIOR TO THE START OF CONSTRUCTION.
10. THE DEVELOPER/CONTRACTOR SHALL ARRANGE A PRE-CONSTRUCTION MEETING WITH THE CITY OF CAMAS ENGINEERING DEPARTMENT PRIOR TO COMMENCING ANY WORK.
11. ANY SIGNIFICANT DEVIATIONS FROM THE PLANS WILL REQUIRE A SUBMITTAL FROM THE APPLICANT'S ENGINEER AND APPROVAL FROM THE CITY OF CAMAS ENGINEERING DEPARTMENT.
12. AN EROSION/SEDIMENT CONTROL BOND MAY BE REQUIRED BY THE CITY OF CAMAS PRIOR TO WORK COMMENCING.

REV. NO.	DATE	BY	APPR.
1	5/1/07	SCD	JC
2	10/1/08	SCD	JC
3	1/1/11	SCD	JC
4	10/21/14	SCD	JC



CITY OF CAMAS ~ GENERAL DETAIL

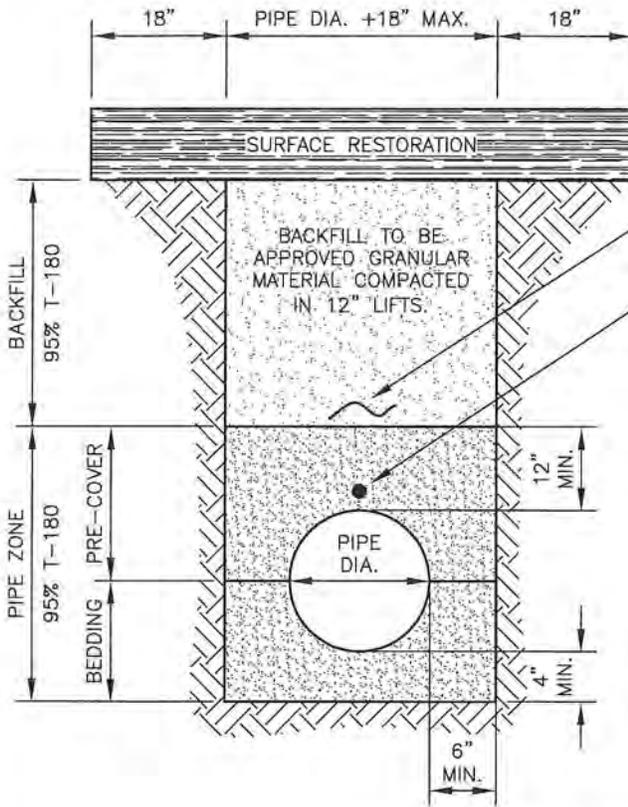
NOTES

John P. Caruthers 10-21-14
 DETAIL APPROVED BY DATE

DETAIL NO.

G1

NOT TO SCALE



SURFACE MATERIAL PER NOTE #5 BELOW OR AS SHOWN ON PLANS FOR NEW CONSTRUCTION

MARKING TAPE REQUIRED FOR ALL SANITARY LINES, 1' ABOVE PIPE

14 GA. HDPE (HMWPE) INSULATED COPPER CLAD STEEL TONING WIRE (GREEN FOR SEWER, BLUE FOR WATER) ON MAINS AND LATERALS WHEN REQUIRED (SEE CHART BELOW), SEAL SPLICE CONNECTIONS WITH 3M DBY OR KING GEL CAPS

NOTES:

1. SAWCUT ALL EDGES FOR SURFACE RESTORATION.
2. ALL TRENCH COMPACTION SHALL MEET OR EXCEED 95% OF AASHTO T-180.
3. BEDDING AND PRE-COVER TO BE APPROVED GRANULAR MATERIAL.
4. CDF BACKFILL REQUIRED ABOVE PIPE ZONE, FOR ALL TRANSVERSE TRENCHLINE AND UTILITY CROSSINGS, TO A MAXIMUM DEPTH OF 3 FEET, ON ALL DESIGNATED COLLECTOR AND ARTERIAL STREETS.
5. STREET SURFACE RESTORATION SHALL CONSIST OF MIN. 3" COMPACTED DEPTH OF CLASS 1/2" PG 64-22 HMA PAVEMENT OVER 12" OF 1 1/4" MINUS CRUSHED AGGREGATE. CONTRACTOR TO MATCH EXISTING ASPHALT DEPTH IF >3".

TRENCH SECTION WITHIN RIGHT-OF-WAY

MINIMUM PIPE COVER CHART			
UTILITY TYPE	MAIN TYPE	MIN. PIPE (MAIN) COVER	MIN. LATERAL OR SERVICE COVER
WATER	DISTRIBUTION TRANSMISSION*	2.5'	2'
		3'	2' **
STORM	MAIN	5'	PER PLAN (MIN. 2')
SEWER:	STEP***	5'	1.5'
	STEF***	6'	4.5'
	GRAVITY	6'	4.5'

* TONING WIRE REQUIRED FOR MAINS 12" DIA. AND LARGER
 ** SERVICES ONLY ALLOWED WHERE APPROVED
 *** TONING WIRE REQUIRED

REV. NO.	DATE	BY	APPR.
1	3/1/07	SCD	JC
2	9/18/07	SCD	JC
3	1/1/11	SCD	JC
4	10/21/14	SCD	JC



CITY OF CAMAS ~ GENERAL DETAIL
 TRENCH DETAIL (IN R.O.W.)

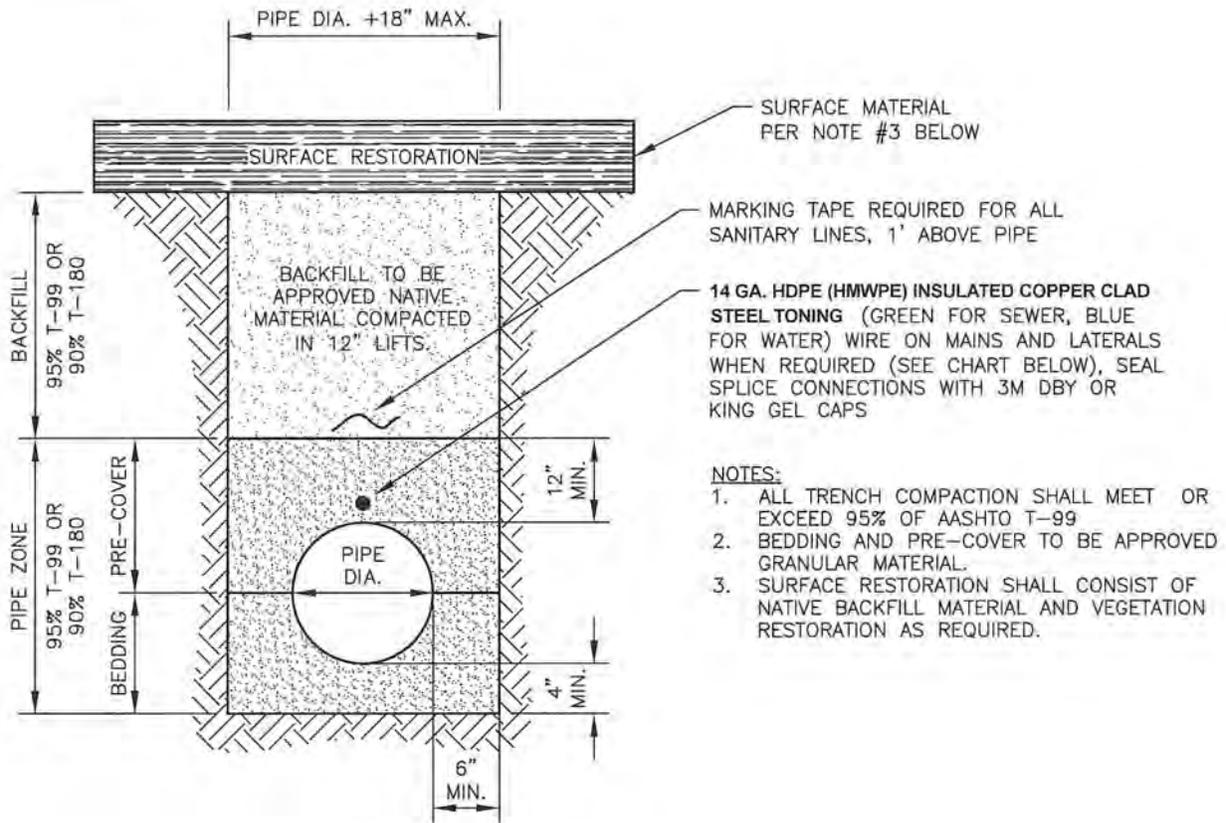
Jan P. [Signature] 10-21-14
 DETAIL APPROVED BY DATE

DETAIL NO.

G2

NOT TO SCALE

GEN-TRENCH.DWG



- NOTES:**
1. ALL TRENCH COMPACTION SHALL MEET OR EXCEED 95% OF AASHTO T-99
 2. BEDDING AND PRE-COVER TO BE APPROVED GRANULAR MATERIAL.
 3. SURFACE RESTORATION SHALL CONSIST OF NATIVE BACKFILL MATERIAL AND VEGETATION RESTORATION AS REQUIRED.

TRENCH SECTION OUTSIDE OF R/W

MINIMUM PIPE COVER CHART			
UTILITY TYPE	MAIN TYPE	MIN. PIPE (MAIN) COVER	MIN. LATERAL OR SERVICE COVER
WATER	DISTRIBUTION	2.5'	2'
	TRANSMISSION*	3'	2' **
STORM	MAIN	5'	PER PLAN (MIN. 2')
SEWER:	STEP***	5'	1.5'
	STEP***	6'	4.5'
	GRAVITY	6'	4.5'

* TONING WIRE REQUIRED FOR MAINS 12" DIA. AND LARGER
 ** SERVICES ONLY ALLOWED WHERE APPROVED
 *** TONING WIRE REQUIRED

REV. NO.	DATE	BY	APPR.
1	3/1/07	SCD	JC
2	1/1/11	SCD	JC
3	10/21/14	SCD	JC



CITY OF CAMAS ~ GENERAL DETAIL
 TRENCH DETAIL (OUTSIDE R.O.W.)

John P. ... 10-21-14
 DETAIL APPROVED BY DATE

NOT TO SCALE

DETAIL NO.

G3

GEN-TRENCH.DWG

CATEGORY	TEST	STANDARD	FREQUENCY	TESTING AGENCY	TIMING	TEST REQUIREMENTS
LOT	LOT AREA COMPACTION	AASHTO T-99 OR AASHTO T-180	MIN. 1 PER EVERY 3' DEPTH, EACH LOT	CERTIFIED LAB	DAILY, AS MAT'L IS PLACED	MINIMUM COMPACTION REQUIRED: 95% WITH T-99 OR 90% WITH T-180
STREET/SUB	SUBGRADE CUT SECTION COMPACTION	CITY OF CAMAS	ALL	CITY OF CAMAS	PRIOR TO BASE ROCK	LOADED 10 CY TRUCK - PROOF ROLL
STREET/SUB	SUBGRADE FILL COMPACTION	AASHTO T-180	EVERY 2500 CY, MIN. 2; AND 1 PER 3 FT. OF DEPTH	CERTIFIED LAB	DAILY, AS MAT'L IS PLACED	95% MIN. COMPACTION
STREET/SUB	SUBGRADE FILL COMPACTION	CITY OF CAMAS	ALL	CITY OF CAMAS	PRIOR TO BASE ROCK	LOADED 10 CY TRUCK - PROOF ROLL
STREET/SUB	SUBGRADE GRADE CHECK ELEV.	CITY OF CAMAS	PER STATION (0+25)	CITY OF CAMAS	PRIOR TO BASE ROCK	+0.04' TOLERANCE
STREET/ROCK	BASE ROCK GRADATION	WSDOT 9-03.9	ONE PER SOURCE	CERTIFIED LAB	PRIOR TO PLACEMENT	COPY TO INSPECTOR
STREET/ROCK	BASE ROCK COMPACTION	AASHTO T-180	EVERY 1000 LF	CERTIFIED LAB	DAILY, AS MAT'L IS PLACED	95% MIN. COMPACTION
STREET/ROCK	BASE ROCK GRADE CHECK ELEV.	CITY OF CAMAS	PER STATION (0+25)	CITY OF CAMAS	PRIOR TO TOP ROCK	MINIMUM SECTION REQUIRED
STREET/ROCK	TOP ROCK GRADATION	WSDOT 9-03.9	ONE PER SOURCE	CERTIFIED LAB	PRIOR TO PLACEMENT	COPY TO INSPECTOR
STREET/ROCK	TOP ROCK COMPACTION	CITY OF CAMAS	ALL	CITY OF CAMAS	PRIOR TO PAVEMENT	LOADED 10 CY TRUCK - PROOF ROLL
STREET/ROCK	TOP ROCK GRADE CHECK ELEV.	CITY OF CAMAS	PER STATION (0+25)	CITY OF CAMAS	PRIOR TO PAVEMENT	+0.02' TOLERANCE
STREET/AC	STORM SYSTEM INSPECTION	CITY OF CAMAS	AS REQUIRED	CITY OF CAMAS	PRIOR TO PLACEMENT	SYSTEM TO BE 100% FUNCTIONAL
STREET/AC	AC GRADE & OIL CONTENT	WSDOT 9-03.8	ONE PER SOURCE	CERTIFIED LAB	PRIOR TO PLACEMENT	COPY TO INSPECTOR
STREET/AC	AC COMPACTION	AASHTO T-209	ONE EVERY 1000 TONS	CERTIFIED LAB	DURING PLACEMENT	91% MIN. COMPACTION
TRENCH	UTILITY BACKFILL COMPACTION (IN RIGHT OF WAY)	AASHTO T-180	EVERY 500 FT, MIN 1/LINE; 2 AT 100 FT FOR FAILED TESTS	CERTIFIED LAB	DAILY, AS MAT'L IS PLACED	95% MIN. COMPACTION
TRENCH	UTILITY BACKFILL COMPACTION (OUT OF RIGHT OF WAY)	AASHTO T-99 OR AASHTO T-180	EVERY 500 FT, MIN 1/LINE; 2 AT 100 FT FOR FAILED TESTS	CERTIFIED LAB	DAILY, AS MAT'L IS PLACED	MINIMUM COMPACTION REQUIRED: 95% WITH T-99 OR 90% WITH T-180
TRENCH	UTILITY BACKFILL COMPACTION (OVER 6 FT. IN DEPTH)	AASHTO T-99 OR AASHTO T-180	EVERY 5 FT. OF DEPTH & SAME AS ABOVE	CERTIFIED LAB	DAILY, AS MAT'L IS PLACED	MINIMUM COMPACTION REQUIRED: 95% WITH T-99 OR 90% WITH T-180
STORM	STORM SEWER MANDREL TEST	WSDOT 7-17.3	AT CITY REQUEST	CONTRACTOR	PRIOR TO BASE ROCK	EFFECTIVE LENGTH > D, MANDREL DIA > 0.95D
STORM	STORM SEWER TV TEST	WSDOT 7-17.3	AT CITY REQUEST	CONTRACTOR	PRIOR TO BASE ROCK	INSPECTION REPORT AND VIDEO RECORDING ON DVD
SEWER	CONVENTIONAL SEWER - AIR TEST	WSDOT 7-17.3	MAINS, LATERALS	CONTRACTOR	PRIOR TO BASE ROCK	4 PSI FOR 1 MINUTE PER 100 LF OF MAIN
SEWER	STEF & CONVENTIONAL SEWER - MANDREL TEST	WSDOT 7-17.3	AT CITY REQUEST	CONTRACTOR	PRIOR TO BASE ROCK	EFFECTIVE LENGTH > D, MANDREL DIA > 0.95D
SEWER	STEF & CONVENTIONAL SEWER - TV TEST	WSDOT 7-17.3	REQUIRED ON MAINS	CONTRACTOR	PRIOR TO BASE ROCK	INSPECTION REPORT AND VIDEO RECORDING ON DVD
SEWER	STEF & CONVENTIONAL SEWER - MANHOLE VACUUM TEST	CITY OF CAMAS	1:4 MH MINIMUM; ADD 1 MH PER FAILURE	CERTIFIED LAB	AFTER PAVEMENT INSTALLED, PRIOR TO MANHOLE COATING	-10 IN. Hg VACUUM FOR 60 SECONDS
SEWER	STEF SEWER - AIR TEST	WSDOT 7-17.3	MAINS, LATERALS	CONTRACTOR	PRIOR TO BASE ROCK	5 PSI FOR 1 MINUTE PER 100 FT.
SEWER	STEF SEWER - TONE TEST	CITY OF CAMAS	MAINS, SERVICES	CITY OF CAMAS	PRIOR TO BASE ROCK	CONTINUOUS TONE
SEWER	STEP SEWER - TONE TEST	CITY OF CAMAS	MAINS, SERVICES	CONTRACTOR	PRIOR TO BASE ROCK	CONTINUOUS TONE
SEWER	STEP SEWER - HYDROSTATIC TEST	CITY OF CAMAS	MAINS, AIR/VAC	CITY OF CAMAS	PRIOR TO BASE ROCK	15 MIN. AT 150 PSI (MIN.) OR WORKING PRESSURE (HIGHER OF 2), < 200 PSI
SEWER	STEP SEWER - SERVICE	CITY OF CAMAS	ALL SERVICES	CONTRACTOR	PRIOR TO BASE ROCK	100 PSI FOR 30 SECONDS
WATER	CHLORINATE WATER MAINS	WSDOT 7-09.3 (24)	ALL	CONTRACTOR	PRIOR TO BACTERIA SAMPLE	50mg/l AT INSERTION, 25 mg/l AFTER 24 HRS, AVAILABLE CHLORINE, WATER DEPT. TO FILL LINES
WATER	BACTERIA WATER SAMPLE	AWWA	MIN. 1 PER BLOWOFF	CITY OF CAMAS	PRIOR TO PRESSURE TEST AND BASE ROCK	E. COLI & COLIFORM ABSENT
WATER	WATER LINE PRESSURE TEST	WSDOT 7-09.3(23)	MAIN, SERVICE, F.H., AIR/VAC	CONTRACTOR	PRIOR TO BASE ROCK	15 MIN. AT 200 PSI (MIN.) AT HIGH POINT. NOT TO EXCEED 250 PSI AT LOW POINT.

REV. NO.	DATE	BY	APPR.
1	5/1/07	SCD	JC
2	1/1/11	SCD	JC
3	10/21/14	SCD	JC



CITY OF CAMAS ~ GENERAL DETAIL
STANDARD TESTING REQUIREMENTS

Jan C. Coates 10-21-14
DETAIL APPROVED BY DATE

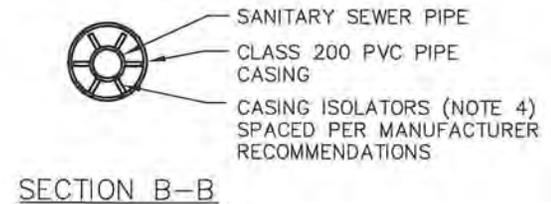
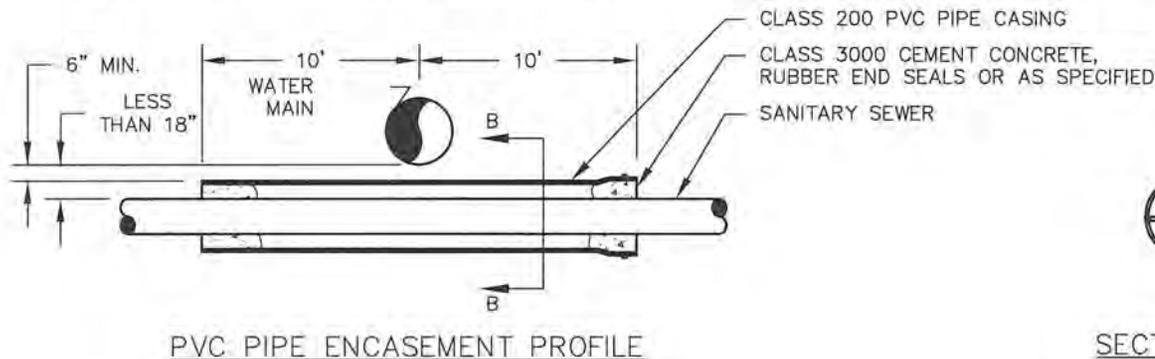
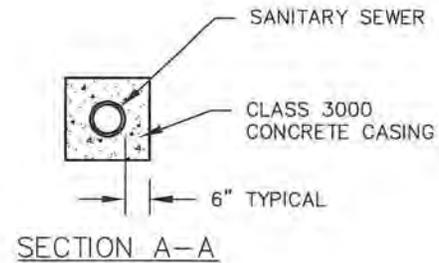
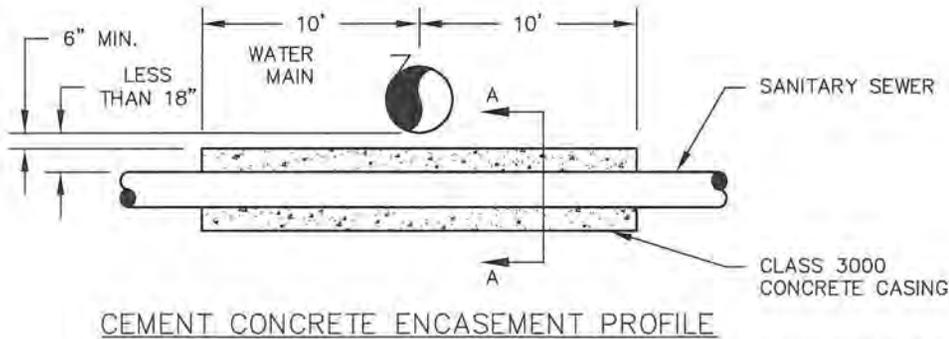
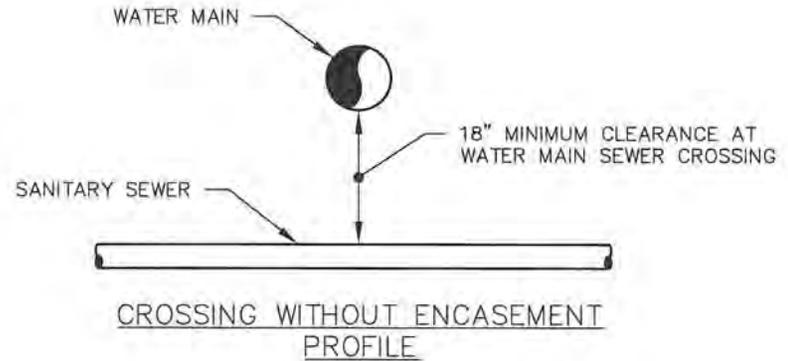
DETAIL NO.

G4

NOT TO SCALE

NOTES:

1. MINIMUM HORIZONTAL CLEARANCE BETWEEN WATER AND SEWER MAINS SHALL BE 10 FEET.
2. MINIMUM HORIZONTAL CLEARANCE BETWEEN WATER OR SEWER MAINS AND FRANCHISE UTILITY MAINS SHALL BE 5 FEET.
3. IF VERTICAL CLEARANCE IS LESS THAN 18", THE SEWER PIPE SHALL BE ENCASED. MINIMUM CLEARANCE WITH CASING SHALL BE 6".
4. CASING SHALL BE A 20' LENGTH OF CLASS 200 P.V.C. WITH BOTH ENDS PLUGGED, OR 6" CLASS 3000 CEMENT CONCRETE AS SHOWN BELOW.
5. MINIMUM VERTICAL CLEARANCE FOR WATER-ENCASEMENT, WATER-STORM OR SANITARY-STORM CROSSINGS SHALL BE 6".
6. SPACERS FOR PVC PIPE ENCASEMENT SHALL BE PSI RANGER II, OR EQUIVALENT, NON-METALLIC CASING ISOLATORS AS SHOWN IN SECTION B-B.
7. RUBBER END SEALS FOR PVC PIPE ENCASEMENT SHALL BE PSI MODEL "W", MODEL "S" OR EQUIVALENT.
8. PIPE JOINTS WITHIN ENCASEMENT SHALL BE RESTRAINED JOINTS.
9. NO PRIVATE UTILITIES SHALL BE ALLOWED IN CITY OF CAMAS CASINGS



REV. NO.	DATE	BY	APPR.
1	5/1/07	SCD	JC
2	1/1/11	SCD	JC
3	10/21/14	SCD	JC



CITY OF CAMAS ~ GENERAL DETAIL
UTILITY CROSSING & MINIMUM SEPARATION

Sam P. Crother 10-21-14
 DETAIL APPROVED BY DATE

DETAIL NO.

G5

NOT TO SCALE

CITY OF CAMAS

CITY ENGINEER

DATE

REVISION NO.	SHEETS AFFECTED	INITIAL APPROVAL	DATE
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

REV. NO.	DATE	BY	APPR.
1	1/1/11	SCD	JC



CITY OF CAMAS ~ GENERAL DETAIL
SIGNATURE AND REVISION BLOCK

Sam C. ... 1-4-11
DETAIL APPROVED BY DATE

NOT TO SCALE

DETAIL NO.

G6

GEN-SIGNATURE

EASEMENT DESIGN NOTES:

1. PUBLIC EASEMENTS FOR WATER, SEWER OR STORMWATER UTILITES LOCATED BETWEEN LOTS, ALONG BACK LOT LINES, WITHIN OPEN SPACES OR THROUGH OTHER TRACTS OR PARCELS WITHIN OR ADJACENT TO A DEVELOPMENT ARE DISCOURAGED AND ONLY ALLOWED ON A CASE BY CASE BASIS AS APPROVED BY THE CITY.
2. IF SUCH EASEMENT IS ALLOWED THE FOLLOWING REQUIREMENTS AND RESTRICTIONS SHALL THEREBY APPLY TO ALL SUCH EASEMENTS UNLESS SUCH REQUIREMENTS AND RESTRICTIONS ARE SPECIFICALLY WAIVED BY THE CITY.
 - a. ALL PUBLIC UTILITIES LOCATED WITHIN A PERMITTED EASEMENT SHALL BE INSTALLED IN ACCORDANCE WITH AND MEET THE REQUIREMENTS OF CITY OF CAMAS GENERAL DETAIL #G2 AS SHOWN IN THE CITY OF CAMAS DESIGN STANDARD MANUAL.
 - b. CONSTRUCTION OR INSTALLATION OF ACCESSORY STRUCTURES, SHEDS, BRICK CONCRETE OR MASONRY GRILLS OR BARBEQUES, DECKS, PLAY STRUCTURES, JUNGLE GYMS, SWING SETS, COVERED PATIOS, SWIMMING POOLS, SPORT COURTS, BRICK OR STONE PAVER WALKWAYS OR DRIVES, LANDSCAPING (OTHER THAN BARK DUST OR LAWN), LANDSCAPING WATER FEATURES SUCH AS COY PONDS OR WATERFALLS, RAISED BED GARDENS OR ANY OTHER PERMANENT OR SEMI-PERMANENT IMPROVEMENTS WITHIN OR ACROSS THE LIMITS OF THE EASEMENT IS PROHIBITED.
 - c. CONSTRUCTION OR INSTALLATION OF CONCRETE SIDEWALKS OR DRIVEWAYS, ASPHALT DRIVEWAYS OR PATHS, GRAVEL DRIVES OR RV PADS, LAWNS OR BARK DUST AREAS ARE ALLOWED WITHIN THE LIMITS OF THE EASEMENT.
 - d. SHOULD THE CITY BE REQUIRED TO DISRUPT THE SURFACE OF THE UTILITY EASEMENT THE CITY WILL PROVIDE SURFACE RESTORATION LIMITED TO THOSE APPROVED SURFACE TREATMENTS NOTED IN SECTION c. ABOVE.
 - e. FOR PUBLIC UTILITY EASEMENTS LOCATED ON SLOPES OF 6% OR GREATER (CROSS SLOPE OR PROFILE GRADE) THERE SHALL BE INSTALLED A MINIMUM 12' WIDE ACCESS ROAD CAPABLE OF SUPPORTING AN H2O TRAFFIC LOAD INSTALLED WITH A MAXIMUM CROSS SLOPE OF 2%. FOR PROFILE GRADES 6% OR STEEPER (TO A MAXIMUM GRADE OF 15%) THE MINIMUM 12' WIDE SURFACE WIDTH SHALL BE PAVED.

REV. NO.	DATE	BY	APPR.
1	10/21/14	SCD	JC

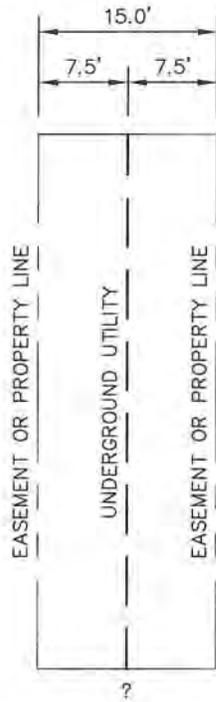


CITY OF CAMAS ~ GENERAL DETAIL
 UTILITY EASEMENT NOTES
Jan P. ... 10-21-14
 DETAIL APPROVED BY DATE

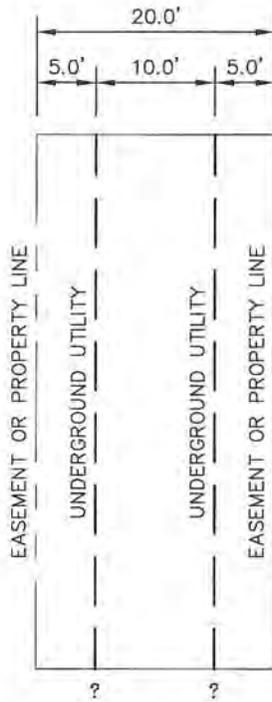
DETAIL NO.
 G7

NOT TO SCALE

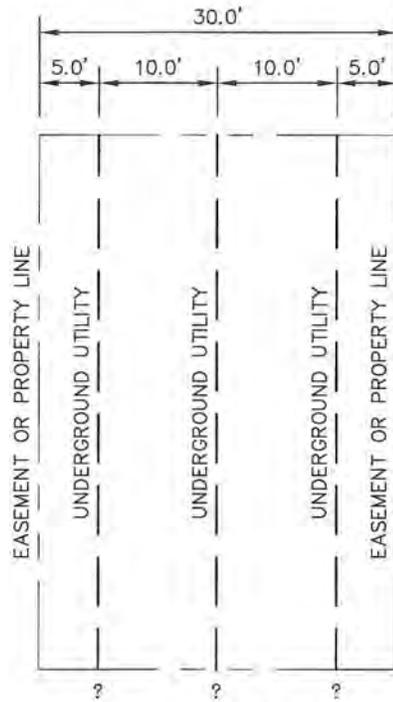
GEN-EASEMENT.DWG



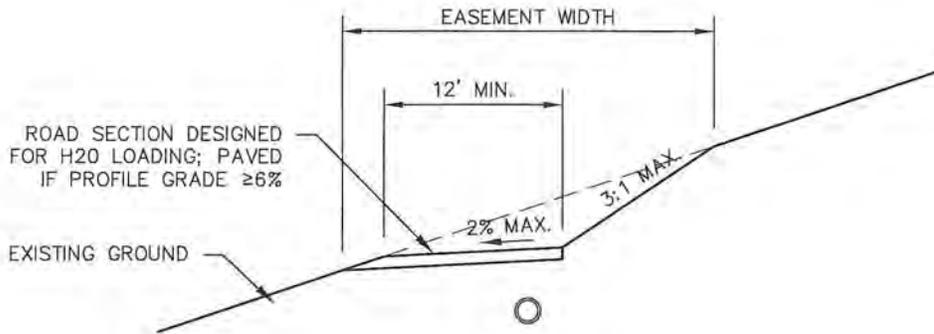
ONE UTILITY
15' WIDE



TWO UTILITIES
20' WIDE



THREE UTILITIES
30' WIDE



EASEMENT ACCESS ROAD SECTION

NOTES:

1. NO PRIVATE UTILITIES SHALL BE ALLOWED IN CITY OF CAMAS EASEMENTS.

REV. NO.	DATE	BY	APPR.
1	10/21/14	SCD	JC



CITY OF CAMAS ~ GENERAL DETAIL
UTILITY EASEMENTS

Jan P. Gauthier 10-21-14
DETAIL APPROVED BY DATE

DETAIL NO.

G8

NOT TO SCALE



Erosion Control / Grading Details

City of Camas
616 NE Fourth Avenue
P.O. Box 1055
Camas, WA 98607
www.cityofcamas.us

Phone: (360) 834-6864
Fax: (360) 834-1535

Creation Date: 10/28/02
Revision Date: 10/21/14 (Partial)

City of Camas Erosion Control Details ~ INDEX

<u>Detail No.</u>	<u>Detail Name</u>	<u>Rev.</u>	<u>Rev. Date</u>
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EC2	EROSION CONTROL NOTES	2	1/1/2011
EC3	EROSION CONTROL NOTES	2	1/1/2011
EC4	WATER QUALITY NOTES	2	1/1/2011
EC5	EROSION CONTROL MATRIX	2	1/1/2011
EC6	STABILIZED CONSTRUCTION ENTRANCE	3	3/1/2012
EC7	WHEEL WASH	2	1/1/2011
EC8	INLET PROTECTION - CURB SEDIMENT TRAPS	2	1/1/2011
EC9	INLET PROTECTION - CATCH BASIN INSERT	2	1/1/2011
EC10	INLET PROTECTION - COMBINATION INLET	2	1/1/2011
EC11	INLET PROTECTION - BIOBAGS	2	1/1/2011
EC12	SILT FENCE	3	3/1/2012
EC13	SILT FENCE FOR HOME BUILDERS	3	3/1/2012
EC14	STRAW WATTLES ON SLOPE	2	1/1/2011
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EC16	BRUSH BARRIER	1	1/1/2011
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EC23	CHECK DAMS	2	1/1/2011
EC24	INTERCEPTOR SWALE AND DIKE	2	1/1/2011
EC25	PIPE SLOPE DRAIN	2	1/1/2011
EC26	TEMPORARY SEDIMENT POND	2	1/1/2011
EC27	STOCKPILE PROTECTION	1	1/1/2011
EC28	CONSTRUCTION ENTRANCE FOR HOME BUILDERS	1	6/11/2012

GRADING NOTES:

1. ALL GRADING SHALL CONFORM TO THE MOST RECENTLY ADOPTED EDITION OF THE W.S.D.O.T. STANDARD SPECIFICATIONS FOR ROAD, BRIDGE AND MUNICIPAL CONSTRUCTION AND THE CITY OF CAMAS DESIGN STANDARDS MANUAL.
2. THE LIMITS OF CLEARING SHALL BE FLAGGED PRIOR TO CLEARING AND GRUBBING OF THE SITE.
3. ANY EXISTING TREES TO REMAIN WITHIN THE CLEARING LIMITS SHALL BE MARKED AND PROTECTED FROM DAMAGE.
4. PRIOR TO ANY FILL PLACEMENT, ALL AREAS WHICH WILL RECEIVE STRUCTURAL FILL SHALL BE EXCAVATED TO FIRM, NON-ORGANIC, UNDISTURBED NATIVE GROUND. THE STRIPPED AREAS SHALL BE OBSERVED AND ACCEPTED BY THE GEOTECHNICAL ENGINEER AND THE CITY OF CAMAS INSPECTOR.
5. ALL LOT FILLS SHALL MEET 95% OF AASHTO T-99 COMPACTION.
6. ALL RIGHT-OF-WAY FILLS SHALL MEET 95% OF AASHTO T-180 COMPACTION.
7. FILLS SHALL BE INSTALLED IN VERTICAL LIFTS NOT EXCEEDING 8 INCHES IN THICKNESS AND SHALL BE COMPACTED AS PREVIOUSLY NOTED.
8. FILLS PLACED ON SLOPES EXCEEDING 5H:IV SHALL BE KEYED AND BENCHED, GEOTECHNICAL APPROVAL REQUIRED PRIOR TO ANY FILL PLACEMENT.
9. ALL SURFACES SHALL BE GRADED SMOOTH AND BE FREE OF IRREGULARITIES THAT MIGHT ACCUMULATE SURFACE WATER.
10. ALL CUT AND FILL SLOPES SHALL NOT EXCEED 2:1 SLOPES.
11. ANY EXCESS MATERIAL NOT REQUIRED TO MEET THE GRADES SHOWN ON THE PLANS SHALL BE HAULED FROM THE SITE TO A CONTRACTOR PROVIDED WASTE SITE. IF WASTE SITE IS WITHIN CITY LIMITS, A GRADING PERMIT MAY BE REQUIRED.
12. ALL EXPOSED AND UNWORKED SOILS SHALL BE STABILIZED BY SUITABLE APPLICATION OF EROSION CONTROL BMP'S.
13. ALL SURFACES REQUIRING VEGETATION SHALL BE ROUGHENED PRIOR TO SEEDING (I.E. WHEEL TRACKED PERPENDICULAR TO SURFACE FLOW TO REDUCE EROSION AND HELP VEGETATION).
14. FINAL GEOTECHNICAL SUMMARY REPORT, INCLUDING ALL COMPACTION TESTING RESULTS, SHALL BE SUBMITTED UPON COMPLETION OF SITE GRADING WORK.

REV. NO.	DATE	BY	APPR.
1	9/18/07	SCD	JC
2	1/1/11	SCD	JC



CITY OF CAMAS - EROSION CONTROL DETAIL
GRADING NOTES

[Signature] 1-4-11
DETAIL APPROVED BY DATE

DETAIL NO.
EC1

NOT TO SCALE

EROSION/SEDIEMENT CONTROL NOTES:

1. THE EROSION/SEDIMENT CONTROL (ESC) PLAN AND STORMWATER POLLUTION PREVENTION PLAN (SWPPP) IS TO BE UTILIZED AS A GUIDE TO CONTROL THE TRANSPORT OF LOOSE SOILS TO THE PROPERTY OUTSIDE OF THE CONSTRUCTION AREA AND AROUND THE CONSTRUCTION SITE. THE ESC MEASURES SHALL BE UPGRADED AS NEEDED FOR UNEXPECTED STORM EVENTS AND TO ENSURE THAT SEDIMENT AND SEDIMENT LADEN WATER DOES NOT LEAVE THE SITE.
2. THE IMPLEMENTATION OF THE ESC PLANS AND THE CONSTRUCTION, MAINTENANCE, REPLACEMENT AND UPGRADE OF THE ESC MEASURES IS THE RESPONSIBILITY OF THE CONTRACTOR UNTIL ALL CONSTRUCTION IS COMPLETED AND APPROVED AND PERMANENT VEGETATION/LANDSCAPING IS ESTABLISHED.
3. IF THE CITY INSPECTOR OR ENGINEER(S) HAS EVIDENCE OF POOR CONSTRUCTION PRACTICES OR EROSION CONTROL TECHNIQUES, A "STOP WORK" ORDER SHALL BE ISSUED UNTIL PROPER MEASURES HAVE BEEN TAKEN AND APPROVED BY THE CITY ENGINEERING STAFF.
4. THE CONTRACTORS SHALL BE RESPONSIBLE TO FAMILIARIZE THEMSELVES WITH THE MOST RECENTLY ADOPTED EDITION OF THE STORMWATER MANAGEMENT MANUAL FOR WESTERN WASHINGTON, VOL. II AND THE CITY OF CAMAS MUNICIPAL CODE 14.06 (2011).
5. ALL EROSION/SEDIMENT CONTROL MEASURES SHALL BE IN PLACE AND IN WORKING CONDITION PRIOR TO DISTURBING AND EXPOSING ANY SOIL SURFACES (I.E. CONSTRUCTION ENTRANCES, FILTER FABRIC SEDIMENT BARRIERS, AND SEDIMENTATION TRAPS) AND MAINTAINED FOR THE DURATION OF THE PROJECT. TRAPPED SEDIMENT IN EXCESS OF 1 FOOT SHALL BE REMOVED OR STABILIZED ON-SITE. DISTURBED SOIL AREAS RESULTING FROM VEGETATION REMOVAL SHALL BE PERMANENTLY STABILIZED. ADDITIONAL MEASURES MAY BE REQUIRED TO ENSURE THAT ALL PAVED AREAS ARE KEPT CLEAN FOR THE DURATION OF THE PROJECT.
6. TO MINIMIZE EROSION AND SEDIMENTATION TRANSPORTATION, EARTHWORK SHALL NOT BE PERFORMED WHILE SOILS ARE IN AN UNSTABLE STATE DUE TO PRECIPITATION.
7. THE CONTRACTOR SHALL BE RESPONSIBLE TO HAVE CLEARING LIMITS AND/OR ANY EASEMENTS, SENSITIVE OR CRITICAL AREAS, AND THEIR BUFFERS, TREES, AND DRAINAGE COURSES FLAGGED PRIOR TO CONSTRUCTION. DURING THE CONSTRUCTION PERIOD, NO DISTURBANCE BEYOND THE FLAGGED CLEARING LIMITS SHALL BE PERMITTED. FLAGGING LIMITS ARE TO BE MAINTAINED BY THE CONTRACTOR FOR THE DURATION OF CONSTRUCTION.
8. REMOVE ONLY THOSE TREES AND SHRUBS THAT NEED TO BE REMOVED FOR THE CONSTRUCTION OF ROADS, SIDEWALKS, UTILITIES, AND STORMWATER FACILITIES.
9. ALL EXISTING AND NEWLY CONSTRUCTED ROAD CATCH BASINS AND CURB INLETS AFFECTED BY CONSTRUCTION SHALL BE PROTECTED AGAINST SEDIMENT DEPOSITS. AT NO TIME SHALL MORE THAN ONE FOOT OF SEDIMENT BE ALLOWED TO ACCUMULATE WITHIN A TRAPPED CATCH BASIN. ALL CATCH BASINS AND CONVEYANCE LINES SHALL BE CLEANED PRIOR TO PAVING. THE CLEANING OPERATION SHALL NOT FLUSH SEDIMENT LADEN WATER INTO THE DOWNSTREAM SYSTEM.
10. ALL POLLUTANTS THAT OCCUR ON-SITE DURING CONSTRUCTION SHALL BE HANDLED AND DISPOSED OF IN A MANNER THAT DOES NOT CAUSE CONTAMINATION OF STORMWATER SYSTEM.
11. ALL DISTURBED SOIL SURFACES ARE TO BE STABILIZED BY A SUITABLE APPLICATION OF "BEST MANAGEMENT PRACTICES" (BMP'S). DURING THE PERIOD OF OCTOBER 1 THROUGH JULY 5 DISTURBED SOILS MAY REMAIN UNSTABILIZED FOR UP TO TWO DAYS WHEN NOT BEING WORKED. FROM JULY 5 THROUGH OCTOBER 1, DISTURBED SOILS MAY REMAIN UNSTABILIZED FOR UP TO 7 DAYS WHEN NOT BEING WORKED. STABILIZATION OF DISTURBED SOIL AREAS MAY CONSIST OF HYDROSEEDING, HAND-SEEDING AND MULCHING, PLACEMENT OF EROSION CONTROL BLANKETS OR PLASTIC. ALL SEEDED AREAS ARE TO BE FERTILIZED, WATERED, AND MAINTAINED TO ENSURE THAT THE GROWTH OF VEGETATION OCCURS AS SOON AS POSSIBLE.
12. ALL TEMPORARY SEDIMENT AND EROSION CONTROL BMP'S SHALL BE REMOVED WITHIN 30 DAYS AFTER FINAL SITE STABILIZATION IS ACHIEVED OR AFTER THE TEMPORARY BMP'S ARE NO LONGER NEEDED.

REV. NO.	DATE	BY	APPR.
1	9/18/07	SD	JC
2	1/1/11	SCD	JC



CITY OF CAMAS - EROSION CONTROL DETAIL
 EROSION/SEDIMENT CONTROL NOTES

Scott P. [Signature] 1-4-11
 DETAIL APPROVED BY DATE

DETAIL NO.
 EC2

NOT TO SCALE

EC-NOTES.DWG

EROSION/SEDIMENT CONTROL NOTES (CONTINUED):

13. THE CONTRACTOR SHALL BE RESPONSIBLE FOR POLICING THE JOB SITE DAILY AND MAINTAINING THE EROSION/SEDIMENT CONTROL MEASURES THROUGHOUT ALL PHASES OF CONSTRUCTION. AN INSPECTION LOG SHALL BE KEPT AND MADE AVAILABLE TO THE CITY OF CAMAS. THE POLICING AND MAINTENANCE SHALL INCLUDE, BUT NOT BE LIMITED TO:
 - VERIFYING THAT ALL AREAS ARE GRADED SUCH THAT ALL RUNOFF IS DIRECTED TO A SEDIMENTATION DEVICE BEFORE DISCHARGE TO SURFACE.
 - REMOVAL OF TRAPPED SILT AT SILT BARRIERS, SILT TRAPS, OR POINTS OF ACCUMULATION.
 - ADDITIONAL PROTECTIVE MEASURES DUE TO JOB SITE OR WEATHER CONDITIONS AS REQUIRED BY THE CITY OF CAMAS.
 - MONITORING OF VEHICLES LEAVING THE SITE TO MINIMIZE TRANSMISSION OF LOOSE SOILS TO THE PUBLIC ROADWAYS.
 - VERIFY THAT ALL PROPERTIES ADJACENT TO THE PROJECT SITE ARE PROTECTED FROM SEDIMENTATION DEPOSITION. THIS MAY BE ACCOMPLISHED BY INSTALLING PERIMETER CONTROLS SUCH AS SEDIMENTATION BARRIERS, FILTERS OR DIKES, SEDIMENTATION BASINS/TRAPS, OR BY A COMBINATION OF SUCH MEASURES.
14. CUT AND FILL SLOPES SHALL BE DESIGNED AND CONSTRUCTED IN A MANNER THAT WILL MINIMIZE EROSION. SLOPES SHALL BE STABILIZED IN ACCORDANCE WITH EROSION/SEDIMENT CONTROL NOTE 11. SLOPES FOUND TO BE ERODING EXCESSIVELY WITHIN TWO YEARS OF CONSTRUCTION MUST BE PROVIDED WITH ADDITIONAL SLOPE STABILIZING MEASURES. THESE MEASURES MAY CONSIST OF ROUGHENED SOIL SURFACES, INTERCEPTORS, DIVERSIONS OR TERRACES, TEMPORARY OR PERMANENT CHANNELS, ADDITIONAL VEGETATION, OR PIPE SLOPE DRAINS AS REQUIRED BY THE CITY OF CAMAS UNTIL THE PROBLEM IS CORRECTED.
15. THE ESC MEASURES ON INACTIVE SITES SHALL BE INSPECTED AND MAINTAINED A MINIMUM OF ONCE A MONTH OR WITHIN 24 HOURS FOLLOWING ANY STORM EVENT.
16. THE CONTRACTOR SHALL BE RESPONSIBLE FOR INSTALLING UNDERGROUND UTILITIES AS SPECIFIED BELOW:
 - WHERE FEASIBLE, NO MORE THAN 500 FEET OF TRENCH SHALL BE OPEN AT ONE TIME.
 - WHERE CONSISTENT WITH SAFETY AND SPACE CONSIDERATIONS, EXCAVATED MATERIAL SHALL BE PLACED ON THE UPHILL SIDE OF TRENCHES.
 - TRENCH DE-WATER DEVICES SHALL DISCHARGE INTO A SEDIMENT TRAP OR SEDIMENT POND.
17. PRIOR TO CONSTRUCTION, THE CITY OF CAMAS REQUIRES AN APPROVED FORM OF SECURITY IN THE AMOUNT OF 200% OF THE ENGINEER'S ESTIMATED COST OF THE ESC MEASURES, INCLUDING ASSOCIATED LABOR, AS SHOWN IN THE APPROVED ESC PLAN AND SWPPP.

18. SUGGESTED STANDARD SEED MIXTURE FOR THOSE AREAS WHERE A TEMPORARY VEGETATIVE COVER IS REQUIRED:

TEMPORARY EROSION CONTROL MIX*

SEED VARIETY	% WEIGHT	% PURITY	% GERMINATION
CHEWINGS OR ANNUAL BLUE GRASS (FESTUCA RUBRA VAR. COMMUTATA OR POA ANNA)	40	98	90
PERENNIAL RYE (LOLIUM PERENNE)	50	98	90
REDTOP OR COLONIAL BENTGRASS (AGROSTIS ALBA OR AGROSTIS TENUIS)	5	92	85
WHITE DUTCH CLOVER (TRIFOLIUM REPENS)	5	98	90

*APPLICATION RATE OF 120 LBS/ACRE AND COVERED WITH STRAW OR MULCH

19. SUGGESTED TURF SEED MIXTURE FOR DRY SITUATIONS WHERE THERE IS NO NEED FOR MUCH WATER:

LOW-GROWING TURF SEED MIX*

SEED VARIETY	% WEIGHT	% PURITY	% GERMINATION
DWARF TALL FESCUE (SEVERAL VARIETIES) (FESTUCA ARUNDINACEA VAR.)	45	98	90
DWARF PERENNIAL RYE (LOLIUM PERENNE VAR. BARCLAY)	30	98	90
RED FESCUE (FESTUCA RUBRA)	20	98	90
COLONIAL BENTGRASS (AGROSTIS TENUIS)	5	98	90

*APPLICATION RATE OF 120 LBS/ACRE AND COVERED WITH STRAW OR MULCH

REV. NO.	DATE	BY	APPR.
1	9/18/07	SD	JC
2	1/1/11	SCD	JC



CITY OF CAMAS ~ EROSION CONTROL DETAIL
EROSION/SEDIMENT CONTROL NOTES

Sam P. Coe 1-4-11
DETAIL APPROVED BY DATE

DETAIL NO.
EC3

NOT TO SCALE

WATER QUALITY NOTES:

1. GRADE BIOFILTRATION SWALE CAREFULLY TO ATTAIN UNIFORM LONGITUDINAL AND LATERAL SLOPES IN ORDER TO ELIMINATE HIGH AND LOW SPOTS.
2. VEGETATION IN BIOFILTRATION SYSTEMS SHALL BECOME FULLY ESTABLISHED PRIOR TO INSTALLATION OF AC PAVEMENT FOR ALL AREAS DRAINING INTO THE WATER QUALITY SYSTEM. IF SOD IS PLACED IN BIOFILTRATION SYSTEM PRIOR TO PAVING, THE CONTRACTOR SHALL OVERSEED THE SOD WITH THE SPECIFIED SEED MIX PRIOR TO COMPLETION OF THE PROJECT.
3. BIOFILTRATION SYSTEMS SHALL BE MAINTAINED BY THE CONTRACTOR UNTIL FINAL ACCEPTANCE OF THE PROJECT BY THE CITY. THIS SHALL INCLUDE IRRIGATING, MOWING, AND ALL OTHER MAINTENANCE AS REQUIRED TO MAINTAIN A HEALTHY STAND OF GRASS.
4. SUGGESTED STANDARD SEED MIXTURE FOR BIOFILTRATION SWALE APPLICATIONS:

BIOSWALE SEED MIX*

SEED VARIETY	% WEIGHT	% PURITY	% GERMINATION
TALL OR MEADOW FESCUE <i>(FESTUCA ARUNDINACEA OR FESTUCA ELATIOR)</i>	75-80	98	90
SEASIDE/CREEPING BENTGRASS <i>(AGROSTIS PALUSTRIS)</i>	10-15	92	85
REDTOP BENTGRASS <i>(AGROSTIS ALBA OR AGROSTIS GIGANTEA)</i>	5-10	90	80

*APPLICATION RATE OF 120 LBS/ACRE AND COVERED WITH STRAW OR MULCH

REV. NO.	DATE	BY	APPR.
1	9/18/07	SD	JC
2	1/1/11	SCD	JC



CITY OF CAMAS ~ EROSION CONTROL DETAIL

WATER QUALITY NOTES

Sam P. Cothran 1-4-11
 DETAIL APPROVED BY DATE

NOT TO SCALE

DETAIL NO.
 EC4

SITE SITUATION	EROSION CONTROL MATRIX													
	Gravel construction entrance	Sediment fence or barrier at toe of disturbed area	Sediment fence at slope break >= 20%	Sediment fence or barrier spacing: install on contour	Seed & mulch 1000 lb/ac with bonding agent	Seed & mulch 2000 lb/ac with heavy bonding agent or netting & anchors	Erosion blankets with anchors	6 mil plastic sheet cover with anchors	Sediment trap drain area < 3 acre	Sediment pond drain; area < 10 acre	Groove or stair-step slope; seed & mulch 1 ton/acre	Re-establish vegetation or landscape prior to removal of erosion control measures	Sediment barrier around catch basins	Sediment barrier or other approved measure in ditch/swale
SINGLE FAMILY/DUPLEX RES. 50% + of site, slope <20% 50% + of site, slope >20%	X X	X X			0	0		0 0	NA NA	NA NA	0	X X		
<5000 sq. ft. DISTURBED AREA	X	X	X		0	X	0	0	NA	NA		X		
OTHER DISTURBED SITES														
slope < 6%	X	X		x700'	X	X	0	0	0	0		X		
< 8%	X	X		x450'	NA	X	0	0	0	0		X		
< 10%	X	X		x300'	NA	X	0	0	0	0		X		
< 12%	X	X		x200'	NA	X	0	0	0	0		X		
< 15%	X	X		x150'	NA	X	0	0	0	0		X		
< 20%	X	X		x100'	NA	X	0	0	0	0		X		
< 30%	X	X		x 50'	NA	X	0	0	0	0		X		
< 40%	X	X		x 25'	NA	X	0	0	0	0		X		
>= 40%	X	X	X	x 25'	NA	X	0	0	NA	NA	0	X		
OTHER spoils stock piles utilities construction catch basin drainage direct ditch drainage ditches/swales		X											X	X

KEY: X - Base Measures Year-around Construction 0 - Option/Alternate to X NA - Not Allowed

REV. NO.	DATE	BY	APPR.
1	9/18/07	SCD	JC
2	1/1/11	SCD	JC

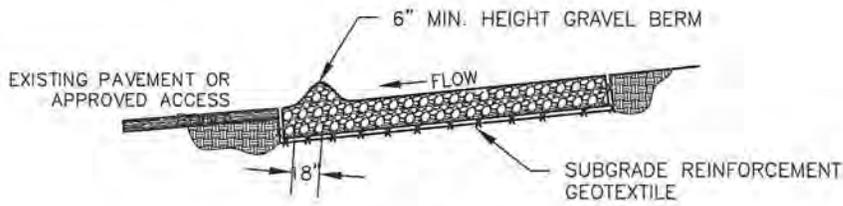


CITY OF CAMAS ~ EROSION CONTROL DETAIL
EROSION CONTROL MATRIX

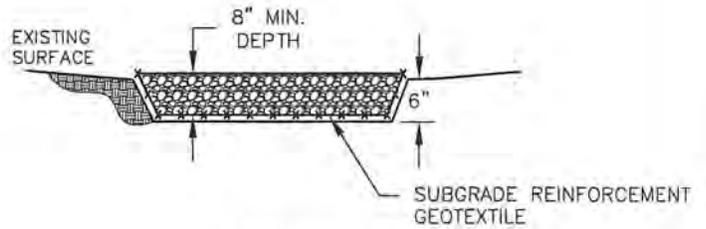
Sam P. Cothran 1-4-11
DETAIL APPROVED BY DATE

DETAIL NO.
EC5

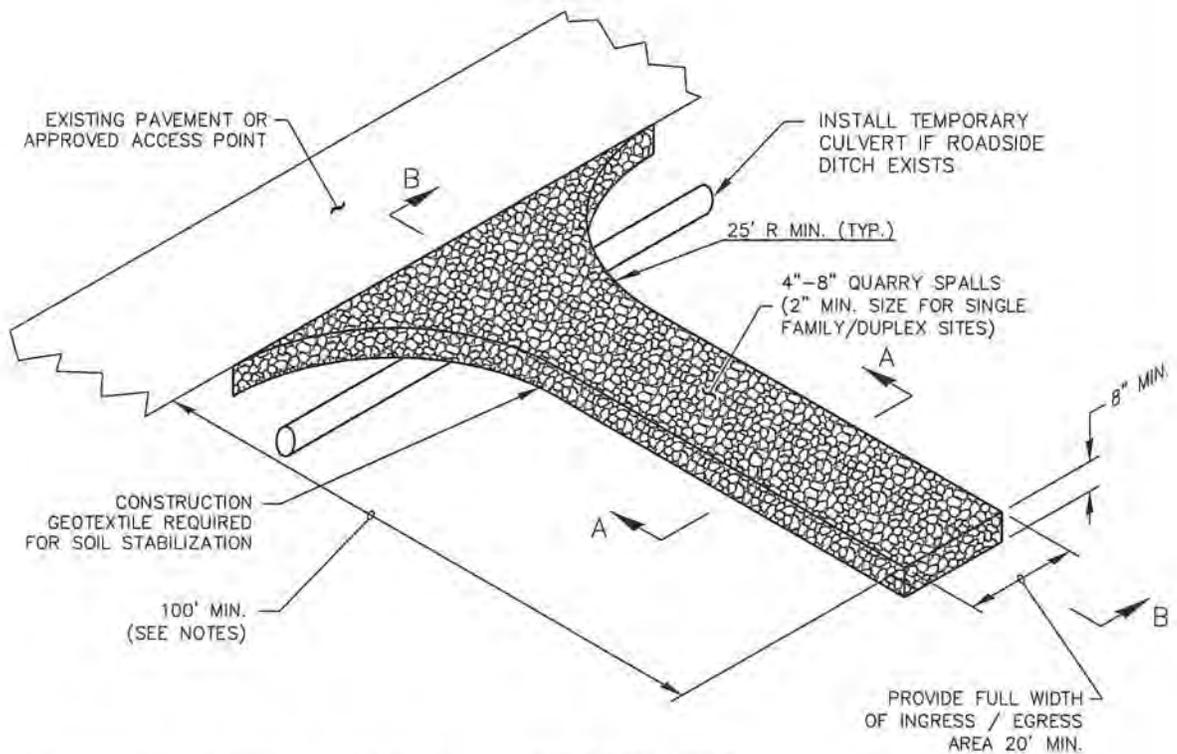
NOT TO SCALE



SECTION B-B



SECTION A-A



ISOMETRIC VIEW

NOTES:

1. 100 FOOT MINIMUM MAY BE REDUCED TO 50 FOOT MINIMUM FOR SITES WITH LESS THAN ONE ACRE OF EXPOSED SOIL, IF APPROVED BY SITE INSPECTOR.
2. 20 FOOT MINIMUM LENGTH FOR SINGLE FAMILY AND DUPLEX RESIDENTIAL.
3. ROCK SHALL BE REMOVED AND REPLACED, OR ADDITIONAL ROCK ADDED IF ENTRANCE FAILS TO FUNCTION AS INTENDED.

REV. NO.	DATE	BY	APPR.
1	8/17/07	SCD	JC
2	1/1/11	SCD	JC
3	3/1/12	SCD	JC

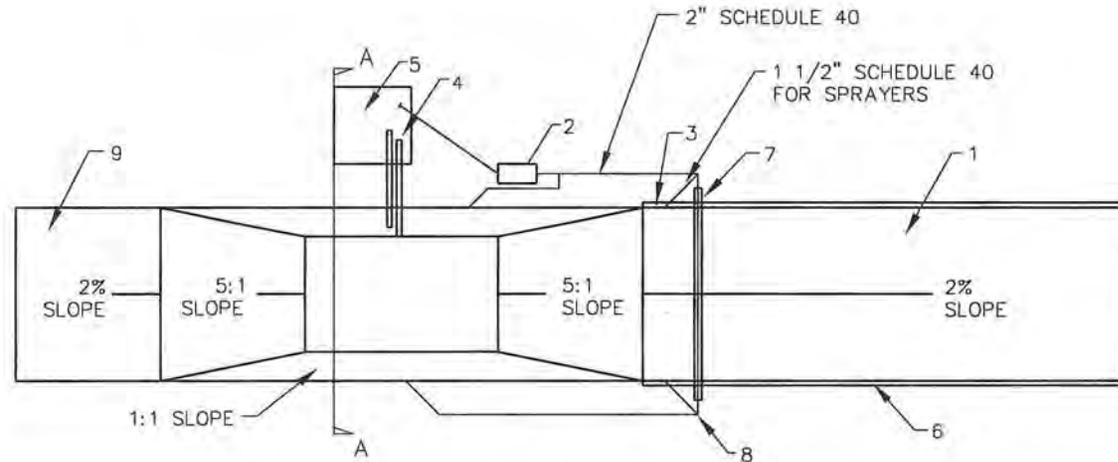


**CITY OF CAMAS - EROSION CONTROL DETAIL
STABILIZED CONSTRUCTION ENTRANCE**

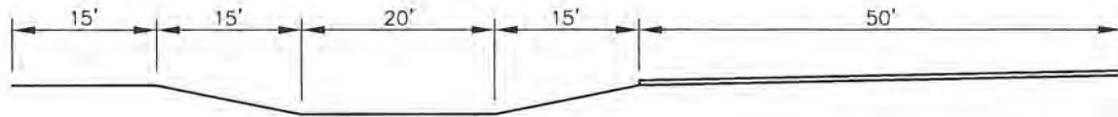
Jan P. Crotter 3-1-12
DETAIL APPROVED BY DATE

DETAIL NO.
EC6

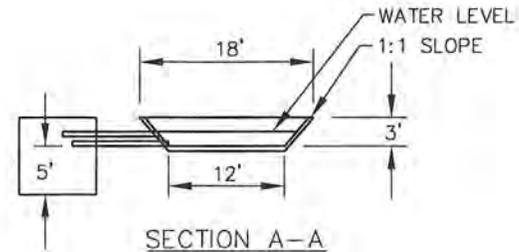
NOT TO SCALE



WHEEL WASH PLAN



ELEVATION VIEW



SECTION A-A

NOTES:

1. ASPHALT CONSTRUCTION ENTRANCE 6 IN. ASPHALT TREATED BASE (ATB).
2. 3 IN. TRASH PUMP WITH FLOATS ON THE SUCTION HOSE.
3. MIDPOINT SPRAY NOZZLES, IF NEEDED.
4. 6 IN. SEWER PIPE WITH BUTTERFLY VALVES. BOTTOM ONE IS A DRAIN. LOCATE TOP PIPE'S INVERT 1-FT. ABOVE BOTTOM OF WHEEL WASH.
5. 8 FT. X 8 FT. SUMP WITH 5-FT. OF CATCHMENT BUILD SO IT CAN BE CLEANED WITH TRACKHOE.
6. 6 IN. ASPHALT CURB ON THE LOW ROAD SIDE TO DIRECT WATER BACK TO POND.
7. 6 IN. SLEEVE UNDER ROAD.
8. BALL VALVES.
9. 15 FT. ATB APRON TO PROTECT GROUND FROM SPLASHING WATER.
10. SEDIMENT LADEN WATER SHALL BE PUMPED INTO A BAKER TANK AND REMOVED.

REV. NO.	DATE	BY	APPR.
1	9/18/07	SCD	JC
2	1/1/11	SCD	JC



CITY OF CAMAS ~ EROSION CONTROL DETAIL
WHEEL WASH

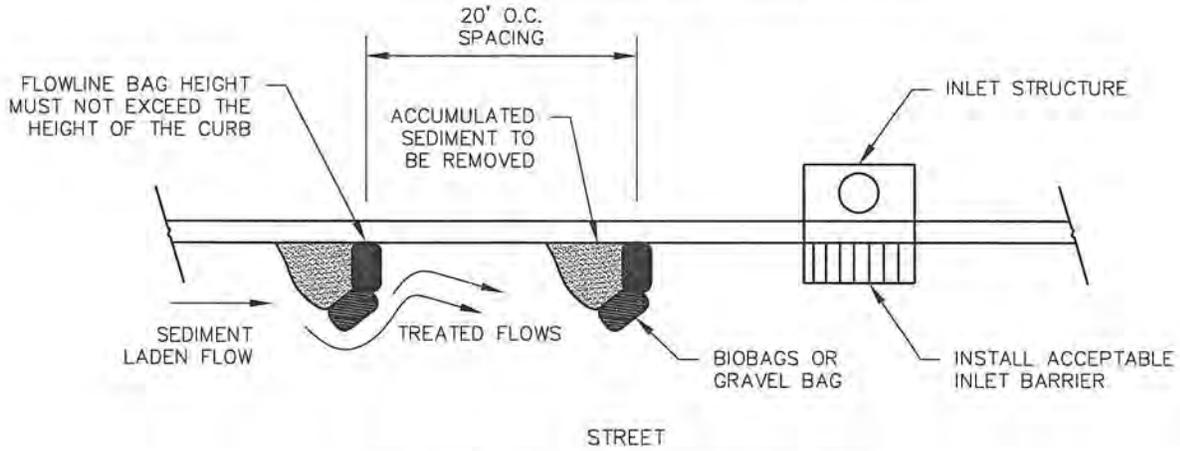
Jim P. Crother 1-4-11
DETAIL APPROVED BY DATE

DETAIL NO.
EC7

NOT TO SCALE

EC - WHEELWASH.DWG

APPROXIMATE SPACING BETWEEN BARRIERS



BIOBAGS OR GRAVEL BAG FILTERS

REV. NO.	DATE	BY	APPR.
1	9/18/07	SCD	JC
2	1/1/11	SCD	JC

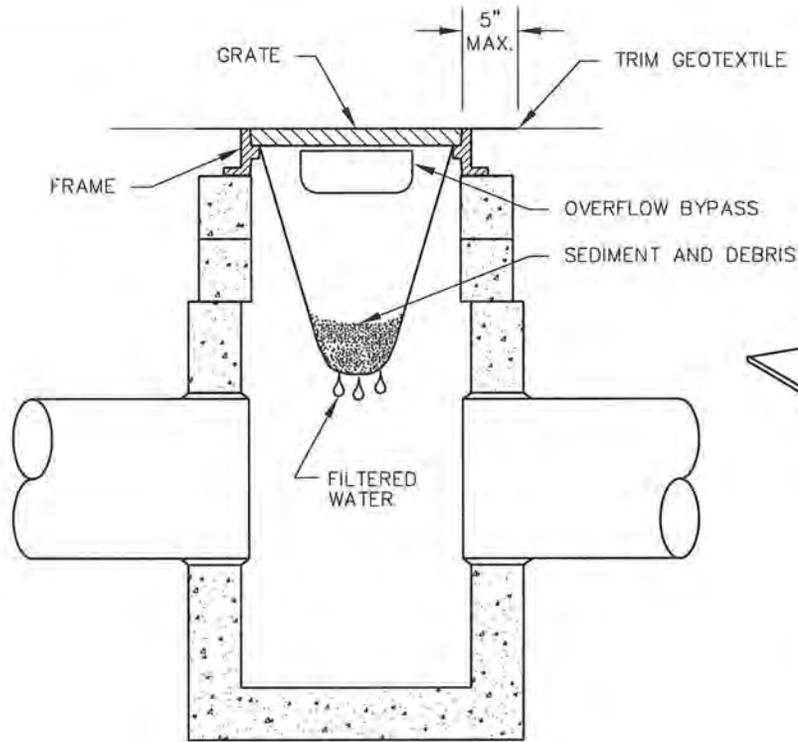


CITY OF CAMAS - EROSION CONTROL DETAIL
 INLET PROTECTION - CURB SEDIMENT TRAPS

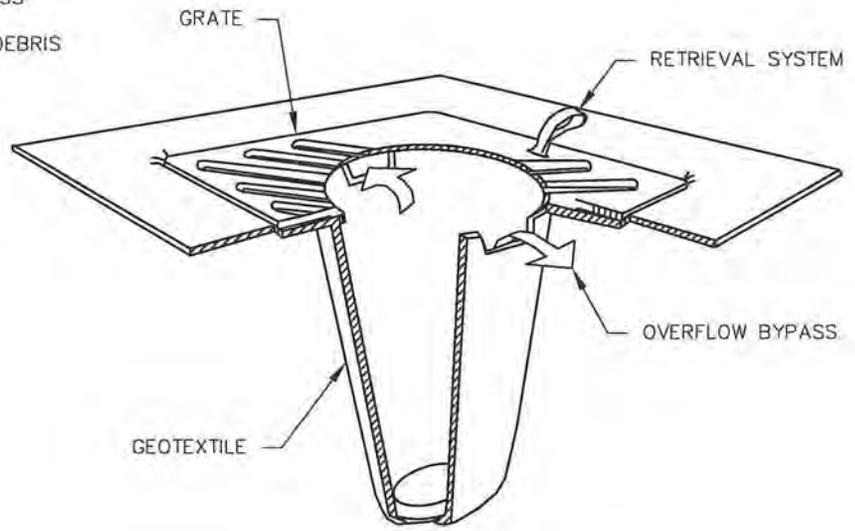
Sam P. Caution 1-4-11
 DETAIL APPROVED BY DATE

NOT TO SCALE

DETAIL NO.
 EC8



CROSS SECTION



ISOMETRIC VIEW

NOTES:

1. INSERTS TO BE REMOVED AND CLEANED OR REPLACED ONCE A MONTH DURING RAINY SEASON.
2. SIZE THE BELOW GRATE INLET DEVICE (BGID) FOR THE STORM WATER STRUCTURE IT WILL SERVICE.
3. THE BGID SHALL HAVE A BUILT-IN HIGH-FLOW RELIEF SYSTEM (OVERFLOW BYPASS).
4. THE RETRIEVAL SYSTEM MUST ALLOW REMOVAL OF THE BGID WITHOUT SPILLING THE COLLECTED MATERIAL.

REV. NO.	DATE	BY	APPR.
1	9/18/07	SCD	JC
2	1/1/11	SCD	JC



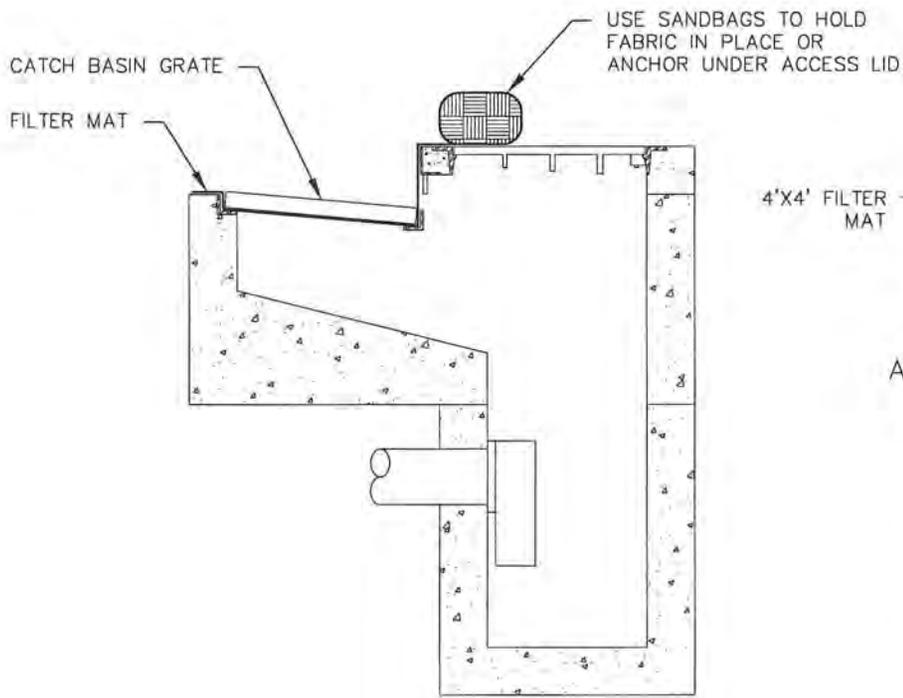
CITY OF CAMAS ~ EROSION CONTROL DETAIL
 INLET PROTECTION - CATCH BASIN INSERT

David P. Austin 1-4-11
 DETAIL APPROVED BY DATE

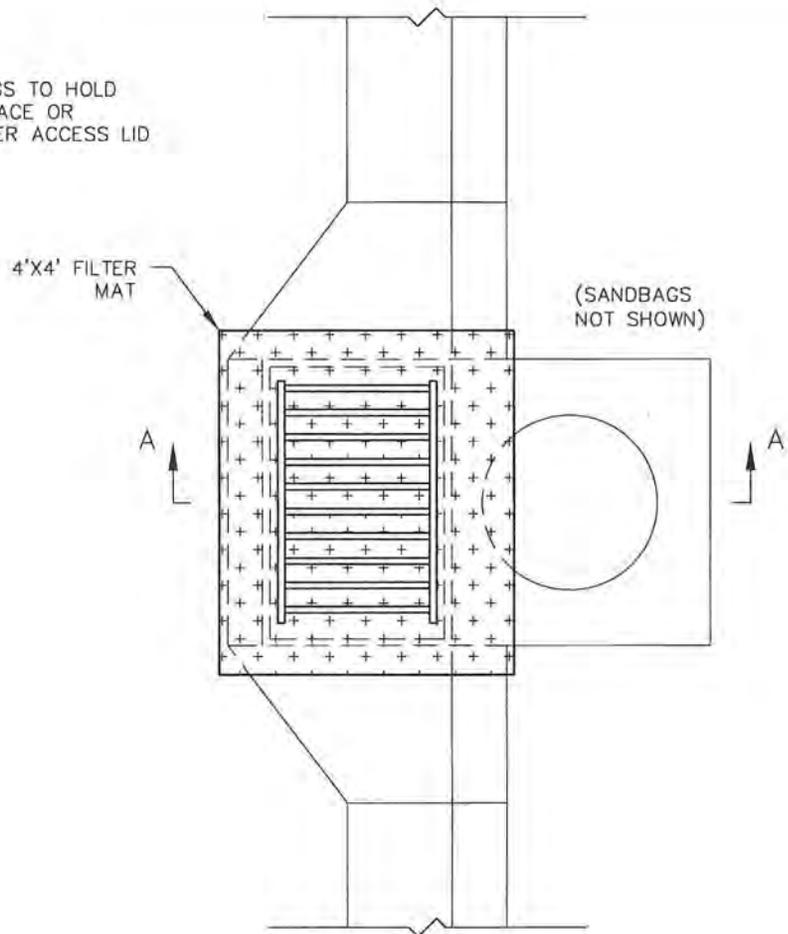
DETAIL NO.
 EC9

NOT TO SCALE

EC-INLETS.DWG



SECTION A-A



NOTES:

1. USE FILTER MAT SEDIMENT BARRIER WHEN CURB INLET IS LOCATED IN GENTLY SLOPING STREET, WITH MINIMAL NEED, WHERE WATER CAN FILTER AND ALLOW SEDIMENT TO SEPARATE FROM RUNOFF.
2. BARRIER SHALL ALLOW FOR OVERFLOW FROM SEVERE STORM EVENT.
3. INSPECT BARRIERS AND REMOVE SEDIMENT AFTER EACH STORM EVENT. SEDIMENT MUST BE REMOVED FROM THE TRAVELED WAY IMMEDIATELY.

REV. NO.	DATE	BY	APPR.
1	9/18/07	SCD	JC
2	1/1/11	SCD	JC



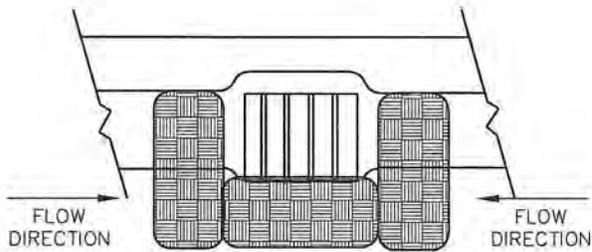
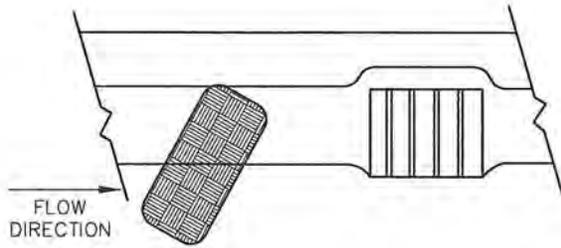
CITY OF CAMAS ~ EROSION CONTROL DETAIL
 INLET PROTECTION – COMBINATION INLET

Sam P. Cothran 1-4-11
 DETAIL APPROVED BY DATE

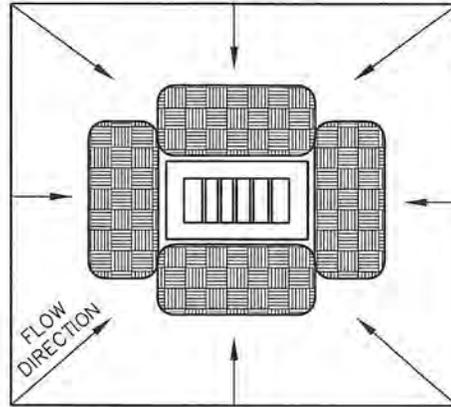
DETAIL NO.
 EC10

NOT TO SCALE

EC-INLETS.DWG



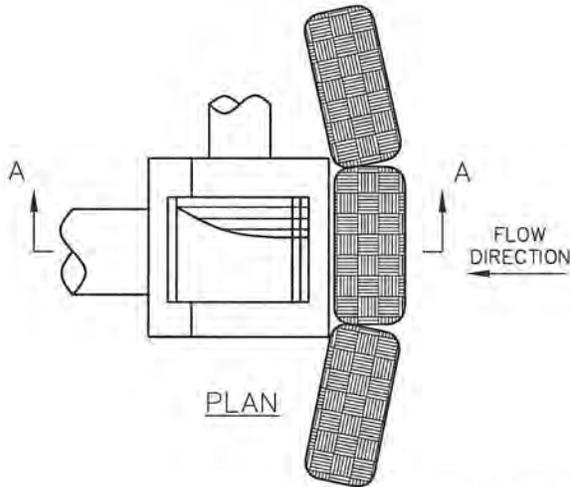
CATCH BASIN



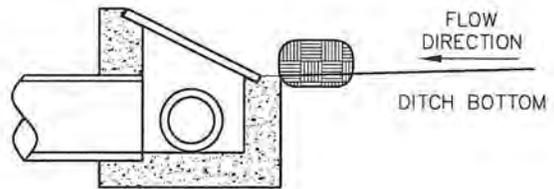
AREA DRAIN

NOTES:

1. MAY BE USED SHORT TERM WITH UTILITY WORK AND WITH PHASING OF DEVELOPMENT (E.G. HOME BUILDERS).
2. REPLACE WITH NEW BAGS AS EXISTING BAGS BECOME SILT LADEN.



PLAN



SECTION A-A

DITCH INLET

REV. NO.	DATE	BY	APPR.
1	9/18/07	SCD	JC
2	1/1/11	SCD	JC

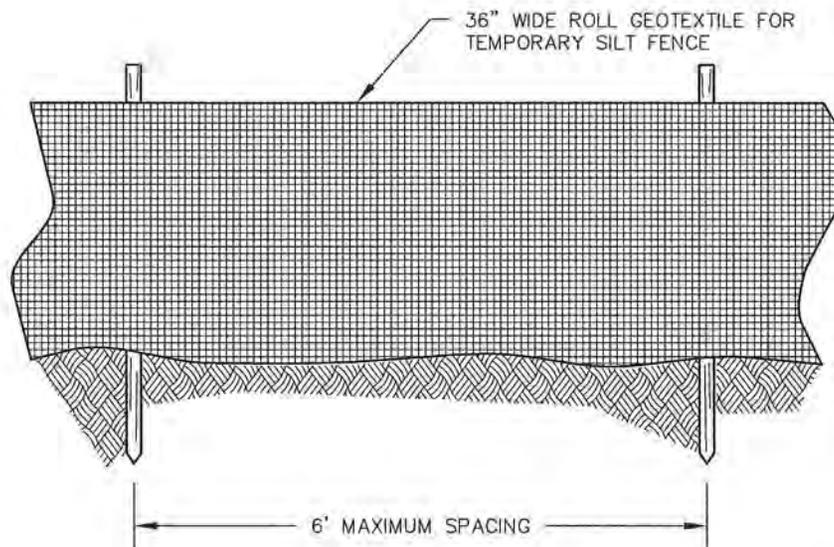


CITY OF CAMAS ~ EROSION CONTROL DETAIL
 INLET PROTECTION - BIOBAGS

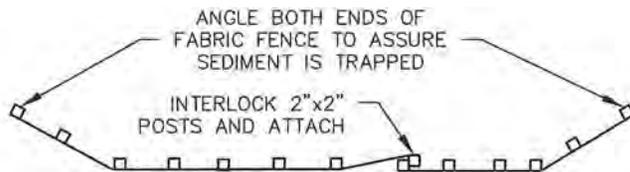
Sam P. Crutcher 1-4-11
 DETAIL APPROVED BY DATE

DETAIL NO.
 EC11

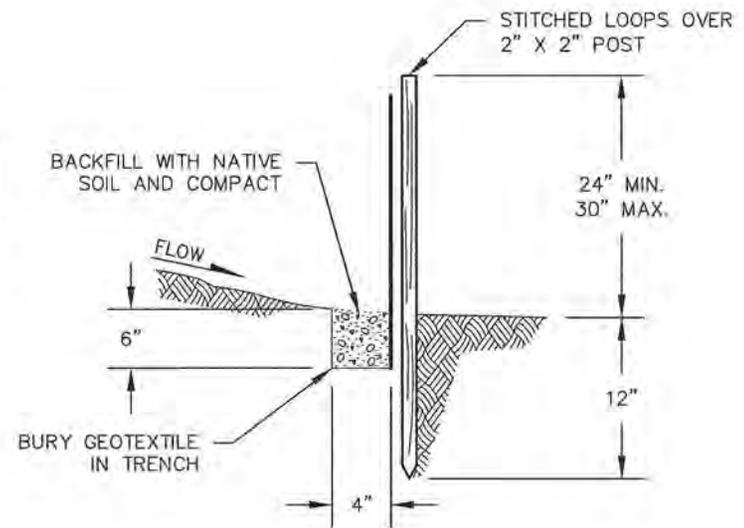
NOT TO SCALE



ELEVATION VIEW



TOP VIEW



SIDE VIEW

NOTES:

1. MAXIMIZE DETENTION OF STORMWATER BY PLACING FENCE AS FAR AWAY FROM THE TOE OF SLOPE AS POSSIBLE WITHOUT ENCROACHING ON SENSITIVE AREAS OR OUTSIDE OF THE CLEARING BOUNDARIES.
2. BURY BOTTOM OF FILTER FABRIC 6" VERTICALLY BELOW FINISHED GRADE.
3. COMPACT ALL AREAS OF FABRIC TRENCH.
4. POSTS SHALL BE WOOD, DIMENSIONAL FIR OR PINE, 2"x2" NOMINAL.
5. STITCHED LOOPS SHALL BE INSTALLED ON UPHILL SIDE OF FENCE.
6. INSTALL SEDIMENT FENCING ALONG CONTOURS WHENEVER POSSIBLE.
7. INSTALL THE ENDS OF THE SEDIMENT FENCE TO POINT SLIGHTLY UP-SLOPE TO PREVENT SEDIMENT FROM FLOWING AROUND THE ENDS OF THE FENCE.
8. SEDIMENT BUILDUP IN EXCESS OF 8-INCHES SHALL BE REMOVED.

REV. NO.	DATE	BY	APPR.
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3	3/1/12	SCD	JC



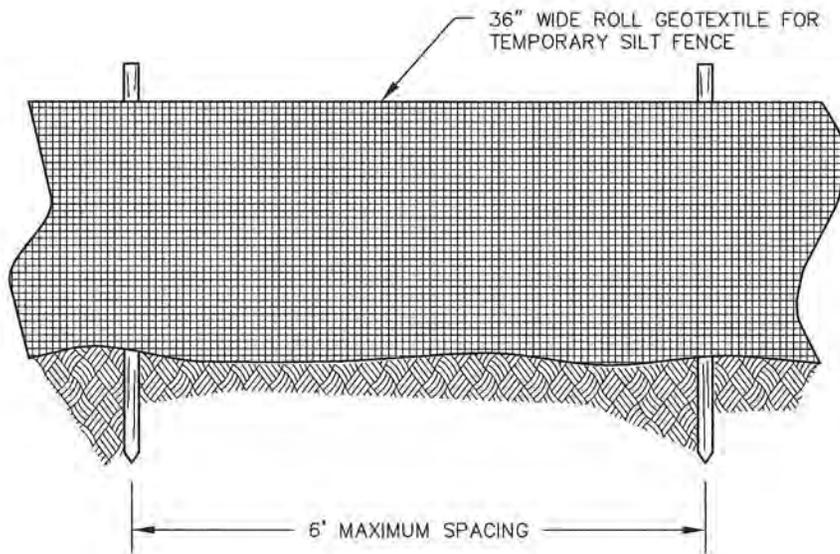
CITY OF CAMAS - EROSION CONTROL DETAIL
SILT FENCE

James P. Coe 3-1-12
DETAIL APPROVED BY DATE

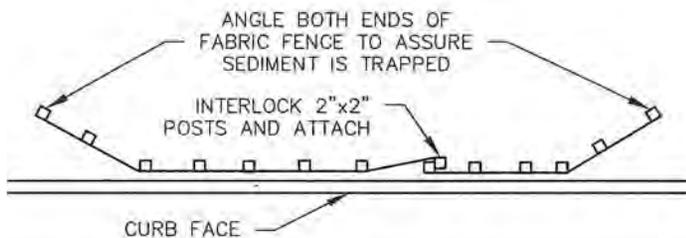
DETAIL NO.

EC12

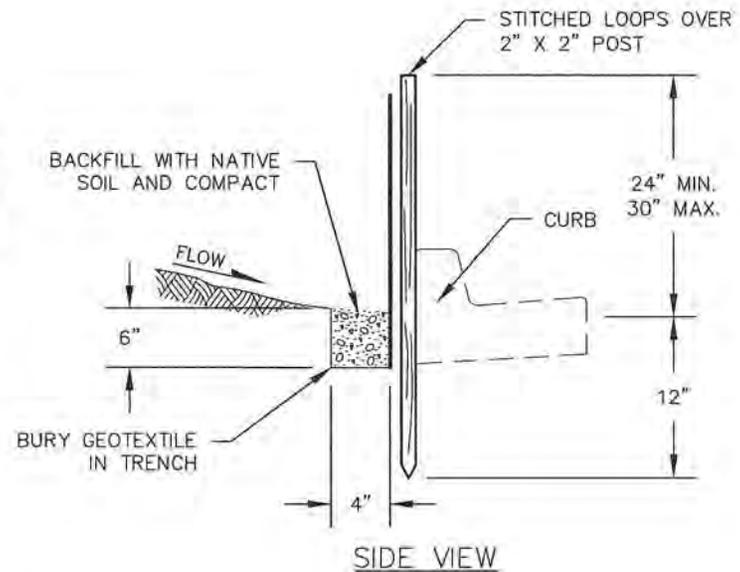
NOT TO SCALE



ELEVATION VIEW



TOP VIEW



NOTES:

1. MAXIMIZE DETENTION OF STORMWATER BY PLACING FENCE AS FAR AWAY FROM THE TOE OF SLOPE AS POSSIBLE WITHOUT ENCROACHING ON SENSITIVE AREAS OR OUTSIDE OF THE CLEARING BOUNDARIES.
2. INSTALL FENCE BEHIND CURB FOR LOTS THAT SLOPE DOWN TO CURB LINE.
2. BURY BOTTOM OF FILTER FABRIC 6" VERTICALLY BELOW FINISHED GRADE.
3. COMPACT ALL AREAS OF FABRIC TRENCH.
4. POSTS SHALL BE WOOD, DIMENSIONAL FIR OR PINE, 2"x2" NOMINAL.
5. STITCHED LOOPS SHALL BE INSTALLED ON UPHILL SIDE OF FENCE.
6. INSTALL SEDIMENT FENCING ALONG CONTOURS WHENEVER POSSIBLE.
7. INSTALL THE ENDS OF THE SEDIMENT FENCE TO POINT SLIGHTLY UP-SLOPE TO PREVENT SEDIMENT FROM FLOWING AROUND THE ENDS OF THE FENCE.
8. SEDIMENT BUILDUP IN EXCESS OF 8-INCHES SHALL BE REMOVED.

REV. NO.	DATE	BY	APPR.
1	9/18/07	SCD	JC
2	1/1/11	SCD	JC
3	3/1/12	SCD	JC



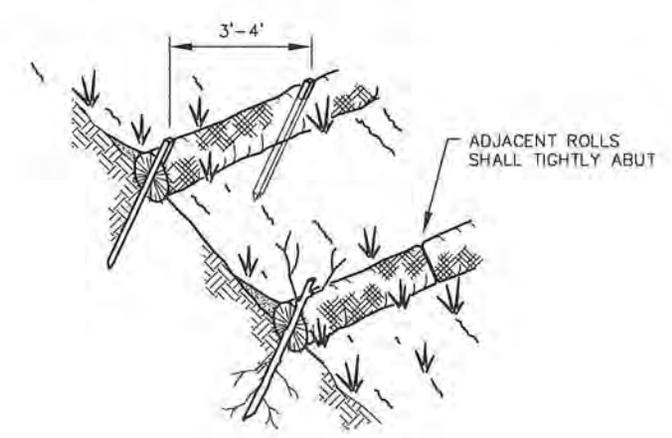
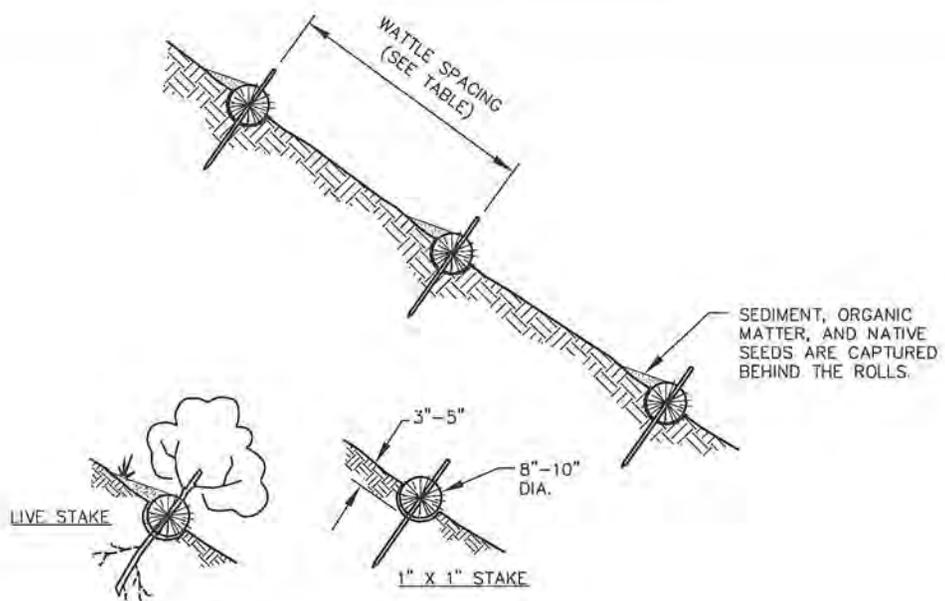
CITY OF CAMAS ~ EROSION CONTROL DETAIL
SILT FENCE FOR HOME BUILDERS

Jim P. [Signature] 3-1-12
DETAIL APPROVED BY DATE

DETAIL NO.

EC13

NOT TO SCALE

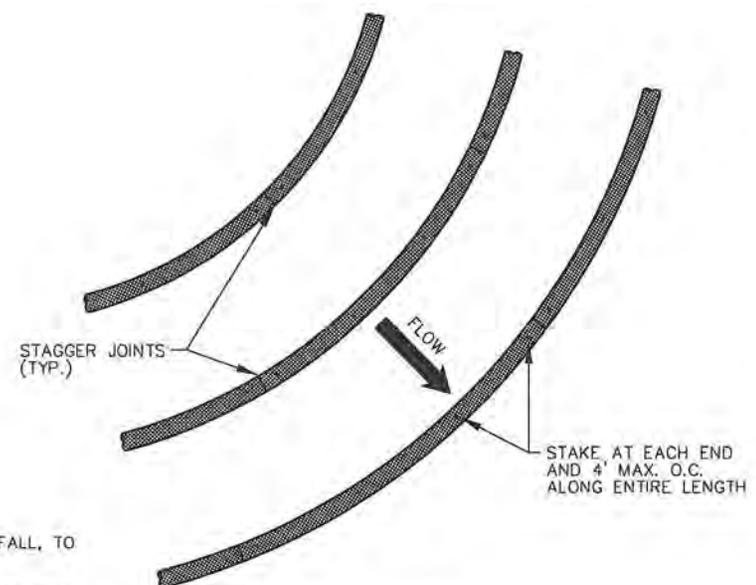


ELEVATION VIEW

WATTLE SPACING TABLE	
SLOPE	MAXIMUM SPACING
1:1 - 1.5:1	3-4 FEET
1.5:1 - 2:1	4-5 FEET
2:1 - 2.5:1	5-6 FEET
2.5:1 - 4:1	6-8 FEET
3.5:1 - 4:1	8-12 FEET
4.5:1 - 5:1	10-20 FEET

NOTES:

1. INSTALL WATTLES ALONG CONTOURS IN A 3"-5" DEEP TRENCH.
2. WATTLES SHALL BE CONSTRUCTED IN ACCORDANCE WITH STD. SPEC. 9-14.5(5).
3. WATTLES SHALL BE INSPECTED REGULARLY, AND IMMEDIATELY AFTER A RUNOFF PRODUCING RAINFALL, TO ENSURE THEY REMAIN THOROUGHLY ENTRENCHED AND IN CONTACT WITH THE SOIL.
4. LIVE STAKES MAY BE USED FOR PERMANENT INSTALLATIONS.
5. INSTALL WATTLES SNUGLY INTO THE TRENCH. ABUT ADJACENT WATTLES TIGHTLY, END TO END, WITHOUT OVERLAPPING THE ENDS.
6. PILOT HOLES MAY BE DRIVEN THROUGH THE WATTLE AND INTO THE SOIL, WHEN SOIL CONDITIONS REQUIRE.
7. RUNOFF MUST NOT BE ALLOWED TO RUN UNDER OR AROUND ROLL.



PLAN VIEW

REV. NO.	DATE	BY	APPR.
1	9/18/07	SCD	JC
2	1/1/11	SCD	JC



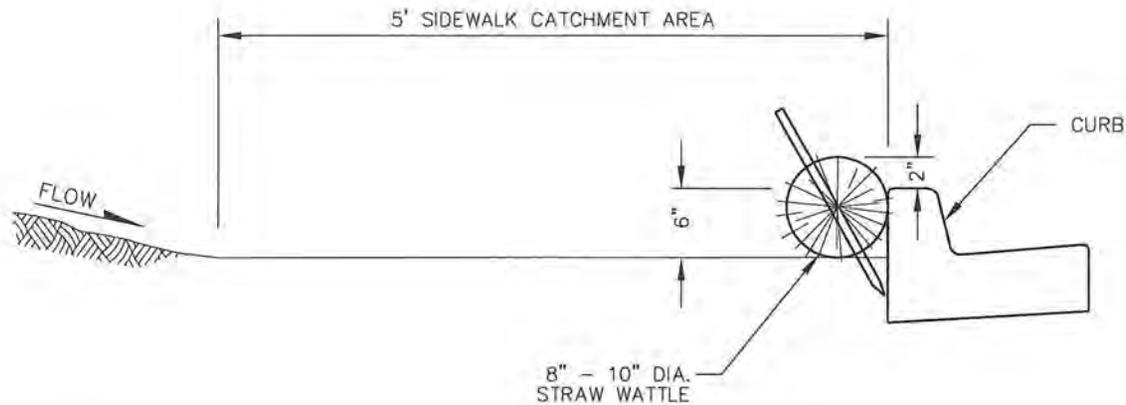
CITY OF CAMAS ~ EROSION CONTROL DETAIL
 STRAW WATTLES ON SLOPE

David P. [Signature] 1-4-11
 DETAIL APPROVED BY DATE

DETAIL NO.
 EC14

NOT TO SCALE

EC-WATTLE.DWG



NOTES:

1. INSTALL WATTLES BEHIND CURB IN 5' SIDEWALK CATCHMENT AREA OR PLANTER STRIP.
2. WATTLES SHALL BE CONSTRUCTED IN ACCORDANCE WITH STD. SPEC. 9-14.5(5).
3. WATTLES SHALL BE INSPECTED REGULARLY, AND IMMEDIATELY AFTER A RUNOFF PRODUCING RAINFALL, TO ENSURE THEY REMAIN THOROUGHLY ENTRENCHED AND IN CONTACT WITH THE SOIL.
4. SEDIMENT BUILDUP IN EXCESS OF 4-INCHES IS TO BE REMOVED.
5. INSTALL WATTLES SNUGLY AGAINST THE BACK OF CURB USING 1" x 1" FIR OR PINE STAKE. ABUT ADJACENT WATTLES TIGHTLY, END TO END, WITHOUT OVERLAPPING THE ENDS.
6. PILOT HOLES MAY BE DRIVEN THROUGH THE WATTLE AND INTO THE SOIL, WHEN SOIL CONDITIONS REQUIRE.

REV. NO.	DATE	BY	APPR.
1	1/1/11	SCD	JC



CITY OF CAMAS ~ EROSION CONTROL DETAIL
 STRAW WATTLES BEHIND CURB

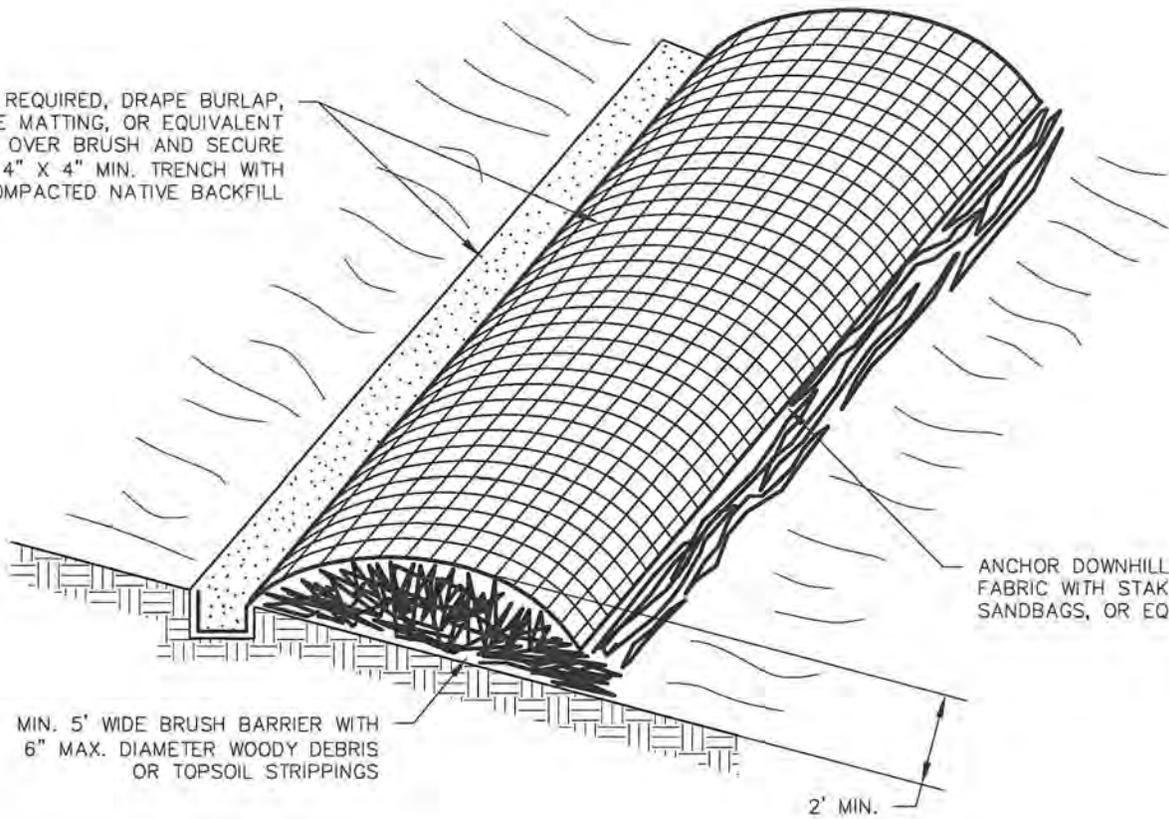
San P. Cothran 1-4-11
 DETAIL APPROVED BY DATE

NOT TO SCALE

DETAIL NO.

EC15

IF REQUIRED, DRAPE BURLAP, JUTE MATTING, OR EQUIVALENT FABRIC OVER BRUSH AND SECURE IN 4" X 4" MIN. TRENCH WITH COMPACTED NATIVE BACKFILL



ANCHOR DOWNHILL EDGE OF FABRIC WITH STAKES, SANDBAGS, OR EQUIVALENT

MIN. 5' WIDE BRUSH BARRIER WITH 6" MAX. DIAMETER WOODY DEBRIS OR TOPSOIL STRIPPINGS

2' MIN.

REV. NO.	DATE	BY	APPR.
1	1/1/11	SCD	JC



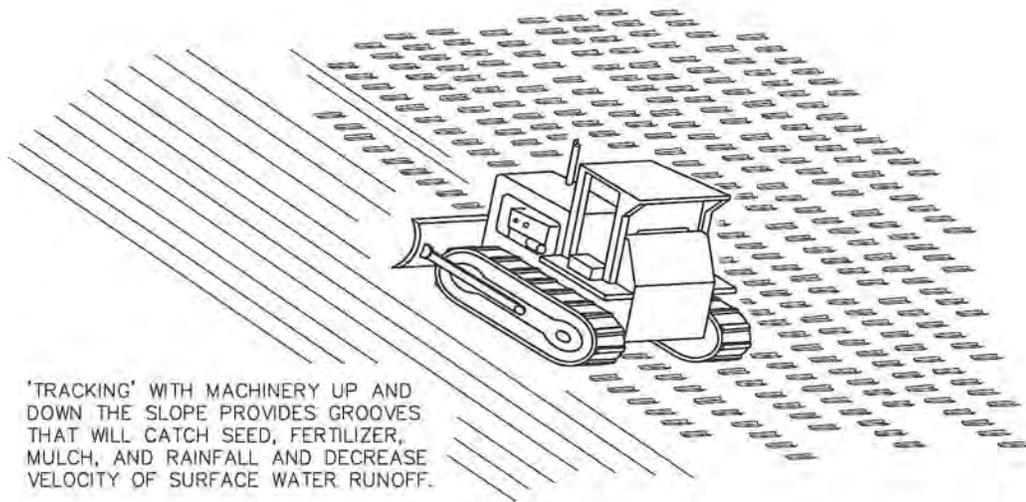
CITY OF CAMAS - EROSION CONTROL DETAIL
BRUSH BARRIER

James P. Coe 1-4-11
DETAIL APPROVED BY DATE

DETAIL NO.
EC16

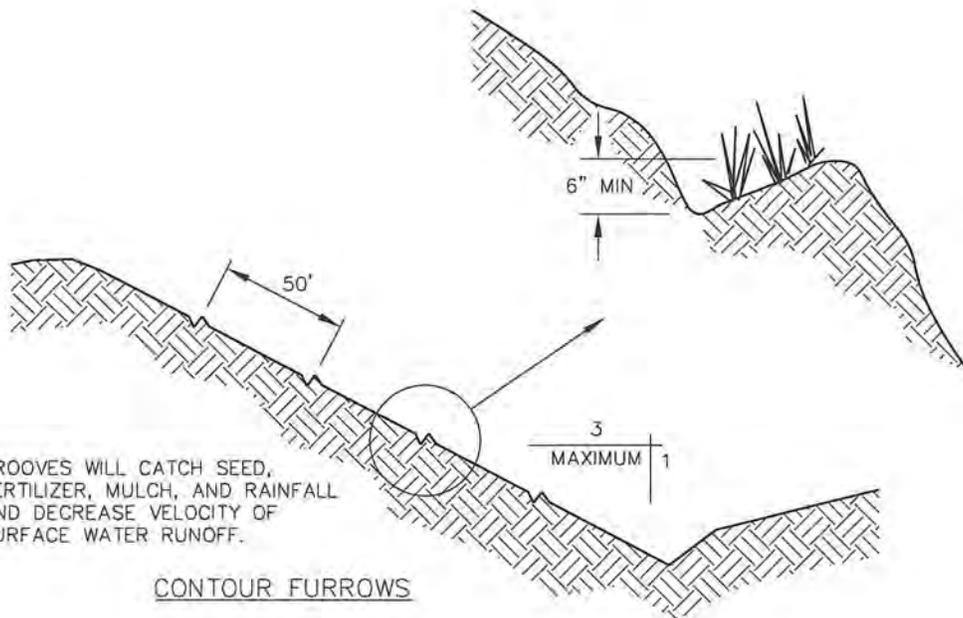
NOT TO SCALE

EC-BRUSH.DWG



'TRACKING' WITH MACHINERY UP AND DOWN THE SLOPE PROVIDES GROOVES THAT WILL CATCH SEED, FERTILIZER, MULCH, AND RAINFALL AND DECREASE VELOCITY OF SURFACE WATER RUNOFF.

TRACKING



GROOVES WILL CATCH SEED, FERTILIZER, MULCH, AND RAINFALL AND DECREASE VELOCITY OF SURFACE WATER RUNOFF.

CONTOUR FURROWS

NOTES:

1. TRACKING IS DONE BY OPERATING EQUIPMENT UP AND DOWN THE SLOPE TO LEAVE HORIZONTAL DEPRESSIONS IN THE SOIL.
2. TRACKED SURFACES SHALL BE SEEDDED IMMEDIATELY AFTER TRACKING.
3. SLOPES WHERE MOWING IS PLANNED SHOULD NOT BE EXCESSIVELY ROUGHENED.

REV. NO.	DATE	BY	APPR.
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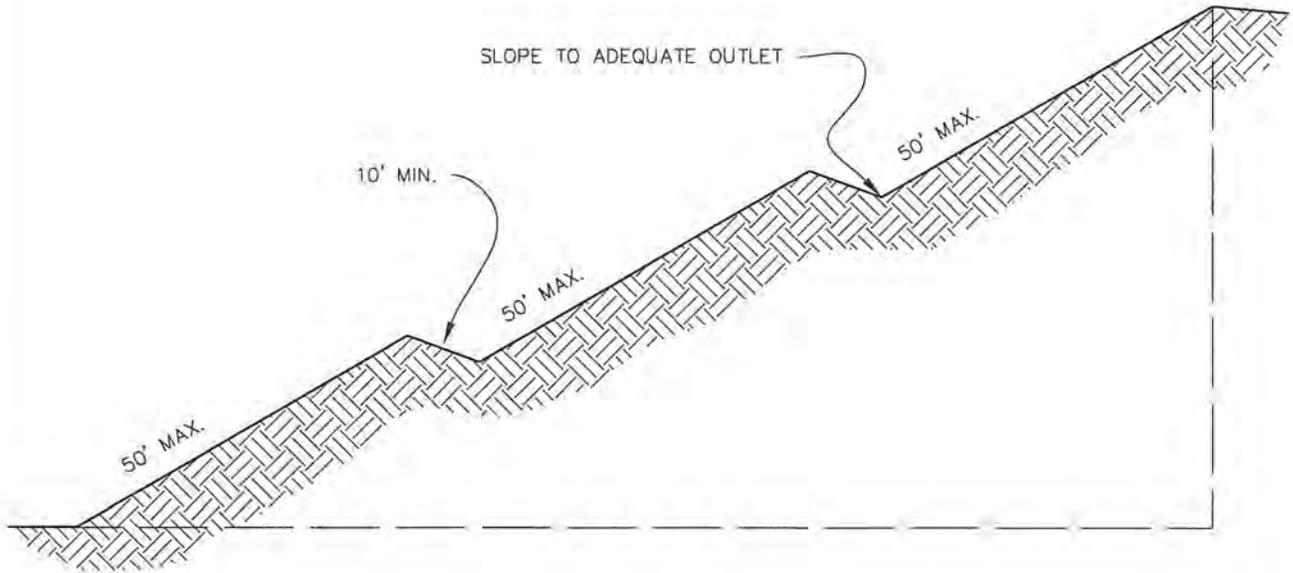


CITY OF CAMAS ~ EROSION CONTROL DETAIL
SURFACE ROUGHENING - TRACKING & FURROWS

John P. Coe 1-4-11
DETAIL APPROVED BY DATE

NOT TO SCALE

DETAIL NO.
EC17



NOTES:

1. ALL GRADIENT TERRACES SHOULD HAVE ADEQUATE OUTLETS. SUCH AN OUTLET MAY BE A GRASSED WATERWAY, VEGETATED AREA, OR TILE OUTLET. IN ALL CASES THE OUTLET MUST CONVEY RUNOFF FROM THE TERRACE OR TERRACE SYSTEM TO A POINT WHERE THE OUTFLOW WILL NOT CAUSE DAMAGE. VEGETATIVE COVER SHOULD BE USED IN THE OUTLET CHANNEL.

REV. NO.	DATE	BY	APPR.
1	9/18/07	SCD	JC
2	1/1/11	SCD	JC



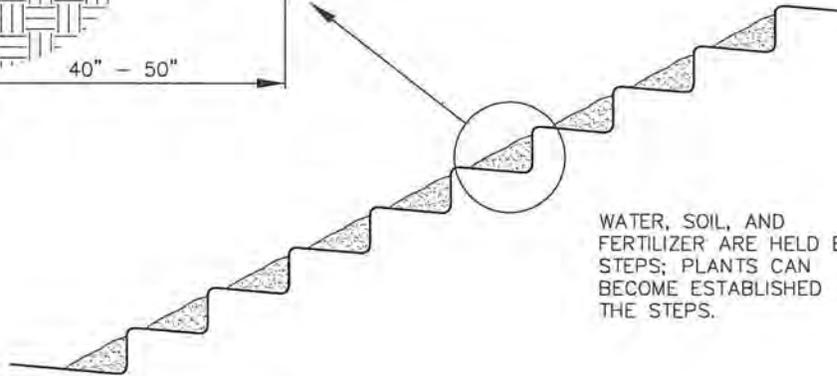
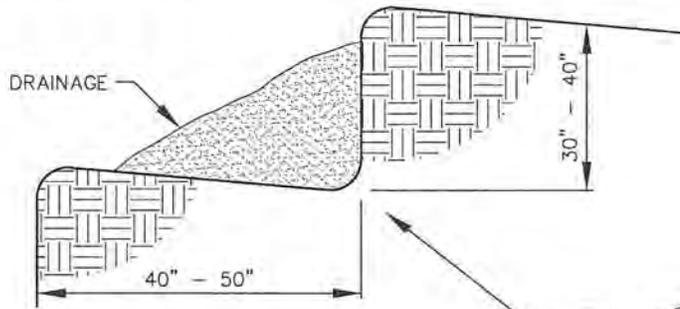
CITY OF CAMAS ~ EROSION CONTROL DETAIL
 SURFACE ROUGHENING - GRADIENT TERRACES

Sam P. Coathun 1-4-11
 DETAIL APPROVED BY DATE

NOT TO SCALE

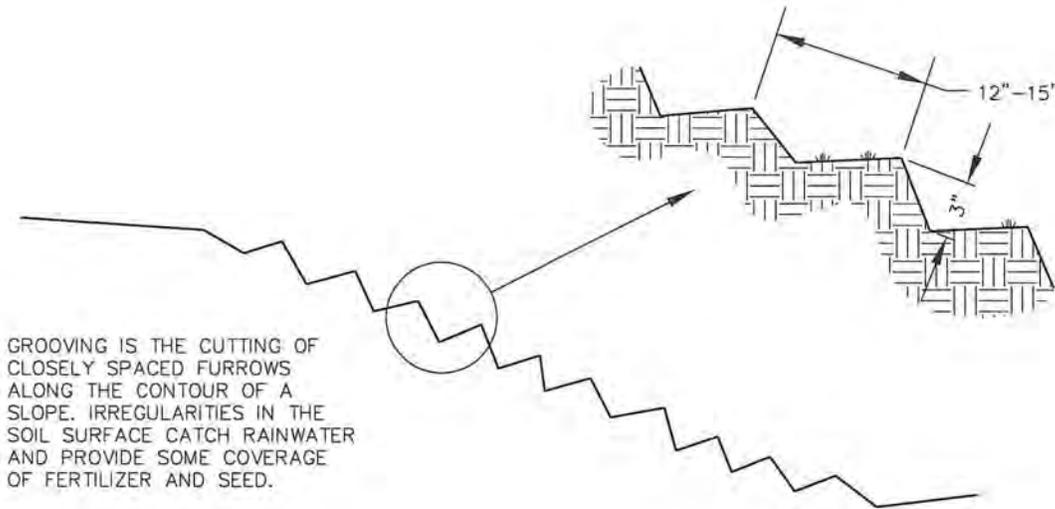
DETAIL NO.
 EC18

DEBRIS FROM SLOPE ABOVE IS CAUGHT BY STEPS



WATER, SOIL, AND FERTILIZER ARE HELD BY STEPS; PLANTS CAN BECOME ESTABLISHED ON THE STEPS.

STAIR STEPPING CUT SLOPES



GROOVING IS THE CUTTING OF CLOSELY SPACED FURROWS ALONG THE CONTOUR OF A SLOPE. IRREGULARITIES IN THE SOIL SURFACE CATCH RAINWATER AND PROVIDE SOME COVERAGE OF FERTILIZER AND SEED.

GROOVING SLOPES

REV. NO.	DATE	BY	APPR.
1	9/18/07	SCD	JC
2	1/1/11	SCD	JC

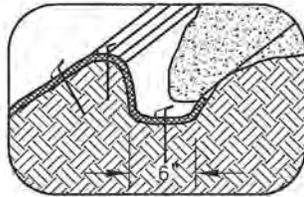


CITY OF CAMAS ~ EROSION CONTROL DETAIL
 SURFACE ROUGHENING - STAIR STEPS & GROOVES

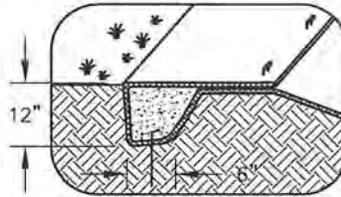
Jan P. Cuthbert 1-4-11
 DETAIL APPROVED BY DATE

NOT TO SCALE

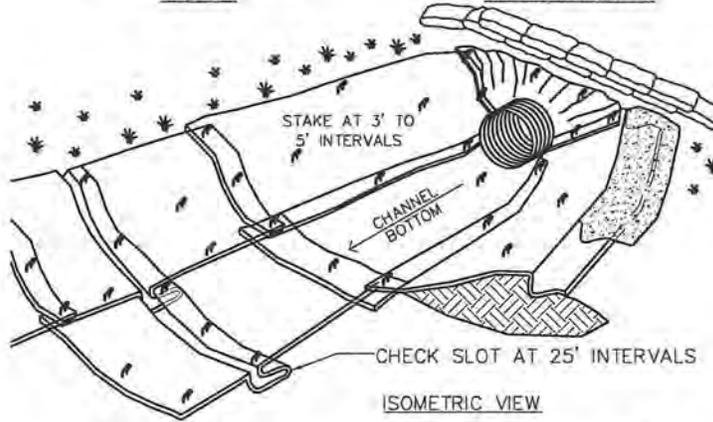
DETAIL NO.
 EC19



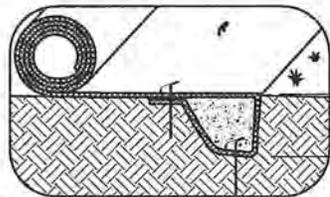
LONGITUDINAL ANCHOR TRENCH



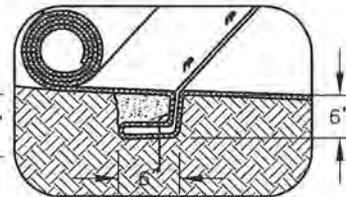
TERMINAL SLOPE AND CHANNEL ANCHOR TRENCH



ISOMETRIC VIEW



INITIAL CHANNEL ANCHOR TRENCH

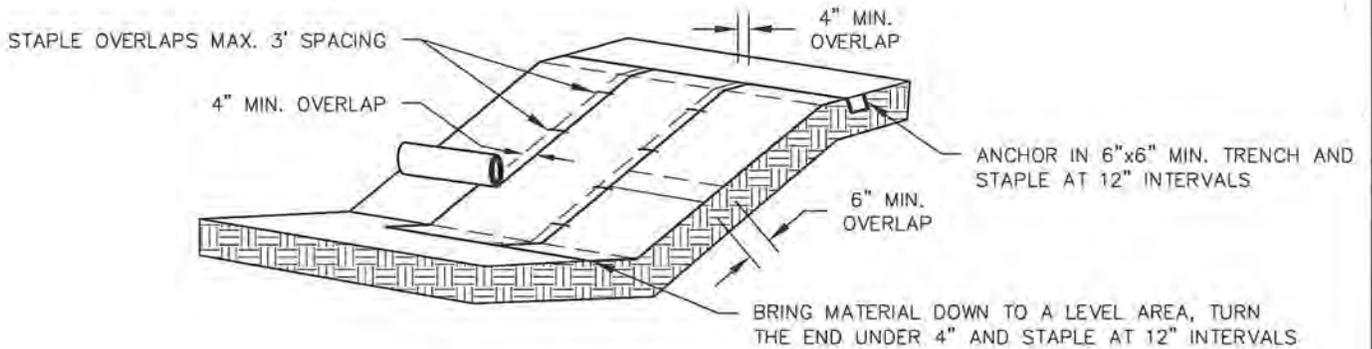


INTERMITTENT CHECK SLOT

NOTES:

1. CHECK SLOTS TO BE CONSTRUCTED PER MANUFACTURE'S SPECIFICATIONS.
2. STAKING OF STAPLING LAYOUT PER MANUFACTURES SPECIFICATIONS.

CHANNEL INSTALLATION



SLOPE INSTALLATION

NOTES:

1. SLOPE SURFACE SHALL BE SMOOTH BEFORE PLACEMENT FOR PROPER SOIL CONTACT
2. DO NOT STRETCH BLANKETS/MATTINGS TIGHT, ALLOW THE ROLLS TO MOLD TO ANY IRREGULARITIES
3. STAPLING PATTERN AS PER MANUFACTURER'S RECOMMENDATIONS
4. IF THERE IS A BERM AT THE TOP OF SLOPE, ANCHOR UPSLOPE OF THE BERM
5. FOR SLOPES LESS THAN 3H:1V, ROLLS MAY BE PLACED IN HORIZONTAL STRIPS
6. LIME, FERTILIZE AND SEED BEFORE INSTALLATION. PLANTING OF SHRUBS, TREES, ETC. SHOULD OCCUR AFTER INSTALLATION.

REV. NO.	DATE	BY	APPR.
1	9/18/07	SCD	JC
2	1/1/11	SCD	JC



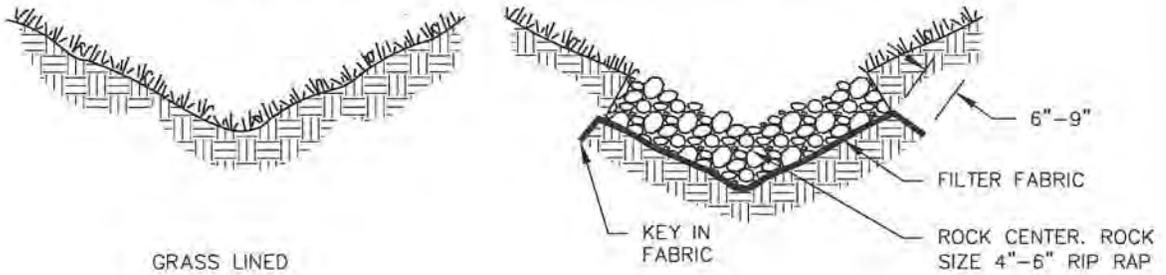
CITY OF CAMAS ~ EROSION CONTROL DETAIL
 EROSION CONTROL BLANKETS

Sam P. Christian 1-4-11
 DETAIL APPROVED BY DATE

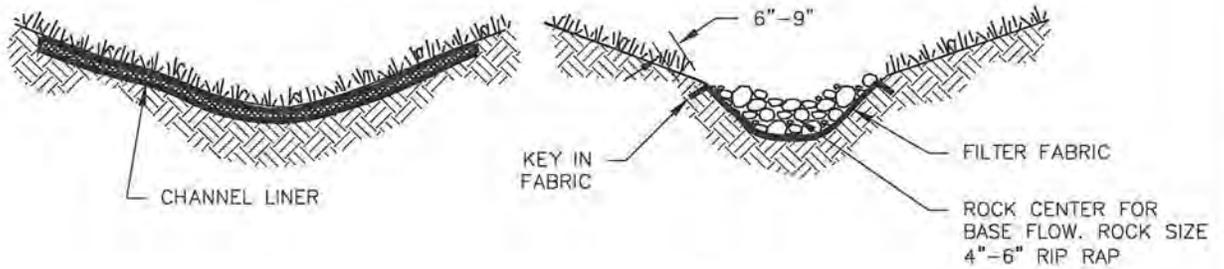
DETAIL NO.
 EC20

NOT TO SCALE

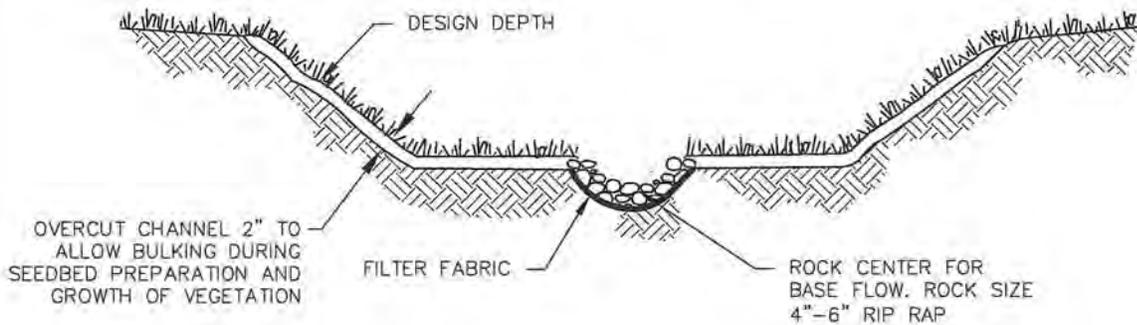
TYPICAL V-SHAPED CHANNEL CROSS-SECTION



TYPICAL PARABOLIC CHANNEL CROSS-SECTION



TYPICAL TRAPEZOIDAL CHANNEL CROSS-SECTION



NOTES:

1. ESTABLISHED GRASS OR VEGETATED LINING IS REQUIRED BEFORE THE CHANNEL CAN BE USED TO CONVEY STORMWATER, UNLESS STABILIZED WITH NETS OR BLANKETS.
2. IF DESIGN VELOCITY OF A CHANNEL TO BE VEGETATED BY SEEDING EXCEEDS 2 FT/SEC, A TEMPORARY CHANNEL LINER IS REQUIRED.
3. SIDE SLOPES SHALL BE 3:1 OR FLATTER TO AID IN THE ESTABLISHMENT OF VEGETATION AND FOR MAINTENANCE.

REV. NO.	DATE	BY	APPR.
1	9/18/07	SCD	JC
2	1/1/11	SCD	JC

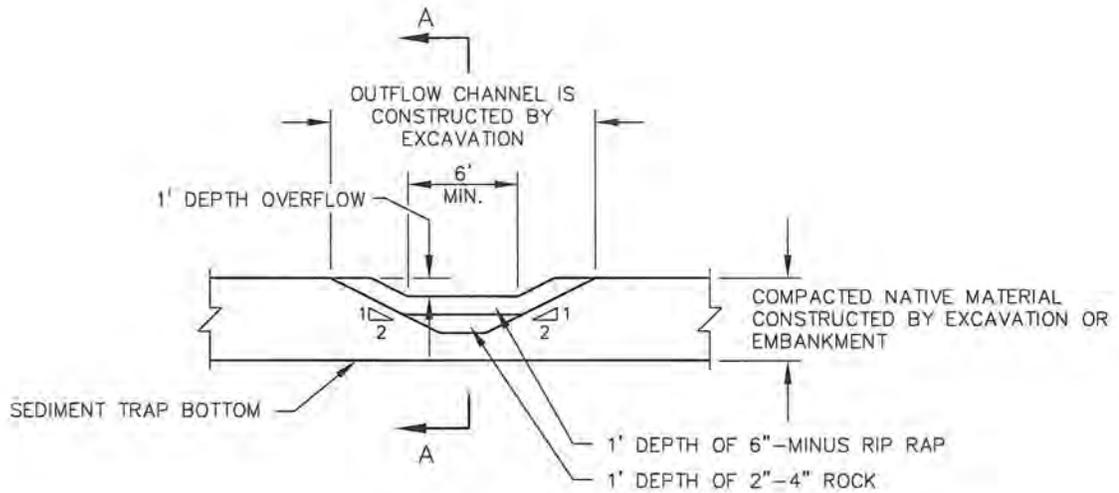


CITY OF CAMAS ~ EROSION CONTROL DETAIL
GRASS LINED CHANNELS

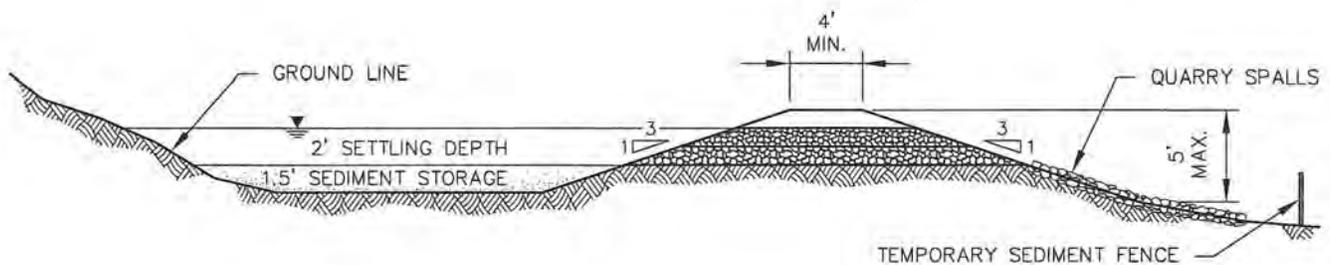
John P. Coe 1-4-11
DETAIL APPROVED BY DATE

NOT TO SCALE

DETAIL NO.
EC21



ELEVATION



SECTION A-A

NOTES:

1. ENGINEER TO PROVIDE CONTRACTOR WITH REQUIRED SEDIMENT STORAGE VOLUME (RSSV) IN CUBIC FEET (TONS X 0.5 TONS/CF).
FOOTPRINT = RSSV (1.5' MAX) + 2' SETTLING VOLUME
DEPTH WITH 3:1 MAX SIDE SLOPES
A 3:1 RATIO OF TRAP LENGTH TO WIDTH IS DESIREABLE.
2. A FILTER SYSTEM MUST BE CONSTRUCTED TO FILTER RUNOFF FROM THE SEDIMENT TRAP PRIOR TO DISCHARGE FROM THE CONSTRUCTION SITE.

REV. NO.	DATE	BY	APPR.
1	9/18/07	SCD	JC
2	1/1/11	SCD	JC

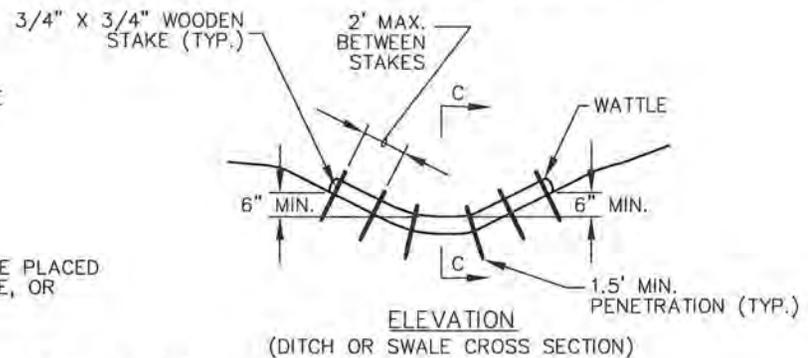
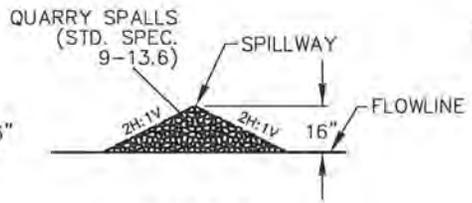
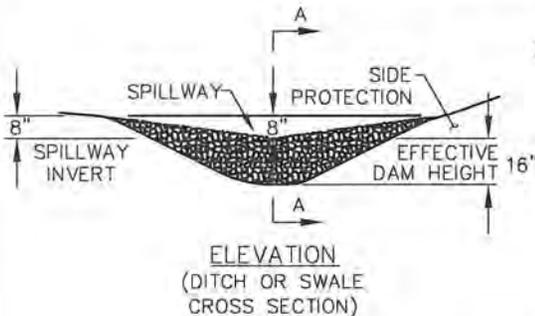
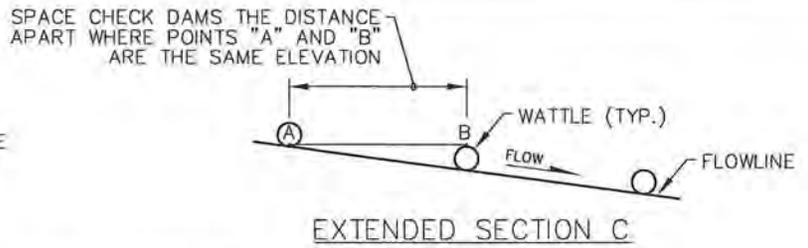
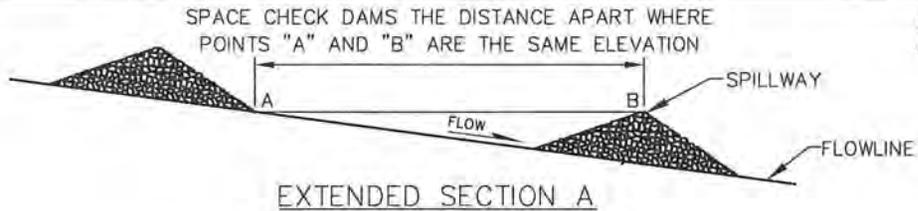


CITY OF CAMAS ~ EROSION CONTROL DETAIL
TEMPORARY SEDIMENT TRAP

John P. Caruthers 1-411
DETAIL APPROVED BY DATE

NOT TO SCALE

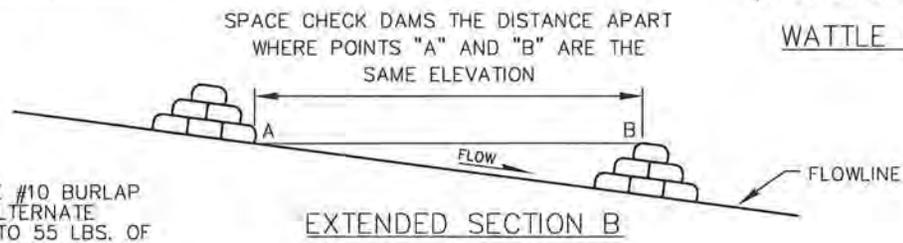
DETAIL NO.
EC22



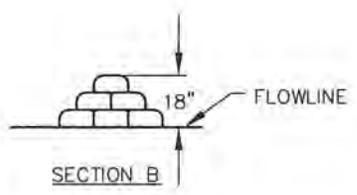
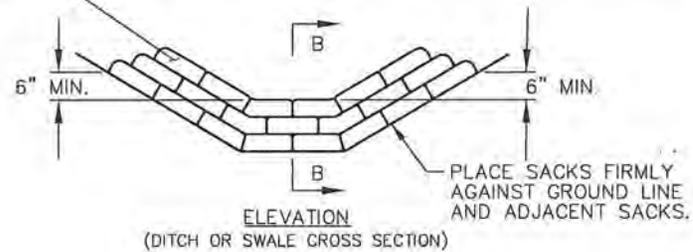
NOTE: ROCK CHECK DAMS SHALL BE PLACED OUTSIDE OF THE CLEAR ZONE, OR BEHIND TRAFFIC BARRIER.

ROCK CHECK DAM

WATTLE CHECK DAM



SACKS SHALL BE #10 BURLAP OR APPROVED ALTERNATE FILLED WITH 48 TO 55 LBS. OF GRAVEL BACKFILL FOR DRAINS.



SANDBAG CHECK DAM

REV. NO.	DATE	BY	APPR.
1	9/18/07	SCD	JC
2	1/1/11	SCD	JC



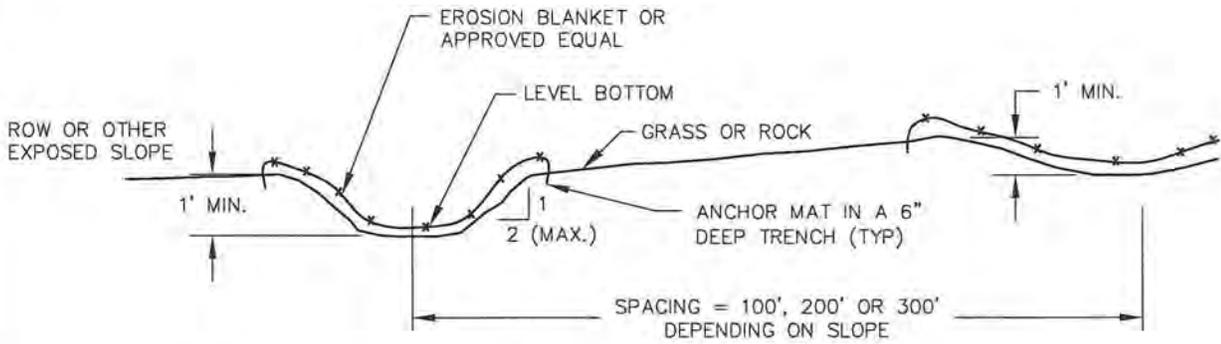
CITY OF CAMAS ~ EROSION CONTROL DETAIL
CHECK DAMS

DETAIL APPROVED BY *Jim P. ...* DATE 1-4-11

DETAIL NO.
EC23

NOT TO SCALE

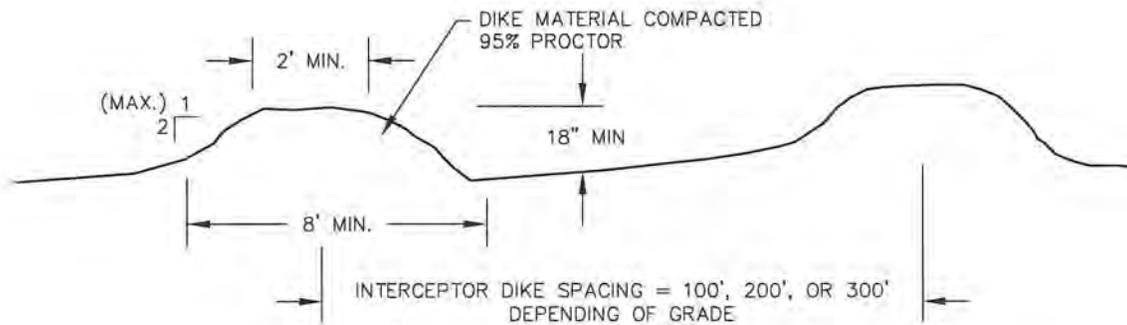
EC-CHKDAMS.DWG



NOTE:
 WHERE OVERLAPPING OF EROSION BLANKET IS NECESSARY, OVERLAP EDGES A MINIMUM OF 4" AND STAPLES DOWN CENTER OF OVERLAP EVERY 3 FEET.

BOTTOM WIDTH: 2' MINIMUM; THE BOTTOM WIDTH SHALL BE LEVEL
 DEPTH: 1' MINIMUM
 SIDE SLOPE: 2H:1V OR FLATTER
 GRADE: MAXIMUM 5 PERCENT, WITH POSITIVE DRAINAGE TO A SUITABLE OUTLET (SUCH AS SEDIMENTATION POND)

INTERCEPTOR SWALE



TEMPORARY INTERCEPTOR DIKES

REV. NO.	DATE	BY	APPR.
1	9/18/07	SCD	JC
2	1/1/11	SCD	JC

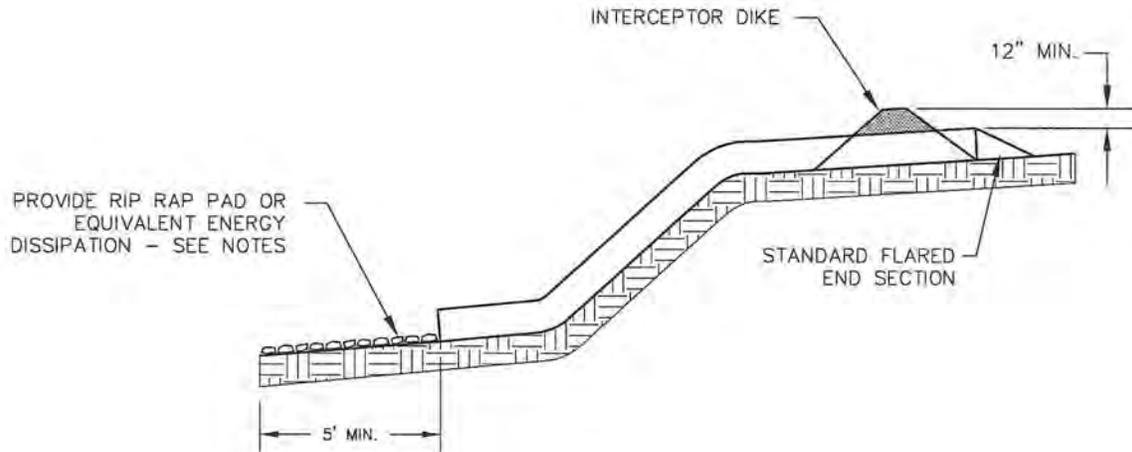
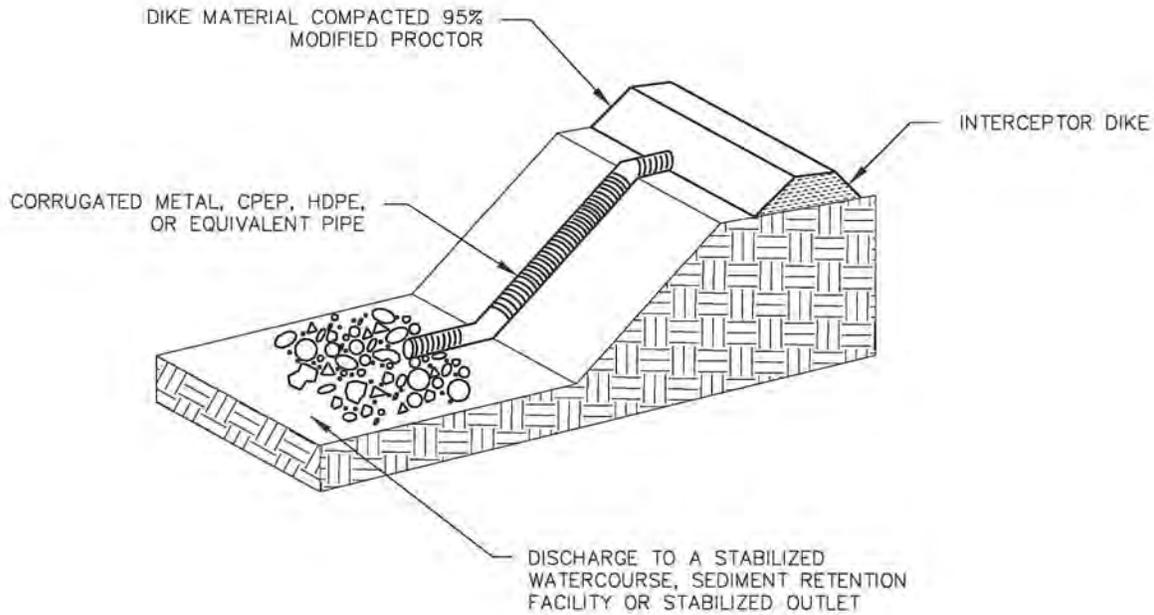


CITY OF CAMAS ~ EROSION CONTROL DETAIL
 INTERCEPTOR SWALE AND DIKE

James P. Coarthen 1-4-11
 DETAIL APPROVED BY DATE

NOT TO SCALE

DETAIL NO.
 EC24



NOTES:

1. PIPE INLET AND ALL SECTIONS SHALL BE SECURELY FASTENED TOGETHER WITH GASKETED WATERTIGHT FITTINGS.
2. SLOPE PIPE SHALL BE SECURELY ANCHORED TO THE SLOPE EVERY 10' OF PIPE LENGTH.
3. SOIL AROUND AND UNDER PIPE ENTRANCE SECTION SHALL BE THOROUGHLY COMPACTED TO PREVENT UNDERCUTTING. THIS AREA SHALL BE REINFORCED WITH SANDBAGS IF REQUIRED.
4. ENERGY DISSIPATION PAD SHALL BE FOUR FEET WIDER THAN THE PIPE DIAMETER; PIPE OUTLET SHALL BE CENTERED ALONG THE HIGH SIDE OF THE PAD

REV. NO.	DATE	BY	APPR.
1	9/18/07	SCD	JC
2	1/1/11	SCD	JC



CITY OF CAMAS - EROSION CONTROL DETAIL
PIPE SLOPE DRAIN

Don C. Coathran 1-4-11
 DETAIL APPROVED BY DATE

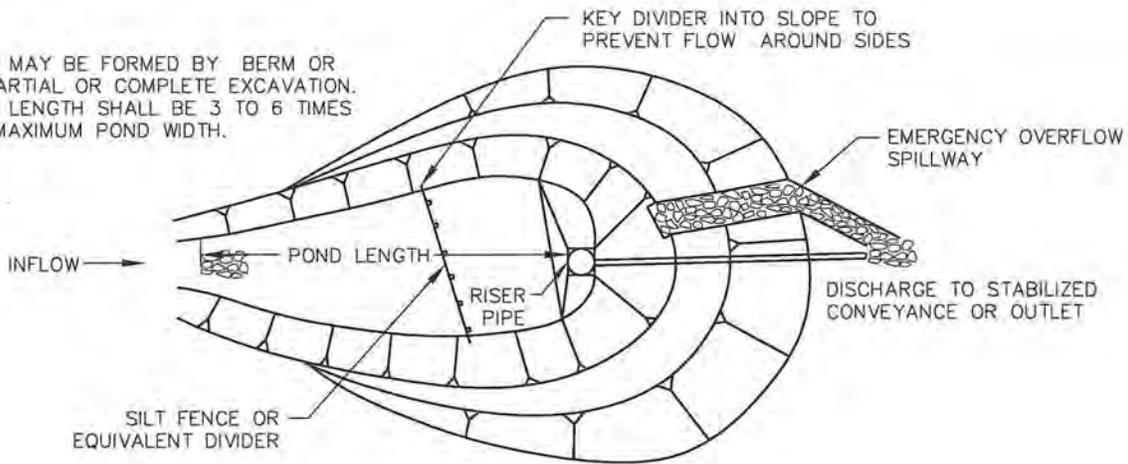
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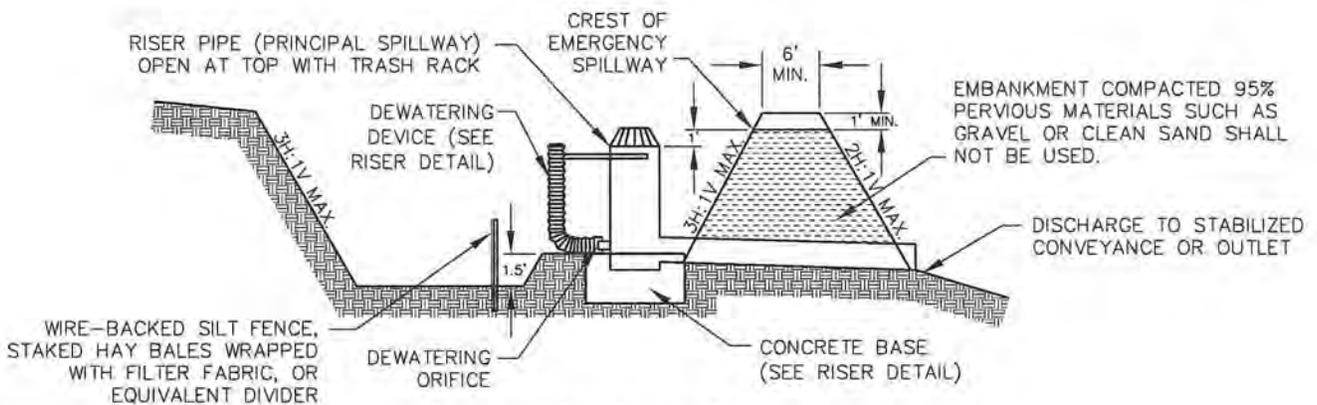
EC25

NOTES:

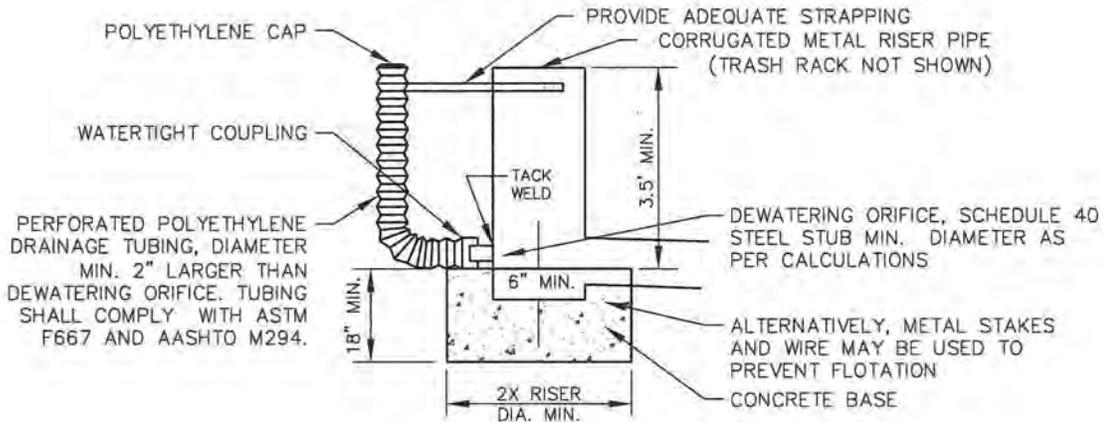
1. POND MAY BE FORMED BY BERM OR BY PARTIAL OR COMPLETE EXCAVATION.
2. POND LENGTH SHALL BE 3 TO 6 TIMES THE MAXIMUM POND WIDTH.



PLAN VIEW



CROSS SECTION



RISER DETAIL

NOTES:

1. STRUCTURES HAVING A MAXIMUM STORAGE CAPACITY AT THE TOP OF THE DAM OF 10 ACRE-FT (435,600 CU. FT.) OR MORE ARE SUBJECT TO THE WASHINGTON DAM SAFETY REGULATIONS (CHAPTER 173-175 WAC).
2. SIZING FOR POND GEOMETRY AND DISCHARGE MECHANISMS SHALL BE CALCULATED PER THE MOST RECENT STORMWATER MANAGEMENT MANUAL FOR WESTERN WASHINGTON.
3. GRADE BOTTOM OF BASIN AS LEVEL AS POSSIBLE.
4. SPILLWAY SHALL BE LINED WITH 6" MIN. RIPRAP.
5. ALL INLETS AND OUTLETS SHALL BE PROTECTED WITH RIPRAP.
6. IF THE POND POSES A SAFETY HAZARD, IT SHALL BE FENCED.
7. REMOVE SEDIMENT BEFORE 1-FOOT ACCUMULATES.

REV. NO.	DATE	BY	APPR.
1	9/18/07	SCD	JC
2	1/1/11	SCD	JC

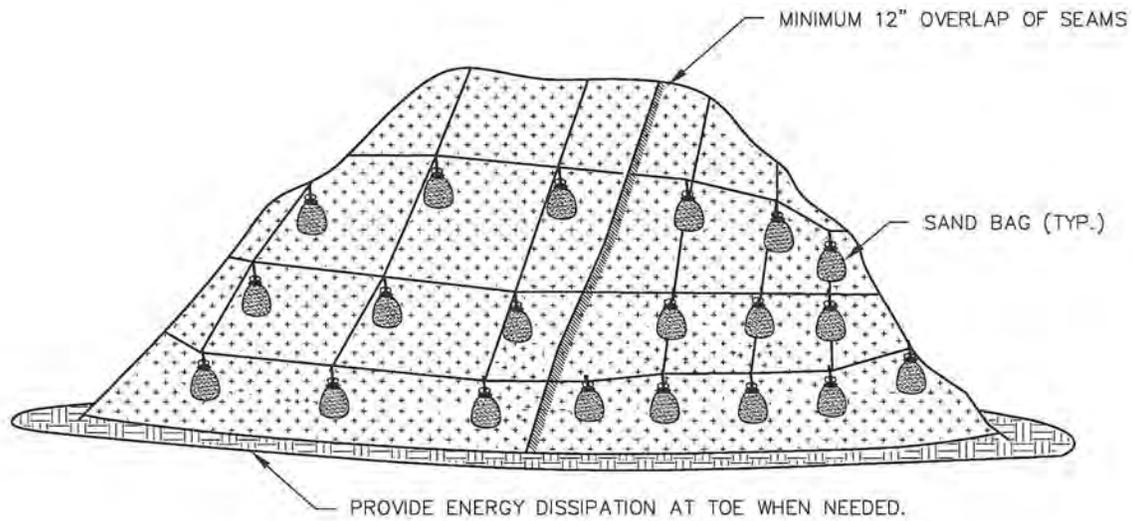


CITY OF CAMAS ~ EROSION CONTROL DETAIL
TEMPORARY SEDIMENT POND

Jan P. Coulter 1-4-11
 DETAIL APPROVED BY DATE

NOT TO SCALE

DETAIL NO.
 EC26



PLASTIC SHEETING

NOTES:

1. PLASTIC SHEETING IS USED TO PROVIDE IMMEDIATE PROTECTION TO SLOPES AND STOCKPILES.
2. DO NOT USE PLASTIC COVERING UPSLOPE OF AREAS SUCH AS STEEP AND/OR UNSTABLE SLOPES THAT MIGHT BE ADVERSELY AFFECTED BY CONCENTRATED RUNOFF.
3. WHEN POSSIBLE, INSTALL AN INTERCEPTOR DIKE AT THE TOP OF THE PLASTIC TO DIVERT FLOWS AWAY FROM THE PLASTIC.
4. TOE-IN THE TOP OF THE SHEETING IN A 6"x6" TRENCH BACKFILLED WITH COMPACTED NATIVE MATERIAL.
5. INSTALL A GRAVEL BERM, RIPRAP, OR OTHER SUITABLE PROTECTION AT THE TOP OF THE SLOPE IN ORDER TO DISSIPATE RUNOFF VELOCITY.
6. ANCHOR THE PLASTIC USING SANDBAGS OR OTHER SUITABLE TETHERED ANCHOR SYSTEM SPACED ON A 10' GRID SPACING IN ALL DIRECTIONS.
7. OVERLAP SEAMS 1'-2', TAPE, ROLL AND STAKE THE SEAMS AND THEN WEIGH DOWN THE ENTIRE LENGTH.
8. PROVIDE ENERGY DISSIPATION AT TOE WHEN NEEDED.
9. REPLACE TORN SHEETS AND REPAIR OPEN SEAMS. COMPLETELY REMOVE AND REPLACE PLASTIC WHEN IT BEGINS TO DETERIORATE.

REV. NO.	DATE	BY	APPR.
1	1/1/11	SCD	JC



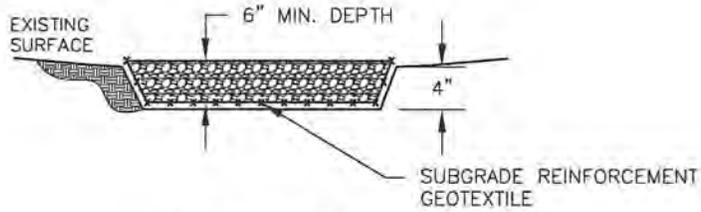
CITY OF CAMAS ~ EROSION CONTROL DETAIL
 STOCKPILE PROTECTION

Jan P. Caruthers 1-4-11
 DETAIL APPROVED BY DATE

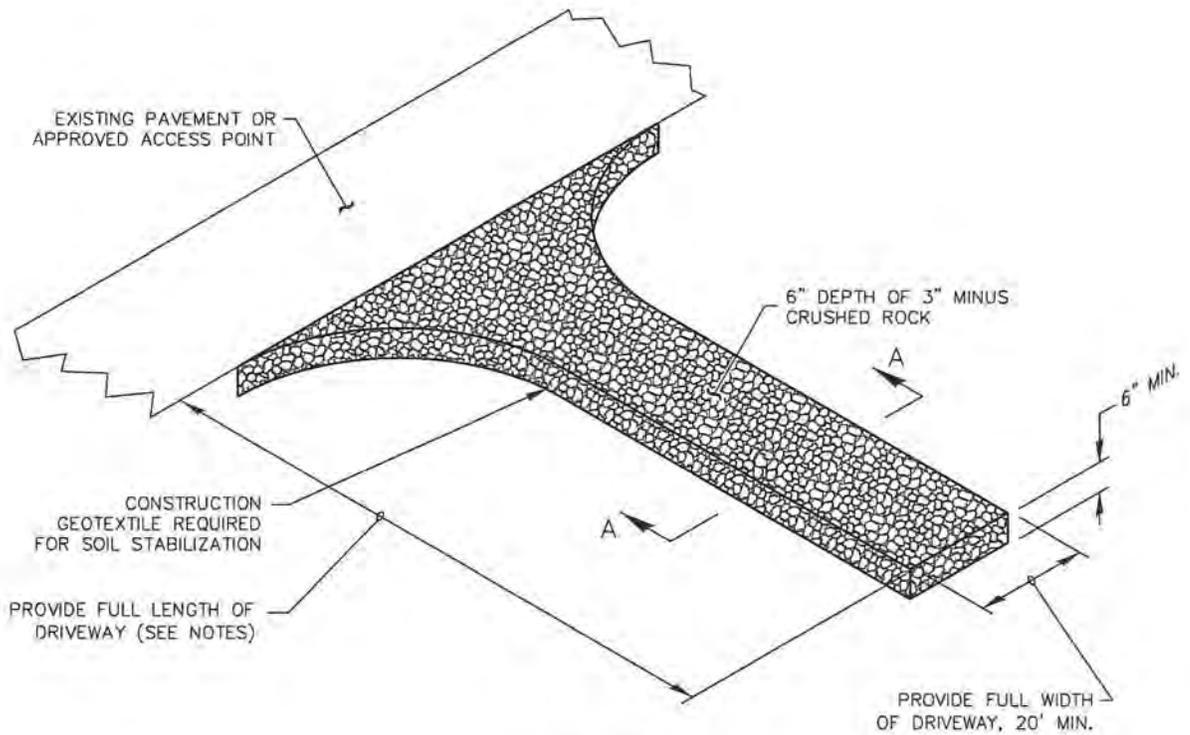
DETAIL NO.
 EC27

NOT TO SCALE

EC-STKPILE.DWG



SECTION A-A



ISOMETRIC VIEW

NOTES:

1. 20 FOOT MINIMUM LENGTH FOR SINGLE FAMILY AND DUPLEX RESIDENTIAL.
2. ROCK SHALL BE REMOVED AND REPLACED, OR ADDITIONAL ROCK ADDED IF ENTRANCE FAILS TO FUNCTION AS INTENDED.

REV. NO.	DATE	BY	APPR.
1	6/11/12	SCD	JC

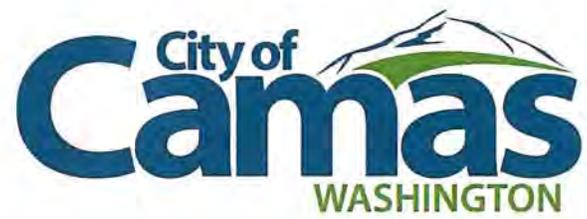


CITY OF CAMAS ~ EROSION CONTROL DETAIL
 CONSTRUCTION ENTRANCE FOR HOME BUILDERS

James P. Cuthbert 6-12-12
 DETAIL APPROVED BY DATE

NOT TO SCALE

DETAIL NO.
 EC28



Street Details

City of Camas
616 NE Fourth Avenue
Camas, WA 98607
www.cityofcamas.us

Phone: (360) 834-6864
Fax: (360) 834-1535

Creation Date: 10/28/02
Revision Date: 4/27/16 (Partial)

City of Camas Street Details ~ INDEX

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ST3	2 LANE LOCAL/SPRINKLERED (52' ROW)	4	10/21/14
ST4	2 LANE COLLECTOR/ARTERIAL (60' ROW)	4	10/21/14
ST5	3 LANE COLLECTOR/ARTERIAL (74' ROW)	5	4/27/16
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ST20A	TYPE 1 DUAL PERPENDICULAR CURB RAMP	2	4/27/16
ST21	TYPE 2 PARALLEL CURB RAMP	3	10/21/14
ST21A	TYPE 2 DUAL PARALLEL CURB RAMP	1	10/21/14
ST22	TYPE 3 CURB RAMP	3	10/21/14
ST23	COMBINATION CURB RAMP	4	10/21/14
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ST25	MID-BLOCK REGIONAL TRAIL CURB RAMP	3	10/21/14
ST26	MID-BLOCK PERPENDICULAR CURB RAMP	3	10/21/14
ST27	DIRECTIONAL CURB RAMP	3	10/21/14
ST28	RETROFIT DIRECTIONAL CURB RAMP	2	10/21/14
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PVT2	PRIVATE STREET - B	2	1/1/11
PVT3	PRIVATE STREET - C	2	1/1/11
PVT4	PRIVATE STREET - D	2	1/1/11
PVT5	PRIVATE STREET - E	2	1/1/11
PVT6	PRIVATE STREET - F	2	1/1/11

STREET CONSTRUCTION NOTES:

1. ENGINEERED FILL SHALL BE PLACED AND COMPACTED IN ACCORDANCE WITH THE MOST RECENTLY ADOPTED EDITION OF THE W.S.D.O.T STANDARD SPECIFICATIONS SECTION 2-03.3(14). FOR FILL AREAS WITHIN ROADWAYS, METHOD C OF (14)C SHALL BE USED. FOR FILL AREAS OUTSIDE OF ROADWAYS METHOD B SHALL BE USED. ALL FILL PLACED SHALL BE VERIFIED BY GEOTECHNICAL TESTING. TEST RESULTS SHALL BE FORWARDED TO THE CITY OF CAMAS PROJECT ENGINEER.
2. MATERIALS IN SOFT SPOTS WITHIN THE ROADWAY SHALL BE REMOVED TO THE DEPTH REQUIRED TO PROVIDE A FIRM FOUNDATION AND SHALL BE BACKFILLED WITH 1-½ INCH MINUS CRUSHED ROCK.
3. ALL SUBGRADE TO BE PROOF ROLLED AND APPROVED BY THE CITY INSPECTOR AND/OR BY A GEOTECHNICAL ENGINEER WITH THE CONSENT OF THE CITY ENGINEER. SUBGRADE FILLS ARE TO BE TESTED USING THE A.A.S.H.T.O. T-180 TEST METHOD.
4. ALL TRENCH LINES, FILL AREAS AND BASE COURSE LOCATED IN THE RIGHT-OF-WAY SHALL BE APPROVED GRANULAR MATERIAL AND SHALL MEET 95% OF A.A.S.H.T.O. T-180 COMPACTION. TRENCH LINES LOCATED WITHIN AN EXISTING ROADWAY SHALL BE PLATED OR TOPPED WITH COLD MIX. GRANULAR BACKFILL OVERNIGHT IS NOT ALLOWED. PLATES SHALL HAVE COLD MIX AROUND ALL EDGES.
5. THE CONTRACTOR SHALL NOTIFY THE CITY INSPECTOR A MINIMUM OF 24 HOURS PRIOR TO SUBGRADE PROOF ROLL OR GRADE CHECK INSPECTIONS.
6. THE AGGREGATE ROAD BASE SHALL BE COMPACTED IN ACCORDANCE WITH THE MOST RECENTLY ADOPTED EDITION OF THE W.S.D.O.T. STANDARD SPECIFICATIONS SECTION 4-04.3. THE CONTRACTOR SHALL SUBMIT TEST RESULTS TO THE ENGINEER AND CITY INSPECTOR. MAXIMUM DENSITY (95%) AS DETERMINED BY A.A.S.H.T.O. T-180 TEST METHOD.
7. ASPHALT CONCRETE PAVEMENT MIX SHALL BE DESIGNED FROM A MIX FORMULA APPROVED BY W.S.D.O.T. FOR MATERIAL USED. CONTRACTOR TO PROVIDE THE CITY WITH CERTIFICATE OF COMPLIANCE FROM THE ASPHALT PAVEMENT PLANT, UNLESS OTHERWISE INDICATED.
8. THE ASPHALT CONCRETE PAVEMENT MIX SHALL BE COMPACTED IN ACCORDANCE WITH THE MOST RECENTLY ADOPTED EDITION OF THE W.S.D.O.T STANDARD SPECIFICATIONS SECTION 5-04.3(10). CONTRACTOR SHALL SUBMIT TEST RESULTS TO THE ENGINEER AND THE CITY INSPECTOR.
9. ALL STORM SYSTEM IMPROVEMENTS AND STORMWATER DETENTION AND TREATMENT FACILITIES SHALL BE COMPLETED AND PROPERLY FUNCTIONING PRIOR TO ANY PAVING.
10. HALF STREET IMPROVEMENTS SHALL INCLUDE AN ANALYSIS OF THE EXISTING STRUCTURAL SECTION OUT TO CENTERLINE. IF FOUND TO BE SUBSTANDARD, THE DEVELOPER SHALL BE REQUIRED TO PROVIDE AN ADEQUATE STRUCTURAL SECTION TO CENTERLINE. THIS MAY CONSIST OF A STRUCTURAL OVERLAY OR A COMPLETE STREET RECONSTRUCTION AS DETERMINED BY A GEOTECHNICAL ANALYSIS AND AS APPROVED BY THE CITY ENGINEER.

REV. NO.	DATE	BY	APPR.
1	5/1/07	SCD	JC
2	1/1/11	SCD	JC

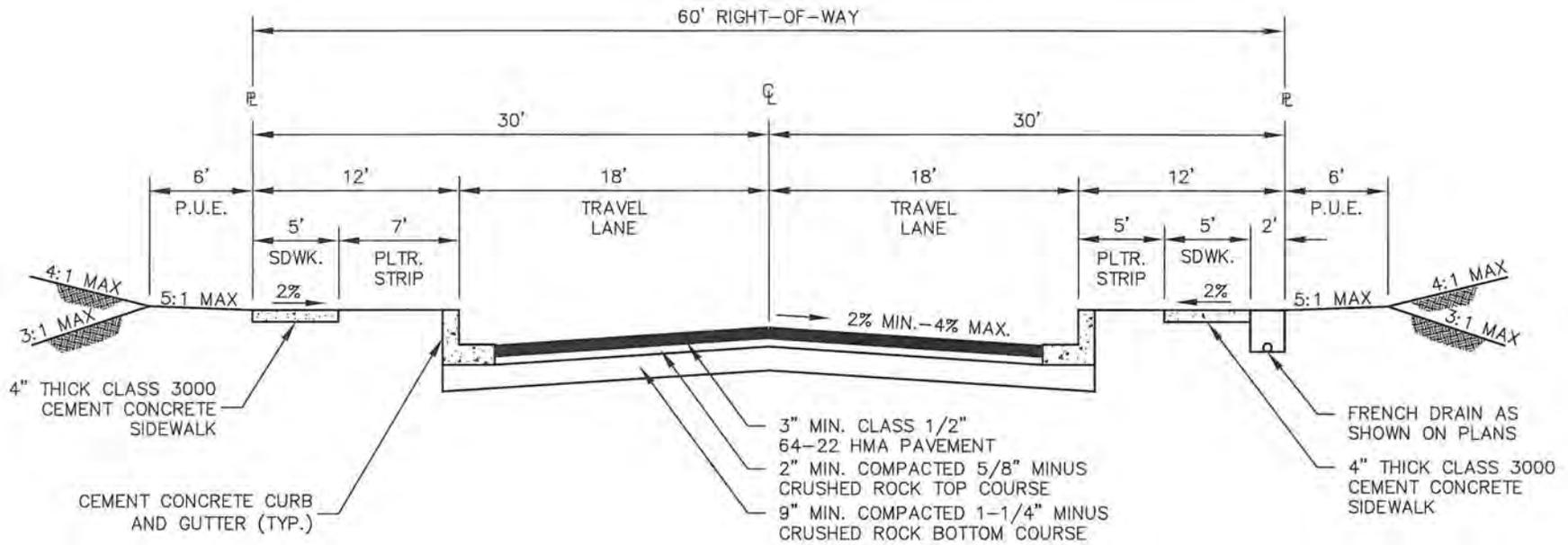


CITY OF CAMAS ~ STREET DETAIL
 STREET CONSTRUCTION NOTES
James P. ... 1-4-11
 DETAIL APPROVED BY _____ DATE _____

DETAIL NO.
 ST1

NOT TO SCALE

ST-NOTES.DWG



NOTES:

1. STREET SECTION DEPTHS SHOWN ARE ABSOLUTE MINIMUMS.
2. CROSS-SLOPE APPLIES TO CROWN OR SHED STREETS.

REV. NO.	DATE	BY	APPR.
1	5/1/07	SCD	JC
2	9/18/07	SCD	JC
3	1/1/11	SCD	JC
4	10/21/14	SCD	JC



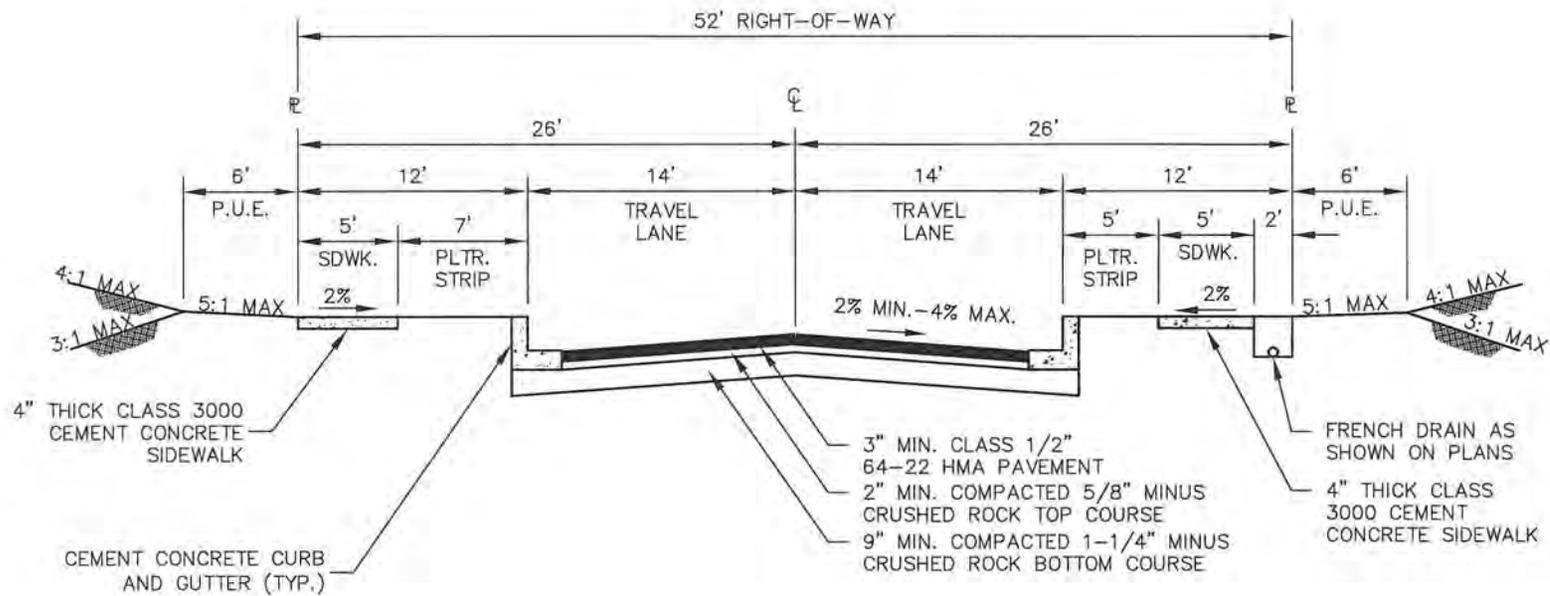
CITY OF CAMAS ~ STREET DETAIL
2 LANE LOCAL (60' R.O.W.)

Jan P. Cavallaro 10-21-14
DETAIL APPROVED BY DATE

DETAIL NO.

ST2

NOT TO SCALE



NOTES:

1. STREET SECTION DEPTHS SHOWN ARE ABSOLUTE MINIMUMS.
2. CROSS-SLOPE APPLIES TO CROWN OR SHED STREETS.
3. PARKING ONLY ALLOWED ON ONE SIDE OF THE STREET.

REV. NO.	DATE	BY	APPR.
1	5/1/07	SCD	JC
2	9/18/07	SCD	JC
3	1/1/11	SCD	JC
4	10/21/14	SCD	JC



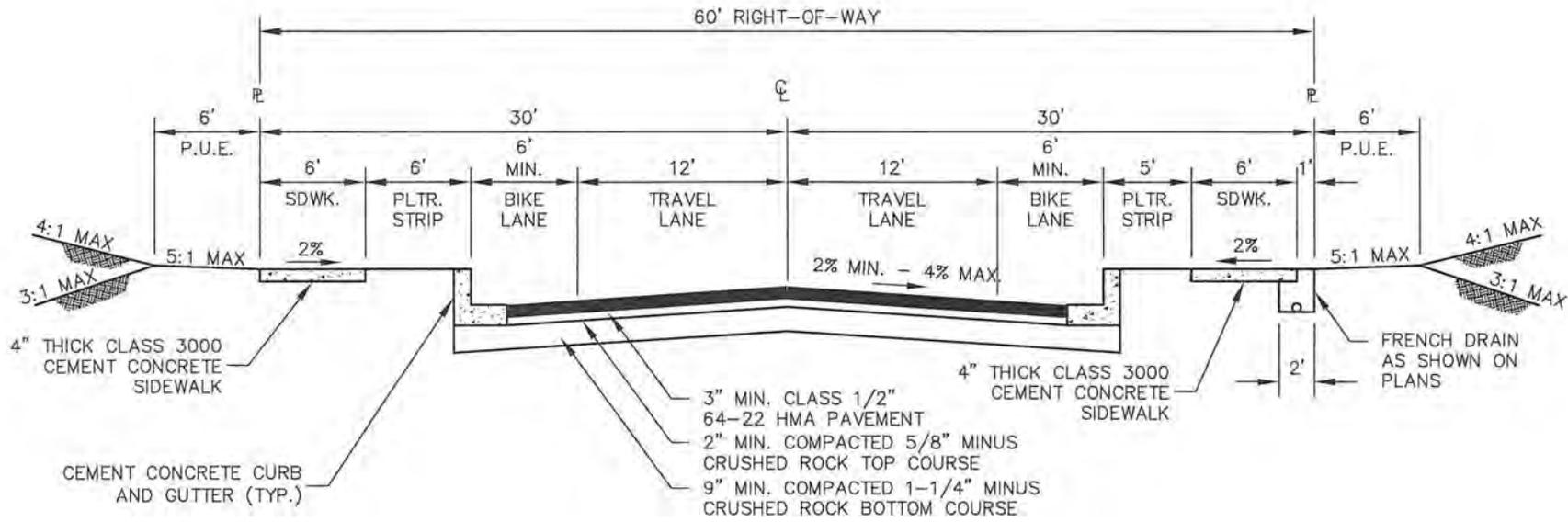
CITY OF CAMAS ~ STREET DETAIL
2 LANE LOCAL/SPRINKLERED (52' R.O.W.)

Jim P. Crutcher 10-21-14
DETAIL APPROVED BY DATE

DETAIL NO.

ST3

NOT TO SCALE



- NOTES:**
1. STREET SECTION DEPTHS SHOWN ARE ABSOLUTE MINIMUMS. ALL STREET SECTION DIMENSIONS TO BE CALCULATED BASED ON THE SITE SOIL CONDITIONS BY A LICENSED STATE OF WASHINGTON ENGINEER.
 2. CROSS-SLOPE APPLIES TO CROWN OR SHED STREETS.
 3. LEFT TURN LANES ARE REQUIRED AT INTERSECTIONS.
 4. MINIMUM CURB RETURN RADIUS SHALL BE 35'.
 5. NO PARKING, MARGINAL ACCESS STREET, NO NEW RESIDENTIAL DRIVEWAYS ALLOWED.

REV. NO.	DATE	BY	APPR.
1	5/1/07	SCD	JC
2	9/18/07	SCD	JC
3	1/1/11	SCD	JC
4	10/21/14	SCD	JC



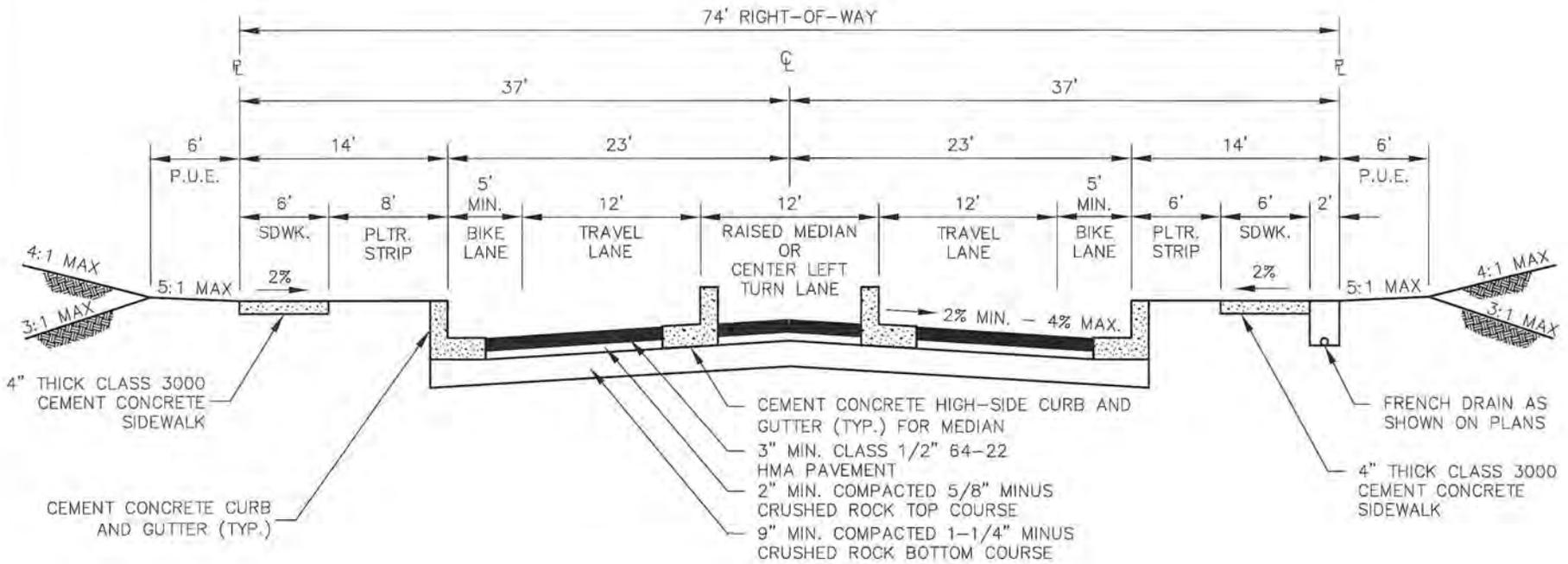
CITY OF CAMAS ~ STREET DETAIL
2 LANE COLLECTOR/ARTERIAL (60' R.O.W.)

John P. Cavitt 10-21-14
 DETAIL APPROVED BY DATE

DETAIL NO.
 ST4

NOT TO SCALE

ST-SECTIONS.DWG



NOTES:

1. STREET SECTION DEPTHS SHOWN ARE ABSOLUTE MINIMUMS. ALL STREET SECTION DIMENSIONS TO BE CALCULATED BASED ON THE SITE SOIL CONDITIONS BY A LICENSED STATE OF WASHINGTON ENGINEER.
2. CROSS-SLOPE APPLIES TO CROWN OR SHED STREETS.
3. MINIMUM CURB RETURN RADIUS SHALL BE 35'.

REV. NO.	DATE	BY	APPR.
2	9/18/07	SCD	JC
3	1/1/11	SCD	JC
4	10/21/14	SCD	JC
5	4/27/16	SCD	JC



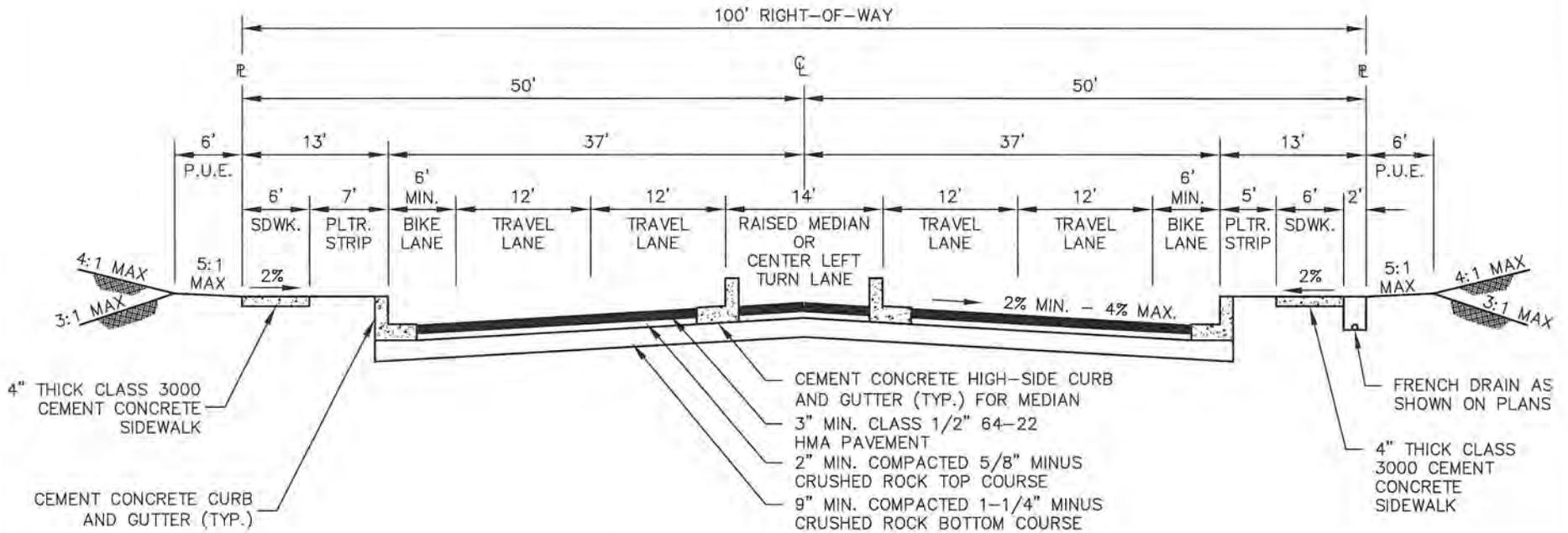
CITY OF CAMAS ~ STREET DETAIL
 3 LANE COLLECTOR/ARTERIAL (74' R.O.W.)

Jan E. Coe 4-26-16
 DETAIL APPROVED BY DATE

DETAIL NO.

ST5

NOT TO SCALE



NOTES:

1. STREET SECTION DEPTHS SHOWN ARE ABSOLUTE MINIMUMS. ALL STREET SECTION DIMENSIONS TO BE CALCULATED BASED ON THE SITE SOIL CONDITIONS BY A LICENSED STATE OF WASHINGTON ENGINEER.
2. CROSS-SLOPE APPLIES TO CROWN OR SHED STREETS.
3. MINIMUM CURB RETURN RADIUS SHALL BE 50'.

REV. NO.	DATE	BY	APPR.
1	5/1/07	SCD	JC
2	9/18/07	SCD	JC
3	1/1/11	SCD	JC



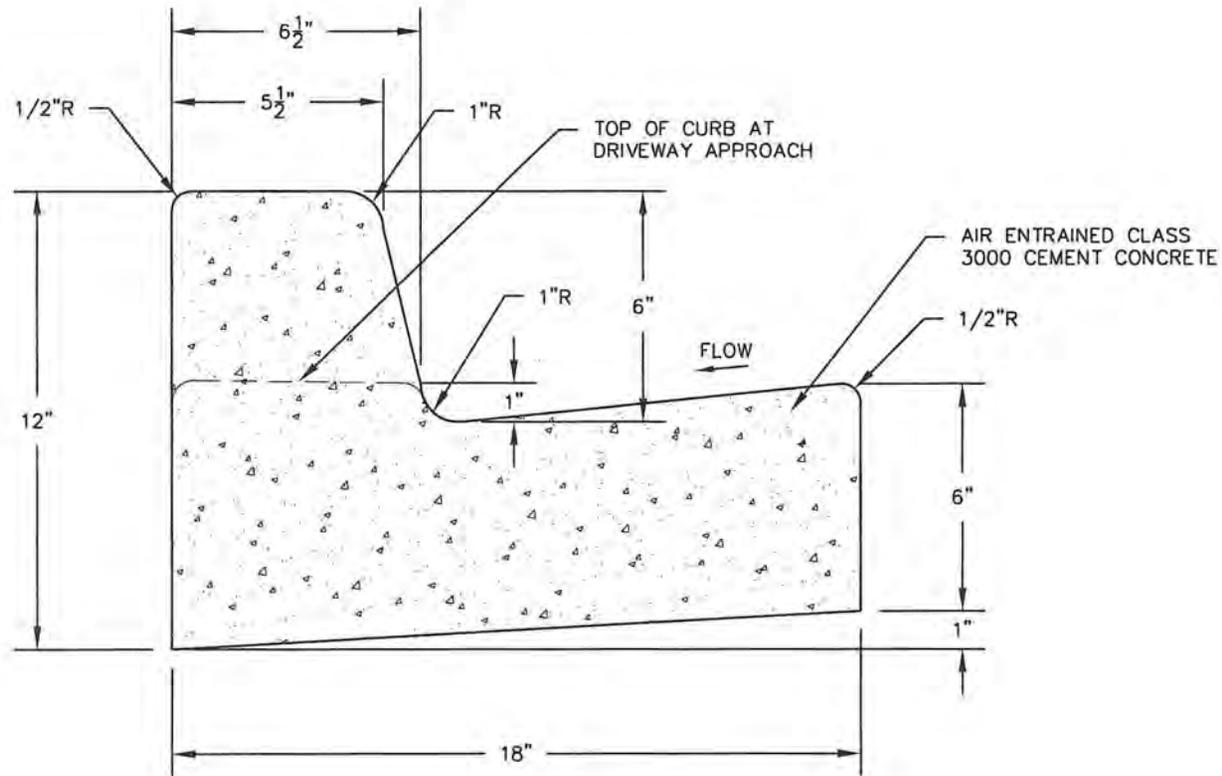
CITY OF CAMAS ~ STREET DETAIL
5 LANE ARTERIAL (100' R.O.W.)

John P. [Signature] 10-21-14
DETAIL APPROVED BY DATE

DETAIL NO.

ST6

NOT TO SCALE



NOTES:

1. THERE SHALL BE EXPANSION JOINTS EVERY 45' & FALSE JOINTS EVERY 15'
2. STAMP A "W" OR "S" IN FACE OF CURB AT WATER AND SEWER SERVICE LOCATIONS.
3. SEE HIGH SIDE TRAFFIC CURB & GUTTER DETAIL FOR SHED SECTIONS.
4. SEE CURB TRANSITION DETAIL FOR TRANSITION TO TRAFFIC CURB OR ROLLED TRAFFIC CURB AND GUTTER

REV. NO.	DATE	BY	APPR.
1	9/18/07	SCD	JC
2	9/18/07	SCD	JC
3	1/1/11	SCD	JC



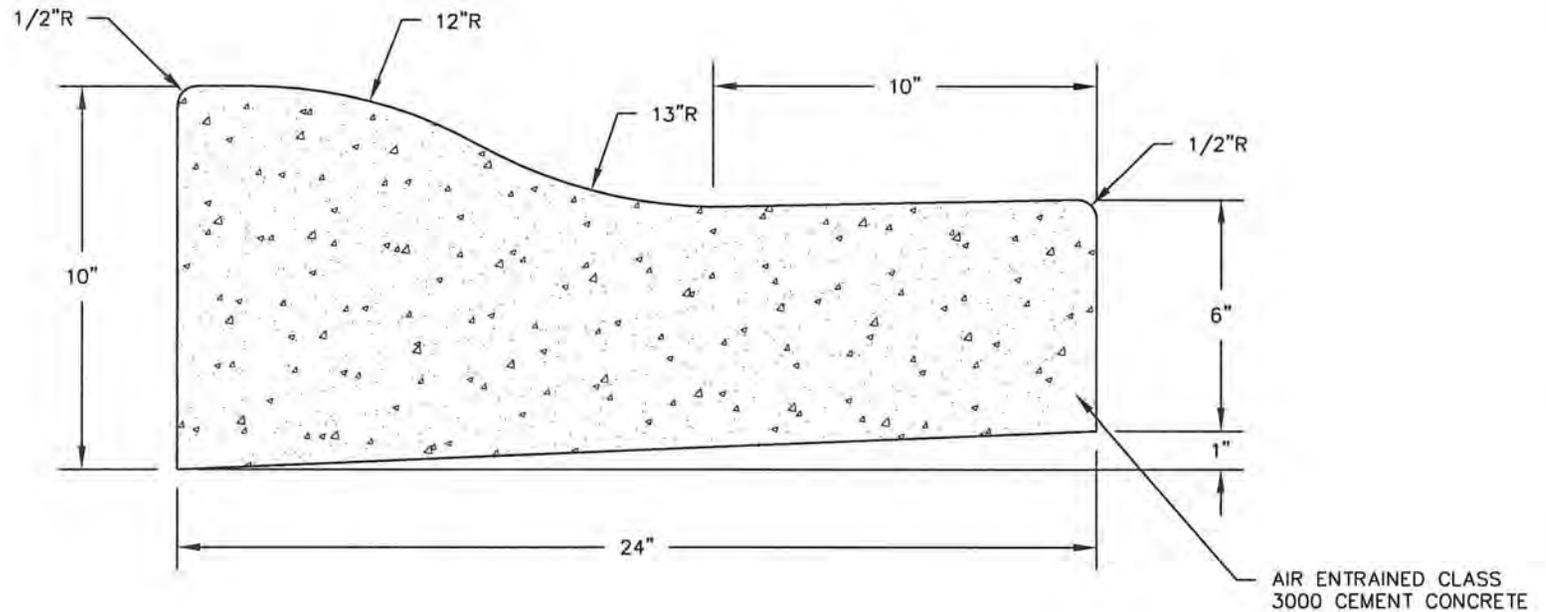
**CITY OF CAMAS ~ STREET DETAIL
TRAFFIC CURB AND GUTTER**

Jan P. Cuthbert 1-4-11
DETAIL APPROVED BY DATE

NOT TO SCALE

DETAIL NO.

ST7



NOTES:

1. THERE SHALL BE EXPANSION JOINTS EVERY 45' & FALSE JOINTS EVERY 15'
2. STAMP A "W" OR "S" IN FACE OF CURB AT WATER AND SEWER SERVICE LOCATIONS.
3. ROLLED CURB AND GUTTER ALLOWED ON NARROW FRONTAGES AND AT THE DISCRETION OF THE CITY ENGINEER.
4. WHEN ATTACHED SIDEWALKS ARE INSTALLED WITH A ROLLED CURB AND GUTTER, THICKENED SIDEWALKS (6" MIN.) SHALL BE CONSTRUCTED.
5. SEE CURB TRANSITION DETAIL FOR TRANSITION TO TRAFFIC CURB AND GUTTER

REV. NO.	DATE	BY	APPR.
1	9/18/07	SCD	JC
2	9/18/07	SCD	JC
3	1/1/11	SCD	JC



CITY OF CAMAS ~ STREET DETAIL
 ROLLED TRAFFIC CURB AND GUTTER

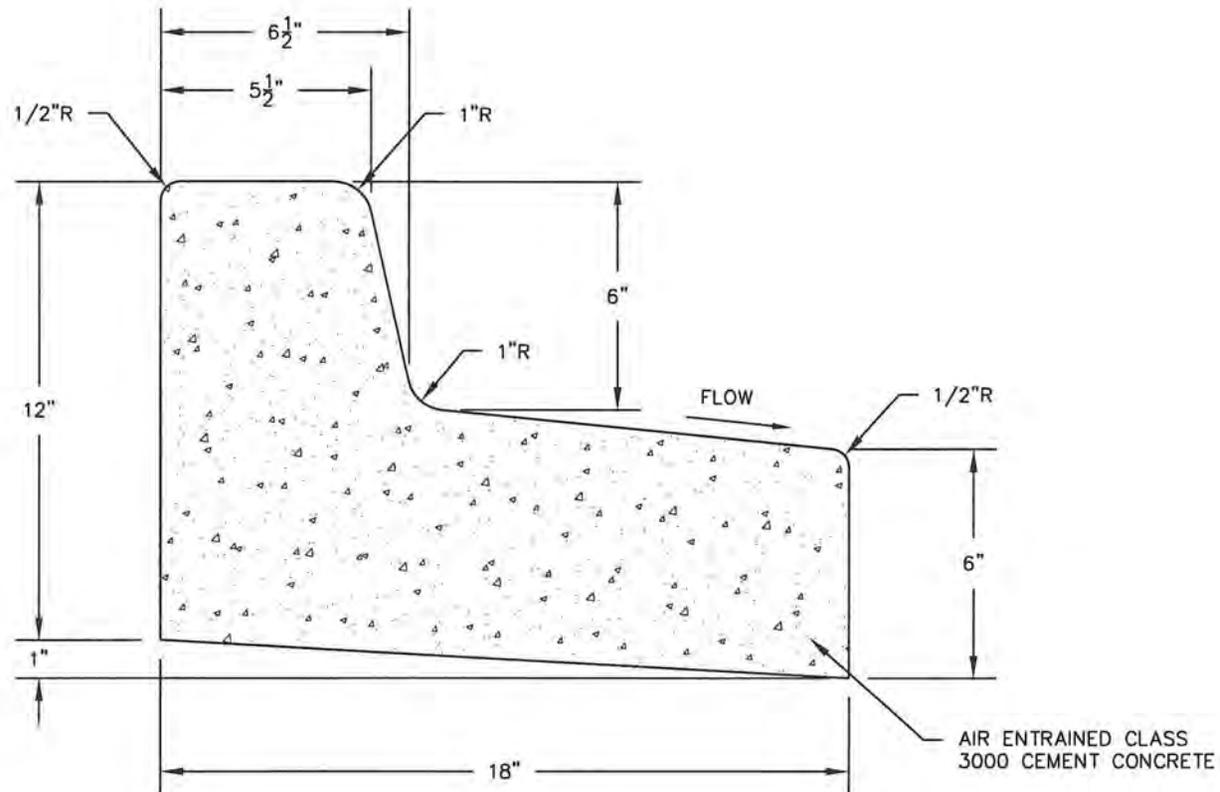
Don C. Crutcher 1-4-11
 DETAIL APPROVED BY DATE

NOT TO SCALE

DETAIL NO.

ST8

ST-CURBS.DWG



NOTES:

1. THERE SHALL BE EXPANSION JOINTS EVERY 45' & FALSE JOINTS EVERY 15'
2. STAMP A "W" OR "S" IN FACE OF CURB AT WATER AND SEWER SERVICE LOCATIONS.
3. SEE TRAFFIC CURB & GUTTER DETAIL FOR CROWN SECTIONS.

REV. NO.	DATE	BY	APPR.
1	5/1/07	SCD	JC
2	1/1/11	SCD	JC



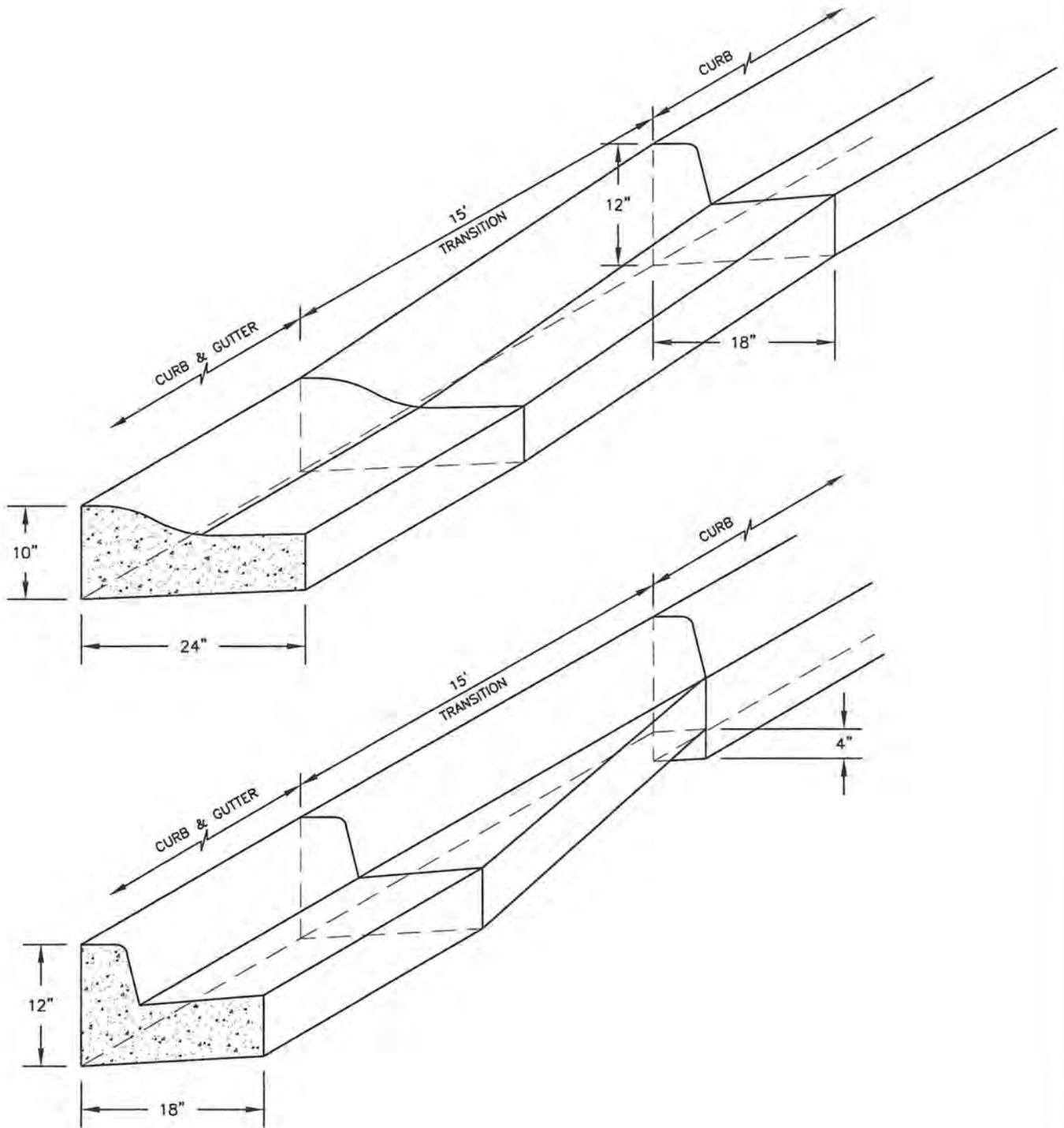
CITY OF CAMAS ~ STREET DETAIL
HIGH SIDE TRAFFIC CURB AND GUTTER

Sam P. Cuthbert 1-4-11
DETAIL APPROVED BY DATE

NOT TO SCALE

DETAIL NO.

ST9



REV. NO.	DATE	BY	APPR.
1	5/1/07	SCD	JC
2	9/18/07	SCD	JC
3	1/1/11	SCD	JC



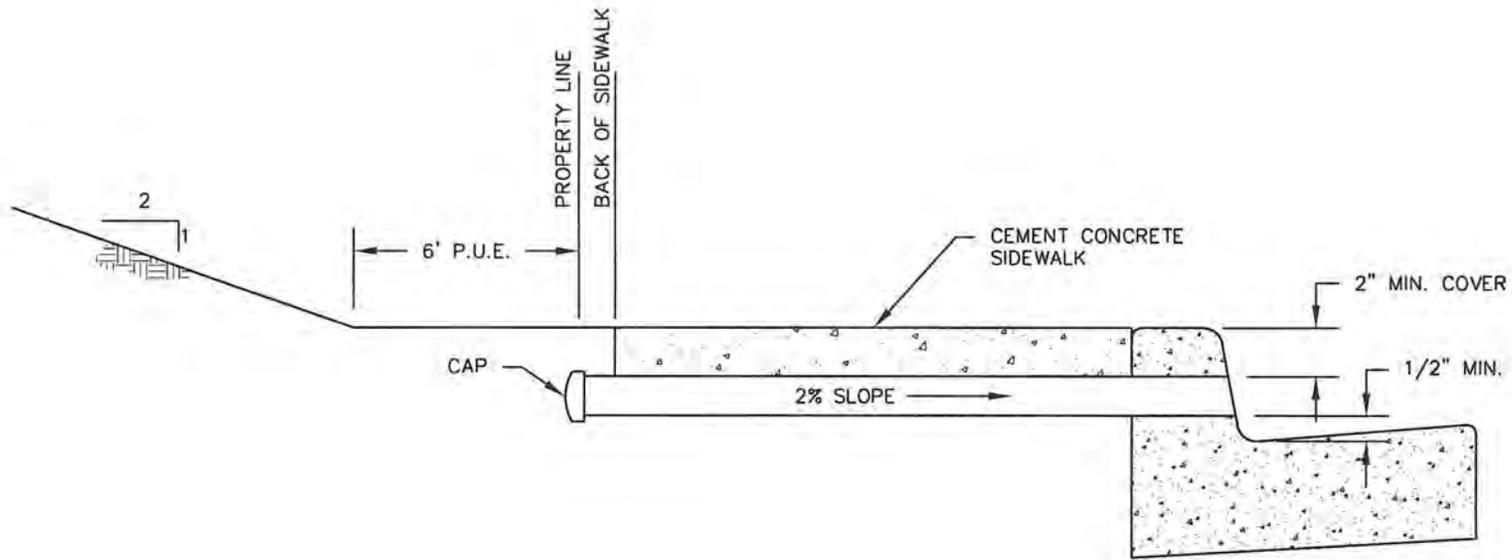
CITY OF CAMAS ~ STREET DETAIL
 TRAFFIC CURB AND GUTTER TRANSITIONS

Jan P. Crutcher 1-4-11
 DETAIL APPROVED BY DATE

NOT TO SCALE

DETAIL NO.

ST10



- NOTES:
1. DRAINAGE PIPE REQUIRED FOR LOTS ABOVE GRADE.
 2. FOR LOTS ON HIGH-SIDE OF SHED STREETS, ROOF AND FOOTING DRAINS SHALL BE CONNECTED BY TIGHT-LINE TO STORM MAIN.
 3. ONE 3" DRAIN REQUIRED PER LOT UNLESS 4" DRAIN FOR LOTS BELOW GRADE IS PROVIDED.
 4. DRAINS ARE TO BE LOCATED NEAR THE LOT CORNER WITH THE LOWEST ELEVATION AT FINISHED GRADE OR AS STAKED BY ENGINEER.
 5. DRAINS TO BE INSTALLED ON CROWNED STREETS ONLY.

REV. NO.	DATE	BY	APPR.
1	5/1/07	SCD	JC
2	1/1/11	SCD	JC



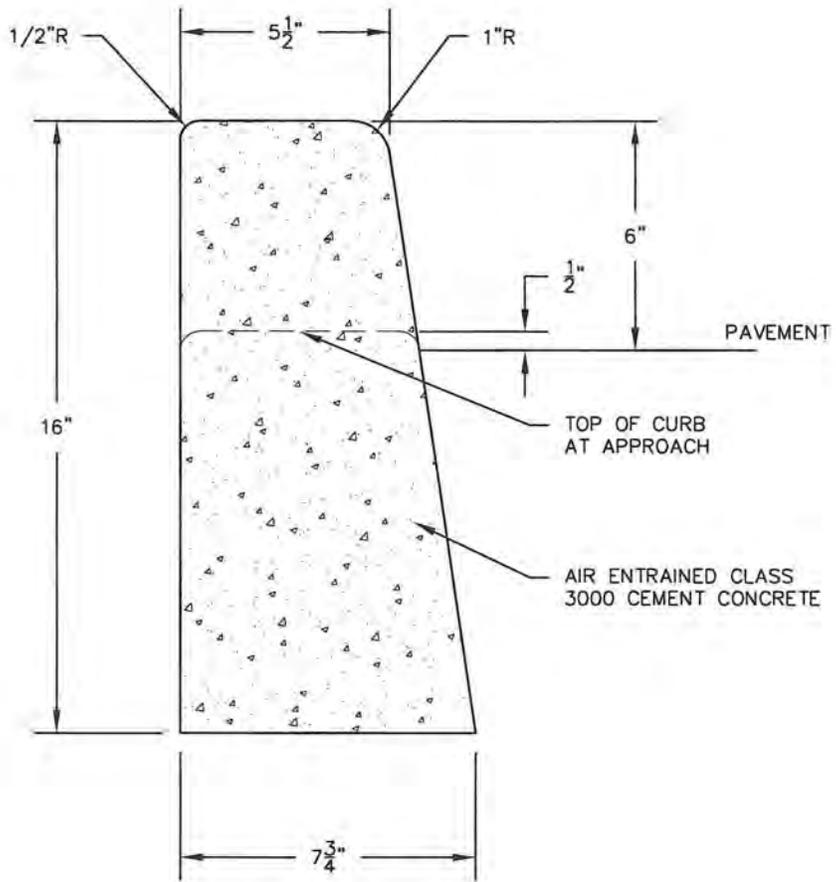
CITY OF CAMAS ~ STREET DETAIL
 DRAINAGE WEEP HOLE (LOTS ABOVE GRADE)

Don P. Cothran 1-4-11
 DETAIL APPROVED BY DATE

NOT TO SCALE

DETAIL NO.
 ST11

ST-CURBS.DWG



NOTES:

1. THERE SHALL BE EXPANSION JOINTS EVERY 45' & FALSE JOINTS EVERY 15'
2. STAMP A "W" OR "S" IN FACE OF CURB AT WATER AND SEWER SERVICE LOCATIONS.
3. SEE CURB TRANSITION DETAIL FOR TRANSITION TO TRAFFIC CURB & GUTTER

REV. NO.	DATE	BY	APPR.
1	5/1/07	SCD	JC
2	9/18/07	SCD	JC
3	1/1/11	SCD	JC



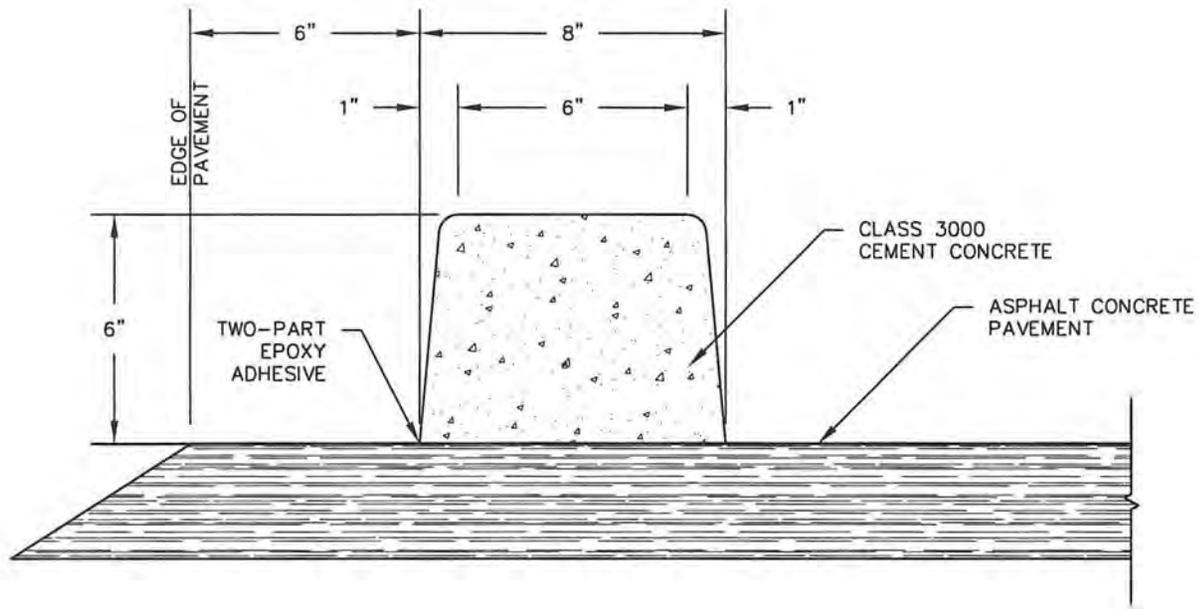
CITY OF CAMAS ~ STREET DETAIL
TRAFFIC CURB

James P. Coe 1-4-11
DETAIL APPROVED BY DATE

DETAIL NO.

ST12

NOT TO SCALE



REV. NO.	DATE	BY	APPR.
1	5/1/07	SCD	JC
2	1/1/11	SCD	JC



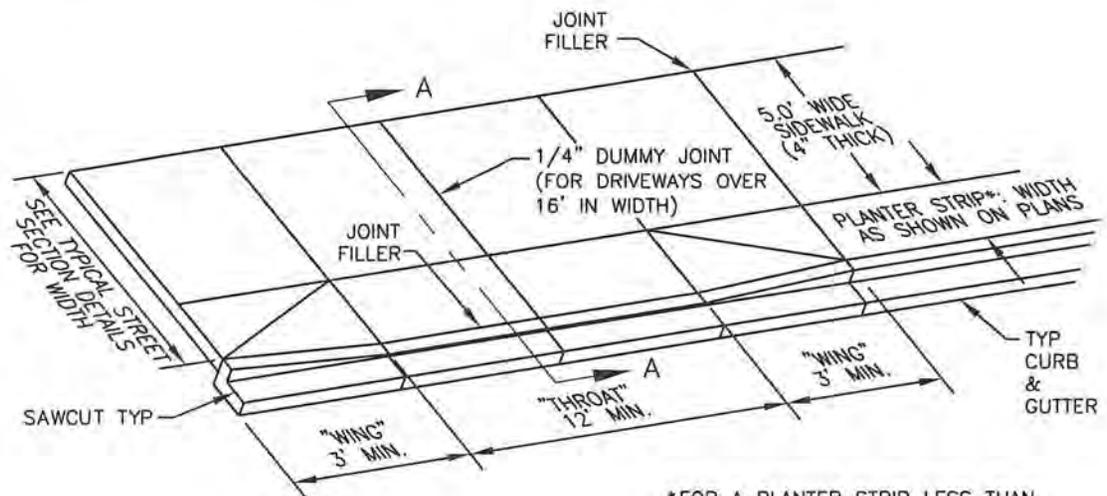
CITY OF CAMAS ~ STREET DETAIL
EXTRUDED CURB

Sam P. Coulter 1-4-11
DETAIL APPROVED BY DATE

NOT TO SCALE

DETAIL NO.

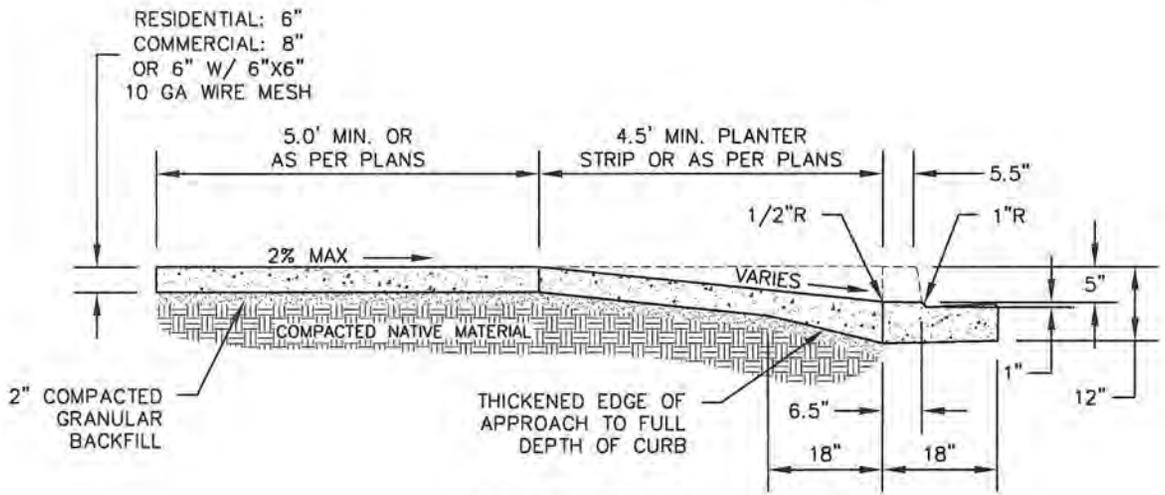
ST13



*FOR A PLANTER STRIP LESS THAN 4.5' WIDE, SEE NOTE 8

NOTES:

1. COMPACTION SHALL BE 95% OF T-180.
2. CONCRETE SURFACE SHALL BE TROWELED SMOOTH & HAIR BROOMED.
3. PROVIDE A WEAKENED PLANE JOINT OF 2" MIN. DEPTH AND 1/8" MAX. WIDTH IN THE MIDDLE OF THE DRIVEWAY APPROACH AND GUTTER.
4. ON MONOLITHIC CURB, GUTTER AND SIDEWALK INSTALL WEAKENED PLANE JOINTS AT EDGES OF DRIVEWAY.
5. MAX. DRIVEWAY THROAT WIDTH = 20' FOR TWO-CAR GARAGE & 30' FOR THREE-CAR GARAGE; PROVIDING THAT DRIVEWAY THROAT WIDTH DOES NOT EXCEED 40% OF TOTAL LOT FRONTAGE. THE WIDTH FOR DRIVEWAYS ACCESSING A LIMITED ACCESS ROADWAY WILL BE DETERMINED BY THE CITY ENGINEER.
6. CEMENT CONCRETE APPROACHES SHALL BE CONSTRUCTED OF AIR-ENTRAINED CONCRETE CLASS 3000 AND MAY BE POURED INTEGRAL WITH CURB. APPROACH THROAT AND WINGS SHALL BE 6" THICK AS SHOWN IN SECTION "A-A".
7. DRIVEWAY DROPS SHALL NOT BE USED AS ADA CURB RAMPS. SEE CURB RAMP DETAILS.
8. AT THE DISCRETION OF THE CITY ENGINEER, DETAIL ST15 MAY BE USED WHERE PLANTER IS STRIP LESS THAN 4.5' WIDE WITH WINGS ALLOWED TO BE 3' TO 6' WIDE PROVIDED THAT SIDEWALK SLOPES ARE HELD.
9. FOR DRIVEWAY ON ROLLED CURB, SEE DETAIL ST16, NOTE 7.



SECTION "A-A"

REV. NO.	DATE	BY	APPR.
1	5/1/07	SCD	JC
2	9/18/07	SCD	JC
3	2/1/10	SCD	JC
4	1/1/11	SCD	JC



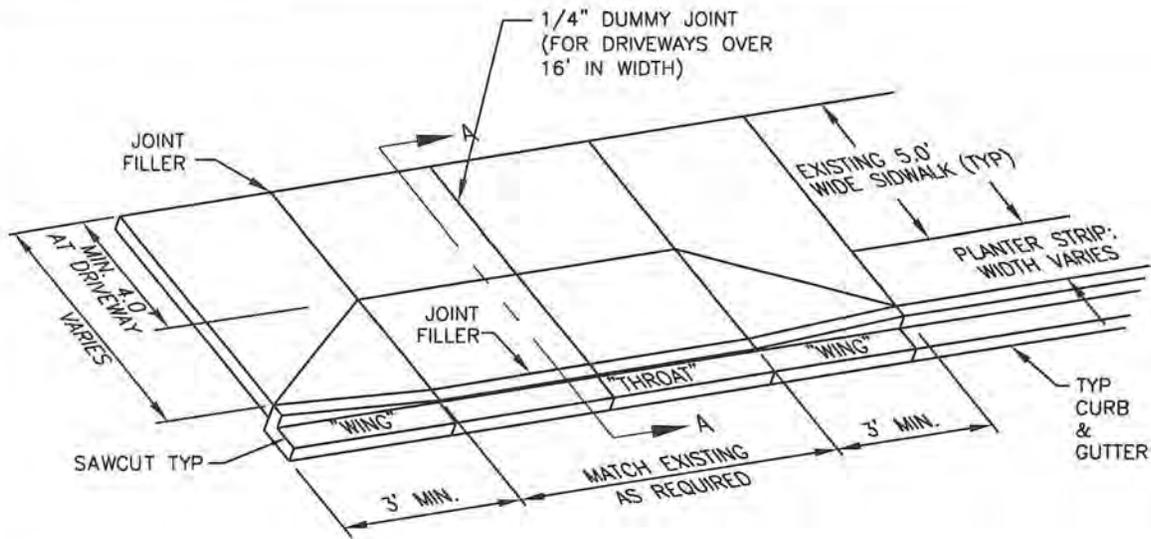
CITY OF CAMAS ~ STREET DETAIL
DRIVEWAY/SIDEWALK WITH PLANTER

John E. ... 1-4-11
DETAIL APPROVED BY DATE

DETAIL NO.
ST14

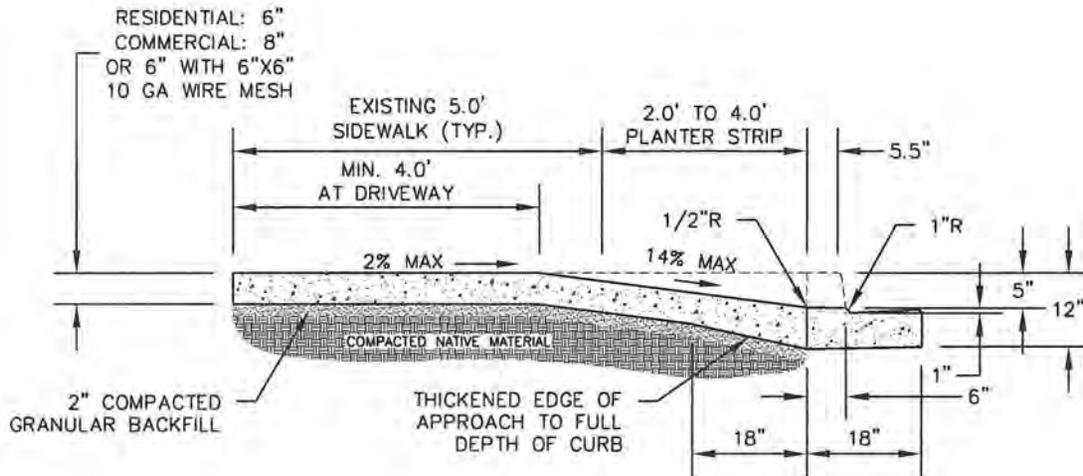
NOT TO SCALE

ST-DRIVEWAYS.DWG



NOTES:

1. COMPACTION SHALL BE 95% OF T-180.
2. CONCRETE SURFACE SHALL BE TROWELED SMOOTH & HAIR BROOMED.
3. PROVIDE A WEAKENED PLANE JOINT OF 2" MIN. DEPTH AND 1/8" MAX. WIDTH IN THE MIDDLE OF THE DRIVEWAY APPROACH AND GUTTER.
4. ON MONOLITHIC CURB, GUTTER AND SIDEWALK INSTALL WEAKENED PLANE JOINTS AT EDGES OF DRIVEWAY.
5. MAX. DRIVEWAY THROAT WIDTH = 20' FOR TWO-CAR GARAGE & 30' FOR THREE-CAR GARAGE; PROVIDING THAT DRIVEWAY THROAT WIDTH DOES NOT EXCEED 40% OF TOTAL LOT FRONTAGE. THE WIDTH FOR DRIVEWAYS ACCESSING A LIMITED ACCESS ROADWAY WILL BE DETERMINED BY THE CITY ENGINEER.
6. CEMENT CONCRETE APPROACHES SHALL BE CONSTRUCTED OF AIR-ENTRAINED CONCRETE CLASS 3000 AND MAY BE POURED INTEGRAL WITH CURB. APPROACH THROAT AND WINGS SHALL BE 6" THICK AS SHOWN IN SECTION "A-A".
7. DRIVEWAY DROPS SHALL NOT BE USED AS ADA CURB RAMPS. SEE CURB RAMP DETAILS.
8. AT THE DISCRETION OF THE CITY ENGINEER, THIS DETAIL MAY BE USED WHERE PLANTER STRIP IS LESS THAN 4.5' WIDE WITH WINGS ALLOWED TO BE 3' TO 6' PROVIDED THAT SIDEWALK SLOPES ARE HELD.
9. FOR DRIVEWAY ON ROLLED CURB, SEE DETAIL ST16, NOTE 7.



SECTION "A-A"

REV. NO.	DATE	BY	APPR.
1	9/18/07	SCD	JC
2	2/1/10	SCD	JC
3	1/1/11	SCD	JC



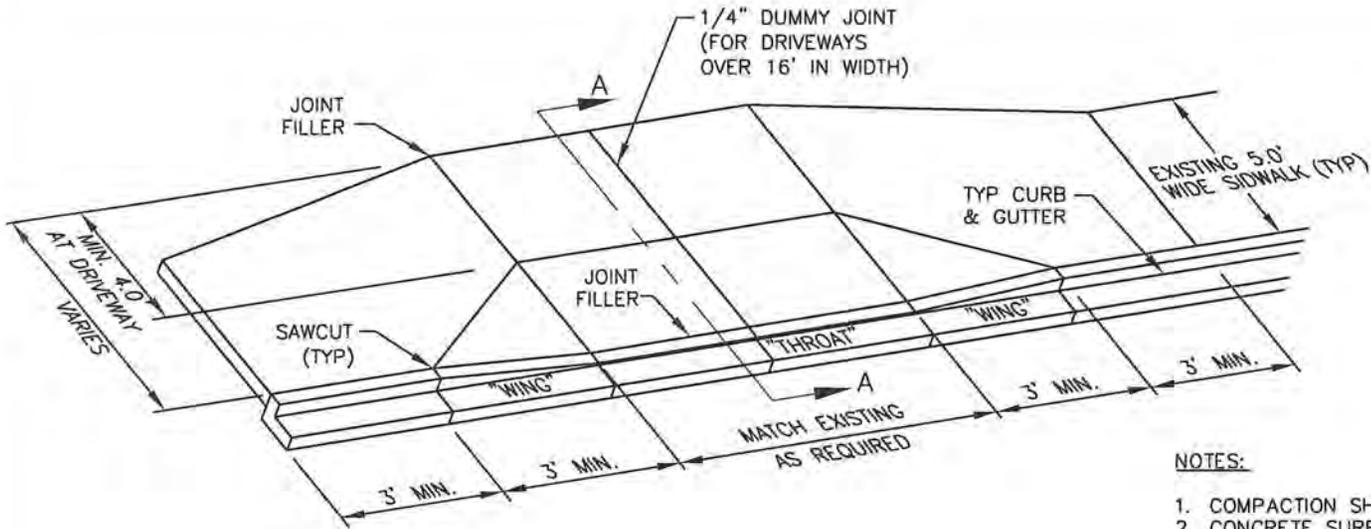
CITY OF CAMAS - STREET DETAIL
 RETRO-FIT DRIVEWAY/SIDEWALK WITH PLANTER

Sam P. Coarthon 1-4-11
 DETAIL APPROVED BY DATE

DETAIL NO.

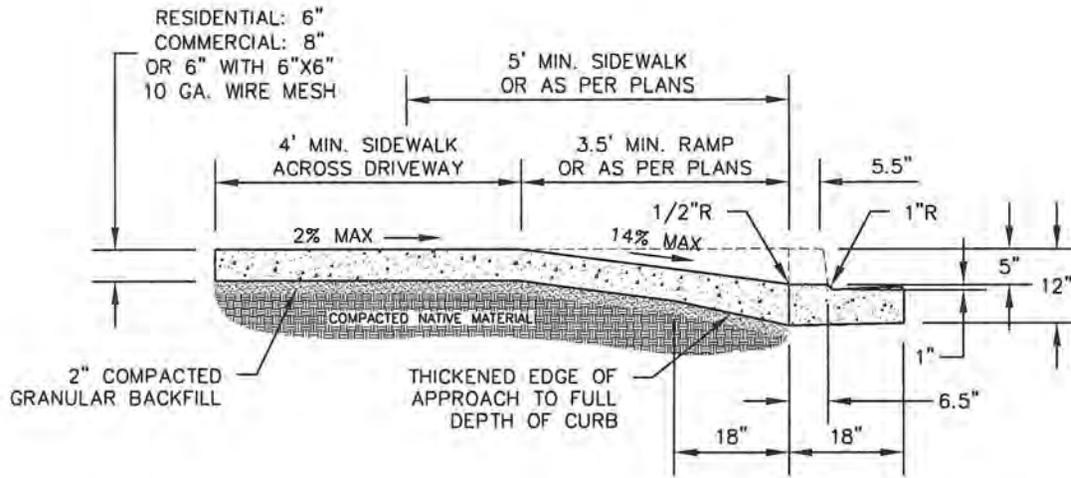
ST15

NOT TO SCALE



NOTES:

1. COMPACTION SHALL BE 95% OF T-180.
2. CONCRETE SURFACE SHALL BE TROWELED SMOOTH & HAIR BROOMED.
3. PROVIDE A WEAKENED PLANE JOINT OF 2" MIN. DEPTH AND 1/8" MAX. WIDTH IN THE MIDDLE OF THE DRIVEWAY APPROACH AND GUTTER.
4. ON MONOLITHIC CURB, GUTTER AND SIDEWALK INSTALL WEAKENED PLANE JOINTS AT EDGES OF DRIVEWAY.
5. MAX. DRIVEWAY THROAT WIDTH = 20' FOR TWO-CAR GARAGE & 30' FOR THREE-CAR GARAGE; PROVIDING THAT DRIVEWAY THROAT WIDTH DOES NOT EXCEED 40% OF TOTAL LOT FRONTAGE. THE WIDTH FOR DRIVEWAYS ACCESSING A LIMITED ACCESS ROADWAY WILL BE DETERMINED BY THE CITY ENGINEER.
6. CEMENT CONCRETE APPROACHES SHALL BE CONSTRUCTED OF AIR-ENTRAINED CONCRETE CLASS 3000 AND MAY BE POURED INTEGRAL WITH CURB. APPROACH THROAT AND WINGS SHALL BE 6" THICK AS SHOWN IN SECTION "A-A".
7. DRIVEWAY DROPS SHALL NOT BE USED AS ADA CURB RAMPS. SEE CURB RAMP DETAILS.
8. AT THE DISCRETION OF THE CITY ENGINEER, THIS DETAIL MAY BE USED WHERE PLANTER STRIP IS LESS THAN 4.5' WIDE WITH WINGS ALLOWED TO BE 3' TO 6' PROVIDED THAT SIDEWALK SLOPES ARE HELD.
9. FOR DRIVEWAY ON ROLLED CURB, SEE DETAIL ST16, NOTE 7.



SECTION "A-A"

REV. NO.	DATE	BY	APPR.
1	10/19/07	SCD	JC
2	2/1/10	SCD	JC
3	1/1/11	SCD	JC

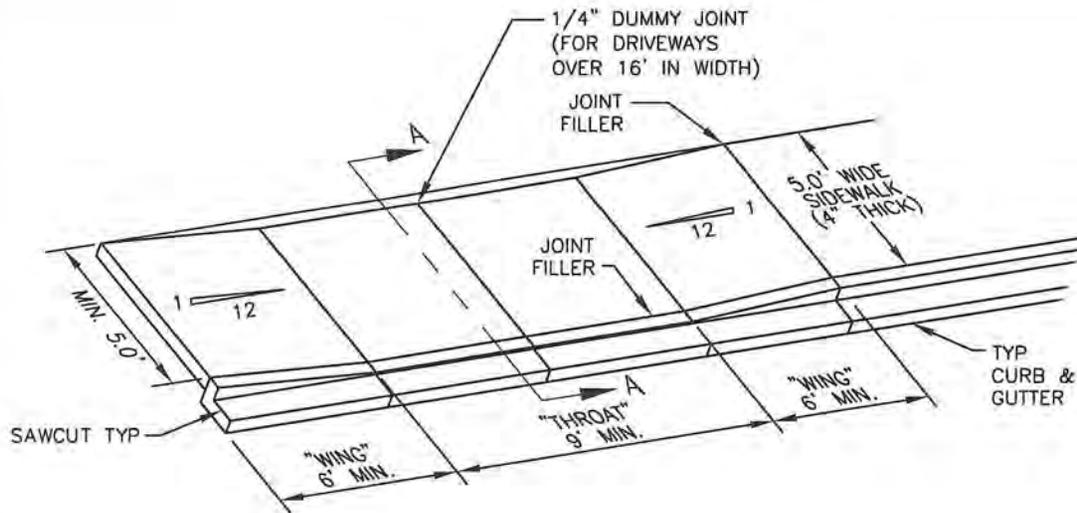


**CITY OF CAMAS ~ STREET DETAIL
RETRO-FIT DRIVEWAY/SIDEWALK WITHOUT PLANTER**

San P. Cothran 1-4-11
DETAIL APPROVED BY DATE

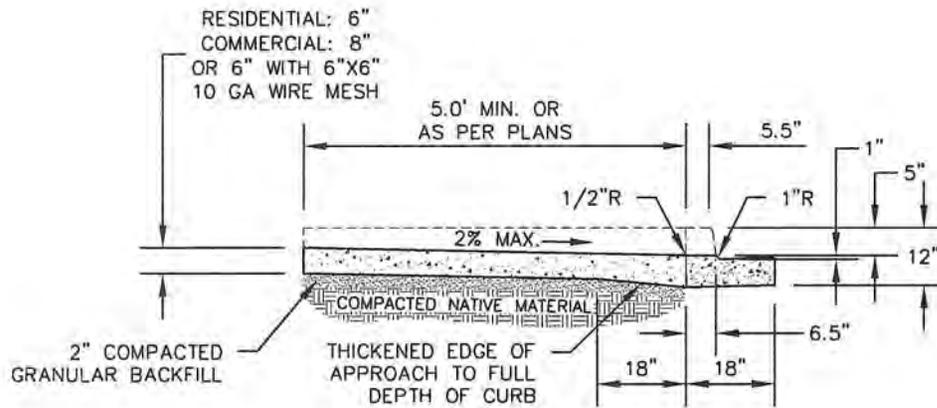
NOT TO SCALE

DETAIL NO.
ST16



NOTES:

1. COMPACTION SHALL BE 95% OF T-180.
2. CONCRETE SURFACE SHALL BE TROWELED SMOOTH & HAIR BROOMED.
3. PROVIDE A WEAKENED PLANE JOINT OF 2" MIN. DEPTH AND 1/8" MAX. WIDTH IN THE MIDDLE OF THE DRIVEWAY APPROACH AND GUTTER.
4. ON MONOLITHIC CURB, GUTTER AND SIDEWALK INSTALL WEAKENED PLANE JOINTS AT EDGES OF DRIVEWAY.
5. MAX. DRIVEWAY THROAT WIDTH = 20' FOR TWO-CAR GARAGE & 30' FOR THREE-CAR GARAGE; PROVIDING THAT DRIVEWAY THROAT WIDTH DOES NOT EXCEED 40% OF TOTAL LOT FRONTAGE. THE WIDTH FOR DRIVEWAYS ACCESSING A LIMITED ACCESS ROADWAY WILL BE DETERMINED BY THE CITY ENGINEER.
6. CEMENT CONCRETE APPROACHES SHALL BE CONSTRUCTED OF AIR-ENTRAINED CONCRETE CLASS 3000 AND MAY BE POURED INTEGRAL WITH CURB. APPROACH THROAT AND WINGS SHALL BE 6" THICK AS SHOWN IN SECTION "A-A".
7. DRIVEWAY DROPS SHALL NOT BE USED AS ADA CURB RAMPS. SEE CURB RAMP DETAILS.
8. AT THE DISCRETION OF THE CITY ENGINEER, THIS DETAIL MAY BE USED WHERE PLANTER STRIP IS LESS THAN 4.5' WIDE. WINGS SHALL BE 6' PROVIDED THAT SIDEWALK SLOPES ARE HELD.
9. FOR DRIVEWAY ON ROLLED CURB, SEE DETAIL ST16, NOTE 7.



SECTION "A-A"

REV. NO.	DATE	BY	APPR.
1	5/1/07	SCD	JC
2	9/18/07	SCD	JC
3	2/1/10	SCD	JC
4	1/1/11	SCD	JC



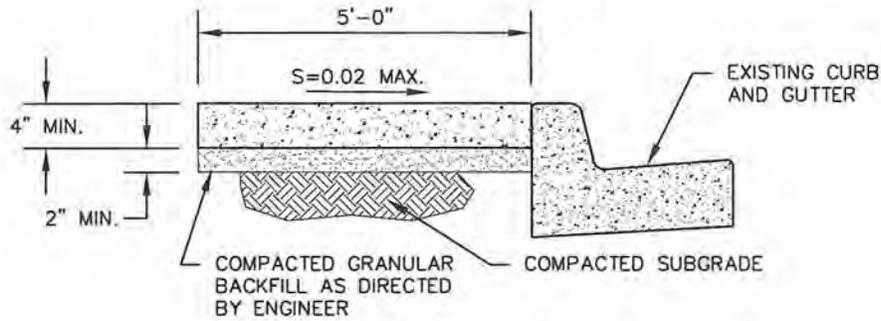
**CITY OF CAMAS ~ STREET DETAIL
DRIVEWAY/SIDEWALK WITHOUT PLANTER**

Don P. Coathran 1-4-11
DETAIL APPROVED BY DATE

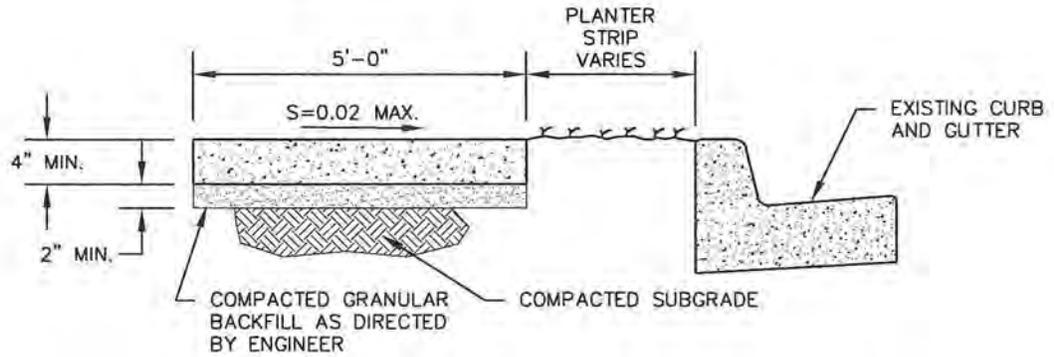
DETAIL NO.

ST17

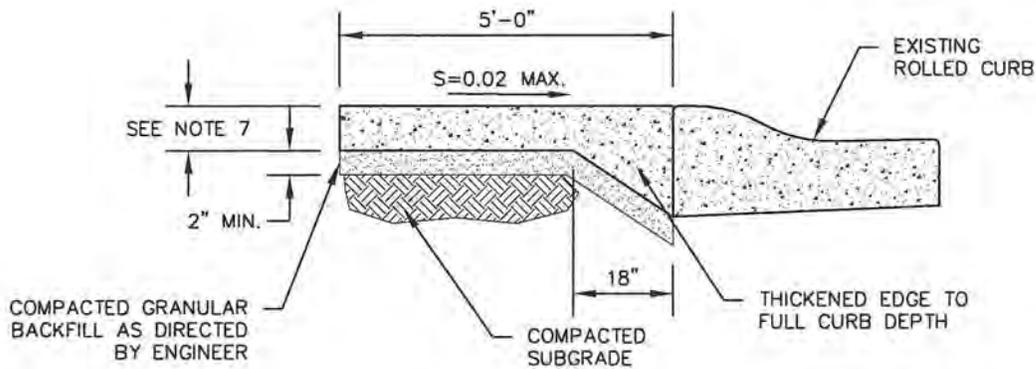
NOT TO SCALE



SITUATION A



SITUATION B



SITUATION C

NOTES:

1. NOTIFY CITY INSPECTOR 24 HOURS PRIOR TO CONCRETE POUR FOR APPROVAL OF FORMS.
2. SUBGRADE SHALL BE SHAPED AND COMPACTED TO A FIRM EVEN SURFACE.
3. ALL SOFT AND YIELDING MATERIAL SHALL BE REMOVED AND REPLACED WITH ACCEPTABLE MATERIAL.
4. CONCRETE FOR SIDEWALKS SHALL BE AIR ENTRAINED CONCRETE CLASS 3000.
5. PROVIDE EXPANSION JOINTS EVERY 15 FEET AND DUMMY JOINTS EVERY 5 FEET.
6. CONCRETE SURFACE SHALL BE TROWELED SMOOTH AND HAIR BROOMED.
7. DRIVEWAY APPROACHES = 6"
ALL OTHER SIDEWALK = 4"

REV. NO.	DATE	BY	APPR.
1	5/1/07	SCD	JC
2	9/18/07	SCD	JC
3	1/1/11	SCD	JC

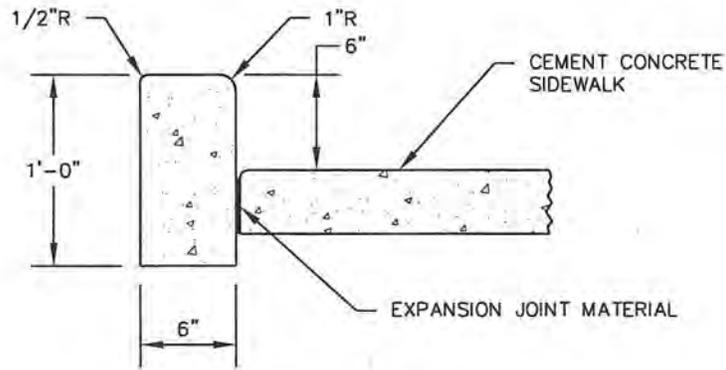


CITY OF CAMAS ~ STREET DETAIL
SIDEWALKS

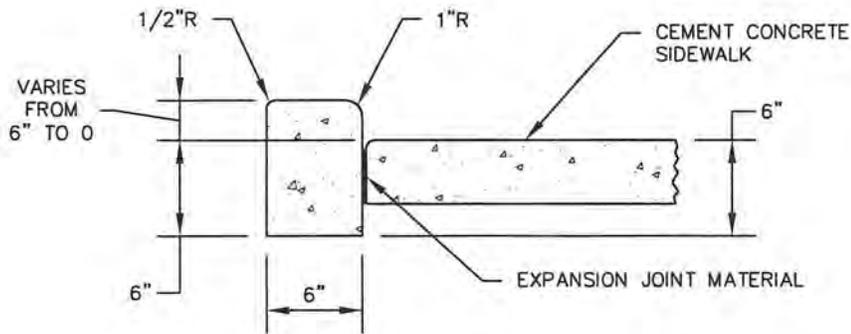
DETAIL APPROVED BY *Jim P. ...* 1-4-11
DATE

NOT TO SCALE

DETAIL NO.
ST18



CEMENT CONCRETE
PEDESTRIAN CURB



CEMENT CONCRETE
PEDESTRIAN CURB
AT SIDEWALKS RAMPS & LANDINGS

REV. NO.	DATE	BY	APPR.
1	1/1/11	SCD	JC



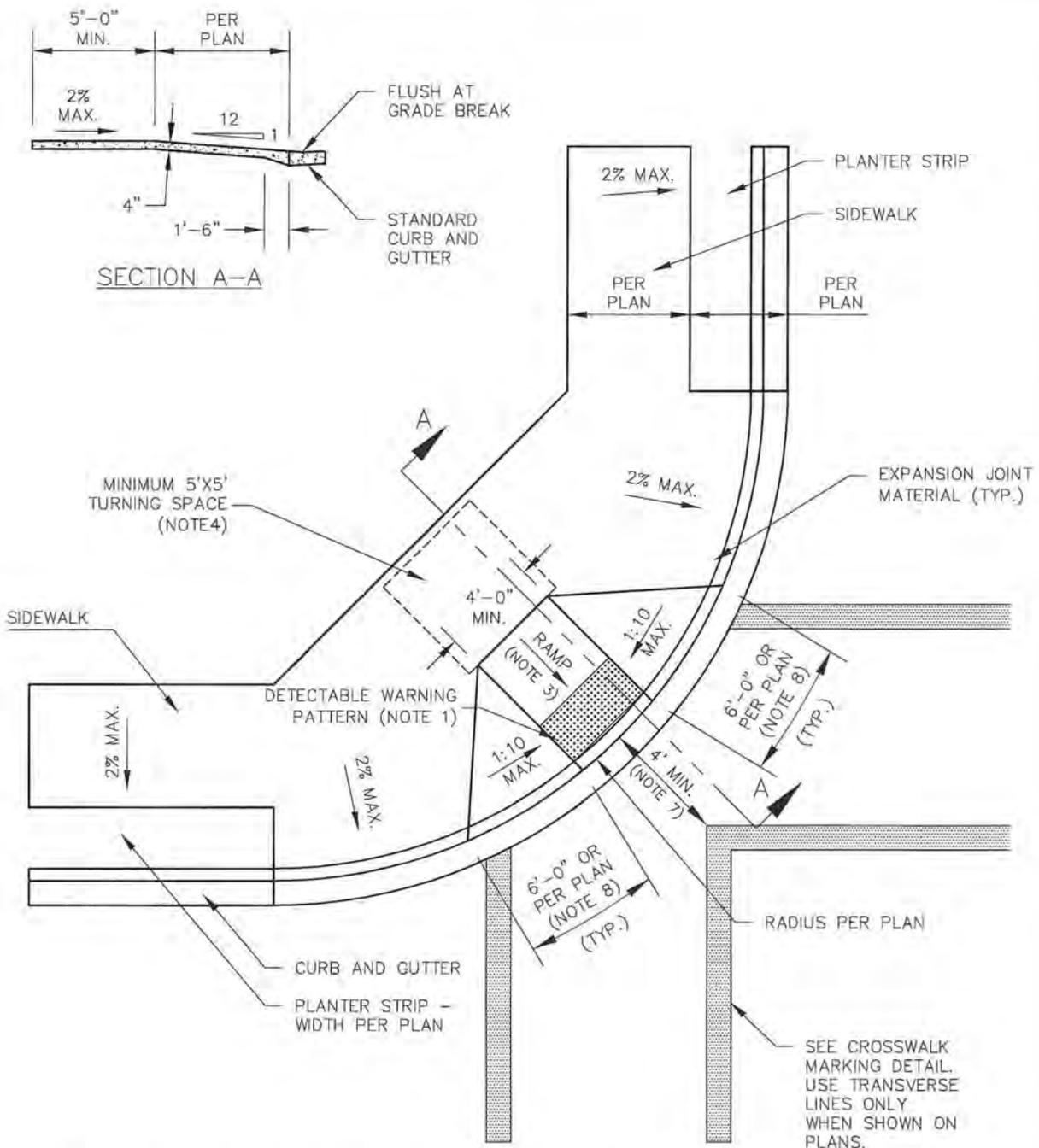
CITY OF CAMAS ~ STREET DETAIL
PEDESTRIAN CURB

Jim P. Cothran 1-4-11
DETAIL APPROVED BY DATE

DETAIL NO.
ST19

NOT TO SCALE

ST-SIDEWALKS.DWG



NOTES:

1. TRUNCATED DOMES SHALL BE IN COMPLIANCE WITH WSDOT STANDARD PLAN F-45.10. SEE DETECTABLE WARNING PATTERN DETAIL.
2. ALL SIDEWALK, TURNING SPACES, RAMPS, WINGS AND CURBS SHALL BE CLASS 3000 CEMENT CONCRETE.
3. RAMP GRADE SHALL NOT EXCEED 8.3% (1:12) AND RAMP CROSS SLOPE SHALL NOT EXCEED 2%.
4. TURNING SPACE SHALL NOT EXCEED 2% SLOPE IN ANY DIRECTION.
5. RAMPS TO BE CENTERED IN CROSSWALKS.
6. RAMPS TO BE CONSTRUCTED SEPARATELY FROM SIDEWALK AND ISOLATED BY EXPANSION JOINT MATERIAL.
7. IF A SINGLE DIAGONAL CURB RAMP IS PERMITTED, 48" MIN. CLEAR SPACE SHALL BE PROVIDED FOR MANEUVERING ROOM IN CROSSWALK.
8. NOT TO EXCEED 6'-0" AT CURB.

REV. NO.	DATE	BY	APPR.
2	9/18/07	SCD	JC
3	1/1/11	SCD	JC
4	10/21/14	SCD	JC
5	4/27/16	SCD	JC



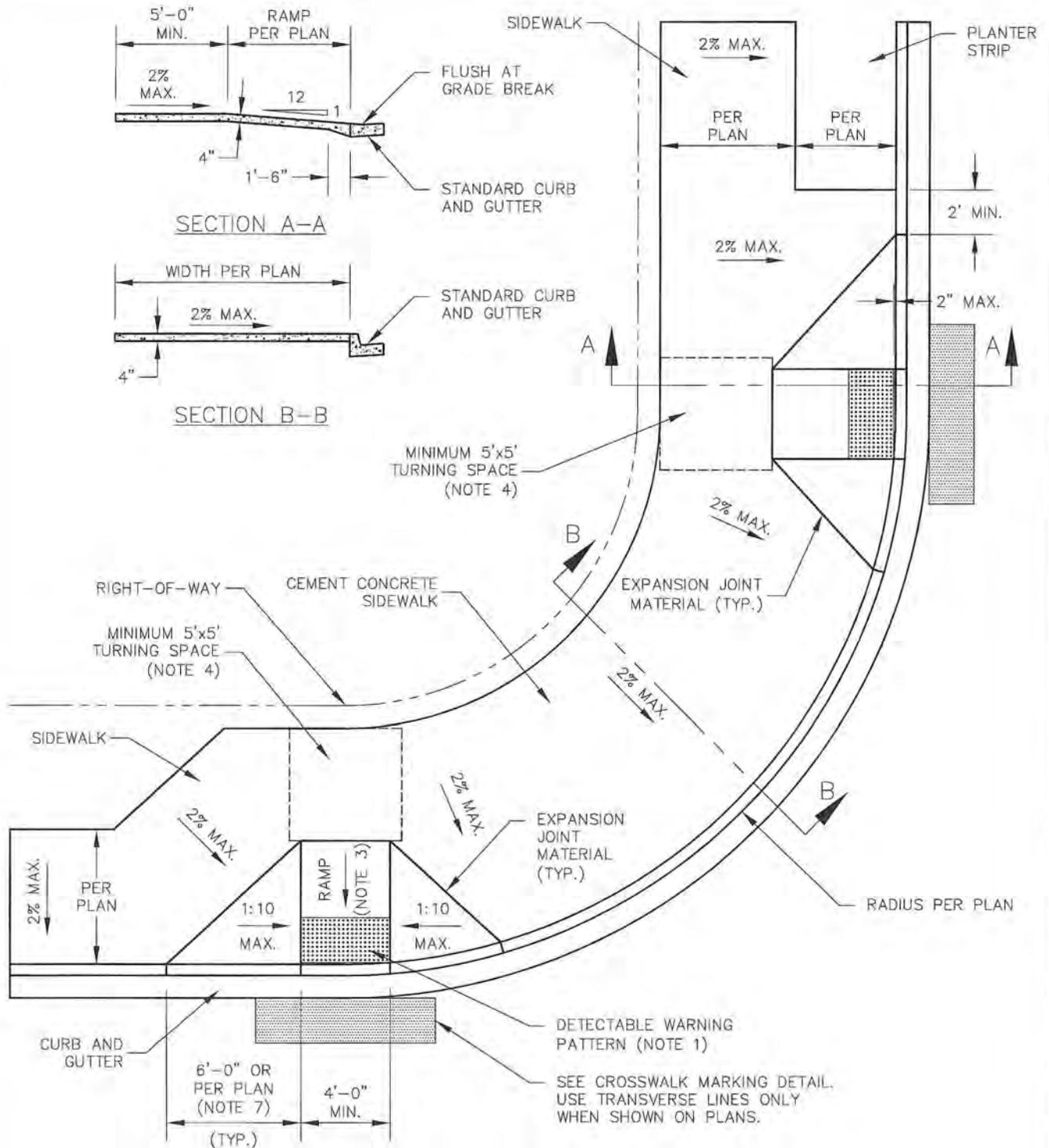
CITY OF CAMAS ~ STREET DETAIL
TYPE 1 PERPENDICULAR CURB RAMP

Don P. Coe 4-26-16
 DETAIL APPROVED BY DATE

DETAIL NO.

ST20

NOT TO SCALE



NOTES:

1. TRUNCATED DOMES SHALL BE IN COMPLIANCE WITH WSDOT STANDARD PLAN F-45.10. SEE DETECTABLE WARNING PATTERN DETAIL.
2. ALL SIDEWALK, TURNING SPACES, RAMPS, WINGS AND CURBS SHALL BE CLASS 3000 CEMENT CONCRETE.
3. RAMP GRADE SHALL NOT EXCEED 8.3% (1:12) AND RAMP CROSS SLOPE SHALL NOT EXCEED 2%.
4. TURNING SPACE GRADE SHALL NOT EXCEED 2% IN ANY DIRECTION.
5. RAMPS TO BE CENTERED IN CROSSWALKS.
6. RAMPS TO BE CONSTRUCTED SEPARATELY FROM SIDEWALK AND ISOLATED BY EXPANSION JOINT MATERIAL.
7. NOT TO EXCEED 6'-0" AT CURB.

REV. NO.	DATE	BY	APPR.
1	10/21/14	SCD	JC
2	4/27/16	SCD	JC



CITY OF CAMAS ~ STREET DETAIL

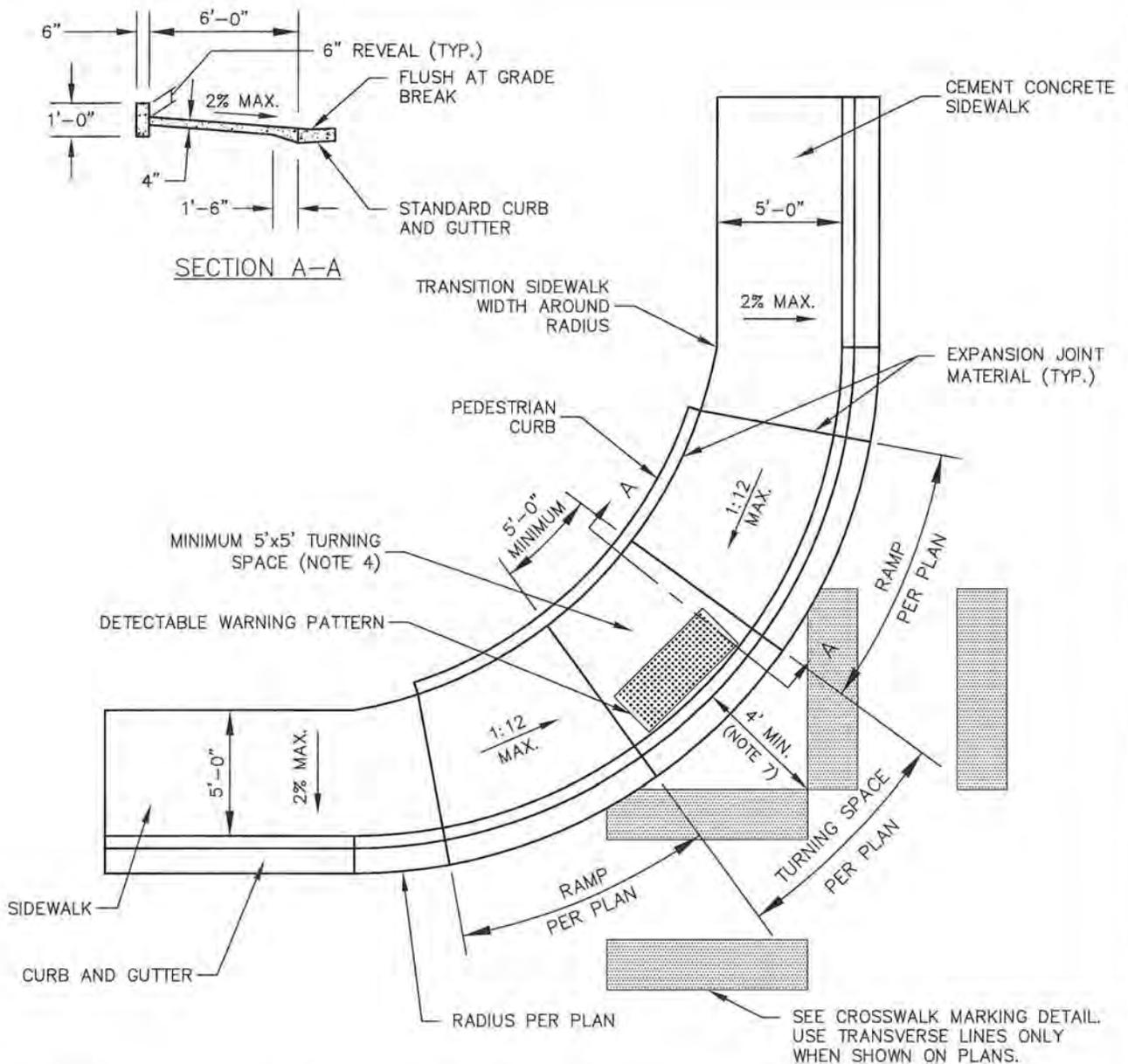
TYPE 1 DUAL PERPENDICULAR CURB RAMP

Don E. Carver 4/26/16
 DETAIL APPROVED BY DATE

DETAIL NO.

ST20A

NOT TO SCALE



NOTES:

1. TRUNCATED DOMES SHALL BE IN COMPLIANCE WITH WSDOT STANDARD PLAN F-45.10. SEE DETECTABLE WARNING PATTERN DETAIL.
2. ALL SIDEWALK, TURNING SPACES, RAMPS, WINGS AND CURBS SHALL BE CLASS 3000 CEMENT CONCRETE.
3. RAMP RUNNING GRADE SHALL NOT EXCEED 8.3% (1:12) AND RAMP CROSS SLOPE SHALL NOT EXCEED 2%. IF THE MAXIMUM RAMP GRADE OF 8.3% (1:12) CANNOT BE ACHIEVED DUE TO THE GRADE OF THE EXISTING SIDEWALK, THE LENGTH OF THE CURB RAMP SHALL NOT BE REQUIRED TO BE LONGER THAN 15 FEET REGARDLESS OF THE RESULTING RAMP GRADE.
4. TURNING SPACE GRADE SHALL NOT EXCEED 2% IN ANY DIRECTION.
5. RAMPS TO BE CENTERED IN CROSS WALKS.
6. RAMPS TO BE CONSTRUCTED SEPARATELY FROM SIDEWALK AND ISOLATED BY EXPANSION JOINT MATERIAL.
7. 48" MIN. CLEAR SPACE SHALL BE PROVIDED FOR MANEUVERING ROOM IN CROSSWALK.

REV. NO.	DATE	BY	APPR.
1	5/1/07	SCD	JC
2	1/1/11	SCD	JC
3	10/21/14	SCD	JC



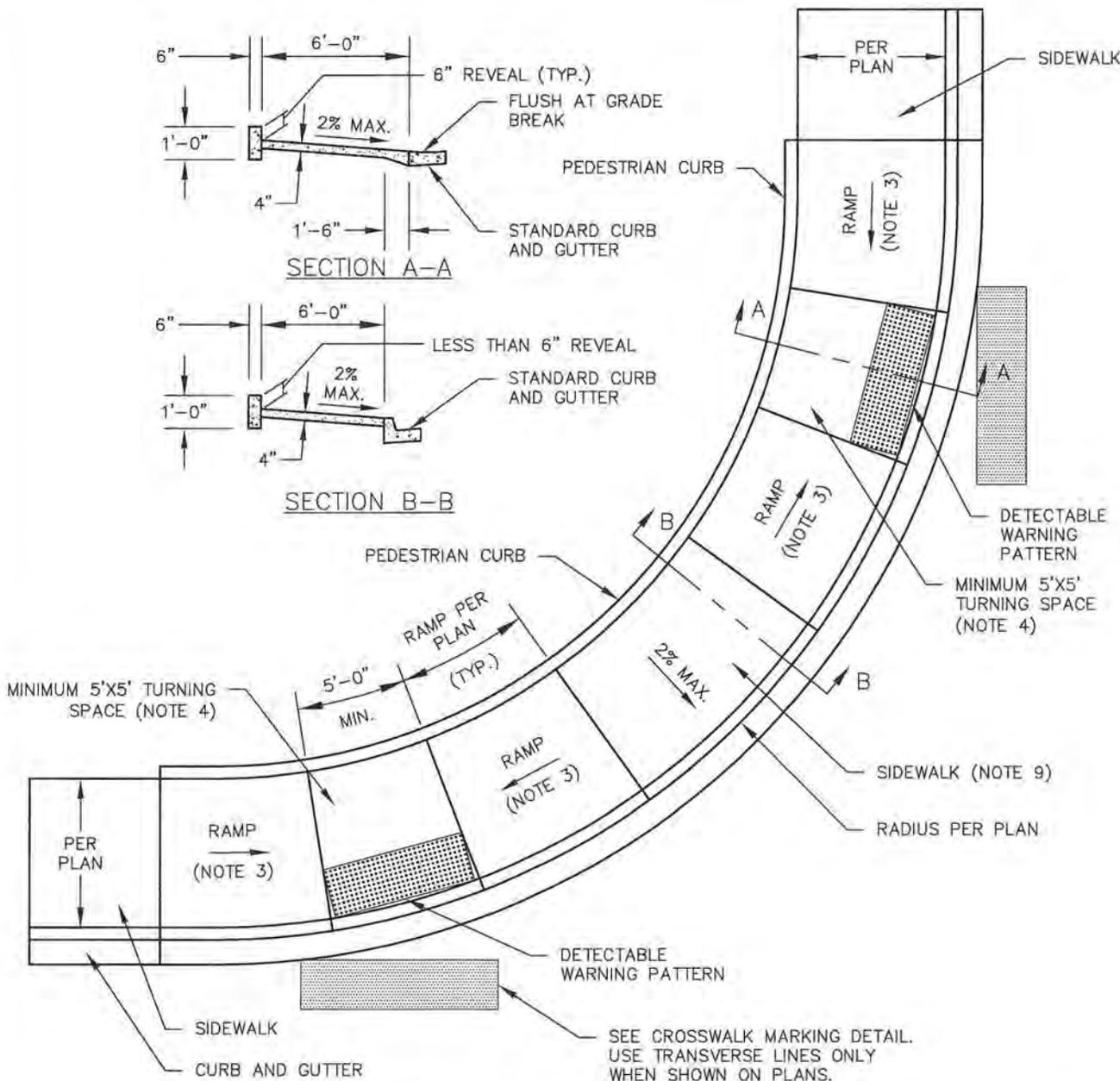
CITY OF CAMAS ~ STREET DETAIL
TYPE 2 PARALLEL CURB RAMP

Jim P. Christian 10-21-14
 DETAIL APPROVED BY DATE

DETAIL NO.

ST21

NOT TO SCALE



NOTES:

1. TRUNCATED DOMES SHALL BE IN COMPLIANCE WITH WSDOT STANDARD PLAN F-45.10. SEE DETECTABLE WARNING PATTERN DETAIL.
2. ALL SIDEWALK, TURNING SPACES, RAMPS, WINGS AND CURBS SHALL BE CLASS 3000 CEMENT CONCRETE.
3. RAMP RUNNING GRADE SHALL NOT EXCEED 8.3% (1:12) AND RAMP CROSS SLOPE SHALL NOT EXCEED 2%. IF THE MAXIMUM RAMP GRADE OF 8.3% (1:12) CANNOT BE ACHIEVED DUE TO THE GRADE OF THE EXISTING SIDEWALK, THE LENGTH OF THE CURB RAMP SHALL NOT BE REQUIRED TO BE LONGER THAN 15 FEET REGARDLESS OF THE RESULTING RAMP GRADE.
4. TURNING SPACE GRADE SHALL NOT EXCEED 2% IN EITHER DIRECTION.
5. RAMPS TO BE CENTERED IN CROSS WALKS.
6. RAMPS TO BE CONSTRUCTED SEPARATELY FROM SIDEWALK AND ISOLATED BY EXPANSION JOINT MATERIAL.
7. IF A SINGLE PARALLEL CURB RAMP IS USED, 48" MIN. CLEAR SPACE SHALL BE PROVIDED FOR MANEUVERING ROOM IN CROSSWALK.
8. FOR DUAL PARALLEL CURB RAMPS THERE SHALL BE A MINIMUM OF 3' OF SIDEWALK BETWEEN TOP OF RAMPS.

REV. NO.	DATE	BY	APPR.
1	10/21/14	SCD	JC

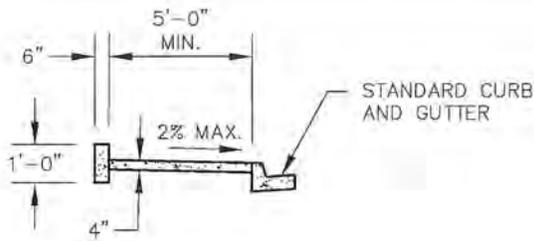


CITY OF CAMAS ~ STREET DETAIL
TYPE 2 DUAL PARALLEL CURB RAMP

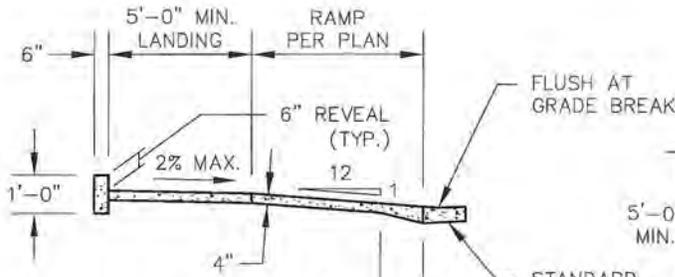
John P. ... 10-21-14
 DETAIL APPROVED BY DATE

DETAIL NO.
 ST21A

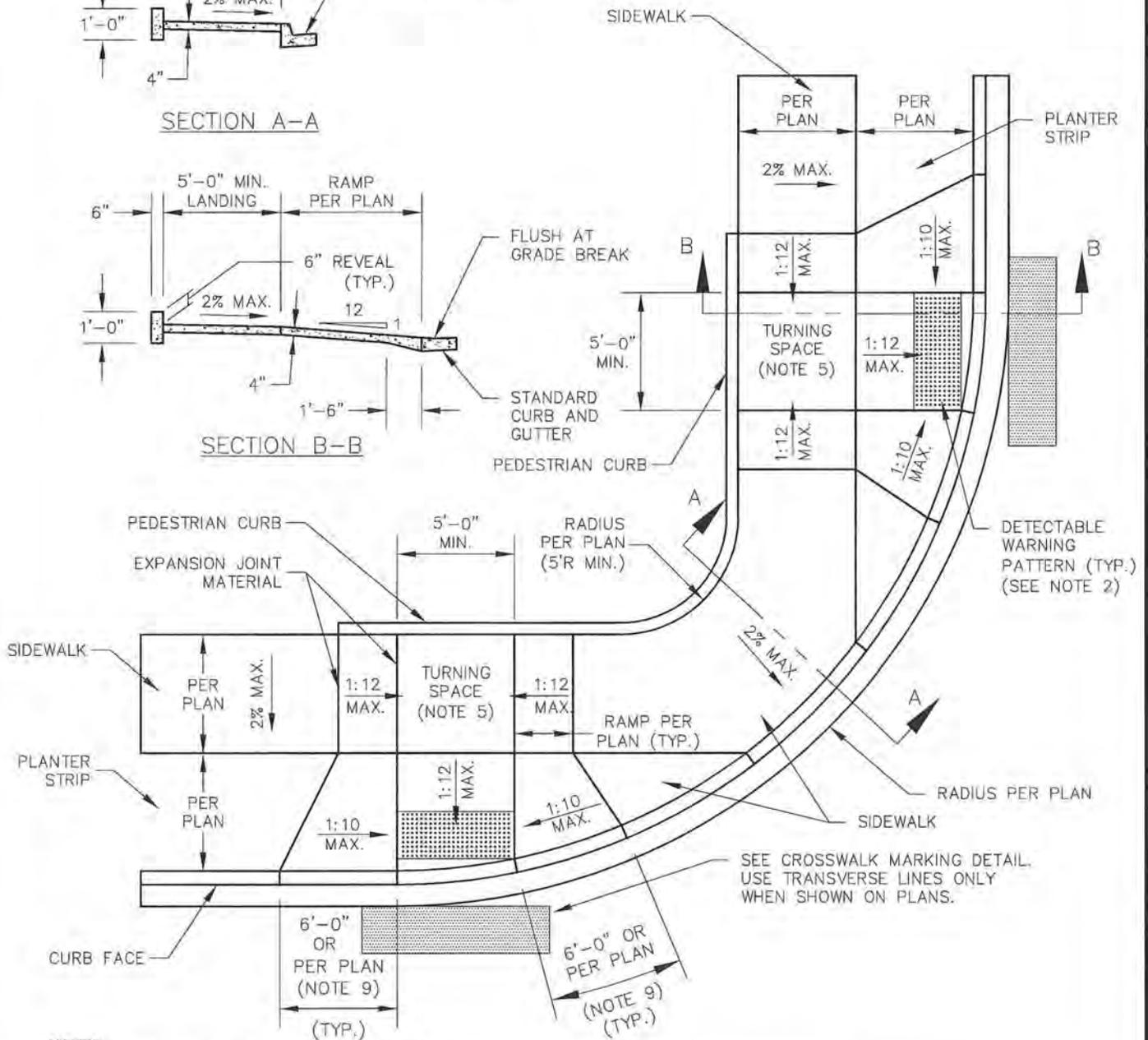
NOT TO SCALE



SECTION A-A



SECTION B-B



NOTES:

1. THIS RAMP TYPE TO BE USED IN EXISTING RESTRICTED RIGHT OF WAY INSTALLATIONS.
2. TRUNCATED DOMES SHALL BE IN COMPLIANCE WITH WSDOT STANDARD PLAN F-45.10. SEE DETECTABLE WARNING PATTERN DETAIL.
3. ALL SIDEWALK, TURNING SPACES, RAMPS, WINGS AND CURBS SHALL BE CLASS 3000 CEMENT CONCRETE.
4. RAMP RUNNING GRADE SHALL NOT EXCEED 8.3% (1:12) AND RAMP CROSS SLOPE SHALL NOT EXCEED 2%. IF THE MAXIMUM RAMP GRADE OF 8.3% (1:12) CANNOT BE ACHIEVED DUE TO THE GRADE OF THE EXISTING SIDEWALK, THE LENGTH OF THE CURB RAMP SHALL NOT BE REQUIRED TO BE LONGER THAN 15 FEET REGARDLESS OF THE RESULTING RAMP GRADE.
5. TURNING SPACE GRADE SHALL NOT EXCEED 2% IN ANY DIRECTION.
6. RAMPS TO BE CENTERED IN CROSS WALKS.
7. RAMPS TO BE CONSTRUCTED SEPARATELY FROM SIDEWALK AND ISOLATED BY EXPANSION JOINT MATERIAL.
8. DOUBLE RAMP ALLOWED ONLY IF CURB RETURN RADIUS IS GREATER THAN OR EQUAL TO 25'.
9. NOT TO EXCEED 6'-0" AT CURB.

REV. NO.	DATE	BY	APPR.
2	9/18/07	SCD	JC
3	1/1/11	SCD	JC
4	10/21/14	SCD	JC
5	4/27/16	SCD	JC



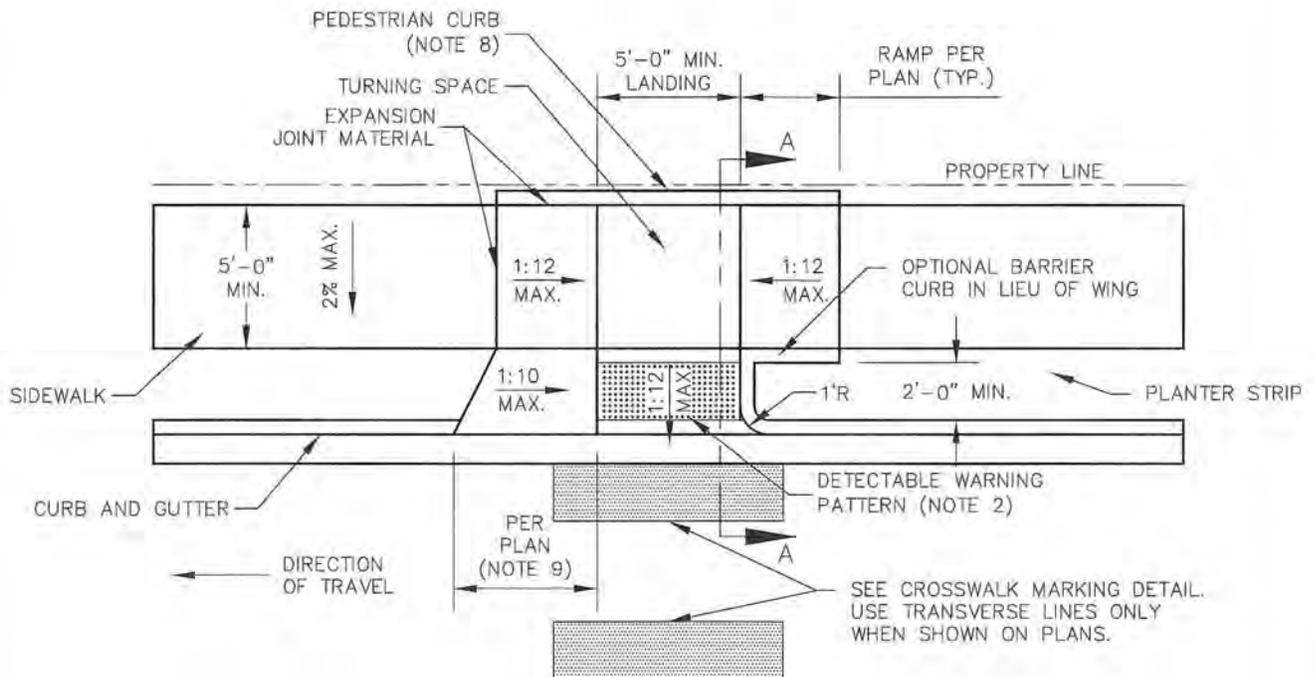
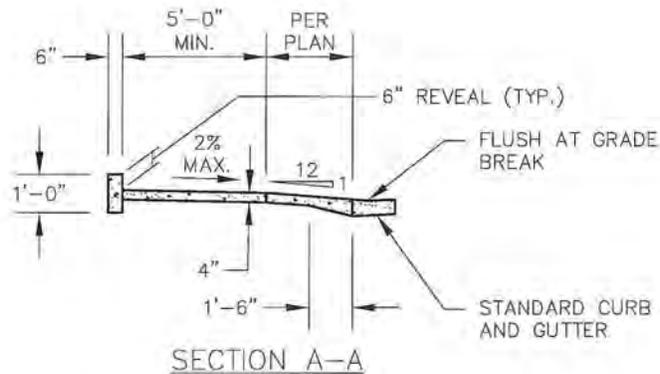
CITY OF CAMAS ~ STREET DETAIL
TYPE 4 COMBINATION CURB RAMP

Don P. Cothran 426-16
 DETAIL APPROVED BY DATE

DETAIL NO.

ST23

NOT TO SCALE



NOTES:

1. THIS RAMP TYPE TO BE USED IN EXISTING RESTRICTED RIGHT OF WAY, MID BLOCK, OR INTERSECTION RADIUS SITUATIONS.
2. TRUNCATED DOMES SHALL BE IN COMPLIANCE WITH WSDOT STANDARD PLAN F-45.10A. SEE DETECTABLE WARNING PATTERN DETAIL.
3. ALL SIDEWALK, TURNING SPACES, RAMPS, WINGS AND CURBS SHALL BE CLASS 3000 CEMENT CONCRETE.
4. RAMP RUNNING GRADE SHALL NOT EXCEED 8.3% (1:12) AND RAMP CROSS SLOPE SHALL NOT EXCEED 2%. IF THE MAXIMUM RAMP GRADE OF 8.3% (1:12) CANNOT BE ACHIEVED DUE TO THE GRADE OF THE EXISTING SIDEWALK, THE LENGTH OF THE CURB RAMP SHALL NOT BE REQUIRED TO BE LONGER THAN 15 FEET REGARDLESS OF THE RESULTING RAMP GRADE.
5. TURNING SPACE GRADE SHALL NOT EXCEED 2% IN ANY DIRECTION.
6. RAMPS TO BE CENTERED IN CROSS WALKS.
7. RAMPS TO BE CONSTRUCTED SEPARATELY FROM SIDEWALK AND ISOLATED BY EXPANSION JOINT MATERIAL.
8. PEDESTRIAN CURB MAY BE PLACED WITHIN SIDEWALK WHEN EXISTING SIDEWALK IS ON PROPERTY LINE.
9. NOT TO EXCEED 6'-0" AT CURB.

REV. NO.	DATE	BY	APPR.
1	5/1/07	SCD	JC
2	1/1/11	SCD	JC
3	10/21/14	SCD	JC
4	4/27/16	SCD	JC

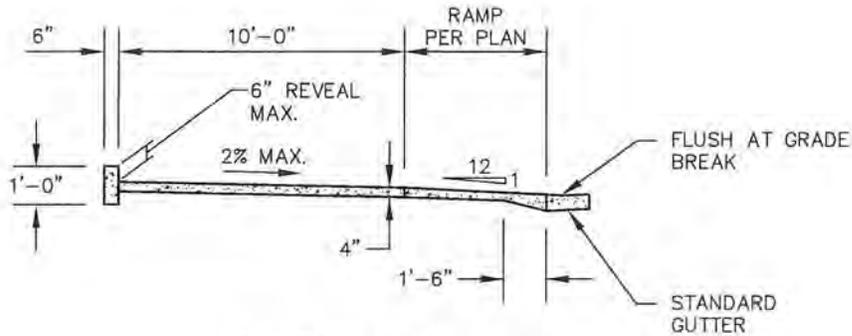


CITY OF CAMAS ~ STREET DETAIL
MID-BLOCK CURB RAMP

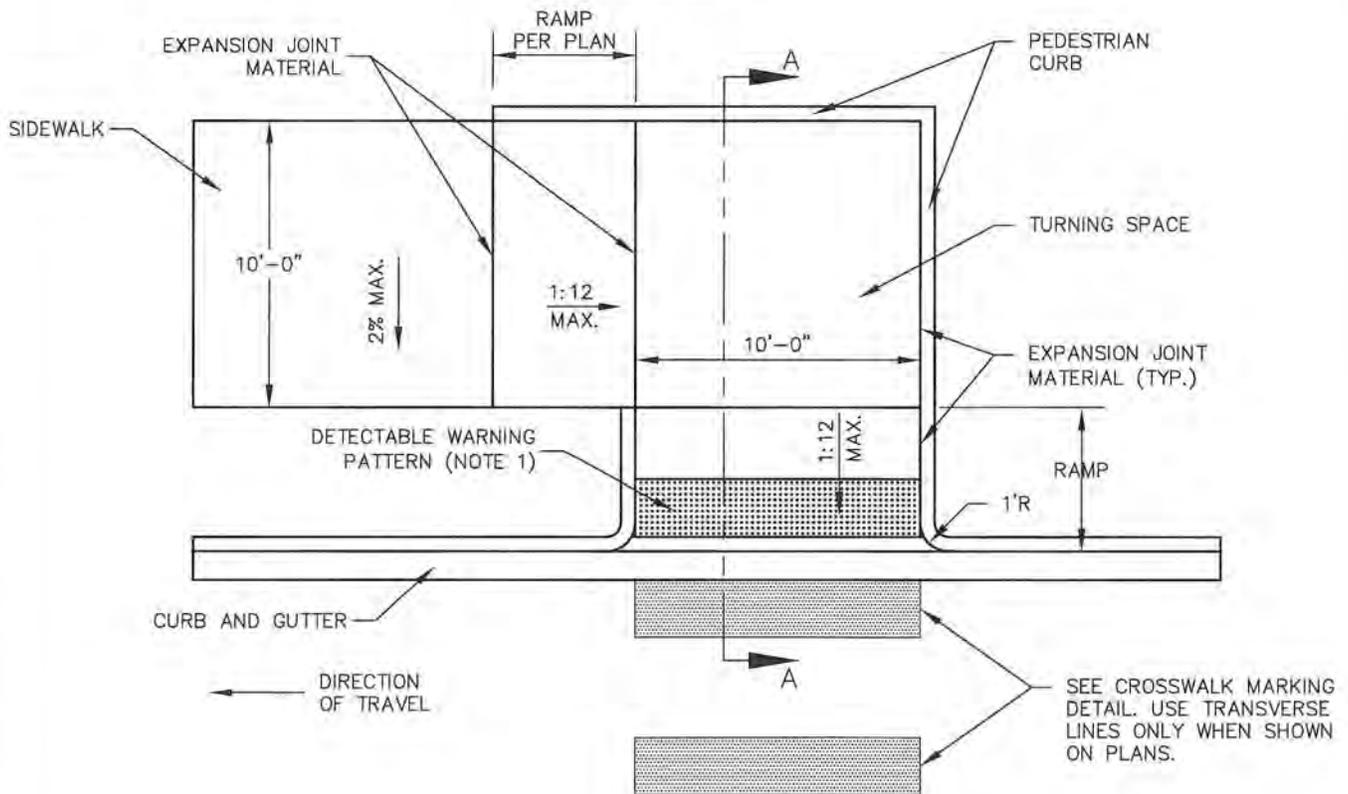
Jan P. Cavetta 4-26-16
 DETAIL APPROVED BY DATE

DETAIL NO.
 ST24

NOT TO SCALE



SECTION A-A



NOTES:

1. TRUNCATED DOMES SHALL BE IN COMPLIANCE WITH WSDOT STANDARD PLAN F-3A. SEE DETECTABLE WARNING PATTERN DETAIL.
2. ALL SIDEWALK, TURNING SPACES, RAMPS, WINGS AND CURBS SHALL BE CLASS 3000 CEMENT CONCRETE.
3. RAMP RUNNING GRADE SHALL NOT EXCEED 8.3% (1:12) AND RAMP CROSS SLOPE SHALL NOT EXCEED 2%. IF THE MAXIMUM RAMP GRADE OF 8.3% (1:12) CANNOT BE ACHIEVED DUE TO THE GRADE OF THE EXISTING SIDEWALK, THE LENGTH OF THE CURB RAMP SHALL NOT BE REQUIRED TO BE LONGER THAN 15 FEET REGARDLESS OF THE RESULTING RAMP GRADE.
4. TURNING SPACE GRADE SHALL NOT EXCEED 2% IN ANY DIRECTION.
5. RAMPS TO BE CENTERED IN CROSSWALKS.
6. RAMPS TO BE CONSTRUCTED SEPARATELY FROM SIDEWALK AND ISOLATED BY EXPANSION JOINT MATERIAL.

REV. NO.	DATE	BY	APPR.
1	2/17/10	SCD	JC
2	1/1/11	SCD	JC
3	10/21/14	SCD	JC

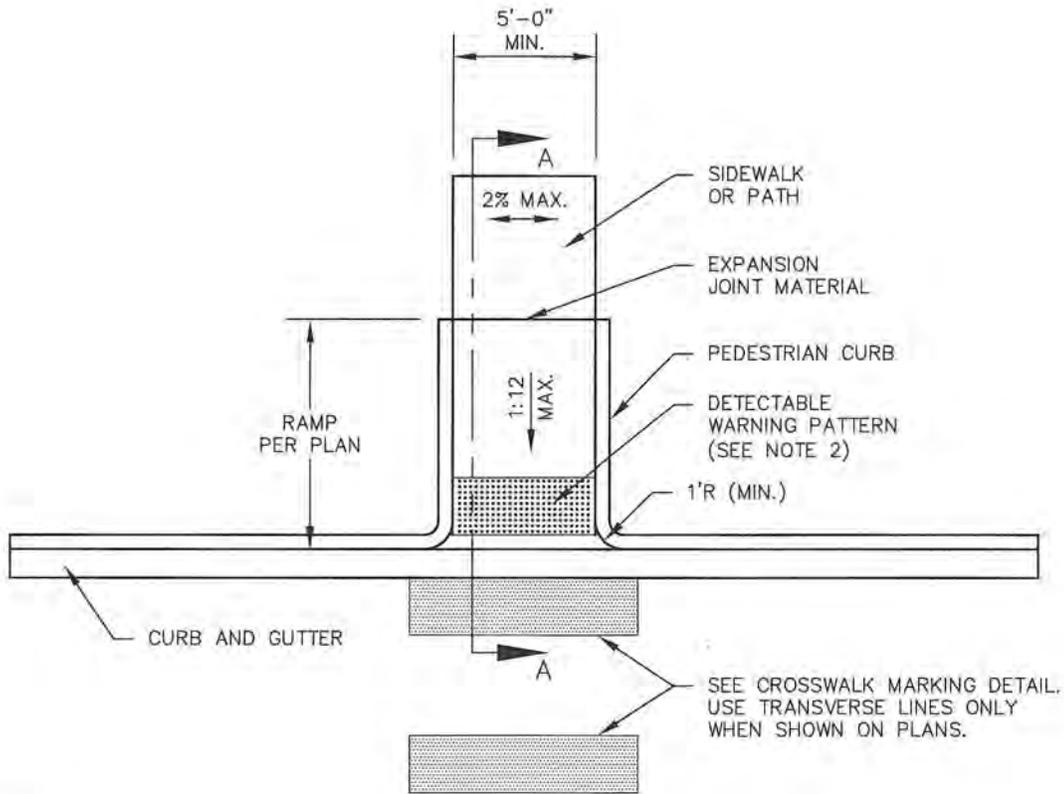
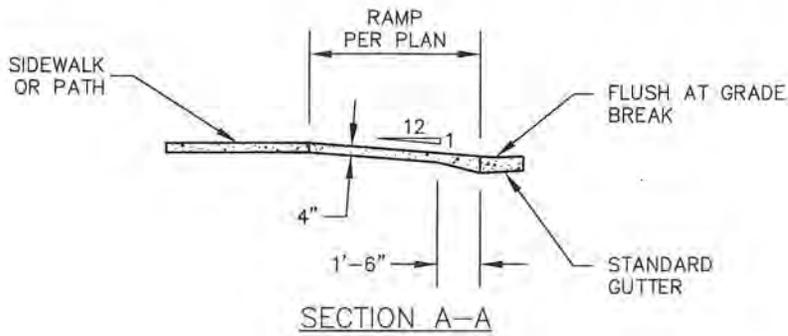


CITY OF CAMAS ~ STREET DETAIL
MID-BLOCK REGIONAL TRAIL CURB RAMP

Jan P. Custer 10-21-14
DETAIL APPROVED BY DATE

NOT TO SCALE

DETAIL NO.
ST25



NOTES:

1. THIS RAMP TYPE TO BE USED IN MID-BLOCK SITUATIONS.
2. TRUNCATED DOMES SHALL BE IN COMPLIANCE WITH WSDOT STANDARD PLAN F-45.10. SEE DETECTABLE WARNING PATTERN DETAIL.
3. ALL SIDEWALK, TURNING SPACES, RAMPS, WINGS AND CURBS SHALL BE CLASS 3000 CEMENT CONCRETE.
4. RAMP RUNNING GRADE SHALL NOT EXCEED 8.3% (1:12) AND RAMP CROSS SLOPE SHALL NOT EXCEED 2%. IF THE MAXIMUM RAMP GRADE OF 8.3% (1:12) CANNOT BE ACHIEVED DUE TO THE GRADE OF THE EXISTING SIDEWALK, THE LENGTH OF THE CURB RAMP SHALL NOT BE REQUIRED TO BE LONGER THAN 15 FEET REGARDLESS OF THE RESULTING RAMP GRADE.
5. RAMPS TO BE CENTERED IN CROSS WALKS.
6. RAMPS TO BE CONSTRUCTED SEPARATELY FROM SIDEWALK AND ISOLATED BY EXPANSION JOINT MATERIAL.

REV. NO.	DATE	BY	APPR.
1	5/1/07	SCD	JC
2	1/1/11	SCD	JC
3	10/21/14	SCD	JC

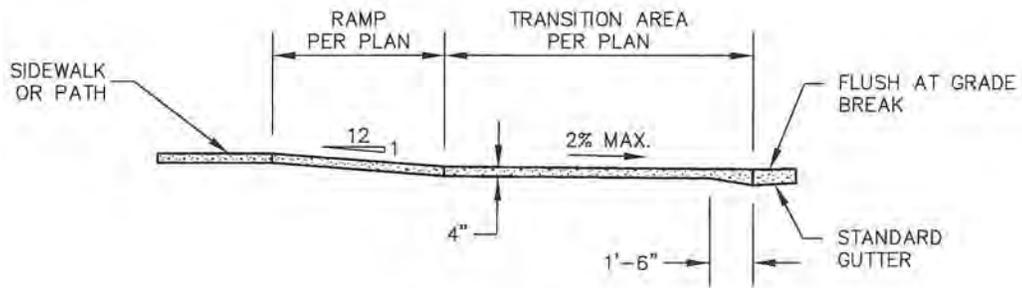


CITY OF CAMAS ~ STREET DETAIL
MID-BLOCK PERPENDICULAR CURB RAMP

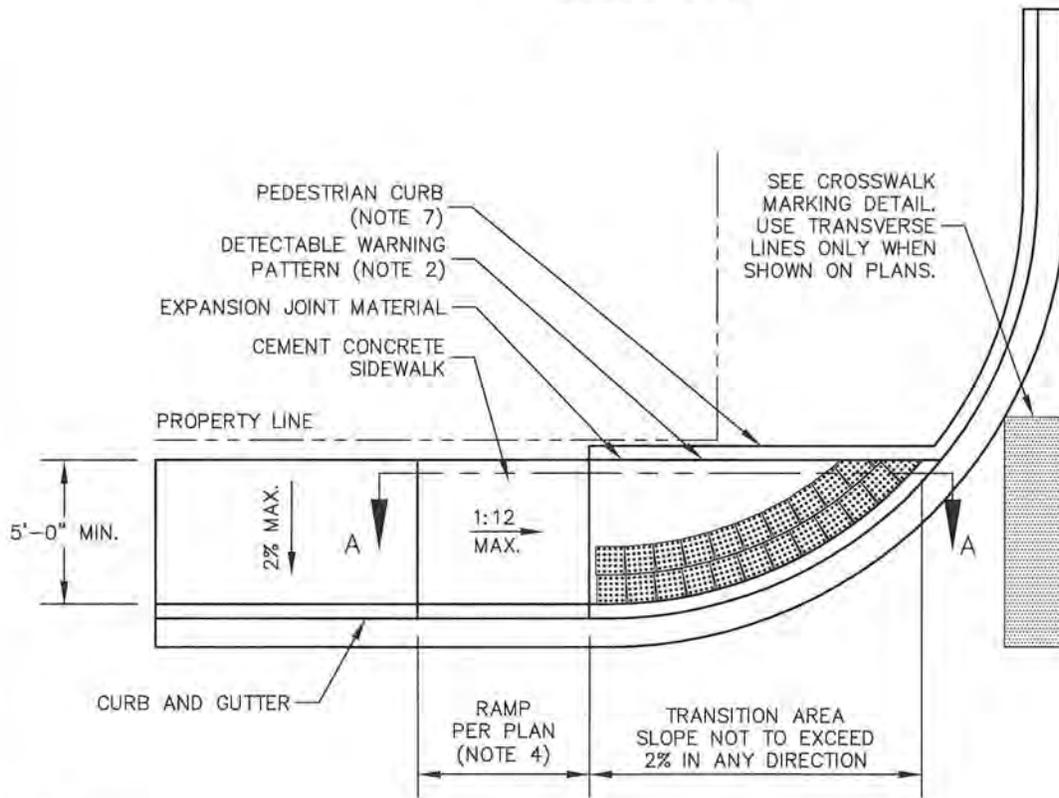
Jim P. Christian 10-21-14
DETAIL APPROVED BY DATE

NOT TO SCALE

DETAIL NO.
ST26



SECTION A-A



NOTES:

1. THIS RAMP TYPE TO BE USED IN EXISTING RESTRICTED RIGHT OF WAY INSTALLATIONS BUT NOT FOR USE WHERE THERE IS SUFFICIENT RIGHT OF WAY FOR OTHER RAMP DESIGNS.
2. TRUNCATED DOMES SHALL BE IN COMPLIANCE WITH WSDOT STANDARD PLAN F-45.10. SEE DETECTABLE WARNING PATTERN (DWP) DETAIL. DWP IS SHOWN AS 12" CONCRETE TILES SO AS NOT TO EXCEED 2" SEPARATION FROM THE REAR CURB LINE. SUBMITTAL REQUIRED FOR ALTERNATIVE DESIGNS.
3. ALL SIDEWALK, TURNING SPACES, RAMPS, WINGS AND CURBS SHALL BE CLASS 3000 CEMENT CONCRETE.
4. RAMP RUNNING GRADE SHALL NOT EXCEED 8.3% (1:12) AND RAMP CROSS SLOPE SHALL NOT EXCEED 2%. IF THE MAXIMUM RAMP GRADE OF 8.3% (1:12) CANNOT BE ACHIEVED DUE TO THE GRADE OF THE EXISTING SIDEWALK, THE LENGTH OF THE CURB RAMP SHALL NOT BE REQUIRED TO BE LONGER THAN 15 FEET REGARDLESS OF THE RESULTING RAMP GRADE.
5. RAMPS TO BE CENTERED IN CROSS WALKS.
6. RAMPS TO BE CONSTRUCTED SEPARATELY FROM SIDEWALK AND ISOLATED BY EXPANSION JOINT MATERIAL.
7. PEDESTRIAN CURB MAY BE PLACED WITHIN SIDEWALK WHEN EXISTING SIDEWALK IS ON PROPERTY LINE.

REV. NO.	DATE	BY	APPR.
1	5/1/07	SCD	JC
2	1/1/11	SCD	JC
3	10/21/14	SCD	JC



CITY OF CAMAS ~ STREET DETAIL
DIRECTIONAL CURB RAMP

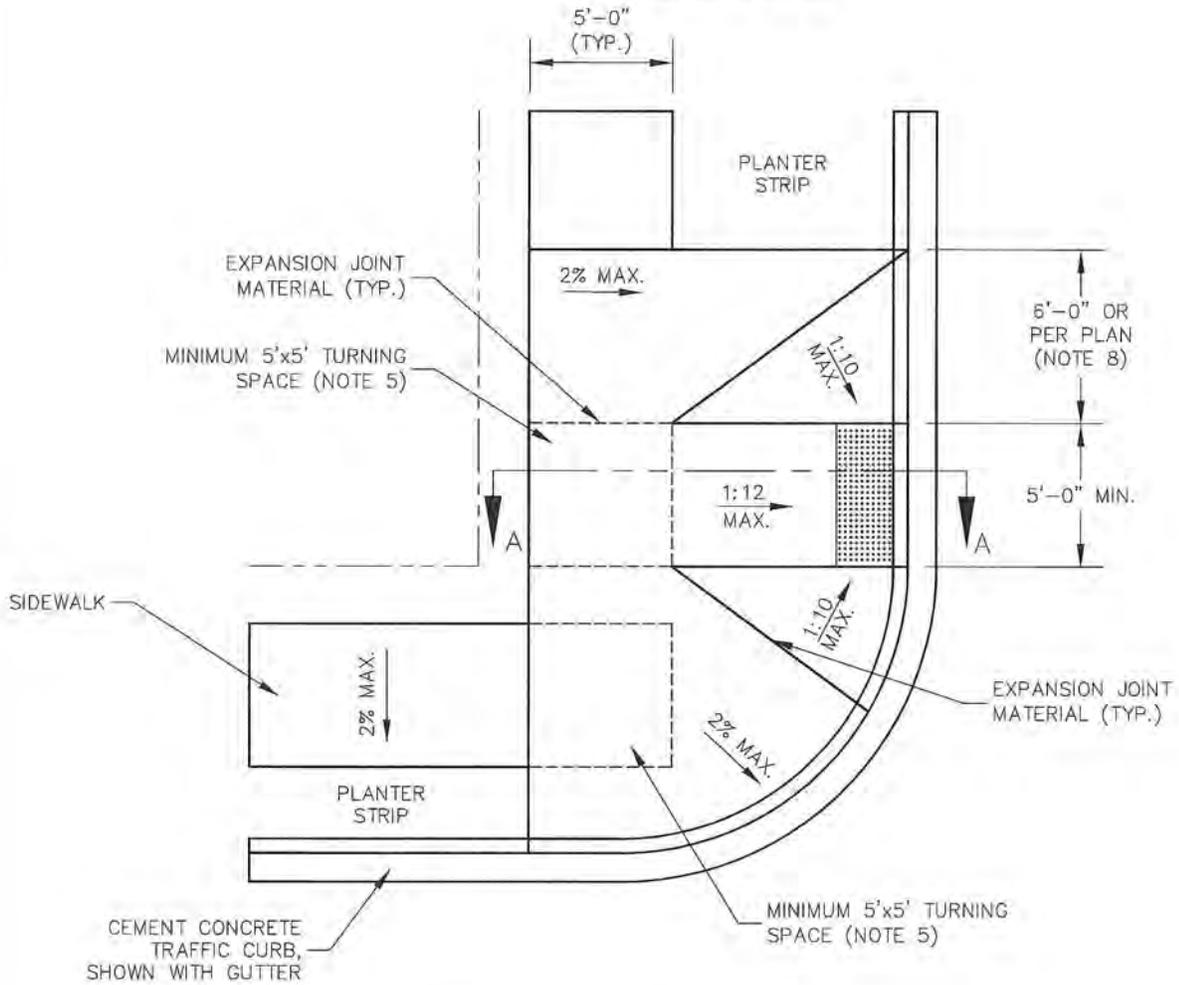
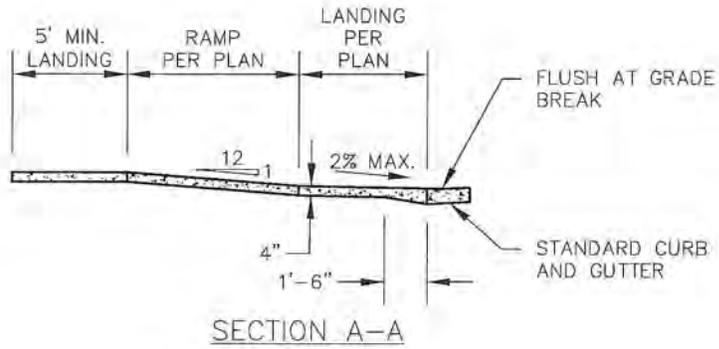
Jim P. Christian 10-21-14
DETAIL APPROVED BY DATE

DETAIL NO.

ST27

NOT TO SCALE

ST-SIDEWALKS.DWG



NOTES:

1. THIS RAMP TYPE TO BE USED IN EXISTING RESTRICTED RIGHT OF WAY INSTALLATIONS.
2. TRUNCATED DOMES SHALL BE IN COMPLIANCE WITH WSDOT STANDARD PLAN F-45.10. SEE DETECTABLE WARNING PATTERN DETAIL.
3. ALL SIDEWALK, TURNING SPACES, RAMPS, WINGS AND CURBS SHALL BE CLASS 3000 CEMENT CONCRETE.
4. RAMP RUNNING GRADE SHALL NOT EXCEED 8.3% (1:12) AND RAMP CROSS SLOPE SHALL NOT EXCEED 2%. IF THE MAXIMUM RAMP GRADE OF 8.3% (1:12) CANNOT BE ACHIEVED DUE TO THE GRADE OF THE EXISTING SIDEWALK, THE LENGTH OF THE CURB RAMP SHALL NOT BE REQUIRED TO BE LONGER THAN 15 FEET REGARDLESS OF THE RESULTING RAMP GRADE.
5. TURNING SPACE GRADE SHALL NOT EXCEED 2% IN ANY DIRECTION.
6. RAMPS TO BE CENTERED IN CROSS WALKS.
7. RAMPS TO BE CONSTRUCTED SEPARATELY FROM SIDEWALK AND ISOLATED BY EXPANSION JOINT MATERIAL.
8. NOT TO EXCEED 6'-0" AT CURB.

REV. NO.	DATE	BY	APPR.
1	1/1/11	SCD	JC
2	10/21/14	SCD	JC
3	4/27/16	SCD	JC



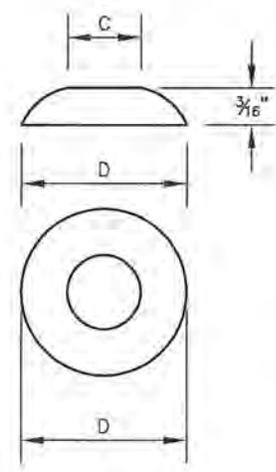
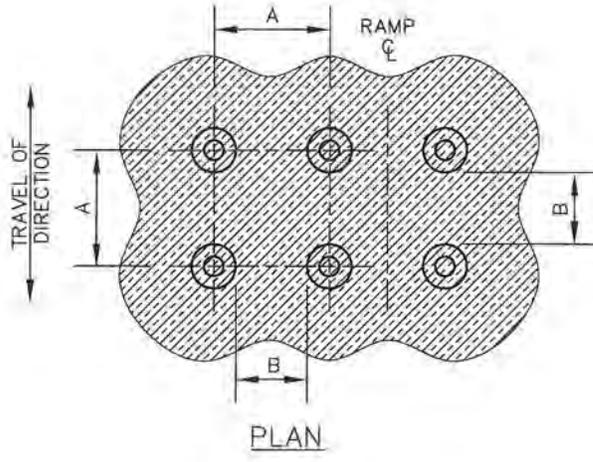
CITY OF CAMAS ~ STREET DETAIL
RETROFIT DIRECTIONAL CURB RAMP

Jan P. Caruth 4-26-16
 DETAIL APPROVED BY DATE

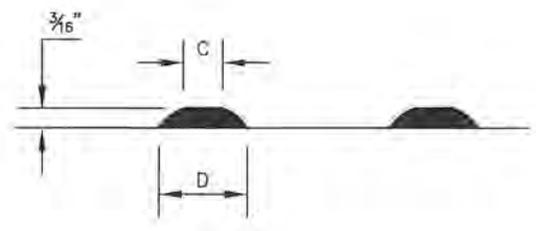
NOT TO SCALE

DETAIL NO.

ST28



DIMENSIONS		
	MIN.	MAX.
A	1 5/8"	2 3/8"
B	5/8"	1 1/2"
C	7/16"	3/4"
D	7/8"	1 7/16"



- NOTES:
1. TRUNCATED DOMES SHALL BE IN COMPLIANCE WITH WSDOT STANDARD PLAN F-45.10.
 2. DETECTABLE WARNING PATTERN AREA SHALL BE YELLOW, IN COMPLIANCE WITH WASHINGTON STATE STD. SPEC. 8-14.3(5).

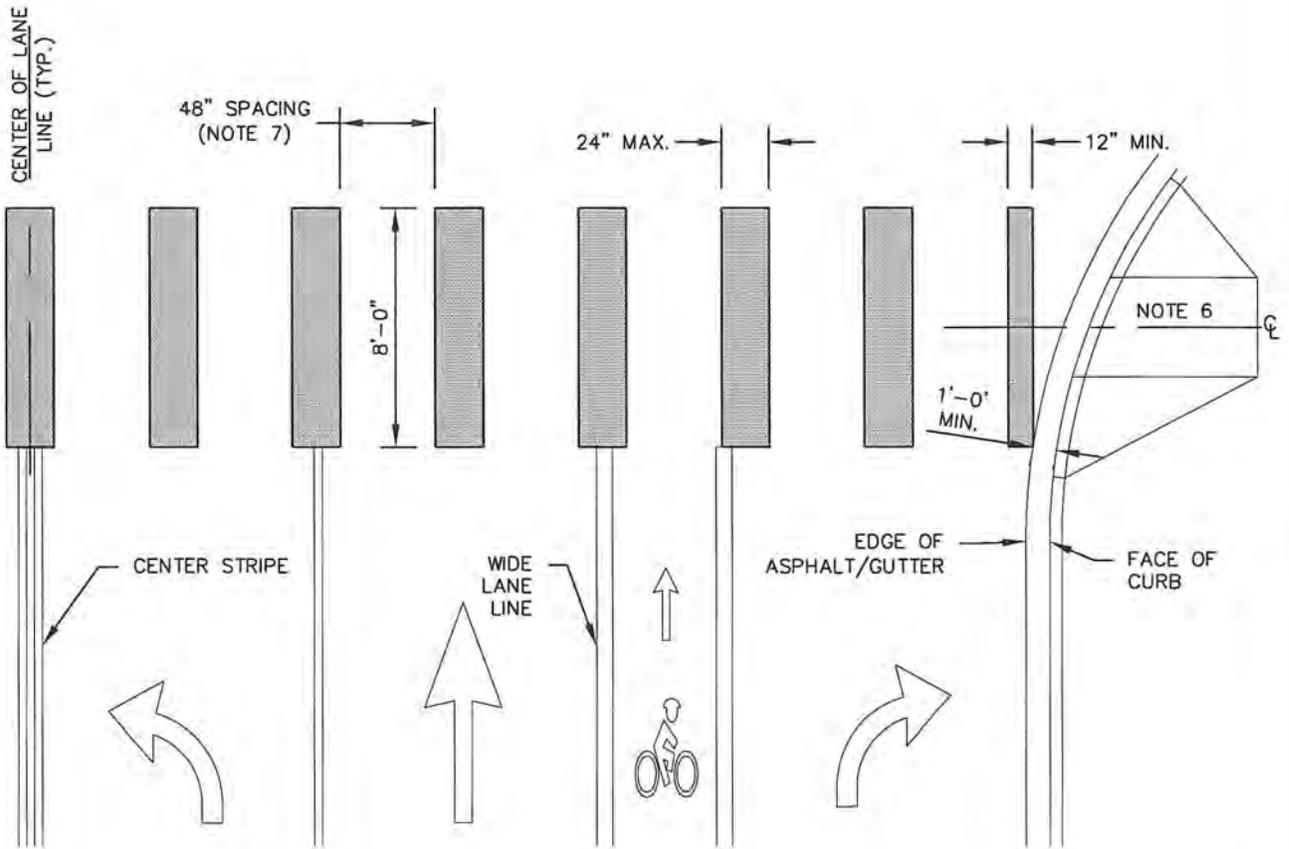
REV. NO.	DATE	BY	APPR.
1	5/1/07	SCD	JC
2	1/1/11	SCD	JC
3	10/21/14	SCD	JC



CITY OF CAMAS ~ STREET DETAIL
 DETECTABLE WARNING PATTERN
Joe P. Coates 10-21-14
 DETAIL APPROVED BY DATE

NOT TO SCALE

DETAIL NO.
 ST29



LONGITUDINAL LINE CROSSWALK

NOTES:

1. ALL PAVEMENT MARKINGS SHALL BE APPLIED PER SECTION 8-22 OF THE WSDOT STANDARD SPECIFICATIONS FOR ROAD, BRIDGE, AND MUNICIPAL CONSTRUCTION.
2. CROSSWALK MARKINGS SHALL BE WHITE PRE-MARK THERMOPLASTIC MATERIAL, OR APPROVED EQUAL.
3. MARKING DIMENSIONS ARE PER THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.
4. SEE APPLICABLE CURB RAMP DETAIL FOR LOCATION OF CORNER CROSSWALK MARKINGS.
5. SPACING OF STRIPES SHALL BE SELECTED TO AVOID WHEEL PATH.
6. CROSSWALK MARKINGS SHALL BE ALIGNED WITH THE CENTERLINE OF THE SIDEWALK.
7. LONGITUDINAL STRIPE GAP NOT TO EXCEED 2.5 TIMES STRIPE WIDTH

REV. NO.	DATE	BY	APPR.
1	5/1/07	SCD	JC
2	1/1/11	SCD	JC

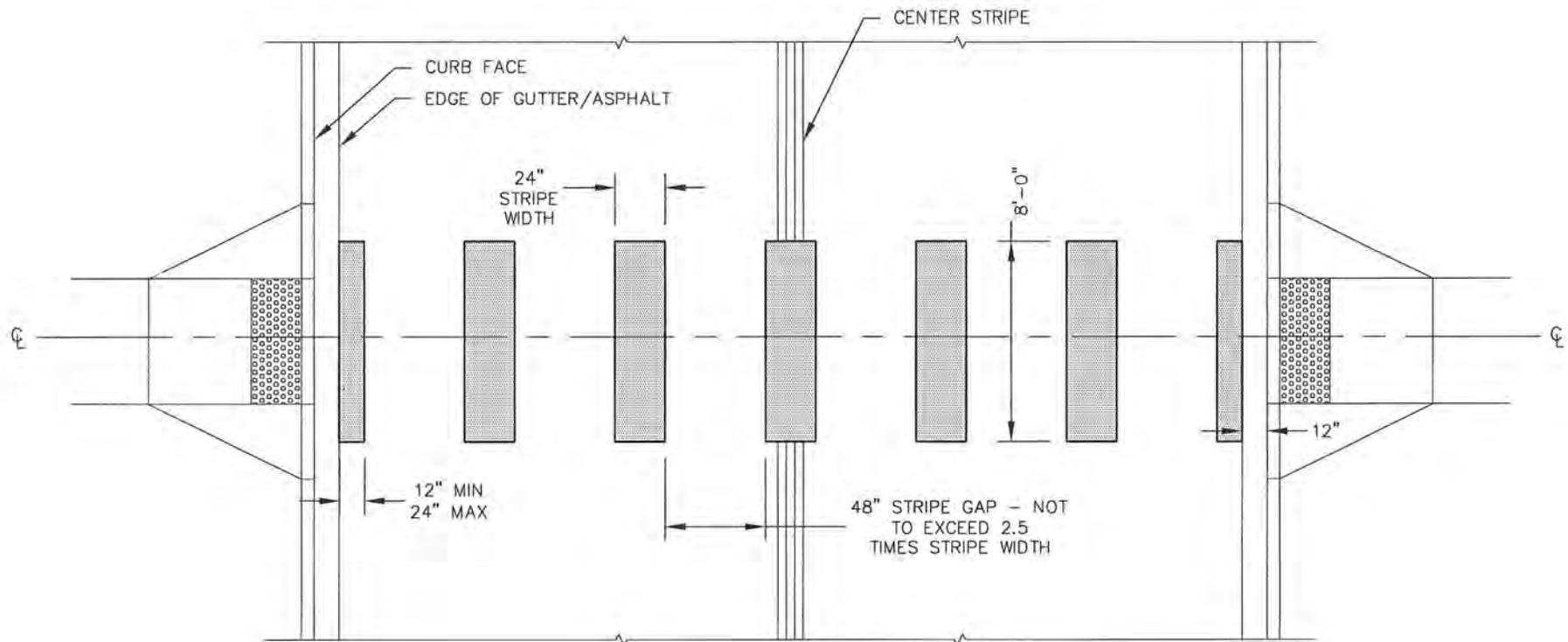


CITY OF CAMAS ~ STREET DETAIL
CROSSWALK MARKINGS

Don P. Cothran 1-4-11
DETAIL APPROVED BY DATE

DETAIL NO.
ST30

NOT TO SCALE



NOTES:

1. CROSSWALK MARKINGS SHALL BE WHITE PRE-MARK THERMOPLASTIC MATERIAL, OR APPROVED EQUAL.
2. SEE CROSSWALK MARKING DETAIL FOR LOCATION OF CORNER CROSSWALK MARKINGS.
3. SPACING OF STRIPES SHALL BE SELECTED TO AVOID WHEEL PATH.
4. CROSSWALK MARKINGS SHALL BE ALIGNED WITH THE CENTERLINE OF THE SIDEWALK.
5. ADVANCE SIGNAGE FOR UNSIGNALIZED MIDBLOCK CROSSINGS SHALL BE PER THE MUTCD AND USED AT THE DISCRETION OF THE ENGINEER.

REV. NO.	DATE	BY	APPR.
1	5/1/07	SCD	JC
2	1/1/11	SCD	JC



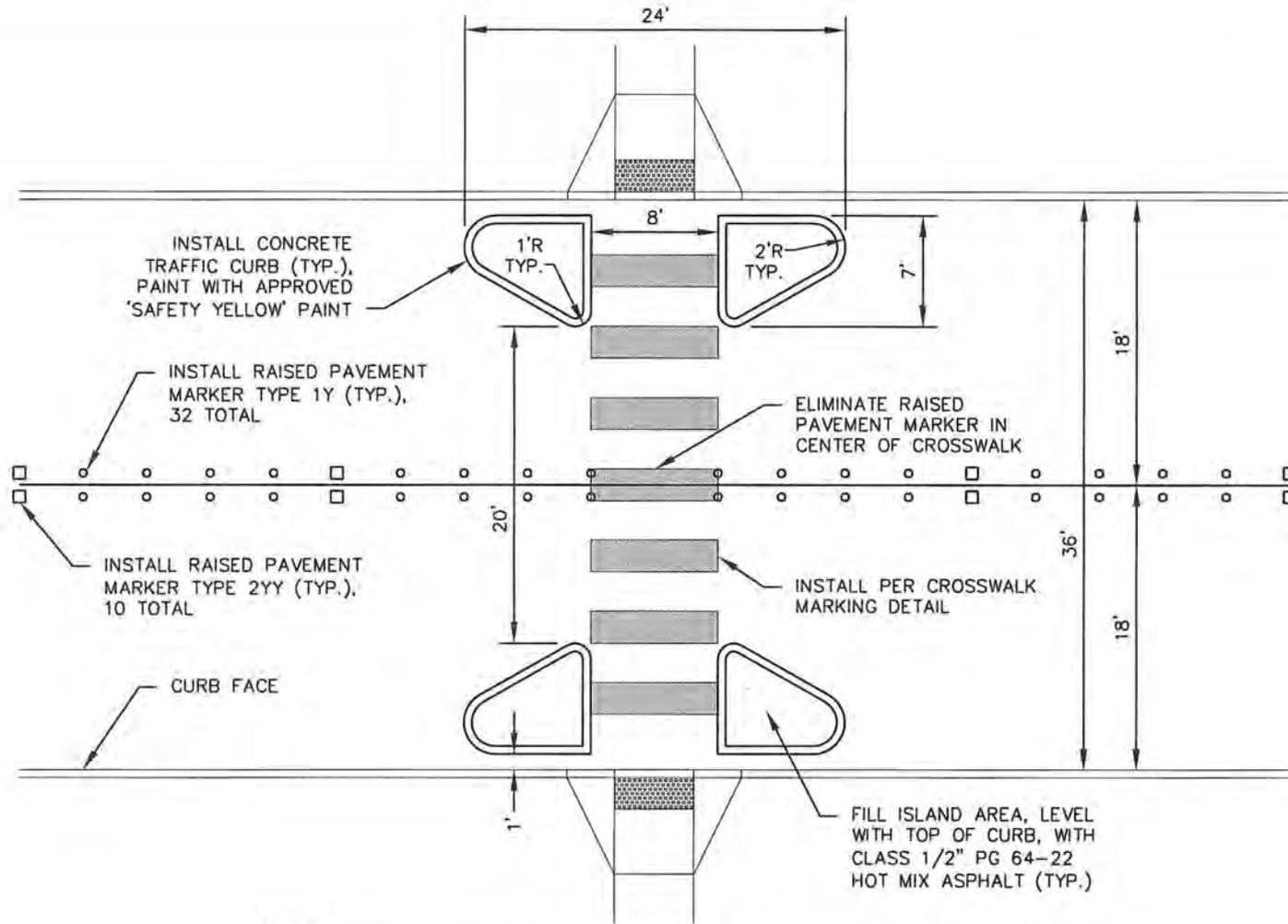
CITY OF CAMAS ~ STREET DETAIL
MIDBLOCK CROSSWALK MARKINGS

Jan P. Coulter 1-4-11
 DETAIL APPROVED BY DATE

DETAIL NO.

ST31

NOT TO SCALE



NOTES:

1. CROSSWALK MARKINGS SHALL BE WHITE PRE-MARK THERMOPLASTIC MATERIAL, OR APPROVED EQUAL.
2. SPACING OF STRIPES SHALL BE SELECTED TO AVOID WHEEL PATH.
3. CROSSWALK MARKINGS SHALL BE ALIGNED WITH THE CENTERLINE OF THE SIDEWALK.
4. ADVANCE SIGNAGE FOR UNSIGNALIZED MIDBLOCK CROSSINGS SHALL BE PER THE MUTCD AND USED AT THE DISCRETION OF THE ENGINEER.
5. RAISED PAVEMENT MARKERS ARE PER THE WSDOT STANDARD PLANS.

REV. NO.	DATE	BY	APPR.
1	5/1/07	SCD	JC
2	1/1/11	SCD	JC



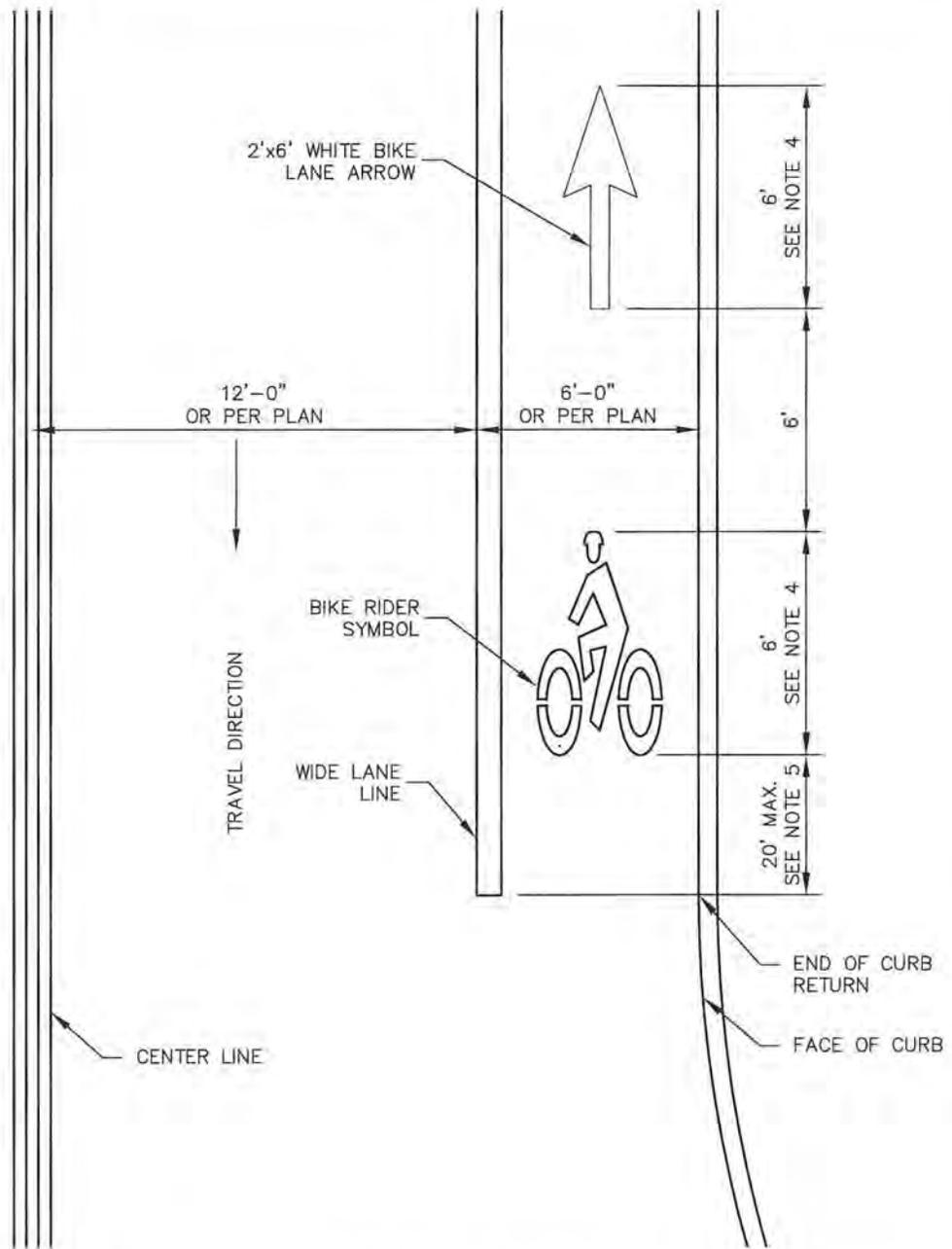
**CITY OF CAMAS ~ STREET DETAIL
TRAFFIC CALMING BULB-OUT**

Sean P. Coathran 1-4-11
DETAIL APPROVED BY DATE

DETAIL NO.

ST32

NOT TO SCALE



NOTES:

1. ALL PAVEMENT MARKINGS SHALL BE APPLIED PER SECTION 8-22 OF THE WSDOT STANDARD SPECIFICATIONS FOR ROAD, BRIDGE, AND MUNICIPAL CONSTRUCTION.
2. MARKINGS SHALL BE WHITE PRE-MARK THERMOPLASTIC MATERIAL, OR APPROVED EQUAL.
3. "BICYCLE LANE SYMBOL" INCLUDES BIKE LANE ARROW AND BIKE RIDER SYMBOL.
4. REFER TO WSDOT STANDARD PLAN M-9.50 FOR SYMBOL DETAILS.
5. BICYCLE LANE SYMBOL SHALL BE LOCATED WITHIN 20' OF THE BEGINNING OF THE BICYCLE LANE LINE, AND ALSO LOCATED:
 - A. AT A MID-POINT BETWEEN INTERSECTIONS WHEN INTERSECTIONS ARE 500 TO 1000 FEET APART
 - B. EVERY 500 FEET WHEN INTERSECTIONS ARE GREATER THAN 1000 FEET APART
 - C. WHERE SHOWN ON PLANS
6. THE WIDE LANE LINE DELINEATES THE BICYCLE LANE AREA, SHALL BE 8" WIDE AND WHITE IN COLOR.
7. WHERE THE BICYCLE LANE IS TO THE LEFT OF THE RIGHT TURN POCKET, THE LANE LINE ON EACH SIDE OF THE BICYCLE LANE SHALL BE 8" WIDE.

REV. NO.	DATE	BY	APPR.
1	1/1/11	SCD	JC
2	10/21/14	SCD	JC



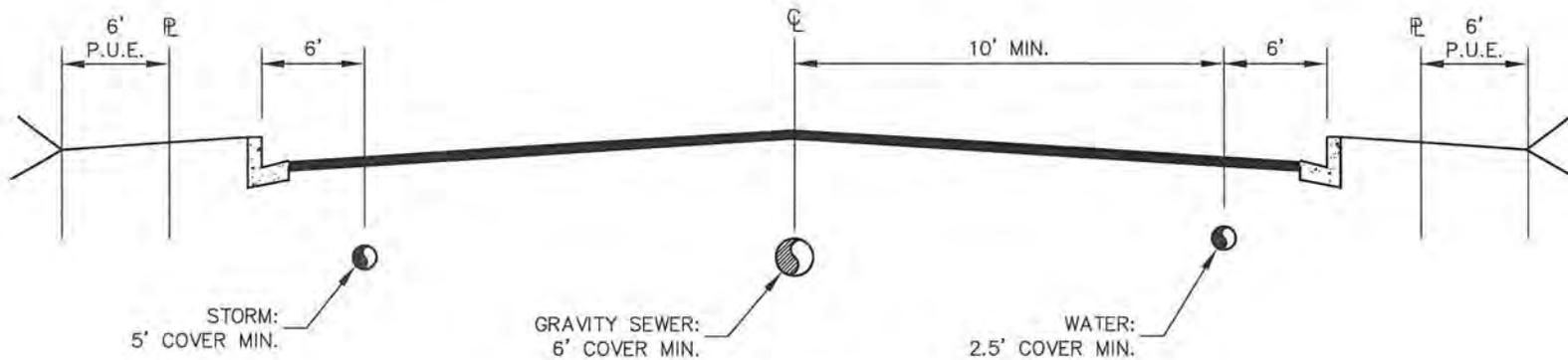
CITY OF CAMAS ~ STREET DETAIL
BICYCLE LANE MARKING

Jan P. Cantor 10-21-14
 DETAIL APPROVED BY DATE

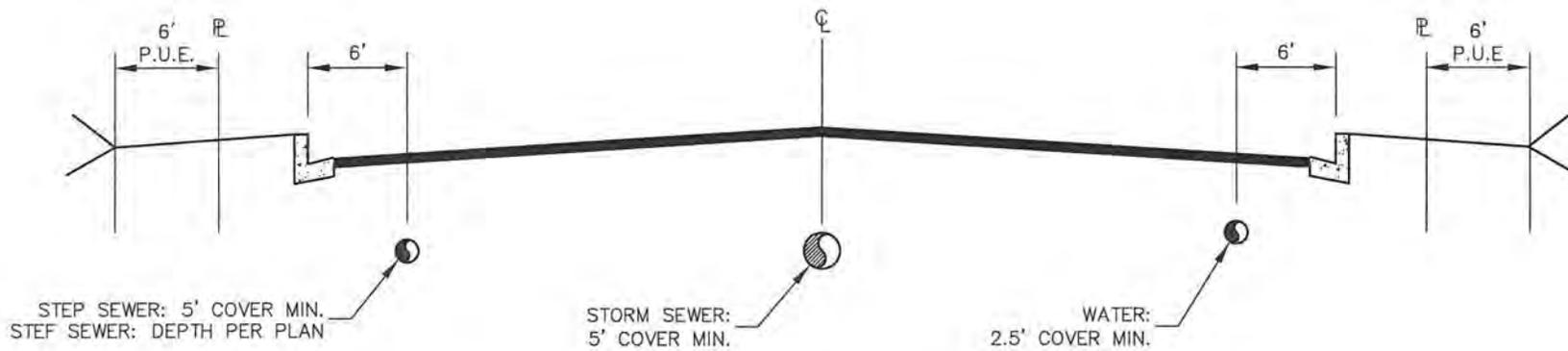
DETAIL NO.

ST33

NOT TO SCALE



STANDARD UTILITY LOCATION W/GRAVITY SEWER



STANDARD UTILITY LOCATION W/STEF OR STEP SEWER

REV. NO.	DATE	BY	APPR.
1	5/1/07	SCD	JC
2	1/1/11	SCD	JC
3	10/21/14	SCD	JC



CITY OF CAMAS ~ STREET DETAIL
STANDARD UTILITY LOCATION

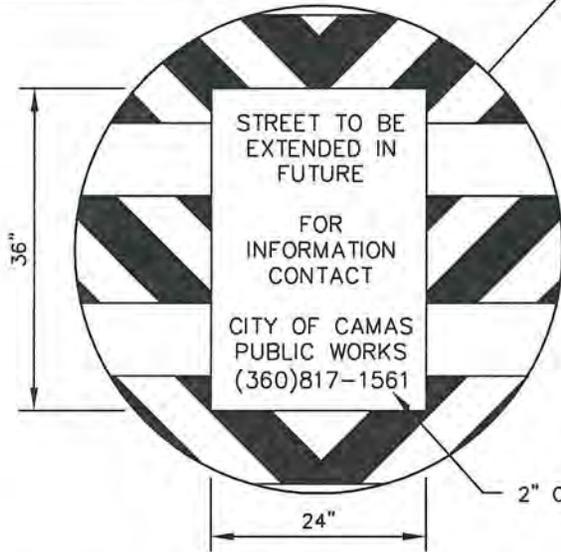
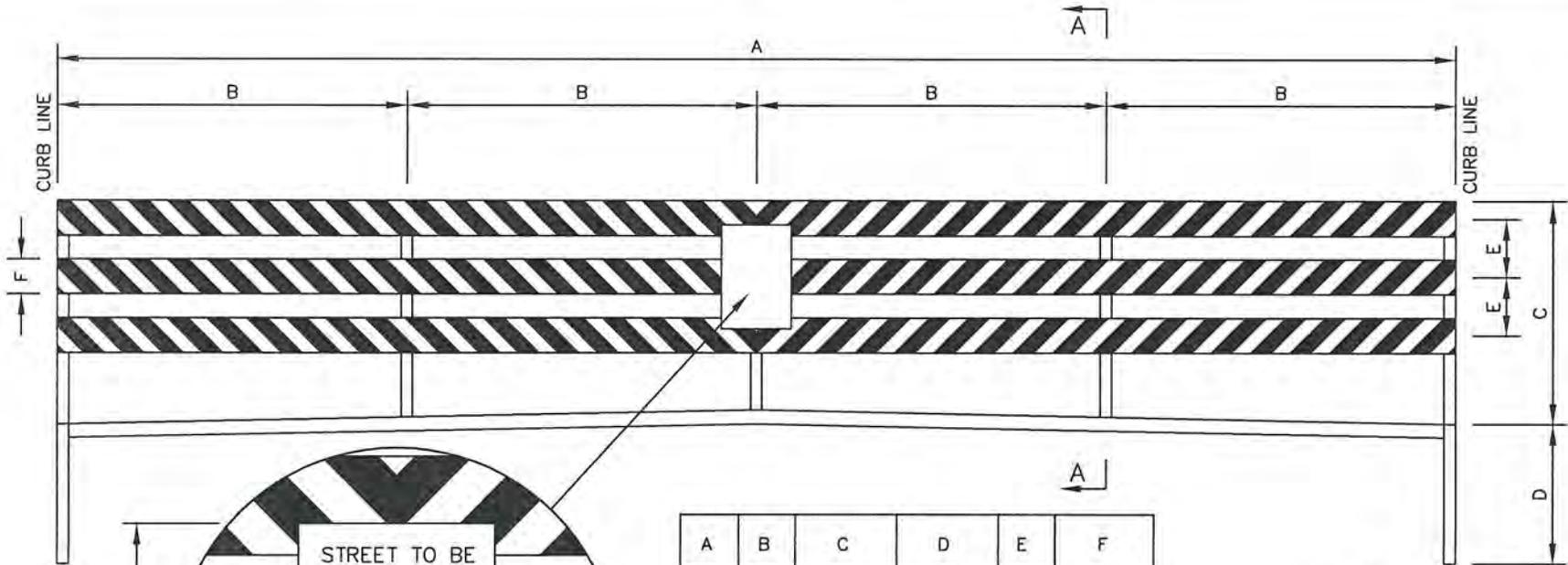
Jan P. Coakley 10-21-14
DETAIL APPROVED BY DATE

DETAIL NO.

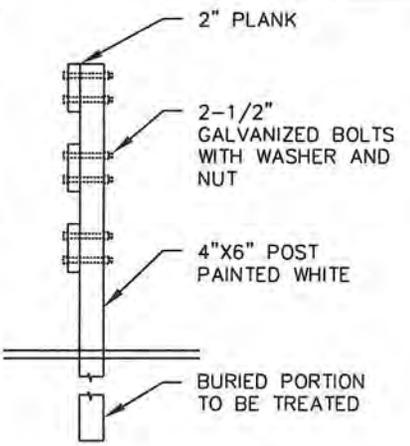
ST34

NOT TO SCALE

ST-MISC.DWG



A	B	C	D	E	F
48'	10'	5' MIN.	4' MIN.	20"	8"-12"
36'	9'	5' MIN.	4' MIN.	20"	8"-12"
28'	8'	5' MIN.	4' MIN.	20"	8"-12"



SECTION A-A

NOTES:

1. STRIPING SHALL BE ALTERNATING ORANGE (RODDA #1249 OR EQUAL) AND WHITE STRIPES 6" IN WIDTH AT A 45 DEGREE ANGLE AND SHALL BE EITHER RETRO-REFLECTIVE HIGH INTENSITY PRISMATIC TAPE OR PAINT WITH A SEALED RETRO-REFLECTIVE SURFACE.
2. THIS BARRICADE SHALL CONFORM TO SECTION 3F-1, MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES-FHWA.

REV. NO.	DATE	BY	APPR.
1	5/1/07	SCD	JC
2	1/1/11	SCD	JC

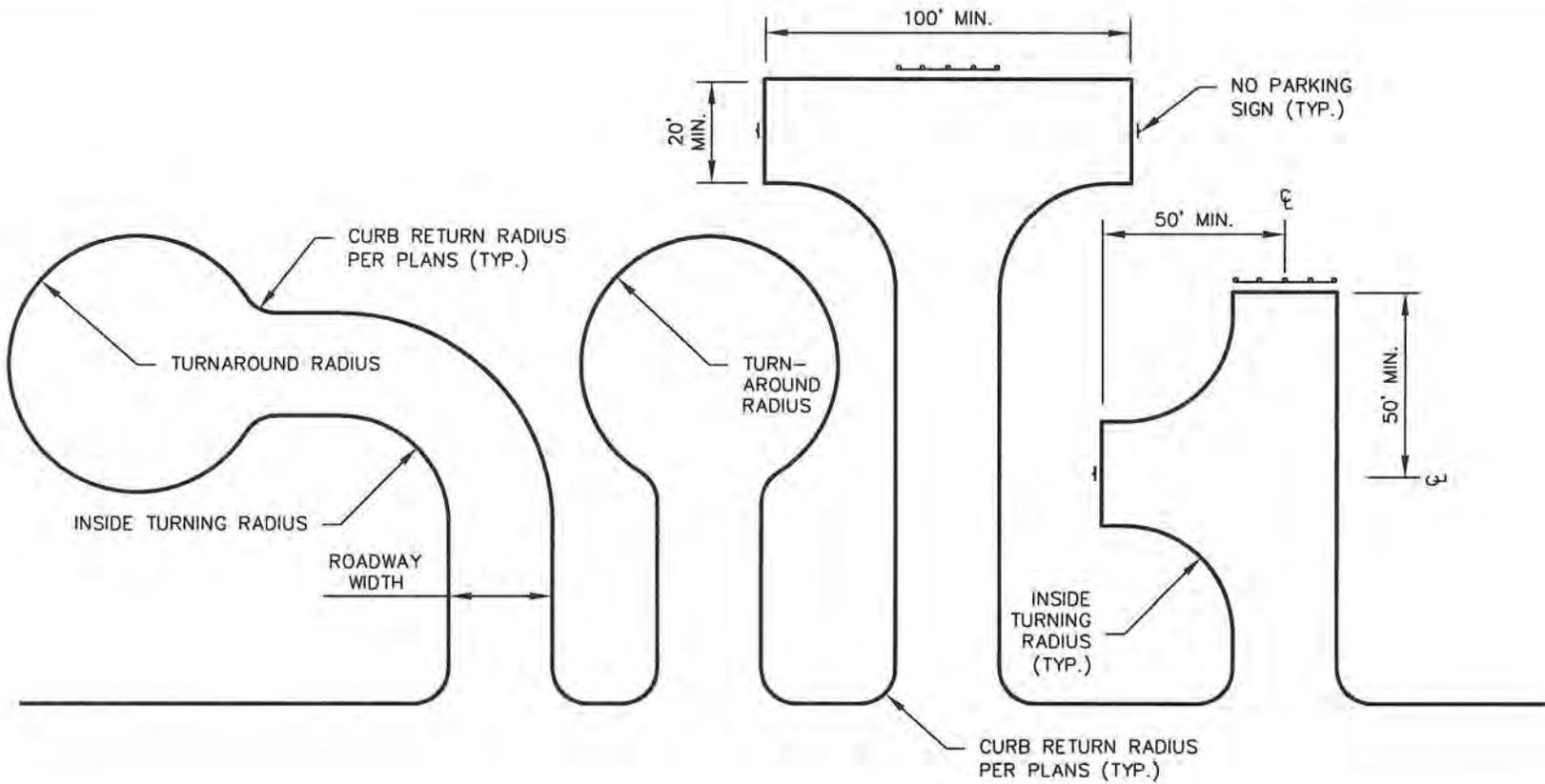


CITY OF CAMAS ~ STREET DETAIL
TYPE III BARRICADE

Jan P. Coulter 1-4-11
DETAIL APPROVED BY DATE

DETAIL NO.
ST35

NOT TO SCALE



GUIDELINES – NON-SPRINKLERED DEVELOPMENT
 MINIMUM ROADWAY WIDTH 36'
 MINIMUM TURNING RADIUS (INSIDE RADIUS) 30'
 MINIMUM TURNAROUND RADIUS 44'

GUIDELINES – SPRINKLERED DEVELOPMENT
 MINIMUM ROADWAY WIDTH 28'
 MINIMUM TURNING RADIUS (INSIDE RADIUS) 30'
 MINIMUM TURNAROUND RADIUS 35'

NOTES:

1. SURFACE SHALL BE AN APPROVED ASPHALT CONCRETE PAVEMENT STRUCTURAL SECTION, MINIMUM 3" COMPACTED THICKNESS.

REV. NO.	DATE	BY	APPR.
1	5/1/07	SCD	JC
2	1/1/11	SCD	JC



CITY OF CAMAS ~ STREET DETAIL
 DEAD END TURNAROUND

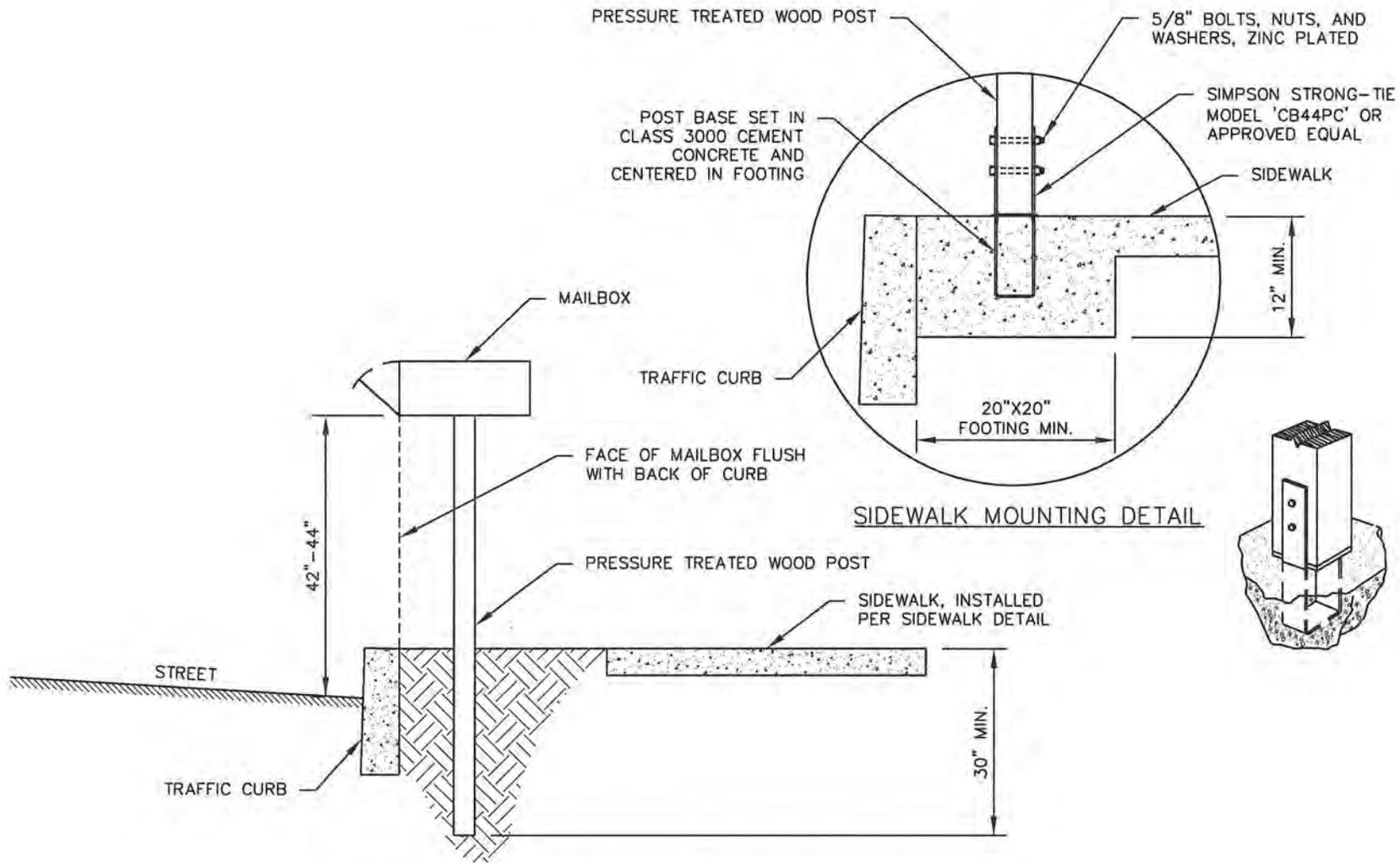
Don P. Cothran 1-4-11
 DETAIL APPROVED BY DATE

DETAIL NO.

ST36

NOT TO SCALE

ST-MISC.DWG



NOTES:

1. IF THERE IS NO PLANTER STRIP, USE POST MOUNTING BASE AND SET IN CONCRETE (SEE INSET DETAIL).
2. POST MOUNTING BASE SHALL BE SIMPSON STRONG-TIE 'CB44PC' WITH POWDER COAT FINISH, OR APPROVED EQUAL.

REV. NO.	DATE	BY	APPR.
1	5/1/07	SCD	JC
2	1/1/11	SCD	JC



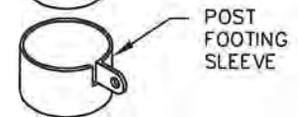
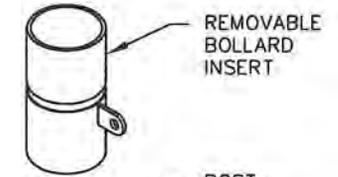
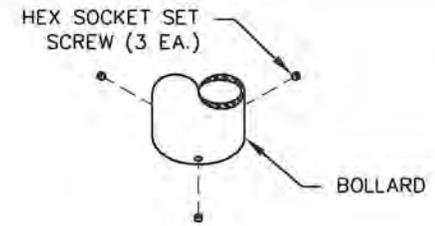
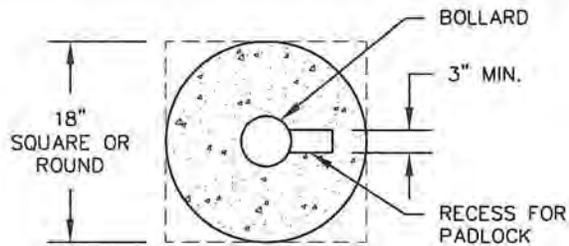
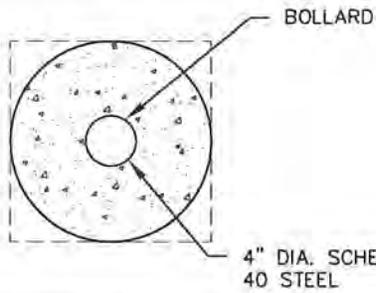
**CITY OF CAMAS ~ STREET DETAIL
MAILBOX INSTALLATION GUIDELINES**

Joe P. Carstensen 1-4-11
DETAIL APPROVED BY DATE

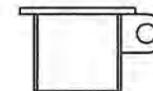
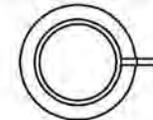
DETAIL NO.

ST37

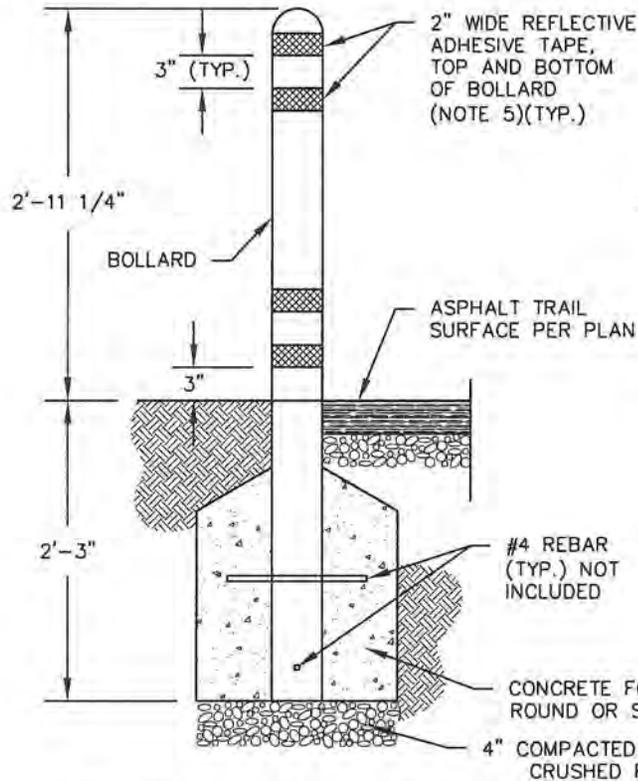
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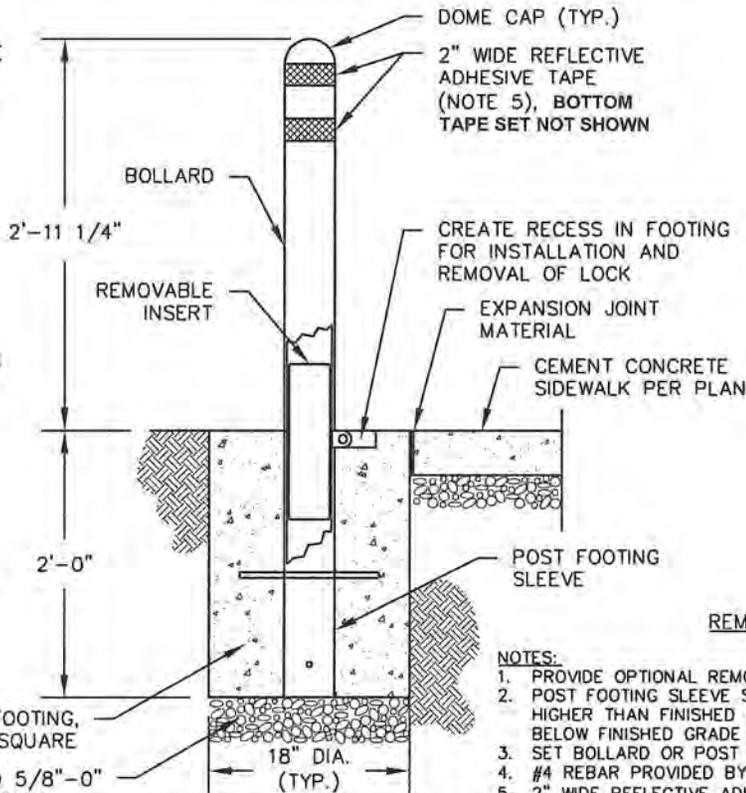
REMOVABLE BOLLARD INSERT & SLEEVE



REMOVABLE BOLLARD HOLE COVER



BOLLARD - EMBEDMENT MOUNT
TYPE 2



BOLLARD - REMOVABLE
TYPE 1

NOTES:

1. PROVIDE OPTIONAL REMOVABLE BOLLARD HOLE COVER WHEN SPECIFIED.
2. POST FOOTING SLEEVE SHALL BE SET IN FOOTING SO THE TOP IS NOT HIGHER THAN FINISHED GRADE, AND PADLOCK TAB SHALL BE RECESSED BELOW FINISHED GRADE WITH SPACE FOR PADLOCK LOOP.
3. SET BOLLARD OR POST FOOTING SLEEVE PLUMB IN CONCRETE FOOTING.
4. #4 REBAR PROVIDED BY CONTRACTOR.
5. 2" WIDE REFLECTIVE ADHESIVE TAPE, 3M DIAMOND GRADE RED, OR APPROVED EQUAL, NOT INCLUDED WITH BOLLARD.
6. BOLLARD MFD. BY COLUMBIA CASCADE, M/N 2190-E (EMBEDMENT), 2190-R (REMOVABLE), 2190-RC (REMOVABLE WITH CAP), POWDER COAT COLOR "CHROME YELLOW", OR APPROVED EQUAL.
7. BOLLARDS SHALL BE LOCATED AS SHOWN IN THE PLANS. WHEN MULTIPLE BOLLARDS ARE REQUIRED, SPACING SHALL BE NO LESS THAN 6.5 FEET.

REV. NO.	DATE	BY	APPR.
1	1/1/11	SCD	JC



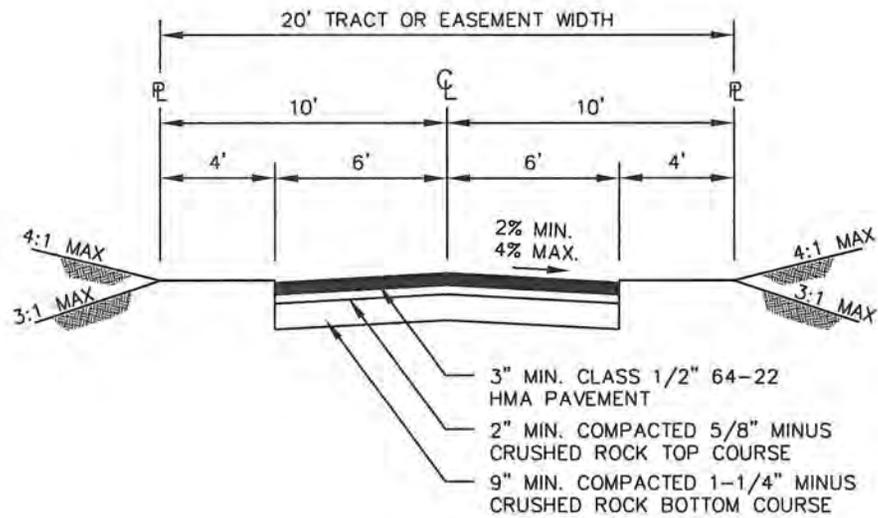
CITY OF CAMAS ~ STREET DETAIL
BOLLARD - TYPE 1 AND TYPE 2

DETAIL APPROVED BY *Sam P. Coathran* 1-4-11
DATE

DETAIL NO.

ST38

NOT TO SCALE



PRIVATE STREET - A
(CROWN OR INVERT SECTION)

- NOTES:**
1. STREET SECTION DEPTHS SHOWN ARE ABSOLUTE MINIMUMS.
 2. CROSS-SLOPE APPLIES TO CROWN OR SHED STREETS.

REV. NO.	DATE	BY	APPR.
1	9/18/07	SCD	JC
2	1/1/11	SCD	JC



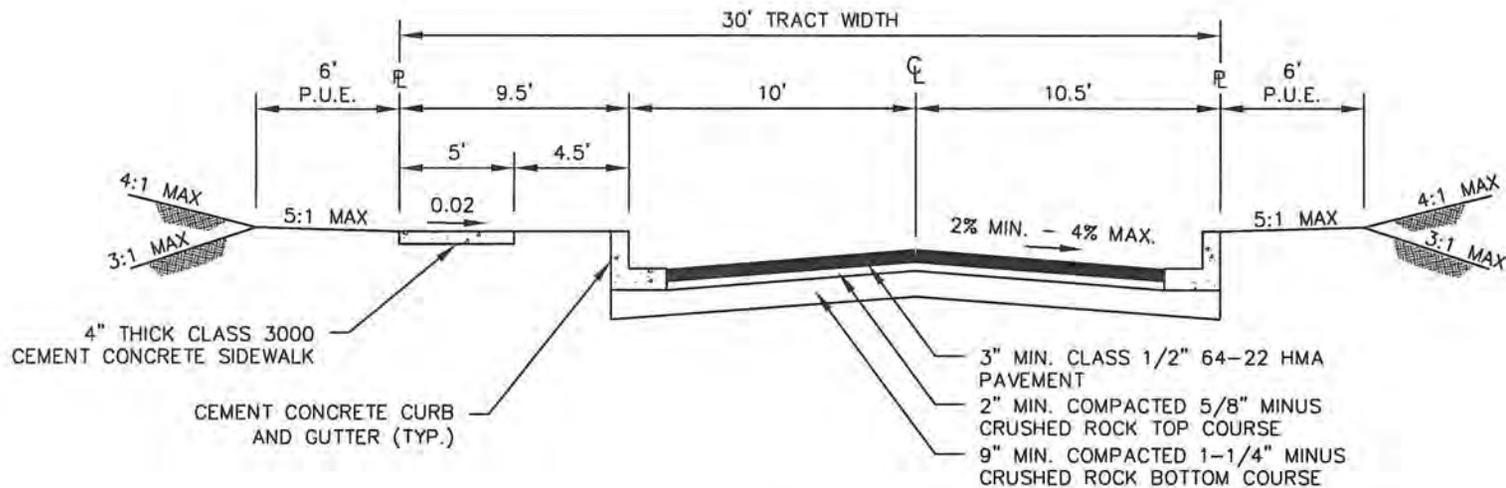
CITY OF CAMAS ~ STREET DETAIL
PRIVATE STREET - A

Jan P. Coathran 1-4-11
DETAIL APPROVED BY DATE

NOT TO SCALE

DETAIL NO.
PVT1

ST-PRIVATE.DWG



PRIVATE STREET - B
(CROWN OR SHED SECTION)

NOTES:

1. STREET SECTION DEPTHS SHOWN ARE ABSOLUTE MINIMUMS.
2. CROSS-SLOPE APPLIES TO CROWN OR SHED STREETS.

REV. NO.	DATE	BY	APPR.
1	9/18/07	SCD	JC
2	1/1/11	SCD	JC



CITY OF CAMAS ~ STREET DETAIL
PRIVATE STREET - B

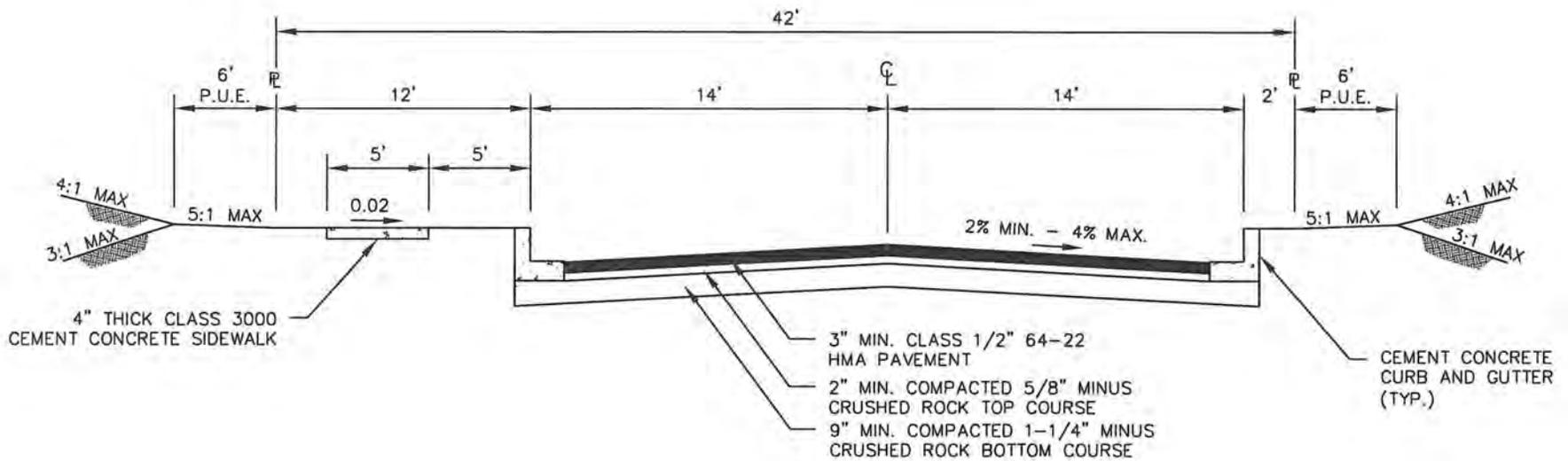
DETAIL APPROVED BY *Jan P. ...* 1-4-11
DATE

NOT TO SCALE

DETAIL NO.

PVT2

ST-PRIVATE.DWG



PRIVATE STREET - C
(CROWN OR SHED SECTION)

NOTES:

1. STREET SECTION DEPTHS SHOWN ARE ABSOLUTE MINIMUMS.
2. CROSS-SLOPE APPLIES TO CROWN OR SHED STREETS.

REV. NO.	DATE	BY	APPR.
1	9/18/07	SCD	JC
2	1/1/11	SCD	JC



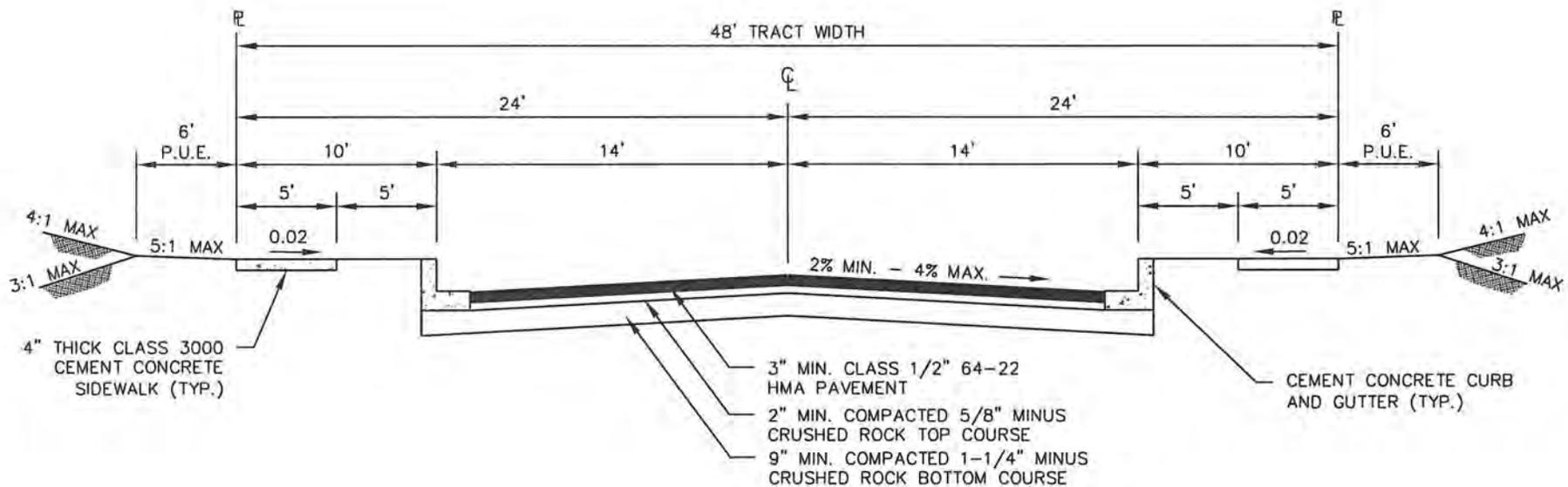
CITY OF CAMAS ~ STREET DETAIL
PRIVATE STREET - C

Jim P. Cothran 1-4-11
DETAIL APPROVED BY DATE

DETAIL NO.

PVT3

NOT TO SCALE



PRIVATE STREET - D
(CROWN OR SHED SECTION)

NOTES:

1. STREET SECTION DEPTHS SHOWN ARE ABSOLUTE MINIMUMS.
2. CROSS-SLOPE APPLIES TO CROWN OR SHED STREETS.

REV. NO.	DATE	BY	APPR.
1	9/18/07	SCD	JC
2	1/1/11	SCD	JC



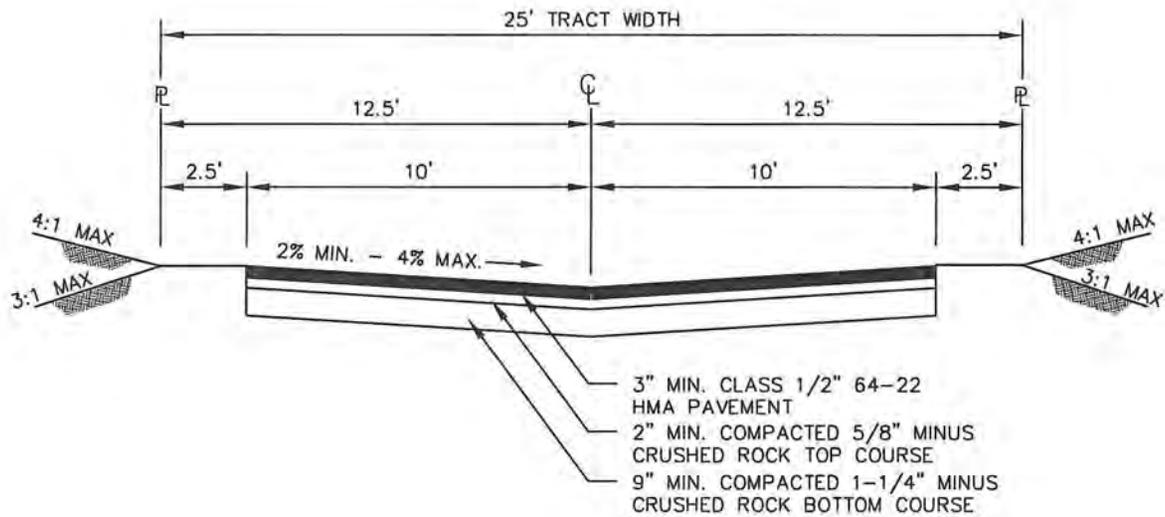
CITY OF CAMAS ~ STREET DETAIL
PRIVATE STREET - D

Sam P. Arthur 1-4-11
DETAIL APPROVED BY DATE

DETAIL NO.

PVT4

NOT TO SCALE



PRIVATE STREET - E
 (INVERT SECTION)

NOTES:

1. STREET SECTION DEPTHS SHOWN ARE ABSOLUTE MINIMUMS.
2. CROSS-SLOPE APPLIES TO CROWN OR SHED STREETS.

REV. NO.	DATE	BY	APPR.
1	9/18/07	SCD	JC
2	1/1/11	SCD	JC



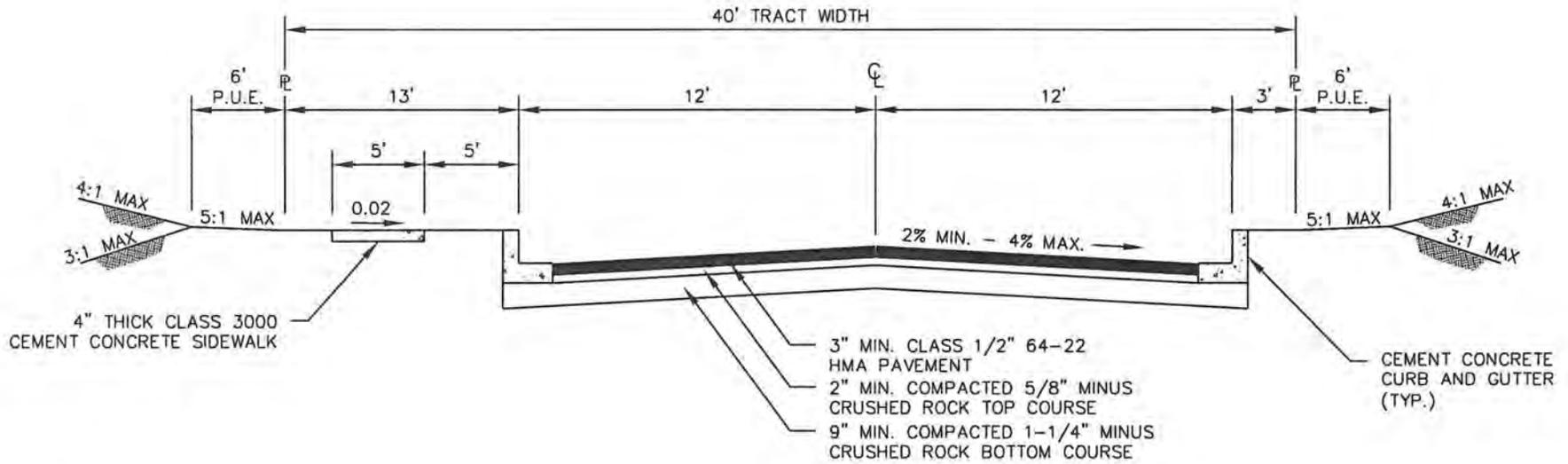
CITY OF CAMAS ~ STREET DETAIL
 PRIVATE STREET - E

Jan P. Crutcher 1-4-11
 DETAIL APPROVED BY DATE

DETAIL NO.

PVT5

NOT TO SCALE



PRIVATE STREET - F

NOTES:

1. STREET SECTION DEPTHS SHOWN ARE ABSOLUTE MINIMUMS.
2. CROSS-SLOPE APPLIES TO CROWN OR SHED STREETS.

REV. NO.	DATE	BY	APPR.
1	9/18/07	SCD	JC
2	1/1/11	SCD	JC



CITY OF CAMAS ~ STREET DETAIL
PRIVATE STREET - F

Jan P. Carothers 1-4-11
DETAIL APPROVED BY DATE

DETAIL NO.

PVT6

NOT TO SCALE



Storm Details

City of Camas
616 NE Fourth Avenue
Camas, WA 98607
www.cityofcamas.us

Phone: (360) 834-6864
Fax: (360) 834-1535

Creation Date: 10/28/02
Revision Date: 4/27/16 (Partial)

City of Camas Storm Details ~ INDEX

<u>Detail No.</u>	<u>Detail Name</u>	<u>Rev.</u>	<u>Rev. Date</u>
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SD2	CATCH BASIN (TYPE 1)	2	1/1/2011
SD3	CURB INLET CATCH BASIN (TYPE 2)	2	1/1/2011
SD4	COMBINATION CURB INLET	2	1/1/2011
SD5	ROLLED CURB CATCH BASIN (TYPE1)	2	1/1/2011
SD6	SLOPED FIELD CATCH BASIN	2	1/1/2011
SD7	CATCH BASIN TRAP	2	1/1/2011
SD8	STORM SEWER SERVICE STUB OUT	2	1/1/2011
SD9	48" STORM SEWER MANHOLE	2	1/1/2011
SD10	48" STORM DROP (UNDER 18") MANHOLE	2	1/1/2011
SD11	60" STORM DROP (OVER 18") MANHOLE	2	1/1/2011
SD12	MANHOLE COVER & RISERS	2	1/1/2011
SD13	FRENCH DRAINS	2	1/1/2011
SD14	FRENCH DRAIN CLEANOUT	4	4/27/2016
SD15	CATCH BASIN - PVC	2	1/1/2011
SD16	CURB INLET CATCH BASIN - PVC	2	1/1/2011
SD17	COMBINATION CURB INLET - PVC	2	1/1/2011
SD18	DRAIN OUTLET	1	1/1/2011
SD19	STORM MEDALLION	1	10/21/2014

STORM CONSTRUCTION NOTES:

1. ALL TRENCH EXCAVATION AND PIPE INSTALLATION SHALL CONFORM TO THE MOST RECENTLY ADOPTED EDITION OF THE W.S.D.O.T. STANDARD SPECIFICATIONS SECTION 7-08.3(1) AND SECTION 7-08.3(2). ALL EXCESS MATERIAL FROM THE TRENCH EXCAVATION SHALL BE DISPOSED OF ON AN APPROVED SITE.
2. PIPE BEDDING, PIPE ZONE MATERIAL AND TRENCH BACKFILL SHALL BE AN APPROVED GRANULAR MATERIAL OF EITHER WASHED SCREENINGS OR 5/8 INCH MINUS CRUSHED ROCK. SAND BACKFILL IS NOT ALLOWED.
3. TRENCH COMPACTION SHALL BE PER THE MOST RECENTLY ADOPTED EDITION OF THE W.S.D.O.T. STANDARD SPECIFICATIONS SECTION 7-08.3(3). CONTRACTOR TO DETERMINE THE TYPE OF EQUIPMENT AND METHOD TO USE TO ACHIEVE THE REQUIRED COMPACTION. EACH LIFT SHALL BE COMPACTED TO A MINIMUM OF 95 PERCENT OF THE MAXIMUM DENSITY AS DETERMINED BY THE A.A.S.H.T.O. T-180 TEST METHOD.
4. SETTLEMENT OF THE FINISHED SURFACE WITHIN THE WARRANTY PERIOD SHALL BE CONSIDERED TO BE A RESULT OF IMPROPER COMPACTION AND SHALL BE PROMPTLY REPAIRED BY THE CONTRACTOR AT NO EXPENSE TO THE CITY.
5. ALL STORM MAIN PIPE SHALL BE A MINIMUM 12 INCHES DIAMETER.
6. ALL STORM PIPE LATERALS SHALL BE A MINIMUM 10 INCHES DIAMETER.
7. STORM PIPE MATERIALS SHALL BE AS INDICATED IN TABLE 7-1 IN THE CAMAS STORMWATER DESIGN STANDARDS MANUAL (CSDSM).
8. STORM PIPE MINIMUM SLOPE SHALL BE AS INDICATED IN TABLE 7-2, AND MAXIMUM SLOPE SHALL BE AS INDICATED IN TABLE 7-3 IN THE CSDSM.
9. ALL MANHOLES LOCATED IN UNIMPROVED EASEMENTS AND RIGHT OF WAYS SHALL BE PROVIDED WITH TAMPER PROOF LIDS AND SHALL BE SET 6 INCHES ABOVE FINISHED GRADE.
10. VIDEO INSPECTION TAPES AND REPORTS MAY BE REQUIRED AT THE CITY'S DISCRETION. MANDREL TESTING MAY BE REQUIRED AT THE CITY'S DISCRETION.
11. INSTALL STORMWATER MEDALLION ON CURB AT EACH CATCH BASIN OR CURB INLET.

REV. NO.	DATE	BY	APPR.
1	9/18/07	SCD	JC
2	1/1/11	SCD	JC
3	10/21/14	SCD	JC



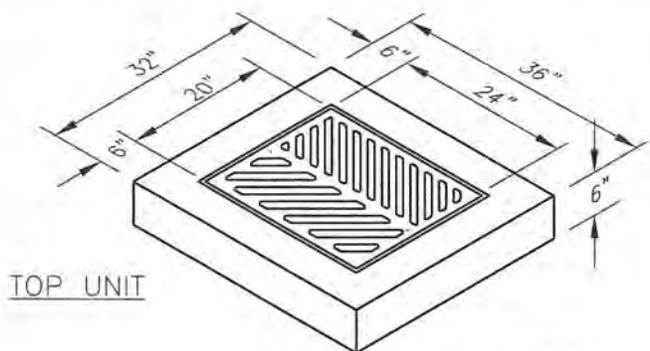
CITY OF CAMAS ~ STORM DETAIL
STORM CONSTRUCTION NOTES

Jan C. Carter 10-21-14
DETAIL APPROVED BY DATE

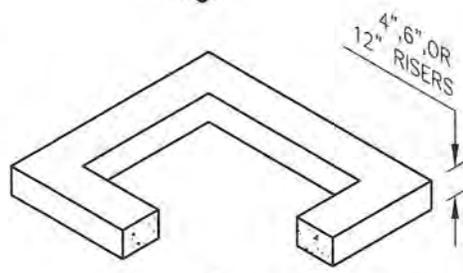
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DETAIL NO.

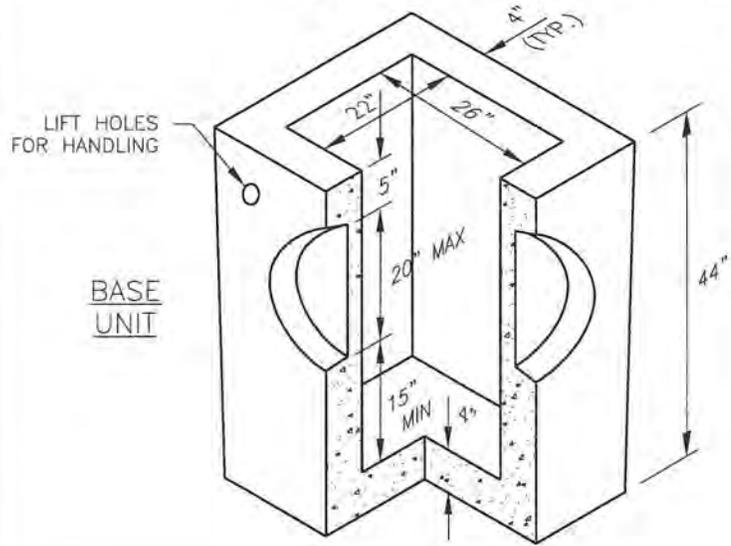
SD1



TOP UNIT

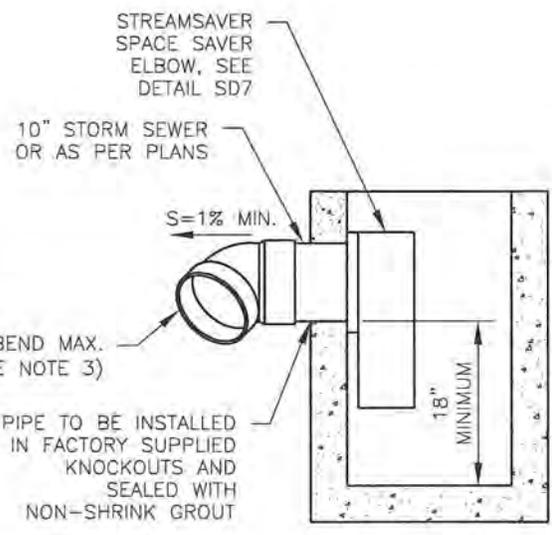


RISER



BASE UNIT

CATCH BASIN TYPE 1



TYPE 1 CATCH BASIN SECTION

NOTES:

1. CATCH BASIN INLET SHALL CONSIST OF A PRECAST WSDOT TYPE 1 BASE AND A PRECAST TOP UNIT, OR APPROVED EQUAL.
2. THE TOP UNIT SHALL CONSIST OF A SEPARATE CAST IRON FRAME AND GRATE OR A CAST IRON GRATE WITH THE FRAME CAST INTO 6" RISER.
3. THE PRECAST BASE SECTION MAY HAVE A ROUNDED FLOOR, AND THE WALLS MAY BE SLOPED AT A RATE OF 1:24 OR STEEPER.
4. LATERALS SHALL BE CONSTRUCTED TO ENTER THE BASIN PERPENDICULAR TO THE BASIN WALL. THE LATERAL SHALL ENTER ONLY AT THE FRONT OR SIDE OF THE BASIN WITH NO LATERALS ALLOWED TO ENTER THE CATCH BASIN AT THE CORNERS. IF NEEDED, A BEND MAY BE USED AS THE FIRST SECTION OF PIPE OUTSIDE THE BASIN WALL. THE MAXIMUM BEND ALLOWED SHALL BE 45 DEGREES.
5. ALL REINFORCED STEEL SHALL HAVE 1-1/2" CLEAR COVER UNLESS OTHERWISE NOTED, AND SHALL BE GRADE 40 OR GRADE 60 (ASTM A-615).
6. ANY PROTRUDING ENDS OF PIPES SHALL BE TRIMMED FLUSH WITH THE INSIDE WALLS AND SEALED WITH NON-SHRINK GROUT.
7. THE METAL FRAME AND GRATE SHALL BE SET TO A SLOPE TO CONFORM TO THE PARTICULAR DRAINAGE SLOPE. CAST IRON GRATE SHALL HAVE DIAGONAL VANES AS SHOWN. NO WELDING IS PERMITTED.
8. ZYMARK STREAMSAVER SPACE SAVER CATCH BASIN OUTFALL ELBOW OR APPROVED EQUAL SHALL BE USED IN ALL CATCH BASINS. TRAP SHALL BE INSTALLED FLUSH WITH INTERIOR WALL OF CATCH BASIN - SEE CATCH BASIN TRAP DETAIL.

REV. NO.	DATE	BY	APPR.
1	9/18/07	SCD	JC
2	1/1/11	SCD	JC



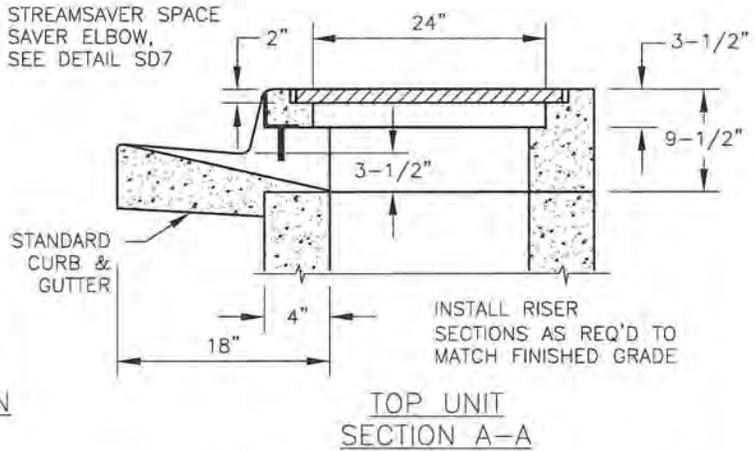
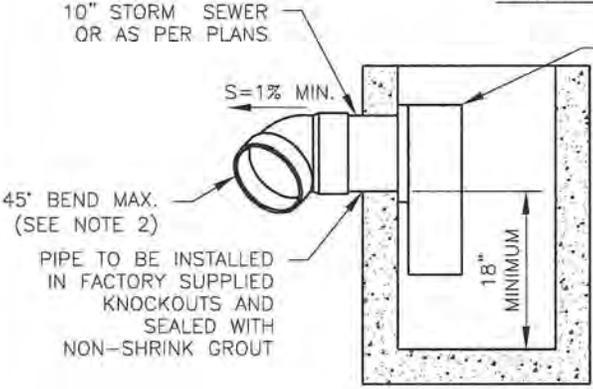
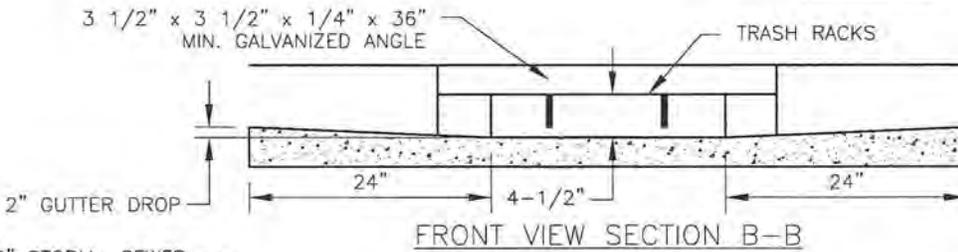
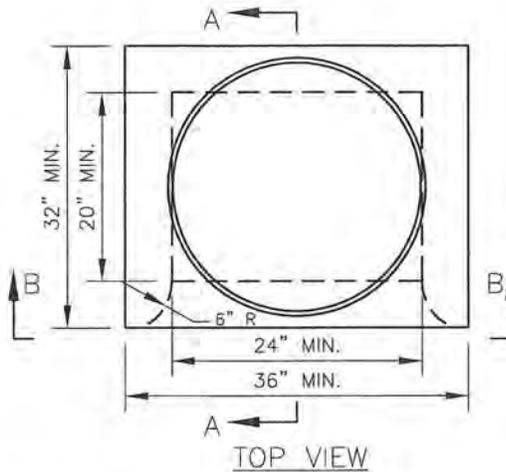
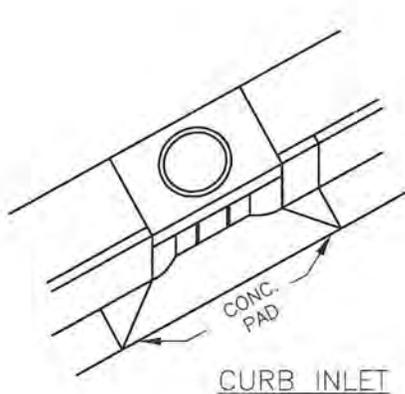
CITY OF CAMAS ~ STORM DETAIL
CATCH BASIN (TYPE 1)

Sam C. Cuthbert 1-4-11
DETAIL APPROVED BY DATE

DETAIL NO.
SD2

NOT TO SCALE

ST-CB.DWG



NOTES:

1. CURB INLET CATCH BASIN SHALL CONSIST OF A PRECAST WSDOT TYPE 1 BASE AND A PRECAST TOP UNIT, OR APPROVED EQUAL.
2. LATERALS SHALL BE CONSTRUCTED TO ENTER THE BASIN PERPENDICULAR TO THE BASIN WALL. THE LATERAL SHALL ENTER ONLY AT THE FRONT OR SIDE OF THE BASIN WITH NO LATERALS ALLOWED TO ENTER THE CATCH BASIN AT THE CORNERS. IF NEEDED, A BEND MAY BE USED AS THE FIRST SECTION OF PIPE OUTSIDE THE BASIN WALL. THE MAXIMUM BEND ALLOWED SHALL BE 45 DEGREES.
3. ALL REINFORCED STEEL SHALL HAVE 1-1/2" CLEAR COVER UNLESS OTHERWISE NOTED, AND SHALL BE GRADE 40 OR GRADE 60 (ASTM A-615).
4. ANY PROTRUDING ENDS OF PIPES SHALL BE TRIMMED FLUSH WITH THE INSIDE WALLS AND SEALED WITH NON-SHRINK GROUT.
5. THE METAL FRAME AND GRATE SHALL BE SET TO A SLOPE TO CONFORM TO THE PARTICULAR DRAINAGE SLOPE.
6. ZYMARK STREAMSAFER SPACE SAVER CATCH BASIN OUTFALL ELBOW OR APPROVED EQUAL SHALL BE USED IN ALL CATCH BASINS. TRAP SHALL BE INSTALLED FLUSH WITH INTERIOR WALL OF CATCH BASIN - SEE CATCH BASIN TRAP DETAIL.
7. CURB & GUTTER TO BE INSTALLED PRIOR TO INSTALLATION OF CURB INLETS. CONTRACTOR IS RESPONSIBLE FOR BLOCKING OUT CURB & GUTTER FOR ADEQUATE SPACE IN INSTALLING CURB INLETS.

REV. NO.	DATE	BY	APPR.
1	9/18/07	SCD	JC
2	1/1/11	SCD	JC



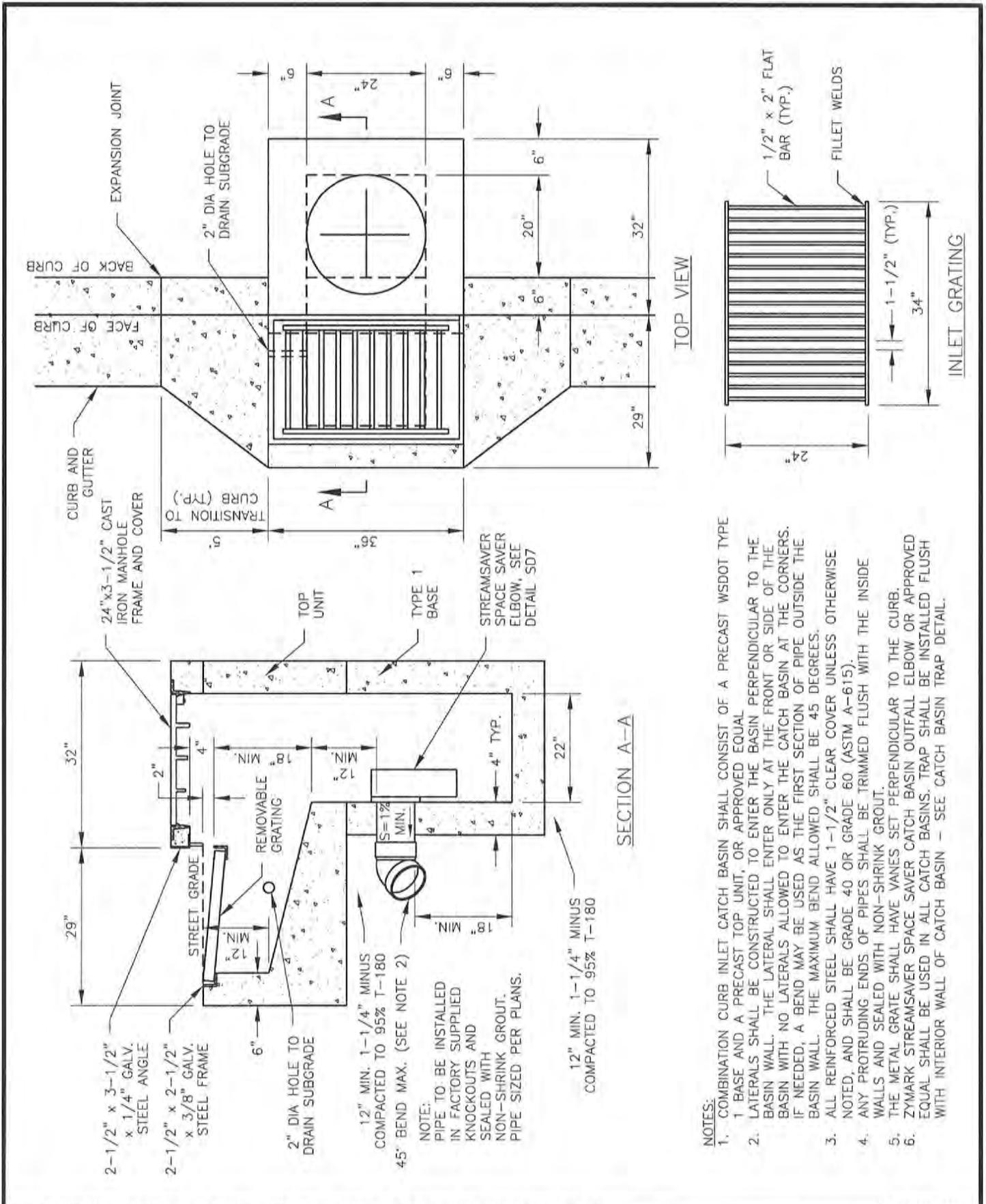
CITY OF CAMAS ~ STORM DETAIL
CATCH BASIN (TYPE 2)

DETAIL APPROVED BY *Don P. Coe* 1-4-11 DATE

DETAIL NO.
SD3

NOT TO SCALE

ST-CB.DWG



- NOTES:**
1. COMBINATION CURB INLET CATCH BASIN SHALL CONSIST OF A PRECAST WSDOT TYPE 1 BASE AND A PRECAST TOP UNIT, OR APPROVED EQUAL
 2. LATERALS SHALL BE CONSTRUCTED TO ENTER THE BASIN PERPENDICULAR TO THE BASIN WALL. THE LATERAL SHALL ENTER ONLY AT THE FRONT OR SIDE OF THE BASIN WITH NO LATERALS ALLOWED TO ENTER THE CATCH BASIN AT THE CORNERS. IF NEEDED, A BEND MAY BE USED AS THE FIRST SECTION OF PIPE OUTSIDE THE BASIN WALL. THE MAXIMUM BEND ALLOWED SHALL BE 45 DEGREES.
 3. ALL REINFORCED STEEL SHALL HAVE 1-1/2" CLEAR COVER UNLESS OTHERWISE NOTED, AND SHALL BE GRADE 40 OR GRADE 60 (ASTM A-615).
 4. ANY PROTRUDING ENDS OF PIPES SHALL BE TRIMMED FLUSH WITH THE INSIDE WALLS AND SEALED WITH NON-SHRINK GROUT.
 5. THE METAL GRATE SHALL HAVE VANES SET PERPENDICULAR TO THE CURB.
 6. ZYMARK STREAMSAVER SPACE SAVER CATCH BASIN OUTFALL ELBOW OR APPROVED EQUAL SHALL BE USED IN ALL CATCH BASINS. TRAP SHALL BE INSTALLED FLUSH WITH INTERIOR WALL OF CATCH BASIN - SEE CATCH BASIN TRAP DETAIL.

REV. NO.	DATE	BY	APPR.
1	9/18/07	SCD	JC
2	1/1/11	SCD	JC

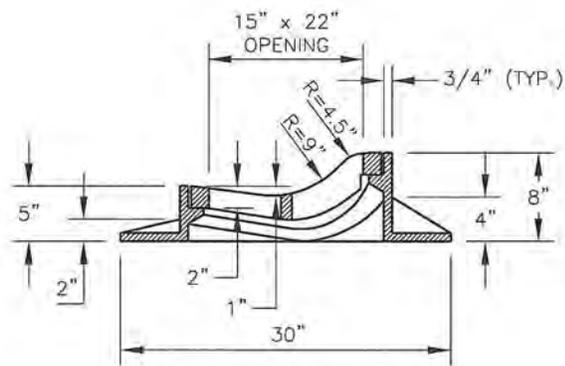


CITY OF CAMAS - STORM DETAIL
COMBINATION CURB INLET

San C. [Signature] 1-4-11
DETAIL APPROVED BY DATE

DETAIL NO.
SD4

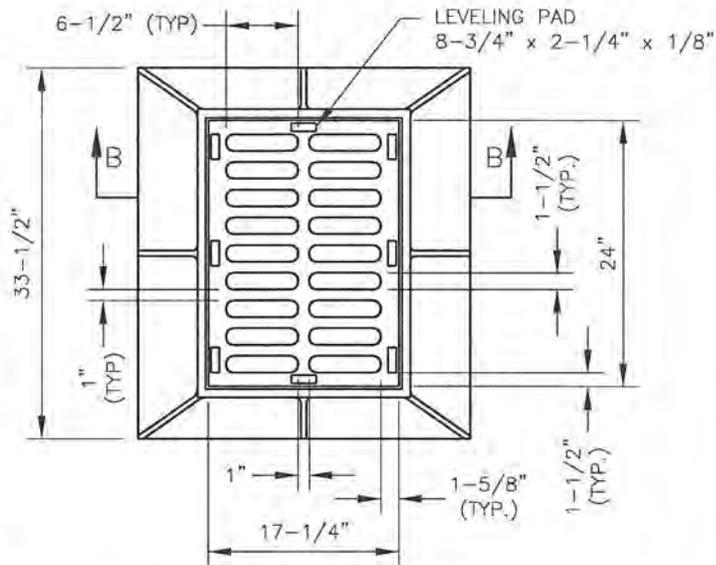
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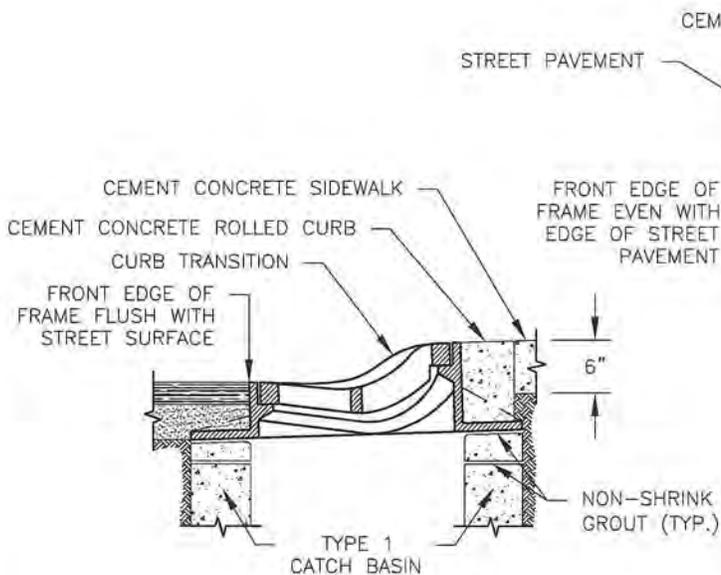
SECTION B-B

NOTES:

1. WELDING NOT PERMITTED
2. MATERIAL IS CAST IRON ASTM A48 CLASS 30.



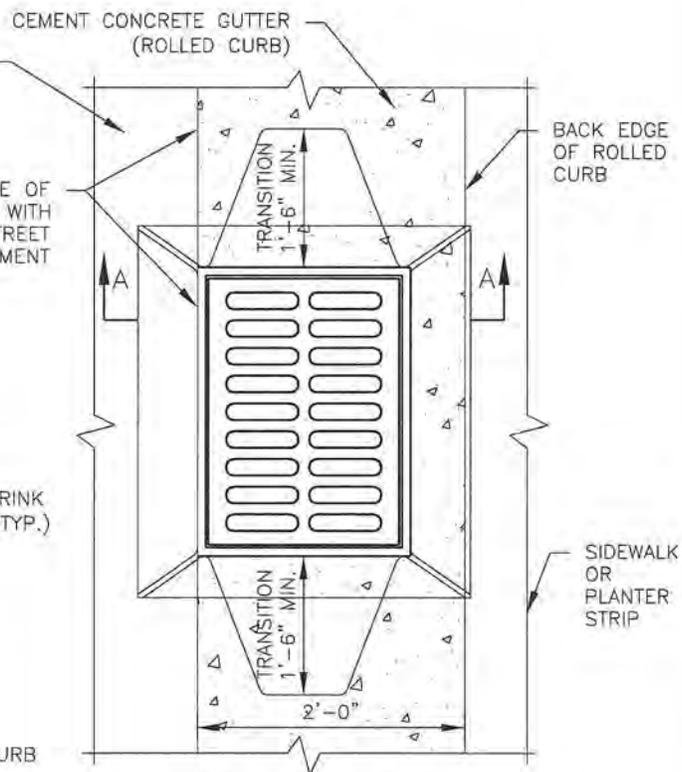
FRAME & GRATE PLAN



SECTION A-A

NOTES:

1. WELDING NOT PERMITTED
2. SET FRAME TO GRADE AND CONSTRUCT ROAD AND CURB TO BE FLUSH AT FRONT AND BACK OF FRAME.
3. SEE TYPE 1 CATCH BASIN FOR PIPE INSTALLATION DETAIL.



INSTALLATION PLAN

REV. NO.	DATE	BY	APPR.
1	9/18/07	SCD	JC
2	1/1/11	SCD	JC



CITY OF CAMAS ~ STORM DETAIL
 ROLLED CURB CATCH BASIN (TYPE 1)

Don P. Cantor 1-4-11
 DETAIL APPROVED BY DATE

NOT TO SCALE

DETAIL NO.
 SD5

DITCH INLET TOP UNIT

TOP UNIT (DITCH INLET)
WEIGHT: 1,350LBS

1 1/2"Ø LIFTING HOLE TYPICAL (2) PLACES

TOP UNIT PROVIDED WITH WSDOT FRAME AND GRATE: 3" X 2-1/2" X 3/8" ANGLE AND 2-1/2" X 3/8" FLAT BAR

10" STORM SEWER OR AS PER PLANS

STREAMSAVER SPACE SAVER ELBOW, SEE DETAIL SD7

S=1% MIN.

45° BEND MAX. (SEE NOTE 4)

SECTION

RISER

RISER: 6" WEIGHT: 275LBS

BASE UNIT

BASE: TYPE 1L WEIGHT: 2,480LBS

1 1/2"Ø LIFTING HOLE TYPICAL (2) PLACES

KNOCKOUT 26"Ø CLEAR OPENING TYPICAL (1) EACH WALL

NOTES:

- CATCH BASIN INLET SHALL CONSIST OF A PRECAST WSDOT TYPE 1L BASE AND A PRECAST DITCH INLET TOP UNIT, OR APPROVED EQUAL
- THE TOP UNIT SHALL CONSIST OF A SEPARATE GALVANIZED STEEL GRATE AND A GALVANIZED STEEL FRAME CAST INTO THE DITCH INLET TOP UNIT.
- THE PRECAST BASE SECTION MAY HAVE A ROUNDED FLOOR, AND THE WALLS MAY BE SLOPED AT A RATE OF 1:24 OR STEEPER.
- LATERALS SHALL BE CONSTRUCTED TO ENTER THE BASIN PERPENDICULAR TO THE BASIN WALL. THE LATERAL SHALL ENTER ONLY AT THE FRONT OR SIDE OF THE BASIN WITH NO LATERALS ALLOWED TO ENTER THE CATCH BASIN AT THE CORNERS. IF NEEDED, A BEND MAY BE USED AS THE FIRST SECTION OF PIPE OUTSIDE THE BASIN WALL. THE MAXIMUM BEND ALLOWED SHALL BE 45 DEGREES.
- ALL REINFORCED STEEL SHALL HAVE 1-1/2" CLEAR COVER UNLESS OTHERWISE NOTED, AND SHALL BE GRADE 40 OR GRADE 60 (ASTM A-615).
- ANY PROTRUDING ENDS OF PIPES SHALL BE TRIMMED FLUSH WITH THE INSIDE WALLS AND SEALED WITH NON-SHRINK GROUT.
- ZYMARK STREAMSAVER SPACE SAVER CATCH BASIN OUTFALL ELBOW OR APPROVED EQUAL SHALL BE USED IN ALL CATCH BASINS. TRAP SHALL BE INSTALLED FLUSH WITH INTERIOR WALL OF CATCH BASIN - SEE CATCH BASIN TRAP DETAIL.

REV. NO.	DATE	BY	APPR.
1	9/18/07	SCD	JC
2	1/1/11	SCD	JC



CITY OF CAMAS ~ STORM DETAIL

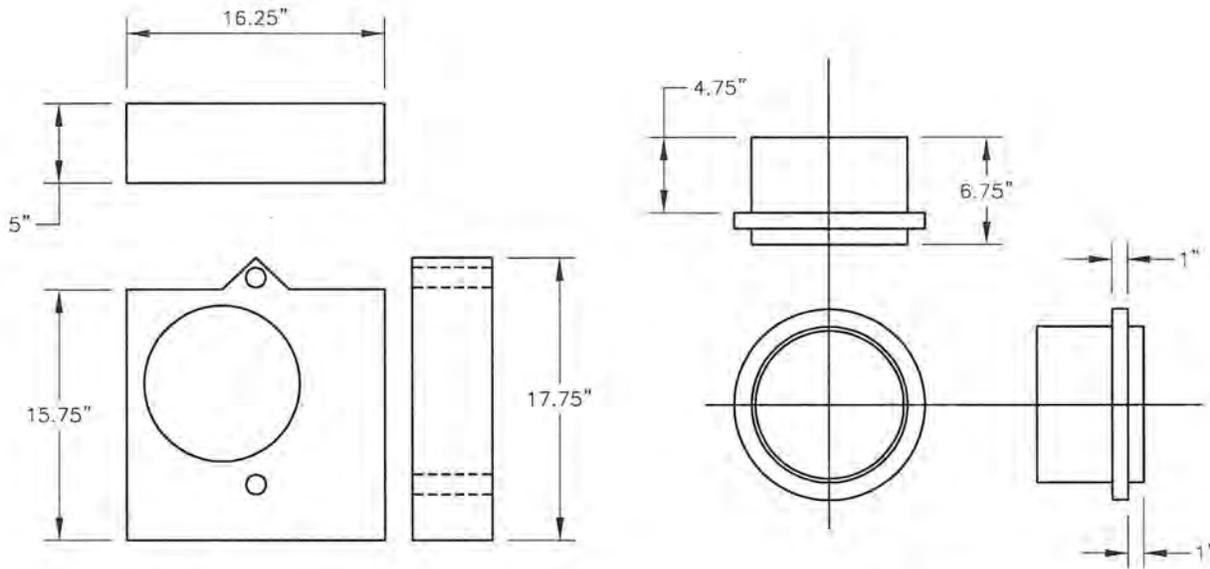
DITCH INLET CATCH BASIN

James P. Coakley 1-4-11
DETAIL APPROVED BY DATE

DETAIL NO.

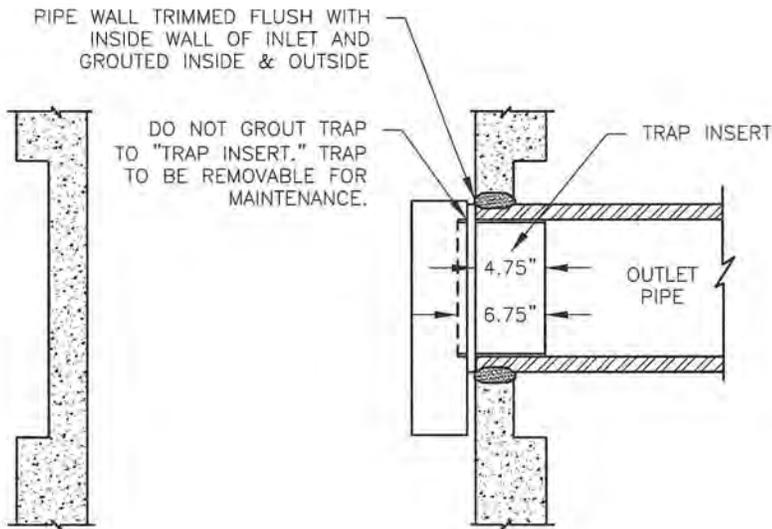
SD6

NOT TO SCALE



LOW PROFILE TRAP

TRAP INSERT



NOTES:

1. ZYMARK STREAMSAVER SPACE SAVER CATCH BASIN OUTFALL ELBOW OR APPROVED EQUAL SHALL BE USED IN ALL CATCH BASINS. TRAP SHALL BE INSTALLED FLUSH WITH INTERIOR WALL OF CATCH BASIN
2. "TRAP INSERT" SHALL BE ADHERED TO INSIDE WALL OF PIPE. CONSTRUCTION ADHESIVE DESIGNED FOR USE ON POLYETHYLENE SHALL BE USED. FACE OF "TRAP INSERT" SHALL BE FLUSH WITH WALL OF STRUCTURE
3. TRAP MATERIAL SHALL BE HDPE

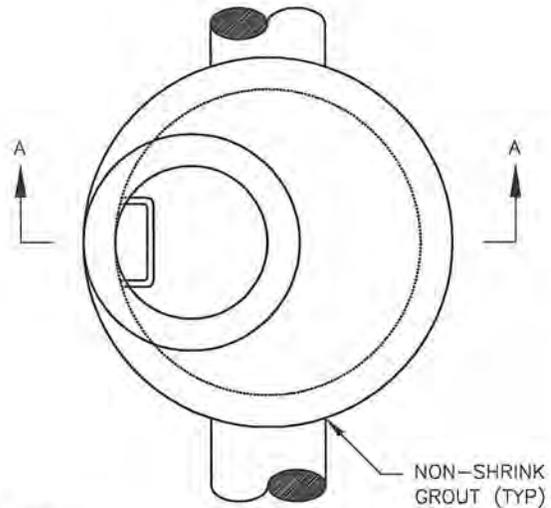
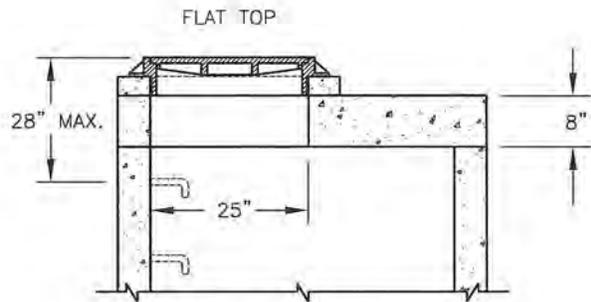
REV. NO.	DATE	BY	APPR.
1	9/18/07	SCD	JC
2	1/1/11	SCD	JC



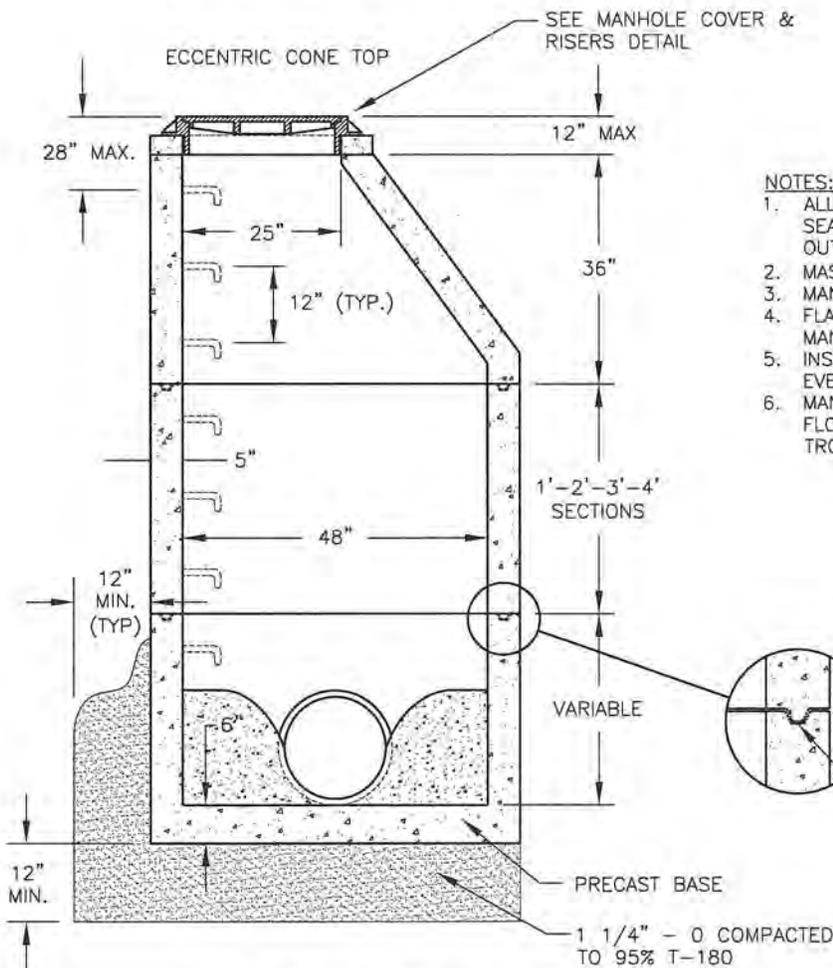
CITY OF CAMAS ~ STORM DETAIL
 CATCH BASIN OUTFALL ELBOW
Don P. Coe 1-4-11
 DETAIL APPROVED BY DATE

DETAIL NO.
 SD7

NOT TO SCALE



PLAN VIEW



SECTION VIEW A-A

NOTES:

1. ALL PIPE OPENINGS SHALL BE CORED AND SEALED WITH NON-SHRINK GROUT INSIDE AND OUTSIDE MANHOLE
2. MASTIC SEAL REQ'D IN ALL KEYLOCK JOINTS
3. MANHOLES SHALL CONFORM TO ASTM C-478
4. FLAT TOP SECTION MAY BE USED FOR SHALLOW MANHOLES
5. INSIDE JOINTS SHALL BE STRUCK SMOOTH & EVEN WITH THE INSIDE WALLS
6. MANHOLE BASE TO HAVE SHAPED CHANNELS. FLOW LINE & INSIDE SURFACES SHALL BE TROWLED SMOOTH & UNIFORM

REV. NO.	DATE	BY	APPR.
1	9/18/07	SCD	JC
2	1/1/11	SCD	JC

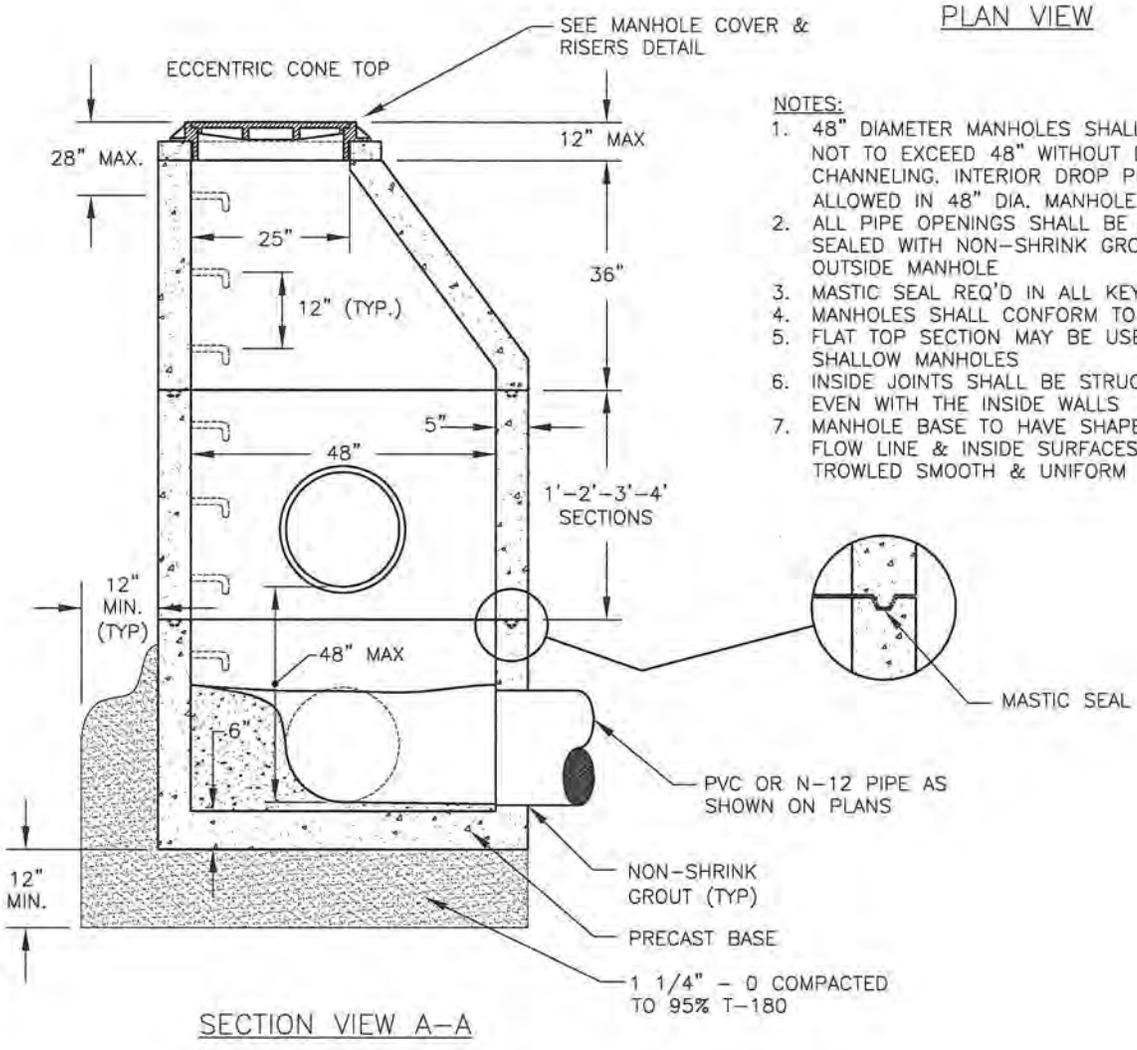
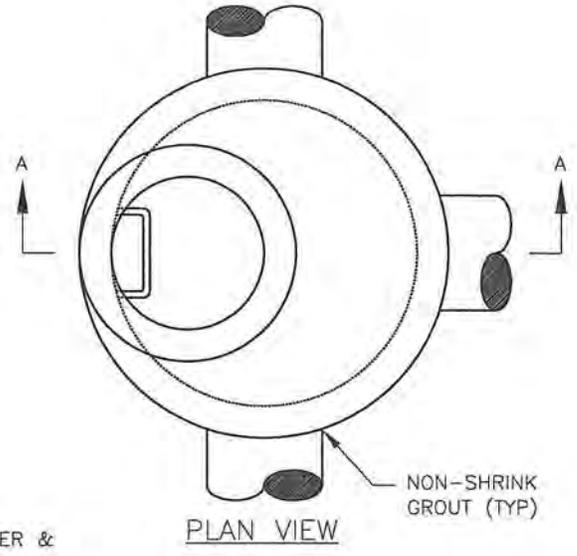
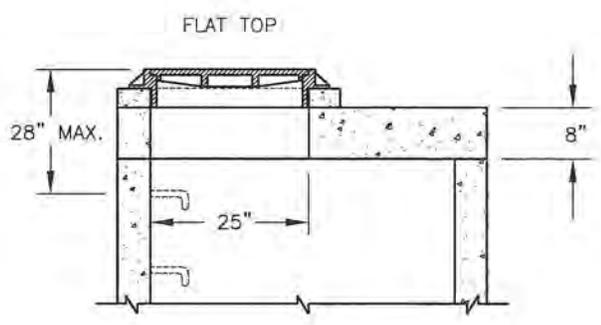


CITY OF CAMAS - STORM DETAIL
48" STORM SEWER MANHOLE

John P. ... 1-4-11
DETAIL APPROVED BY DATE

DETAIL NO.
SD9

NOT TO SCALE



- NOTES:**
1. 48" DIAMETER MANHOLES SHALL HAVE DROPS NOT TO EXCEED 48" WITHOUT DROP CHANNELING. INTERIOR DROP PIPING NOT ALLOWED IN 48" DIA. MANHOLE.
 2. ALL PIPE OPENINGS SHALL BE CORED AND SEALED WITH NON-SHRINK GROUT INSIDE AND OUTSIDE MANHOLE
 3. MASTIC SEAL REQ'D IN ALL KEYLOCK JOINTS
 4. MANHOLES SHALL CONFORM TO ASTM C-478
 5. FLAT TOP SECTION MAY BE USED FOR SHALLOW MANHOLES
 6. INSIDE JOINTS SHALL BE STRUCK SMOOTH & EVEN WITH THE INSIDE WALLS
 7. MANHOLE BASE TO HAVE SHAPED CHANNELS. FLOW LINE & INSIDE SURFACES SHALL BE TROWLED SMOOTH & UNIFORM

SECTION VIEW A-A

REV. NO.	DATE	BY	APPR.
1	9/18/07	SCD	JC
2	1/1/11	SCD	JC



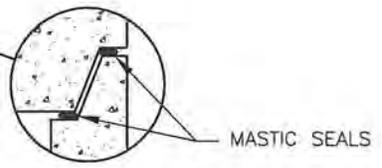
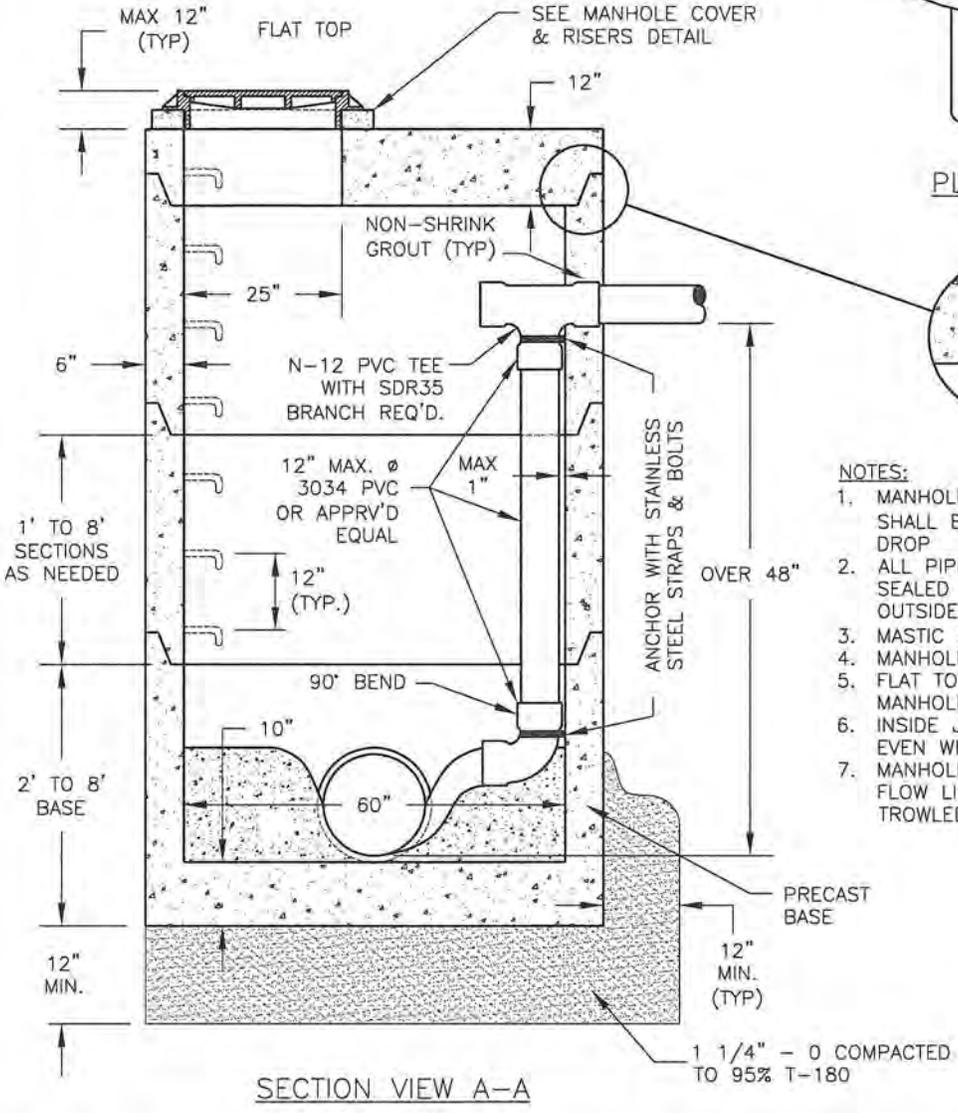
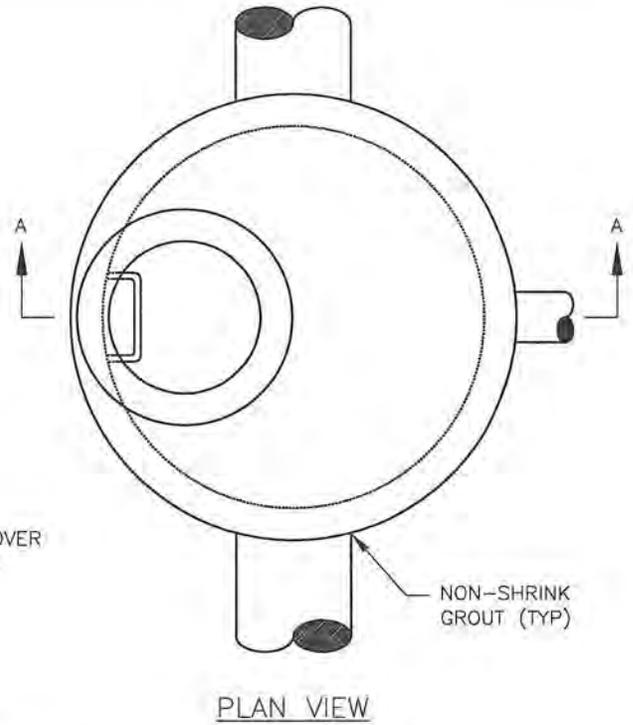
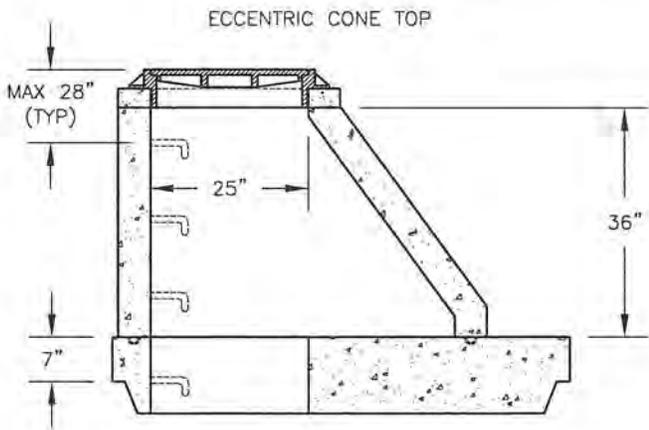
CITY OF CAMAS - STORM DETAIL
48" STORM SEWER DROP MANHOLE

Don P. Coulter 1-4-11
DETAIL APPROVED BY DATE

DETAIL NO.
SD10

NOT TO SCALE

MANHOLES.DWG



- NOTES:**
1. MANHOLES WITH GREATER THAN 48" DROP SHALL BE 60" DIAMETER WITH AN INTERIOR DROP
 2. ALL PIPE OPENINGS SHALL BE CORED AND SEALED WITH NON-SHRINK GROUT INSIDE AND OUTSIDE MANHOLE
 3. MASTIC SEAL REQ'D IN ALL KEYLOCK JOINTS
 4. MANHOLES SHALL CONFORM TO ASTM C-478
 5. FLAT TOP SECTION MAY BE USED FOR SHALLOW MANHOLES
 6. INSIDE JOINTS SHALL BE STRUCK SMOOTH & EVEN WITH THE INSIDE WALLS
 7. MANHOLE BASE TO HAVE SHAPED CHANNELS. FLOW LINE & INSIDE SURFACES SHALL BE TROWLED SMOOTH & UNIFORM

REV. NO.	DATE	BY	APPR.
1	9/18/07	SCD	JC
2	1/1/11	SCD	JC

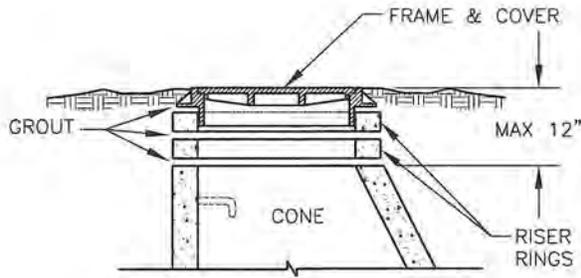


CITY OF CAMAS ~ STORM DETAIL
60" STORM SEWER DROP MANHOLE
Jim P. Crutcher 1-4-11
 DETAIL APPROVED BY DATE

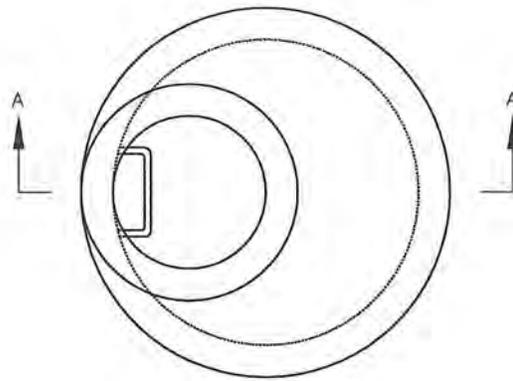
DETAIL NO.
SD11

NOT TO SCALE

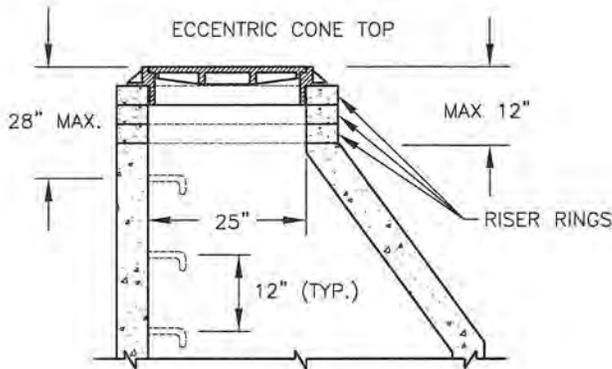
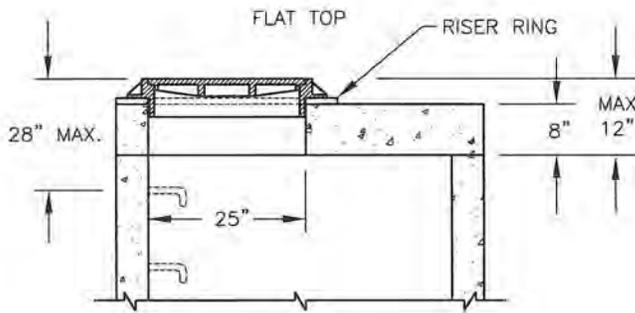
MANHOLES.DWG



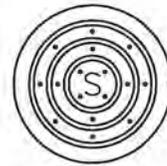
RISER RING & COLLAR DETAIL



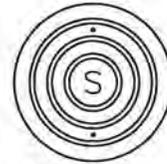
PLAN VIEW



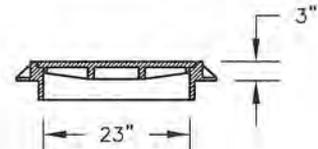
SECTION VIEWS A-A



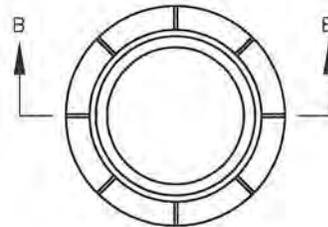
STORM COVER



SANITARY COVER



SECTION B-B



3" TALL FRAME

CAST IRON SUBURBAN COVER & FRAME

NOTES:

1. MANHOLES SHALL CONFORM TO ASTM C-478.
2. NON-SHRINK GROUT SHALL BE USED BETWEEN FRAME, RISER RINGS, AND MANHOLE.
3. 3" TALL FRAME IS STANDARD, 7" TALL FRAME (NOT SHOWN) IS OPTIONAL.
4. ANY COMBINATION OF RISER RING THICKNESS, GROUT, AND FRAME SHALL BE USED TO ACHIEVE THE 12" MAXIMUM DEPTH FROM FINISH GRADE TO TOP OF CONE OR FLAT TOP.

REV. NO.	DATE	BY	APPR.
1	9/18/07	SCD	JC
2	1/1/11	SCD	JC

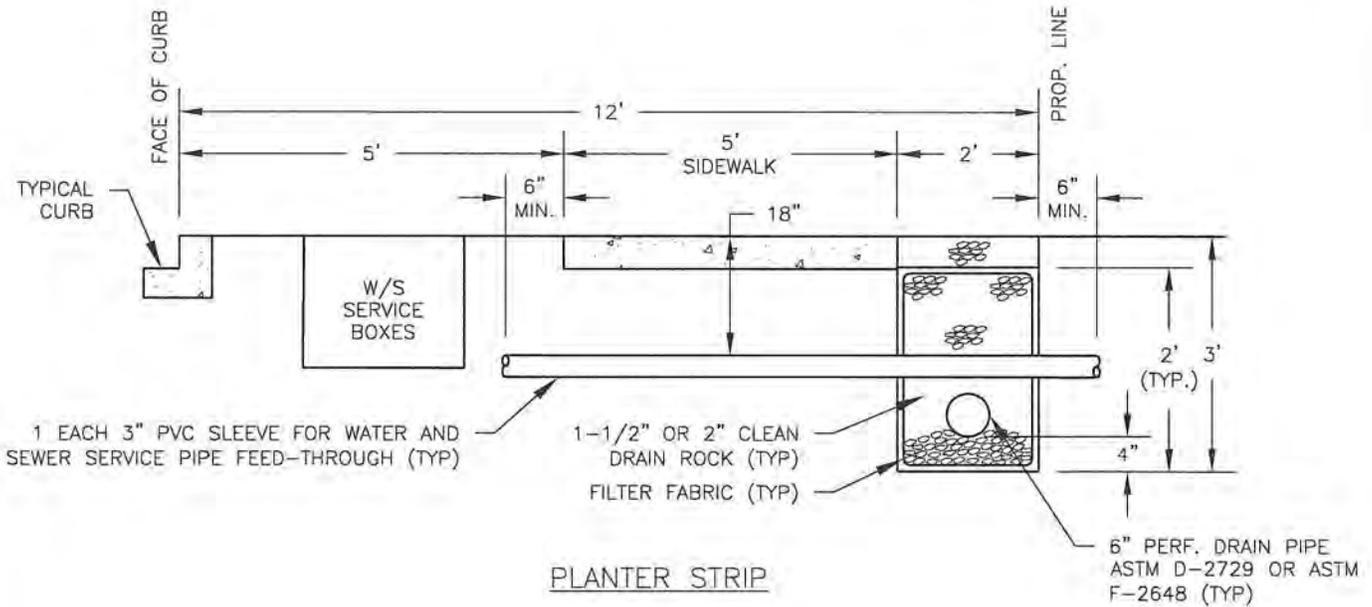


CITY OF CAMAS - STORM DETAIL
MANHOLE COVER & RISERS

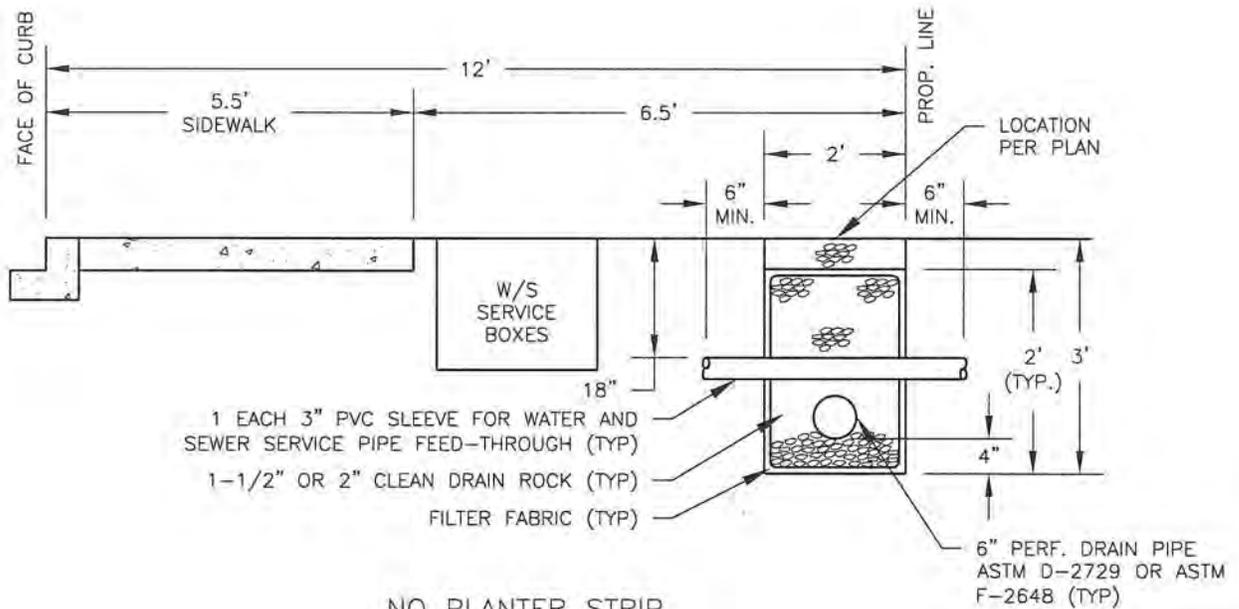
Don P. ... 1-4-11
DETAIL APPROVED BY DATE

DETAIL NO.
SD12

NOT TO SCALE



PLANTER STRIP



NO PLANTER STRIP

NOTES:

1. PIPE SHALL BE PVC PERFORATED DRAIN PIPE AND SOLID WALL PIPE, OR RIGID N-12 HDPE DUAL WALL PERFORATED DRAIN PIPE AND SOLID WALL PIPE. USE OF SINGLE WALL FLEXIBLE CORRUGATED POLYETHYLENE PIPE IS NOT ALLOWED
2. ALL FRENCH DRAIN FITTINGS SHALL BE PVC SOLVENT WELD TYPE OR POLYETHYLENE GASKETED TYPE.
3. SEE 'FRENCH DRAIN CLEANOUT' DETAIL DRAWING FOR CLEANOUT CONSTRUCTION.
4. 3" PVC UTILITY SLEEVE SHALL BE INSTALLED ACROSS FRENCH DRAIN TRENCH AS SHOWN, FOR EACH WATER AND PRESSURE SEWER SERVICE.
5. BASED ON 52' OR 60' R.O.W.

REV. NO.	DATE	BY	APPR.
1	9/18/07	SCD	JC
2	1/1/11	SCD	JC

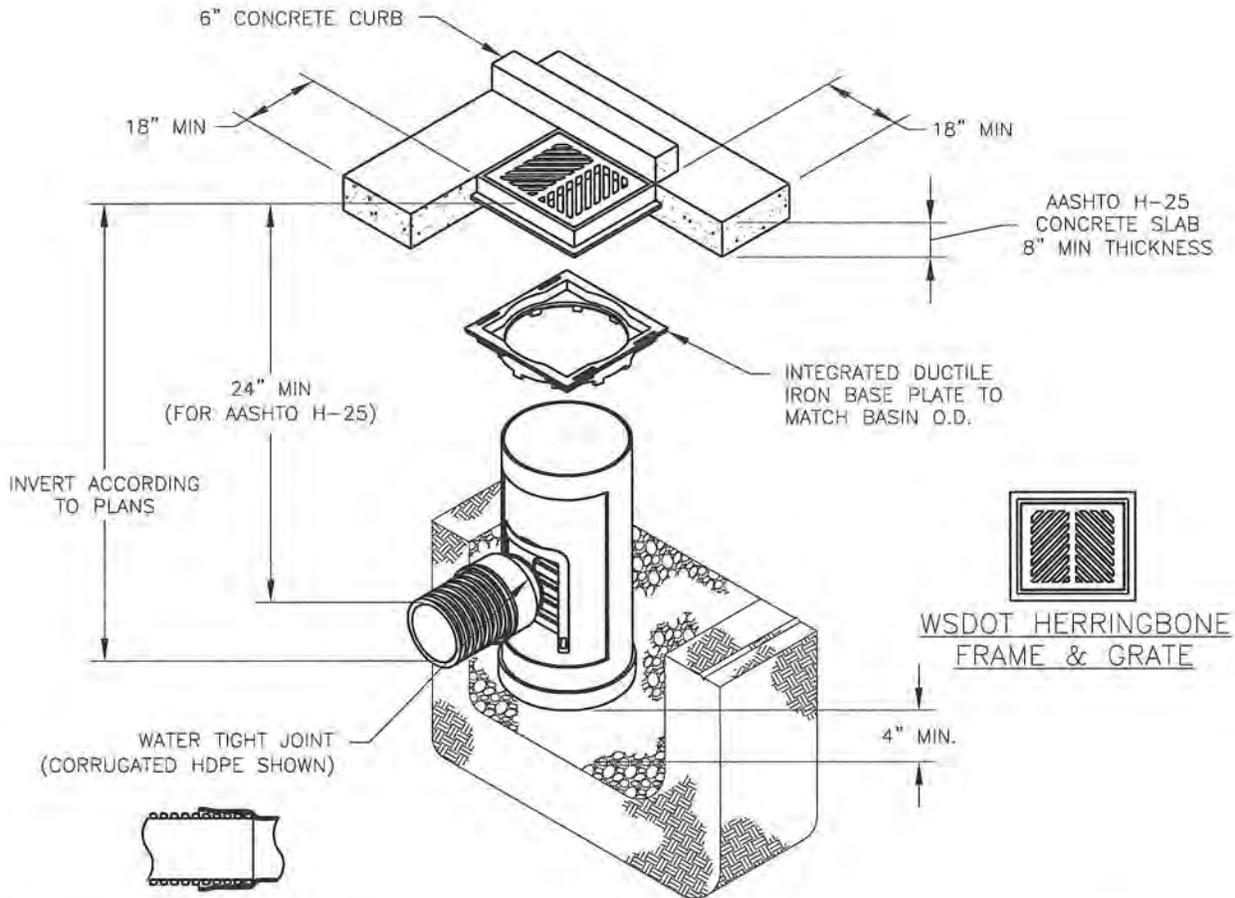


CITY OF CAMAS ~ STORM DETAIL
FRENCH DRAINS

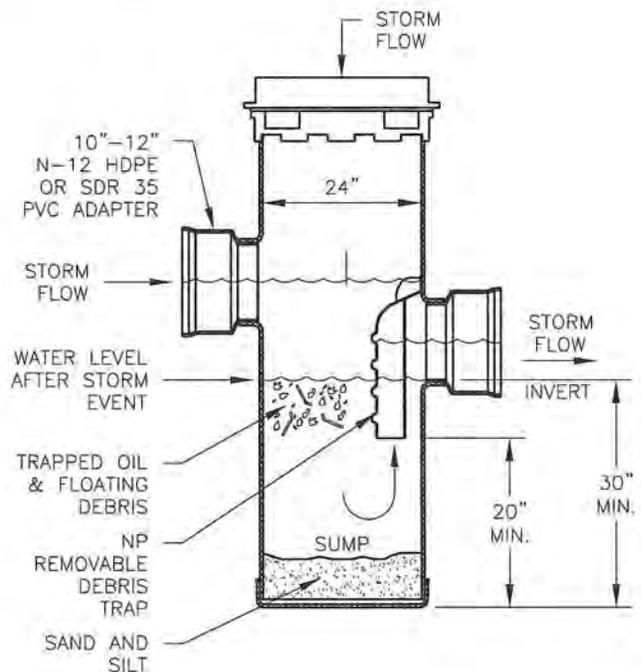
Dean P. Coathran 1-4-11
DETAIL APPROVED BY DATE

DETAIL NO.
SD13

NOT TO SCALE



1. DRAIN BASIN TO BE 24" DIAMETER NYLOPLAST OR EQUAL (ROUND) STRUCTURE.
2. DRAIN BASIN TO BE CUSTOM MANUFACTURED ACCORDING TO PLAN DETAILS.
3. USE APPROPRIATE TYPES OF INLET & OUTLET ADAPTERS TO MATCH PIPE AS SHOWN IN PLANS.
4. DRAINAGE CONNECTION STUB JOINT TIGHTNESS SHALL CONFORM TO ASTM D3212 FOR CORRUGATED HDPE & SDR 35 PVC
5. THE MAX. DEPTH FROM THE FINISHED GRADE TO THE PIPE INVERT IS 5' - 0".
6. BACKFILL MATERIAL BELOW & TO SIDE OF STRUCTURE SHALL BE ASTM D2321 CLASS I OR II CRUSHED STONE OR GRAVEL, PLACED UNIFORMLY. BACKFILL TO MEET WSDOT M41-10 & T99 95% COMPACTION.
7. DRAIN BASIN FRAME & GRATE SHALL BE IN ACCORDANCE WITH WSDOT STANDARD SPECIFICATIONS & MEET THE STRENGTH REQUIREMENTS OF FEDERAL SPECIFICATION RR-F-621D. MATING SURFACES SHALL BE FINISHED TO ASSURE NON-ROCKING FIT WITH ANY COVER POSITION.
8. FRAME MUST BE INSTALLED WITH FLANGE DOWN.
9. BASE PLATE SHALL BE DUCTILE IRON PER ASTM A536 GRADE 70-50-05.
10. ALL CAST-IN-PLACE CONCRETE SHALL BE CLASS 4,000.
11. FOR USE IN LOW VOLUME ROADWAYS AT THE CITY ENGINEER'S DISCRETION.



REV. NO.	DATE	BY	APPR.
1	9/18/07	SCD	JC
2	1/1/11	SCD	JC

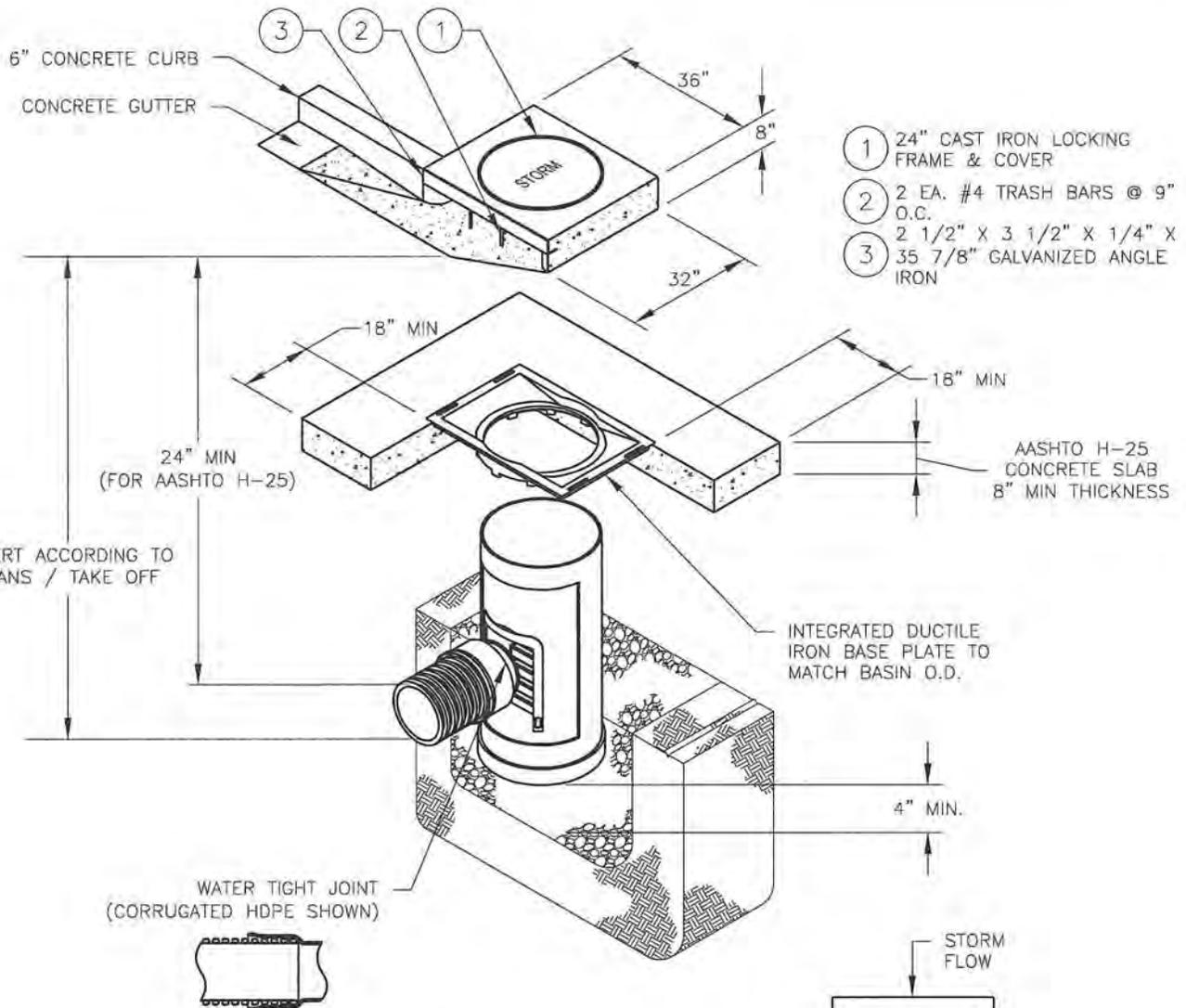


CITY OF CAMAS ~ STORM DETAIL
CATCH BASIN - PVC

Jan P. Cothran 1-4-11
DETAIL APPROVED BY DATE

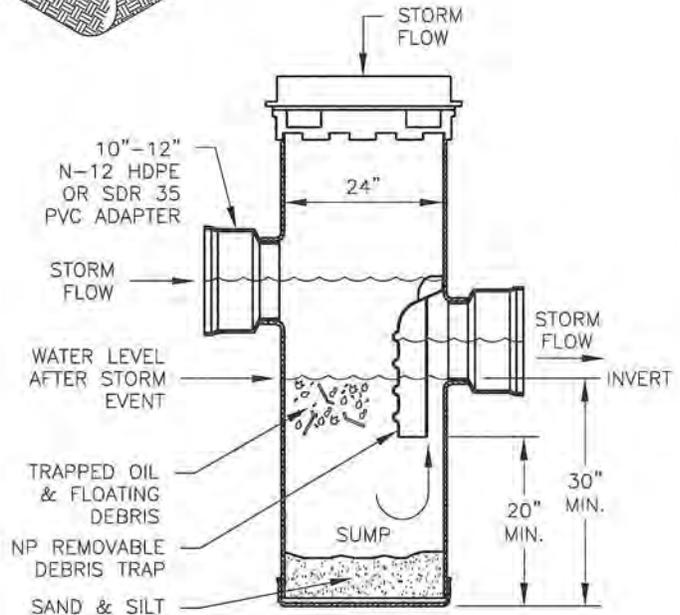
DETAIL NO.
SD15

NOT TO SCALE



NOTES:

1. DRAIN BASIN TO BE 24" DIAMETER NYLOPLAST OR EQUAL (ROUND) STRUCTURE.
2. DRAIN BASIN TO BE CUSTOM MANUFACTURED ACCORDING TO PLAN DETAILS.
3. USE APPROPRIATE TYPES OF INLET & OUTLET ADAPTERS TO MATCH PIPE AS SHOWN IN PLANS.
4. DRAINAGE CONNECTION STUB JOINT TIGHTNESS SHALL CONFORM TO ASTM D3212 FOR CORRUGATED HDPE & SDR 35 PVC
5. THE MAX. DEPTH FROM THE FINISHED GRADE TO THE PIPE INVERT IS 5' - 0".
6. BACKFILL MATERIAL BELOW & TO SIDE OF STRUCTURE SHALL BE ASTM D2321 CLASS I OR II CRUSHED STONE OR GRAVEL, PLACED UNIFORMLY. BACKFILL TO MEET WSDOT M41-10 & T99 95% COMPACTION.
7. BASE PLATE SHALL BE DUCTILE IRON PER ASTM A536 GRADE 70-50-05.
8. GUTTER IS TAPERED DOWN TO INLET.
9. ALL CAST-IN-PLACE CONCRETE SHALL BE CLASS 4,000.
10. FOR USE IN LOW VOLUME ROADWAYS AT THE CITY ENGINEER'S DISCRETION.



REV. NO.	DATE	BY	APPR.
1	9/18/07	SCD	JC
2	1/1/11	SCD	JC

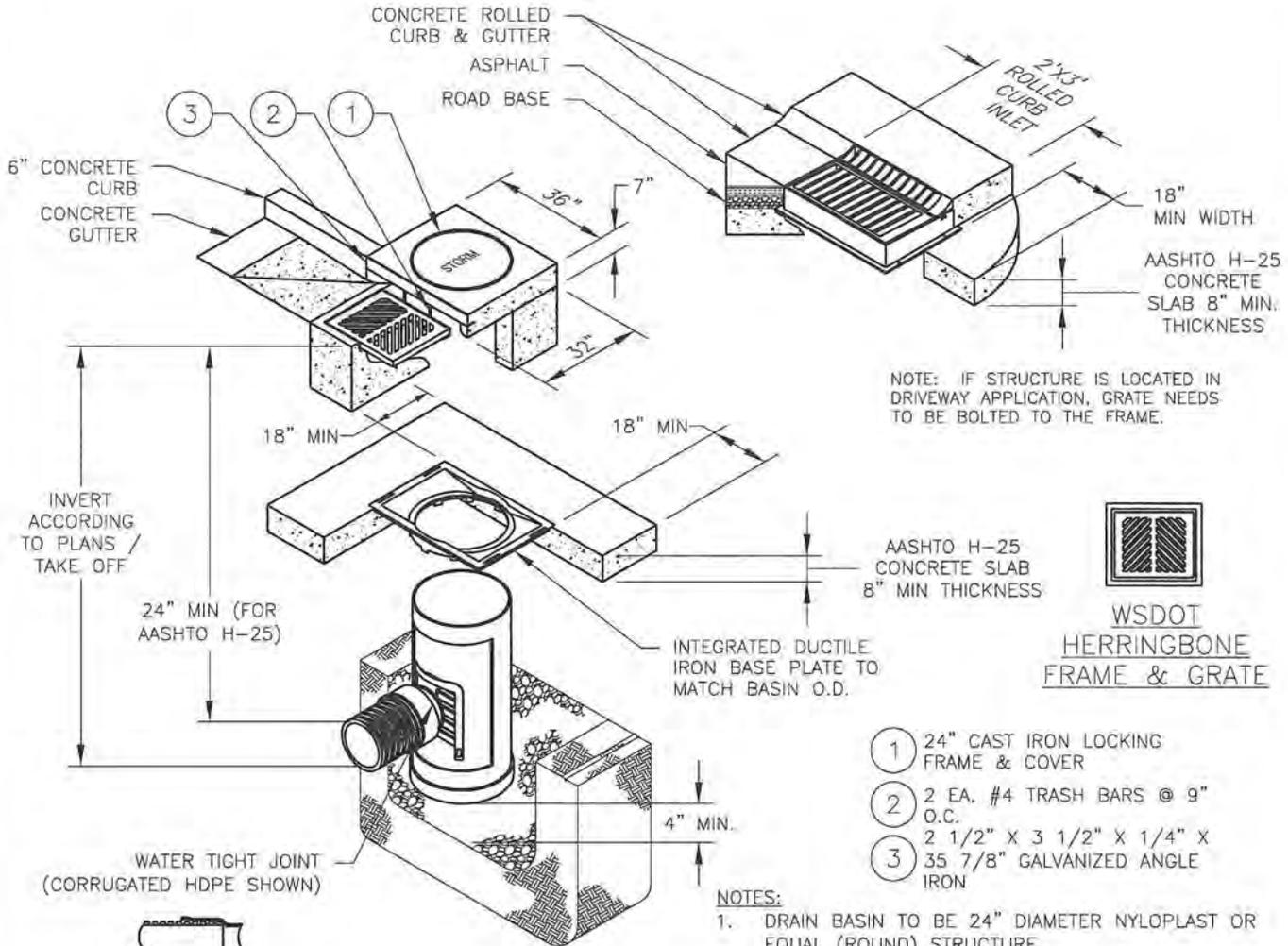


CITY OF CAMAS ~ STORM DETAIL
CURB INLET CATCH BASIN - PVC

Jan P. ... 1-4-11
 DETAIL APPROVED BY DATE

NOT TO SCALE

DETAIL NO.
 SD16



NOTE: IF STRUCTURE IS LOCATED IN DRIVEWAY APPLICATION, GRATE NEEDS TO BE BOLTED TO THE FRAME.

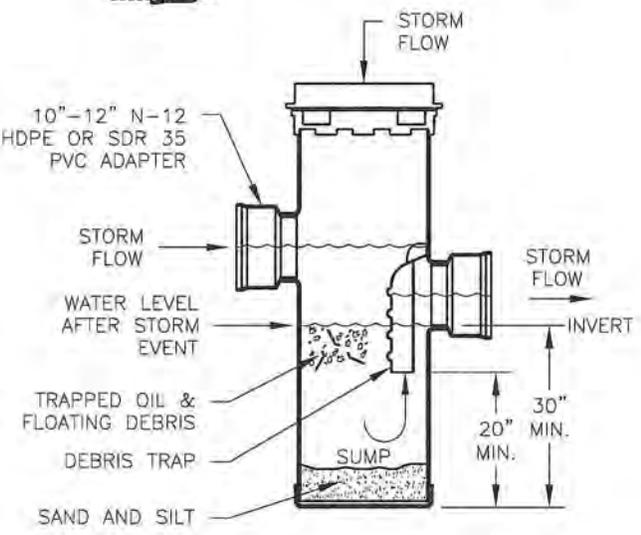


WSDOT
HERRINGBONE
FRAME & GRATE

- ① 24" CAST IRON LOCKING FRAME & COVER
- ② 2 EA. #4 TRASH BARS @ 9" O.C.
- ③ 2 1/2" X 3 1/2" X 1/4" X 35 7/8" GALVANIZED ANGLE IRON

NOTES:

1. DRAIN BASIN TO BE 24" DIAMETER NYLOPLAST OR EQUAL (ROUND) STRUCTURE.
2. DRAIN BASIN TO BE CUSTOM MANUFACTURED ACCORDING TO PLAN DETAILS.
3. USE APPROPRIATE TYPES OF INLET & OUTLET ADAPTERS TO MATCH PIPE AS SHOWN IN PLANS.
4. DRAINAGE CONNECTION STUB JOINT TIGHTNESS SHALL CONFORM TO ASTM D3212 FOR CORRUGATED HDPE & SDR 35 PVC
5. THE MAX. DEPTH FROM THE FINISHED GRADE TO THE PIPE INVERT IS 5' - 0".
6. BACKFILL MATERIAL BELOW & TO SIDE OF STRUCTURE SHALL BE ASTM D2321 CLASS I OR II CRUSHED STONE OR GRAVEL, PLACED UNIFORMLY. BACKFILL TO MEET WSDOT M41-10 & T99 95% COMPACTION.
7. BASE PLATE SHALL BE DUCTILE IRON PER ASTM A536 GRADE 70-50-05.
8. DRAIN BASIN FRAME & GRATE SHALL BE IN ACCORDANCE WITH WDOT STANDARD SPECIFICATIONS & MEET THE STRENGTH REQUIRMENTS OF FEDERAL SPECIFICATION RR-F-621D. MATING SURFACES SHALL BE FINISHED TO ASSURE NON-ROCKING FIT WITH ANY COVER POSITION.
9. GUTTER IS TAPERED DOWN TO INLET.
10. ALL CAST-IN-PLACE CONCRETE SHALL BE CLASS 4,000.
11. FOR USE IN LOW VOLUME ROADWAYS AT THE CITY ENGINEER'S DISCRETION.



REV. NO.	DATE	BY	APPR.
1	9/18/07	SCD	JC
2	1/1/11	SCD	JC

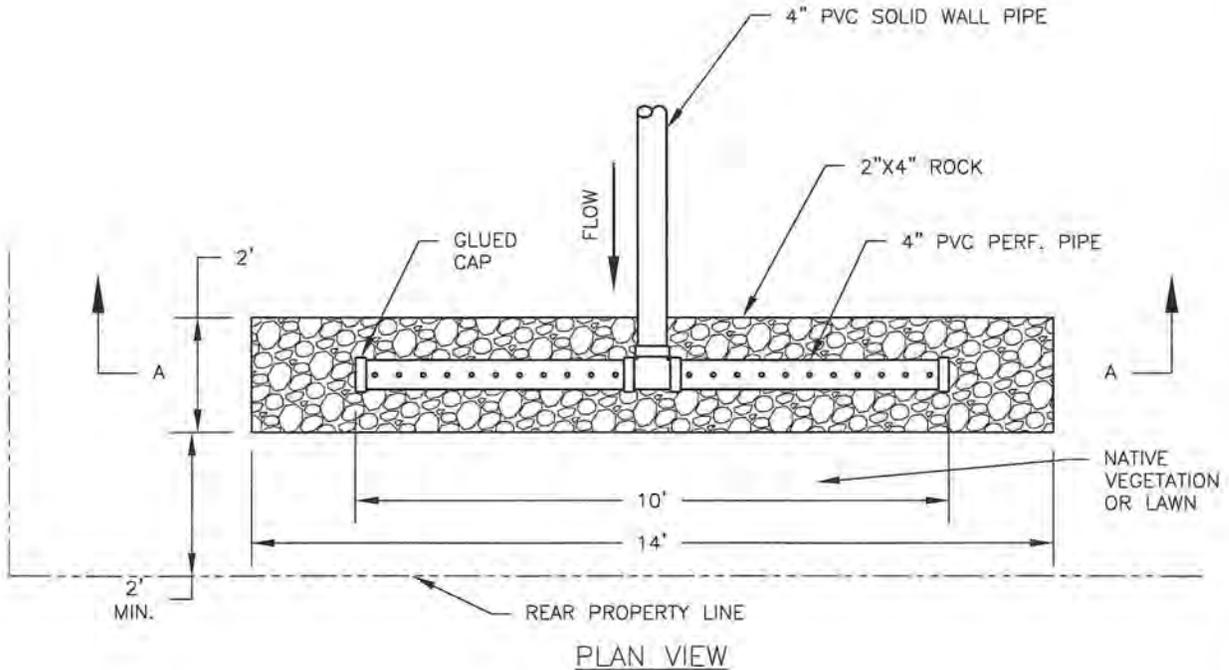
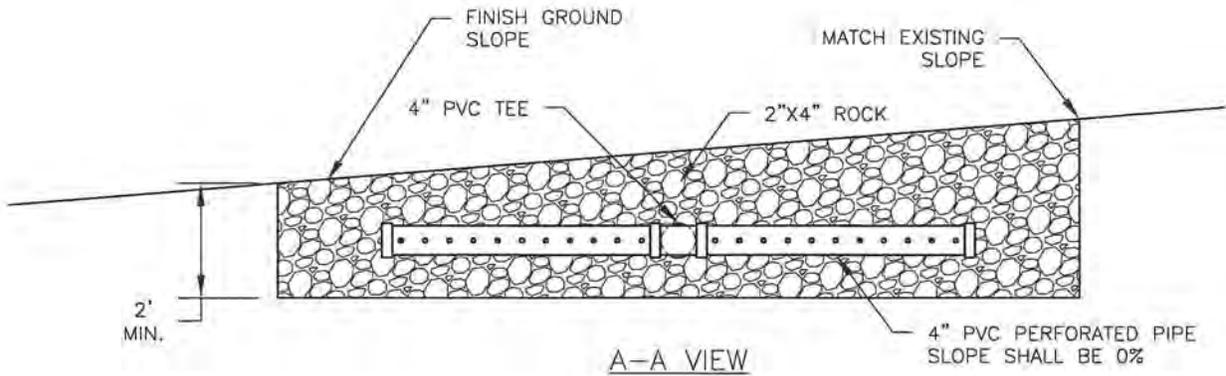


CITY OF CAMAS ~ STORM DETAIL
COMBINATION CURB INLET - PVC

John C. [Signature] 1-4-11
DETAIL APPROVED BY DATE

DETAIL NO.
SD17

NOT TO SCALE



NOTES:

1. PIPE SHALL BE PVC PERFORATED DRAIN PIPE AND SOLID WALL PIPE, OR RIGID N-12 HDPE DUAL WALL PERFORATED DRAIN PIPE AND SOLID WALL PIPE. USE OF SINGLE WALL FLEXIBLE CORRUGATED POLYETHYLENE PIPE IS NOT ALLOWED
2. TO BE CONSTRUCTED BY HOME BUILDER AT BACK OF LOT LINE.
3. LAY PERFORATED PIPE AND ROCK LEVEL FROM END TO END.

REV. NO.	DATE	BY	APPR.
1	1/1/11	SCD	JC



CITY OF CAMAS ~ STORM DETAIL

DRAIN OUTLET

Jan P. Coathorne 1-4-11
 DETAIL APPROVED BY DATE

DETAIL NO.

SD18

NOT TO SCALE



STORM CONSTRUCTION NOTES:

1. STORM WATER MEDALLION SHALL BE PERMANENTLY FASTENED TO THE TOP OF THE CURB ADJACENT TO EVERY CATCH BASIN.
2. MEDALLION SHALL BE AN ALMETEK 4 INCH STORM DRAIN MARKER (AS SHOWN ABOVE), STAMPED STAINLESS STEEL, WITH BLUE BACKGROUND COLOR AND CENTER RIVET HOLE, OR APPROVED EQUAL.

REV. NO.	DATE	BY	APPR.
1	10/21/14	SCD	JC



CITY OF CAMAS ~ STORM DETAIL
STORM WATER MEDALLION

Joe P. Carother 10-21-14
DETAIL APPROVED BY DATE

NOT TO SCALE

DETAIL NO.

SD19



Sewer Details

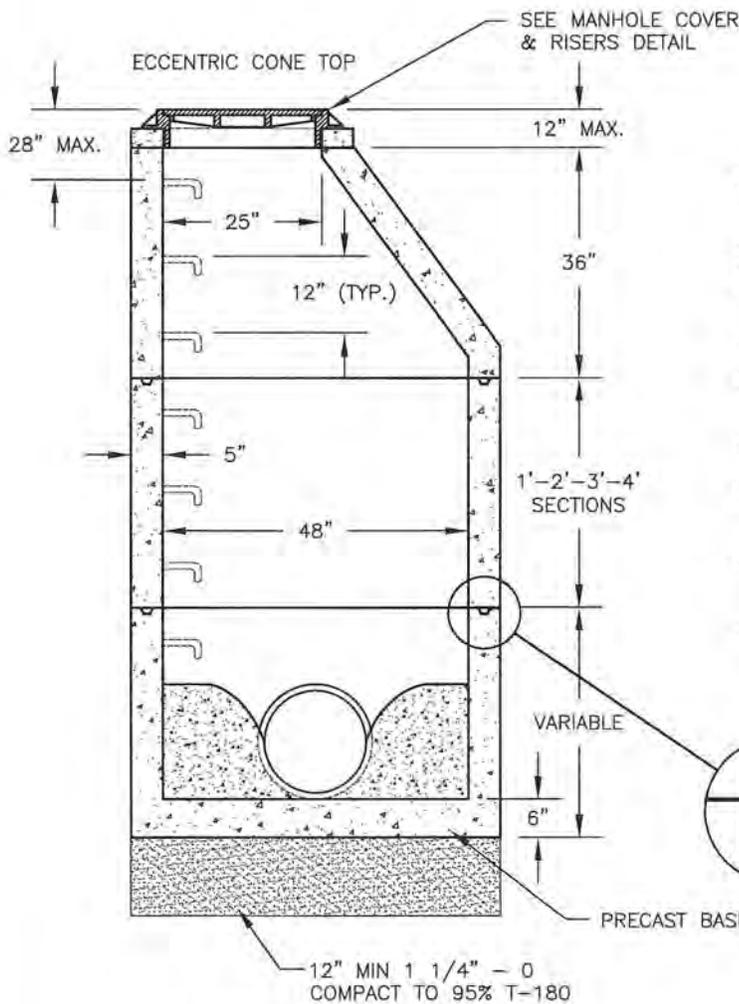
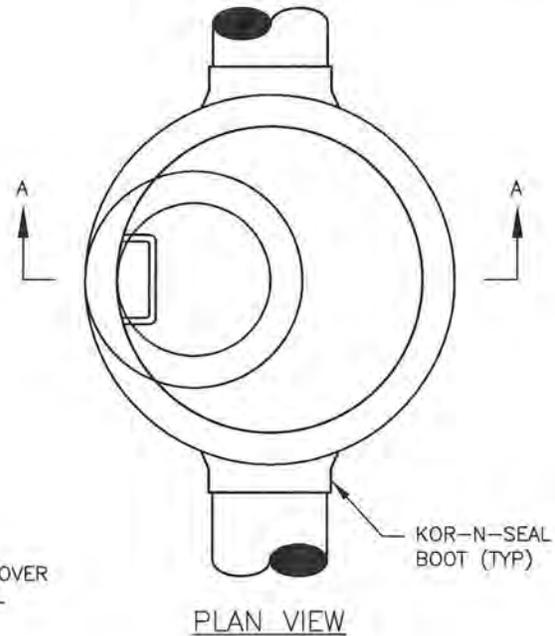
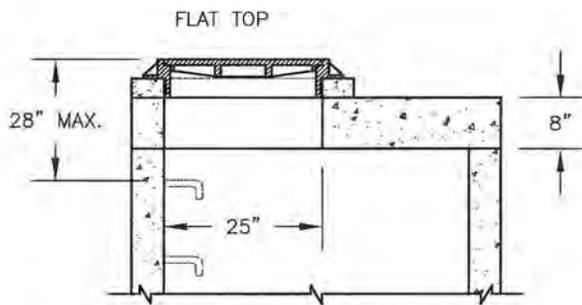
City of Camas
616 NE Fourth Avenue
Camas, WA 98607
www.cityofcamas.us

Phone: (360) 834-6864
Fax: (360) 834-1535

Creation Date: 10/28/02
Revision Date: 4/27/16 (Partial)

City of Camas General Sanitary Details ~ INDEX

<u>Detail No.</u>	<u>Detail Name</u>	<u>Rev.</u>	<u>Rev. Date</u>
<u>General Sanitary Sewer Details</u>			
S1	48" SANITARY SEWER MANHOLE	4	4/27/2016
S2	48" SANITARY STD. DROP (UNDER 18") MANHOLE	4	4/27/2016
S3	60" SANITARY DROP (OVER 18") MANHOLE	2	1/1/2011
S4	MANHOLE COVER & RISERS	2	1/1/2011



NOTES:

1. ALL PIPE OPENINGS SHALL BE CORED AND RUBBER BOOTED
2. MASTIC SEAL REQ'D IN ALL KEYLOCK JOINTS
3. MANHOLES SHALL CONFORM TO ASTM C-478
4. FLAT TOP SECTION MAY BE USED FOR SHALLOW MANHOLES
5. INSIDE JOINTS SHALL BE STRUCK SMOOTH & EVEN WITH THE INSIDE WALLS
6. MANHOLE BASE TO HAVE SHAPED CHANNELS. FLOW LINE & INSIDE SURFACES SHALL BE TROWLED SMOOTH & UNIFORM
7. MANHOLE TO BE VACUUM TESTED IN ACCORDANCE WITH C.O.C. STANDARDS
8. MANHOLE TO BE SPRAY LINED WITH HYDROGEN SULFIDE RESISTANT MATERIAL RAVEN 405 OR APPROVED EQUAL SUBMITTAL REQUIRED
9. 48" DIA. MANHOLES SHALL HAVE CHANNELED DROPS NOT TO EXCEED 18" HIGH. SEE DETAIL S2.
10. MANHOLES WITH GREATER THAN 18" DROP SHALL BE 60" DIA. WITH AN INTERIOR DROP. SEE DETAIL S3.

SECTION VIEW A-A

REV. NO.	DATE	BY	APPR.
1	5/1/07	SCD	JC
2	1/1/11	SCD	JC
3	10/21/14	SCD	JC
4	4/27/16	SCD	JC



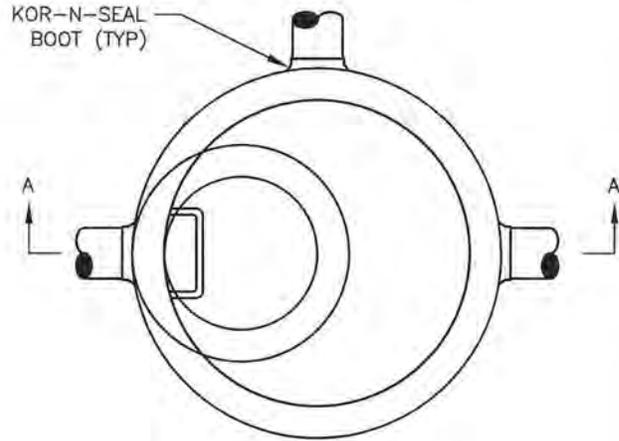
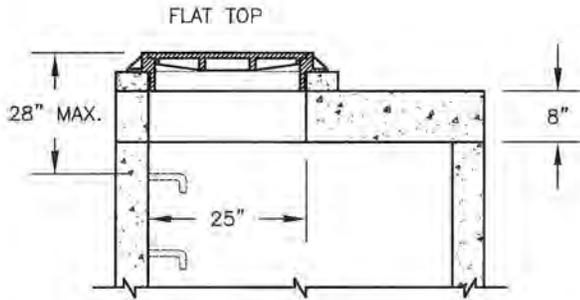
CITY OF CAMAS ~ SANITARY DETAIL
 48" SANITARY SEWER MANHOLE
Jim E. Coates 4-26-16
 DETAIL APPROVED BY DATE

DETAIL NO.

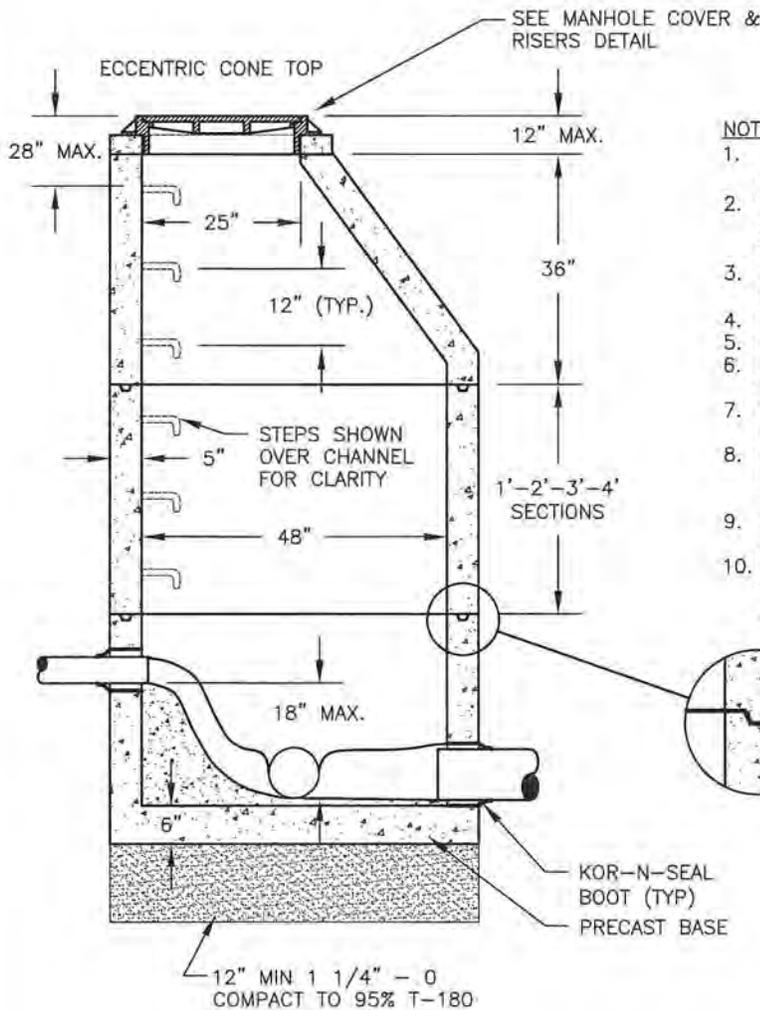
S1

NOT TO SCALE

MANHOLES.DWG



PLAN VIEW



SECTION VIEW A-A

NOTES:

1. 48" DIAMETER MANHOLES SHALL HAVE CHanneled DROPS NOT TO EXCEED 18".
2. MANHOLES WITH A DROP GREATER THAN 18" SHALL BE 60" DIA. WITH AN INTERIOR DROP. SEE DETAIL S3.
3. ALL PIPE OPENINGS SHALL BE CORED AND RUBBER BOOTED
4. MASTIC SEAL REQ'D IN ALL KEYLOCK JOINTS
5. MANHOLES SHALL CONFORM TO ASTM C-478
6. FLAT TOP SECTION MAY BE USED FOR SHALLOW MANHOLES
7. INSIDE JOINTS SHALL BE STRUCK SMOOTH & EVEN WITH THE INSIDE WALLS
8. MANHOLE BASE TO HAVE SHAPED CHANNELS. FLOW LINE & INSIDE SURFACES SHALL BE TROWLED SMOOTH & UNIFORM
9. MANHOLE TO BE VACUUM TESTED IN ACCORDANCE WITH C.O.C. STANDARDS
10. MANHOLE TO BE SPRAY LINED WITH HYDROGEN SULFIDE RESISTANT MATERIAL RAVEN 405 OR APPROVED EQUAL SUBMITTAL REQUIRED

REV. NO.	DATE	BY	APPR.
1	5/1/07	SCD	JC
2	1/1/11	SCD	JC
3	10/21/14	SCD	JC
4	4/27/16	SCD	JC



CITY OF CAMAS ~ SANITARY DETAIL

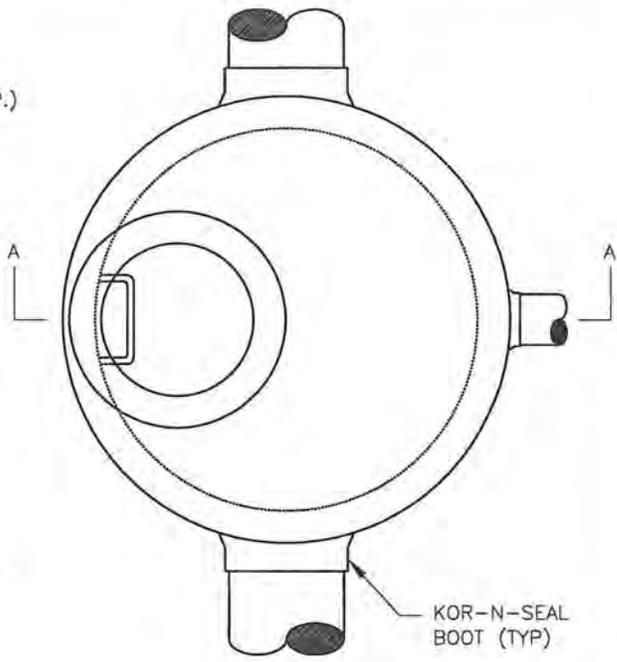
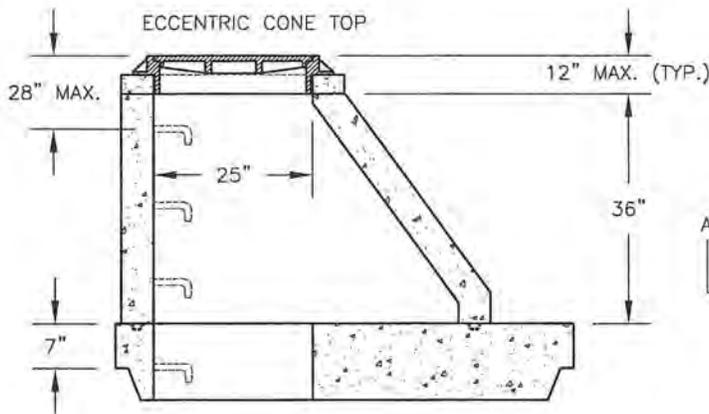
48" SANITARY SEWER DROP (UNDER 18") MANHOLE

Don P. Coe 4-26-16
 DETAIL APPROVED BY DATE

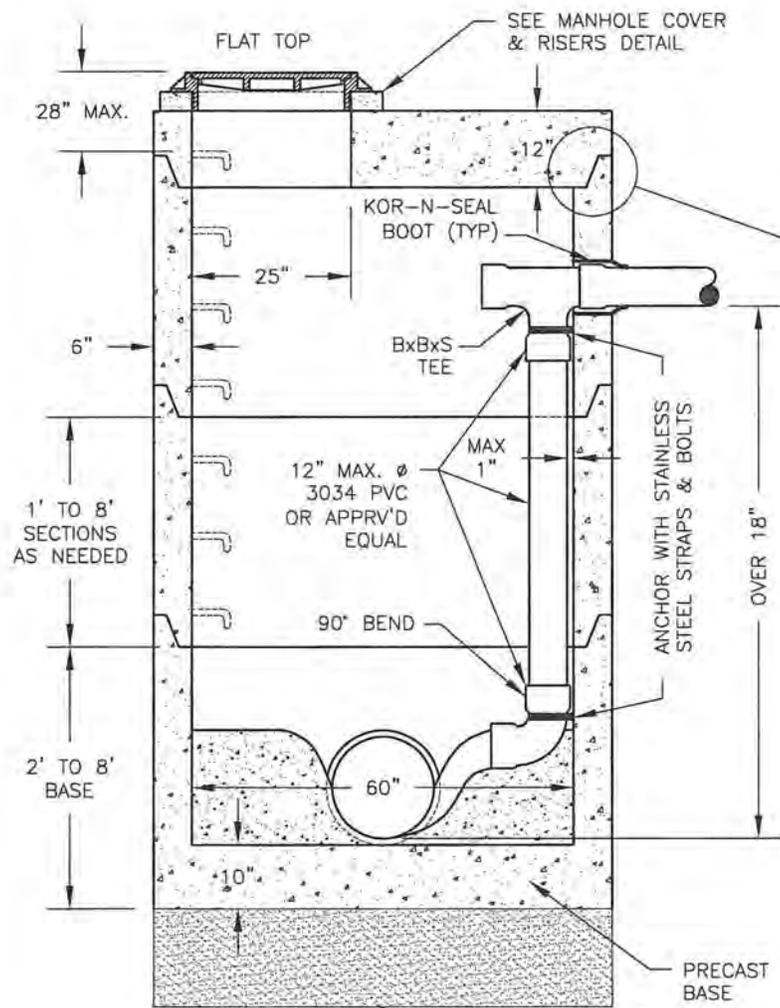
NOT TO SCALE

DETAIL NO.

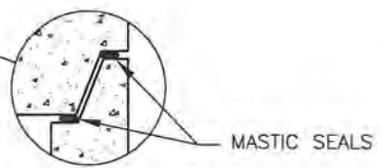
S2



PLAN VIEW



SECTION VIEW A-A



MASTIC SEALS

NOTES:

1. MANHOLES WITH GREATER THAN 18" DROP SHALL BE 60" DIAMETER WITH AN INTERIOR DROP
2. ALL PIPE OPENINGS SHALL BE CORED AND RUBBER BOOTED
3. MASTIC SEAL REQ'D IN ALL KEYLOCK JOINTS
4. MANHOLES SHALL CONFORM TO ASTM C-478
5. FLAT TOP SECTION MAY BE USED FOR SHALLOW MANHOLES
6. INSIDE JOINTS SHALL BE STRUCK SMOOTH & EVEN WITH THE INSIDE WALLS
7. MANHOLE BASE TO HAVE SHAPED CHANNELS. FLOW LINE & INSIDE SURFACES SHALL BE TROWLED SMOOTH & UNIFORM
8. MANHOLE TO BE VACUUM TESTED IN ACCORDANCE WITH C.O.C. STANDARDS
9. MANHOLE TO BE SPRAY LINED WITH HYDROGEN SULFIDE RESISTANT MATERIAL RAVEN 405 OR APPROVED EQUAL SUBMITTAL REQUIRED

REV. NO.	DATE	BY	APPR.
1	5/1/07	SCD	JC
2	1/1/11	SCD	JC



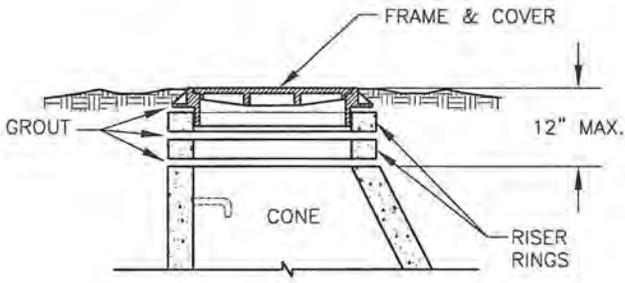
CITY OF CAMAS - SANITARY DETAIL
60" SANITARY SEWER DROP (OVER 18") MANHOLE

Jan E. Cauffman 1-4-11
DETAIL APPROVED BY DATE

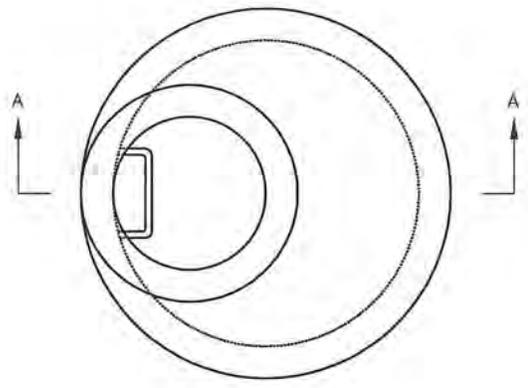
DETAIL NO.
S3

NOT TO SCALE

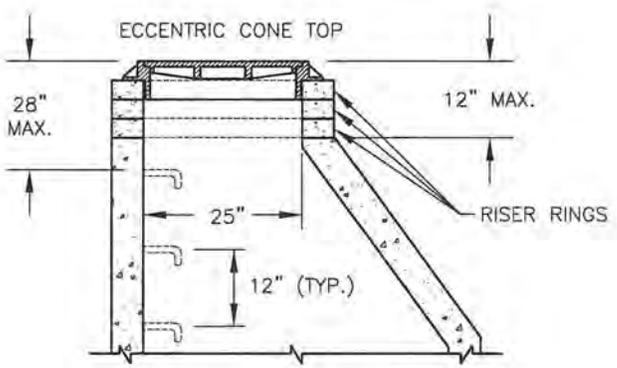
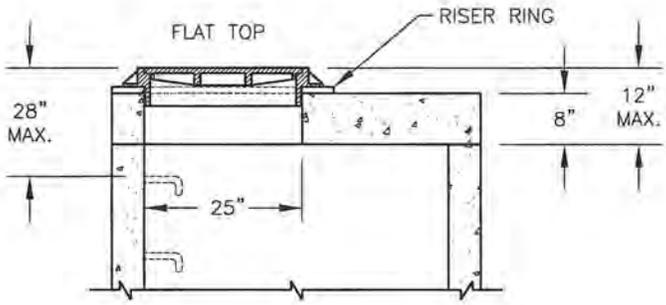
MANHOLES.DWG



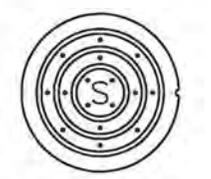
RISER RING & COLLAR DETAIL



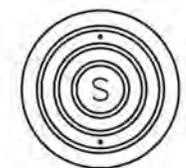
PLAN VIEW



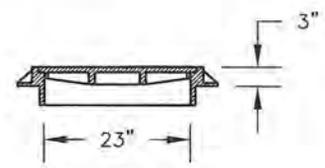
SECTION VIEWS A-A



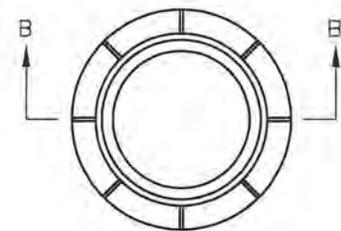
STORM COVER



SANITARY COVER



SECTION B-B



3" TALL FRAME

CAST IRON SUBURBAN COVER & FRAME

- NOTES:**
1. MANHOLES SHALL CONFORM TO ASTM C-478.
 2. NON-SHRINK GROUT SHALL BE USED BETWEEN FRAME, RISER RINGS, AND MANHOLE.
 3. 3" TALL FRAME IS STANDARD, 7" TALL FRAME (NOT SHOWN) IS OPTIONAL.
 4. ANY COMBINATION OF RISER RING THICKNESS, GROUT, AND FRAME SHALL BE USED TO ACHIEVE THE 12" MAXIMUM DEPTH FROM FINISH GRADE TO TOP OF CONE OR FLAT TOP.

REV. NO.	DATE	BY	APPR.
1	5/1/07	SCD	JC
2	1/1/11	SCD	JC



CITY OF CAMAS - SANITARY DETAIL
MANHOLE COVER & RISERS

Jan P. Coatsworth 1-4-11
DETAIL APPROVED BY DATE

DETAIL NO.
S4

NOT TO SCALE

MANHOLES.DWG



S.T.E.F. Sewer Details

City of Camas
616 NE Fourth Avenue
P.O. Box 1055
Camas, WA 98607
www.cityofcamas.us

Phone: (360) 834-6864
Fax: (360) 834-1535

Creation Date: 10/28/02
Revision Date: 10/21/14 (Partial)

City of Camas STEF Sanitary Details ~ INDEX

STEF Sanitary Sewer Details

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SEPTIC TANK EFFLUENT FILTER (S.T.E.F.) NOTES:

1. ALL TRENCH EXCAVATION AND PIPE INSTALLATION SHALL CONFORM TO THE MOST RECENTLY ADOPTED EDITION OF THE W.S.D.O.T. STANDARD SPECIFICATIONS SECTION 7-08.3(1) AND SECTION 7-08.3(2). ALL EXCESS MATERIAL FROM THE TRENCH EXCAVATION SHALL BE DISPOSED OF ON AN APPROVED SITE.
2. PIPE BEDDING, PIPE ZONE MATERIAL AND TRENCH BACKFILL SHALL BE AN APPROVED GRANULAR MATERIAL OF EITHER WASHED SCREENINGS OR 5/8 INCH MINUS CRUSHED ROCK. SAND BACKFILL IS NOT ALLOWED.
3. TRENCH COMPACTION SHALL CONFORM TO THE MOST RECENTLY ADOPTED EDITION OF THE W.S.D.O.T. STANDARD SPECIFICATIONS SECTION 7-08.3(3). CONTRACTOR TO DETERMINE THE TYPE OF EQUIPMENT AND METHOD TO USE TO ACHIEVE THE REQUIRED COMPACTION. EACH LIFT SHALL BE COMPACTED TO A MINIMUM OF 95 PERCENT OF THE MAXIMUM DENSITY AS DETERMINED BY THE A.A.S.H.T.O. T-180 TEST METHOD.
4. SETTLEMENT OF THE FINISHED SURFACE WITHIN THE WARRANTY PERIOD SHALL BE CONSIDERED TO BE A RESULT OF IMPROPER COMPACTION AND SHALL BE PROMPTLY REPAIRED BY THE CONTRACTOR AT NO EXPENSE TO THE CITY.
5. ALL PIPE AND FITTINGS SHALL BE PVC GASKETED PIPE, ASTM D2241 PRESSURE RATED FOR 200 PSI UNLESS OTHERWISE NOTED.
6. PIPE SHALL BE BEDDED WITH A MINIMUM OF 4 INCHES OF APPROVED GRANULAR MATERIAL.
7. 14 GAUGE GREEN HDPE (HMWPE) INSULATED COPPER CLAD STEEL TONING WIRE SHALL BE PLACED DIRECTLY OVER ALL SEWER MAINS AND SERVICE LATERALS. THE TONING WIRE SHALL BE ACCESSIBLE AT ALL SERVICE LATERAL MARKER BOARDS, A.A.R.V.'S, RISERS, AND CLEANOUTS. ALL SPLICES AND CONNECTIONS TO TONING WIRE SHALL BE PROTECTED WITH KING GEL CAPS, 3M DBY DIRECT BURY, OR OTHER APPROVED EQUAL CONNECTORS. ALL TONING WIRE CONNECTIONS SHALL BE TONE TESTED PRIOR TO INSTALLING BASE ROCK.
8. MAINLINE CLEANOUTS SHALL BE SPACED A MAXIMUM OF 400 FEET AND/OR FOR EVERY 90 DEGREES OF BENDS.
9. ALL PIPE AND FITTINGS SHALL BE AIR TESTED AT FIVE P.S.I. FOR ONE MINUTE PER EVERY 100 FEET OF MAINLINE.
10. SANITARY SERVICE LATERAL ENDS SHALL EXTEND 8 FEET PAST THE STREET RIGHT-OF-WAY LINE OR AS SHOWN ON THE PLANS AND MARKED WITH A 10 FOOT LONG 2 X 4.
11. ALL SANITARY LINES SHALL BE INSTALLED WITH A MINIMUM COVER OF 6 FEET AND A MINIMUM GRADE OF 0.4% UNLESS OTHERWISE SHOWN ON THE PLANS.
12. ALL S.T.E.F. SANITARY SEWER LATERALS SHALL BE INSTALLED IN A DEDICATED TRENCH FROM THE SERVICE CONNECTION TO THE TANK. BACKFILL SHALL BE APPROVED GRANULAR MATERIAL OR AS APPROVED BY THE WATER/SEWER DEPARTMENT.
13. ALL TANKS WITH A BURY DEPTH OVER 4'-0" MUST HAVE H-20 RATED TANK LID

REV. NO.	DATE	BY	APPR.
1	5/1/07	SCD	JC
2	1/1/11	SCD	JC
3	10/21/14	SCD	JC



CITY OF CAMAS ~ SANITARY DETAIL
STEF SEWER CONSTRUCTION NOTES

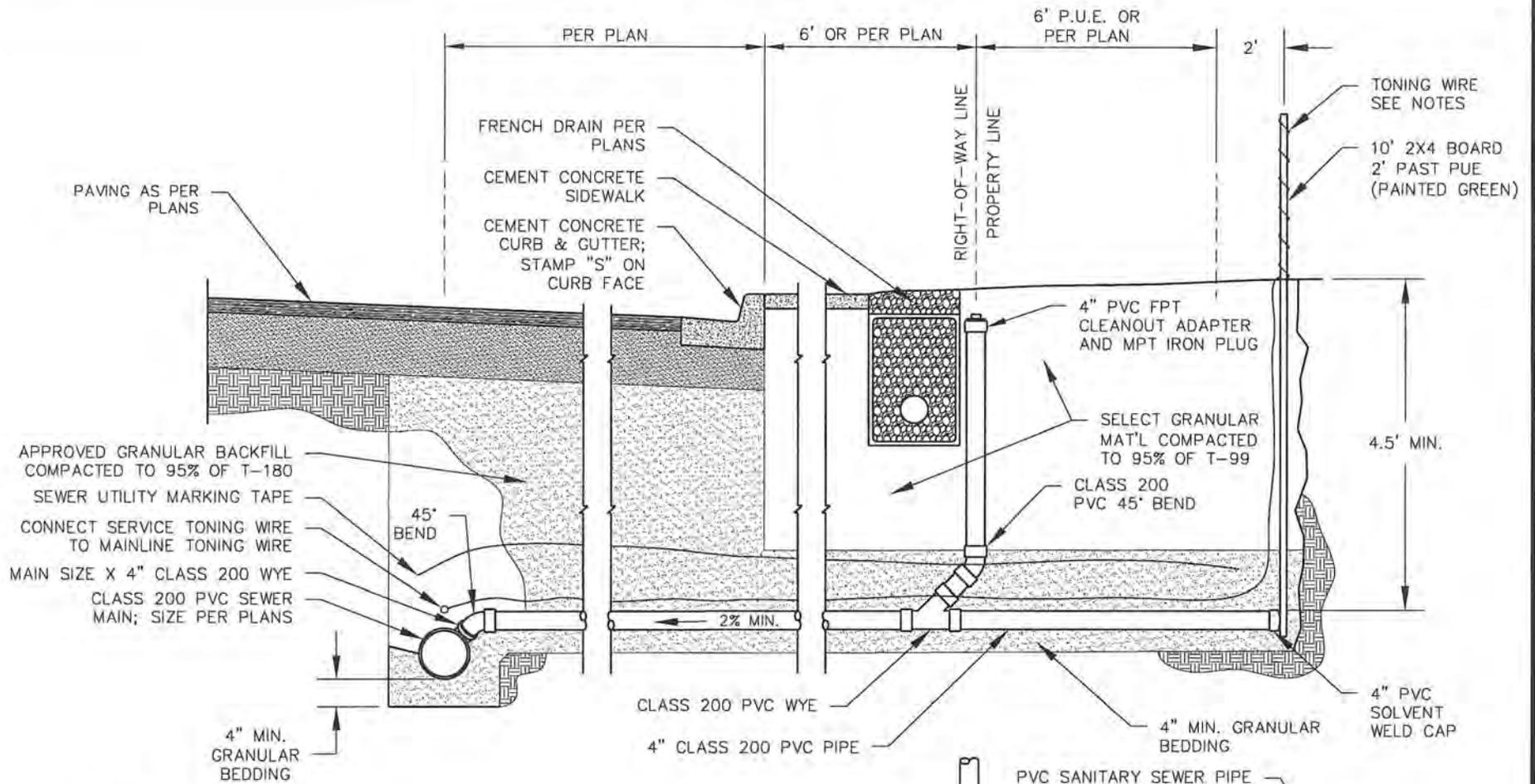
San P. [Signature] 10-21-14
DETAIL APPROVED BY DATE

DETAIL NO.

SF1

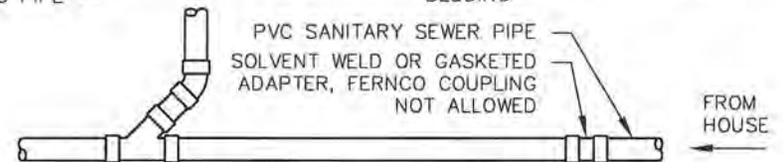
NOT TO SCALE

STEF-NOTES.DWG



NOTES:

1. ALL PIPE AND FITTINGS SHALL BE CLASS 200 PVC, EXCEPT WHERE NOTED.
2. SEWER UTILITY MARKING TAPE AND **14 GAUGE GREEN HMWPE INSULATED COPPER CLAD STEEL TONING WIRE** REQUIRED AS SHOWN ON TRENCH DETAIL.
3. CONNECTIONS AND SPLICES TO TONING WIRE SHALL BE SEALED WITH KING GEL CAPS, 3M DBY DIRECT BURY CAPS, OR OTHER APPROVED CONNECTION, AT ALL SPLICES.
4. ELEVATION OF SERVICE STUB OUT AND CONNECTION SHALL BE NOTED ON AS-BUILT DRAWINGS.



CONNECTION AT BUILD-OUT

REV. NO.	DATE	BY	APPR.
1	5/1/07	SCD	JC
2	1/1/11	SCD	JC



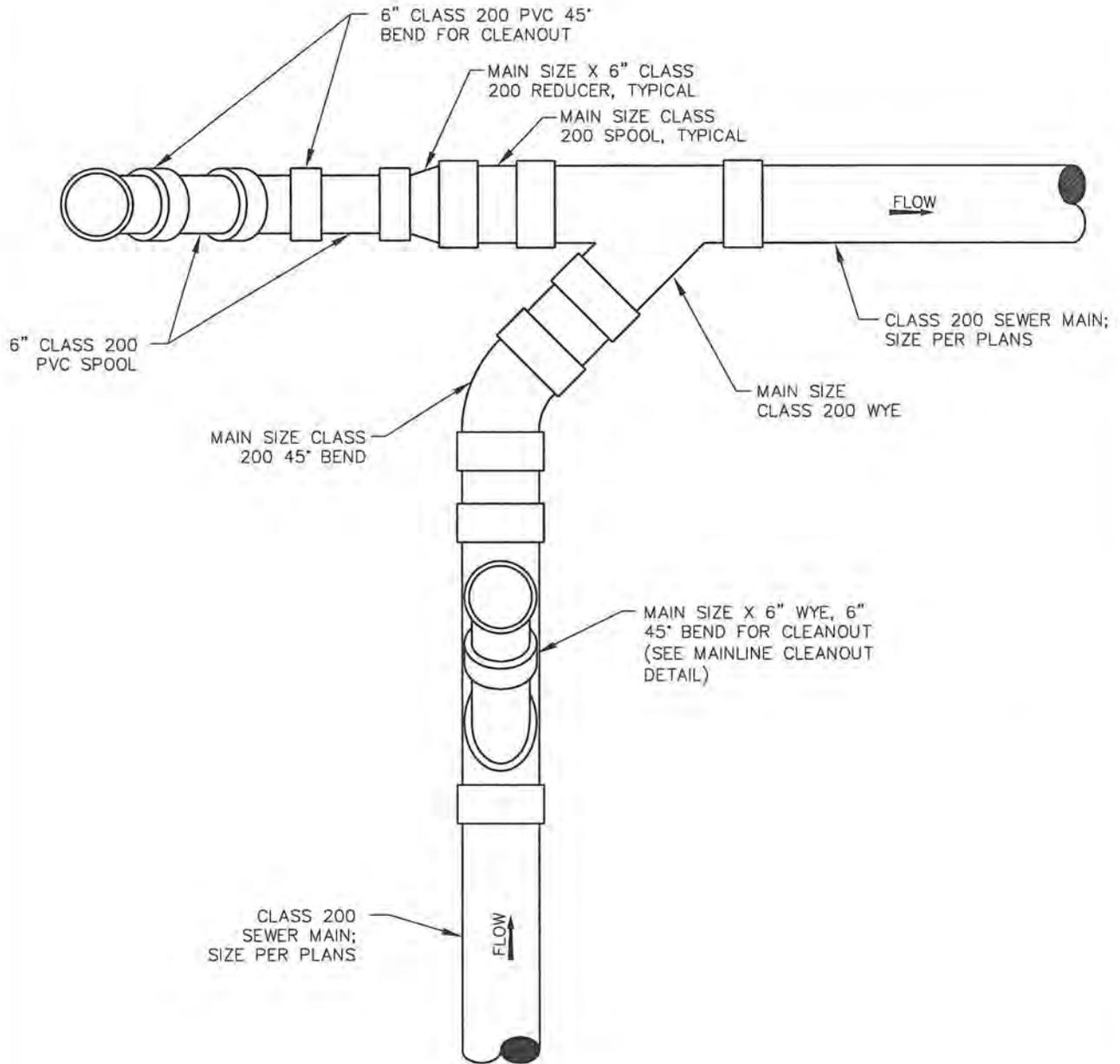
CITY OF CAMAS ~ SANITARY DETAIL
STEF SEWER SERVICE STUB OUT

Jan P. Costello 1-4-11
 DETAIL APPROVED BY DATE

NOT TO SCALE

DETAIL NO.
 SF2

STEF-SERV.DWG



NOTES:

1. ALL PIPE AND FITTINGS SHALL BE GASKETED CLASS 200 PVC.
2. SEWER UTILITY MARKING TAPE AND **14 GAUGE GREEN HMWPE INSULATED COPPER CLAD STEEL TONING WIRE** REQUIRED AS SHOWN ON TRENCH DETAIL.
3. CONNECTIONS AND SPLICES TO TONING WIRE SHALL BE SEALED WITH KING GEL CAPS, 3M DBY DIRECT BURY CAPS, OR OTHER APPROVED CONNECTION, AT ALL SPLICES.
4. SEE 'CLEANOUT DETAIL' FOR CLEANOUT CONSTRUCTION.

REV. NO.	DATE	BY	APPR.
1	5/1/07	SCD	JC
2	1/1/11	SCD	JC

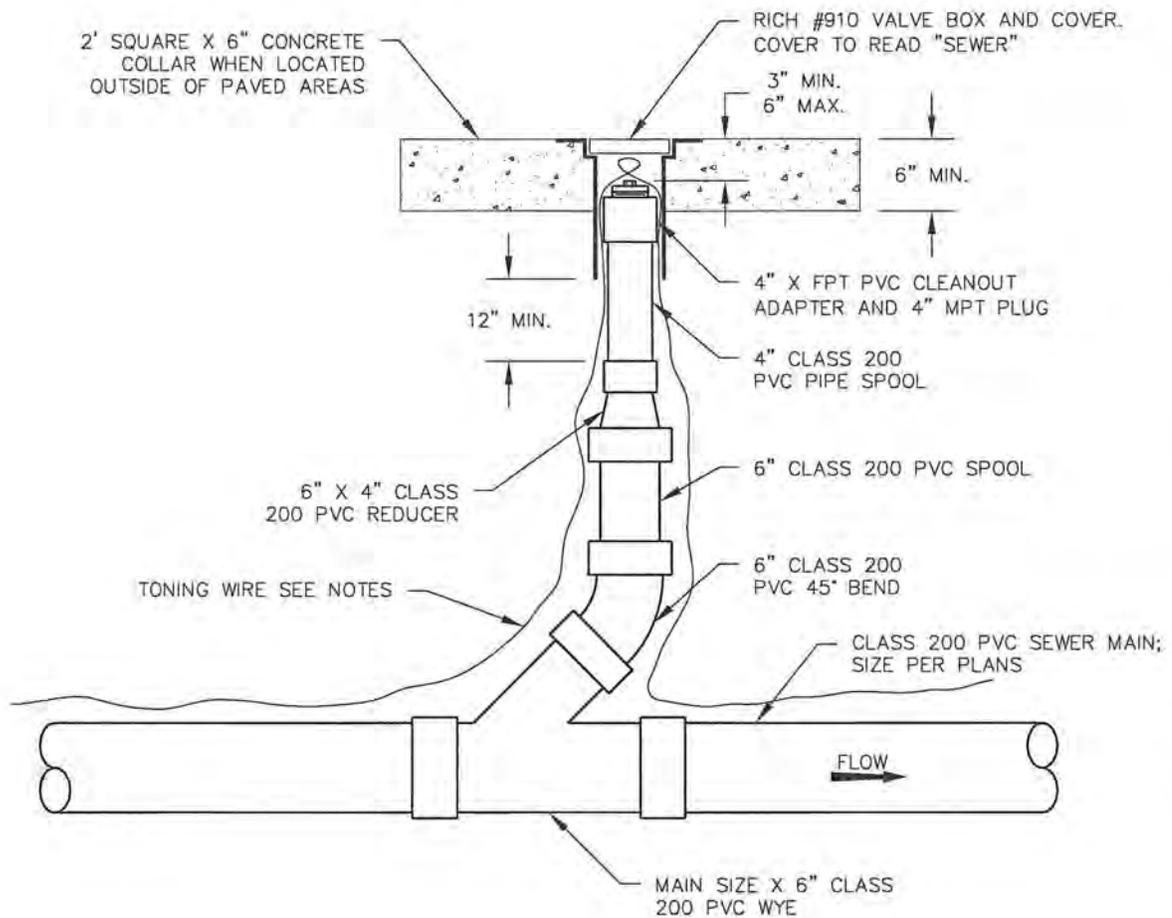


CITY OF CAMAS - SANITARY DETAIL
STEF 90° BEND

Don P. Caruthers 1-4-11
 DETAIL APPROVED BY DATE

NOT TO SCALE

DETAIL NO.
 SF4



NOTES:

1. PROVIDE 2' SQ. x 6" DEEP CONCRETE COLLAR AROUND VALVE BOX FOR CLEANOUTS IF OUT OF ROADWAY.
2. ALL PIPE AND FITTINGS SHALL BE GASKETED CLASS 200 PVC.
3. SEE TRENCH DETAIL FOR BACKFILL/BEDDING, SEWER UTILITY MARKING TAPE AND TONING WIRE REQUIREMENTS.
4. CONNECTIONS AND SPLICES TO TONING WIRE SHALL BE SEALED WITH KING GEL CAPS, 3M DBY DIRECT BURY CAPS, OR OTHER APPROVED CONNECTION, AT ALL SPLICES.
5. 14 GAUGE GREEN HMWPE INSULATED COPPER CLAD STEEL TONING WIRE REQUIRED.

REV. NO.	DATE	BY	APPR.
1	5/1/07	SCD	JC
2	1/1/11	SCD	JC



**CITY OF CAMAS ~ SANITARY DETAIL
STEF MAINLINE CLEAN OUT**

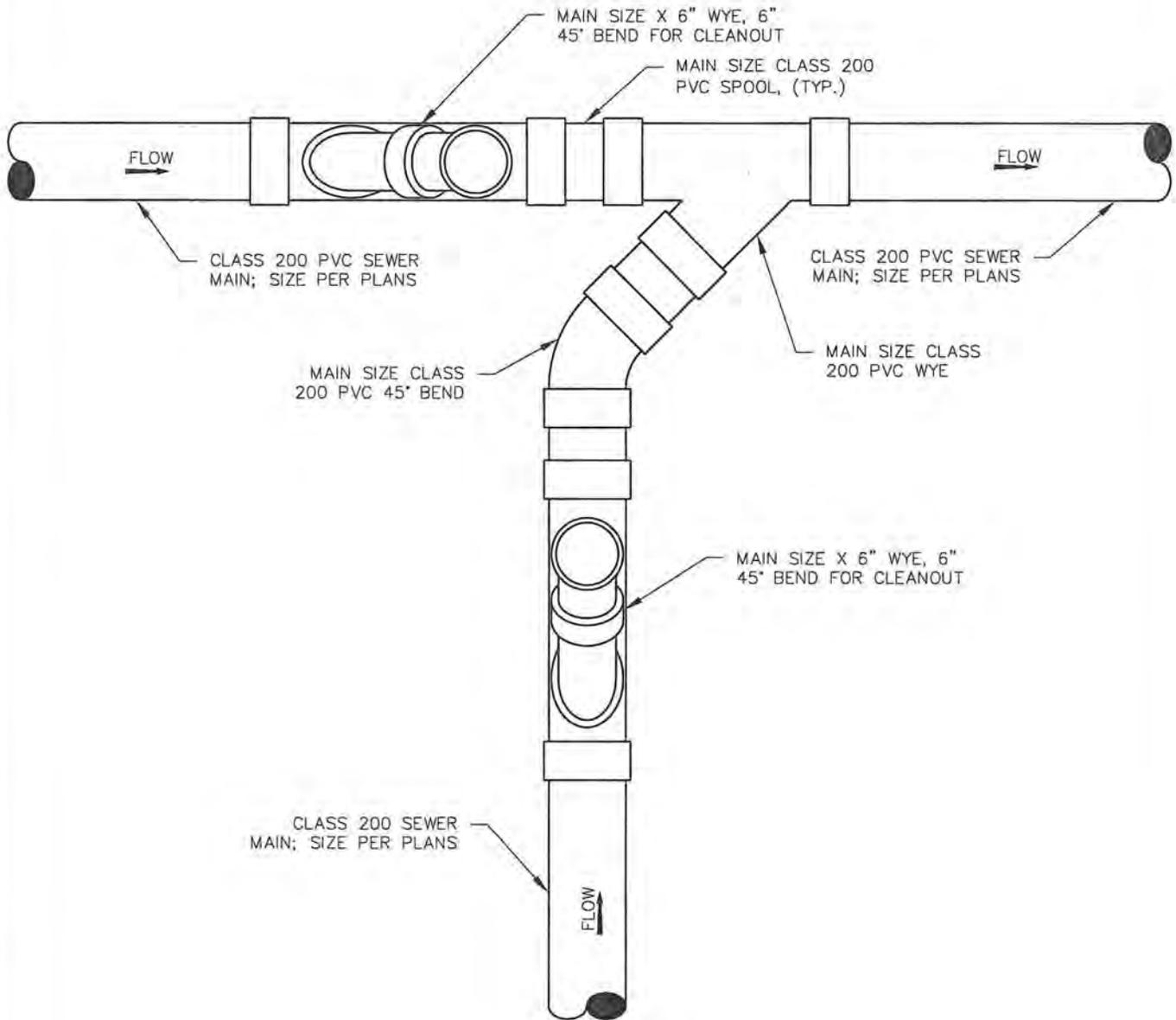
Sam P. Coathran 1-4-11
DETAIL APPROVED BY DATE

DETAIL NO.

SF5

NOT TO SCALE

STEF-MAIN.DWG



NOTES:

1. ALL PIPE AND FITTINGS SHALL BE GASKETED CLASS 200 PVC.
2. SEWER UTILITY MARKING TAPE AND **14 GAUGE GREEN HMWPE INSULATED COPPER CLAD STEEL TONING WIRE** REQUIRED AS SHOWN ON TRENCH DETAIL.
3. CONNECTIONS AND SPLICES TO TONING WIRE SHALL BE SEALED WITH KING GEL CAPS, 3M DBY DIRECT BURY CAPS, OR OTHER APPROVED CONNECTION, AT ALL SPLICES.
4. SEE 'CLEANOUT DETAIL' FOR CLEANOUT CONSTRUCTION.

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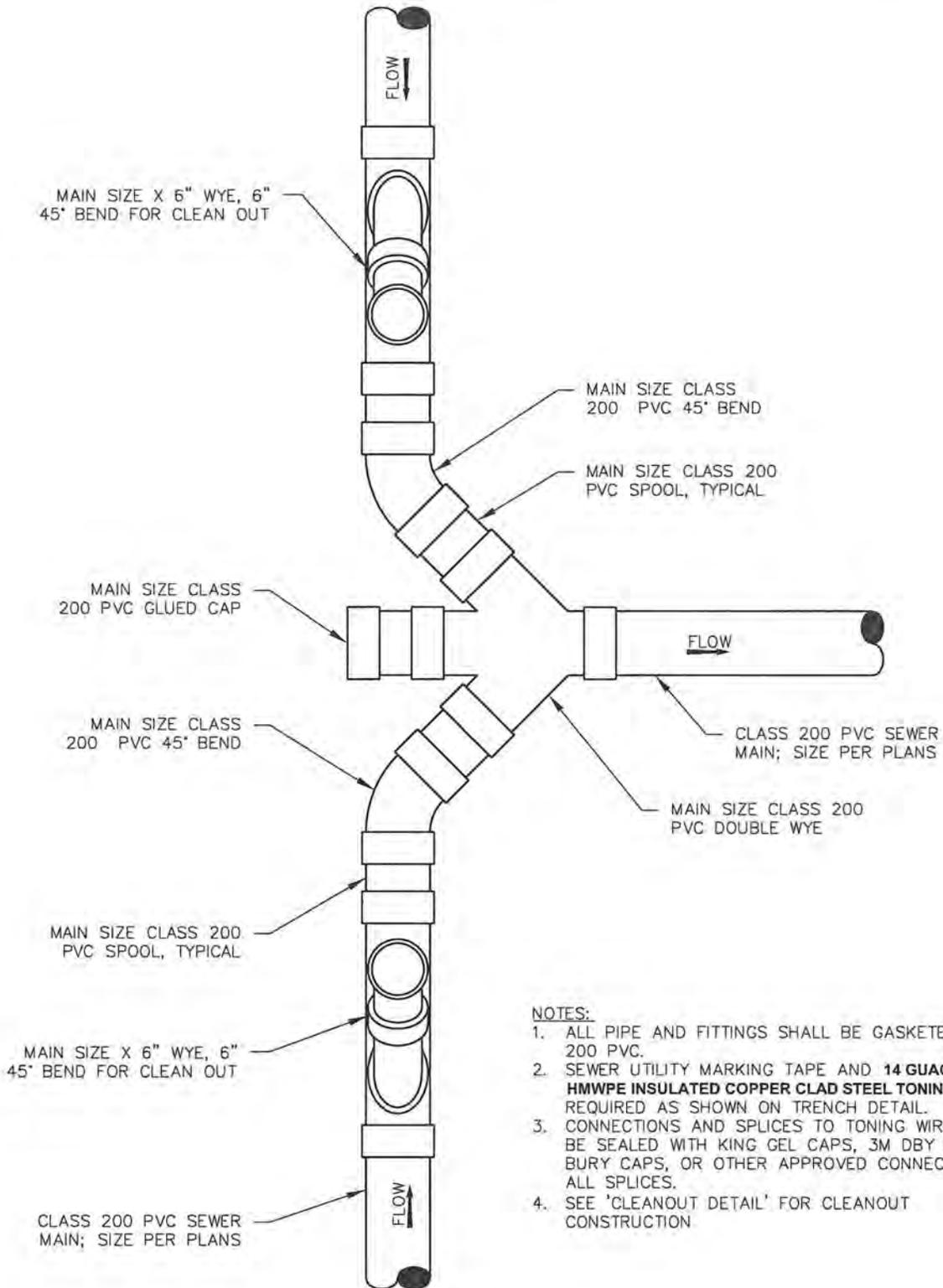


CITY OF CAMAS ~ SANITARY DETAIL
STEF MAIN TEE ASSEMBLY (FLOW A)

John P. Carothers 1-4-11
 DETAIL APPROVED BY DATE

DETAIL NO.
 SF6

NOT TO SCALE



NOTES:

1. ALL PIPE AND FITTINGS SHALL BE GASKETED CLASS 200 PVC.
2. SEWER UTILITY MARKING TAPE AND 14 GAUGE GREEN HMWPE INSULATED COPPER CLAD STEEL TONING WIRE REQUIRED AS SHOWN ON TRENCH DETAIL.
3. CONNECTIONS AND SPLICES TO TONING WIRE SHALL BE SEALED WITH KING GEL CAPS, 3M DBY DIRECT BURY CAPS, OR OTHER APPROVED CONNECTION, AT ALL SPLICES.
4. SEE 'CLEANOUT DETAIL' FOR CLEANOUT CONSTRUCTION.

REV. NO.	DATE	BY	APPR.
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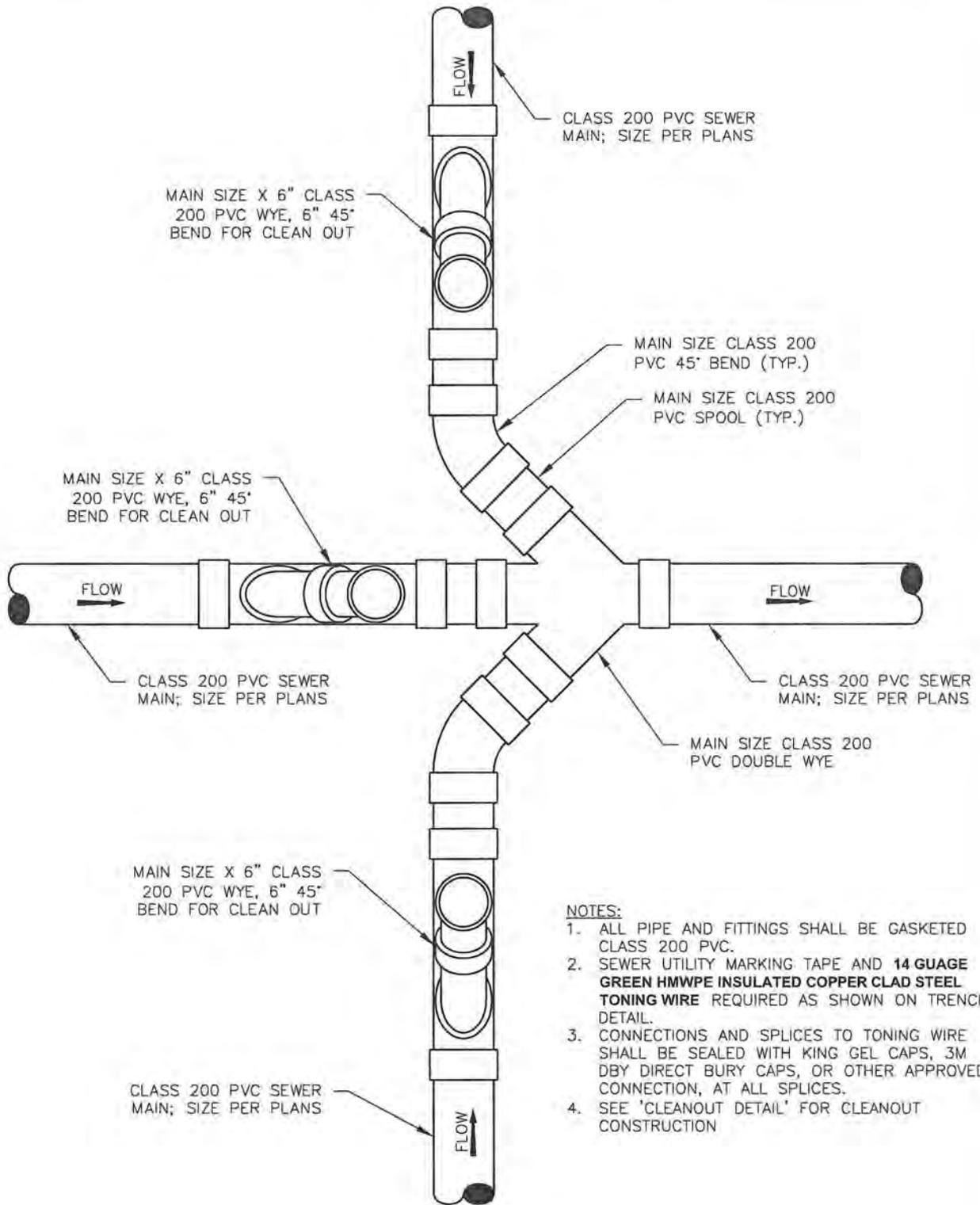


CITY OF CAMAS - SANITARY DETAIL
STEF MAIN TEE ASSEMBLY (FLOW B)

Don P. Caruth 1-4-11
 DETAIL APPROVED BY DATE

DETAIL NO.
 SF7

NOT TO SCALE



NOTES:

1. ALL PIPE AND FITTINGS SHALL BE GASKETED CLASS 200 PVC.
2. SEWER UTILITY MARKING TAPE AND **14 GAUGE GREEN HMWPE INSULATED COPPER CLAD STEEL TONING WIRE** REQUIRED AS SHOWN ON TRENCH DETAIL.
3. CONNECTIONS AND SPLICES TO TONING WIRE SHALL BE SEALED WITH KING GEL CAPS, 3M DBY DIRECT BURY CAPS, OR OTHER APPROVED CONNECTION, AT ALL SPLICES.
4. SEE 'CLEANOUT DETAIL' FOR CLEANOUT CONSTRUCTION

REV. NO.	DATE	BY	APPR.
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2	1/1/11	SCD	JC



CITY OF CAMAS ~ SANITARY DETAIL
STEF MAIN CROSS ASSEMBLY

John P. Coe 1-4-11
 DETAIL APPROVED BY DATE

DETAIL NO.
 SF8

NOT TO SCALE

RICH #910 VALVE BOX, COVER TO READ "SEWER" (TYP.)

4" X FPT PVC CLEANOUT ADAPTER AND 4" MPT PLUG (TYP.)

SEE NOTES #4 & #5

4" CLASS 200 PVC PIPE SPOOL (TYP.)

6" CLASS 200 PVC 45° BEND

MAIN SIZE X 6" CLASS 200 PVC WYE

5' TYP.

MAIN SIZE CLASS 200 PVC 45° BEND

CLASS 200 PVC SEWER MAIN; SIZE PER PLANS

MAIN SIZE X 4" CLASS 200 PVC REDUCER

MAIN SIZE CLASS 200 PVC RISER

MAIN SIZE CLASS 200 PVC WYE

FLOW

4" CLASS 200 PVC PIPE SPOOL (TYP.)

MAIN SIZE X 4" CLASS 200 PVC REDUCER

MAIN SIZE CLASS 200 PVC RISER

MAIN SIZE CLASS 200 PVC WYE

STEF AARV/CO SEE NOTE #6

6" CLASS 200 PVC PIPE SPOOL

6" CLASS 200 PVC 45° BEND

MAIN SIZE X 6" CLASS 200 PVC WYE

MAIN SIZE CLASS 200 PVC 45° BENDS

CLASS 200 PVC SEWER MAIN; SIZE PER PLANS

4' TYP.

MAIN SIZE CLASS 200 PVC PIPE SPOOL (TYP.)

MAIN SIZE CLASS 200 PVC 45° BENDS

NOTES:

1. SEWER UTILITY MARKING TAPE AND 14 GAUGE GREEN HMWPE INSULATED COPPER CLAD STEEL TONING WIRE REQUIRED. LOOP IN ALL CLEANOUT BOXES.
2. CONNECTIONS AND SPLICES TO TONING WIRE SHALL BE SEALED WITH KING GEL CAPS, 3M DBY DIRECT BURY CAPS, OR OTHER APPROVED CONNECTION, AT ALL SPLICES.
3. ALL PIPE FITTINGS SHALL BE GASKETED CLASS 200 PVC.
4. PROVIDE 2' SQUARE x 6" DEEP CONCRETE COLLAR AROUND ALL VALVE BOXES WHEN LOCATED OUTSIDE ROADWAY.
5. REFER TO MAINLINE CLEANOUT DETAIL FOR CONSTRUCTION REQUIREMENTS.
6. REFER TO AARV CLEANOUT DETAILS FOR ROADWAY AND OUTSIDE-ROADWAY CONSTRUCTION REQUIREMENTS.
7. DOWNSTREAM SECTION MUST BE AT LEAST 1' LOWER IN ELEVATION THAN UPSTREAM SECTION.

REV. NO.	DATE	BY	APPR.
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CITY OF CAMAS ~ SANITARY DETAIL
STEF "P" TRAP ASSEMBLY

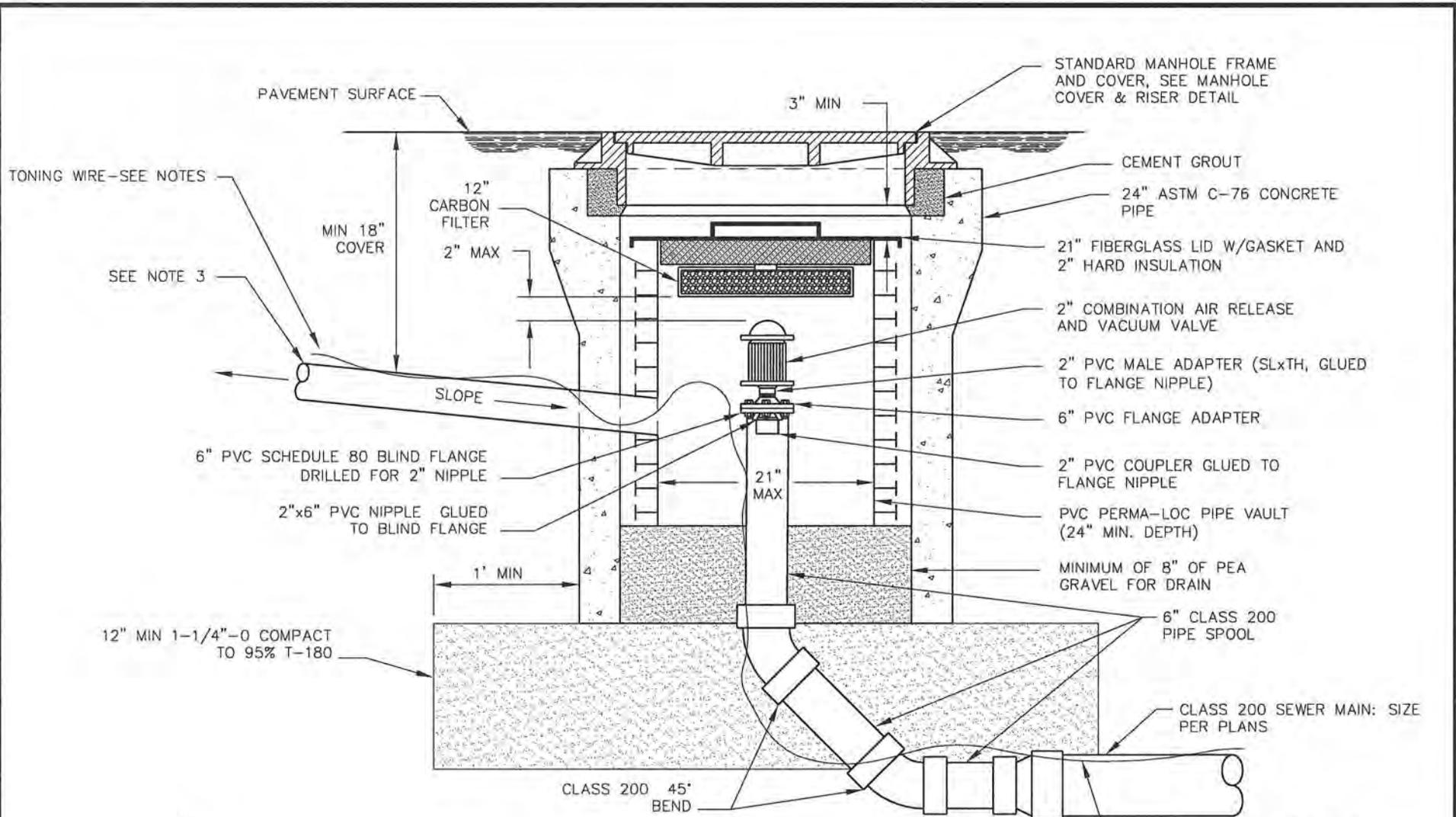
Sam P. Cothran 1-4-11
 DETAIL APPROVED BY DATE

DETAIL NO.

SF9

NOT TO SCALE

STEF-MAIN.DWG



NOTE:

1. FOR PLACEMENT IN A TRAFFIC AREA
2. BACKFILL AND COMPACTION PER APPROPRIATE TRENCH DETAIL UNLESS OTHERWISE NOTED
3. 3" PVC VENT LINE TO CARBON OR SOIL FILTER WHEN SPECIFIED, SEE APPLICABLE DETAIL.
4. CONNECTIONS AND SPLICES TO TONING WIRE SHALL BE SEALED WITH KING GEL CAPS, 3M DBY DIRECT BURY, OR OTHER APPROVED CONNECTORS, AT ALL SPLICES.
5. **14 GAUGE GREEN HMWPE INSULATED COPPER CLAD STEEL TONING WIRE REQUIRED.**

REV. NO.	DATE	BY	APPR.
1	5/1/07	SCD	JC
2	1/1/11	SCD	JC



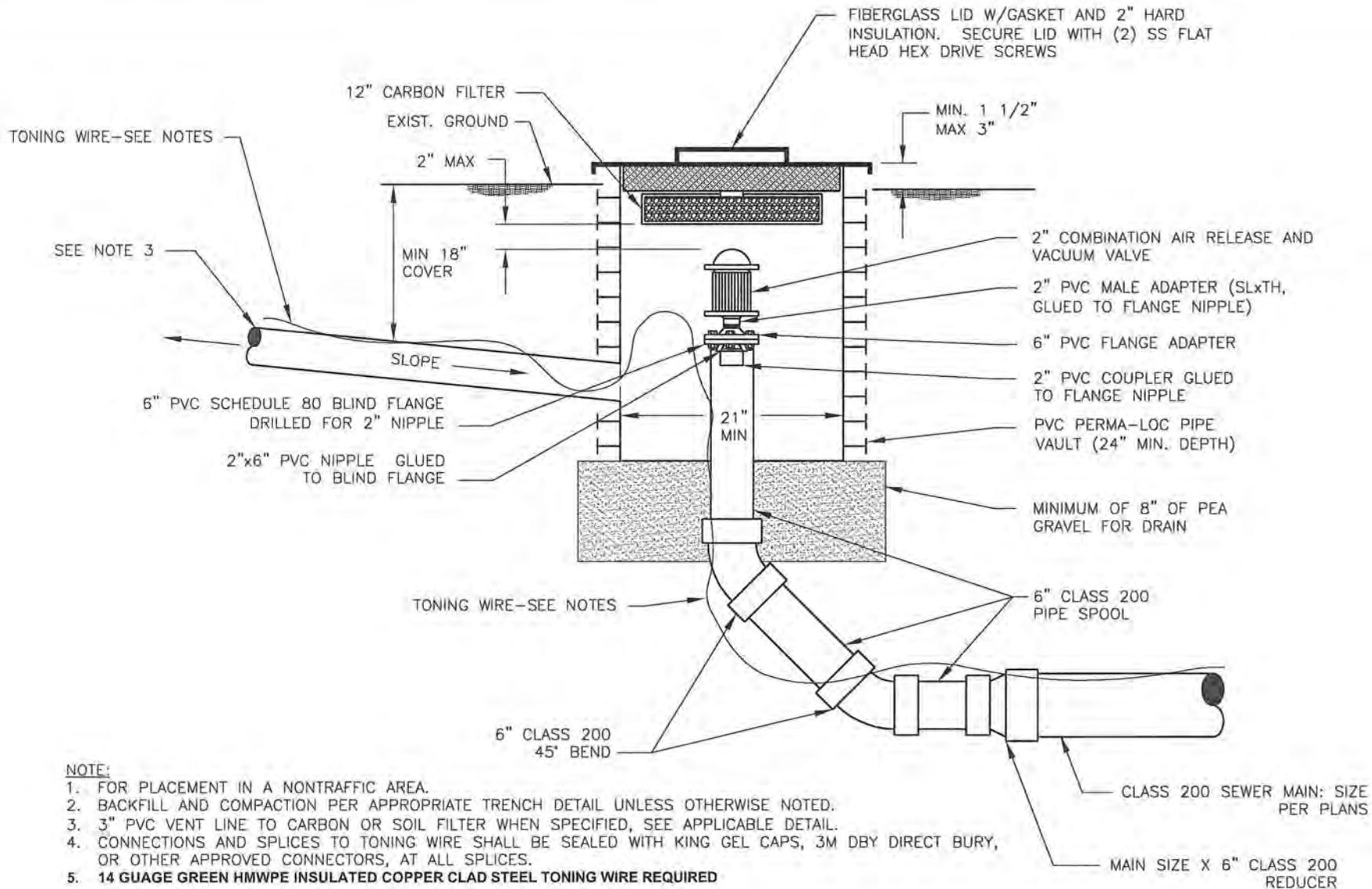
CITY OF CAMAS ~ SANITARY DETAIL
STEF AARV/CLEANOUT (TRAFFIC RATED)

Jan E. Caruth 1-4-11
 DETAIL APPROVED BY DATE

DETAIL NO.
 SF10

NOT TO SCALE

STEF-AARVCC.DWG



NOTE:

1. FOR PLACEMENT IN A NONTRAFFIC AREA.
2. BACKFILL AND COMPACTION PER APPROPRIATE TRENCH DETAIL UNLESS OTHERWISE NOTED.
3. 3" PVC VENT LINE TO CARBON OR SOIL FILTER WHEN SPECIFIED, SEE APPLICABLE DETAIL.
4. CONNECTIONS AND SPLICES TO TONING WIRE SHALL BE SEALED WITH KING GEL CAPS, 3M DBY DIRECT BURY, OR OTHER APPROVED CONNECTORS, AT ALL SPLICES.
5. **14 GAUGE GREEN HMWPE INSULATED COPPER CLAD STEEL TONING WIRE REQUIRED**

REV. NO.	DATE	BY	APPR.
1	5/1/07	SCD	JC
2	1/1/11	SCD	JC

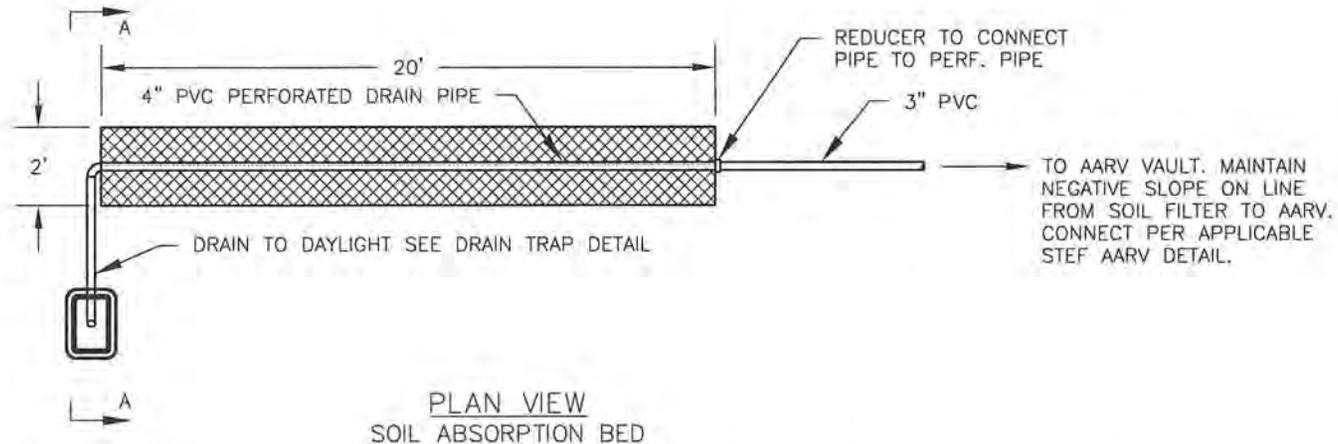
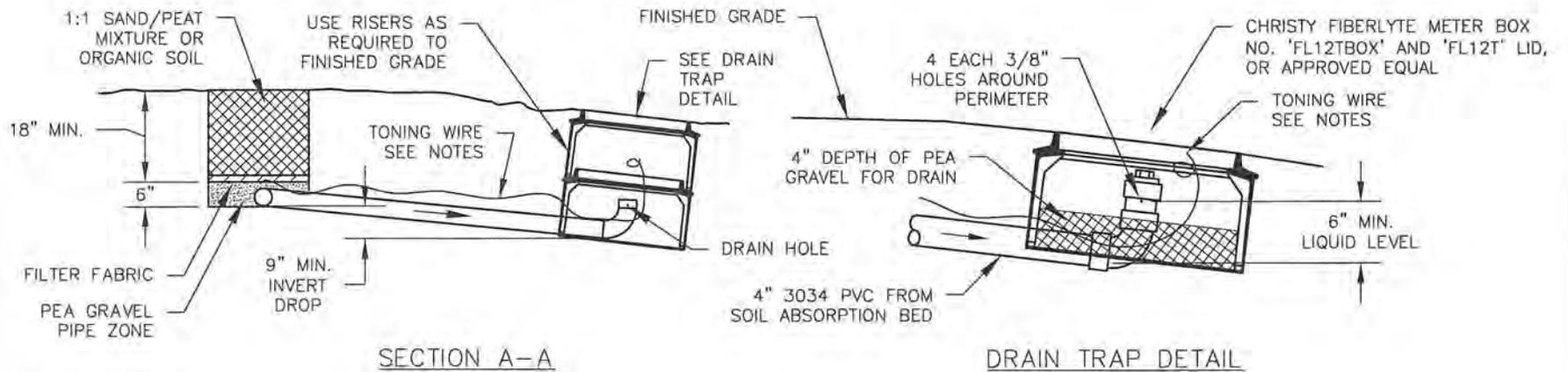


CITY OF CAMAS ~ SANITARY DETAIL
STEF AARV/CLEANOUT (NON-TRAFFIC RATED)
Jan P. Coethen 1-4-11
 DETAIL APPROVED BY DATE

DETAIL NO.
 SF11

NOT TO SCALE

STEF-AARVCO.DWG



NOTE:

1. BASED ON ANALYSIS OF VOLUME, OTHER METHODS OF ODOR CONTROL MAY BE REQUIRED BY CITY.
2. FILTER FABRIC SHOULD BE USED TO LINE ENTIRE TRENCH.
3. IF GROUND WATER IS AN ISSUE, THE TRENCH SHOULD BE LINED WITH POND LINER AND CLAMPED TO THE PIPE AT EACH END OF THE FILTER BED, OR A CARBON FILTER CAN BE USED.
4. TRENCH TO FOLLOW CONTOUR OF LANDSCAPING. PERF PIPE DOES NOT NEED TO BE LEVEL.
5. CONNECTIONS AND SPLICES TO TONING WIRE SHALL BE SEALED WITH KING GEL CAPS, 3M DBY DIRECT BURY CAPS, OR OTHER APPROVED CONNECTION, AT ALL SPLICES.
6. **14 GAUGE GREEN HMWPE INSULATED COPPER CLAD STEEL TONING WIRE REQUIRED.**

REV. NO.	DATE	BY	APPR.
1	5/1/07	SCD	JC
2	1/1/11	SCD	JC



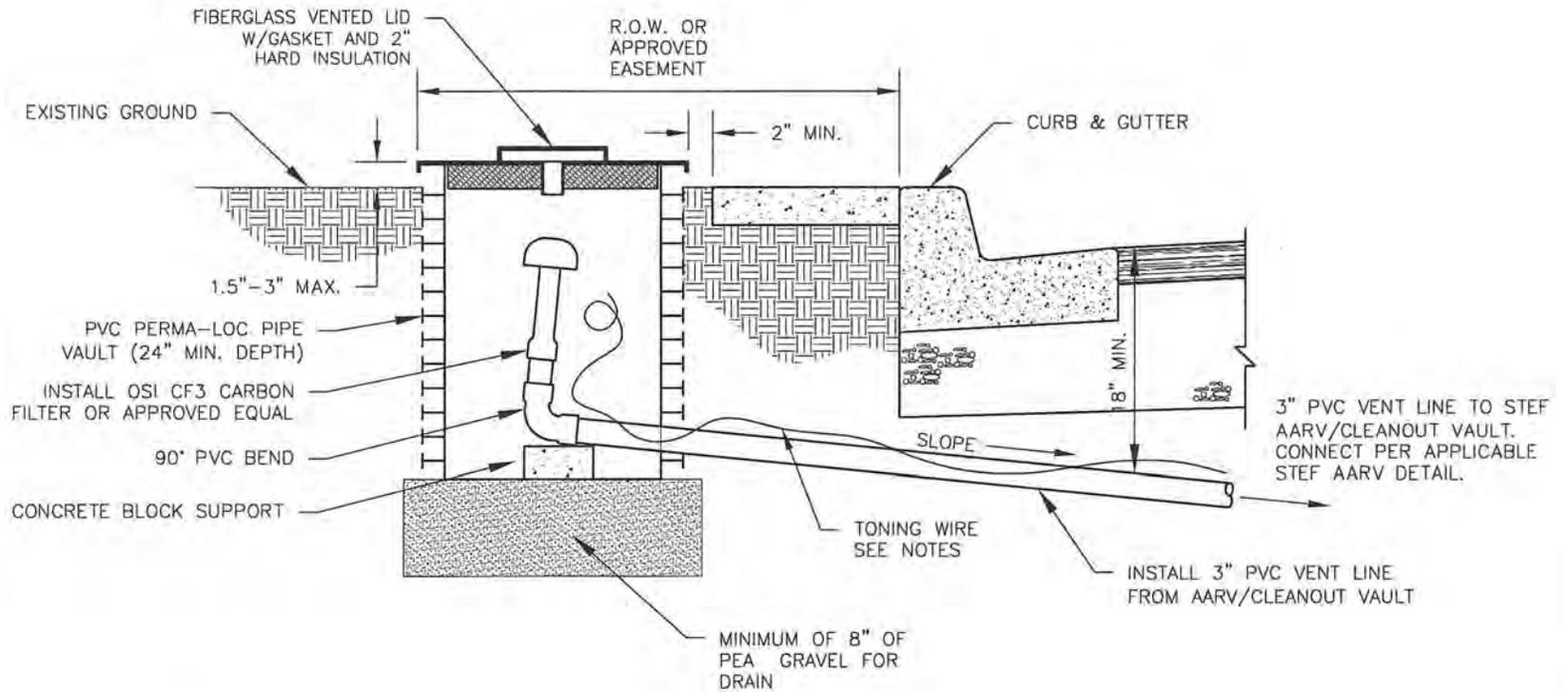
CITY OF CAMAS ~ SANITARY DETAIL
STEF SOIL FILTER

Sam P. Coulter 1-4-11
DETAIL APPROVED BY DATE

DETAIL NO.

SF12

NOT TO SCALE



NOTE:

1. SEE PLAN AND STREET SECTIONS FOR SIDEWALK LOCATION
2. CONNECTIONS AND SPLICES TO TONING WIRE SHALL BE SEALED WITH KING GEL CAPS, 3M DBY DIRECT BURY CAPS, OR OTHER APPROVED CONNECTION, AT ALL SPLICES.
3. **14 GAUGE GREEN HMPWE INSULATED COPPER CLAD STEEL TONING WIRE REQUIRED**

REV. NO.	DATE	BY	APPR.
1	5/1/07	SCD	JC
2	1/1/11	SCD	JC



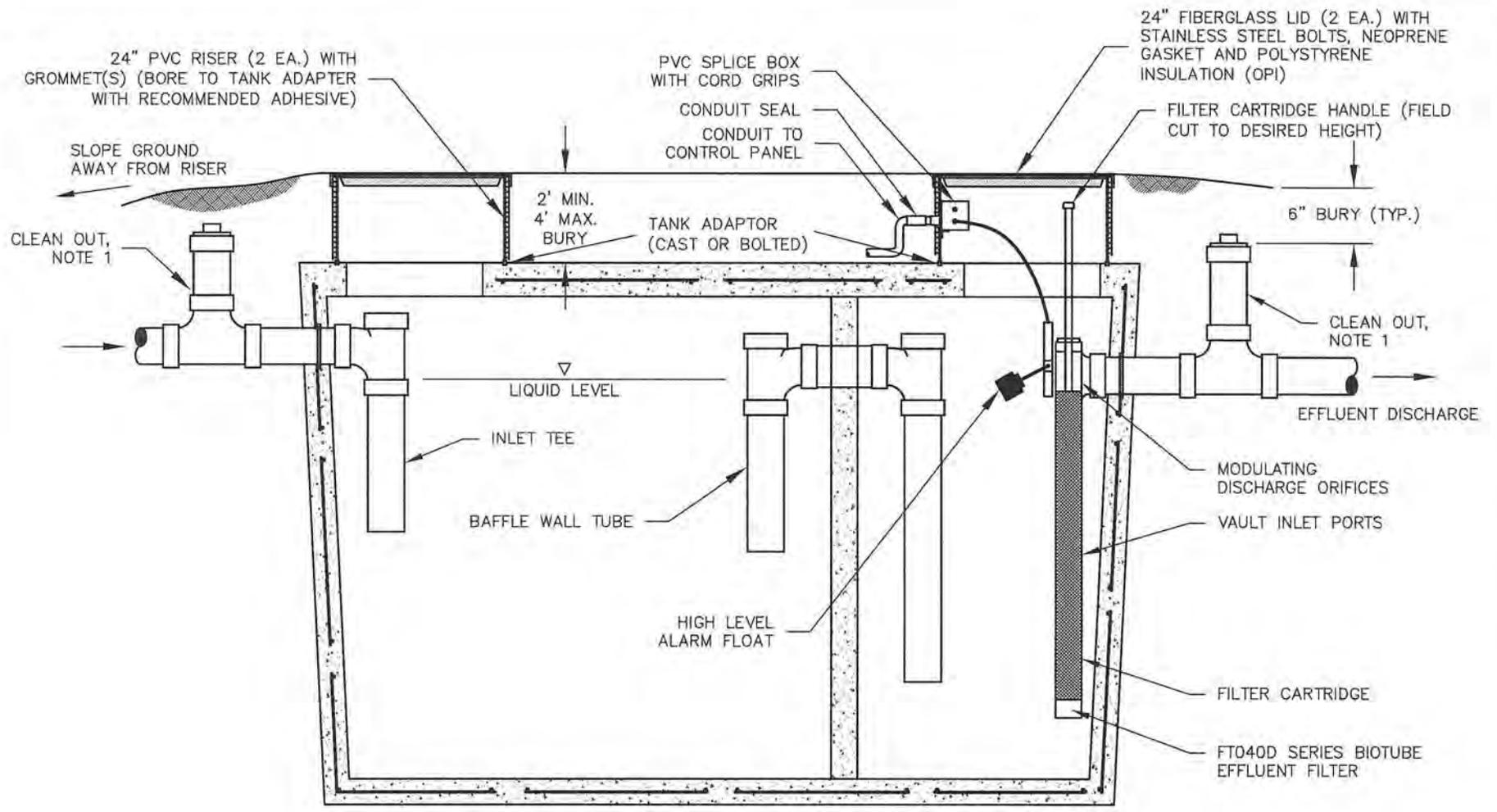
CITY OF CAMAS ~ SANITARY DETAIL
STEF CARBON FILTER

San P. Carthon 1-4-11
 DETAIL APPROVED BY DATE

DETAIL NO.

SF13

NOT TO SCALE



STEF (SEPTIC TANK EFFLUENT FILTER SYSTEM)
 SECTION VIEW TYPICAL 1500 GALLON TANK W/DUAL COMPARTMENT
 DRAWDOWN BIOTUBE EFFLUENT FILTER

- NOTES:**
1. 2-WAY CLEAN OUT; SOLVENT WELD OR GASKETED CONNECTIONS REQUIRED, FERNCO COUPLINGS NOT ALLOWED, IRON PLUG W/ 2" SQUARE NUT.
 2. FOR TANK BURY DEPTH OVER 4', OR DRIVEWAY LOCATIONS, AN H-20 TRAFFIC RATED TANK LID IS REQUIRED.
 3. FOR TANK LOCATED IN DRIVEWAY A UTILITY VAULT FRAME AND LID IS ALSO REQUIRED.

REV. NO.	DATE	BY	APPR.
1	5/1/07	SCD	JC
2	1/1/11	SCD	JC
3	10/21/14	SCD	JC



CITY OF CAMAS ~ SANITARY DETAIL

STEF TANK

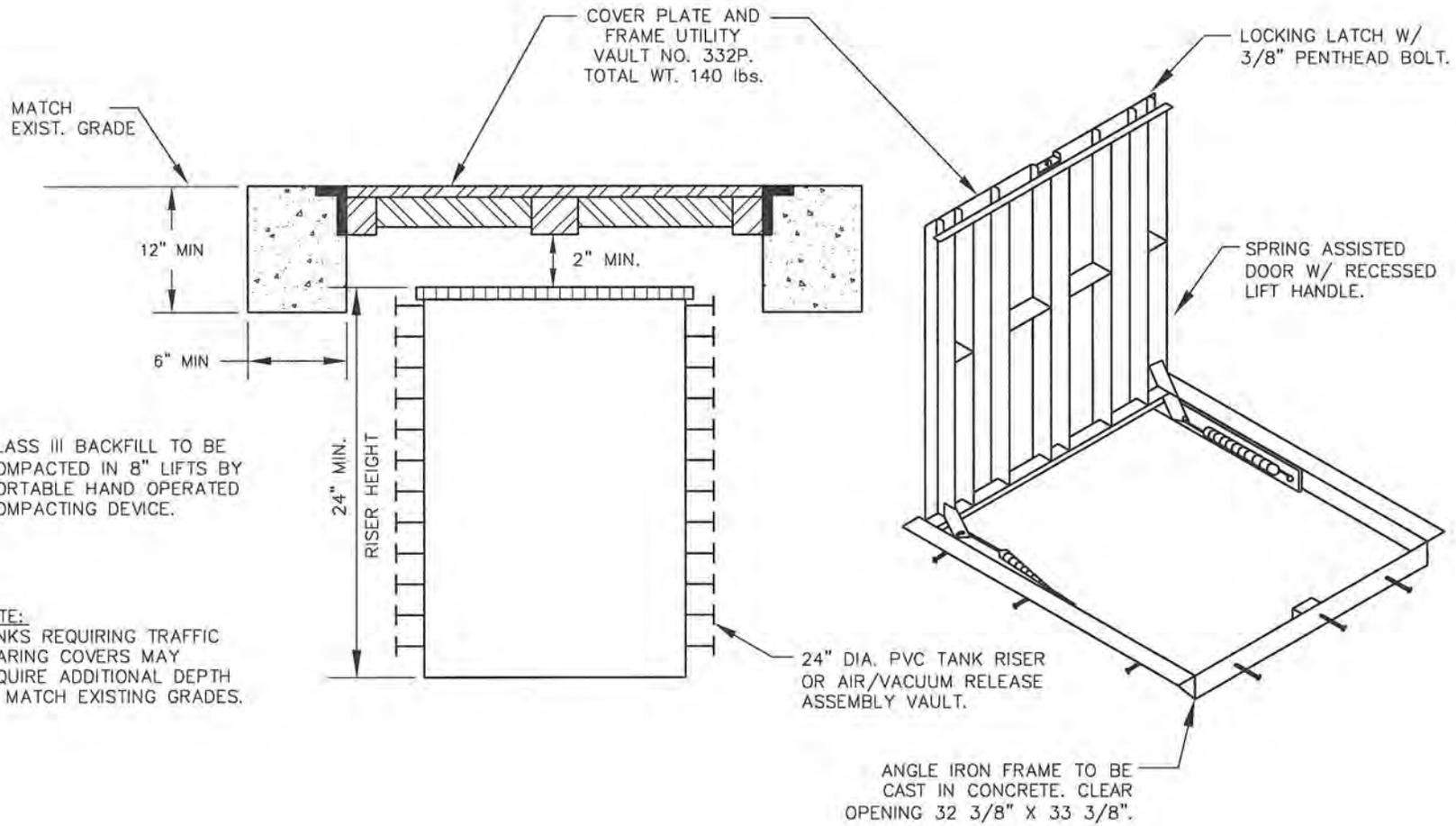
Jan C. Caruth 10-21-14
 DETAIL APPROVED BY DATE

DETAIL NO.

SF14

NOT TO SCALE

STEF-TANK.DWG



REV. NO.	DATE	BY	APPR.
1	1/1/11	SCD	JC



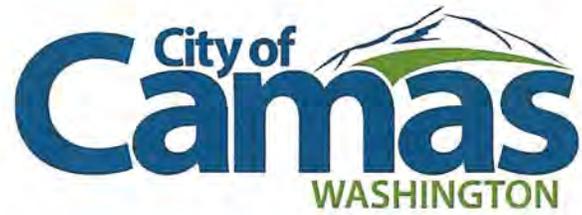
CITY OF CAMAS ~ SANITARY DETAIL
STEF TRAFFIC BEARING RISER LID

Don P. Coulter 1-4-11
DETAIL APPROVED BY DATE

DETAIL NO.
SF15

NOT TO SCALE

STEF-TANK.DWG



S.T.E.P. Sewer Details

City of Camas
616 NE Fourth Avenue
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Creation Date: 10/28/02
Revision Date: 10/21/14 (Partial)

City of Camas STEP Sanitary Details ~ INDEX

STEP Sanitary Sewer Details

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SEPTIC TANK EFFLUENT PUMP (S.T.E.P.) NOTES:

1. ALL TRENCH EXCAVATION AND PIPE INSTALLATION SHALL CONFORM TO THE MOST RECENTLY ADOPTED EDITION OF THE W.S.D.O.T. STANDARD SPECIFICATIONS SECTION 7-08.3(1) AND SECTION 7-08.3(2). ALL EXCESS MATERIAL FROM THE TRENCH EXCAVATION SHALL BE DISPOSED OF ON AN APPROVED SITE.
2. PIPE BEDDING, PIPE ZONE MATERIAL, AND TRENCH BACKFILL SHALL BE AN APPROVED GRANULAR MATERIAL OF EITHER WASHED SCREENINGS OR 5/8 INCH MINUS CRUSHED ROCK. SAND BACKFILL IS NOT ALLOWED.
3. TRENCH COMPACTION SHALL CONFORM TO THE MOST RECENTLY ADOPTED EDITION OF THE W.S.D.O.T. STANDARD SPECIFICATIONS SECTION 7-08.3(3). CONTRACTOR TO DETERMINE THE TYPE OF EQUIPMENT AND METHOD TO USE TO ACHIEVE THE REQUIRED COMPACTION. EACH LIFT SHALL BE COMPACTED TO A MINIMUM OF 95 PERCENT OF THE MAXIMUM DENSITY AS DETERMINED BY THE A.A.S.H.T.O. T-180 TEST METHOD.
4. SETTLEMENT OF THE FINISHED SURFACE WITHIN THE WARRANTY PERIOD SHALL BE CONSIDERED TO BE A RESULT OF IMPROPER COMPACTION AND SHALL BE PROMPTLY REPAIRED BY THE CONTRACTOR AT NO EXPENSE TO THE CITY.
5. ALL SANITARY SEWER PIPE AND FITTINGS 2 INCHES IN DIAMETER AND LARGER SHALL BE PVC GASKETED PIPE, ASTM D2241 PRESSURE RATED FOR 200 PSI UNLESS OTHERWISE NOTED. ALL SANITARY SEWER PIPE AND FITTINGS SMALLER THAN 2 INCH DIAMETER SHALL BE PVC SCHEDULE 40.
6. PIPE SHALL BE BEDDED WITH A MINIMUM OF 4 INCHES OF APPROVED GRANULAR MATERIAL.
7. 14 GAUGE GREEN HDPE (HMWPE) INSULATED COPPER CLAD STEEL TONING WIRE SHALL BE PLACED DIRECTLY OVER ALL SEWER MAINS AND SERVICE LATERALS. THE TONING WIRE SHALL BE ACCESSIBLE AT ALL VALVES, RISERS, A.A.R.V.'S AND SERVICE BOXES. ALL SPLICES AND CONNECTIONS TO TONING WIRE SHALL BE PROTECTED WITH KING GEL CAPS, 3M DBY DIRECT BURY, OR OTHER APPROVED EQUAL CONNECTORS.
8. ALL PIPE AND FITTINGS SHALL BE HYDROSTATICALLY TESTED AT 150 P.S.I. FOR FIFTEEN MINUTES, EXCEPT LATERAL SERVICES, WHICH SHALL BE TESTED AT 100 P.S.I. FOR 30 SECONDS.
9. ALL S.T.E.P. SANITARY SEWER MAINLINES SHALL BE INSTALLED WITH A MINIMUM COVER OF 5 FEET.
10. ALL S.T.E.P. SANITARY SEWER LATERALS SHALL BE INSTALLED IN A DEDICATED TRENCH FROM THE SERVICE CONNECTION TO THE TANK. BACKFILL SHALL BE APPROVED GRANULAR MATERIAL OR AS APPROVED BY THE WATER/SEWER DEPARTMENT.
11. ALL TANKS WITH A BURY DEPTH OVER 4'-0" MUST HAVE H-20 RATED TANK LID.

REV. NO.	DATE	BY	APPR.
1	5/1/07	SCD	JC
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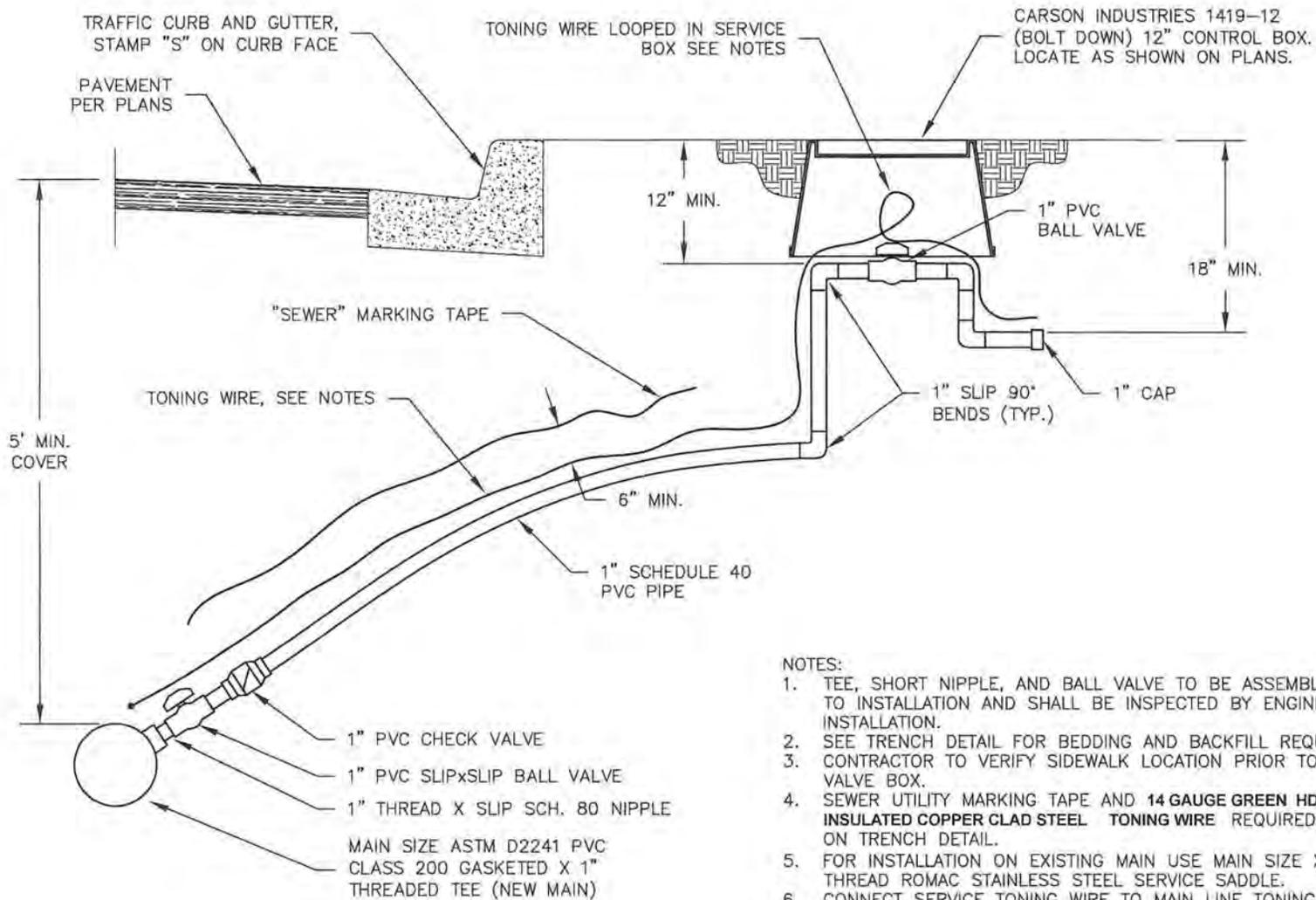
CITY OF CAMAS ~ SANITARY DETAIL
STEP SEWER CONSTRUCTION NOTES

John P. Swathen 10-21-14
DETAIL APPROVED BY DATE

NOT TO SCALE

DETAIL NO.

SP1



NOTES:

1. TEE, SHORT NIPPLE, AND BALL VALVE TO BE ASSEMBLED PRIOR TO INSTALLATION AND SHALL BE INSPECTED BY ENGINEER BEFORE INSTALLATION.
2. SEE TRENCH DETAIL FOR BEDDING AND BACKFILL REQUIREMENTS.
3. CONTRACTOR TO VERIFY SIDEWALK LOCATION PRIOR TO LOCATING VALVE BOX.
4. SEWER UTILITY MARKING TAPE AND 14 GAUGE GREEN HDPE INSULATED COPPER GLAD STEEL TONING WIRE REQUIRED AS SHOWN ON TRENCH DETAIL.
5. FOR INSTALLATION ON EXISTING MAIN USE MAIN SIZE X 1" I.P. THREAD ROMAC STAINLESS STEEL SERVICE SADDLE.
6. CONNECT SERVICE TONING WIRE TO MAIN LINE TONING WIRE WITH KING GEL CAPS, 3M DBY DIRECT BURY CAPS, OR OTHER APPROVED CONNECTION, AT ALL SPLICES.

REV. NO.	DATE	BY	APPR.
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3	10/21/14	SCD	JC



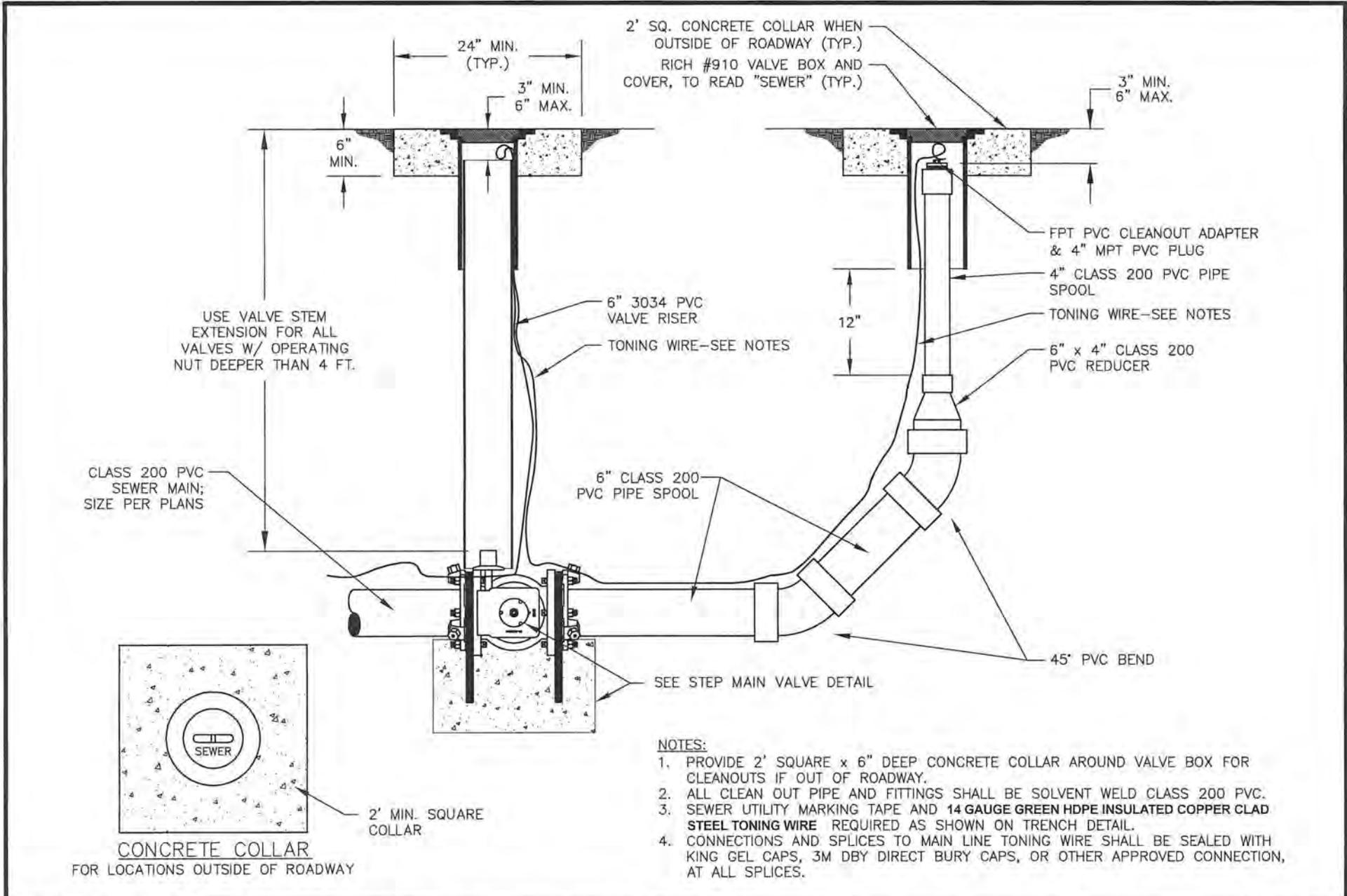
CITY OF CAMAS ~ SANITARY DETAIL
STEP SEWER SERVICE

San J. Christian 10-21-14
DETAIL APPROVED BY DATE

DETAIL NO.

SP2

NOT TO SCALE



- NOTES:**
1. PROVIDE 2' SQUARE x 6" DEEP CONCRETE COLLAR AROUND VALVE BOX FOR CLEANOUTS IF OUT OF ROADWAY.
 2. ALL CLEAN OUT PIPE AND FITTINGS SHALL BE SOLVENT WELD CLASS 200 PVC.
 3. SEWER UTILITY MARKING TAPE AND 14 GAUGE GREEN HDPE INSULATED COPPER CLAD STEEL TONING WIRE REQUIRED AS SHOWN ON TRENCH DETAIL.
 4. CONNECTIONS AND SPLICES TO MAIN LINE TONING WIRE SHALL BE SEALED WITH KING GEL CAPS, 3M DBY DIRECT BURY CAPS, OR OTHER APPROVED CONNECTION, AT ALL SPLICES.

REV. NO.	DATE	BY	APPR.
1	5/1/07	SCD	JC
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3	10/21/14	SCD	JC



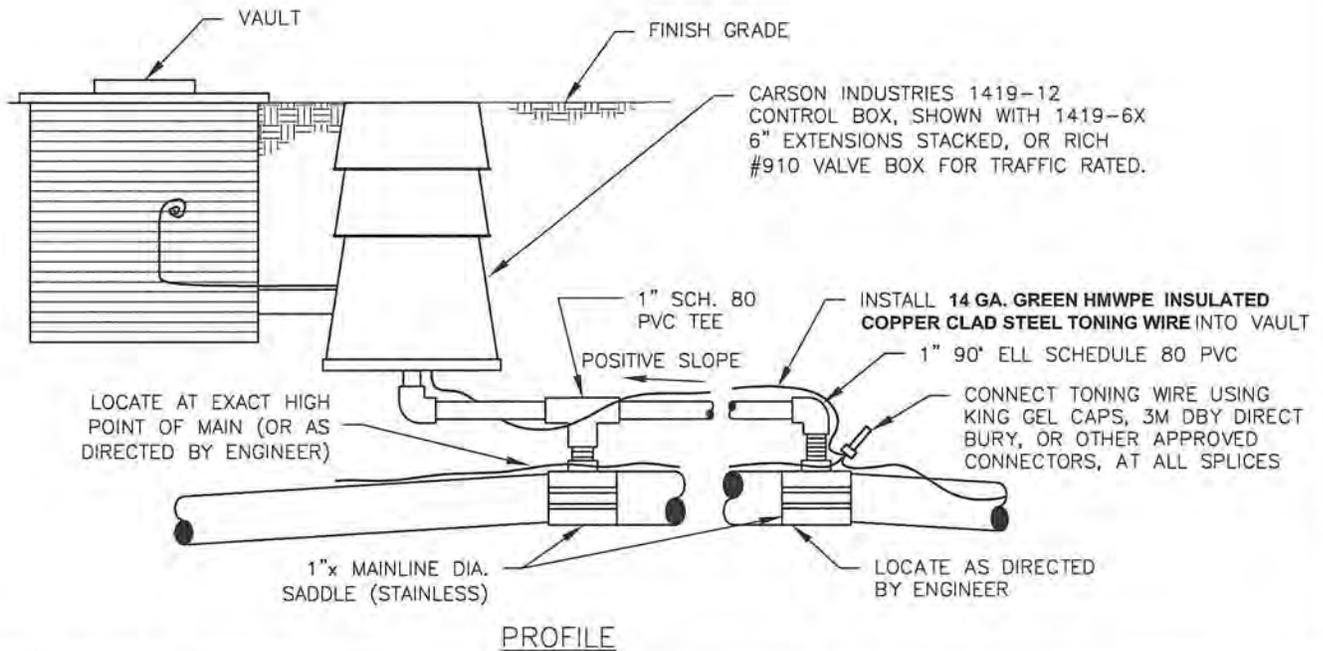
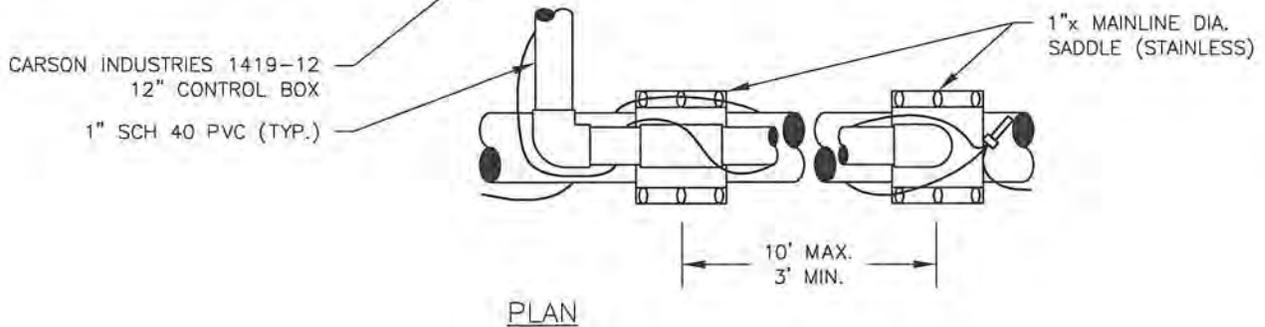
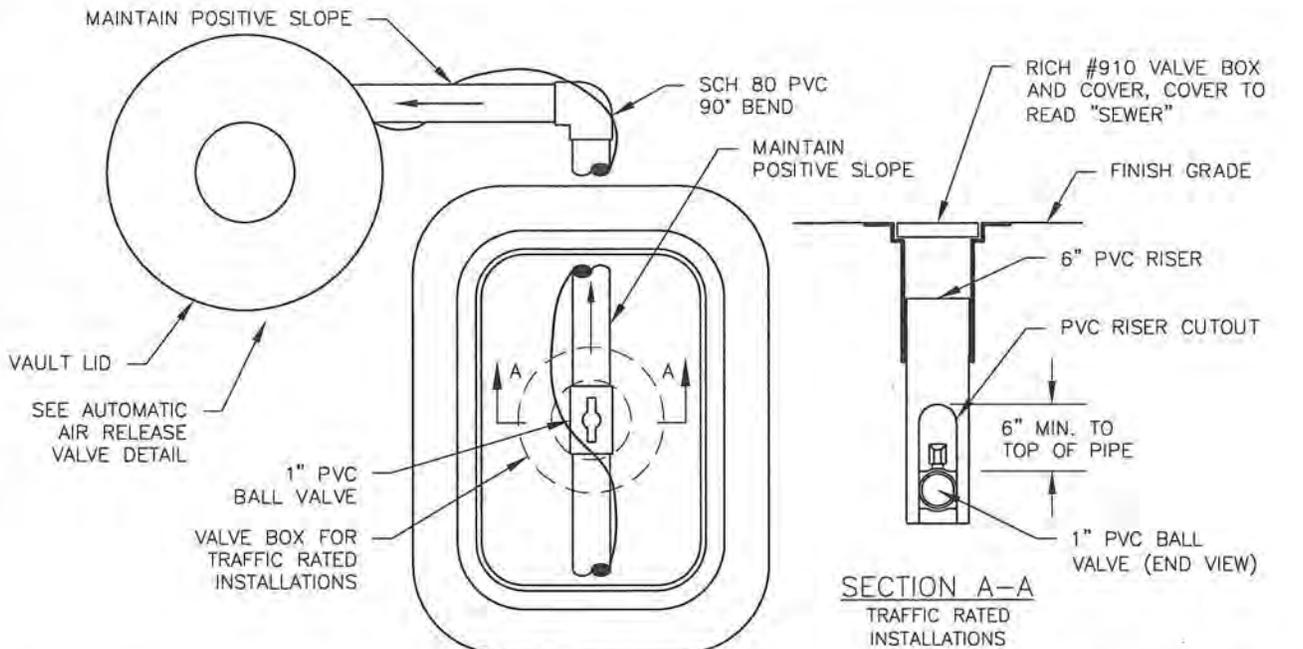
CITY OF CAMAS ~ SANITARY DETAIL
STEP SANITARY CLEAN OUT

San P. [Signature] 10-21-14
DETAIL APPROVED BY DATE

DETAIL NO.
SP3

NOT TO SCALE

STEP-MAIN.DWG



REV. NO.	DATE	BY	APPR.
1	5/1/07	SCD	JC
2	1/1/11	SCD	JC

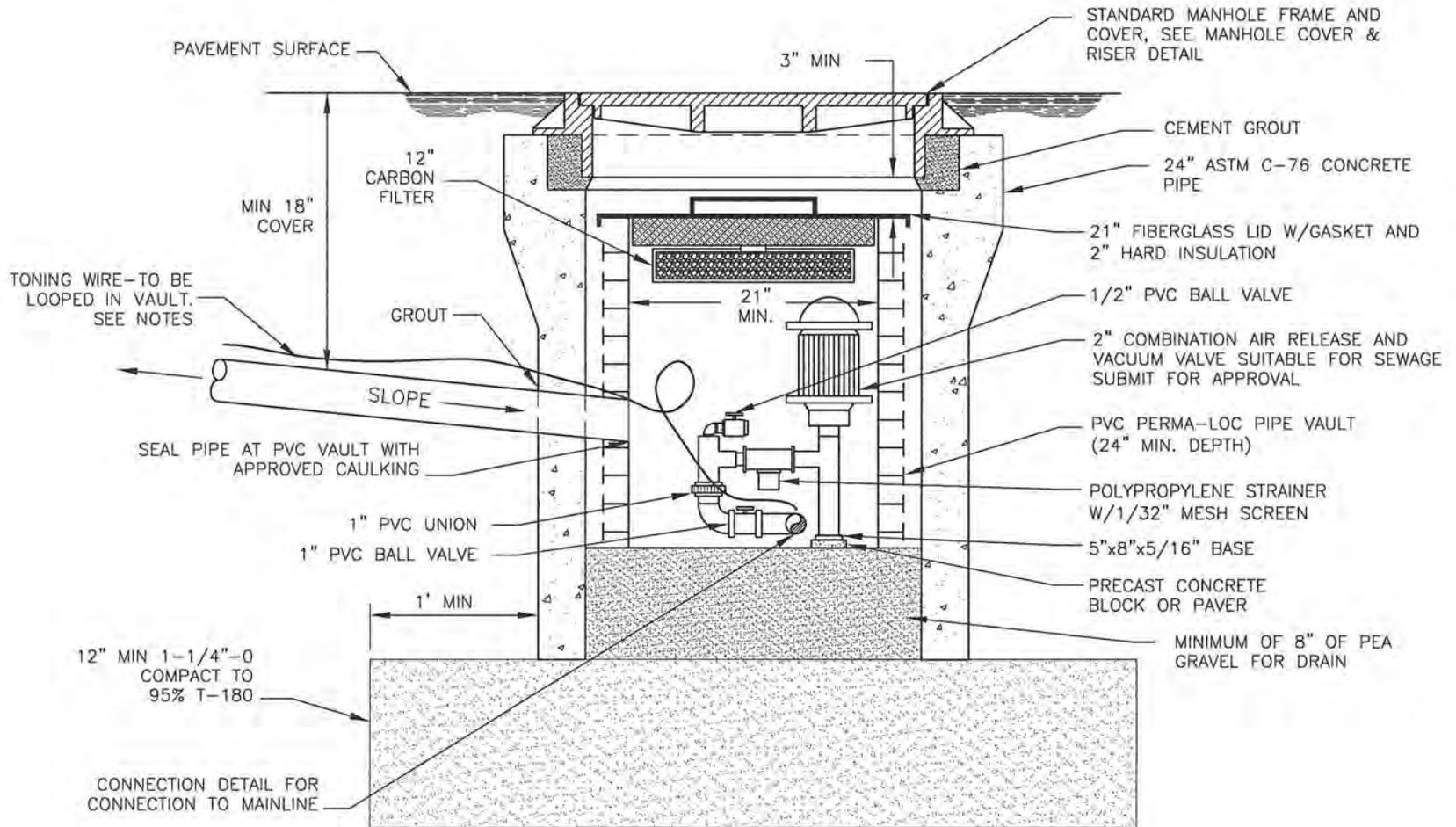


CITY OF CAMAS ~ SANITARY DETAIL
STEP AARV MANIFOLD ASSEMBLY

Jan C. Crutcher 1-4-11
DETAIL APPROVED BY DATE

NOT TO SCALE

DETAIL NO.
SP5



NOTE:

1. FOR PLACEMENT IN A TRAFFIC AREA
2. BACKFILL AND COMPACTION PER APPROPRIATE TRENCH DETAIL UNLESS OTHERWISE NOTED
3. AARV UNIT TO BE SUPPLIED COMPLETELY ASSEMBLED BY VENDOR
4. 3" PVC VENT LINE TO CARBON OR SOIL FILTER WHEN SPECIFIED, SEE APPLICABLE DETAIL.
5. MAIN TO BE TESTED WITH ASSEMBLY VALVES "OPEN" AND UNIT ON LINE.
6. CONNECTIONS AND SPLICES TO TONING WIRE SHALL BE SEALED WITH KING GEL CAPS, 3M DBY DIRECT BURY CAPS, OR OTHER APPROVED CONNECTION, AT ALL SPLICES.
7. **14 GAUGE GREEN HMWPE INSULATED COPPER CLAD STEEL TONING WIRE REQUIRED.**

REV. NO.	DATE	BY	APPR.
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2	1/1/11	SCD	JC



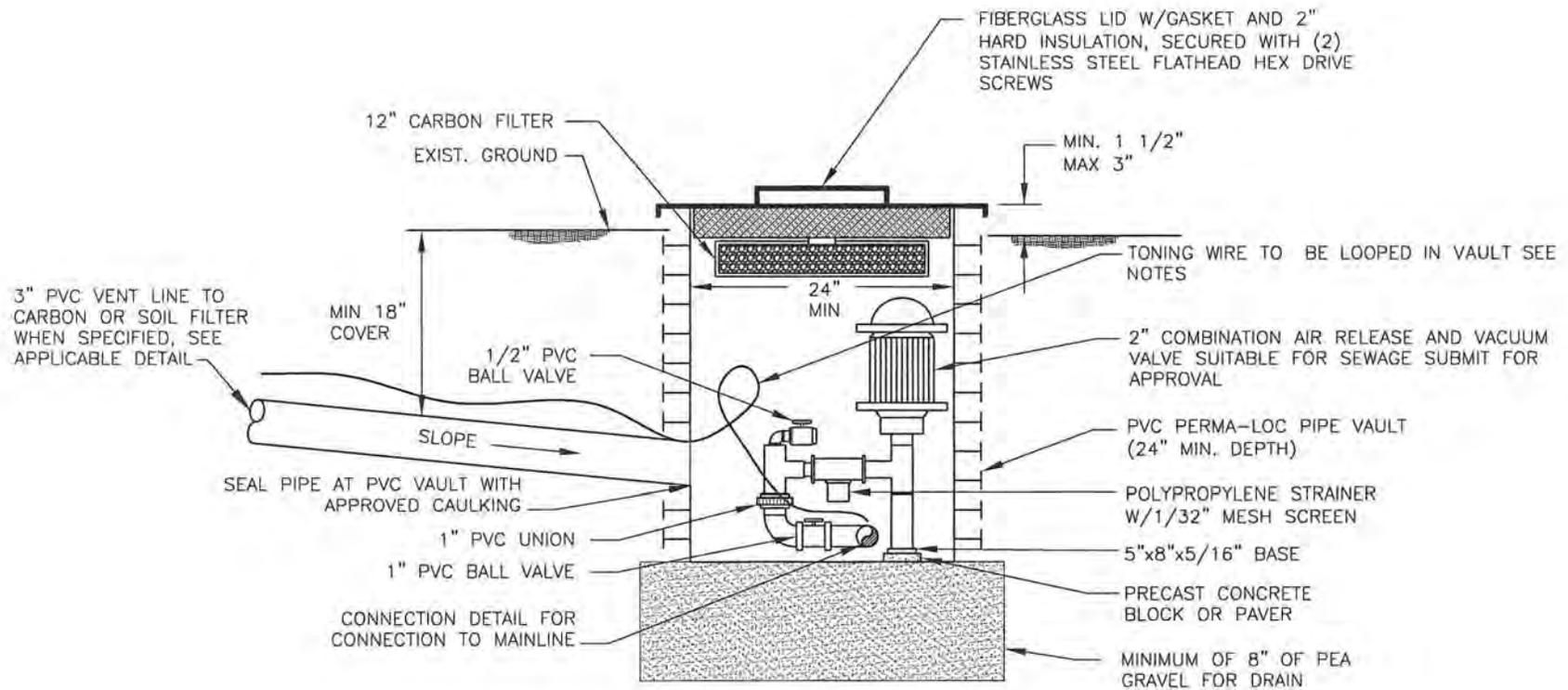
**CITY OF CAMAS ~ SANITARY DETAIL
STEP AARV (TRAFFIC RATED)**

Jan P. [Signature] 1-4-11
DETAIL APPROVED BY DATE

DETAIL NO.

SP6

NOT TO SCALE



NOTE:

1. FOR PLACEMENT IN A NONTRAFFIC AREA
2. BACKFILL AND COMPACTION PER APPROPRIATE TRENCH DETAIL UNLESS OTHERWISE NOTED
3. AARV UNIT TO BE SUPPLIED COMPLETELY ASSEMBLED BY VENDOR
4. CONNECTIONS AND SPLICES TO TONING WIRE SHALL BE SEALED WITH KING GEL CAPS, 3M DBY DIRECT BURY CAPS, OR OTHER APPROVED CONNECTION, AT ALL SPLICES.
5. **14 GAUGE GREEN HMWPE INSULATED COPPER CLAD STEEL TONING WIRE REQUIRED.**

REV. NO.	DATE	BY	APPR.
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2	1/1/11	SCD	JC



CITY OF CAMAS ~ SANITARY DETAIL
STEP AARV (NON-TRAFFIC RATED)

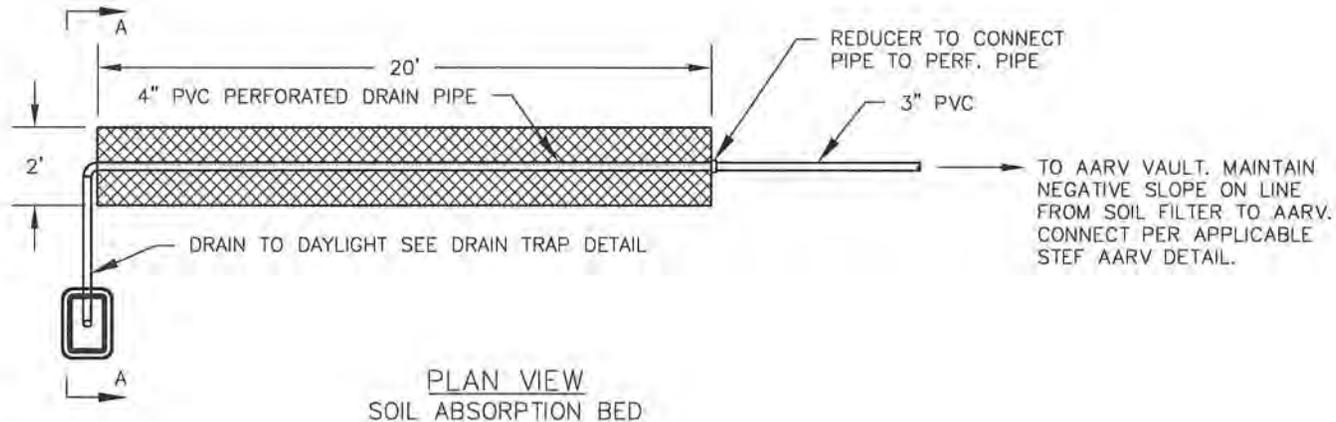
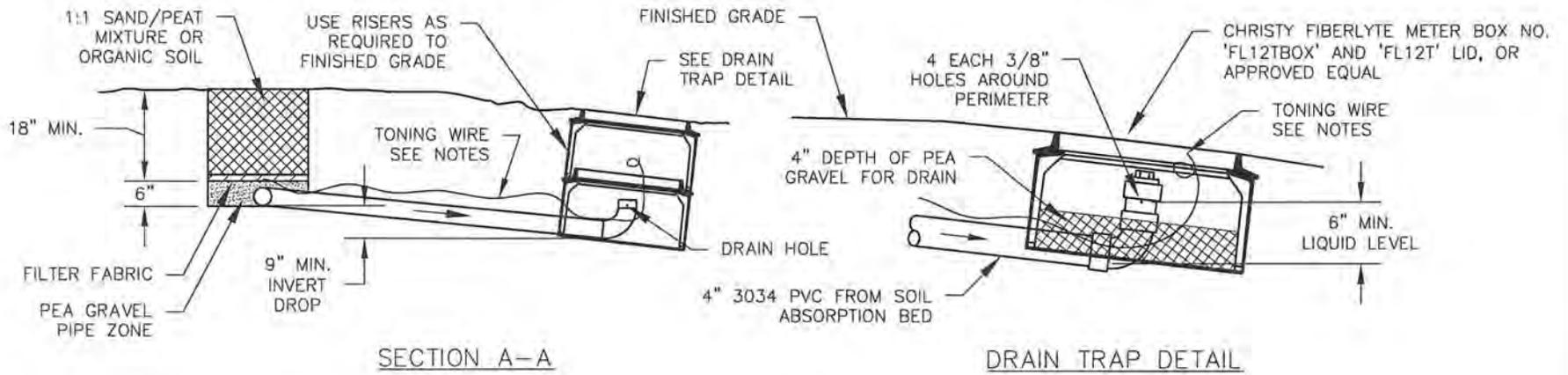
Sam P. Coulter 1-4-11
DETAIL APPROVED BY DATE

NOT TO SCALE

DETAIL NO.

SP7

STEP-AARV.DWG



NOTE:

1. BASED ON ANALYSIS OF VOLUME, OTHER METHODS OF ODOR CONTROL MAY BE REQUIRED BY CITY.
2. FILTER FABRIC SHOULD BE USED TO LINE ENTIRE TRENCH.
3. IF GROUND WATER IS AN ISSUE, THE TRENCH SHOULD BE LINED WITH POND LINER AND CLAMPED TO THE PIPE AT EACH END OF THE FILTER BED, OR A CARBON FILTER CAN BE USED.
4. TRENCH TO FOLLOW CONTOUR OF LANDSCAPING. PERF PIPE DOES NOT NEED TO BE LEVEL.
5. CONNECTIONS AND SPLICES TO TONING WIRE SHALL BE SEALED WITH KING GEL CAPS, 3M DBY DIRECT BURY CAPS, OR OTHER APPROVED CONNECTION, AT ALL SPLICES.
6. **14 GAUGE GREEN HMWPE INSULATED COPPER CLAD STEEL TONING WIRE REQUIRED.**

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2	1/1/11	SCD	JC



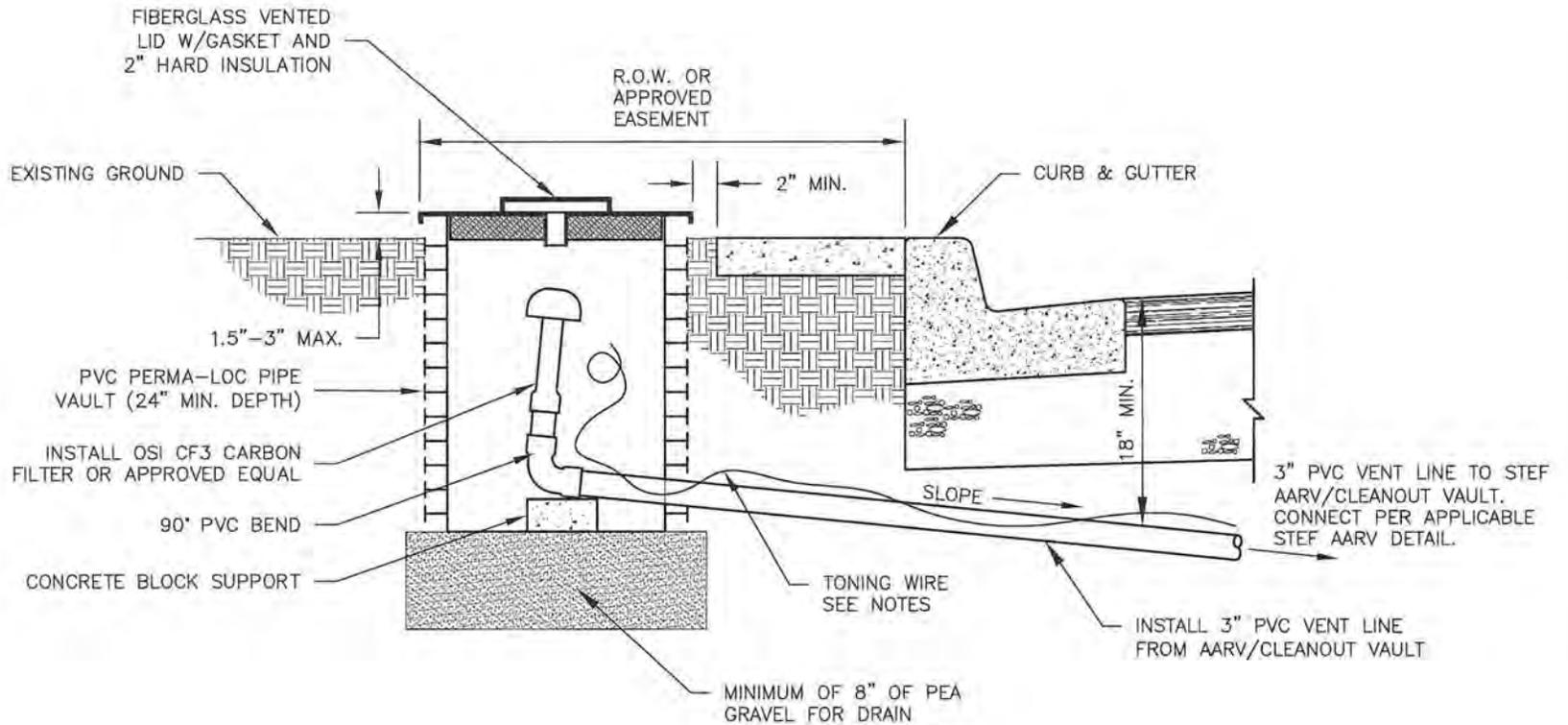
CITY OF CAMAS ~ SANITARY DETAIL
STEP SOIL FILTER

Sam E. Crutcher 1-4-11
DETAIL APPROVED BY DATE

DETAIL NO.

SP8

NOT TO SCALE



NOTE:

1. SEE PLAN AND STREET SECTIONS FOR SIDEWALK LOCATION
2. CONNECTIONS AND SPLICES TO TONING WIRE SHALL BE SEALED WITH KING GEL CAPS, 3M DBY DIRECT BURY CAPS, OR OTHER APPROVED CONNECTION, AT ALL SPLICES.
3. 14 GAUGE GREEN HDPE INSULATED COPPER CLAD STEEL TONING WIRE REQUIRED.

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3	10/21/14	SCD	JC



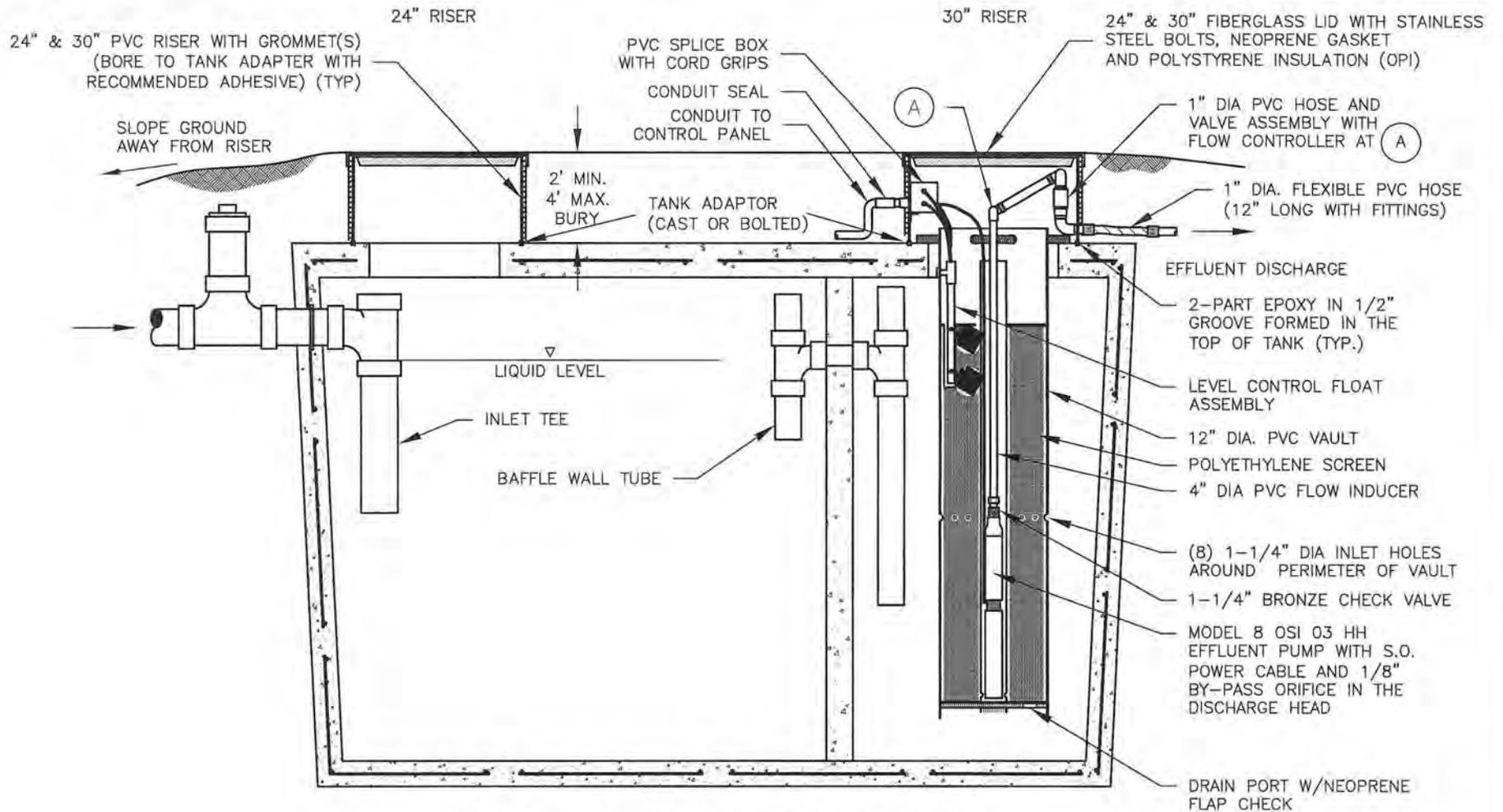
**CITY OF CAMAS ~ SANITARY DETAIL
STEP CARBON FILTER**

Joe P. [Signature] 10-21-14
 DETAIL APPROVED BY DATE

DETAIL NO.

SP9

NOT TO SCALE



STEP (SEPTIC TANK EFFLUENT PUMP SYSTEM)
 SIDE VIEW TYPICAL 1500 GALLON TANK W/MF-ABR LEVEL CONTROL FLOAT ASSEMBLY

NOTES:

1. 2-WAY CLEAN OUT; SOLVENT WELD OR GASKETED CONNECTIONS REQUIRED, FERNCO COUPLINGS NOT ALLOWED, IRON PLUG W/ 2" SQUARE NUT.
2. FOR TANK BURY DEPTH OVER 4', OR DRIVEWAY LOCATIONS, AN H-20 TRAFFIC RATED TANK LID IS REQUIRED.
3. FOR TANK LOCATED IN DRIVEWAY A UTILITY VAULT FRAME AND LID IS ALSO REQUIRED.

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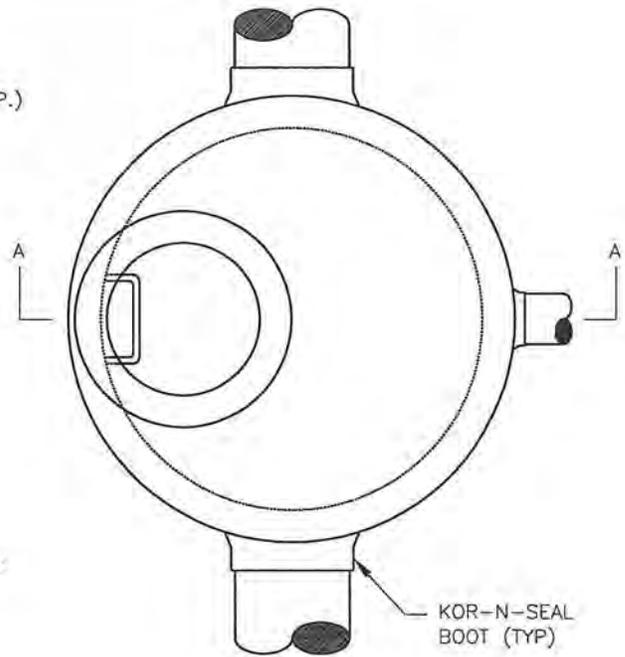
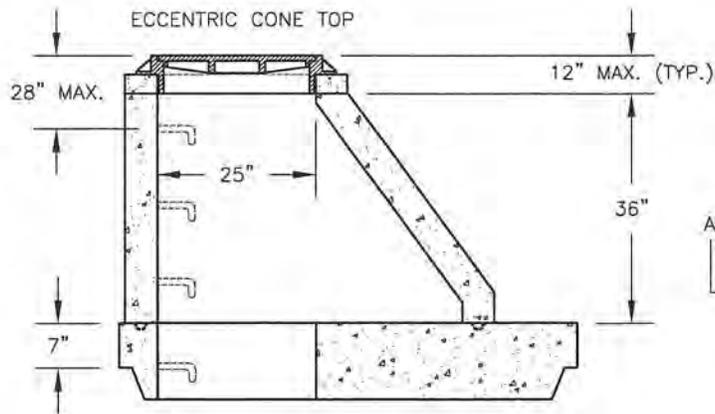
CITY OF CAMAS ~ SANITARY DETAIL
STEP TANK

Jan P. Chautau 10-21-14
 DETAIL APPROVED BY DATE

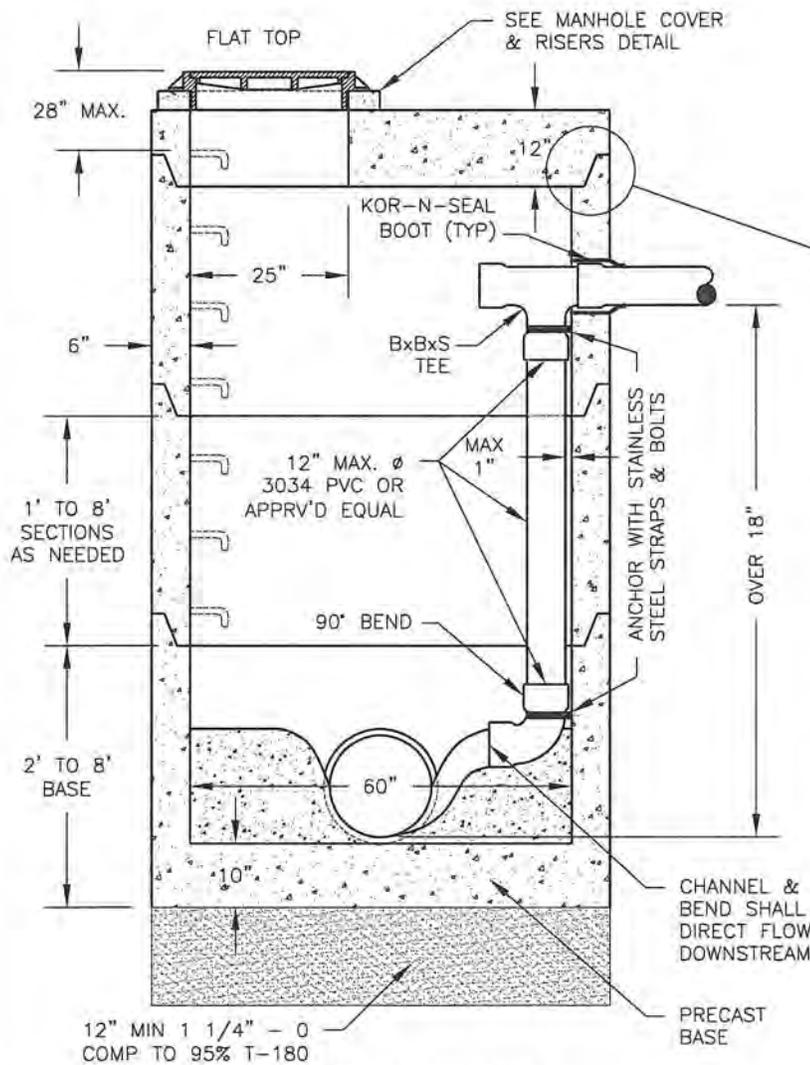
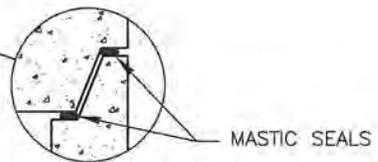
DETAIL NO.

SP10

NOT TO SCALE



PLAN VIEW



SECTION VIEW A-A

NOTES:

1. MANHOLES WITH GREATER THAN 18" DROP SHALL BE 60" DIAMETER WITH AN INTERIOR DROP
2. ALL PIPE OPENINGS SHALL BE CORED AND RUBBER BOOTED
3. MASTIC SEAL REQ'D IN ALL KEYLOCK JOINTS
4. MANHOLES SHALL CONFORM TO ASTM C-478
5. FLAT TOP SECTION MAY BE USED FOR SHALLOW MANHOLES
6. INSIDE JOINTS SHALL BE STRUCK SMOOTH & EVEN WITH THE INSIDE WALLS
7. MANHOLE BASE TO HAVE SHAPED CHANNELS. FLOW LINE & INSIDE SURFACES SHALL BE TROWLED SMOOTH & UNIFORM
8. MANHOLE TO BE VACUUM TESTED IN ACCORDANCE WITH C.O.C. STANDARDS
9. MANHOLE TO BE SPRAY LINED WITH HYDROGEN SULFIDE RESISTANT MATERIAL RAVEN 405 OR APPROVED EQUAL SUBMITTAL REQUIRED

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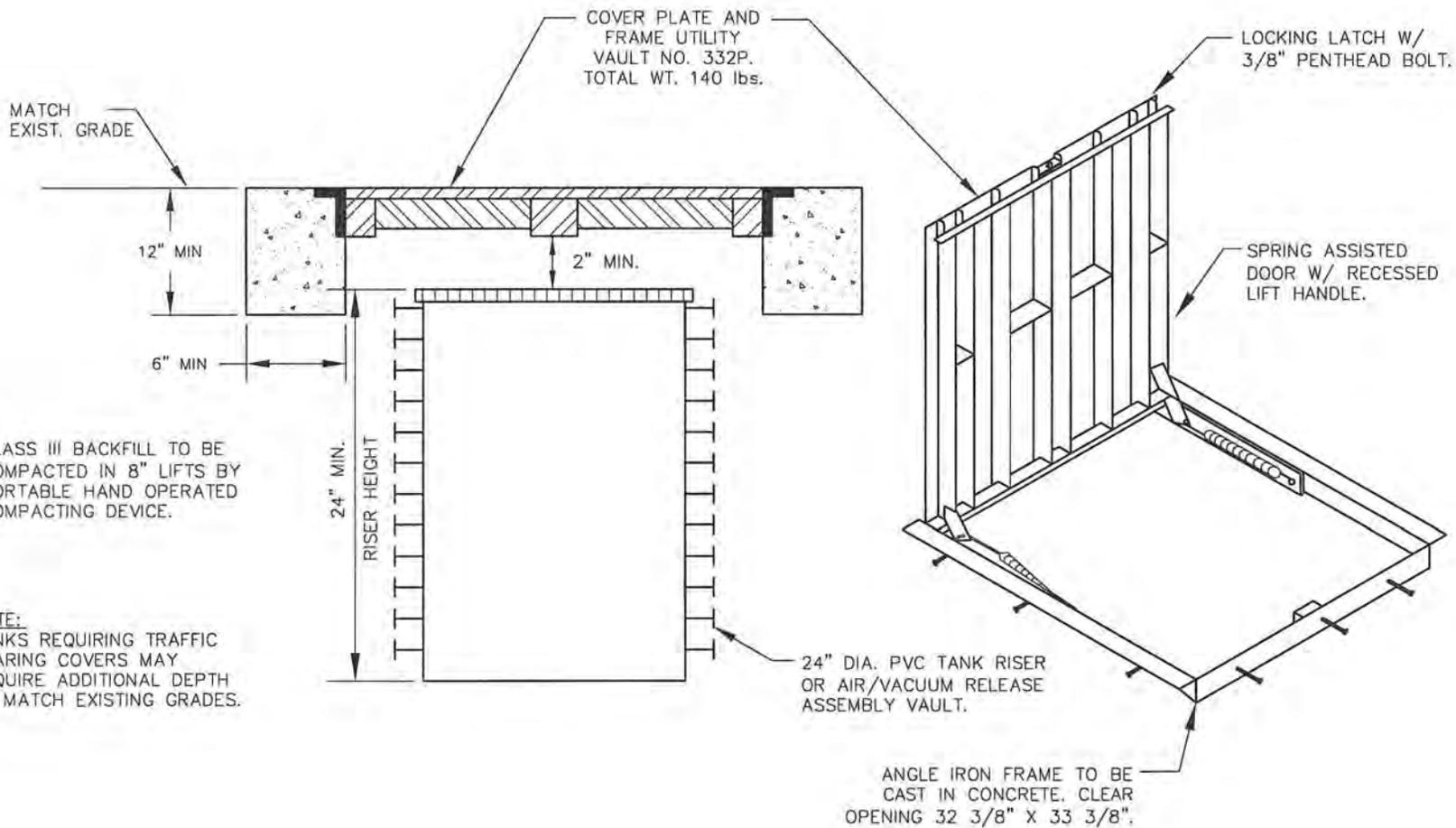
CITY OF CAMAS ~ SANITARY DETAIL
STEP SEWER DROP MANHOLE

DETAIL APPROVED BY *[Signature]* DATE 1-4-11

DETAIL NO.
SP11

NOT TO SCALE

MANHOLES.DWG



REV. NO.	DATE	BY	APPR.
1	5/1/07	SCD	JC
2	1/1/11	SCD	JC



CITY OF CAMAS ~ SANITARY DETAIL
STEP TRAFFIC BEARING RISER LID

Don P. Christian 1-4-11
DETAIL APPROVED BY DATE

DETAIL NO.

SP12

NOT TO SCALE



Gravity Sewer Details

City of Camas
616 NE Fourth Avenue
P.O. Box 1055
Camas, WA 98607
www.cityofcamas.us

Phone: (360) 834-6864
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Creation Date: 10/28/02
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City of Camas Gravity Sanitary Details ~ INDEX

Gravity Sanitary Sewer Details

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SG5	GRAVITY SANITARY SEWER CLEAN OUT	2	1/1/11

CONVENTIONAL GRAVITY SEWER CONSTRUCTION NOTES:

1. ALL TRENCH EXCAVATION AND PIPE INSTALLATION SHALL CONFORM TO THE MOST RECENTLY ADOPTED VERSION OF W.S.D.O.T. STANDARD SPECIFICATIONS SECTION 7-08.3(1) AND SECTION 7-08.3(2). ALL EXCESS MATERIAL FROM THE TRENCH EXCAVATION SHALL BE DISPOSED OF ON AN APPROVED SITE.
2. PIPE BEDDING, PIPE ZONE MATERIAL, AND TRENCH BACKFILL SHALL BE AN APPROVED GRANULAR MATERIAL OF EITHER WASHED SCREENINGS OR 5/8 INCH MINUS CRUSHED ROCK. SAND BACKFILL IS NOT ALLOWED.
3. TRENCH COMPACTION SHALL BE PER CITY OF CAMAS STANDARD TEST REQUIREMENTS DETAIL G4. CONTRACTOR TO DETERMINE THE TYPE OF EQUIPMENT AND METHOD TO USE TO ACHIEVE THE REQUIRED COMPACTION. EACH LIFT SHALL BE COMPACTED TO A MINIMUM OF 95 PERCENT OF THE MAXIMUM DENSITY AS DETERMINED BY THE A.A.S.H.T.O. T-180 TEST METHOD.
4. SETTLEMENT OF THE FINISHED SURFACE WITHIN THE WARRANTY PERIOD SHALL BE CONSIDERED TO BE A RESULT OF IMPROPER COMPACTION AND SHALL BE PROMPTLY REPAIRED BY THE CONTRACTOR AT NO EXPENSE TO THE CITY.
5. ALL PIPE AND FITTINGS SHALL CONFORM TO THE MOST RECENTLY ADOPTED VERSION OF W.S.D.O.T. STANDARD SPECIFICATIONS SECTION 7-17.2.
6. PIPE SHALL BE BEDDED WITH A MINIMUM OF 4-INCHES OF APPROVED GRANULAR MATERIAL.
7. ALL PIPE CONNECTIONS AT MANHOLES SHALL BE CORED AND RUBBER BOOTED.
8. VACUUM TESTING OF MANHOLES IS REQUIRED PRIOR TO APPLICATION OF AN APPROVED HYDROGEN SULFIDE RESISTANT LINER.
9. ALL MANHOLES SHALL BE COATED WITH A HYDROGEN SULFIDE RESISTANT LINING, MATERIAL SUBMITTAL REQUIRED. LINING SHALL ALSO BE APPLIED TO EXISTING MANHOLES WHEN A NEW LINE ENTRY IS TIED-IN TO THE MANHOLE.
10. ALL PIPE AND FITTINGS SHALL BE AIR TESTED AT FOUR P.S.I. FOR ONE MINUTE PER EVERY 100 FEET OF MAINLINE.
11. SANITARY SERVICE LATERAL SHALL BE 6 INCHES IN DIAMETER AND THE ENDS SHALL EXTEND 8 FEET PAST THE STREET RIGHT-OF-WAY LINE OR AS SHOWN ON THE PLANS AND MARKED WITH A 10 FOOT LONG 2" X 4".
12. ALL SANITARY LINES SHALL BE INSTALLED WITH A MINIMUM COVER OF 6 FEET AND A MINIMUM GRADE OF 0.4% UNLESS OTHERWISE SHOWN ON THE PLANS.

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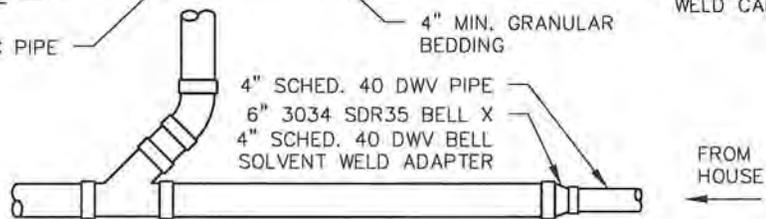
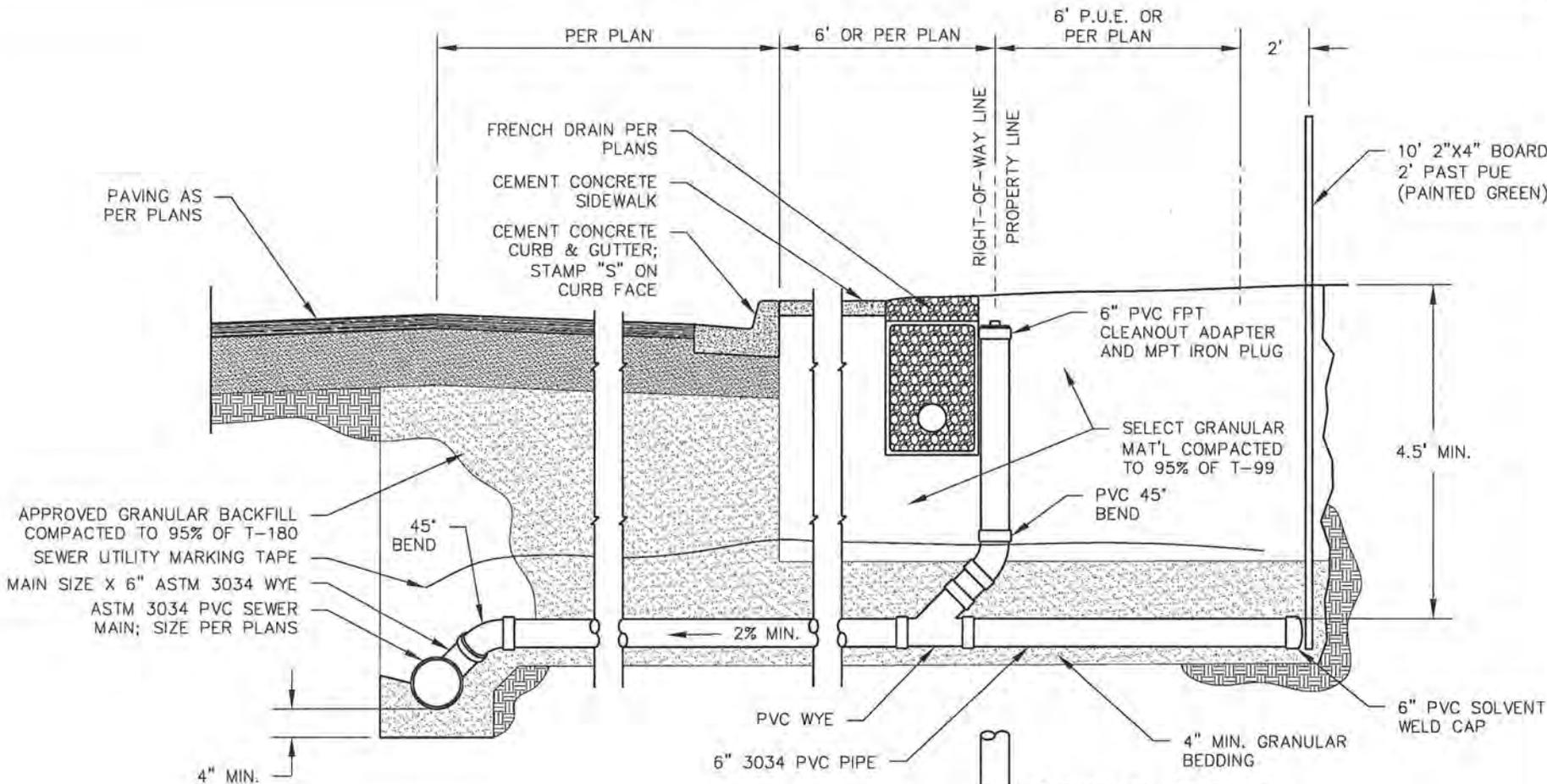


CITY OF CAMAS ~ SANITARY DETAIL
 GRAVITY SEWER CONSTRUCTION NOTES
Jan P. Coe 10-21-14
 DETAIL APPROVED BY DATE

NOT TO SCALE

DETAIL NO.
 SG1

GRAY-NOTES.DWG



SANITARY CONNECTION AT BUILD-OUT

- NOTES:**
1. ALL PIPE AND FITTINGS SHALL BE 3034 PVC, EXCEPT WHERE NOTED.
 2. SEWER UTILITY MARKING TAPE REQUIRED AS SHOWN ON TRENCH DETAIL.
 3. ELEVATION OF SERVICE STUB OUT AND CONNECTION TO BE NOTED ON AS-BUILT DRAWINGS.

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2	1/1/11	SCD	JC

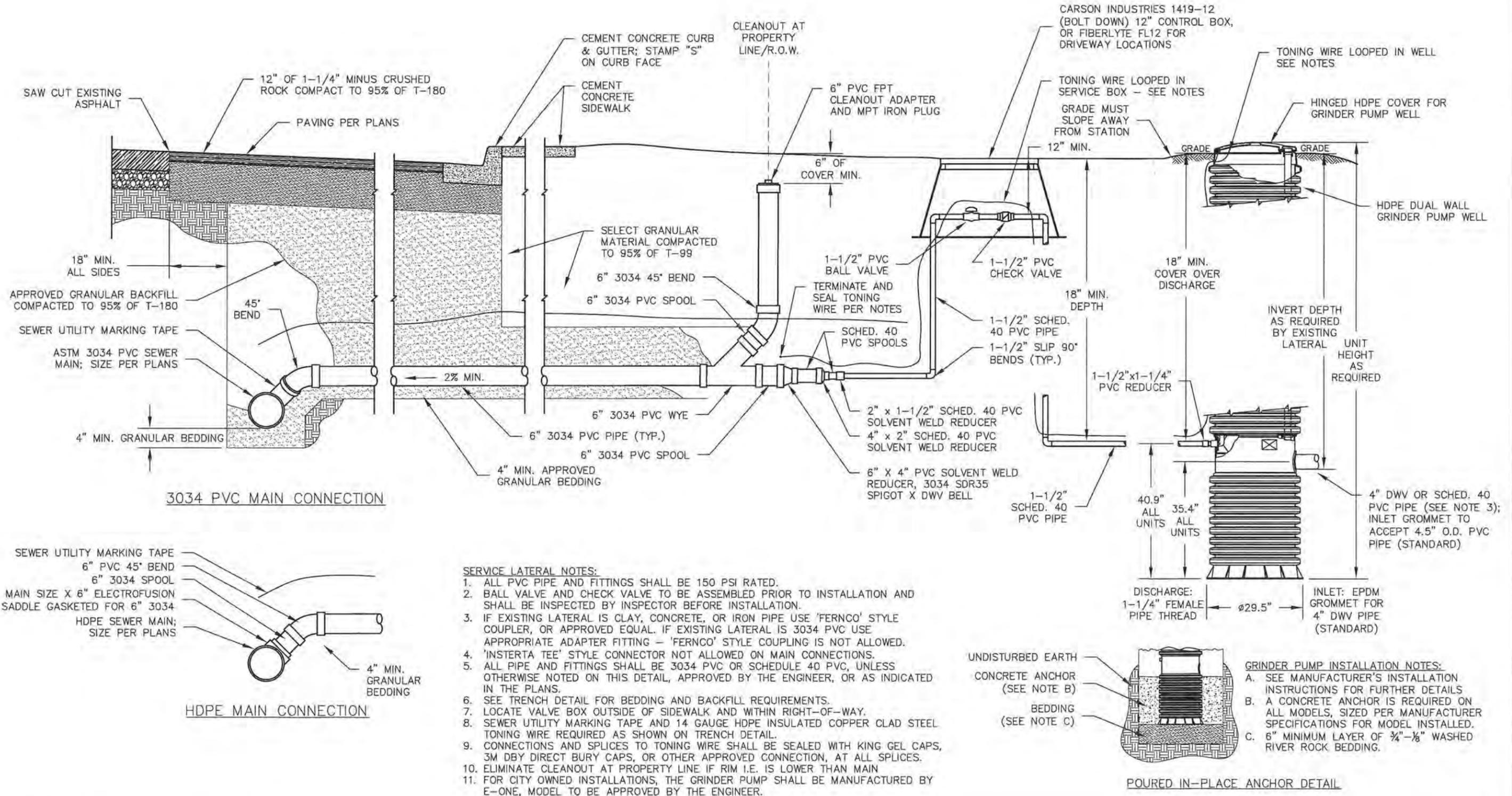


CITY OF CAMAS ~ SANITARY DETAIL
 GRAVITY SEWER SERVICE STUB OUT
Sam P. Coulter 1-4-11
 DETAIL APPROVED BY DATE

DETAIL NO.
 SG2

NOT TO SCALE

GRAY-SERV.DWG



- SERVICE LATERAL NOTES:**
1. ALL PVC PIPE AND FITTINGS SHALL BE 150 PSI RATED.
 2. BALL VALVE AND CHECK VALVE TO BE ASSEMBLED PRIOR TO INSTALLATION AND SHALL BE INSPECTED BY INSPECTOR BEFORE INSTALLATION.
 3. IF EXISTING LATERAL IS CLAY, CONCRETE, OR IRON PIPE USE 'FERNCO' STYLE COUPLER, OR APPROVED EQUAL. IF EXISTING LATERAL IS 3034 PVC USE APPROPRIATE ADAPTER FITTING - 'FERNCO' STYLE COUPLING IS NOT ALLOWED.
 4. 'INSTERTA TEE' STYLE CONNECTOR NOT ALLOWED ON MAIN CONNECTIONS.
 5. ALL PIPE AND FITTINGS SHALL BE 3034 PVC OR SCHEDULE 40 PVC, UNLESS OTHERWISE NOTED ON THIS DETAIL, APPROVED BY THE ENGINEER, OR AS INDICATED IN THE PLANS.
 6. SEE TRENCH DETAIL FOR BEDDING AND BACKFILL REQUIREMENTS.
 7. LOCATE VALVE BOX OUTSIDE OF SIDEWALK AND WITHIN RIGHT-OF-WAY.
 8. SEWER UTILITY MARKING TAPE AND 14 GAUGE HDPE INSULATED COPPER CLAD STEEL TONING WIRE REQUIRED AS SHOWN ON TRENCH DETAIL.
 9. CONNECTIONS AND SPLICES TO TONING WIRE SHALL BE SEALED WITH KING GEL CAPS, 3M DBY DIRECT BURY CAPS, OR OTHER APPROVED CONNECTION, AT ALL SPLICES.
 10. ELIMINATE CLEANOUT AT PROPERTY LINE IF RIM I.E. IS LOWER THAN MAIN
 11. FOR CITY OWNED INSTALLATIONS, THE GRINDER PUMP SHALL BE MANUFACTURED BY E-ONE, MODEL TO BE APPROVED BY THE ENGINEER.

- GRINDER PUMP INSTALLATION NOTES:**
- A. SEE MANUFACTURER'S INSTALLATION INSTRUCTIONS FOR FURTHER DETAILS
 - B. A CONCRETE ANCHOR IS REQUIRED ON ALL MODELS, SIZED PER MANUFACTURER SPECIFICATIONS FOR MODEL INSTALLED.
 - C. 6" MINIMUM LAYER OF 3/4"-1/2" WASHED RIVER ROCK BEDDING.

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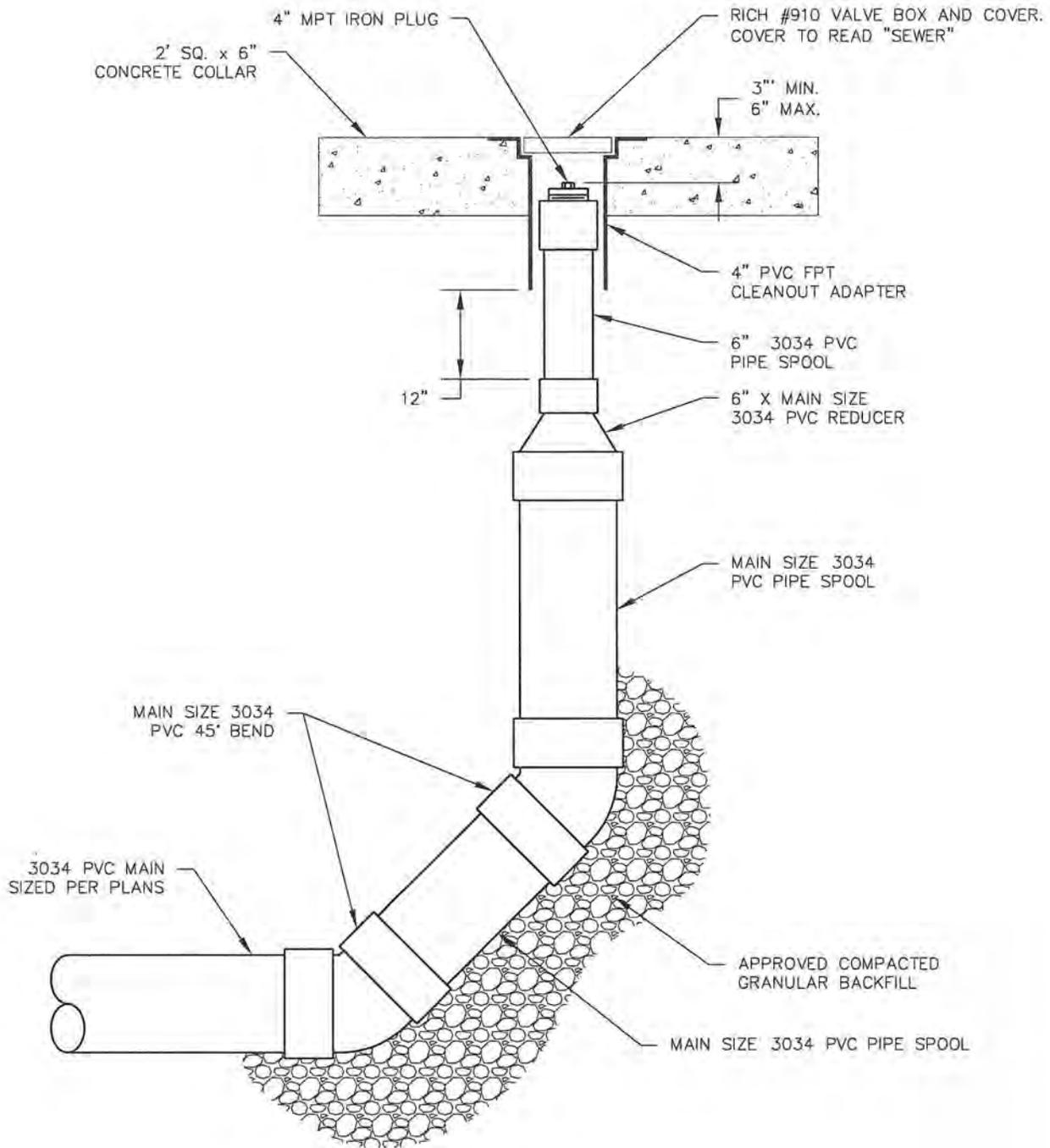


CITY OF CAMAS ~ SANITARY DETAIL
 GRINDER PUMP SEWER SERVICE
Shirley P. Coon 10-21-14
 DETAIL APPROVED BY DATE

DETAIL NO.
 SG4

NOT TO SCALE

GRAV-SERV.DWG



NOTES:

1. PROVIDE 2' SQ. x 6" DEEP CONCRETE COLLAR AROUND VALVE BOX FOR CLEANOUTS IF OUT OF ROADWAY.
2. ALL PIPE AND FITTINGS SHALL BE GASKETED 3034 PVC.
3. SEE TRENCH DETAIL FOR BACKFILL/BEDDING AND SEWER UTILITY MARKING TAPE REQUIREMENTS.

REV. NO.	DATE	BY	APPR.
1	5/1/07	SCD	JC
2	1/1/11	SCD	JC



CITY OF CAMAS ~ SANITARY DETAIL
GRAVITY SANITARY SEWER MAIN CLEANOUT

Don P. Crothers 1-4-11
 DETAIL APPROVED BY DATE

NOT TO SCALE

DETAIL NO.
 SG5



Water Details

City of Camas
616 NE Fourth Avenue
Camas, WA 98607
www.cityofcamas.us

Phone: (360) 834-6864
Fax: (360) 834-1535

Creation Date: 10/28/02
Revision Date: 4/27/16 (Partial)

City of Camas Water Details ~ INDEX

<u>Detail No.</u>	<u>Detail Name</u>	<u>Rev.</u>	<u>Rev. Date</u>
W1	Water Notes	3	1/1/11
W2	1" Water Service - New (Subdivision)	6	4/27/16
W3	1" Water Service - Replacement	6	4/27/16
W4	1" Water Service - Meter Relocation	6	4/27/16
W5	1" Water Service - Rural	6	4/27/16
W6	2" Water Service	5	6/2/15
W7a & b	3" Water Service	3	1/1/11
W8	2" Standard Blowoff	4	1/1/11
W9	6" Low Point Blowoff - Ditch	2	1/1/11
W10	6" Low Point Blowoff - Street	2	1/1/11
W11	Fire Hydrant	5	6/2/15
W12	Valve Box and Riser	4	10/21/14
W13	Water Main Line and Valve	2	1/1/11
W14	Pipe Joint Restraint	3	1/1/11
W15	Thrust Blocks	3	1/1/11
W16	2" Air/Vacuum Release Valve	5	10/21/14
W17	2" Air/Vacuum Release Valve in 48" MANHOLE	2	10/21/14
W18	2" Pressure Relief Valve Assembly	2	1/1/11
W19	4" Vacuum Relief Valve	2	1/1/11
W20A	6"x2" PRV Station with 3" Relief	2	1/1/11
W20B	6"x2" PRV Station with 3" Relief	3	10/21/14
W21	Above Ground PRV Relief Drain	3	4/27/16
W22	Water Quality Sampling Station	2	1/1/11
W23A	Standard Double Check Detector Valve Assembly	3	10/21/14
W23B	Standard Double Check Detector Valve Assembly	3	10/21/14

WATER CONSTRUCTION NOTES:

1. ALL TRENCH EXCAVATION AND PIPE INSTALLATION SHALL CONFORM TO THE MOST CURRENT A.W.W.A. STANDARDS, AND THE MOST RECENTLY ADOPTED EDITION OF THE W.S.D.O.T. STANDARD SPECIFICATIONS SECTION 7-08.3(1) AND SECTION 7-08.3(2). ALL EXCESS MATERIAL FROM THE TRENCH EXCAVATION SHALL BE LOADED DIRECTLY INTO A DUMP TRUCK AND DISPOSED OF AT AN APPROVED SITE.
2. PIPE BEDDING, PIPE ZONE MATERIAL AND TRENCH BACKFILL SHALL BE AN APPROVED GRANULAR MATERIAL OF EITHER WASHED SCREENINGS OR 5/8 INCH MINUS CRUSHED ROCK. SAND BACKFILL IS NOT ALLOWED.
3. TRENCH COMPACTION SHALL CONFORM TO THE MOST RECENTLY ADOPTED EDITION OF THE W.S.D.O.T. STANDARD SPECIFICATIONS SECTION 7-08.3(3). CONTRACTOR TO DETERMINE THE TYPE OF EQUIPMENT AND METHOD USED TO ACHIEVE THE REQUIRED COMPACTION AND BE APPROVED BY THE CITY OF CAMAS. EACH LIFT SHALL BE COMPACTED TO A MINIMUM OF 95 PERCENT OF THE MAXIMUM DENSITY AS DETERMINED BY THE A.A.S.H.T.O. T-180 TEST METHOD.
4. SETTLEMENT OF THE FINISHED SURFACE WITHIN THE WARRANTY PERIOD SHALL BE CONSIDERED TO BE A RESULT OF IMPROPER COMPACTION AND SHALL BE PROMPTLY REPAIRED BY THE CONTRACTOR AT NO EXPENSE TO THE CITY.
5. ALL VALVES 10 INCHES OR LESS IN DIAMETER SHALL BE A.W.W.A. APPROVED RESILIENT WEDGE GATE VALVES, BUBBLE TIGHT AT 200PSI, HAVE NON RISING STEMS, AND OPEN BY TURNING TO THE LEFT. PROVIDE A 2 INCH SQUARE NUT TO CONFORM TO A.W.W.A. C-504. ALL VALVES 12 INCHES OR LARGER IN DIAMETER SHALL BE A.W.W.A. APPROVED BUTTERFLY VALVES.
6. ALL WATER PIPE 12 INCHES OR LESS IN DIAMETER SHALL BE DUCTILE IRON CLASS 52 PIPE. ALL WATER PIPE 14 INCHES IN DIAMETER AND LARGER SHALL BE DUCTILE IRON CLASS 51 PIPE. RUBBER GASKET TYPE SHALL BE U.S. PIPE, TYTON OR APPROVED EQUAL. ALL FITTINGS SHALL BE DUCTILE IRON AND SHALL CONFORM TO THE A.W.W.A. STANDARD C-110.
7. ALL TEES, FLANGES, CAPS, BENDS AND OFFSETS, AS WELL AS ALL OTHER APPURTENANCES WHICH ARE SUBJECT TO UNBALANCED THRUST, SHALL BE PROPERLY BRACED BY ONE OF THE FOLLOWING METHODS:
 - A. CONCRETE THRUST BLOCKING- AS DETAILED IN THE PLANS, SHALL BE PLACED AT BENDS, TEES, DEAD ENDS AND CROSSES. BLOCKING SHALL BE 3000 PSI CONCRETE POURED IN PLACE. CONCRETE BLOCKING SHALL BE AGAINST SOLID UNDISTURBED EARTH AT THE SIDES AND BOTTOM OF THE TRENCH EXCAVATION AND SHALL BE SHAPED SO AS NOT TO OBSTRUCT ACCESS TO THE JOINTS OF THE PIPE. 6 MIL. PLASTIC SHALL BE USED TO INSULATE PIPE.
 - B. MECHANICAL JOINT RESTRAINT-USE "EBBA IRON SERIES 1100 MEGA LUG MECHANICAL JOINT THRUST RESTRAINT" OR APPROVED EQUAL. CONTRACTOR TO RESTRAIN THE MINIMUM REQUIRED PIPE LENGTH WITH "FIELD-LOK" GASKETS OR APPROVED EQUAL.
8. ALL WATER MAINS SHALL BE TESTED AT 200PSI IN ACCORDANCE WITH SECTION 7-09.3(23) OF THE STANDARD SPECIFICATIONS. THE CITY SHALL BE NOTIFIED 48 HOURS IN ADVANCE OF ACCEPTANCE TESTING. MAXIMUM LENGTH OF PIPE TO BE TESTED AT ONE TIME IS 1000 FT.
9. CHLORINATION SHALL BE PERFORMED IN ACCORDANCE WITH SECTION 7-09.3(24) OF THE STANDARD SPECIFICATIONS. CITY INSPECTOR WILL TAKE SAMPLES AND DELIVER TO LABORATORY FOR BACTERIA TESTING, NEGATIVE SAMPLE RESULTS SHALL BE CONFIRMED, PRIOR TO PRESSURE TESTING. DECLORINATION OR DISPOSAL TO SANITARY MAIN MAY BE REQUIRED.
10. APPROPRIATE DISPOSAL AND OR DECHLORINATION OF FLUSHED WATER DURING BLOWOFF IS THE RESPONSIBILITY OF THE CONTRACTOR. METHOD USED SHALL BE APPROVED BY CITY AND OTHER REGULATING AUTHORITIES.
11. WATER MAIN TO HAVE A MINIMUM COVER OF 30 INCHES. WATER SERVICES TO HAVE A MINIMUM 24" OF COVER.
12. ALL EXISTING VALVES TO BE OPERATED BY CITY OF CAMAS WATER/SEWER DEPARTMENT PERSONNEL ONLY.
13. NO CONNECTIONS TO EXISTING WATER MAINS SHALL BE MADE PRIOR TO SATISFACTORY PRESSURE TESTING, DISINFECTION, AND THE CONFIRMATION OF A NEGATIVE BACTERIA TEST.

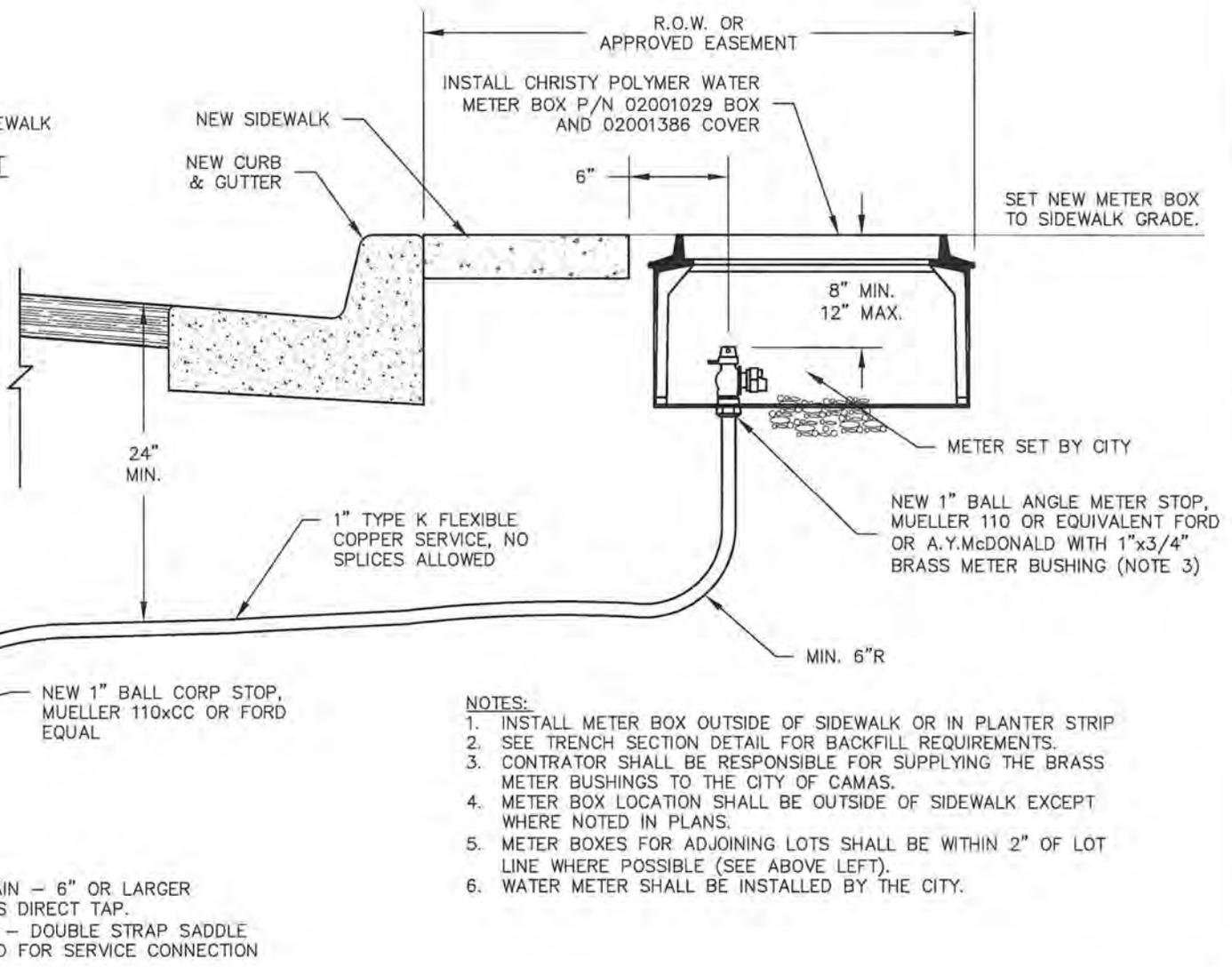
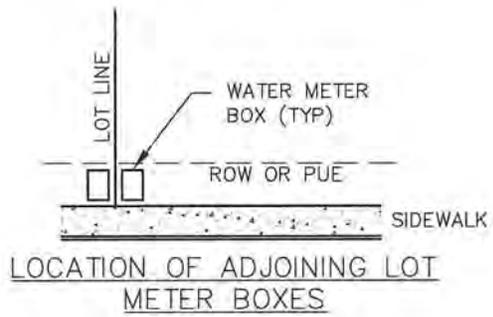
REV. NO.	DATE	BY	APPR.
1	7/17/06	SCD	RES1071
2	5/1/07	SCD	JC
3	1/1/11	SCD	JC



CITY OF CAMAS ~ WATER DETAIL
 WATER CONSTRUCTION NOTES
John P. [Signature] 1-4-11
 DETAIL APPROVED BY DATE

NOT TO SCALE

DETAIL NO.
W1



- NOTES:**
1. INSTALL METER BOX OUTSIDE OF SIDEWALK OR IN PLANTER STRIP
 2. SEE TRENCH SECTION DETAIL FOR BACKFILL REQUIREMENTS.
 3. CONTRATOR SHALL BE RESPONSIBLE FOR SUPPLYING THE BRASS METER BUSHINGS TO THE CITY OF CAMAS.
 4. METER BOX LOCATION SHALL BE OUTSIDE OF SIDEWALK EXCEPT WHERE NOTED IN PLANS.
 5. METER BOXES FOR ADJOINING LOTS SHALL BE WITHIN 2" OF LOT LINE WHERE POSSIBLE (SEE ABOVE LEFT).
 6. WATER METER SHALL BE INSTALLED BY THE CITY.

REV. NO.	DATE	BY	APPR.
3	1/1/11	SCD	JC
4	10/21/14	SCD	JC
5	6/2/15	SCD	JC
6	4/27/16	SCD	JC

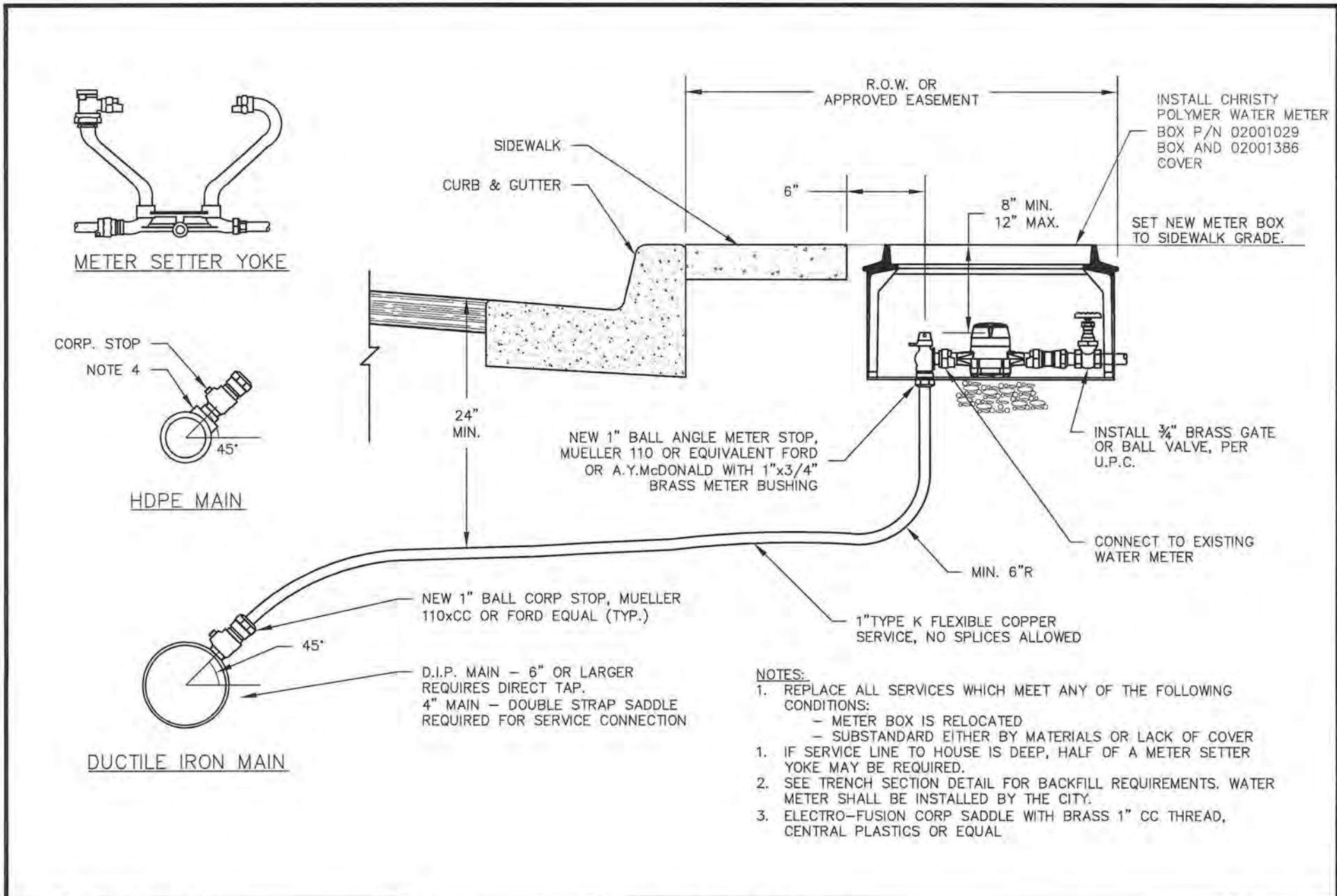


CITY OF CAMAS ~ WATER DETAIL
1" WATER SERVICE - NEW (SUBDIVISION)
Don P. Coe 4-26-16
 DETAIL APPROVED BY DATE

DETAIL NO.
 W2

NOT TO SCALE

WTR - W51.DWG



REV. NO.	DATE	BY	APPR.
3	1/1/11	SCD	JC
4	10/21/14	SCD	JC
5	6/2/15	SCD	JC
6	4/27/18	SCD	JC



CITY OF CAMAS ~ WATER DETAIL
1" WATER SERVICE - REPLACEMENT

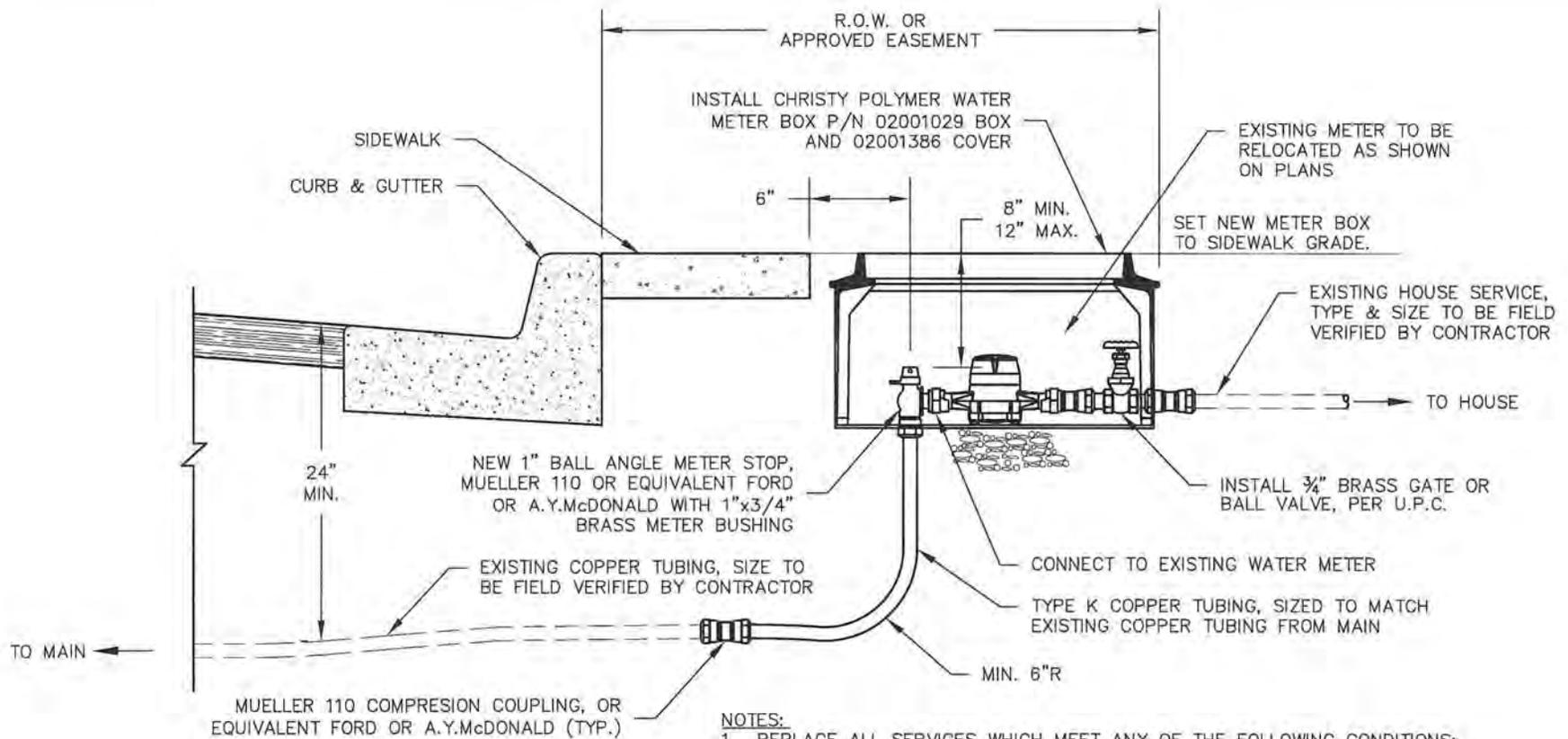
Sam P. Coe 4/26/16
DETAIL APPROVED BY DATE

DETAIL NO.

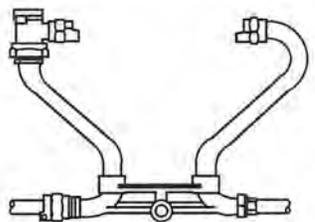
W3

NOT TO SCALE

WTR-WST.DWG



MUELLER 110 COMPRESSION COUPLING, OR EQUIVALENT FORD OR A.Y.McDONALD (TYP.)



METER SETTER YOKE

NOTES:

1. REPLACE ALL SERVICES WHICH MEET ANY OF THE FOLLOWING CONDITIONS:
 - METER BOX IS RELOCATED
 - SUBSTANDARD EITHER BY MATERIALS OR LACK OF COVER
 - METER IS TOO DEEP AND A YOKE MUST BE ADDED.
2. IF SERVICE LINE TO HOUSE IS DEEP, HALF OF A METER YOKE MAY BE REQUIRED.
3. IF SERVICE IS NOT COPPER, CONTRACTOR IS TO REFER TO DETAIL W3 (1" WATER SERVICE - REPLACEMENT) FOR INSTALLATION.
4. FOR SERVICE RELOCATIONS, ONLY ONE FITTING IS ALLOWED BETWEEN THE CORP STOP AND THE METER STOP. A METER ADAPTER REDUCING FROM A 1" METER STOP TO A SMALLER METER MAY BE ALLOWED IN ADDITION TO THE ONE FITTING.
5. INSTALL METER BOX OUTSIDE OF SIDEWALK
6. CALL FOR INSPECTION OF COUPLING UNDER PRESSURE PRIOR TO BACKFILLING.
7. SEE TRENCH SECTION DETAIL FOR BACKFILL REQUIREMENTS.
8. WATER METER SHALL BE INSTALLED BY THE CITY.

REV. NO.	DATE	BY	APPR.
3	1/1/11	SCD	JC
4	10/21/14	SCD	JC
5	6/2/15	SCD	JC
6	4/27/16	SCD	JC



CITY OF CAMAS ~ WATER DETAIL

1" WATER SERVICE - METER RELOCATION

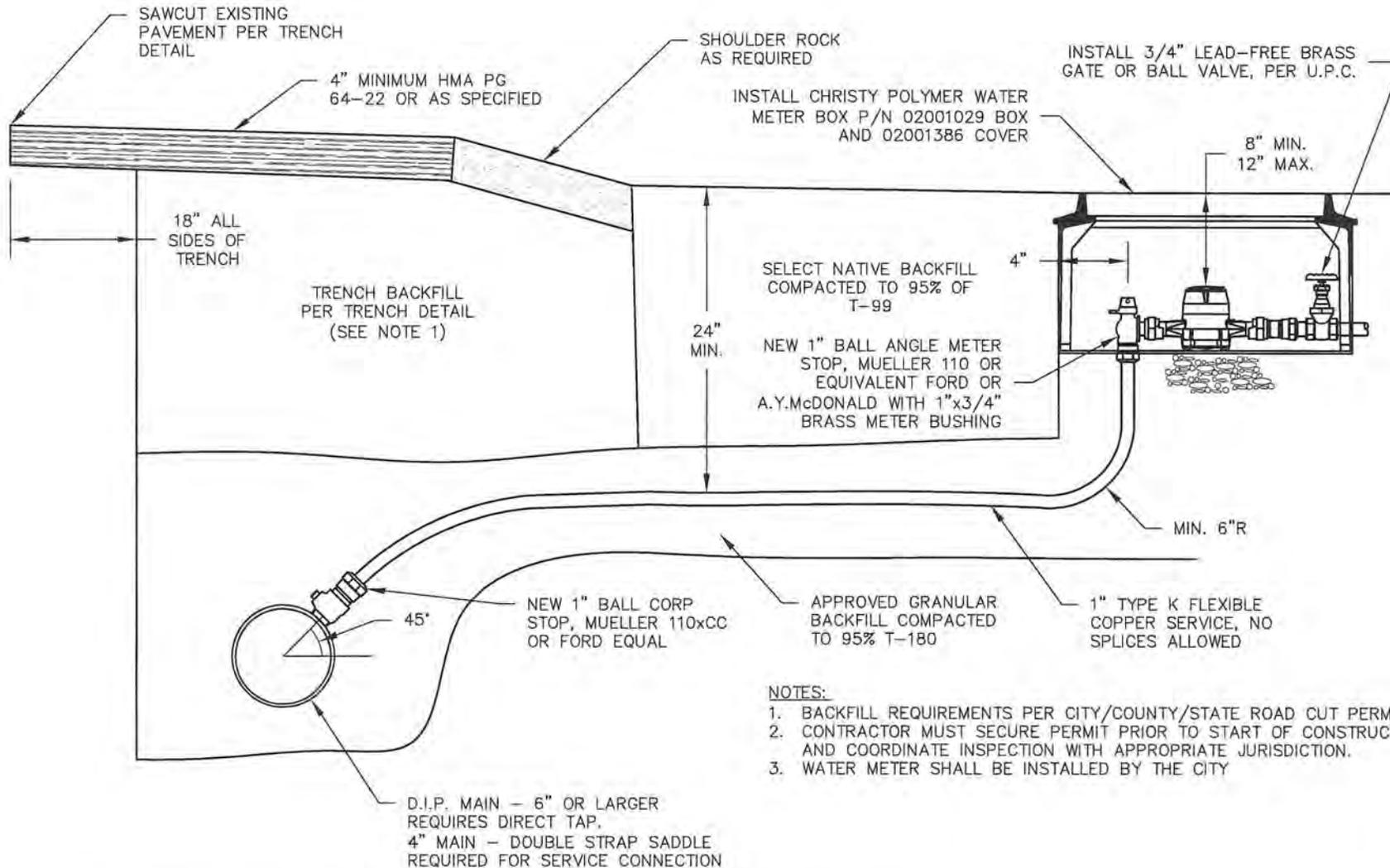
Jim P. Carithers 4-26-16
 DETAIL APPROVED BY DATE

NOT TO SCALE

DETAIL NO.

W4

WTR-W51.DWG



- NOTES:**
1. BACKFILL REQUIREMENTS PER CITY/COUNTY/STATE ROAD CUT PERMIT.
 2. CONTRACTOR MUST SECURE PERMIT PRIOR TO START OF CONSTRUCTION AND COORDINATE INSPECTION WITH APPROPRIATE JURISDICTION.
 3. WATER METER SHALL BE INSTALLED BY THE CITY

REV. NO.	DATE	BY	APPR.
3	1/1/11	SCD	JC
4	10/21/14	SCD	JC
5	6/2/15	SCD	JC
6	4/27/16	SCD	JC

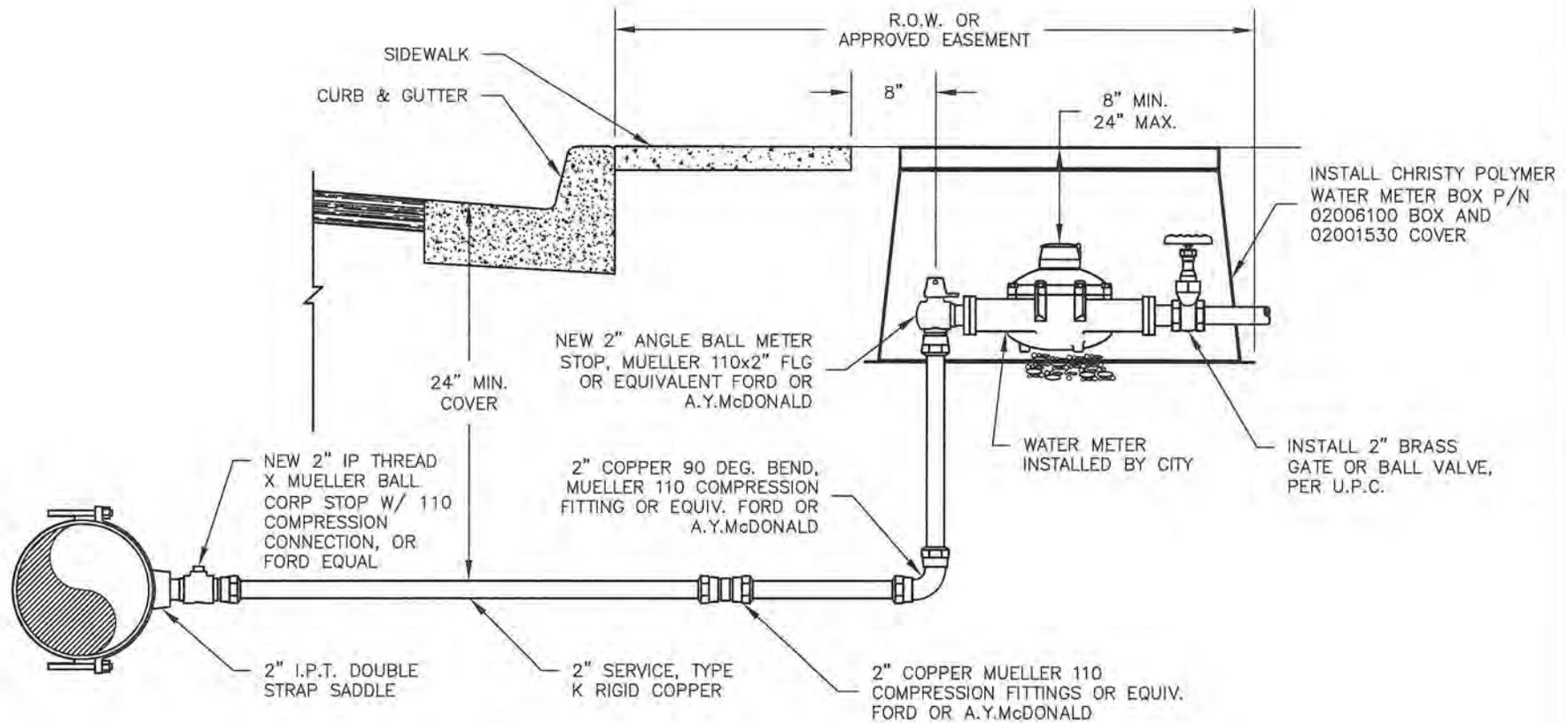


CITY OF CAMAS ~ WATER DETAIL
1" WATER SERVICE - RURAL
Jan P. Caruth 4-26-16
 DETAIL APPROVED BY DATE

NOT TO SCALE

DETAIL NO.
 W5

WTR-W51.DWG



NOTES:

1. REPLACE ALL SERVICES WHICH MEET ANY OF THE FOLLOWING CONDITIONS:
 - METER BOX IS RELOCATED
 - SUBSTANDARD EITHER BY MATERIALS OR LACK OF COVER
2. INSTALL CHRISTY POLYMER METER BOX, MODEL NO. FL36BOX18 (02006100 BOX & 02001530 COVER), OUTSIDE OF SIDEWALK. INSTALL FL36X6 OR FL36X8 BASE EXTENSIONS AS REQUIRED.
3. INSTALL COMPRESSION FITTINGS OUTSIDE OF STREET WHERE POSSIBLE.
4. SEE TRENCH SECTION DETAIL FOR BACKFILL REQUIREMENTS.
5. WATER METER SHALL BE INSTALLED BY THE CITY.

REV. NO.	DATE	BY	APPR.
2	5/1/07	SCD	JC
3	1/1/11	SCD	JC
4	10/21/14	SCD	JC
5	6/2/15	SCD	JC



CITY OF CAMAS ~ WATER DETAIL
2" WATER SERVICE

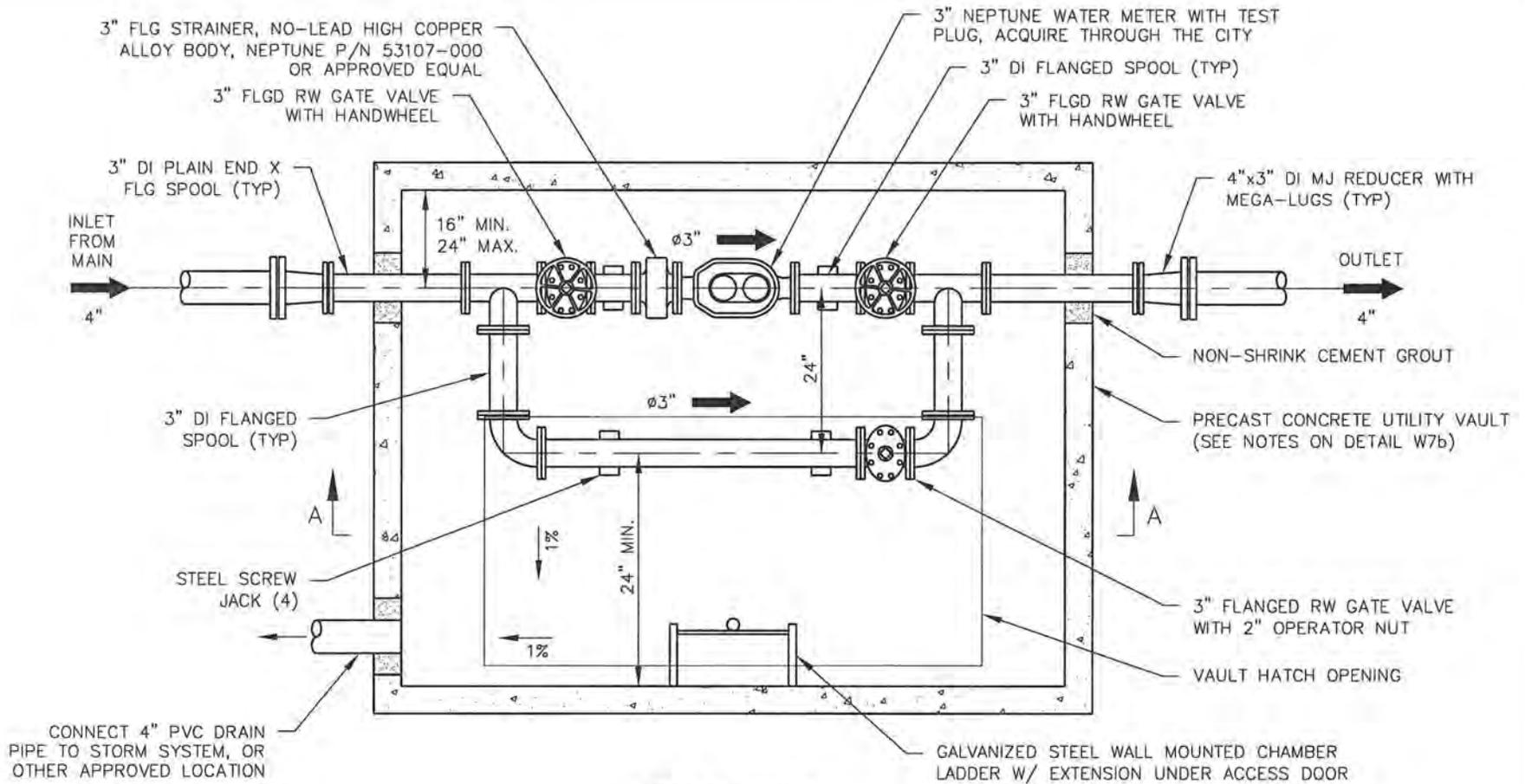
David C. Cothran 6-2-15
 DETAIL APPROVED BY DATE

NOT TO SCALE

DETAIL NO.

W6

WTR-WS2.DWG



PLAN VIEW

WATER METER NOTES:

1. FOR NEW MAINS, INSTALL MAIN SIZE MJ x 4" FL TEE. FOR EXISTING MAINS, LIVE TAP TO BE PERFORMED BY APPROVED TAPPING CONTRACTOR.
2. PROVIDE APPROVED JOINT RESTRAINT FOR ALL JOINTS ON 4" DUCTILE IRON PIPE. MINIMUM COVER 30".
3. PROVIDE FLANGED CONNECTIONS FOR ALL JOINTS ON 3" DUCTILE IRON PIPE AND FITTINGS.
4. CONSTRUCTION AND MAINTENANCE WITHIN VAULTS MAY BE SUBJECT TO CONFINED SPACE ENTRY PERMITTING REQUIREMENTS AND/OR SAFETY PRECAUTIONS.

REV. NO.	DATE	BY	APPR.
1	7/17/06	SCD	RES1071
2	5/1/07	SCD	JC
3	1/1/11	SCD	JC



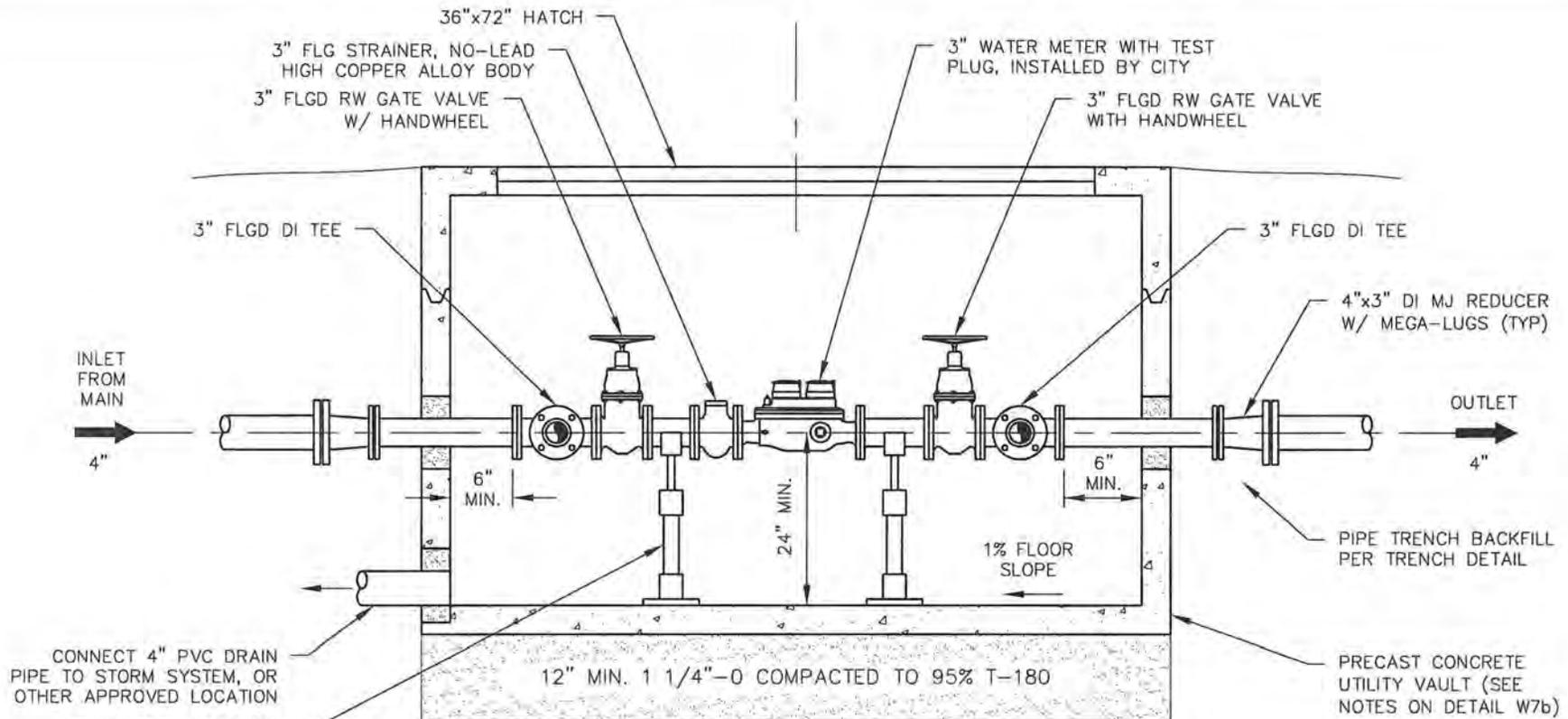
CITY OF CAMAS ~ WATER DETAIL
3" WATER SERVICE

Sam P. Cothran 1-4-11
 DETAIL APPROVED BY DATE

DETAIL NO.

W7A

NOT TO SCALE



SECTION A-A

(BY-PASS LINE REMOVED FOR CLARITY)

VAULT CONSTRUCTION NOTES:

1. VAULT SHALL BE PRE-APPROVED PRIOR TO INSTALLATION.
2. VAULTS SHALL HAVE A MINIMUM OF 3' CLEARANCE FROM ALL STRUCTURES.
3. APPROVED VAULT SHALL BE RATED FOR H20 LOADING AND INCLUDE AN EXTENSION LADDER, MINIMUM INSIDE DIMENSIONS 8'Lx6'Wx5'H.
4. VAULT SHALL BE SET FOR 1% SLOPE TO DRAIN.
5. ALL BACKFILL SHALL BE APPROVED GRANULAR MATERIAL.
6. HATCH SHALL BE AN H20 RATED, 36"x72" SPRING ASSISTED, HOT DIPPED GALVANIZED DIAMOND PLATE DOUBLE DOOR. FOR TRAFFIC INSTALLATIONS A 30" MANHOLE LID SHALL BE USED INSTEAD OF A HATCH.
7. SUMP PUMP MAY BE REQUIRED ON INSTALLATIONS WHERE DRAIN PIPE CANNOT BE CONNECTED TO ADEQUATE STORM DRAIN SYSTEM. THE APPROVED SUMP PUMP SHALL BE A COMMERCIAL GRADE WATER POWERED VENTURI DESIGN WITH BACKFLOW PREVENTION, SIZED TO PROVIDE 10GPM AT 10 FEET OF HEAD AT THE AVAILABLE SYSTEM WATER PRESSURE. BACKFLOW DEVICE SHALL BE CERTIFIED BY WASHINGTON STATE CERTIFIED BACKFLOW TESTER AFTER INSTALLATION AND PRIOR TO ACCEPTANCE. TEST RESULTS SHALL BE SENT TO CITY OF CAMAS WATER DEPARTMENT.
8. CONSTRUCTION AND MAINTENANCE WITHIN VAULTS MAY BE SUBJECT TO CONFINED SPACE ENTRY PERMITTING REQUIREMENTS AND/OR SAFETY PRECAUTIONS.

REV. NO.	DATE	BY	APPR.
1	7/1/706	SCD	RES1071
2	5/1/07	SCD	JC
3	1/1/11	SCD	JC



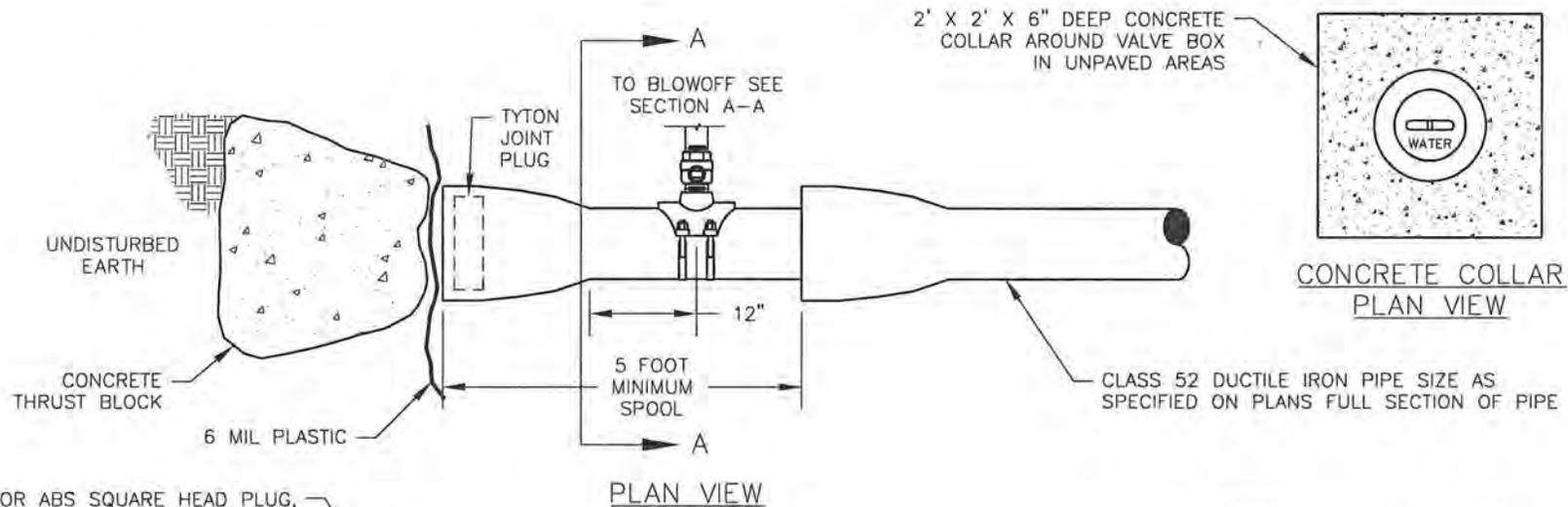
CITY OF CAMAS ~ WATER DETAIL
3" WATER SERVICE

Jim P. Christian 1-4-11
DETAIL APPROVED BY DATE

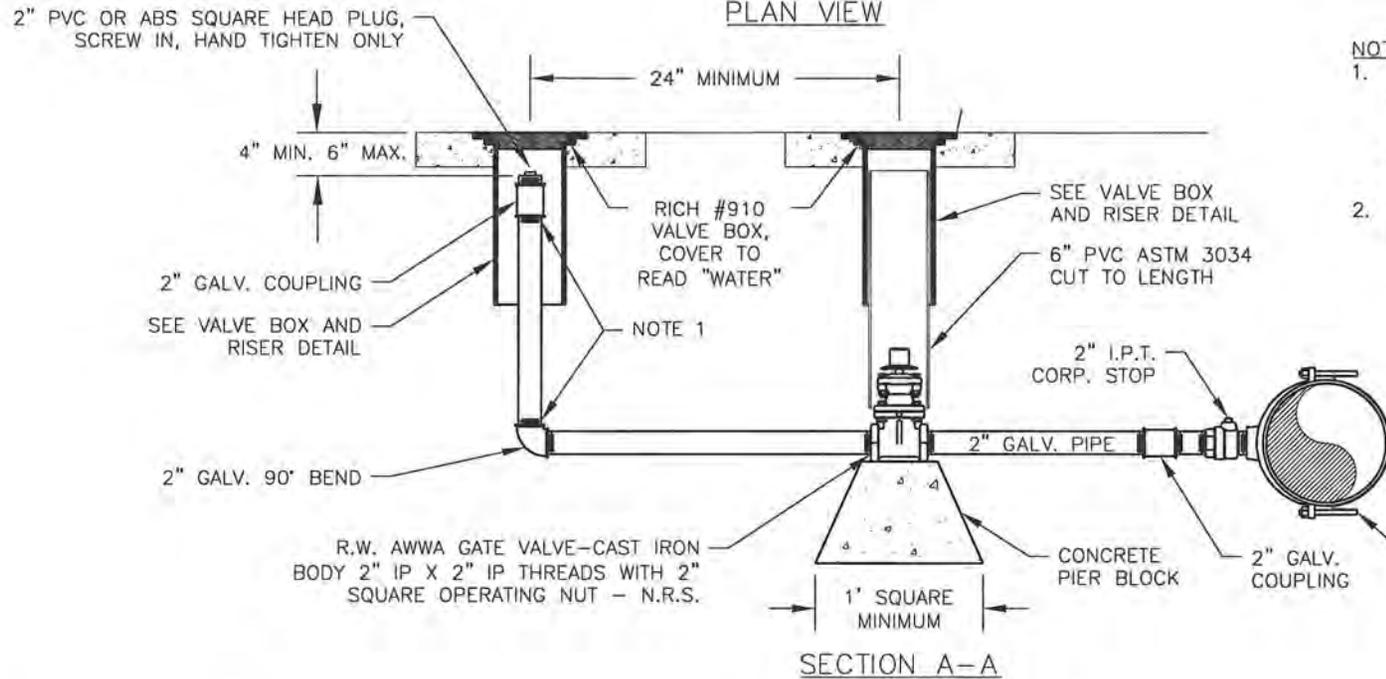
DETAIL NO.
W7B

NOT TO SCALE

WTR-WS3.DWG



CONCRETE COLLAR
PLAN VIEW



- NOTES:
1. TIGHTEN ALL THREADED PIPE JOINTS SECURELY. USE LOCTITE THREADLOCKER RED, OR APPROVED EQUAL, ON THREADED ELBOW AND COUPLING. VISUAL INSPECTION REQUIRED PRIOR TO BURY.
 2. SWAB ALL PIPE WITH CHLORINE MIXTURE PRIOR TO SERVICE.

REV. NO.	DATE	BY	APPR.
1	7/17/06	SCD	RES1071
2	5/1/07	SCD	JC
3	9/18/07	SCD	JC
4	1/1/11	SD	JC

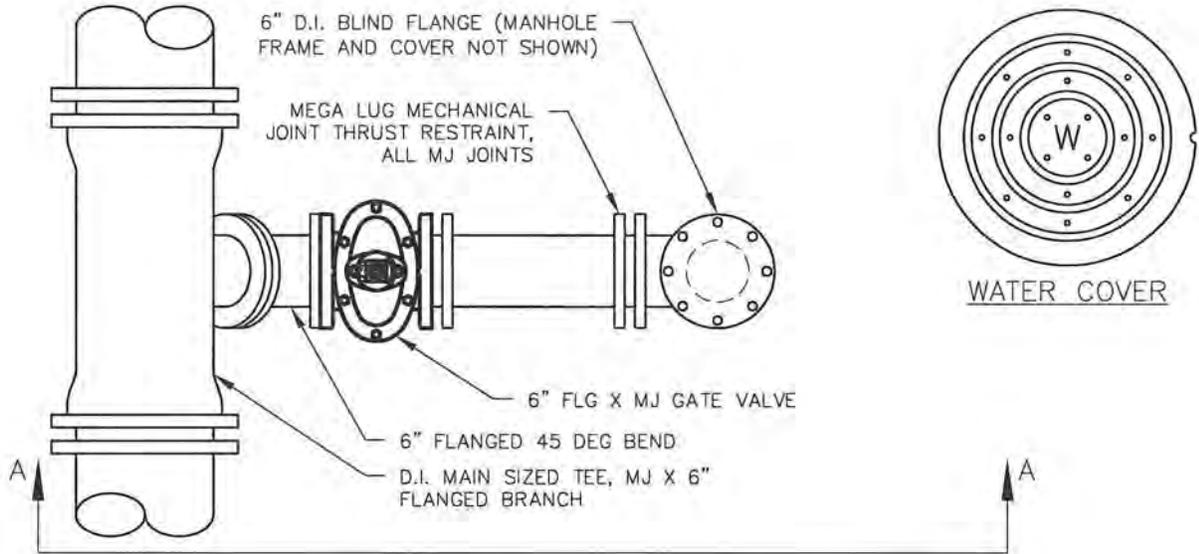


CITY OF CAMAS ~ WATER DETAIL
2" STANDARD BLOWOFF

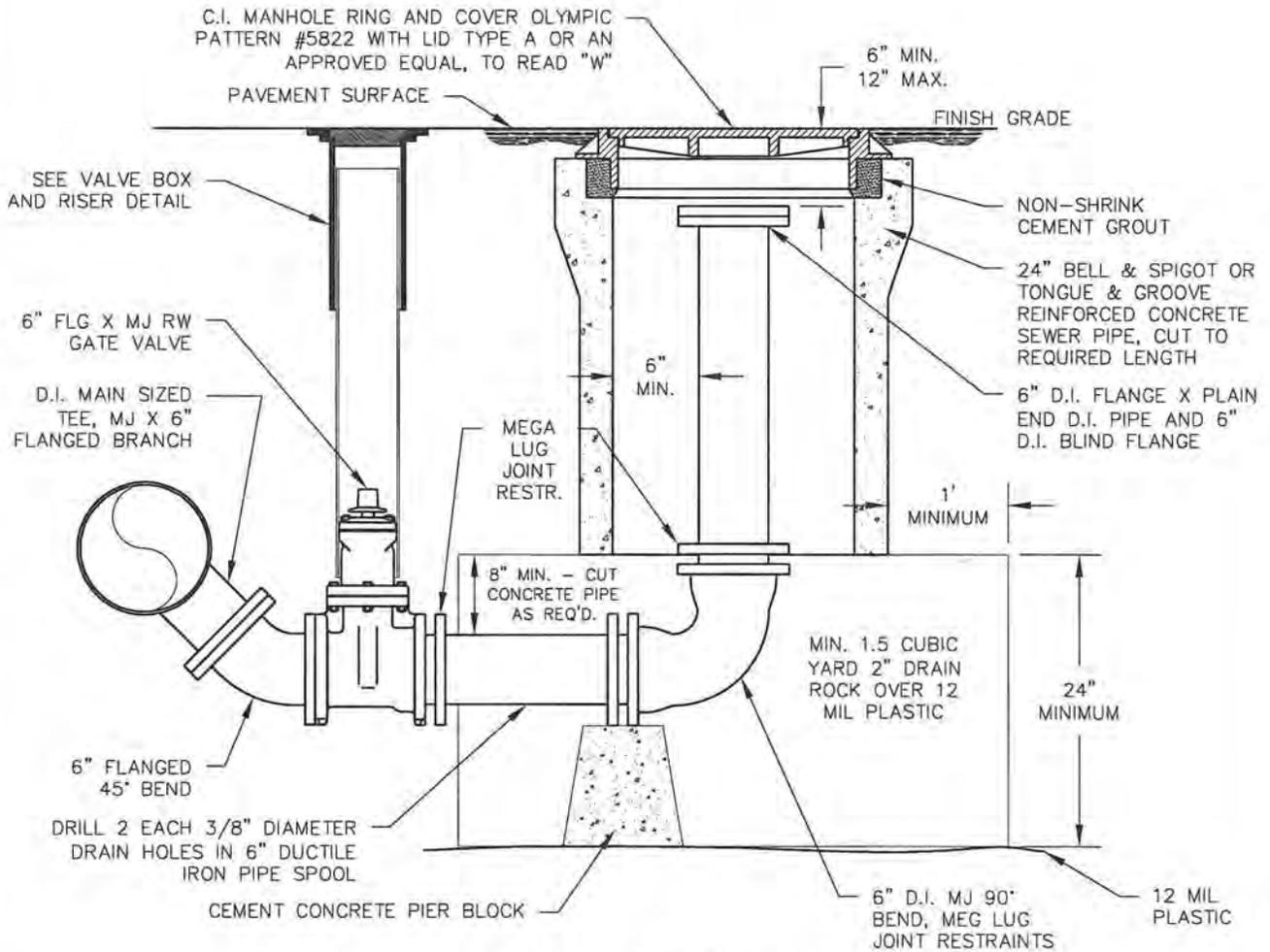
Jan E. Caruthers 1-4-11
DETAIL APPROVED BY DATE

DETAIL NO.
W8

NOT TO SCALE



PLAN VIEW



SECTION VIEW A-A

REV. NO.	DATE	BY	APPR.
1	5/1/07	SCD	JC
2	1/1/11	SCD	JC



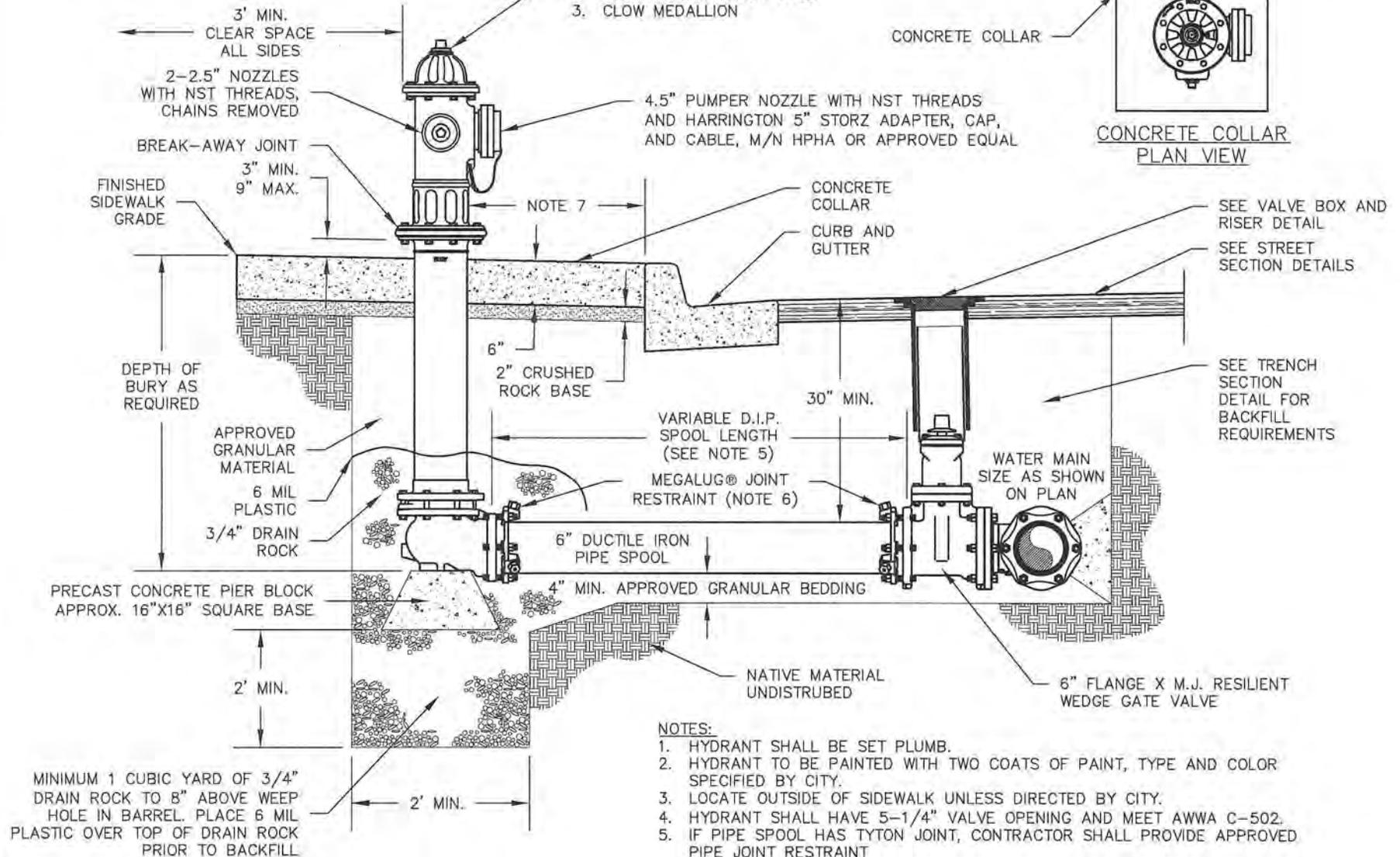
CITY OF CAMAS ~ WATER DETAIL
6" LOW POINT BLOW OFF - STREET

Don P. Cothran 1-4-11
DETAIL APPROVED BY DATE

DETAIL NO.
W10

NOT TO SCALE

- FIRE HYDRANT AS SPECIFIED:
1. KENNEDY K81D
 2. MUELLER CENTURION A423
 3. CLOW MEDALLION



- NOTES:
1. HYDRANT SHALL BE SET PLUMB.
 2. HYDRANT TO BE PAINTED WITH TWO COATS OF PAINT, TYPE AND COLOR SPECIFIED BY CITY.
 3. LOCATE OUTSIDE OF SIDEWALK UNLESS DIRECTED BY CITY.
 4. HYDRANT SHALL HAVE 5-1/4" VALVE OPENING AND MEET AWWA C-502.
 5. IF PIPE SPOOL HAS TYTON JOINT, CONTRACTOR SHALL PROVIDE APPROVED PIPE JOINT RESTRAINT
 6. EBAA IRON SERIES 1100 MEGALUG® MECHANICAL JOINT THRUST RESTRAINT.
 7. 24" TYPICAL, 20" MINIMUM ONLY ON CURB SIDE

REV. NO.	DATE	BY	APPR.
2	5/1/07	SCD	JC
3	1/1/11	SCD	JC
4	10/21/14	SCD	JC
5	6/1/15	SCD	JC



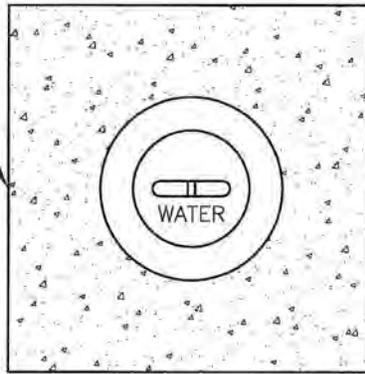
CITY OF CAMAS ~ WATER DETAIL
FIRE HYDRANT

Jim P. Cooney 6-2-15
DETAIL APPROVED BY DATE

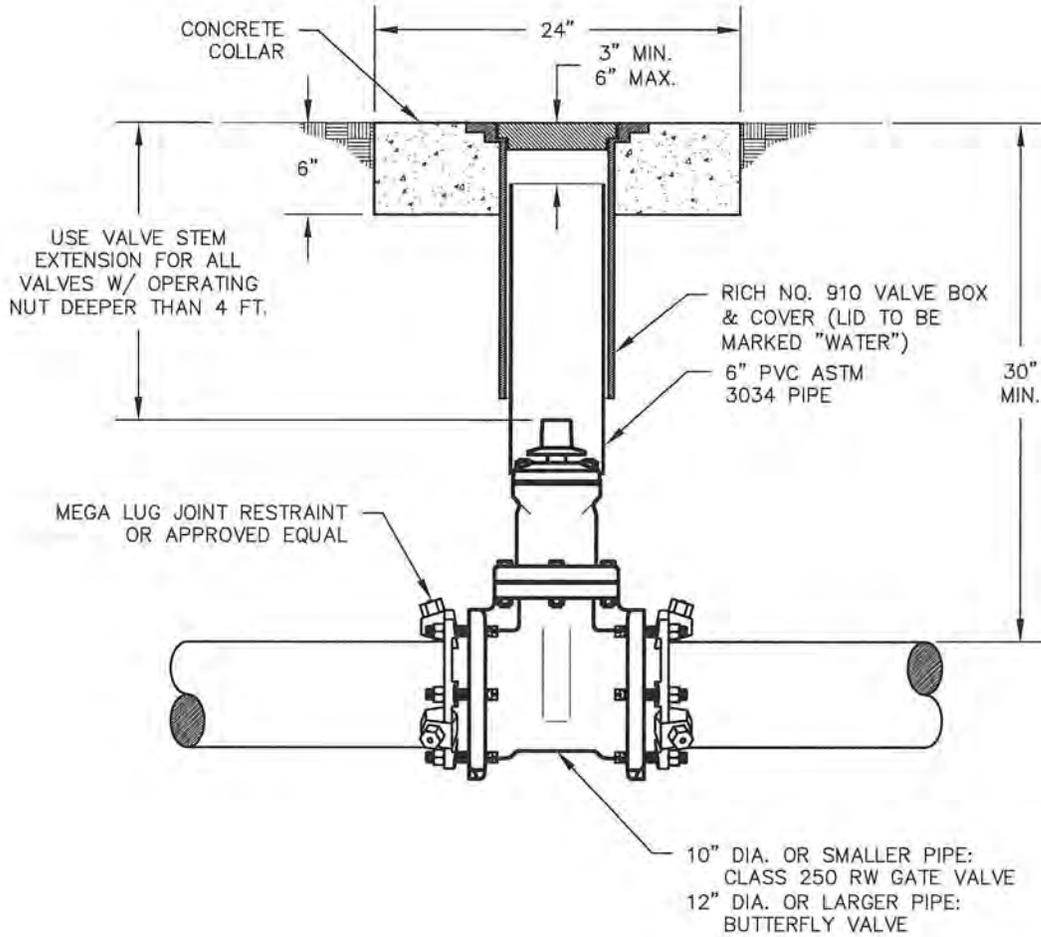
DETAIL NO.
W11

NOT TO SCALE

SQUARE 24" X 24" X 6"
DEEP CONCRETE COLLAR
AROUND VALVE BOX IN
UNPAVED AREAS



CONCRETE COLLAR PLAN VIEW



REV. NO.	DATE	BY	APPR.
1	7/17/06	SCD	RES1076
2	5/1/07	SCD	JC
3	1/1/11	SCD	JC
4	10/21/14	SCD	JC

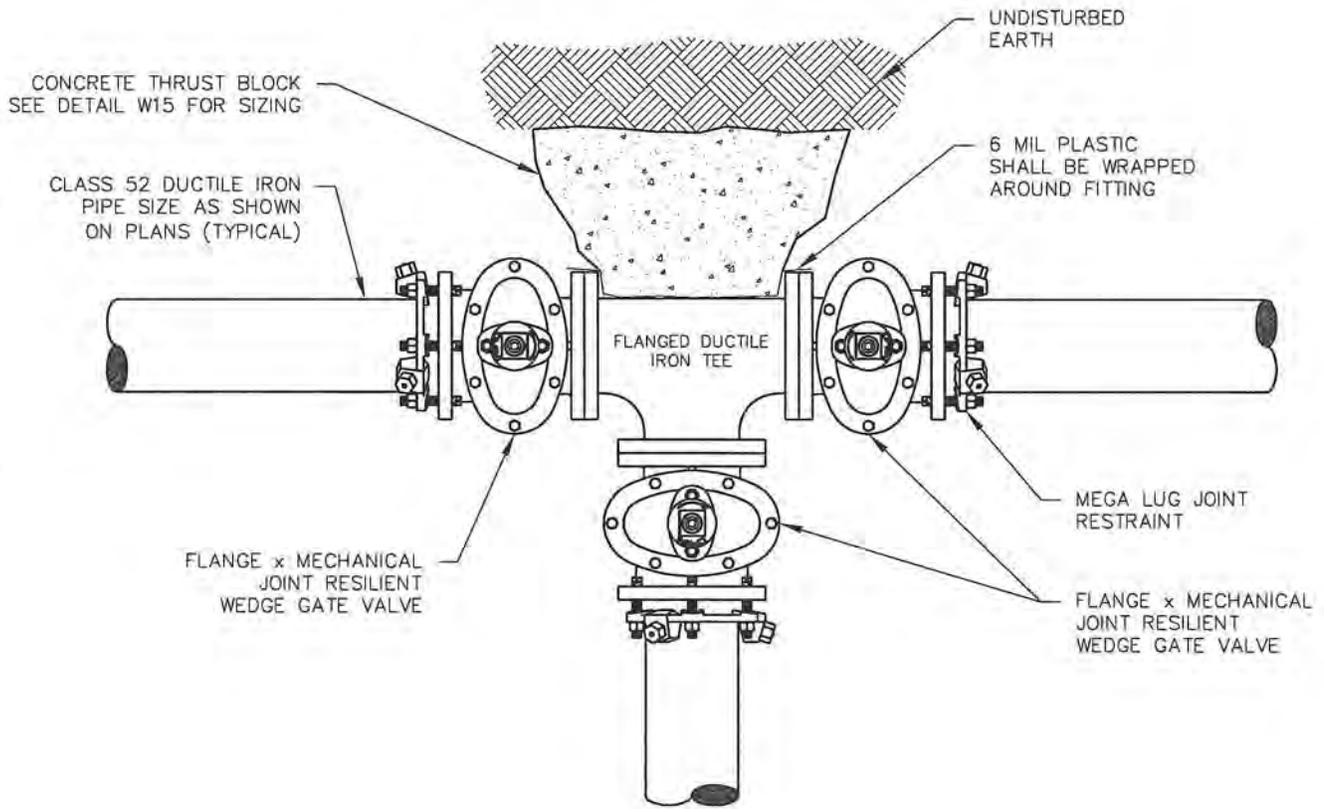


CITY OF CAMAS ~ WATER DETAIL
VALVE BOX AND RISER

Jim E. Crutcher 10-21-14
DETAIL APPROVED BY DATE

DETAIL NO.
W12

NOT TO SCALE



NOTES:

1. VALVES TO BE INSTALLED AT ALL BRANCHES. FOR LONG MAIN LINE RUNS, INLINE VALVE SPACING NOT TO EXCEED 500'. LOOP WATER SYSTEM WHEREVER POSSIBLE. KEEP DEAD ENDS TO A MINIMUM.
2. MECHANICAL THRUST RESTRAINT MAY BE USED DUE TO UNSTABLE SOILS OR THE ENGINEER'S DISCRETION.
3. SEE DETAIL W15 FOR THRUST BLOCK REQUIREMENTS.

REV. NO.	DATE	BY	APPR.
1	5/1/07	SCD	JC
2	1/1/11	SCD	JC



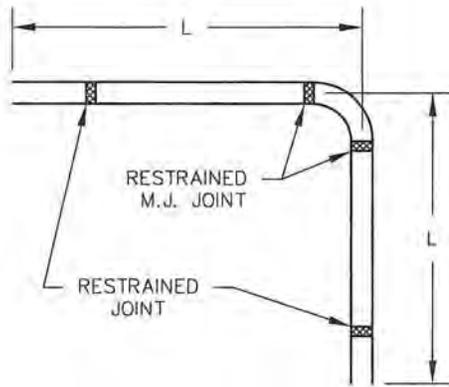
CITY OF CAMAS ~ WATER DETAIL
WATER MAIN LINE AND VALVE

Jan P. Causton 1-4-11
 DETAIL APPROVED BY DATE

NOT TO SCALE

DETAIL NO.
 W13

FOR HORIZONTAL BENDS:



MINIMUM REQUIRED PIPE LENGTHS FOR RESTRAINED JOINTS

BEND IN DEGREES	PIPE DIAMETER			
	6"	8"	10"	12"
90°	25'	33'	39'	45'
45°	10'	13'	16'	19'
22 1/2°	5'	6'	8'	9'
11 1/2°	3'	3'	4'	4'

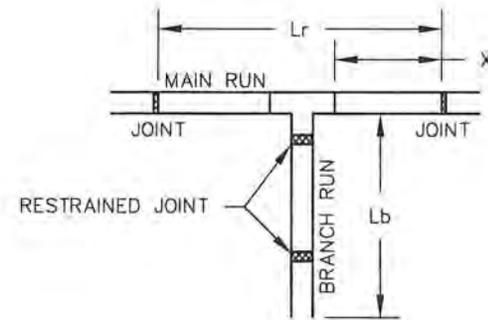
NOTE: CHART USES WORKING PRESSURE OF 200 PSI

FOR PRESSURES OTHER THAN 200 PSI USE:

$$\frac{(L) \times (\text{PRESSURE})}{200}$$

NOTE:
FIELD-LOCK GASKETS ARE APPROVED FOR RESTRAINED JOINT INSTALLATION.

FOR TEES:



MINIMUM REQUIRED PIPE LENGTHS FOR RESTRAINED JOINTS

FOR 6" TEES USE FORMULA
 $L_b = 50 - 1.63 (L_r)$

WHERE:

L_b = THE MINIMUM REQUIRED RESTRAINED PIPE (IN FEET) ON THE BRANCH LINE

L_r = THE TOTAL LENGTH (IN FEET) BETWEEN THE FIRST JOINTS ON EITHER SIDE OF THE TEE ON THE MAIN RUN.

NOTE:

CONDITIONS TO BE FIELD VERIFIED BY ENGINEER.

IF (X) IS LESS THAN 5 FEET THEN PIPE MUST BE RESTRAINED TWO FULL LENGTHS.

FOR 8" TEE USE FORMULA
 $L_b = 64 - 1.65(L_r)$

FOR 12" TEE USE FORMULA
 $L_b = 90 - 1.67(L_r)$

REV. NO.	DATE	BY	APPR.
1	7/17/06	SCD	RES1071
2	5/1/07	SCD	JC
3	1/1/11	SCD	JC



CITY OF CAMAS ~ WATER DETAIL
PIPE JOINT RESTRAINT

Don P. Coathran 1-4-11
DETAIL APPROVED BY DATE

DETAIL NO.

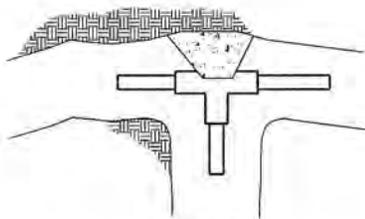
W14

NOT TO SCALE

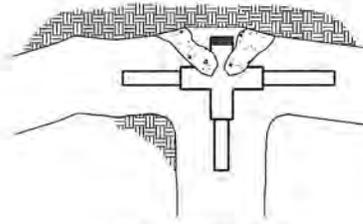
FITTING SIZE	TEE, WYE, PLUG OR CAP	90° BEND PLUGGED CROSS	TEE PLUGGED ON RUN		45° BEND	22 1/2° BEND	11 1/2° BEND
			A1	A2			
4	1.0	1.4	1.9	1.4	1.0	---	---
6	2.1	3.0	4.3	3.0	1.6	1.0	---
8	3.8	5.3	7.6	5.4	2.9	1.5	1.0
10	5.9	8.4	11.8	8.4	4.6	2.4	1.2
12	8.5	12.0	17.0	12.0	6.6	3.4	1.7
14	11.5	16.3	23.0	16.3	8.9	4.6	2.3
16	15.0	21.3	30.0	21.3	11.6	6.0	3.0
18	19.0	27.0	38.0	27.0	14.6	7.6	3.8
20	23.5	33.3	47.0	33.3	18.1	9.4	4.7
24	34.0	48.0	68.0	48.0	26.2	13.6	6.8

NOTES:

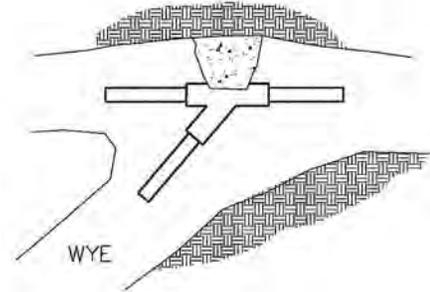
1. CONCRETE THRUST BLOCKING TO BE POURED AGAINST UNDISTURBED EARTH
2. KEEP CONCRETE CLEAR OF JOINTS AND ACCESSORIES.
3. THE REQUIRED THRUST BEARING AREAS FOR SPECIAL CONNECTIONS ARE SHOWN ENCIRCLED ON THE PLANS. e.g. (15) INDICATES 15 SQUARE FEET BEARING AREA REQUIRED.
4. IF NOT SHOWN ON PLANS THE REQUIRED BEARING AREAS AT FITTINGS SHALL BE AS INDICATED IN TABLE, ADJUSTED IF NECESSARY, TO CONFORM TO THE TEST PRESSURE(S) AND ALLOWED SOIL BEARING STRESS(ES) STATED IN THE SPECIAL SPECIFICATIONS.
5. BEARING AREAS AND SPECIAL BLOCKING DETAILS SHOWN ON PLANS TAKE PRECEDENCE OVER BEARING AREAS AND BLOCKING DETAILS SHOWN ON THIS STANDARD DETAIL.
6. ALL FITTINGS SHALL BE WRAPPED IN 6 MIL PLASTIC PRIOR TO THRUST BLOCK PLACEMENT MAKING SURE THE BOLTS AND NUTS ARE PROTECTED.
7. THRUST BLOCKS SHALL BE GIVEN 72 HOURS TO SET UP PRIOR TO PRESSURIZING LINE OR AS DIRECTED BY CITY INSPECTOR.



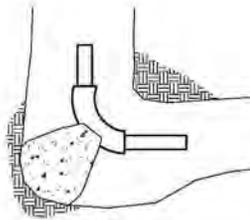
TEE



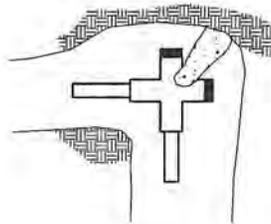
PLUGGED CROSS



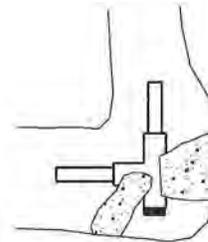
WYE



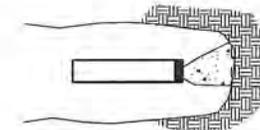
BEND



PLUGGED CROSS



PLUGGED TEE



PLUG OR CAP

NOTES:

1. ABOVE BEARING AREAS BASED ON TEST PRESSURE OF 150 PSI AND AN ALLOWABLE SOIL BEARING STRESS OF 2,000 LBS. PER SQUARE FOOT.
2. TO COMPUTE BEARING AREAS FOR DIFFERENT TEST PRESSURES AND SOIL BEARING STRESSES USE THE FOLLOWING EQUATION:

$$\text{BEARING AREA} = (\text{TEST PRESSURE} / 150) \times (2000 / \text{SOIL BEARING STRESS}) \times (\text{TABLE VALUE})$$
3. EACH AREA IS 1/2 OF REQUIRED TOTAL AREA

REV. NO.	DATE	BY	APPR.
1	7/17/06	SCD	RES1071
2	5/1/07	SCD	JC
3	1/1/11	SCD	JC



CITY OF CAMAS ~ WATER DETAIL
THRUST BLOCKS

Jan P. Caruth 1-4-11
 DETAIL APPROVED BY DATE

NOT TO SCALE

DETAIL NO.

W15

C.I. MANHOLE RING AND COVER OLYMPIC PATTERN #5822 WITH LID TYPE A OR AN APPROVED EQUAL, TO READ "W"

PAVEMENT SURFACE
FINISH GRADE

NON-SHRINK CEMENT GROUT

6" MIN.
12" MAX.

24" BELL & SPIGOT OR TONGUE & GROOVE REINFORCED CONCRETE SEWER PIPE CONFORMING TO ASTM C 76, CLASS II, CUT TO REQUIRED LENGTH

2" GALVANIZED STEEL STREET ELL.

2% MIN.

3" RELIEF TIE INTO STORM SYSTEM OR OTHER AS DETERMINED BY CITY. SEE 'ABOVE GROUND PRV RELIEF DRAIN' DETAIL W21

2" ANGLE VALVE WITH HAND WHEEL, TO BE LEAD-FREE BRONZE BODY, PLUG DISC, TO HAVE THREADED CONNECTIONS

2" AIR VACUUM RELEASE VALVE

2" GALVANIZED STEEL PIPE, FITTINGS, NIPPLES (TYP)

3" MIN.

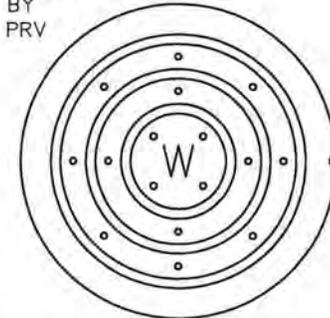
1" LEAD-FREE BRONZE GATE VALVE, GALVANIZED NIPPLE, 2"x1" REDUCER

CONCRETE PIER BLOCK

MIN. 8" - CUT CONCRETE PIPE AS REQUIRED

1' MIN.

1.5 CUBIC YARD MIN. DRAIN ROCK OVER 12 MIL PLASTIC



WATER COVER

PIPE LINE, SIZE AND TYPE AS SPECIFIED ON PLANS

2" MUELLER 300 BALL CORP. STOP WITH IRON PIPE INLET THREADS, AND IRON PIPE OUTLET THREADS.

12 MIL PLASTIC

STAINLESS STEEL DOUBLE STRAP SERVICE SADDLE (I.P.T.), AND NEOPRENE GASKETS.

NOTES:

1. CORPORATION STOP, ANGLE VALVE, AND CONNECTING PIPE SHALL BE THE SAME DIAMETER AS THE AIR INLET.
2. USE APPROVED JOINTING COMPOUND ON ALL THREADED CONNECTIONS.
3. ROTATE AIR/VACUUM VALVE TO PROVIDE MAXIMUM CLEARANCE FOR ACCESS TO ANGLE VALVE.
4. AIR/VACUUM VALVE TO BE EQUAL TO APCO HEAVY DUTY COMBINATION AIR RELEASE VALVE, MODEL #145C.
5. ALL PIPE SHALL BE SCHEDULE40 GALV. STEEL PIPE CONFORMING TO ASTM A 120.
6. DETAILS SHOWN ON THE PLANS TAKE PRECEDENCE OVER THIS STANDARD DETAIL.
7. AIR/VAC ASSEMBLY MAY BE LOCATED ADJACENT TO MAIN LOCATION AT THE DISCRETION OF ENGINEER.

REV. NO.	DATE	BY	APPR.
2	5/1/07	SCD	JC
3	9/17/07	SCD	JC
4	1/1/11	SCD	JC
5	10/21/14	SCD	JC



CITY OF CAMAS ~ WATER DETAIL
2" AIR/VACUUM RELEASE VALVE

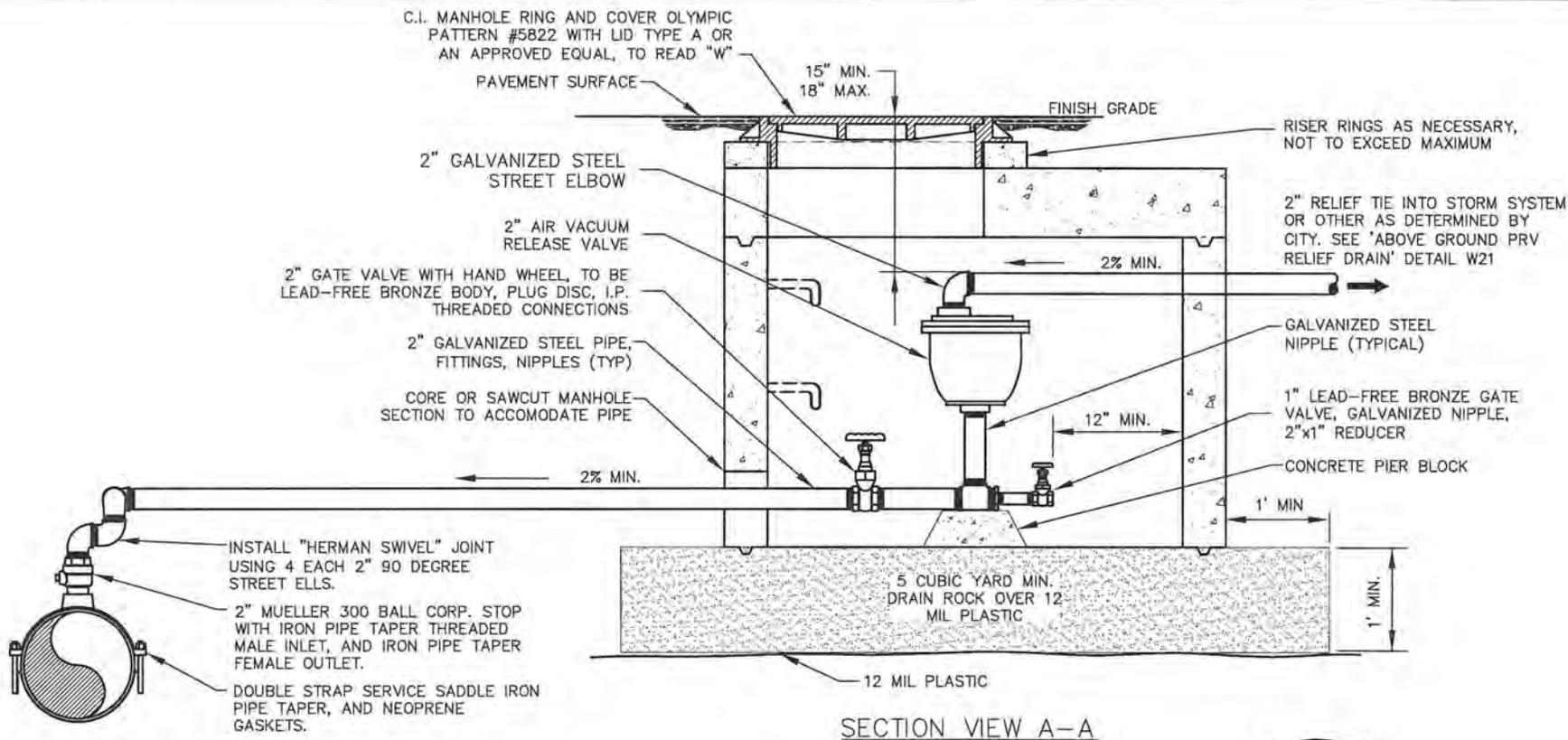
Joe P. Christian 10-21-14
DETAIL APPROVED BY DATE

DETAIL NO.

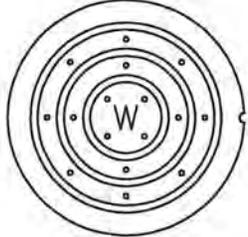
W16

NOT TO SCALE

WTR-2VACVLV.DWG



SECTION VIEW A-A



WATER COVER

WATER NOTES:

1. MANHOLE SECTION SHALL BE LOCATED WITHIN ONE TRAVEL LANE WITH MANHOLE FRAME CENTERED IN THE TRAVEL LANE.
2. CORPORATION STOP, GATE VALVE, AND CONNECTING PIPE SHALL BE THE SAME DIAMETER AS THE AIR INLET.
3. USE APPROVED JOINTING COMPOUND ON ALL THREADED CONNECTIONS.
4. LOCATE AIR/VACUUM VALVE TO PROVIDE MAXIMUM CLEARANCE FOR ACCESS TO GATE VALVE.
5. AIR/VACUUM VALVE TO BE EQUAL TO APCO HEAVY DUTY COMBINATION AIR RELEASE VALVE, MODEL #145C.
6. ALL PIPE SHALL BE SCHEDULE 40 GALVANIZED STEEL PIPE CONFORMING TO ASTM A 120.
7. DETAILS SHOWN ON THE PLANS TAKE PRECEDENCE OVER THIS STANDARD DETAIL.
8. AIR/VAC ASSEMBLY MAY BE LOCATED ADJACENT TO MAIN LOCATION AT THE DISCRETION OF ENGINEER.
9. MANHOLES SHALL CONFORM TO ASTM C-478.
10. NON-SHRINK GROUT SHALL BE USED BETWEEN FRAME, RISER RINGS, AND MANHOLE.
11. 3" TALL FRAME IS STANDARD, 7" TALL FRAME (NOT SHOWN) IS OPTIONAL.
12. ANY COMBINATION OF RISER RING THICKNESS, GROUT, AND FRAME SHALL BE USED TO ACHIEVE THE 12" MAXIMUM DEPTH FROM FINISH GRADE TO TOP OF CONE OR FLAT TOP.

REV. NO.	DATE	BY	APPR.
1	11/1/09	SCD	JC
2	10/21/14	SCD	JC



CITY OF CAMAS ~ WATER DETAIL

2" AIR/VACUUM RELEASE VALVE IN 48" MANHOLE

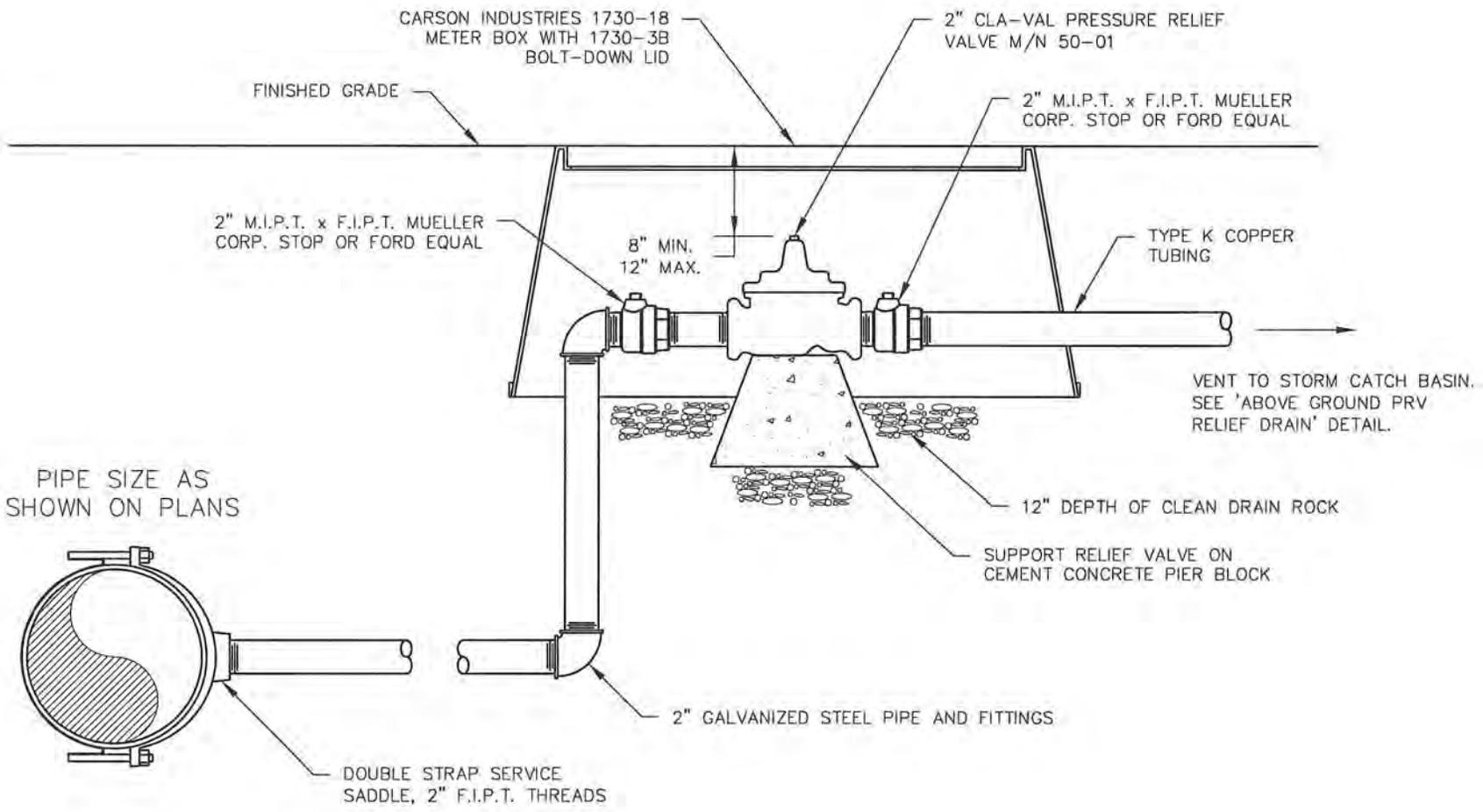
DETAIL APPROVED BY *Jan P. ...* DATE 10-21-14

DETAIL NO.

W17

NOT TO SCALE

WTR-2VACLV.DWG



REV. NO.	DATE	BY	APPR.
1	5/1/07	SCD	JC
2	1/1/11	SCD	JC



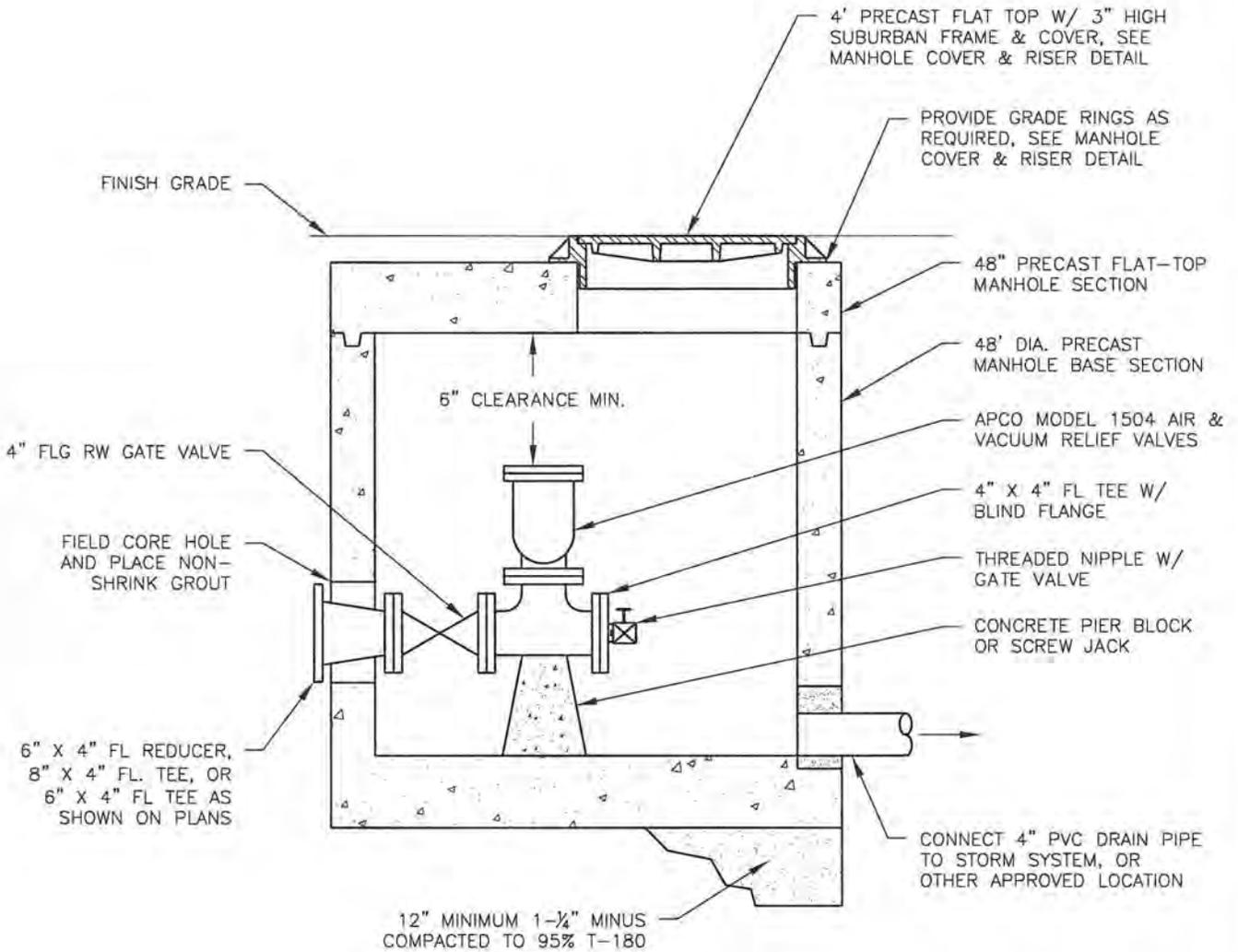
CITY OF CAMAS ~ WATER DETAIL
2" PRESSURE RELIEF VALVE ASSEMBLY

Jim P. Coe 1-4-11
DETAIL APPROVED BY DATE

NOT TO SCALE

DETAIL NO.

W18



NOTES:

1. MANHOLE SHALL CONFORM TO ASTM C-478.
2. MASTIC SEAL REQUIRED ON ALL KEYLOCK JOINTS.
3. VAULT SHALL BE SET FOR 1% SLOPE TO DRAIN.
4. ALL BACKFILL SHALL BE APPROVED GRANULAR MATERIAL.
5. SUMP PUMP MAY BE REQUIRED ON INSTALLATIONS WHERE DRAIN PIPE CANNOT BE CONNECTED TO ADEQUATE STORM DRAIN SYSTEM. THE APPROVED SUMP PUMP SHALL BE A COMMERCIAL GRADE WATER POWERED VENTURI DESIGN WITH BACKFLOW PREVENTION, SIZED TO PROVIDE 10GPM AT 10 FEET OF HEAD AT THE AVAILABLE SYSTEM WATER PRESSURE. BACKFLOW DEVICE SHALL BE CERTIFIED BY WASHINGTON STATE CERTIFIED BACKFLOW TESTER AFTER INSTALLATION AND PRIOR TO ACCEPTANCE. TEST RESULTS SHALL BE SENT TO CITY OF CAMAS WATER DEPARTMENT.

REV. NO.	DATE	BY	APPR.
1	5/1/07	SCD	JC
2	1/1/11	SCD	JC

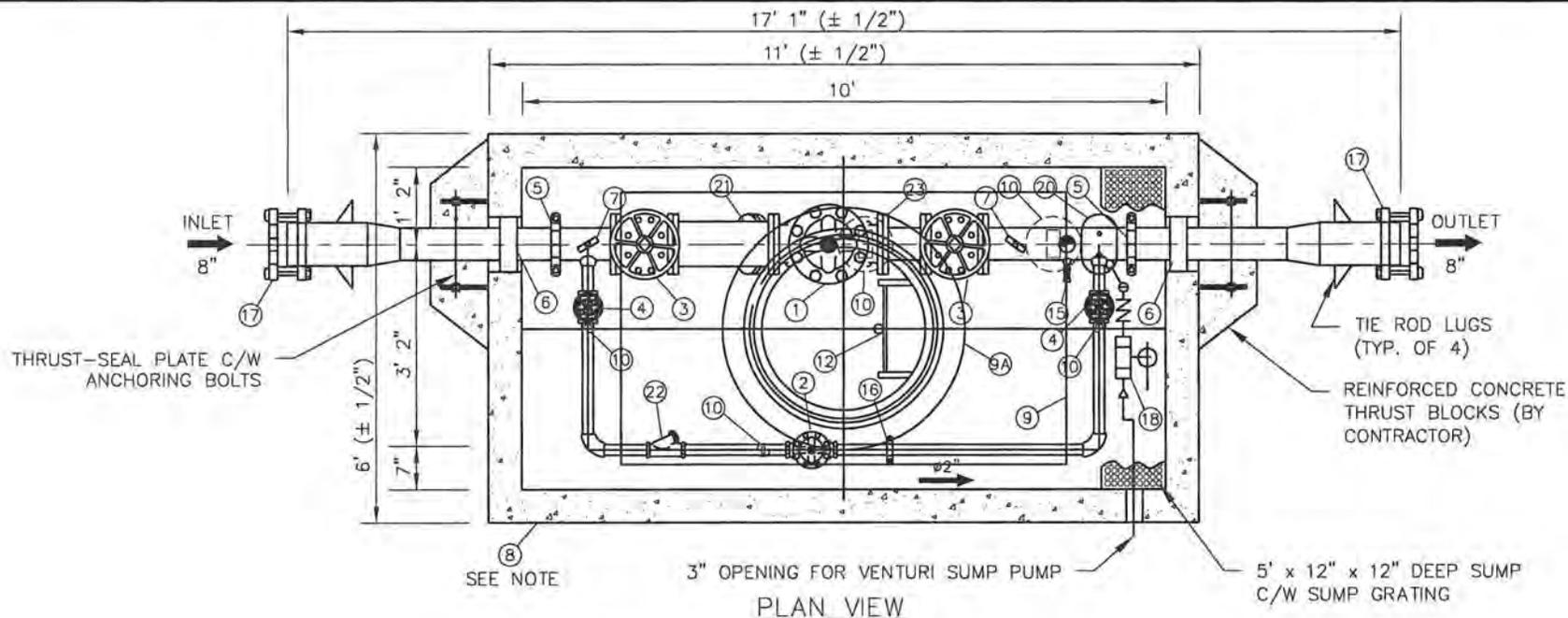


CITY OF CAMAS ~ WATER DETAIL
4" VACUUM RELIEF VALVE

Jim C. Carstensen 1-4-11
 DETAIL APPROVED BY DATE

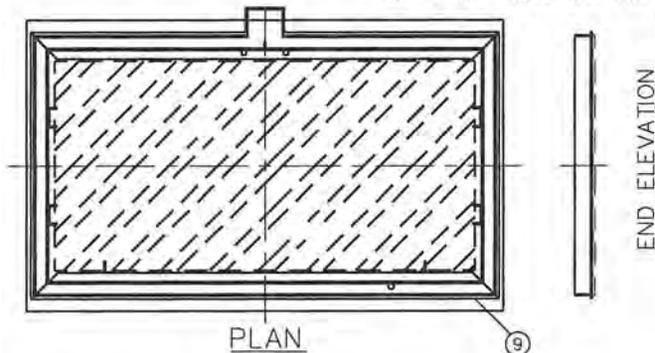
DETAIL NO.
 W19

NOT TO SCALE



PLAN VIEW

50" x 82" OPENING FOR
36" x 72" ALUMINUM HATCH



ELEVATION

36" x 72" ALUMINUM HATCH
(30"Ø MANHOLE SHALL BE USED
AS APPROVED BY CITY OF CAMAS)

NOTES:

1. PRV STATION SHALL BE A PRE-ASSEMBLED, PRE-TESTED, PACKAGED UNIT BY GC SYSTEMS, INC., OR APPROVED EQUAL.
2. VAULT #10565 (H2O LOADING) INSIDE DIMENSIONS 10' LX 5' WX 6' H.

STANDARD FABRICATION & FINISHING SPECIFICATION:

ALL 2" AND SMALLER PIPE TO BE THREADED BRASS. ALL 3" AND LARGER PIPE, INSIDE WETTED SURFACES TO BE SANDBLASTED, EPOXY LINED AND COATED TO AWWA C-210 AND NSF-61 SPECIFICATION. FINISH COATING WILL BE BLUE ENAMEL.

FABRICATED STEEL PIPE & FITTINGS TO BE SCHEDULE NO. 40 STEEL PIPE FOR SIZES TO 10" AND 3/8" WALL FOR 12" AND LARGER.

REV. NO.	DATE	BY	APPR.
1	5/1/07	SCD	JC
2	1/1/11	SCD	JC



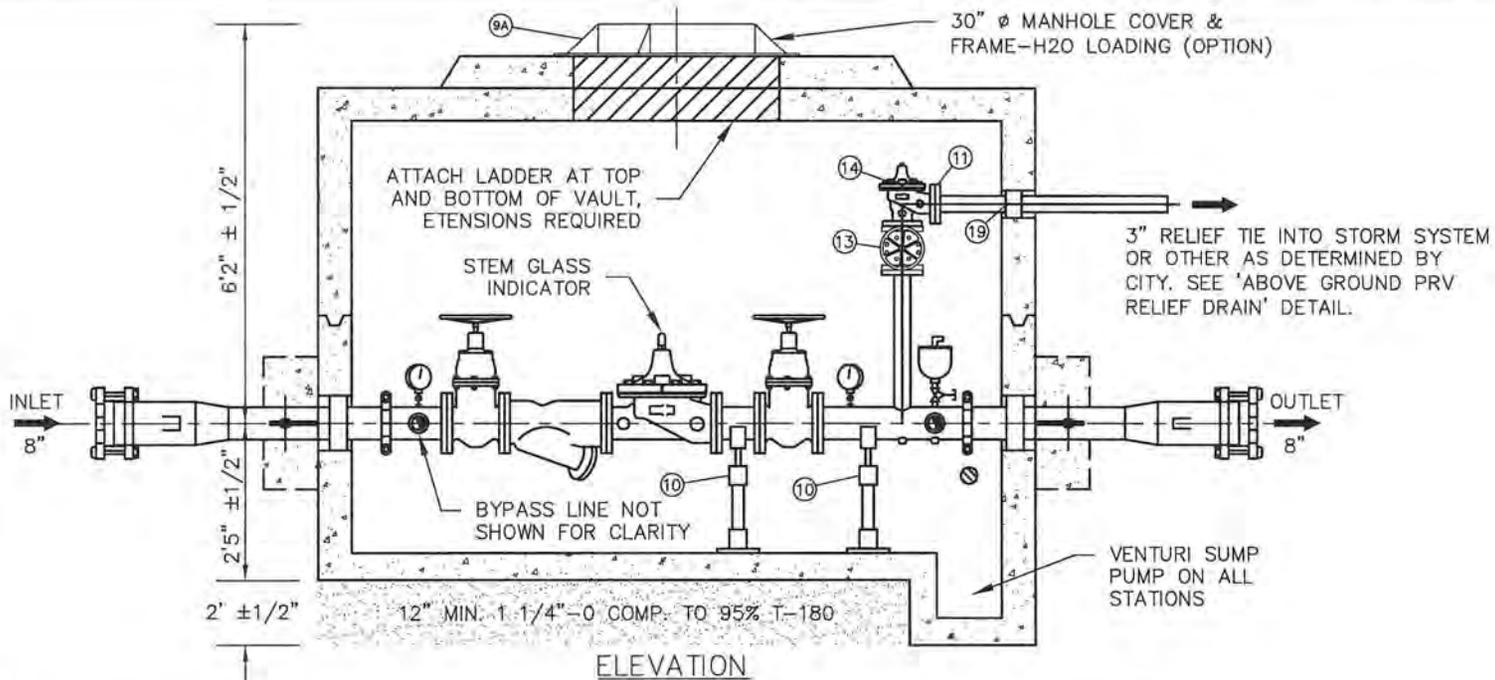
CITY OF CAMAS ~ WATER DETAIL
6"X2" PRV STATION W/ 3" RELIEF

Jan P. Cothran 1-4-11
DETAIL APPROVED BY DATE

DETAIL NO.

W20A

NOT TO SCALE



MATERIALS

ITEM	QTY.	DESCRIPTION	ITEM	QTY.	DESCRIPTION
1	1	6" CLA-VAL 90-01YBCS PRESSURE REDUCING VALVE C/W X 101 POSITION INDICATOR, DIBT-#150 FLG (15-75PSI)	12	1	ALUMINUM LADDER WITH LADDER-UP ASSEMBLY
2	1	2" CLA-VAL 90-01YBCS PRESSURE REDUCING VALVE C/W X 101 POSITION INDICATOR, DIBT-THREADED (15-75 PSI)	13	1	3" MUELLER A2360-6W41 NRS GATE VALVE C/W HANDWHEEL-#125 FLGD.
3	2	6" MUELLER A2360-6W41 NRS GATE VALVE C/W HANDWHEEL -#125 FLGD	14	1	3" CLA-VAL 50A-01B PRESSURE RELIEF VALVE C/W DIBT-150# FLG (20-200 PSI)
4	2	2" MUELLER A2360-8 RW NRS GATE VALVE C/W HANDWHEEL-THREADED	15	1	3/4" HOSE BIB ASSEMBLY
5	2	6" VICTAULIC #07 COUPLING	16	1	2" VICTAULIC #07 COUPLING
6	2	6" PIPE SEAL ASSEMBLY	17	1	8" SMITH BLAIR ST X DI TRANSITION COUPLING
7	2	4" WIKA (0-200PSI) PRESSURE GAUGE C/W GAUGE COCK	18	1	VENTURI SUMP PUMP
8	1	#10565 PRECAST CONCRETE VAULT C/W WHITE INTERIOR, BLACK EXTERIOR	19	1	3" PIPE SEAL ASSEMBLY
9	1	36"x72" ALUMINUM HATCH W/ SPRING ASSIST	20	1	1" APCO 143C.1 COMB. A.R.V. C/W ISOLATION VALVE
10	5	ADJUSTABLE PIPE SUPPORTS	21	1	6" MUELLER 758 Y-STRAINER - #125 FLGD
11	1	3" VICTAULIC #741 FLANGE ADAPTER ADAPTOR	22	1	2" MUELLER 351M Y-STRAINER - THD
			23	1	6" VICTAULIC #741 FLANGE ADAPTOR

REV. NO.	DATE	BY	APPR.
1	5/1/07	SCD	JC
2	1/1/11	SCD	JC
3	10/21/14	SCD	JC

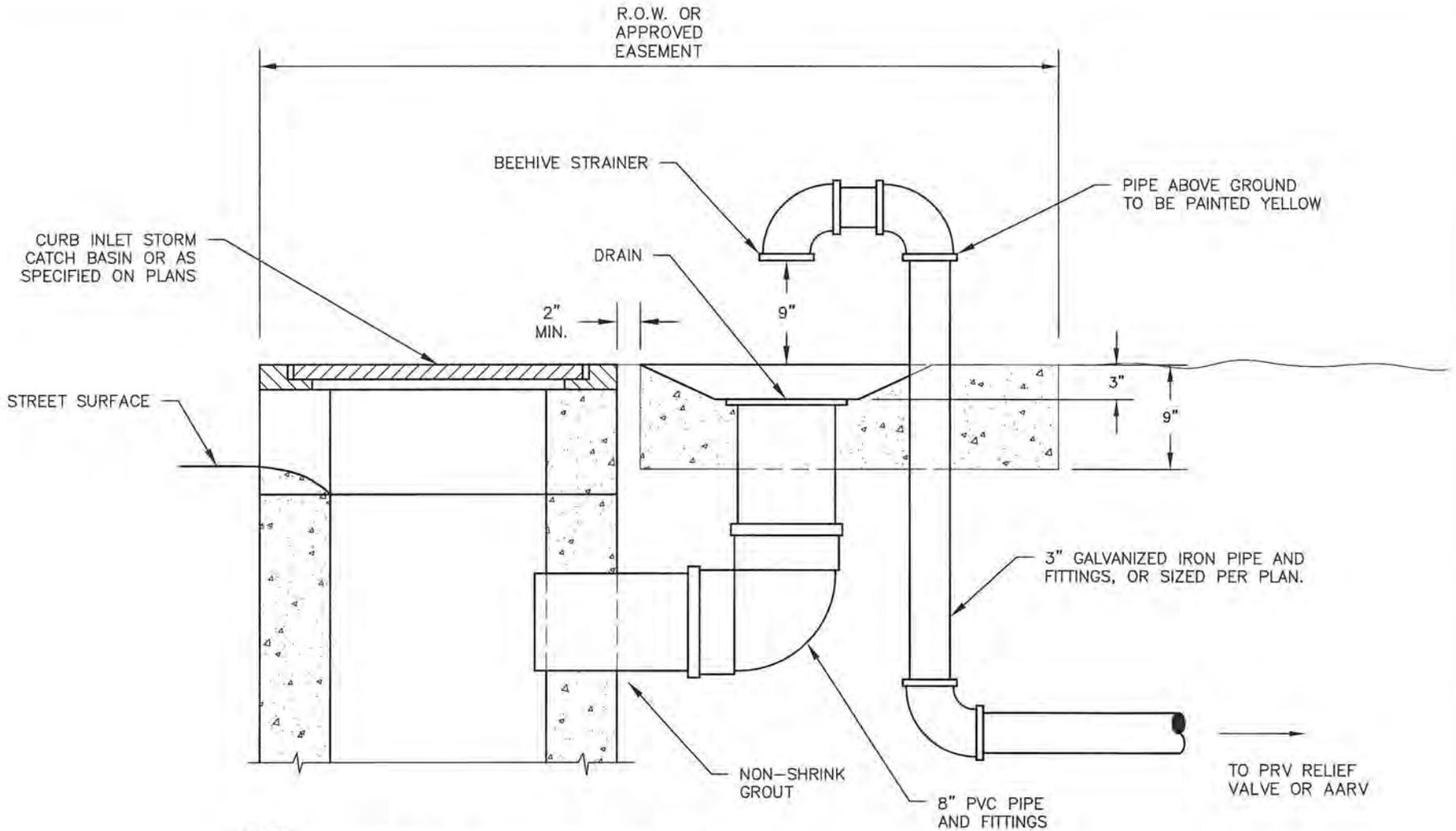


CITY OF CAMAS ~ WATER DETAIL
 6"X2" PRV STATION W/ 3" RELIEF
Jim P. Carver 10-21-14
 DETAIL APPROVED BY DATE

DETAIL NO.
 W20B

NOT TO SCALE

WTR-PRV3RELIEF.DWG



NOTE:
 1. IF CATCH BASIN IS NOT AVAILABLE, A DEDICATED STORM LATERAL MAY BE REQUIRED.

REV. NO.	DATE	BY	APPR.
1	5/1/06	SCD	JC
2	1/1/11	SCD	JC
3	4/27/16	SCD	JC



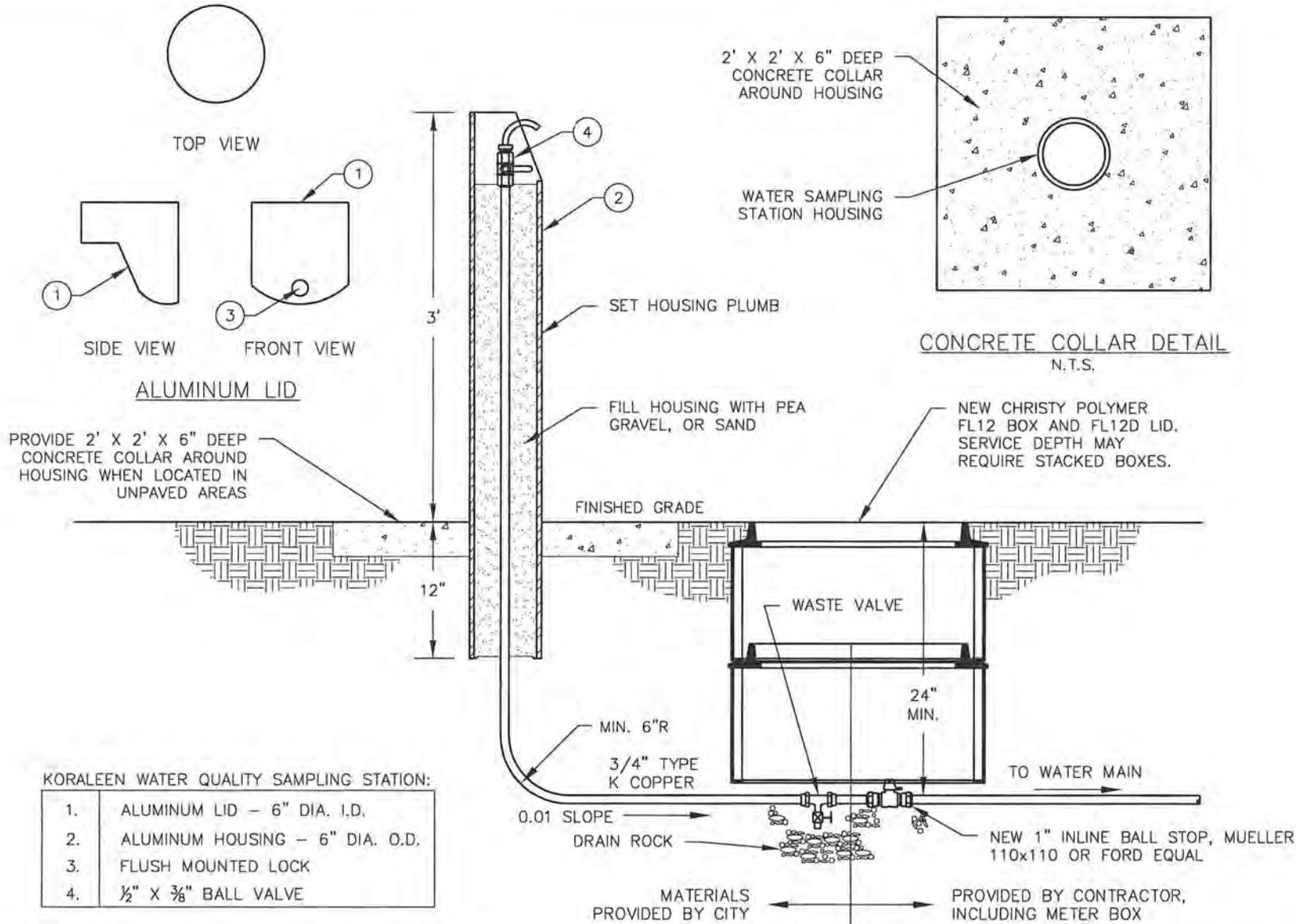
CITY OF CAMAS ~ WATER DETAIL
ABOVE GROUND PRV RELIEF DRAIN

Jim P. Carleton 4-26-16
 DETAIL APPROVED BY DATE

DETAIL NO.

W21

NOT TO SCALE



KORALEEN WATER QUALITY SAMPLING STATION:

- | | |
|----|---------------------------------|
| 1. | ALUMINUM LID - 6" DIA. I.D. |
| 2. | ALUMINUM HOUSING - 6" DIA. O.D. |
| 3. | FLUSH MOUNTED LOCK |
| 4. | 1/2" X 3/8" BALL VALVE |

REV. NO.	DATE	BY	APPR.
1	5/1/07	SCD	JC
2	1/1/11	SCD	JC



CITY OF CAMAS ~ WATER DETAIL
WATER SAMPLING STATION

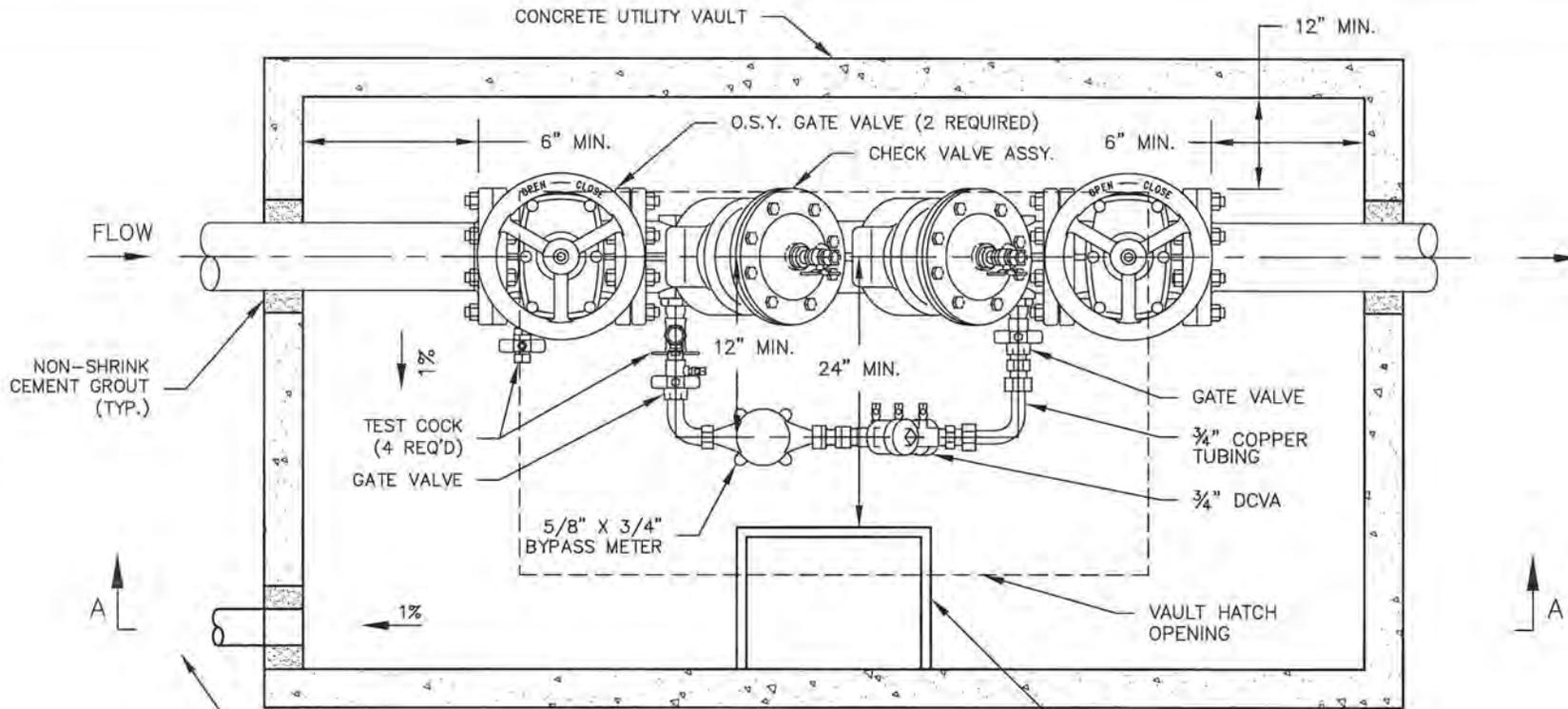
Jim P. Crotham 1-4-11
DETAIL APPROVED BY DATE

DETAIL NO.

W22

NOT TO SCALE

WTR - WQSMPL.DWG



CONNECT 4" PVC DRAIN PIPE TO STORM SYSTEM, OR OTHER APPROVED LOCATION

GALVANIZED STEEL WALL MOUNTED CHAMBER LADDER W/ EXTENSION UNDER ACCESS DOOR

PLAN VIEW

DOUBLE CHECK DETECTOR VALVE ASSY. NOTES:

1. APPROVED DOUBLE CHECK DETECTOR VALVE ASSEMBLY TO LAY HORIZONTAL WITH THE GROUND, SHALL BE INSTALLED ON FIRE PROTECTION SYSTEMS WHEN CONNECTED TO POTABLE WATER SUPPLY. THE ASSEMBLY SHALL BE A COMPLETE ASSEMBLY INCLUDING UL LISTED RESILIENT SEATED OSY SHUTOFF VALVES AND TEST COCKS. THE UNIT SHALL BE UL/FM APPROVED WITH UL/FM APPROVED OSY SHUTOFF VALVES. THE AUXILIARY LINE SHALL CONSIST OF AN APPROVED BACKFLOW PREVENTER AND WATER METER. THE ASSEMBLY SHALL MEET THE BASIC REQUIREMENTS OF ASSE 1048; AWWA STD. C510 FOR DOUBLE CHECK VALVES, AND BE APPROVED BY THE FOUNDATION FOR CROSS-CONNECTION CONTROL AND HYDRAULIC RESEARCH AT THE UNIVERSITY OF SOUTHERN CALIFORNIA. THE DOUBLE CHECK DETECTOR VALVE ASSEMBLY SHALL BE A ZURN WILKINS MODEL 950DA OR APPROVED EQUAL.
2. SYSTEM SHALL BE DESIGNED FOR BACK SIPHONAGE AND BACK PRESSURE.
5. THE WATER LINE SHALL BE DISINFECTED, FLUSHED, AND PRESSURE TESTED PRIOR TO INSTALLING THE BACKFLOW ASSEMBLY. THE BACKFLOW ASSEMBLY SHALL BE PROTECTED FROM FREEZING AND FLOODING.
4. ALL PIPE, VALVE, AND FITTING JOINTS FROM THE SUPPLY MAIN SHALL BE FLANGED AND RESTRAINED. MINIMUM COVER 30". GROUT PIPE ENTRANCE AND EXIT IN VAULT WITH WATER TIGHT GROUT.
5. THE BACKFLOW ASSEMBLY SHALL BE TESTED AFTER INSTALLATION AND PRIOR TO ACCEPTANCE AND ALSO YEARLY THEREAFTER BY A WASHINGTON STATE CERTIFIED BACKFLOW TESTER. TEST RESULTS SHALL BE SENT TO THE CITY OF CAMAS WATER DEPARTMENT.
6. ALL BACKFILL SHALL BE APPROVED GRANULAR MATERIAL.

REV. NO.	DATE	BY	APPR.
1	5/1/07	SCD	JC
2	1/1/11	SCD	JC
3	10/21/14	SCD	JC



CITY OF CAMAS ~ WATER DETAIL

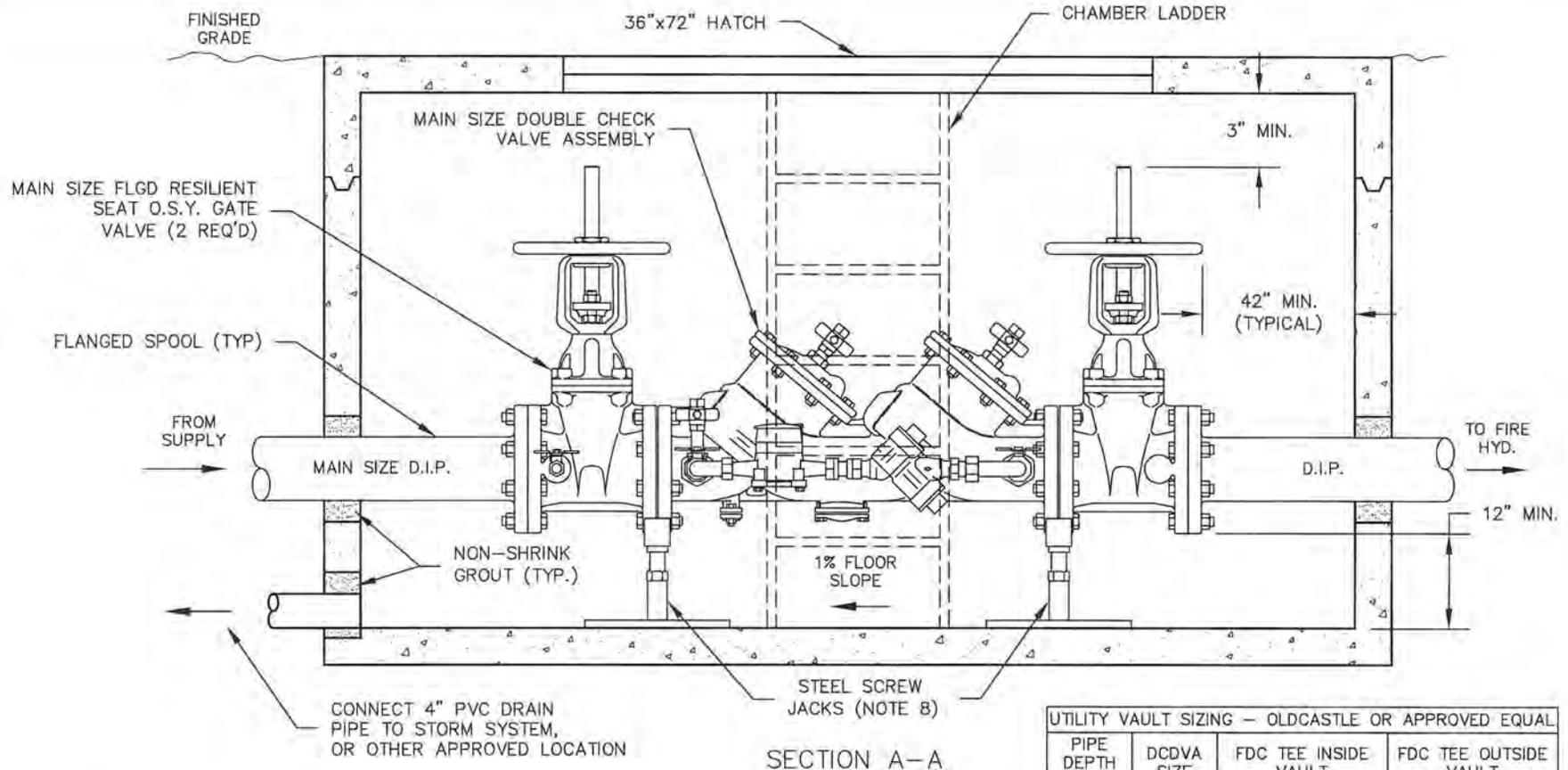
STANDARD DOUBLE CHECK DETECTOR VALVE ASSY.

Jan P. Carstensen 10-21-14
 DETAIL APPROVED BY DATE

DETAIL NO.

W23A

NOT TO SCALE



UTILITY VAULT SIZING - OLDCASTLE OR APPROVED EQUAL

PIPE DEPTH UP TO	DCDVA SIZE	FDC TEE INSIDE VAULT	FDC TEE OUTSIDE VAULT
6'	4"	676-WA	577-WA
4'	6"	887-WA	675-WA
6'	6"	-	676-WA
6'	8"	5106-WA	687-WA
6'	10"	5106-WA	5106-WA

VAULT CONSTRUCTION NOTES:

1. VAULT SHALL BE PRE-APPROVED PRIOR TO INSTALLATION.
2. VAULT SHALL BE INSTALLED AT PROPERTY LINE OR EASEMENT LINE AND ON OWNERS PROPERTY.
3. VAULTS SHALL HAVE A MINIMUM OF 3' CLEARANCE FROM ALL STRUCTURES.
4. APPROVED VAULT SHALL BE RATED FOR H2O LOADING AND INCLUDE AN EXTENSION LADDER
5. VAULT SHALL BE SET FOR 1% SLOPE TO DRAIN.
6. ALL BACKFILL SHALL BE APPROVED GRANULAR MATERIAL.
7. HATCH SHALL BE AN H20 RATED, 36"x72" SPRING ASSISTED, HOT DIPPED GALVANIZED DIAMOND PLATE DOUBLE DOOR. FOR TRAFFIC INSTALLATIONS A 30" MANHOLE LID SHALL BE USED INSTEAD OF A HATCH.
8. SUMP PUMP MAY BE REQUIRED ON INSTALLATIONS WHERE DRAIN PIPE CANNOT BE CONNECTED TO ADEQUATE STORM DRAIN SYSTEM. THE APPROVED SUMP PUMP SHALL BE A COMMERCIAL GRADE WATER POWERED VENTURI DESIGN WITH BACKFLOW PREVENTION, SIZED TO PROVIDE 10GPM AT 10 FEET OF HEAD AT THE AVAILABLE SYSTEM WATER PRESSURE. BACKFLOW DEVICE SHALL BE CERTIFIED BY WASHINGTON STATE CERTIFIED BACKFLOW TESTER AFTER INSTALLATION AND PRIOR TO ACCEPTANCE. TEST RESULTS SHALL BE SENT TO CITY OF CAMAS WATER DEPARTMENT.
9. FOUR (4) STEEL SCREW JACKS REQUIRED FOR SUPPORT OF DOUBLE CHECK VALVE ASSEMBLY AND BYPASS ASSEMBLY.
10. FIRE DEPARTMENT CONNECTION (FDC) MAY BE LOCATED THROUGH THE VAULT LID (NOT SHOWN), OR MAY BE LOCATED OUTSIDE OF THE VAULT DEPENDING UPON SITE.

SECTION A-A

REV. NO.	DATE	BY	APPR.
1	5/1/07	SCD	JC
2	1/1/11	SCD	JC
3	10/21/14	SCD	JC



CITY OF CAMAS ~ WATER DETAIL

STANDARD DOUBLE CHECK DETECTOR VALVE ASSY.

San P. Christian 10-21-14
 DETAIL APPROVED BY DATE

DETAIL NO.

W23B

NOT TO SCALE



Streetscape Design Standards

Section Index

- **Public Works Facilities Landscape Standards**
- **Plant Materials for Rights-of-Way**
- **Streetscape Standards**
 - GatewaySidewalk Details
 - Fence Details
 - Irrigation Details

City of Camas
616 NE Fourth Avenue
Camas, WA 98607
www.cityofcamas.us

Phone: (360) 834-6864
Fax: (360) 834-1535

Creation Date: 10/28/02
Revision Date: 4/27/16 (Partial)



Public Works Facilities Landscape Standards

City of Camas
616 NE Fourth Avenue
Camas, WA 98607
www.cityofcamas.us

Phone: (360) 834-6864
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Creation Date: 10/28/02
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City of Camas Landscape Standards Details ~ INDEX

<u>Detail No.</u>	<u>Detail Name</u>	<u>Rev.</u>	<u>Rev. Date</u>
PL1	Landscaping Requirements - Within R.O.W.	2	4/27/2016
PL2	Planting Notes - Within R.O.W.	2	4/27/2016
PL3	Bare Root Planting	1	10/21/2014
PL4	Deciduous Balled/Burlap Tree Planting	1	10/21/2014
PL5	Shrub Container Planting	1	10/21/2014
PL6	Tree Protection Fence Detail	1	10/21/2014
PL7	Groundcover Planting Detail	1	10/21/2014
PL8	Root Barrier Detail	1	10/21/2014
PL9	Root Barrier General Notes	1	10/21/2014
PL10	Root Barrier Installation	1	10/21/2014

LANDSCAPING NOTES:

1. DEVELOPER SHALL SUBMIT A LANDSCAPE PLAN SHOWING PLANT TYPE, LOCATION, AND QUANTITY OF PLANTS, THAT IS DESIGNED BY A QUALIFIED LANDSCAPE DESIGNER.
2. SHOW THE LOCATION OF SIDEWALK, LIGHT POLES, MAIL BOXES, DRIVEWAYS, FIRE HYDRANTS, INTERSECTIONS, AND ANY OTHER APPURTENANCE THAT MAY INFLUENCE THE PLACEMENT OF PLANTS.
3. LANDSCAPING SHALL BE SELECTED AND LOCATED TO DETER SOUND, FILTER AIR CONTAMINANTS, CURTAIL EROSION, MINIMIZE STORM WATER RUN-OFF, CONTRIBUTE TO LIVING PRIVACY, REDUCE THE VISUAL IMPACTS OF BUILDINGS/EQUIPMENT AND PAVED AREAS, SCREEN, REDUCE GLARE, AND EMPHASIZE OR SEPARATE OUTDOOR SPACES OF DIFFERENT USES OR CHARACTER.
4. LANDSCAPING SHALL BE DESIGNED TO BE HARMONIOUS WITH THE LOCAL SETTING AND WITH NEIGHBORING DEVELOPMENTS.
5. PLANTS AND TREES SHALL COMPLEMENT OR SUPPLEMENT SURROUNDING NATURAL VEGETATION.
6. PLANTS AND TREES CHOSEN SHALL BE IN SCALE WITH THE STRUCTURES AND EQUIPMENT DEVELOPMENT, KEEPING IN MIND THE MATURE SIZE OF PLANTINGS.
7. MINIMUM LANDSCAPING AS A PERCENT OF GROSS SITE AREA SHALL BE 15%.
8. DEVELOPER SHALL PROVIDE AN IRRIGATION PLAN.
 - 8.1. APPROPRIATE IRRIGATION SYSTEMS SHALL BE INSTALLED WHERE NEEDED TO ASSURE LANDSCAPING SUCCESS.
 - 8.2. DESIGN OF LANDSCAPING THAT INCLUDES XERISCAPE PRINCIPLES IS ENCOURAGED TO REDUCE LONG-TERM MAINTENANCE DEMANDS AND TO CONSERVE WATER.
 - 8.3. XERISCAPE IS DEFINED AS LANDSCAPE DESIGN, WHICH WOULD INCORPORATE PLANT MATERIALS THAT REQUIRE LITTLE OR NO IRRIGATION AND RELY ON NATURAL MOISTURE AND RAINFALL FOR SURVIVAL ONCE ESTABLISHED.
9. LANDSCAPE SHALL BE DESIGNED WITH MAINTENANCE IN MIND:
 - 9.1. DEVELOPER SHALL PROVIDE A MAINTENANCE PLAN DESCRIBING FUNDING, RESPONSIBILITY, AND FREQUENCY OF MAINTENANCE.
 - 9.2. PLANTS AND TREES THAT MINIMIZE UPKEEP AND MAINTENANCE SHALL BE SELECTED.
 - 9.3. TREES, AS THEY GROW, SHALL BE PRUNED TO THEIR NATURAL FORM TO PROVIDE AT LEAST 10 FEET OF CLEARANCE ABOVE SIDEWALKS AND 12 FEET ABOVE STREET ROADWAY SURFACES.
 - 9.4. SHRUBS SHALL BE MAINTAINED TO A MAXIMUM HEIGHT OF 42 INCHES FROM TOP OF CURB TO TOP OF PLANT. ENSURE THAT SHRUBS ARE TRIMMED BACK FROM FACE OF CURB.
10. TREES SHALL NOT BE PLANTED CLOSER THAN 25 FEET FROM THE CURB LINE OF THE INTERSECTIONS OF STREETS OR ALLEYS, AND NOT CLOSER THAN 10 FEET FROM DRIVEWAYS, FIRE HYDRANTS, OR UTILITY POLES.
11. STREET TREES SHALL NOT BE PLANTED CLOSER THAN 20 FEET TO LIGHT STANDARDS. EXCEPT FOR PUBLIC SAFETY, NO NEW LIGHT STANDARD SHOULD BE POSITIONED CLOSER THAN 10 FEET TO ANY EXISTING STREET TREE, AND PREFERABLY SUCH LOCATIONS WILL BE AT LEAST 20 FEET DISTANCE.
12. TREES SHALL NOT BE PLANTED CLOSER THAN 2-1/2 FEET FROM THE FACE OF THE CURB EXCEPT AT INTERSECTIONS, WHERE IT SHOULD BE 25 FEET FROM THE CURB IN A CURB RETURN AREA.
13. WHERE THERE ARE OVERHEAD UTILITY LINES, TREE SPECIES THAT WILL NOT INTERFERE WITH THOSE LINES SHALL BE CHOSEN. DEVELOPER IS TO VERIFY WITH UTILITY ON SPECIES SELECTION.
14. TREES SHALL NOT BE PLANTED WITHIN 2 FEET OF ANY PERMANENT HARD SURFACE PAVING OR WALKWAY.
15. EXISTING TREES MAY BE USED AS STREET TREES IF THERE WILL BE NO DAMAGE FROM THE DEVELOPMENT WHICH WILL KILL OR WEAKEN THE TREE.
16. VISION CLEARANCE HAZARDS SHALL BE AVOIDED AND VISION CLEARANCE STANDARDS SHALL BE ADHERED TO.
17. PARKING AND LOADING AREAS SHALL BE SCREENED FROM HORIZONTAL VIEW WITH THE USE OF DENSE LANDSCAPING, MOUNDS OR BERMS.
18. PERIMETER AND SECURITY FENCING SHALL BE CONSTRUCTED TO MINIMIZE VISUAL IMPACT. WALLS OR FENCES SEPARATING ADJOINING PARCELS MAY BE LOCATED AT THE PROPERTY LINE. SECURITY FENCING SHALL BLEND INTO AND BE COMPATIBLE WITH LANDSCAPING AND SURROUNDING ENVIRONMENT. FENCING SHALL HAVE EARTH TONE COLORS OF BROWN, TAN GRAY, OR GREEN, WALLS SHALL BE CONSTRUCTED OF MATERIALS COMPATIBLE WITH THE BUILDING ARCHITECTURE, LANDSCAPING, AND SURROUNDING ENVIRONMENT.
19. SITE AND BUILDING LIGHTING SHALL BE DESIGNED TO MINIMIZE GLARE OR OBJECTIONABLE EFFECTS TO THE ADJACENT PROPERTIES. SITE LIGHTING POLES SHALL NOT EXCEED 20 FEET IN HEIGHT AND SHALL DIRECT THE LIGHT DOWNWARD. LIGHTING SOURCES VIEWED FROM ABOVE OR BELOW ON ADJACENT PROPERTY SHALL BE SHIELDED. BUILDING LIGHTING IS TO BE CONCEALED AND INDIRECT. SITE LIGHTING IS TO BE DESIGNED TO PROVIDE UNIFORM DISTRIBUTION AND THE LIGHT LEVELS SHALL BE ADEQUATE FOR REASONABLE SECURITY AND SAFETY ON THE PREMISES.
20. EARTH BERMS MAY BE USED TO PROVIDE VARIATION IN THE GROUND PLANE AND FOR SCREENING INTERIOR PORTIONS OF THE SITE. CARE MUST BE TAKEN IN THEIR DESIGN TO AVOID CREATING AN ARTIFICIAL APPEARING LANDSCAPE. THE BERMED AREAS SHALL BE AS LONG, AS GRADUAL, AND AS GRACEFUL AS SPACE WILL ALLOW, AND SHOULD HAVE A MINIMUM HEIGHT ABOVE SURROUNDING GRADE OF THREE FEET. MAXIMUM SLOPES FOR BERMED AREAS SHALL BE 3:1 FOR TURF AREAS AND 2:1 FOR GROUND COVER AREAS.

REV. NO.	DATE	BY	APPR.
1	10/21/14	SCD	JC
2	4/27/16	SCD	JC



CITY OF CAMAS ~ STREET DETAIL

LANDSCAPING REQUIREMENTS – WITHIN R.O.W.

Jim P. Caruthers 4-26-16
 DETAIL APPROVED BY DATE

NOT TO SCALE

DETAIL NO.

PL1

PLANTING NOTES:

1. ALL PLANTING TO BE OF NURSERY STOCK GRADE NO. 1 OR BETTER AND MUST BE APPROVED PRIOR TO PLANTING.
2. ALL PLANTING HOLES SHALL BE EXCAVATED THREE TIMES THE DIAMETER OF THE TREE ROOT BALL OR ROOT SYSTEM.
3. DECIDUOUS TREES SHALL HAVE STRAIGHT TRUNKS, BE FULL BRANCHED, HAVE A MINIMUM CALIPER OF 2 INCHES AND BE ADEQUATELY STAKED FOR PLANTING. CALIPER OF TREES SHALL BE LARGER WHEN REQUIRED BY OTHER CITY STANDARDS OR PLANS.
4. EVERGREEN TREES SHALL BE A MINIMUM OF THREE FEET IN HEIGHT, FULLY BRANCHED AND ADEQUATELY STAKED FOR PLANTING.
5. DECIDUOUS TREES SHALL BE A MINIMUM 2" CALIPER UNLESS APPROVED BY THE CITY.
6. POTTED OR B&B PLANTS SHALL BE A MINIMUM SIZE OF 3 GALLONS UNLESS APPROVED BY THE CITY.
7. SHRUBS SHALL BE PLANTED ACCORDING TO RECOGNIZED LANDSCAPE STANDARD PRACTICE FOR MAINTENANCE, APPEARANCE, HEALTH OF THE PLANTS, AND OVERALL AESTHETICS.
8. PLANT UPRIGHT AND FACE TO GIVE BEST APPEARANCE OR RELATIONSHIP TO OTHER PLANTS AND STRUCTURES.
 - 8.1. LOOSEN AND REMOVE TWINE BINDING AND BURLAP FROM AROUND THE TOP OF EACH ROOT BALL.
 - 8.2. SET TREES AN INCH ABOVE FINISH GRADE.
 - 8.3. STAKE OR GUY TREES IMMEDIATELY AFTER PLANTING (SEE DETAIL PL3, PL4, & PL5)
 - 8.4. REMOVE STAKES OR GUY WIRES ONE YEAR AFTER INSTALLATION.
9. PLACE AND COMPACT BACKFILL SOIL MIXTURE CAREFULLY TO AVOID INJURY TO ROOTS, AND TO FILL ALL VOIDS. BACKFILL MIX SHALL CONSIST OF 1/4 APPROVED HUMUS MATERIAL TO 3/4 TOPSOIL, PLUS SOIL AMENDMENTS/FERTILIZERS AS PER SOIL ANALYSIS (TO BE PERFORMED PRIOR TO PLANTING TREES).
10. WHEN HOLE IS NEARLY FILLED, COMPLETELY SOAK AND ALLOW WATER TO DRAIN AWAY. FILL HOLE TO FINISH GRADE. PROVIDE 2 INCH HIGH BERM WATER RING AT THE BASE OF EACH TREE. REMOVE BERM AT THE END OF CONTRACT MAINTENANCE PERIOD.
11. GROUND COVER, SHALL BE PLANTED ACCORDING TO RECOGNIZED LANDSCAPE STANDARD PRACTICE FOR MAINTENANCE, APPEARANCE, OVERALL AESTHETICS, AND HEALTH OF THE PLANTS.
12. TREES, AS THEY GROW, SHALL BE PRUNED TO THEIR NATURAL FORM TO PROVIDE AT LEAST 10 FEET OF CLEARANCE ABOVE SIDEWALKS AND 14 FEET ABOVE STREET ROADWAY SURFACES.
13. TREE MAINTENANCE – IN ORDER TO INSURE ESTABLISHMENT, SURVIVAL AND GROWTH, TREES SHALL BE MULCHED WITH 4" DEEP COMPOST AND WATERED AS NECESSARY DURING THE FIRST TWO GROWING SEASONS. PRUNING TO BE AS FOLLOWS:
 - 13.1. YEAR 1 – ONLY DEAD, BROKEN, OR CROSSING BRANCHES SHALL BE PRUNED.
 - 13.2. YEAR 2 – A CLASS 1 PRUNE, PURSUANT TO NATIONAL ARBORIST ASSOCIATION STANDARDS, SHALL BE PERFORMED. THE PURPOSE OF THIS PRUNING IS TO ESTABLISH PROPER SCAFFOLD BRANCHING, RAISE THE CROWN FOR ROAD/SIDEWALK CLEARANCE, AND REMOVE ANY DEAD, DYING OR CROSSING BRANCHES.
 - 13.3. YEAR 3 – A CLASS 1 PRUNE, PURSUANT TO NATIONAL ARBORIST ASSOCIATION STANDARDS, SHALL BE PERFORMED. THE PURPOSE OF THIS PRUNING IS TO CONTINUE TO ESTABLISH THE PROPER SCAFFOLD BRANCHING, CONTINUE TO RAISE THE CROSSING FOR ROAD/SIDEWALK CLEARANCE, AND TO REMOVE ANY DEAD, DYING, OR CROSSING BRANCHES.
14. DEFINITIONS:
 - 14.1. BALLED AND BURLAPPED (B&B) – TREES AND SHRUBS WITH A LARGE BALL OF SOIL AROUND THE ROOTS WRAPPED IN BURLAP.
 - 14.2. BARE-ROOT – OFFERED BY NURSERIES IN WINTER AND EARLY SPRING WITH ALL THE SOIL REMOVED FROM THEIR ROOTS.
 - 14.3. CALIPER – THE DIAMETER OF THE TRUNK MEASURED AT 4- FEET FROM THE GROUND.
 - 14.4. GROUND COVER – LIVING MATERIAL THAT DOES NOT INCLUDE BARK CHIPS OR OTHER MULCH.

REV. NO.	DATE	BY	APPR.
1	10/21/14	SCD	JC
2	4/27/16	SCD	JC



CITY OF CAMAS ~ STREET DETAIL

PLANTING NOTES – WITHIN RIGHT OF WAY

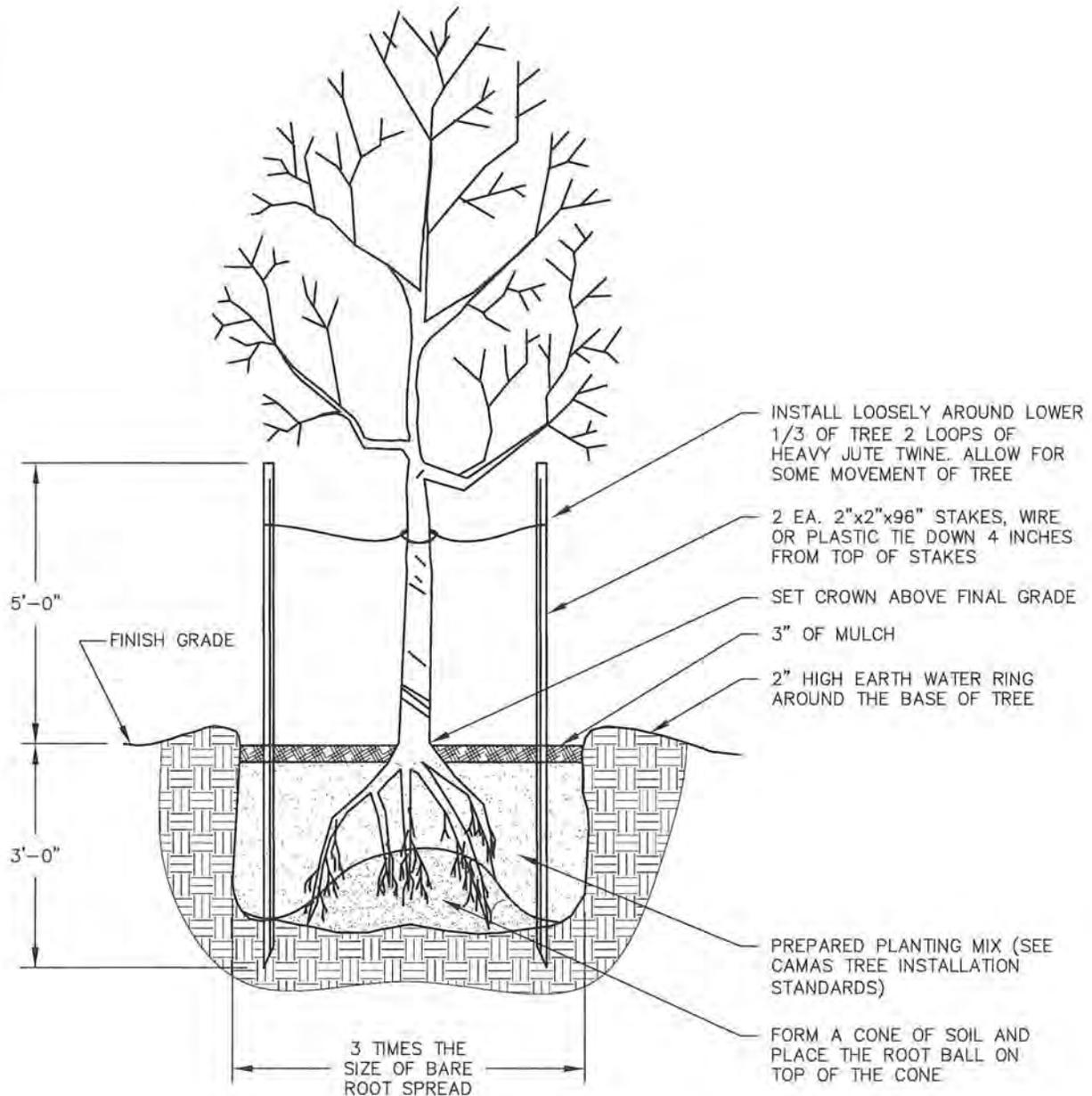
Joe E. Coe 4-26-16
 DATE

DETAIL APPROVED BY

NOT TO SCALE

DETAIL NO.

PL2



NOTES:

1. A ROOT BARRIER SHOULD BE INSTALLED AT THE EDGE OF PAVEMENT OR 4 FEET WIDE AND 6 FEET LONG RECTANGLE AROUND THE TREE. SEE DETAILS PL7, PL8 & PL9
2. BACKFILL MIX SHALL CONSIST OF THE FOLLOWING: 0.75 PART TOPSOIL, 0.25 PART APPROVED HUMUS MATERIAL, SOIL AMENDMENTS/FERTILIZERS AS PER SOIL ANALYSIS (TO BE PERFORMED BEFORE PLANTING TREES).

REV. NO.	DATE	BY	APPR.
1	10/21/14	SCD	JC



CITY OF CAMAS ~ STREET DETAIL

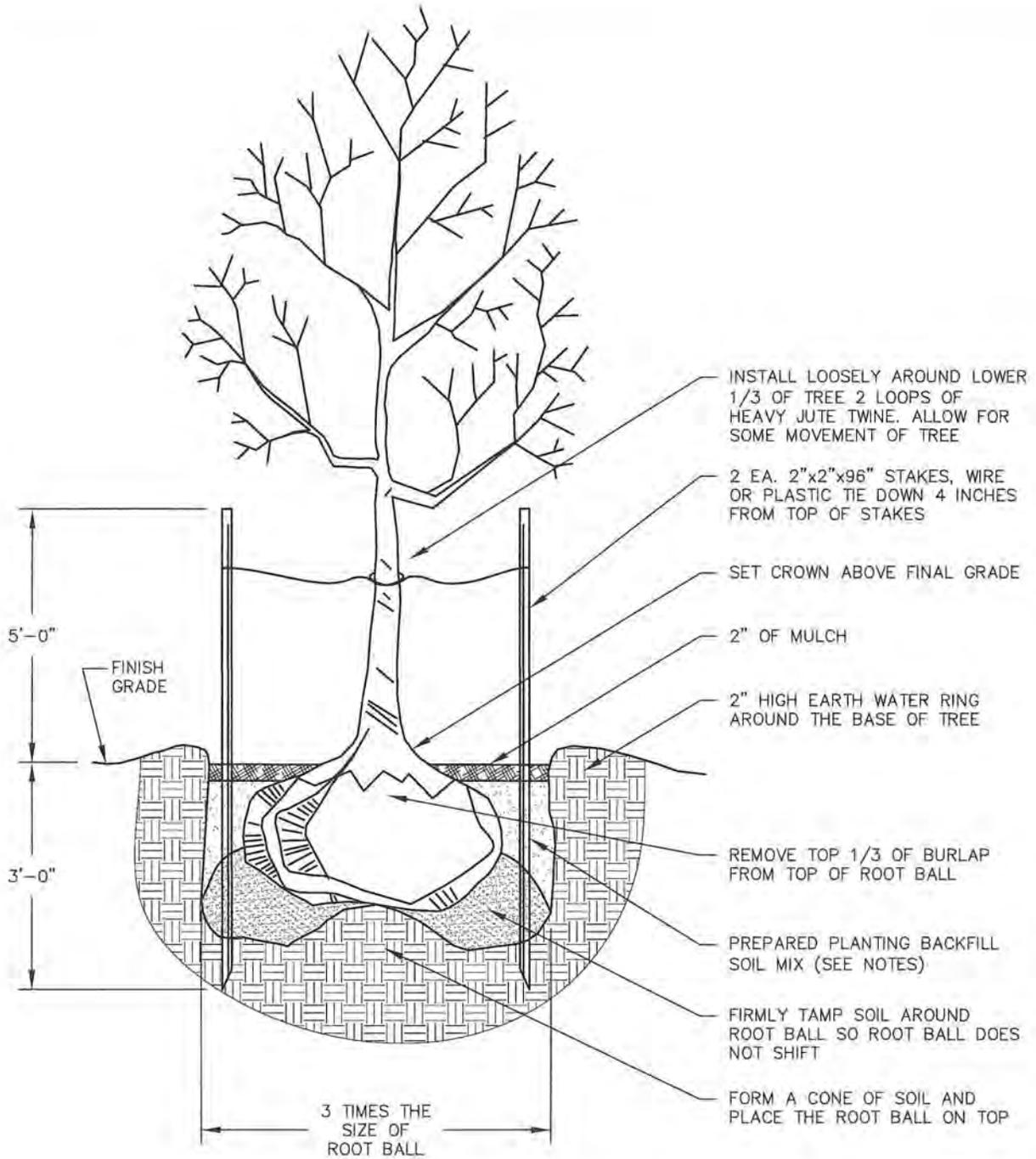
BARE ROOT PLANTING

Jan P. Carver 10-21-14
 DETAIL APPROVED BY DATE

DETAIL NO.

PL3

NOT TO SCALE



NOTES:

1. A ROOT BARRIER SHOULD BE INSTALLED AT THE EDGE OF PAVEMENT OR 4 FEET WIDE AND 6 FEET WIDE RECTANGLE AROUND THE TREE. SEE DETAILS PL7, PL8 & PL9
2. BACKFILL MIX SHALL CONSIST OF THE FOLLOWING: 0.75 PART TOPSOIL, 0.25 PART APPROVED HUMUS MATERIAL, SOIL AMENDMENTS/FERTILIZERS AS PER SOIL ANALYSIS (TO BE PERFORMED BEFORE PLANTING TREES).

REV. NO.	DATE	BY	APPR.
1	10/21/14	SCD	JC



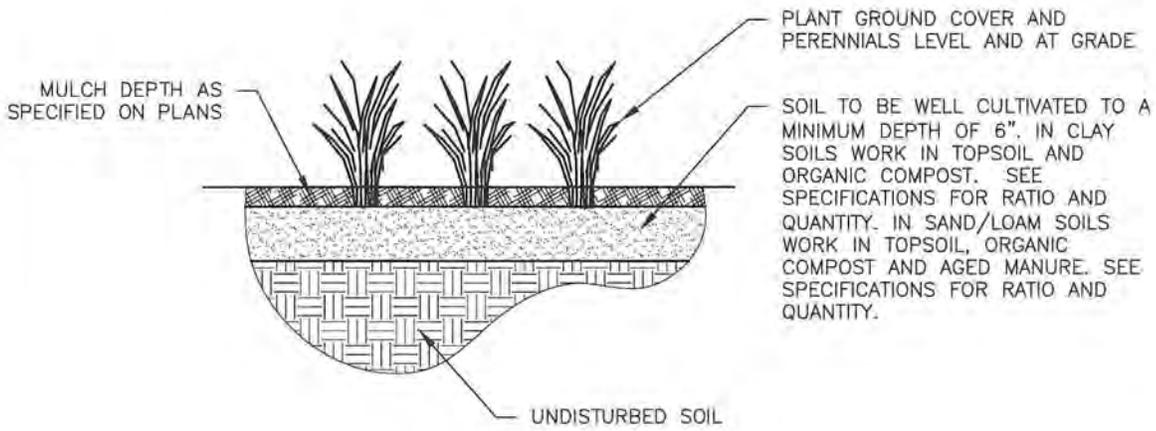
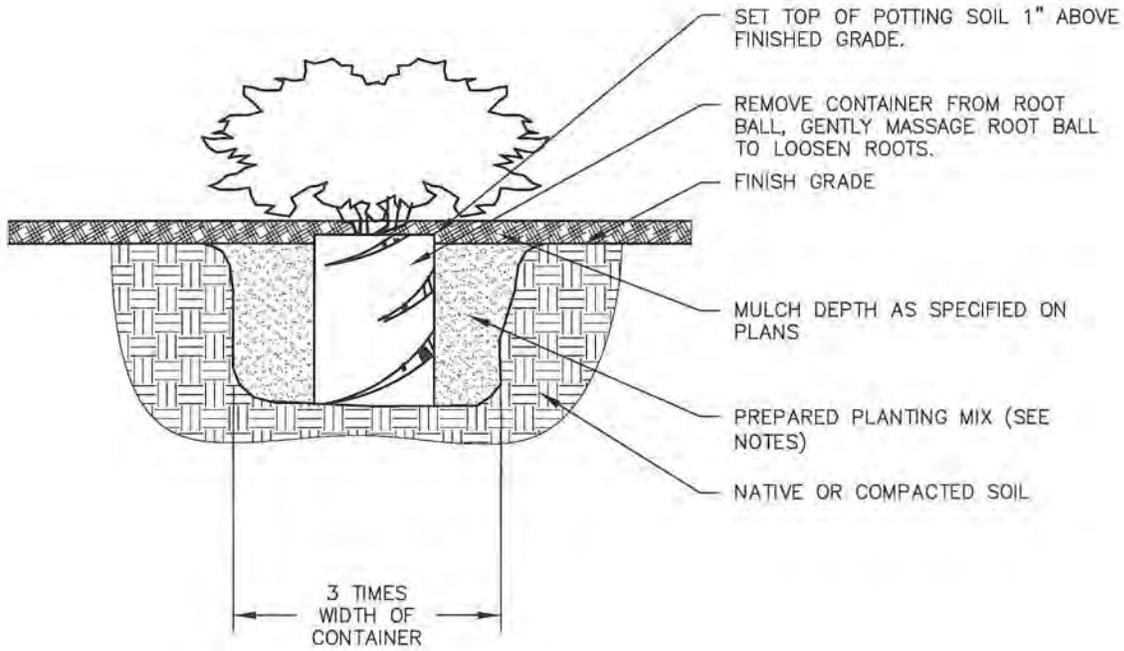
CITY OF CAMAS ~ STREET DETAIL
 DECIDUOUS BALLED/BURLAP TREE PLANTING

Jan P. Crockett 10-21-14
 DETAIL APPROVED BY DATE

NOT TO SCALE

DETAIL NO.

PL4



- NOTES:**
1. SCARIFY BOTTOM AND SIDES OF HOLE PRIOR TO PLANTING.
 2. KEEP PLANTS MOIST AND SHADED UNTIL PLANTING.
 3. BACKFILL MIX SHALL CONSIST OF THE FOLLOWING: 0.75 PART TOPSOIL, 0.25 PART APPROVED HUMUS MATERIAL, SOIL AMENDMENTS/FERTILIZERS AS PER SOIL ANALYSIS (TO BE PERFORMED BEFORE PLANTING).

REV. NO.	DATE	BY	APPR.
1	10/21/14	SCD	JC

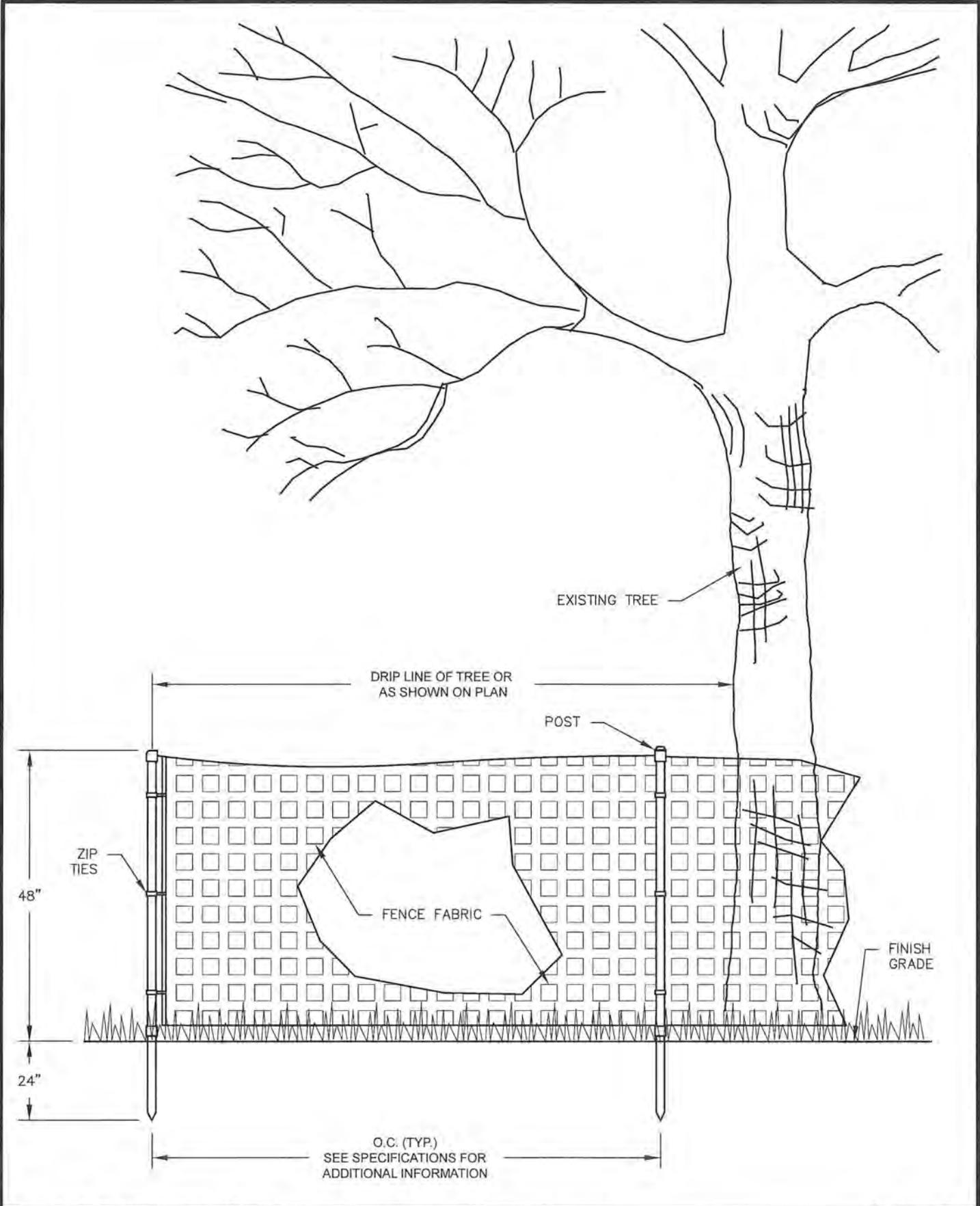


CITY OF CAMAS ~ STREET DETAIL
SHRUB CONTAINER PLANTING

Jan E. Christen 10-21-14
 DETAIL APPROVED BY DATE

NOT TO SCALE

DETAIL NO.
 PL5



REV. NO.	DATE	BY	APPR.
1	10/21/14	SCD	JC

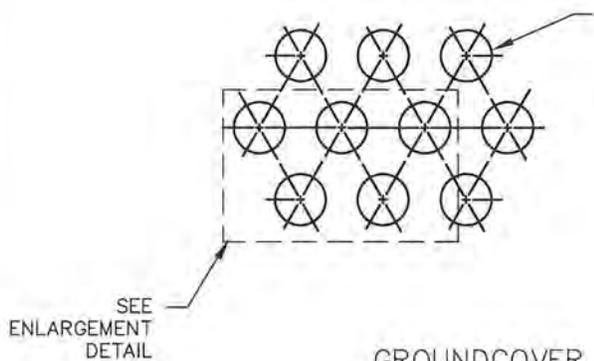


CITY OF CAMAS ~ STREET DETAIL
 TREE PROTECTION FENCE DETAIL
Jan P. Crockett 10-21-14
 DETAIL APPROVED BY DATE

DETAIL NO.
 PL6

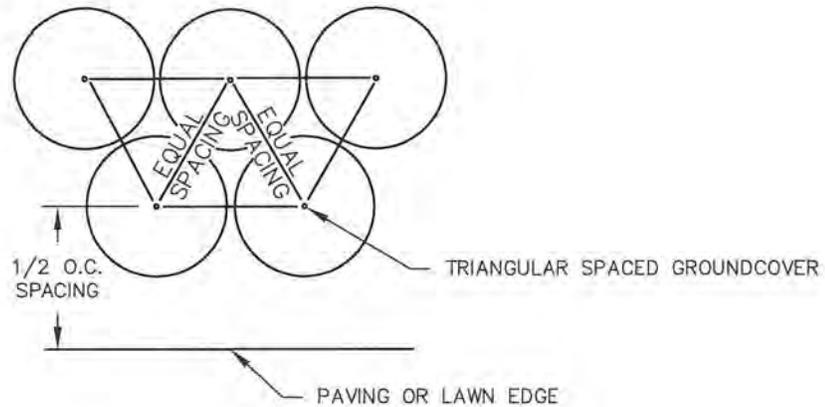
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ST-PLANTING.DWG



1. ALL GROUNDCOVER SHALL BE PLANTED AT EQUAL TRIANGULAR SPACING OR ON CENTER SPACING AS SPECIFIED ON PLANTING PLAN.
2. LOCATE GROUNDCOVER ONE HALF OF SPECIFIED SPACING DISTANCE FROM ANY CURB, SIDEWALK, OR OTHER HARD SURFACE, UNLESS OTHERWISE SPECIFIED.

GROUNDCOVER PLANTING DETAIL



ENLARGEMENT DETAIL:
TRIANGULAR SPACING

REV. NO.	DATE	BY	APPR.
1	10/21/14	SCD	JC



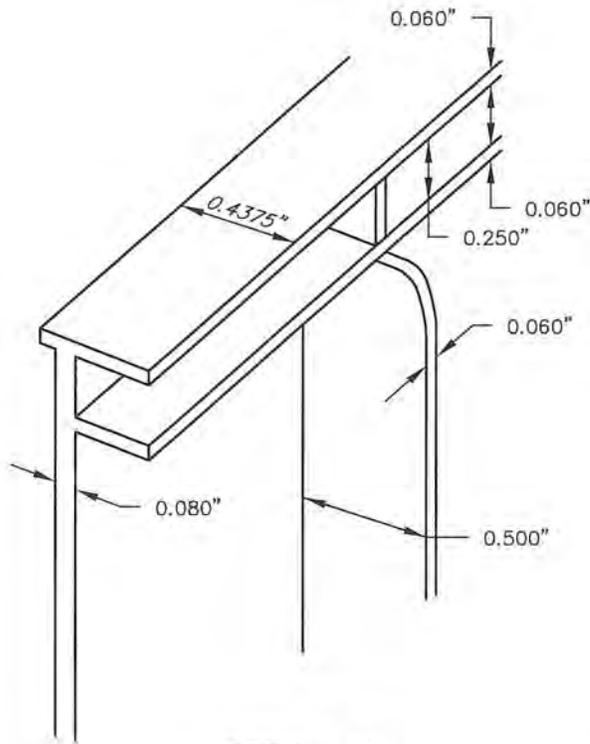
CITY OF CAMAS ~ STREET DETAIL
GROUNDCOVER PLANTING DETAIL

Jan P. Christian 10-21-14
DETAIL APPROVED BY DATE

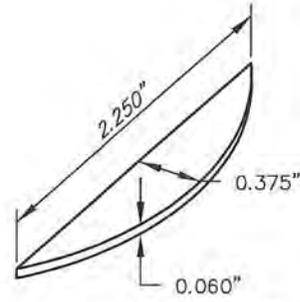
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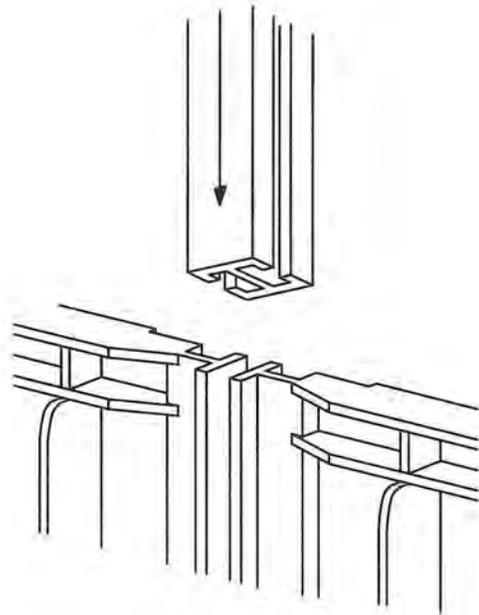
PL7



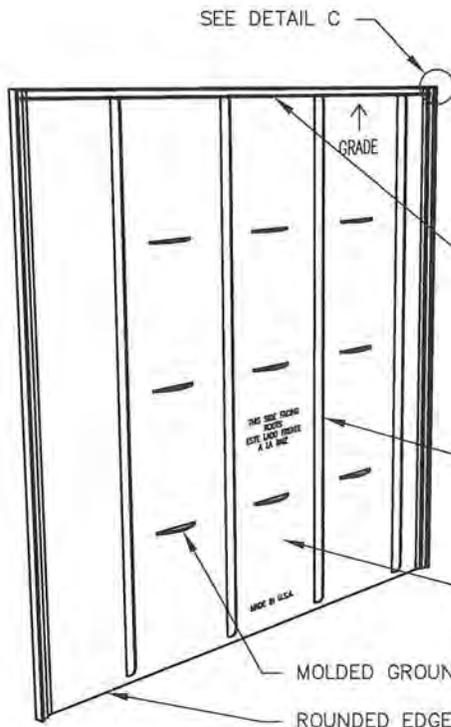
DETAIL A



DETAIL B



DETAIL C



DOUBLE TOP EDGE FOR PREVENTION OF ROOT OVER GROWTH, EXTRA STRENGTH AND ULTRAVIOLET PROTECTION - SEE DETAIL A

90° ROOT DEFLECTING RIBS INTEGRAL PART OF PANEL

PANEL 0.080" (2.03mm) THICK POLYPROPYLENE

MOLDED GROUND LOCKING ANTI-LIFT TABS - SEE DETAIL B

ROUNDED EDGES FOR SAFETY AND STRENGTH

NOTES:

1. SEE GENERAL NOTES AND INSTALLATION NOTES ON DETAIL PL8 AND PL9

REV. NO.	DATE	BY	APPR.
1	10/21/14	SCD	JC



CITY OF CAMAS ~ STREET DETAIL
ROOT BARRIER DETAIL

Jan E. Coarthen 10-21-14
 DETAIL APPROVED BY DATE

DETAIL NO.

PL8

NOT TO SCALE

ROOT BARRIER GENERAL NOTES:

1. SPECIFIED TREE ROOT BARRIERS ARE A MECHANICAL BARRIER AND ROOT DEFLECTOR TO PREVENT TREE ROOTS FROM DAMAGING HARDSCAPES AND LANDSCAPES. ASSEMBLED IN 2' LONG MODULES WITH RIGID JOINER STRIPS TO CREATE VARYING SIZES OF CYLINDERS FOR SURROUNDING ROOT BALLS (SURROUND PLANTING STYLE) OR FOR LINEAR APPLICATIONS DIRECTLY BESIDE A HARDSCAPE ADJACENT TO ONE SIDE OF THE TREES (LINEAR PLANTING STYLE).
2. DIMENSIONS ARE APPROXIMATE, SUBMIT SAMPLE FOR ENGINEERS APPROVAL PRIOR TO INSTALLATION.

A. MATERIALS

1. THE CONTRACTOR SHALL FURNISH AND INSTALL TREE ROOT BARRIERS AS SPECIFIED. THE TREE ROOT BARRIERS SHALL BE BLACK, INJECTION MOLDED PANELS, OF MINIMUM 0.080" WALL THICKNESS IN MODULES 24" LONG BY 18" DEEP; MANUFACTURED WITH A MINIMUM 50% POST CONSUMER RECYCLED POLYPROPYLENE PLASTIC WITH ADDED ULTRAVIOLET INHIBITORS; RECYCLABLE. EACH PANEL SHALL HAVE: NOT LESS THAN 4 MOLDED INTEGRAL VERTICAL ROOT DEFLECTING RIBS OF AT LEAST 0.06" THICKNESS PROTRUDING 1/2" AT 90° FROM INTERIOR OF THE BARRIER PANEL, SPACED 6" APART. (SEE PANEL DRAWING BELOW) A DOUBLE TOP EDGE CONSISTING OF TWO PARALLEL, INTEGRAL, HORIZONTAL RIBS AT THE TOP OF THE PANEL OF A MINIMUM 0.06" THICKNESS, 7/16" WIDE AND 1/4" APART WITH THE LOWER RIB ATTACHED TO THE VERTICAL ROOT DEFLECTING RIBS. (SEE DETAIL "A") A MINIMUM OF 9 ANTI-LIFT GROUND LOCK TABS CONSISTING OF INTEGRAL HORIZONTAL RIDGES OF A MINIMUM 0.06" THICKNESS IN THE SHAPE OF A SEGMENT OF A CIRCLE, THE 2 1/4" CHORD OF THE SEGMENT JOINING THE PANEL WALL AND THE SEGMENT, PROTRUDING 3/8" FROM THE PANEL. THE NINE GROUND LOCKS ON EACH PANEL SHALL BE ABOUT EQUALLY SPACED BETWEEN EACH OF THE VERTICAL ROOT DEFLECTING RIBS (3 BETWEEN EACH SET OF RIBS, SEE DETAIL "B"). A SELF LOCKING RIGID JOINER STRIP TO CONNECT ONE PANEL TO ANOTHER WITH A SEPARATION STRESS TEST OF 1000 POUNDS AT THE MOMENT OF SEPARATION. (SEE DETAIL "C"). TREE ROOT BARRIERS SHALL BE BY DEEPROOT OR APPROVED EQUAL.
2. THE BASIC PROPERTIES OF THE MATERIAL SHALL BE:

TEST	ASTM TEST METHOD	VALUE COPOLYMER POLYPROPYLENE
TENSILE STRESS AT YIELD	D638	3800 PSI
ELONGATION AT YIELD	D638	6.3%
FLEXURAL MODULUS	D790B	155,000 PSI
NOTCHED IZOD IMPACT	D256A	7.1
ROCKWELL HARDNESS R. SCALE	D785A	68

B. CONSTRUCTION AND INSTALLATION

1. THE CONTRACTOR SHALL INSTALL THE TREE ROOT BARRIERS WITH THE NUMBER OF PANELS AND IN THE MANNER SHOWN ON THE DRAWINGS. THE VERTICAL ROOT DEFLECTING RIBS SHALL BE FACING INWARDS TO THE ROOT BALL AND THE TOP OF THE DOUBLE EDGE SHALL BE 1/2" ABOVE GRADE. EACH OF THE REQUIRED NUMBER OF PANELS SHALL BE CONNECTED WITH THE RIGID JOINER STRIPS TO FORM A CIRCLE AROUND THE ROOT BALL OR WHERE SPECIFIED JOINED IN A LINEAR FASHION AND PLACED ALONG THE ADJACENT HARDSCAPE.
2. EXCAVATION AND SOIL PREPARATION SHALL CONFORM TO THE DRAWINGS.
3. THE TREE ROOT BARRIERS SHALL BE BACKFILLED ON THE OUTSIDE WITH 3/4" TO 1 1/2" GRAVEL OR CRUSHED ROCK AS SHOWN ON THE DRAWINGS. NO GRAVEL BACKFILL IS REQUIRED FOR A LINEAR PLANTING.

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1	10/21/14	SCD	JC



CITY OF CAMAS ~ STREET DETAIL

ROOT BARRIER GENERAL NOTES

Jan P. Matthews 10-21-14
 DETAIL APPROVED BY DATE

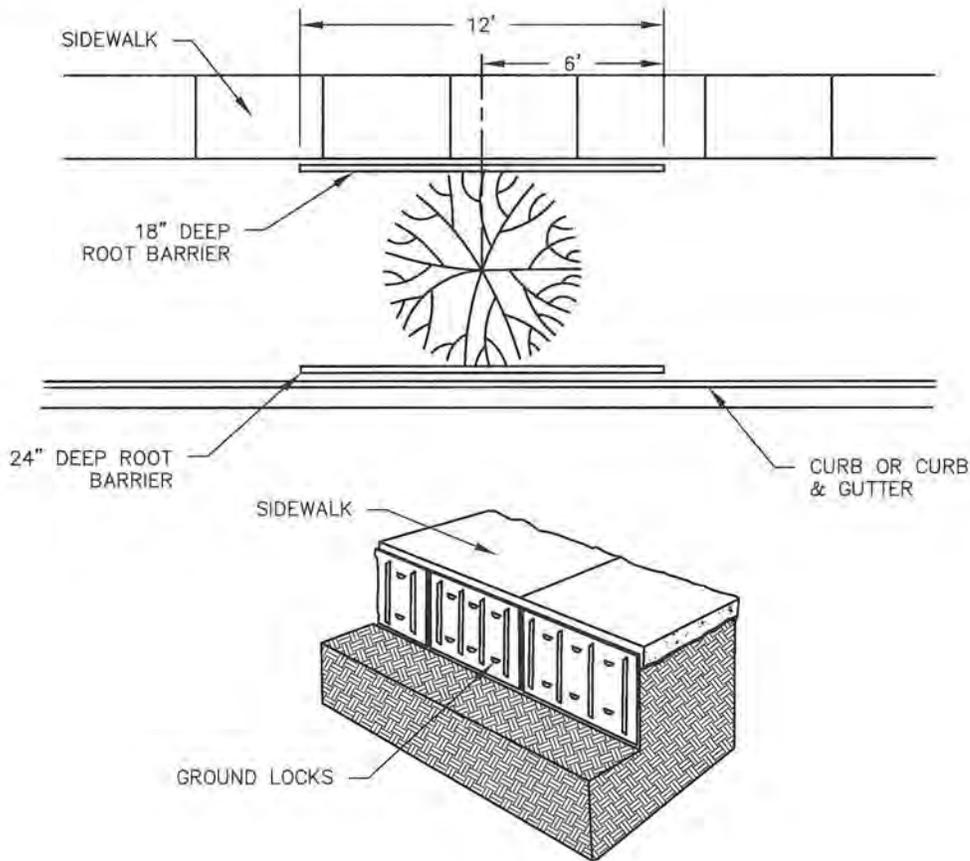
DETAIL NO.

PL9

NOT TO SCALE

NOTES:

1. DETERMINE THE CORRECT NUMBER OF PANELS TO BE USED. DEPENDING UPON THE ACTUAL PLANTING PLAN AND THE NUMBER OF TREES INVOLVED THE LENGTH OF LINEAR BARRIER WILL VARY, BUT AS A GENERAL RULE OF THUMB TAKE THE ANTICIPATED MATURE CANOPY DIAMETER OF THE TREE AND ADD 2 FEET (61CM). THIS WILL BE THE NUMBER OF FEET NECESSARY FOR A LINEAR STYLE PLANTING APPLICATION. (SEE CHART BELOW.)
2. CHOOSE THE BARRIER THAT BEST SUITS THE APPLICATION. GENERALLY IF A SIDEWALK, PATIO OR DRIVEWAY IS TO BE PROTECTED, 18" IS SUFFICIENT DEPTH, WITH 12" AS AN ALTERNATE CHOICE FOR NON-AGGRESSIVE, DEEPER ROOTING TREES. HOWEVER FOR CURB AND GUTTER PROTECTION OR MORE AGGRESSIVE ROOTS 24" IS GENERALLY THE BETTER CHOICE.
3. DIG THE TRENCH TO THE DEPTH BASED UPON THE PARTICULAR BARRIER CHOSEN.
4. INSTALL THE BARRIER. WHEN USING DEEP ROOT LINEAR BARRIERS SIMPLY PULL THE APPROPRIATE NUMBER OF PANELS OUT OF THE BOX (THEY COME PRE-ASSEMBLED) AND SEPARATE THE JOINER AT THE CORRECT LENGTH. WHEN INSTALLING DEEP ROOT UNIVERSAL BARRIERS IN A LINEAR FASHION YOU WILL NEED TO JOIN THE APPROPRIATE NUMBER OF PANELS TOGETHER.
5. NEXT PLACE THE BARRIER IN THE TRENCH WITH THE VERTICAL RIBS FACING TOWARD THE TREE AND ALIGN IN A STRAIGHT FASHION. IT IS HELPFUL TO PLACE THE BARRIER AGAINST THE HARDSCAPE. USE THE HARDSCAPE AS A GUIDE AND BACKFILL AGAINST THE BARRIERS TO PROMOTE A CLEAN SMOOTH FIT TO THE HARDSCAPE. BE SURE TO KEEP THE BARRIER'S DOUBLE TOP EDGE AT LEAST 1/2" ABOVE GRADE TO ENSURE ROOTS DO NOT GROW OVER THE TOP.
6. PLANT THE TREE(S). THE LINEAR STYLE OFFERS A MORE EXPANSIVE ROOTING GROWTH AREA, HOWEVER ADVERSE SOIL AND DRAINAGE CONDITIONS MAY EXIST IN THE ACTUAL PLANTING AREA. TAKE STEPS TO ENSURE HEALTHY GROWTH OF THE TREE AT PLANTING. CONSULT WITH A LOCAL ARBORIST FOR PLANTING TIPS AND RECOMMENDATIONS.



REV. NO.	DATE	BY	APPR.
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**CITY OF CAMAS ~ STREET DETAIL
ROOT BARRIER INSTALLATION**

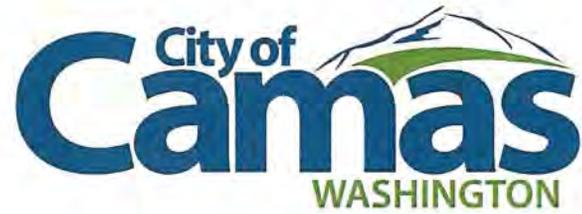
Jan P. [Signature] 10-21-14
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DETAIL NO.

PL10

NOT TO SCALE

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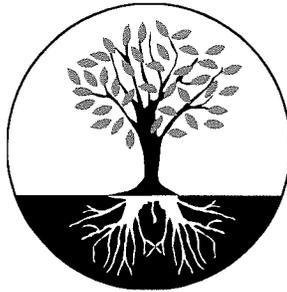
Plant Materials for Rights-of-Way

City of Camas
616 NE Fourth Avenue
P.O. Box 1055
Camas, WA 98607
www.cityofcamas.us

Phone: (360) 834-6864
Fax: (360) 834-1535

Creation Date: 10/28/02
Revision Date: 10/21/14 (Partial)

CITY OF CAMAS PLANT MATERIALS FOR CITY RIGHT-OF-WAYS



Approved: October, 2002
Effective: October, 2002
Revised: October 2014

These guidelines and details have been compiled to help a development plant appropriately and successfully in the Rights of Way. Size of planting area, microclimate, aesthetics, visibility, safety, and compatibility of trees, shrubs, and ground cover should be considered when selecting plants. Substitute varieties are subject to approval by the City of Camas. Submit a “characteristic” card from a nursery including information on mature height, spread, and root system (deep or shallow) when requesting a substitute. For additional landscaping requirements, see Camas Municipal Code, Title 18, Chapter 18.13 Landscaping.

**Trees for Narrow Spaces such as Parking Strips or Exterior Fencescapes
(Plant 15'-25' apart, compatible with mature tree size)
Typical size at time of planting: 2" minimum caliper (B&B or container)**

Common Name Deciduous (D) or Evergreen (E)	Botanical Name	Height	Spread	Characteristics
Armstrong Maple	<i>Acer rubrum</i> 'Armstrong'	45'	15'	Tall. Narrow. Fast growing.
Bowhall Red Maple	<i>Acer rubrum</i> 'Bowhall'	40'	15'	Upright. Sturdy. Good fall color.
Columnar Ginkgo	<i>Ginkgo biloba</i> 'Princeton Sentry'	40'	15'	Upright. Narrow. Bright yellow fall color.
Columnar Norway Maple	<i>Acer platanoides</i> 'Columnare'	35'	15'	Ideal "Street Tree". Yellow fall color.
Corinthian Linden (Little Leaf Linden)	<i>Tilia cordata</i> 'Corzam', 'DeGroot', 'Chancelor'	45'	15'	Small, thick, dark green leaves. Delicate appearance.
Crimson Sentry Norway Maple	<i>Acer platanoides</i> 'Crimson Sentry'	25'	10'	Upright tree. Maroon to reddish-bronze fall color.
Edith Boque Magnolia	<i>Magnolia grandiflora</i> 'Edith Boque'	30'	15'	Pyramidal Form. Stands up well to snow and ice.
Flowering Pear, Capital	<i>Pyrus calleryana</i> 'Capital'	35'	12'	White flower cluster. Glossy foliage.
Flowering Pear, (Chanticleer, Redspire, Whitehouse)	<i>Pyrus calleryana</i> ('Chanticleer', 'Redspire', 'Whitehouse')	40'	15'	Good "Street Tree". Disease resistant.
Frans Fontaine Hornbeam	<i>Carpinus betulus</i> 'Frans Fontaine'	35'	15'	Narrow. Columnar.
Hogan Red Cedar	<i>Thuja plicata</i> 'Fastigiata'	40'	15'	Dense. Narrow. Erect. Good tall screen.
Ivory silk Tree Lilac	<i>Syringa reticulata</i> 'Ivory Silk'	20'	15'	Creamy panicles. Upright.
Japanese Flowering Cherry	<i>Prunus serrulata</i> , 'Amaogawa'	20'-25'	8'	Good columnar tree. Semi-double pink flowers in midseason.
Japanese Umbrella Pine	<i>Sciadopitys verticillata</i>	40'	15'	Decorative. Striking. Fleshy needles.
Skyrocket Oak	<i>Quercus robur</i> 'Fastigiata'	45'	15'	Narrow. Uniform.
Slender Hinoki Cypress	<i>Chamaecyparis obtusa</i> 'Gracillis'	20'	5'	Slender, somewhat weeping form. Soft. Dense.
Weeping Alaska Cedar	<i>Chamaecyparis nootkatensis</i> 'Pendula'	30'	10'	Slow growing. Blue-green foliage.

For additional narrow trees, see the "Trees for R.O.W.'s Under Utility Wires" section.

**Small Trees – Suitable for R.O.W.'s Under Utility Wires
(Plant 20'-30' apart, compatible with mature tree size)
Typical size at time of planting: 2" minimum caliper (B&B or container)**

Common Name Deciduous (D) or Evergreen (E)	Botanical Name	Height	Spread	Characteristics
American Hornbeam	<i>Carpinus caroliniana</i>	25'	20'	Outstanding fall colors.
Amur Maackia	<i>Maackia amurensis</i>	25'	20'	Hardy. Vase shaped. Does well in poor soils.
Big Cis Plum	<i>Prunus x cistena</i> 'Schmidtciis	14'	12'	Purple leaves. Pink fragrant flowers.
Birch Bark Cherry	<i>Prunus serrula</i>	30'	30'	Small white flowers. Midseason blooms.
Fragrant Snowbell	<i>Styrax obassia</i>	20'-30'	15'	Fragrant, drooping white flowers in June. Non-aggressive roots. Needs water.
Japanese Flowering Cherry	<i>Prunus serrulata</i> , 'Shirofugen'	25'	25'	Double long-stalked pink flowers. Late blooming.
Japanese Flowering Cherry	<i>Prunus serrulata</i> , 'Shirotae' (Mt. Fuji)	20'	25'	Semi-double pink to white to purple flowers. Early blooming.
Japanese Maple	<i>Acer palmatum</i>	20'	24'	Small. Beautiful fall colors.
Leprechaun Ash	<i>Fraxinus pennsylvanica</i> 'Johnson'	18'	16'	Dense. Compact.
Paperbark Maple	<i>Acer griseum</i>	25'	20'	Peeling bark. Showy samaras. Bright red fall colors.
Spanish fir	<i>Abies pinsapo</i> 'Glauca'	25'	15'	Dense. Symmetrical. Striking.

For additional small trees, see the "Trees for Narrow Spaces" section.

**Medium to Large Size Trees (Not for under or adjacent to overhead utility lines)
(Plant 30'-50' apart, compatible with mature tree size)**

Typical size at time of planting: 2" minimum caliper (B&B or container)

Common Name Deciduous (D) or Evergreen (E)	Botanical Name	Height	Spread	Characteristics
American Hophornbeam	<i>Ostrya virginiana</i>	35'	25'	Adaptable to many soils conditions.
Austrian Black Pine	<i>Pinus nigra</i>	40'	25'	Dense. Regular whorls. Hardy.
Chancellor Linden	<i>Tilia cordata</i> 'Chancole'	35'	20'	Good street tree.
Eastern Redbud	<i>Cercis canadensis</i>	25'-35'	30'	Pink flowers in spring. Good fall color.
Fairmount Ginkgo	<i>Ginkgo biloba</i> 'Fairmount'	45'	35'	Graceful. Hardy. Golden fall color. Slow growth.
Glenleven Linden	<i>Tilia cordata</i> 'Glenleven'	45'	30'	Hardy. Open form.
Halka Zelkova	<i>Zelkova serrata</i> 'Halka'	50'	30'	Elm shaped.
Olympic Linden	<i>Tilia cordata</i> 'Olympic'	40'	30'	Hardy. Less formal growth.
Pacific Sunset Maple	<i>Acer truncatum</i> 'Pacific Sunset'	30'	25'	Upright. Spreading. Yellow- orange to bright red fall color.
Palo Alto Sweetgum	<i>Liquidambar styraciflua</i> 'Palo Alto'	45'	25'	Gorgeous fall colors. Narrow. Pyramidal.
Parkway Norway Maple	<i>Acer platanoides</i> 'Columnarbroad'	40'	25'	Healthy "street trees". Disease resistant.
Persian Parrotia	<i>Parrotia persica</i>	30'	20'	Interesting red stamens. Dramatic color changes in the fall.
Red Sunset Maple	<i>Acer rubrum</i> 'Franksred'	45'	35'	Hardy. Red. Upright.
Scotch Pine	<i>Pinus sylvestris</i>	70'	35'	Reddish bark. Bluish needles.
September Golden Rain Tree	<i>Koelreuteria paniculata</i> 'September'	30'	30'	Showy flowers. Adapts to many adverse conditions.
Shore Pine	<i>Pinus contorta</i>	30'	24'	Compact. Pyramidal.
Skyline Honey Locust	<i>Gleditsia triacanthos</i> 'Skyline'	45'	35'	Tolerates city conditions.
Stewartia	<i>Stewartia sinensis</i>	25'	15'-20'	Distinctive branch pattern. White flowers. Good fall color.
Tulip Poplar	<i>Liriodendron tulipifera</i>	60'	30'	Yellow/green leaves. Columnar growth.

Small to Medium Size Shrubs
(Plant according to spread of mature plant)
Typical size at time of planting: 1) 2 gallon (small), 5 gallon (medium) or 2) 18" B&B

Common Name	Botanical Name	Height	Spread	Characteristics
Andromeda or Lily of the Valley Shrub	<i>Pieris japonica</i> 'Forest Flame'	8'	6'	Bright red spring foliage. Profuse white flowers.
Bird's Nest Spruce	<i>Picea abies</i> 'Nidiformis'	3'	6'	Very compact. Good bonsai subject.
Compact Oregon Grape	<i>Mahonia aquifolium</i> 'Compacta'	2'	2+'	Hardy. Erect. Uniform, prickly leaves.
David Viburnum	<i>Viburnum davidii</i>	1'-3'	3'-4'	Deeply veined, glossy leaves. Metallic, dark blue fruits.
Delavay Osmanthus	<i>Osmanthus delavayi</i>	4'-6'	6'-8'	Evergreen. White, fragrant flower clusters March to May.
Dwarf Burning Bush	<i>Euonymus alata</i> 'Compacta'	4'-6'	4-6'	Vibrant red fall color. Nice background plant.
Dwarf Golden Hinoki	<i>Chamaecyparis obtusa</i> 'Nana Aurea'	4'	3'	New growth is yellow. Mature leaves are dark green.
Dwarf Hinoki Cypress	<i>Chamaecyparis obtusa</i> 'Nana'	3'	2'	Nice foreground plant. Graceful.
Evergreen Variegated Euonymous	<i>Euonymus japonica</i> 'Aurea Variegata'	8'	6'	Leaves have brilliant yellow blotch w/green edges.
Golden Thread Cypress	<i>Chamaecyparis pisifera</i> 'Filifera Aurea'	To 8'	6'	Loose mound. Prune to keep in bounds.
Heavenly Bamboo	<i>Nandina domestica</i> ('Moyers Red' or 'Umpqua Chief')	6'-8'	3'	Excellent fall color. Bamboolike foliage. Not invasive.
Jackman's Cinquefoil	<i>Potentilla fruticosa</i> 'Jackman's'	4'	4+'	Bright yellow flowers.
Japanese Holly	<i>Ilex crenata</i> 'Compacta'	2'-3'	2'-3'	Neat. Hardy. Dense.
Mugho Pine	<i>Pinus mugo mugo</i>	4'	3'	Low growing. Dense. Hardy.
Otto Luyken Laurel	<i>Prunus laurocerasus</i> 'Otto Luyken'	5'	4'	Hardy, neat, white flowers in clusters in summer.
Rose Glow Barberry	<i>Berberis thunbergii</i> 'Rose Glow'	4'	4'	Rosy-bronze. Does best in full sun
Sargent Weeping Hemlock	<i>Tsuga canadensis</i> 'Pendula'	2'-3'	4'-6'	Graceful addition to landscape.
Spanish Bayonet	<i>Yucca aloifolia</i>	10'	5'	Good barrier plant. Showy, creamy white flower clusters.
Warty Barberry	<i>Berberis verruculosa</i>	3'-4'	3'-4'	Neat, tailored shrub. Good on banks

Accent Shrubs
(Plant according to spread of mature plant)
Typical size at time of planting: 1) 5 gallon or 2) 18" B&B

Common Name	Botanical Name	Height	Spread	Characteristics
Anthony Waterer Spiraea	Spiraea bumalda 'Anthony Waterer'	2'-3'	3'	Flowers from June to fall.
Blue Mist Shrub	Caryopteris incana	3-4'	4'	Lavender blue flowers from July to frost. Prune harshly for long bloom.
European Cranberry Bush	Viburnum opulus 'Compactum'	4'-5'	4'-5'	White flower clusters. Red fruit.
European Cranberry Bush	Viburnum opulus 'Nanum'	2'	2'	Can take poor, wet soils. No fruit or flowers. Good hedge.
Drooping Leucothoe	Leucothoe fontanesiana	2'-6'	2'-6'	Graceful arching branches. Drooping clusters of white flowers in spring.
Elfin King Strawberry Madrone	Arbutus unedo 'Elfin King'	5'	5'	Slow growth. Flowers and fruits almost constantly.
Firethorn	Pyracantha – various species	Varies	Varies	Evergreen. Bright berries. Creamy white fragrant flowers. Good espalier subjects.
Jean Marie Rhododendron	Rhododendron 'Jean Marie'	5'	5'	Bright scarlet flowers. Good foliage.
Karl Sax Forsythia	Forsythia intermedia 'Karl Sax'	7'	6'	Profuse, tawny yellow bloom from February to April.
Kerria	Kerria japonica 'Plentifolia'	8'	5'6'	Double yellow roselike flowers.
Marie's Doublefile Viburnum	Viburnum plicatum tomentosum 'Mariesii'	6'	12'	Flat flower clusters.
Mountain Laurel	Kalmia latifolia	6'-8'	6'-8'	Glossy, leather leaves. Pink flowers May – June.
Rose of Sharon	Hibiscus syriacus	10'	6'	Can be trained into small tree.

Ornamental Grasses (Not for use in biofiltration systems)
(Plant according to spread of mature plant)
Typical size at time of planting: 2 gallon

Common Name	Botanical Name	Height	Spread	Characteristics
Blue Oat Grass	Helictotrichon sempervirens	2'-3'	2'-3'	Bright blue-gray. Needs full sun, good drainage.
Eulalia Grass (varieties)	Miscanthus sinensis (varieties)	5'-6'	@4'	Graceful, interesting, clumping grasses. Can be weeping, variegated, banded, etc.
Fountain Grass	Pennisetum setaceum	4'	4'	Good in dry location. Full sun. Drought resistant.

Ground Covers
(Plant according to spread of mature plant)
Typical size at time of planting:

- 1) 4" pot (Ajuga, Rubus, Vinca)**
- 2) 1 gallon (Artostaphylos, Berberises, Pachysandra, Vinca)**
- 3) 2 gallon (Erica, Genista, Ilex, Juniperus)**

Common Name	Botanical Name	Height	Spread	Characteristics
Carpet Bugle	Ajuga reptans	6"	18"	Fast growing. Blue flowers on spikes. Good coverage.
Crimson Pygmy Barberry	Berberis thunbergii 'Crimson Pygmy'	1 ½'	2 ½'	Bronzy blood red. Does best in full sun.
Dwarf Spanish Broom	Genista pilosa	1'	7'	Fast growing. Prostrate. Evergreen. Profuse yellow flowers in May – June.
Heath	Erica carnea (varieties)	6"-16"	1'-3'	Often blooms when nothing else does.
Helleri Japanese Holly	Ilex crenata 'Helleri'	1'	2'	Polished small leaf evergreen. Very hardy. Sun or shade.
Japanese Spurge	Pachysandra terminalis	6"-10"	12"	Delicate looking. Nice transition between shrubs and lawn. Shade or sun.
Groundcover variety Juniper	Juniperus horizontalis	6"-14"	6'-10'	Many varieties and colors. Hardy and drought tolerant.
Kinnikinnick	Arctostaphylos uva-ursi	8"	15'	Flat growing. Evergreen. Needs pruning at least once a year.
Periwinkle	Vinca minor	1'	2'	Spreading. Nice blue, white, lavender or maroon flowers. Can be mowed once a year.
Pygmy Magellan Barberry	Berberis boxifolia 'Pygmaea'	1'	2'	Tough. Thorny.
Taiwan Creeper	Rubus calycinoides	3"-4"	1' per year	Makes spreading mat. White, strawberry-like flowers. Edible, salmon-colored berries.



Streetscape Standards

City of Camas
616 NE Fourth Avenue
P.O. Box 1055
Camas, WA 98607
www.cityofcamas.us

Phone: (360) 834-6864
Fax: (360) 834-1535

Creation Date: 10/21/14
Revision Date: 10/21/14

City of Camas Streetscape Standards Details ~ INDEX

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CONSTRUCTION NOTES:

1. DECORATIVE SIDEWALK SURFACE FINISHES, PATTERNS AND DIMENSIONS SHALL BE SUBJECT TO REVIEW AND APPROVAL PRIOR TO INSTALLATION.
2. SERPENTINE SIDEWALKS MAY REQUIRE THE ESTABLISHMENT OF EASEMENTS SHOULD THE SIDEWALK LEAVE THE PUBLIC RIGHT OF WAY.
3. SIDEWALKS SHALL BE PLACED ON A MINIMUM 2 INCHES OF COMPACTED GRANULAR MATERIAL AND SHALL BE CONSTRUCTED WITH A MINIMUM 3,000 PSI CONCRETE.
4. SIDEWALKS SHALL MEET ALL APPLICABLE AMERICANS WITH DISABILITIES ACT (ADA) REQUIREMENTS. THE PROJECT INSPECTOR SHALL BE ALLOWED TO INSPECT ALL FORMS FOR ADA CONFORMANCE PRIOR TO CONCRETE PLACEMENT.
5. ALL PLANTING MATERIALS SHALL BE CONSISTENT WITH THE CITY'S RIGHT OF WAY PLANT MATERIALS REQUIREMENTS.
6. ALL IRRIGATION SHALL MEET THE CITY'S IRRIGATION REQUIREMENTS.

REV. NO.	DATE	BY	APPR.
1	0/21/2014	SCD	JC



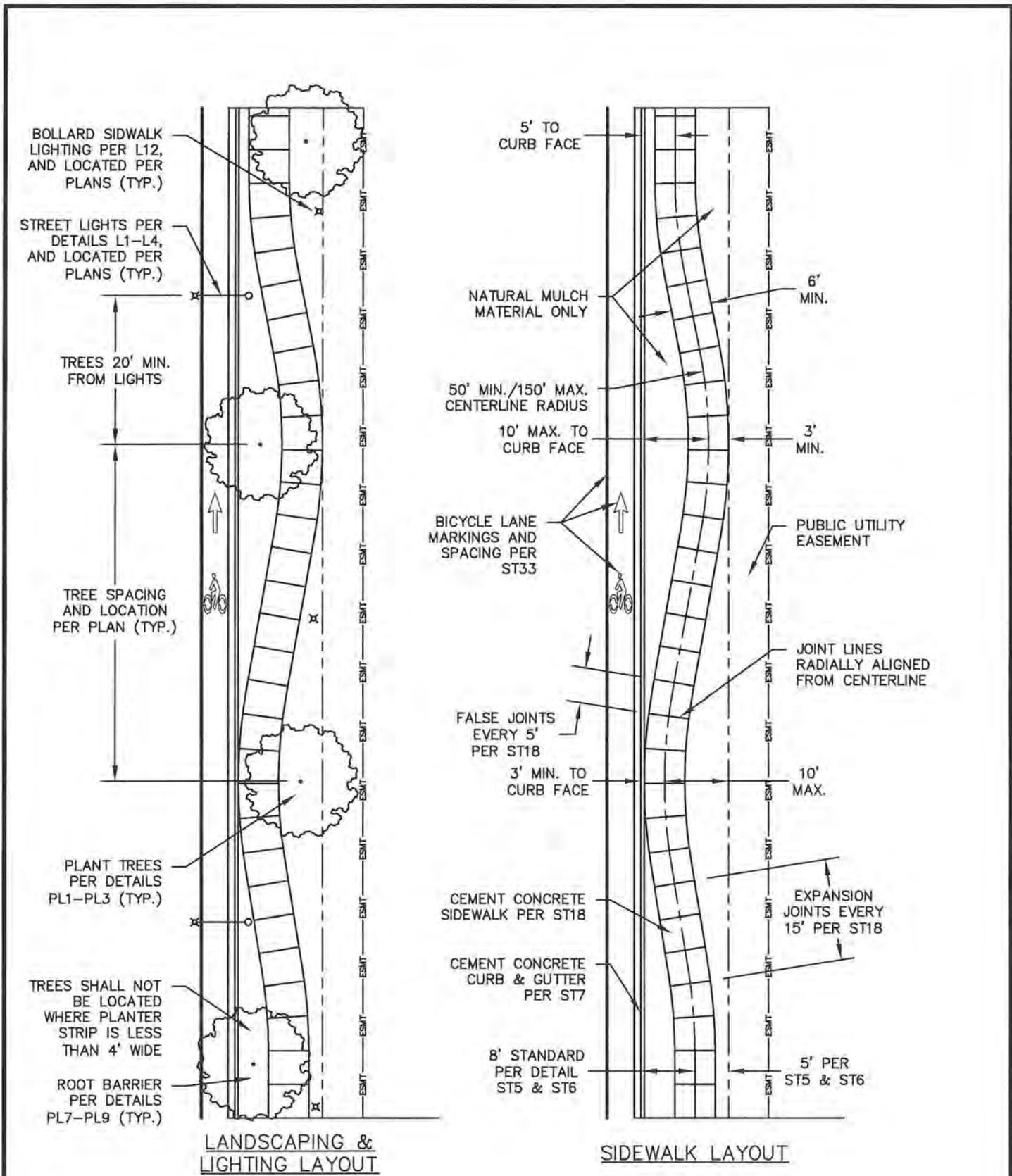
CITY OF CAMAS ~ STREET DETAIL
 SIDEWALK CONSTRUCTION NOTES

San P. Cavett 10-21-14
 DETAIL APPROVED BY DATE

DETAIL NO.

STS1

NOT TO SCALE



REV. NO.	DATE	BY	APPR.
1	0/21/2014	SCD	JC



CITY OF CAMAS ~ STREET DETAIL
 ARTERIAL/COLLECTOR SERPENTINE SIDEWALK

Jim P. Coates 10-21-14
 DETAIL APPROVED BY DATE

NOT TO SCALE

DETAIL NO.
 STS2

STS-SIDEWALKS.DWG

NOTES:

1. FENCING OR WALLS ARE REQUIRED ALONG ALL LIMITED ACCESS CORRIDORS.
2. FENCING OR WALLS SHALL NOT EXCEED 6 FEET IN HEIGHT AND SHALL NOT BE LOCATED WITHIN THE PUBLIC RIGHT OF WAY.
3. MAINTENANCE PROVISIONS FOR THE FENCING OR WALLS SHALL BE THE RESPONSIBILITY OF THE DEVELOPER OR HOME OWNERS ASSOCIATION.
4. THE DECORATIVE FENCING OR WALLS SHOWN IN THE FOLLOWING DETAILS ARE EXAMPLES OF THE MINIMUM ACCEPTABLE STYLES. ALTERNATIVE DESIGNS MAY BE SUBMITTED FOR REVIEW AND APPROVAL BY THE CITY.
5. SOUND WALL DESIGNS MAY BE PROPOSED AND ARE SUBJECT TO APPROVAL BY THE CITY ON A CASE BY CASE BASIS.
6. CHAINLINK FENCING SHALL BE PLACED AROUND ALL VISIBLE STORMWATER OR SANITARY SEWER PUMP STATION FACILITIES AND SHALL BE VINYL COATED BLACK OR GREEN IN COLOR.

REV. NO.	DATE	BY	APPR.
1	10/21/14	SCD	JC

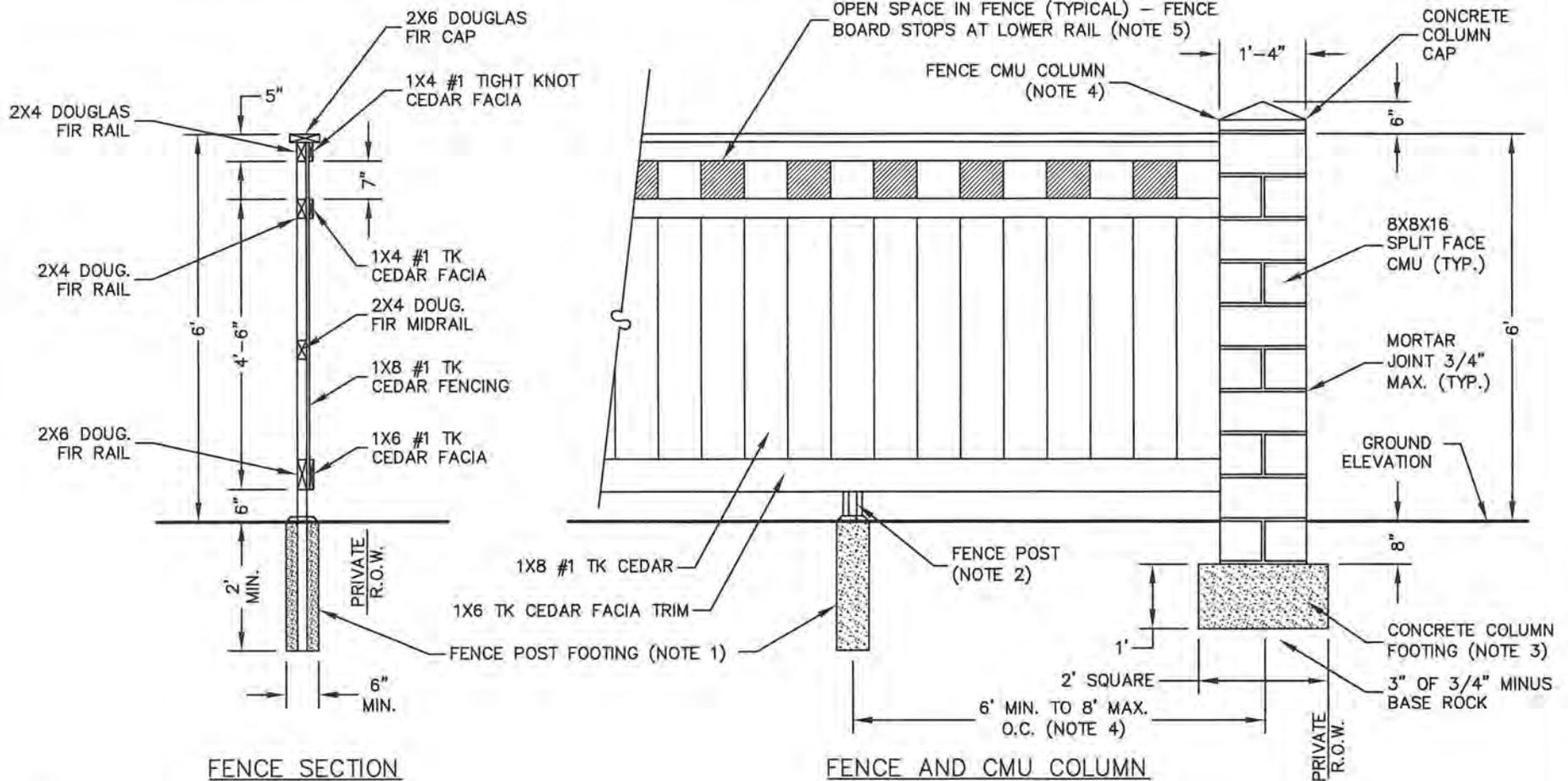


CITY OF CAMAS ~ STREET DETAIL
 FENCE AND WALL NOTES

Jan P. Coates 10-21-14
 DETAIL APPROVED BY DATE

NOT TO SCALE

DETAIL NO.
STS3



- NOTES:**
1. FENCE POST FOOTINGS SHALL BE MINIMUM 3000 PSI CEMENT CONCRETE. FOOTING TO EXTEND 1 INCH MINIMUM ABOVE FINISH GRADE AND BE SLOPED AWAY FROM POST. FENCE POST SPACING SHALL BE A MINIMUM OF 6 FEET AND MAXIMUM OF 8 FEET ON CENTER.
 2. FENCE POSTS SHALL BE POST MASTER GALVANIZED STEEL POSTS BY MASTER HALCO. ALTERNATIVE GALVANIZED STEEL POSTS SHALL BE SUBMITTED FOR APPROVAL BY THE CITY. FENCE SHALL BE INSTALLED SO THAT CEDAR FENCING IS FACING THE RIGHT-OF-WAY AND POSTS AND RAILS ARE ON THE OPPOSITE SIDE.
 3. CMU COLUMN FOOTINGS SHALL BE MINIMUM 3000 PSI CEMENT CONCRETE ON A 3" BASE OF 3/4" MINUS CRUSHED ROCK COMPACTED TO 95% T-180.
 4. CMU COLUMNS SHALL BE LOCATED AT EACH CORNER, EACH END OF FENCE, AND EVENLY SPACED IN THE FENCE RUN. CMU COLUMN SPACING SHALL BE A MAXIMUM OF 96 FEET O.C. OR AS APPROVED BY THE CITY TO ACHIEVE UNIFORM SPACING BETWEEN CORNERS.
 5. FENCE DESIGN SHOWN IS PREFERRED. ALTERNATIVE FENCE DESIGN SHALL BE SUBMITTED FOR APPROVAL BY THE CITY AND SHALL BE CONSISTENT THROUGHOUT THE LENGTH OF A CORRIDOR. FINISH SHALL BE A COLORED OR TINTED STAIN AS APPROVED BY THE CITY AND CONSISTENT WITH EXISTING FENCES ALONG THE CORRIDOR.
 6. FENCE BOARDS SHALL BE EXTENDED TO COVER POSTS - PLAN POST LOCATIONS SO AS TO AVOID OPEN SPACE LOCATIONS.
 7. FENCE RAILS SHALL BE ANCHORED TO CMU COLUMNS USING GALVANIZED STEEL BRACKETS AND FASTENED WITH MASONRY WALL ANCHORS.

REV. NO.	DATE	BY	APPR.
1	10/21/14	SCD	JC

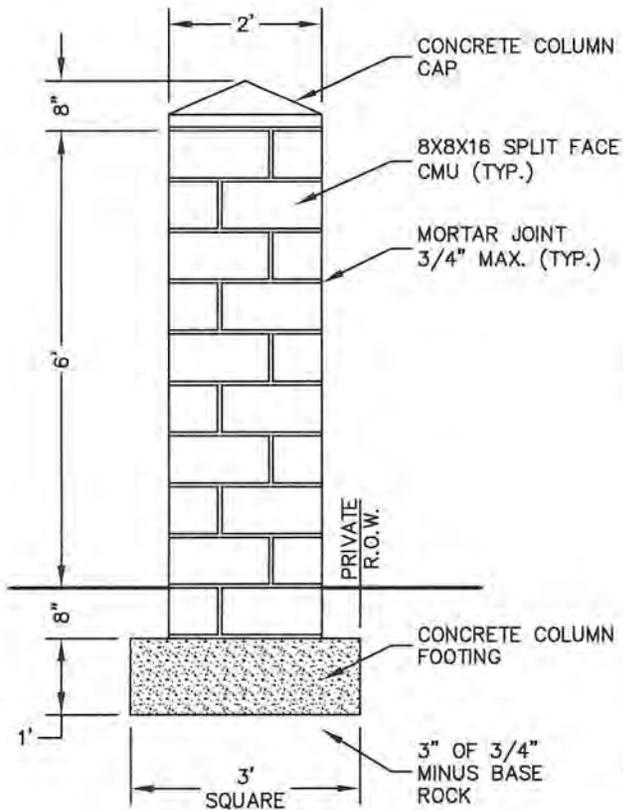


CITY OF CAMAS ~ STREET DETAIL
 COLLECTOR AND ARTERIAL FENCE AND CMU COLUMN

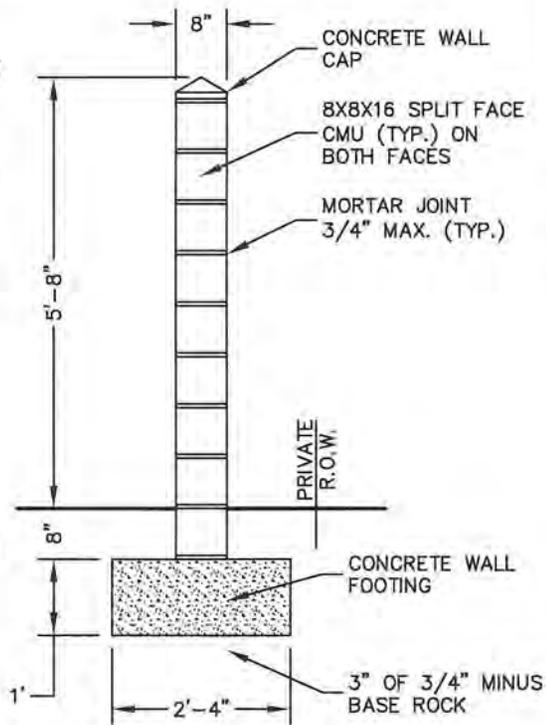
John P. Crutcher 10-21-14
 DETAIL APPROVED BY DATE

DETAIL NO.
 STS4

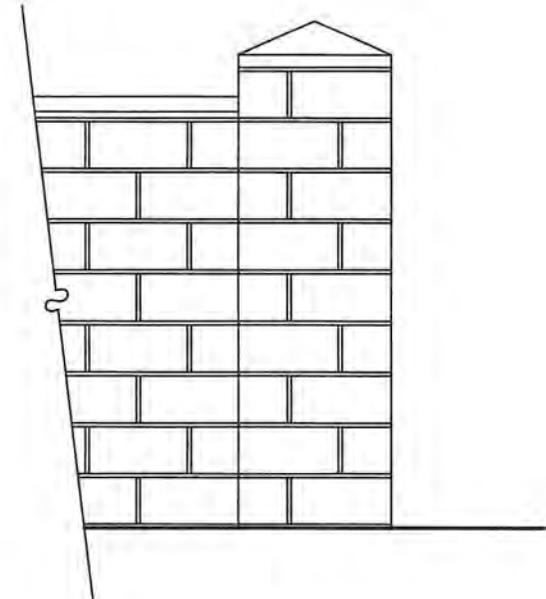
NOT TO SCALE



24" CMU COLUMN



CMU WALL SECTION



CMU WALL & 24" COLUMN

NOTES:

1. CMU FOOTINGS SHALL BE MINIMUM 3000 PSI CEMENT CONCRETE ON A 3" BASE OF 3/4" MINUS CRUSHED ROCK COMPACTED TO 95% T-180.
2. CMU WALLS, COLUMNS, AND THEIR FOOTINGS SHALL CONTAIN STRUCTURAL REBAR - DESIGN SUBMITTAL AND BUILDING PERMIT REQUIRED.
3. CMU COLUMNS SHALL BE LOCATED AT EACH CORNER, EACH END OF FENCE, AND EVENLY SPACED IN THE FENCE RUN. CMU COLUMN SPACING SHALL BE A MAXIMUM OF 96 FEET O.C. OR AS APPROVED BY THE CITY TO ACHIEVE UNIFORM SPACING BETWEEN CORNERS.
4. CMU COLUMN FOOTINGS SHALL BE MINIMUM 3000 PSI CEMENT CONCRETE ON A BASE 3" OF 3/4" MINUS CRUSHED ROCK COMPACTED TO 95% T-180.
5. INSTALL VERTICAL EXPANSION JOINT EVERY 20 FEET OF CONTINUOUS CMU WALL.

REV. NO.	DATE	BY	APPR.
1	10/21/14	SCD	JC



CITY OF CAMAS ~ STREET DETAIL

COLLECTOR AND ARTERIAL CMU BLOCK WALL AND COLUMN

DETAIL APPROVED BY *Jan P. Coe* 10-21-14
DATE

DETAIL NO.

STS5

NOT TO SCALE

CONSTRUCTION NOTES:

1. THE CONTRACTOR SHALL INSPECT THE SITE AND VERIFY CONDITIONS AND DIMENSIONS PRIOR TO CONSTRUCTION.
2. IRRIGATION PLANS ARE SCHEMATIC REPRESENTATIONS ONLY. PLACE LINES IN A COMMON TRENCH WHENEVER POSSIBLE. FIELD ADJUST LINES TO AVOID CONFLICT WITH UTILITIES.
3. IRRIGATION IS COORDINATED WITH THE PLANTING PLAN AND SITE IMPROVEMENTS AND IS DESIGNED WITH TRIANGULAR SPACING GIVING HEAD TO HEAD COVERAGE. COORDINATE IRRIGATION HEAD LAYOUT WITH NEW PLANT MATERIALS, LOCATE SPRAY HEADS 30" FROM BASE OF TREE. DO NOT ALTER HEAD LOCATION, PIPE LAYOUT, OR VALVE LOCATION WITHOUT WRITTEN APPROVAL FROM THE CITY ENGINEER. NOTIFY THE CITY ENGINEER IF DISCREPANCIES OCCUR BETWEEN THE PLANS AND FIELD CONDITIONS.
4. ALL COMPONENTS OF IRRIGATION SYSTEM SHALL BE INSTALLED AND PROPERLY ADJUSTED TO PROVIDE ADEQUATE COVERAGE AND MINIMIZATION OF OVER SPRAY ONTO WALKS, BUILDINGS, PARKING AREAS, ETC.
5. ALL PIPE SIZES INDICATED ARE MINIMUMS. CONTRACTOR MAY NOT DECREASE PIPE SIZE. LARGER PIPE SIZES MAY BE USED AT NO ADDITIONAL COST TO OWNER. IRRIGATION LATERALS ARE SIZED BEGINNING AT THE AUTOMATIC VALVE AND CONTINUING IN DIRECTION OF FLOW. REDUCTIONS IN PIPE SIZE ARE LABELED BEGINNING DOWNSTREAM OF NEAREST FITTING. ALL LATERALS NOT SIZED ARE MINIMUM 3/4".
6. INSTALL ALL IRRIGATION PIPE AND CONTROL WIRES IN MINIMUM 4" PVC SLEEVE BELOW ALL PAVED SURFACES UNLESS OTHERWISE INDICATED ON THE PLANS. INSTALL SLEEVES PRIOR TO PLACEMENT OF PAVEMENTS AND PAVEMENT SUB-BASE. SEE PIPE SLEEVING DETAIL FOR FURTHER REQUIREMENTS.
7. COORDINATE IRRIGATION POINTS OF CONNECTION AND LOCATION OF AUTOMATIC CONTROL VALVES WITH THE ENGINEER. COORDINATE ALL WORK WITH OTHER TRADES, I.E. ELECTRICAL, MASONRY, ETC.
8. CONTRACTOR TO PROGRAM AUTOMATIC CONTROLLER TO ALLOW FOR THE EQUIVALENT OF 1" OF WATER PER WEEK.
9. ALL PIPES SHALL BE TRENCHED. PROVIDE POSITIVE DRAINAGE OF MAINLINE. PLACE MANUAL DRAIN AT LOW POINTS IN MAINLINE. IDENTIFY LOCATIONS ON AS-BUILTS.
10. USE 45° ELBOWS INSTEAD OF 90° ELBOWS ON ALL MAINLINES 2-1/2" AND LARGER. INSTALL CONCRETE THRUST BLOCKS AT ALL MAINLINE CHANGES IN DIRECTION. POUR MINIMUM OF 1 CUBIC FOOT OF CONCRETE ON UNDISTURBED SOIL. WRAP PIPE IN PLASTIC PRIOR TO COVERING WITH CONCRETE.
11. CONTRACTOR TO INSTALL CONTROLLER, CPU ELECTRICAL, PHONE AND ACCESSORIES AS REQUIRED. CONTRACTOR TO FURNISH CONTROL WIRES FROM VALVES TO CONTROLLER. CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING 110 VOLT SERVICE FROM BUILDING TO EXISTING JUNCTION BOX IN CONTROLLER HOUSING AND CONNECT CONTROLLER SERVICE.
12. ALL TONING WIRE, WHERE REQUIRED, SHALL BE 14 GAUGE COPPER CLAD STEEL WITH HDPE DIRECT BURY INSULATION. SEAL SPLICE CONNECTIONS WITH 3M DBY OR KING GEL CAPS.
13. ALL DIRECT BURY CONTROL WIRING AND CABLING SHALL HAVE SPLICE CONNECTIONS SEALED WITH 3M DBY OR RAIN BIRD DB SERIES WIRE CONNECTORS IN A SPLICE BOX.
14. SEE SPECIFICATIONS FOR FURTHER REQUIREMENTS.
15. WATER METER SHALL BE INSTALLED BY THE CITY. CONTRACTOR RESPONSIBLE FOR CONNECTIONS DOWNSTREAM OF WATER METER.
16. CONTRACTOR TO VERIFY WATER PRESSURE TO ENSURE THAT PRESSURE MATCHES THE SYSTEM DESIGN PRESSURE.
17. WHERE REQUIRED, CONTRACTOR SHALL PROVIDE AN APPROPRIATELY SIZED POLYMER IRRIGATION VALVE BOX LARGE ENOUGH TO CONTAIN THE SPECIFIED COMPONENTS. VALVE BOXES SHALL BE RAINBIRD VB SERIES, CARSON, OR APPROVED EQUIVALENT.

REV. NO.	DATE	BY	APPR.
1	10/21/14	SCD	JC



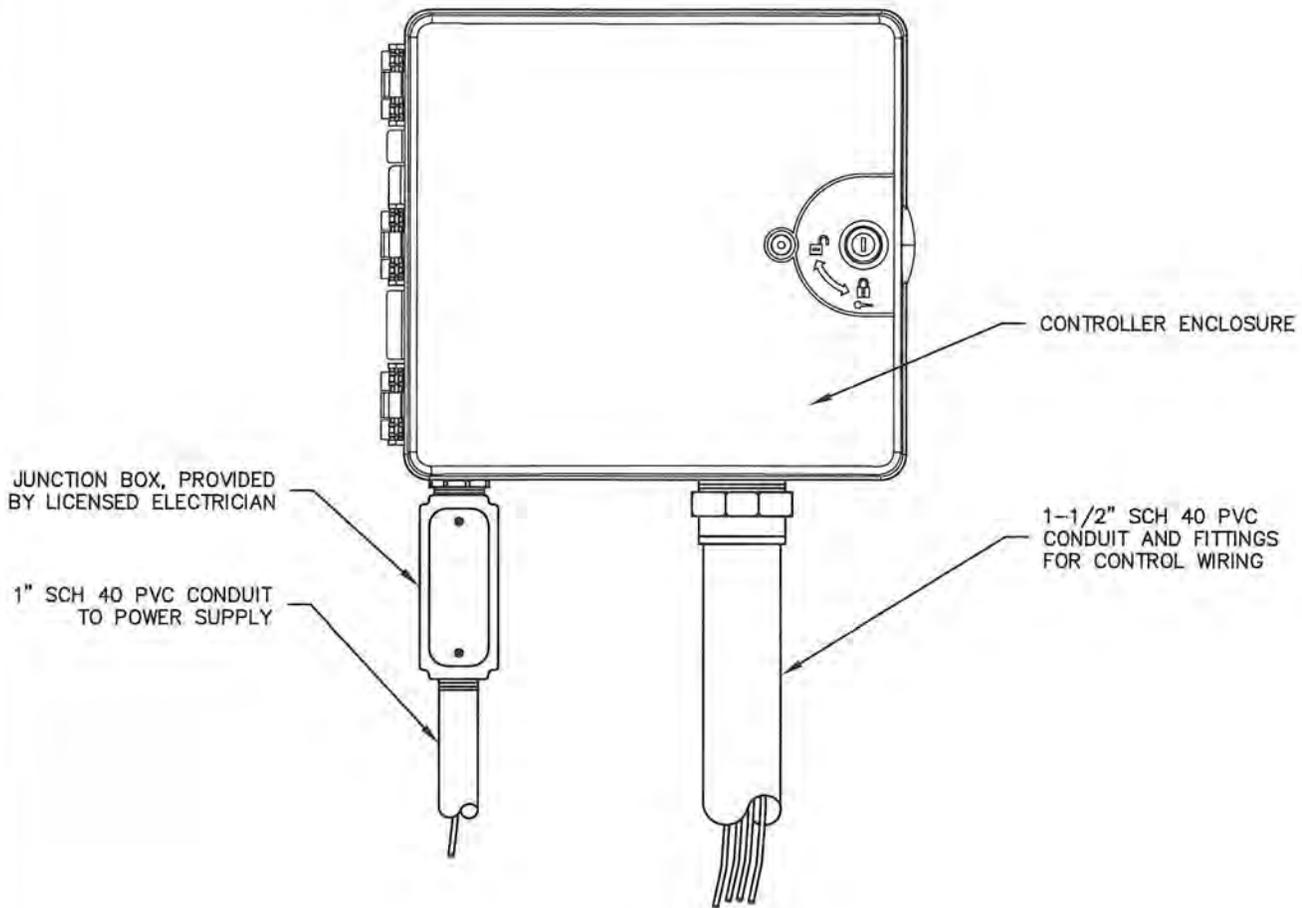
CITY OF CAMAS ~ STREET DETAIL
IRRIGATION NOTES – WITHIN RIGHT OF WAY

John P. ... 10-21-14
 DETAIL APPROVED BY _____ DATE _____

DETAIL NO.
 IR1

NOT TO SCALE

ST-IRRIGATION.DWG



- NOTES:**
1. IRRIGATION CONTROLLER SHALL BE A RAINBIRD ESP-LXME SERIES PROGRAMMABLE CONTROLLER, OR APPROVED EQUAL.
 2. INTERIOR INSTALLATIONS DO NOT REQUIRE AN ENCLOSURE WHEN MOUNTED WITHIN THE UTILITY ROOM OF A RESTROOM OR OTHER FACILITY WHERE THE PUBLIC HAS NO ACCESS.
 3. FOR EXTERIOR WALL MOUNTED APPLICATIONS SEE DETAIL IR3.

REV. NO.	DATE	BY	APPR.
1	10/21/14	SCD	JC



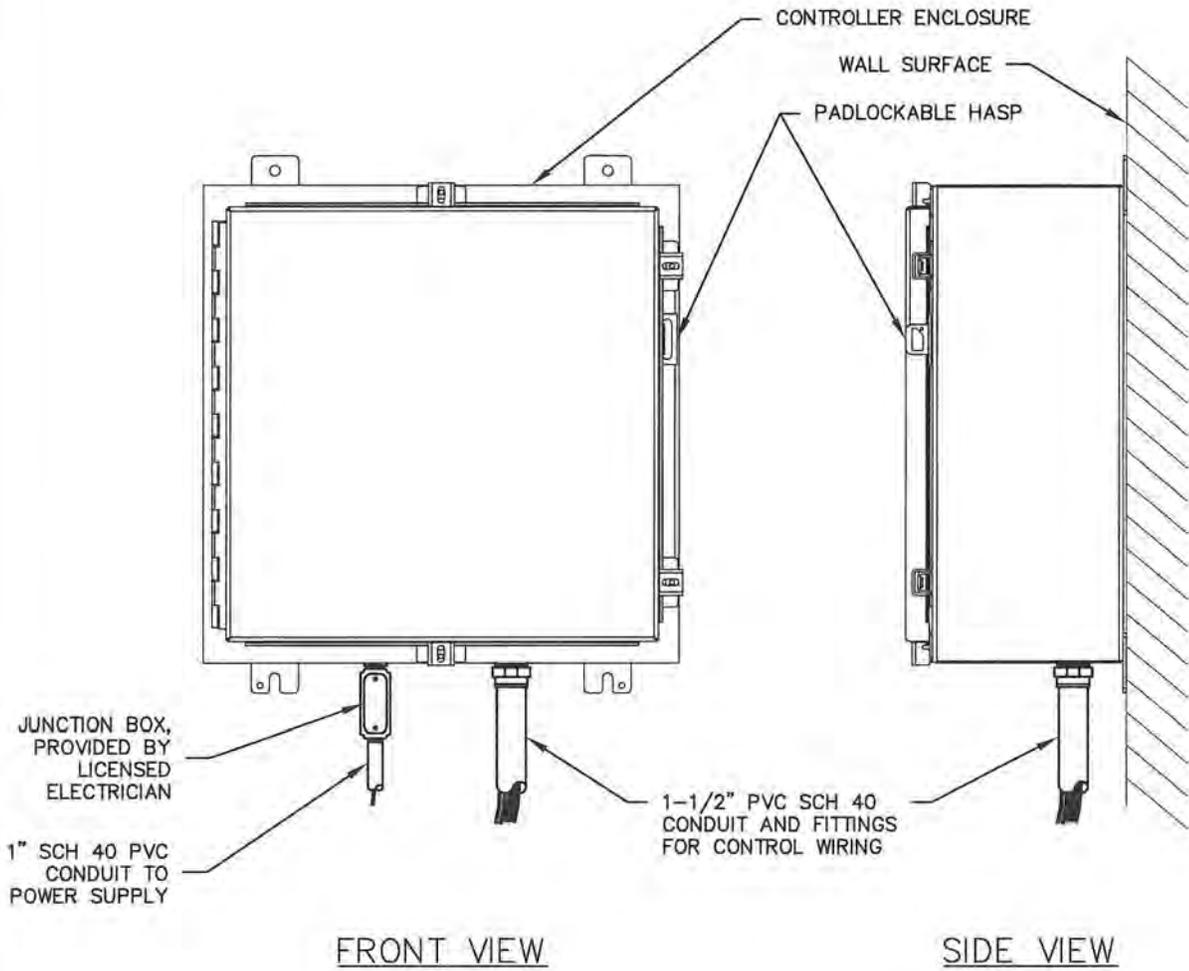
CITY OF CAMAS ~ STREET DETAIL
IRRIGATION CONTROLLER – INDOOR MOUNT

Jan P. Crockett 10-21-14
 DETAIL APPROVED BY DATE

DETAIL NO.

IR2

NOT TO SCALE



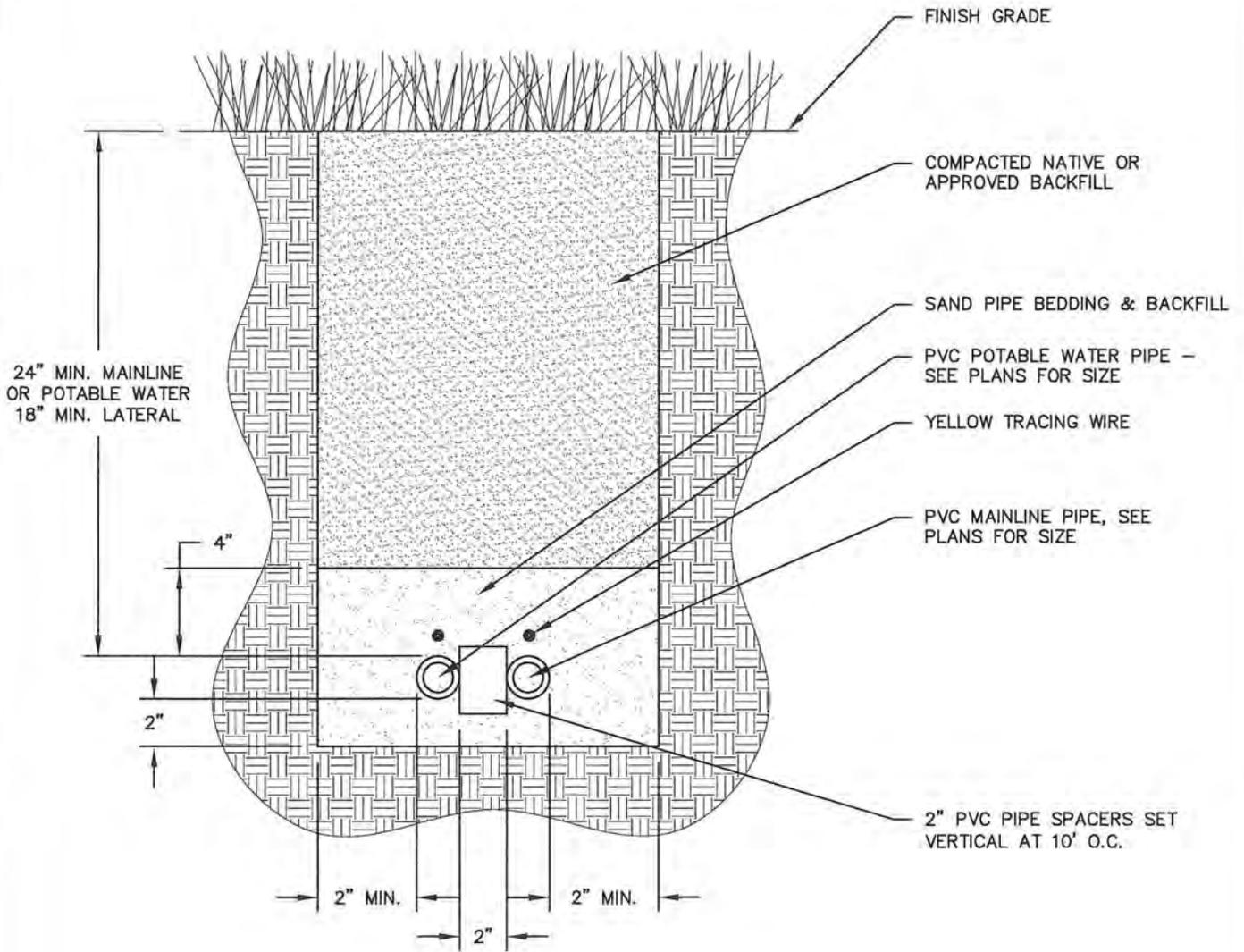
- NOTES:**
1. IRRIGATION CONTROLLER SHALL BE A RAINBIRD ESP-LXME PROGRAMMABLE CONTROLLER, OR APPROVED EQUAL.
 2. INTERIOR INSTALLATIONS DO NOT REQUIRE AN ENCLOSURE WHEN MOUNTED WITHIN THE UTILITY ROOM OF A RESTROOM OR OTHER FACILITY WHERE THE PUBLIC HAS NO ACCESS. SEE DETAIL IR2.
 3. EXTERIOR WALL MOUNTED ENCLOSURE SHALL BE STAINLESS STEEL, NEMA 4X RATED, 20"H x 20"W x 8"D SIZE, WITH BUILT-IN PADLOCKABLE HASP AND PLASTIC DATA POCKET. HOFFMAN, HAMMOND, WIEGMANN OR APPROVED EQUAL MANUFACTURER.
 4. MOUNTING HARDWARE SHALL BE AS RECOMMENDED BY THE ENCLOSURE MANUFACTURER.
 5. FOR INSTALLATIONS WITHIN THE RIGHT-OF-WAY WHERE THERE IS NO WALL MOUNTING SURFACE, THE ENCLOSURE MAY BE PIPE MOUNTED TO A 3 INCH DIAMETER GALVANIZED POST, OR OTHER PERMANENT INSTALLATION, AT A HEIGHT NOT TO EXCEED 3 FEET TO TOP OF ENCLOSURE AND SHALL BE HIDDEN BY VEGETATION.

REV. NO.	DATE	BY	APPR.
1	10/21/14	SCD	JC



CITY OF CAMAS ~ STREET DETAIL
 IRRIGATION CONTROLLER – EXTERIOR MOUNT
John P. Coates 10-21-14
 DETAIL APPROVED BY DATE NOT TO SCALE

DETAIL NO.
 IR3



NOTES:

1. ALL TONING WIRE SHALL BE 14 GAUGE YELLOW HDPE INSULATED COPPER CLAD STEEL. SEAL SPLICE CONNECTIONS WITH 3M DBY OR KING GEL CAPS.
2. PROVIDE A 48 INCH COIL OF TONING WIRE IN EACH VALVE BOX.

REV. NO.	DATE	BY	APPR.
1	10/21/14	SCD	JC



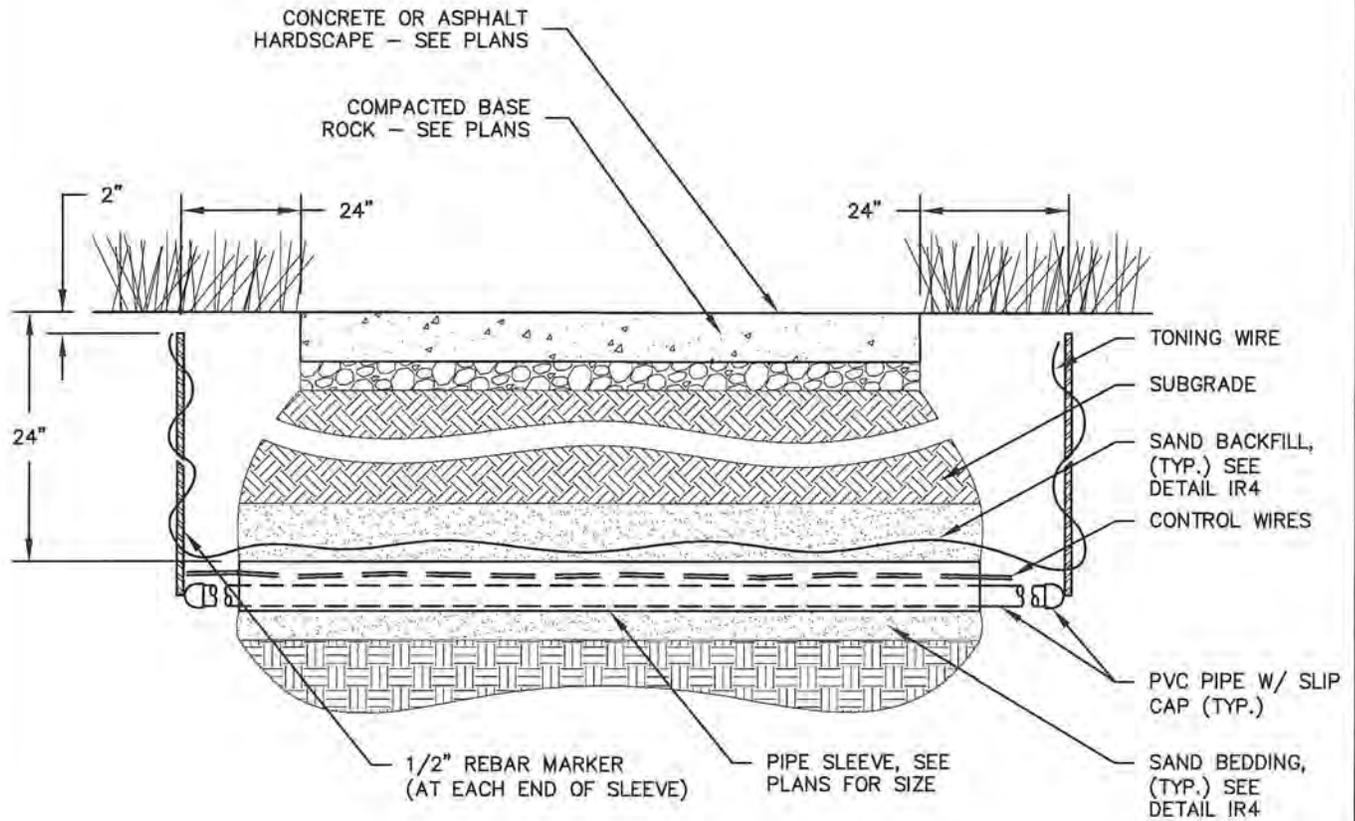
**CITY OF CAMAS ~ STREET DETAIL
IRRIGATION TRENCH**

Joe P. Crothers 10-25-14
 DETAIL APPROVED BY DATE

DETAIL NO.

IR4

NOT TO SCALE



NOTES:

1. CONTRACTOR SHALL PROVIDE AN APPROPRIATELY SIZED IRRIGATION POLYMER VALVE BOX LARGE ENOUGH TO CONTAIN THE SPECIFIED COMPONENTS. VALVE BOXES SHALL BE RAINBIRD VB SERIES, CARSON, OR APPROVED EQUIVALENT.
2. PROVIDE TONING WIRE ALONG ALL PIPE SLEEVING.
3. ALL TONING WIRE SHALL BE 14 GAUGE YELLOW HDPE INSULATED COPPER CLAD STEEL. SEAL SPLICE CONNECTIONS WITH 3M DBY OR KING GEL CAPS.

REV. NO.	DATE	BY	APPR.
1	10/21/14	SCD	JC



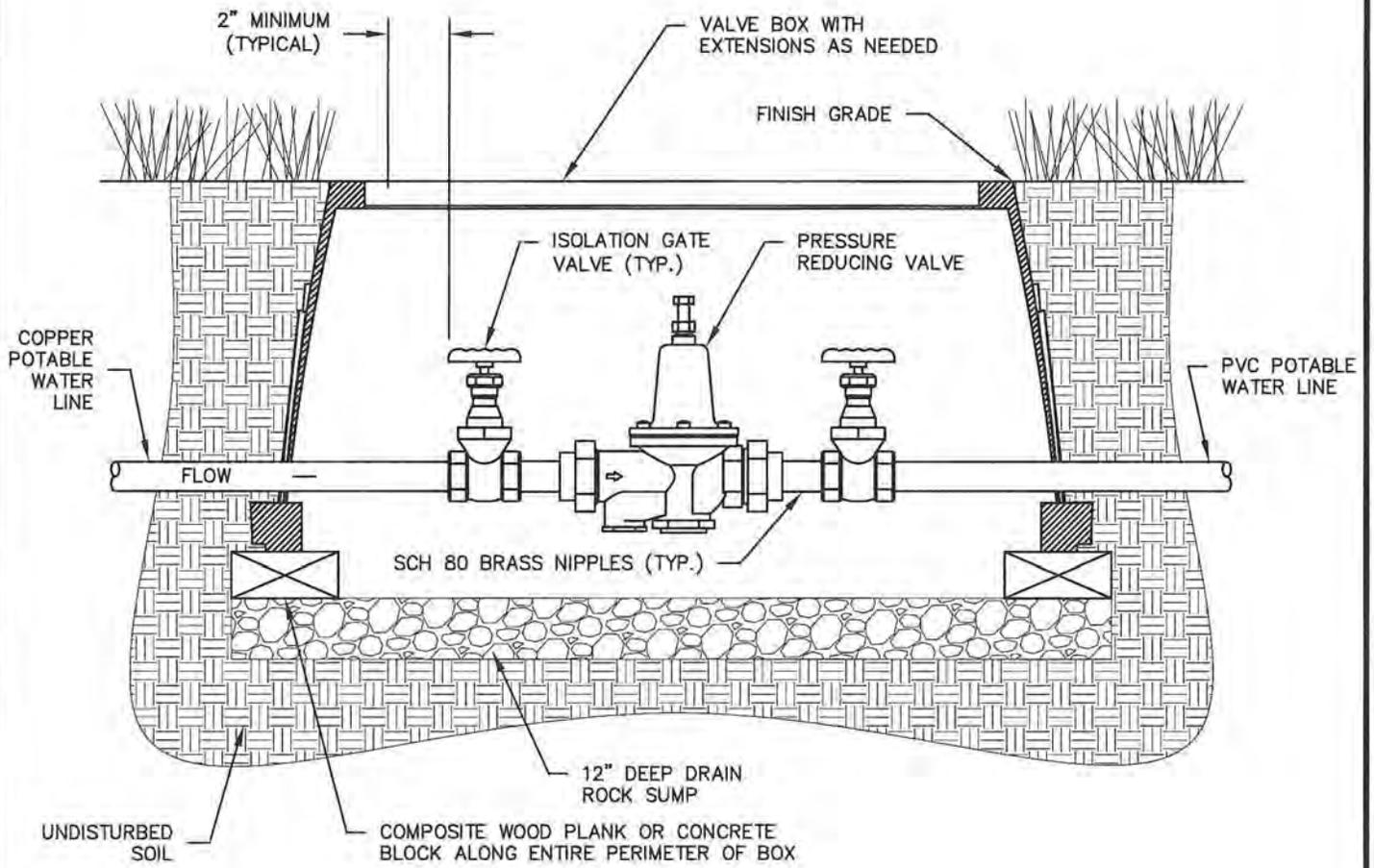
CITY OF CAMAS ~ STREET DETAIL
IRRIGATION PIPE SLEEVE

Jim P. Carver 10-21-14
DETAIL APPROVED BY DATE

DETAIL NO.

IR5

NOT TO SCALE



NOTES:

1. CONTRACTOR SHALL PROVIDE AN APPROPRIATELY SIZED POLYMER IRRIGATION VALVE BOX LARGE ENOUGH TO CONTAIN THE SPECIFIED COMPONENTS. VALVE BOXES SHALL BE RAINBIRD VB SERIES, CARSON, OR APPROVED EQUIVALENT.
2. ALL THREADED FITTINGS SHALL BE WRAPPED WITH TEFLON TAPE.
3. PRESSURE REDUCING VALVE SHALL BE A WATTS M/N 25AUB-Z3 WITH DOUBLE UNION END CONNECTIONS, OR APPROVED EQUAL.
4. FOR APPLICATIONS WHERE DRINKING FOUNTAINS ARE SUPPLIED, ALL COMPONENTS SHALL BE SUITABLE FOR POTABLE WATER.

REV. NO.	DATE	BY	APPR.
1	10/21/14	SCD	JC



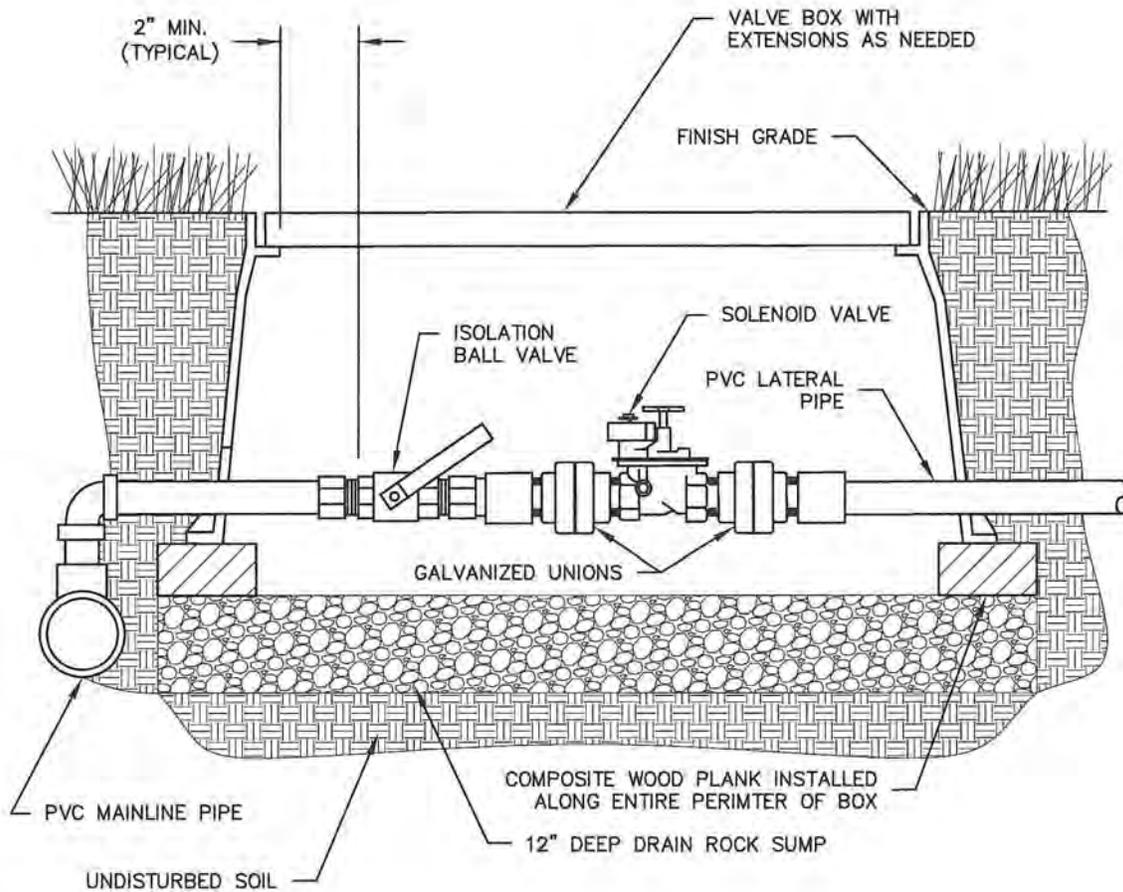
CITY OF CAMAS ~ STREET DETAIL
IRRIGATION PRESSURE REGULATOR

Jim E. Coates 10-21-14
DETAIL APPROVED BY DATE

DETAIL NO.
IR6

NOT TO SCALE

ST-IRRIGATION.DWG



NOTES:

1. CONTRACTOR SHALL PROVIDE AN APPROPRIATELY SIZED POLYMER IRRIGATION VALVE BOX LARGE ENOUGH TO CONTAIN THE SPECIFIED COMPONENTS. VALVE BOXES SHALL BE RAINBIRD VB SERIES, CARSON, OR APPROVED EQUIVALENT.
2. ALL THREADED FITTINGS SHALL BE WRAPPED WITH TEFLON TAPE.

REV. NO.	DATE	BY	APPR.
1	10/21/14	SCD	JC



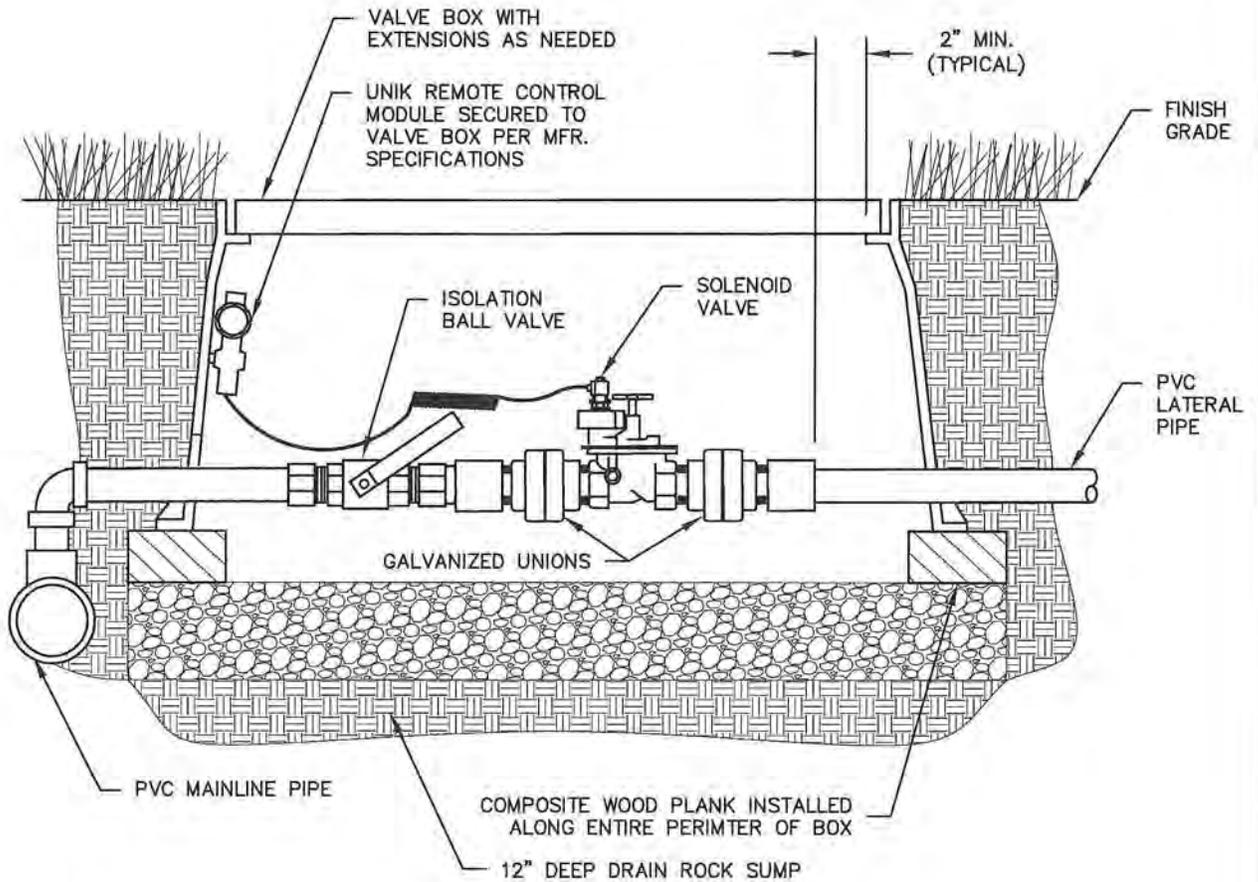
CITY OF CAMAS ~ STREET DETAIL
IRRIGATION SOLENOID VALVE

Jan P. Quattrin 10-21-14
DETAIL APPROVED BY DATE

DETAIL NO.
IR7

NOT TO SCALE

ST-IRRIGATION.DWG



NOTES:

1. CONTRACTOR SHALL PROVIDE AN APPROPRIATELY SIZED POLYMER IRRIGATION VALVE BOX LARGE ENOUGH TO CONTAIN THE SPECIFIED COMPONENTS. VALVE BOXES SHALL BE RAINBIRD VB SERIES, CARSON, OR APPROVED EQUIVALENT.
2. ALL THREADED FITTINGS SHALL BE WRAPPED WITH TEFLON TAPE.

REV. NO.	DATE	BY	APPR.
1	10/21/14	SCD	JC



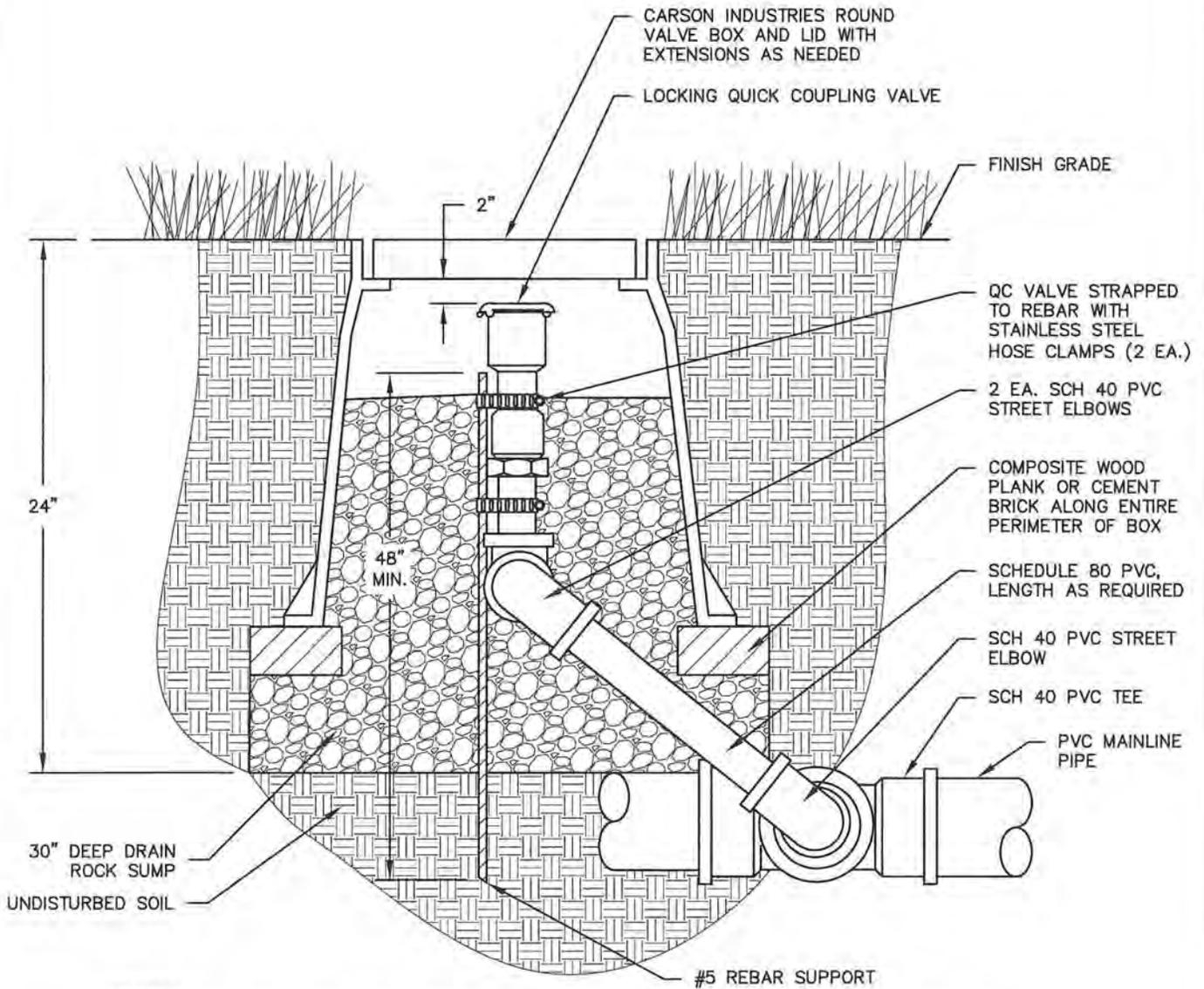
CITY OF CAMAS ~ STREET DETAIL
IRRIGATION SOLENOID VALVE – UNIK CONTROL

Jan E. Coatsworth 10-21-14
DETAIL APPROVED BY DATE

NOT TO SCALE

DETAIL NO.

IR8



NOTES:

1. CONTRACTOR SHALL PROVIDE AN APPROPRIATELY SIZED POLYMER IRRIGATION VALVE BOX LARGE ENOUGH TO CONTAIN THE SPECIFIED COMPONENTS. VALVE BOXES SHALL BE RAINBIRD VB SERIES, CARSON, OR APPROVED EQUIVALENT.
2. ALL THREADED FITTINGS SHALL BE WRAPPED WITH TEFLON TAPE.
3. SWING JOINT SIZE SHALL BE SAME SIZE AS VALVE BOTTOM INLET.

REV. NO.	DATE	BY	APPR.
1	10/21/14	SCD	JC



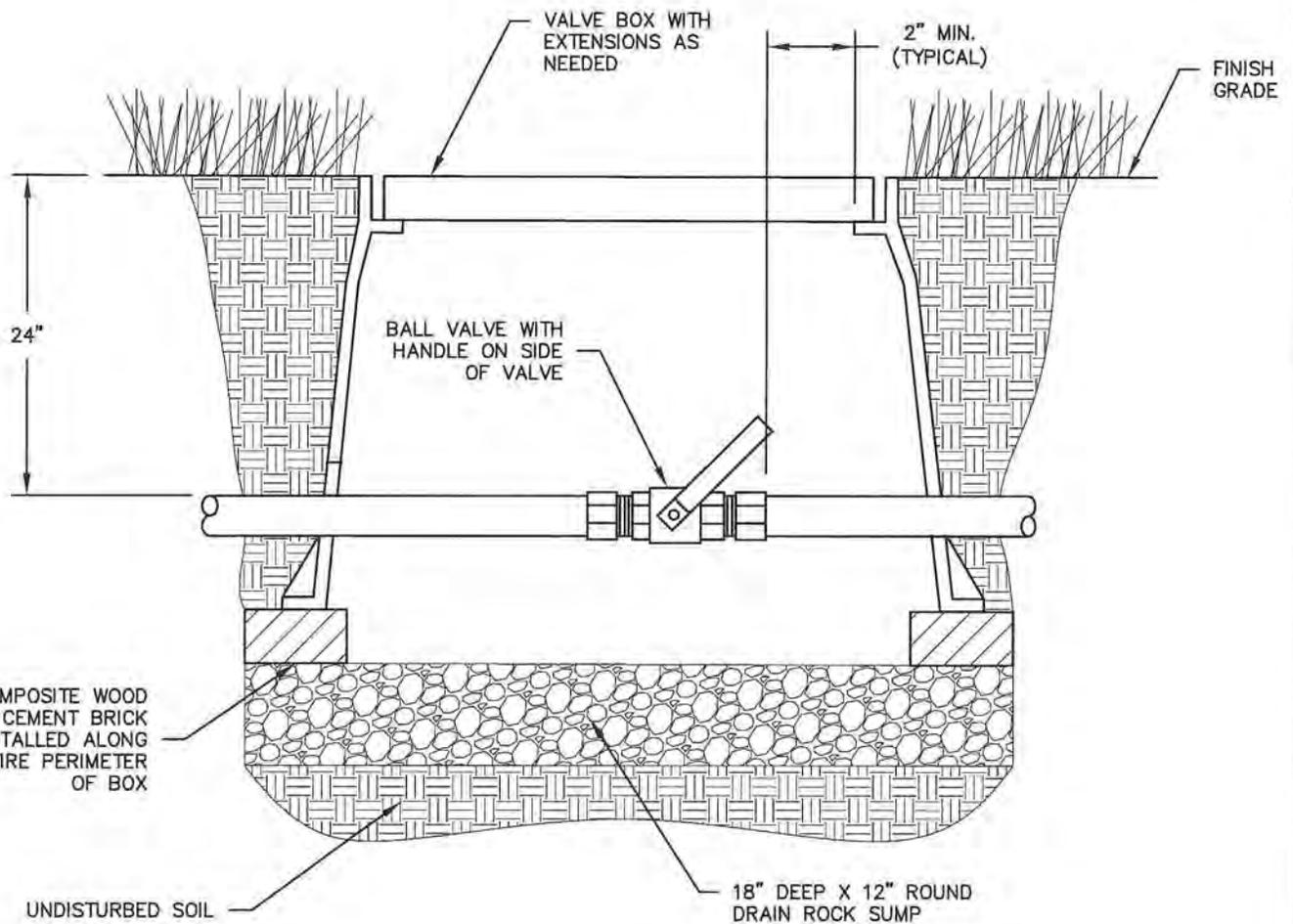
CITY OF CAMAS ~ STREET DETAIL
IRRIGATION QUICK COUPLING VALVE

Jim P. Cantor 10-21-14
DETAIL APPROVED BY DATE

DETAIL NO.

IR9

NOT TO SCALE



NOTES:

1. CONTRACTOR SHALL PROVIDE AN APPROPRIATELY SIZED POLYMER IRRIGATION VALVE BOX LARGE ENOUGH TO CONTAIN THE SPECIFIED COMPONENTS. VALVE BOXES SHALL BE RAINBIRD VB SERIES, CARSON, OR APPROVED EQUIVALENT.
2. ALL THREADED FITTINGS SHALL BE WRAPPED WITH TEFLON TAPE.

REV. NO.	DATE	BY	APPR.
1	10/21/14	SCD	JC



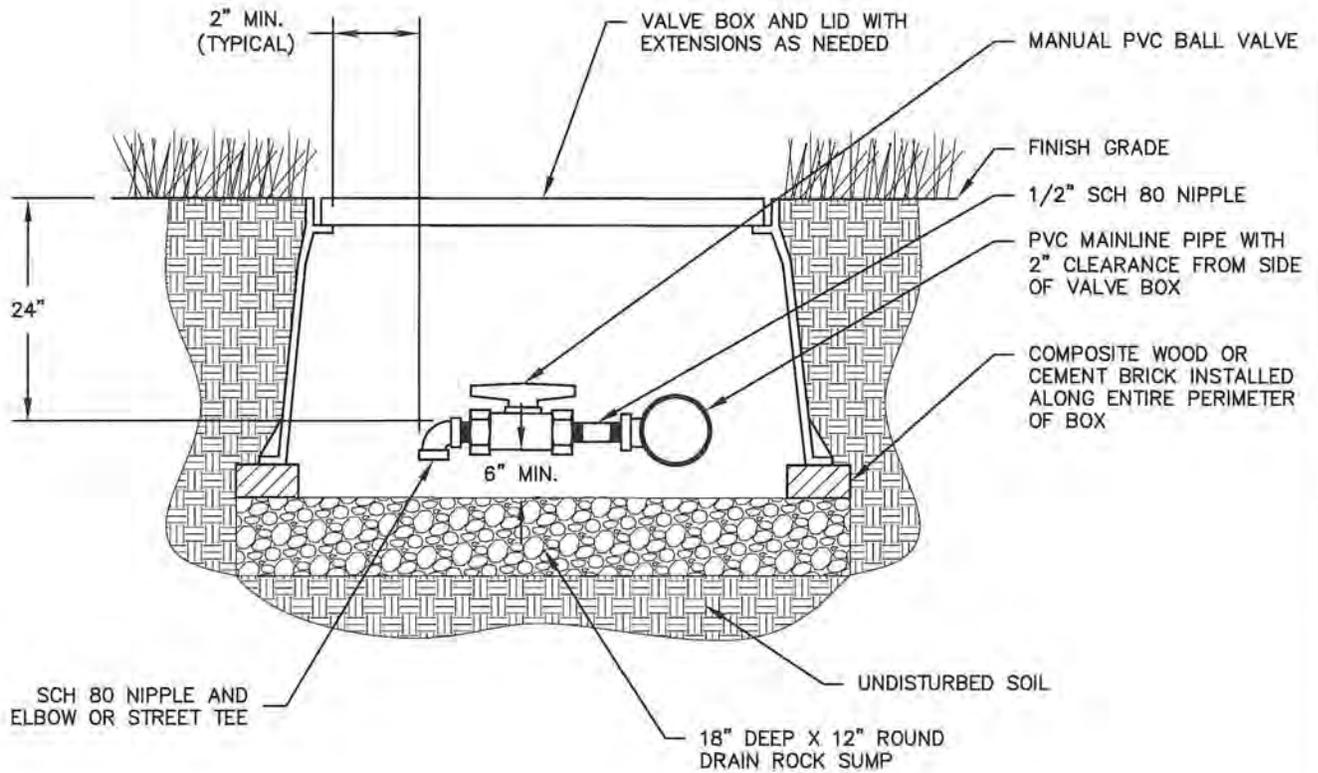
CITY OF CAMAS ~ STREET DETAIL
IRRIGATION ISOLATION BALL VALVE

Jan P. Carothers 10-21-14
DETAIL APPROVED BY DATE

DETAIL NO.

IR10

NOT TO SCALE



NOTES:

1. CONTRACTOR SHALL PROVIDE AN APPROPRIATELY SIZED POLYMER IRRIGATION VALVE BOX LARGE ENOUGH TO CONTAIN THE SPECIFIED COMPONENTS. VALVE BOXES SHALL BE RAINBIRD VB SERIES, CARSON, OR APPROVED EQUIVALENT.
2. ALL THREADED FITTINGS SHALL BE WRAPPED WITH TEFLON TAPE.
3. CONTRACTOR RESPONSIBLE FOR LOCATING DRAIN VALVE AT LOWEST POINT OF MAINLINE TO ENSURE POSITIVE DRAINAGE.
4. ALLOW FOR 1" CLEARANCE FROM HOLE IN BOX TO TOP OF PIPE.

REV. NO.	DATE	BY	APPR.
1	10/21/14	SCD	JC



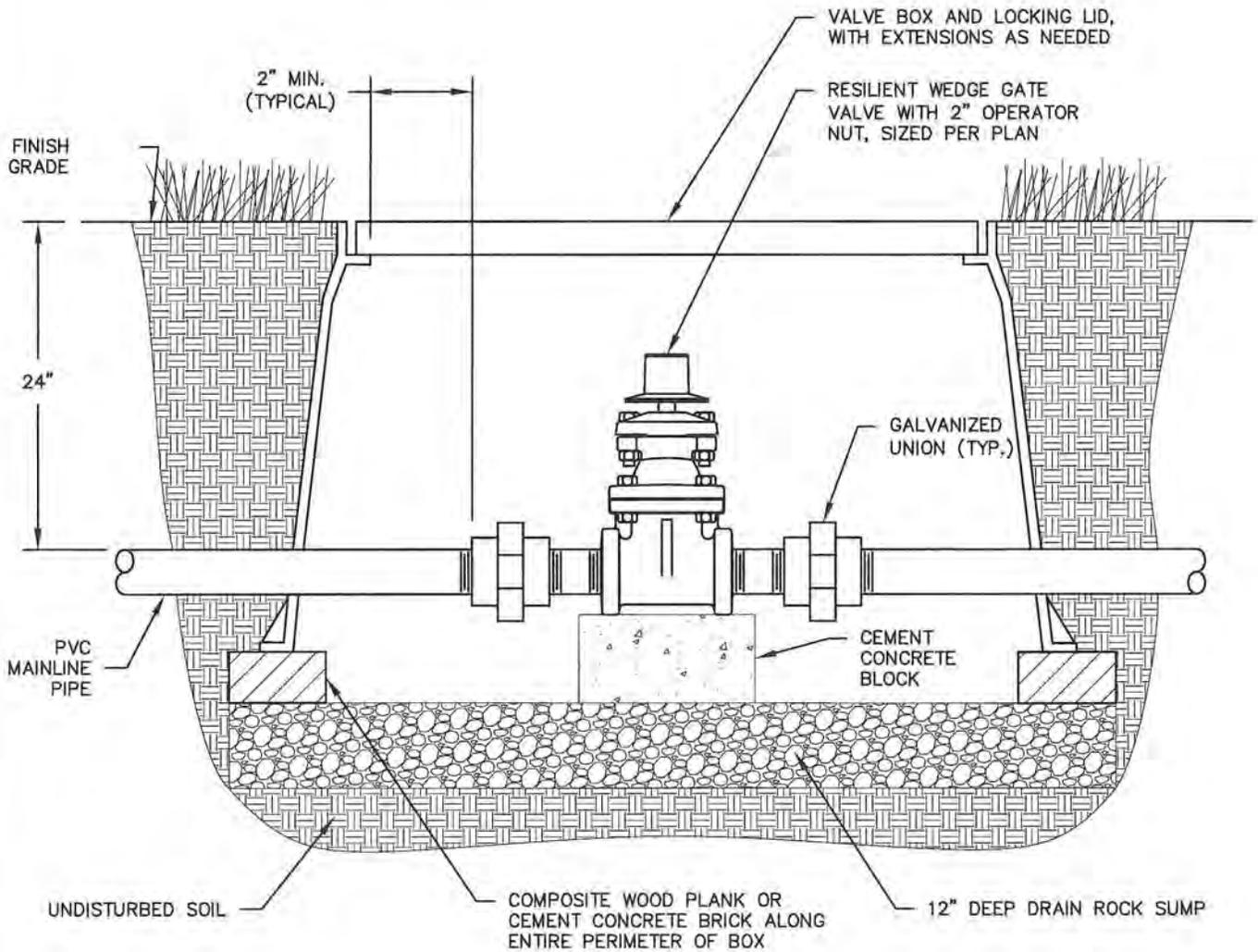
CITY OF CAMAS ~ STREET DETAIL
IRRIGATION MANUAL DRAIN VALVE

John P. Cristoforo 10-21-14
DETAIL APPROVED BY DATE

DETAIL NO.

IR11

NOT TO SCALE



NOTES:

- CONTRACTOR SHALL PROVIDE AN APPROPRIATELY SIZED POLYMER IRRIGATION VALVE BOX LARGE ENOUGH TO CONTAIN THE SPECIFIED COMPONENTS. VALVE BOXES SHALL BE RAINBIRD VB SERIES, CARSON, OR APPROVED EQUIVALENT.

REV. NO.	DATE	BY	APPR.
1	10/21/14	SCD	JC



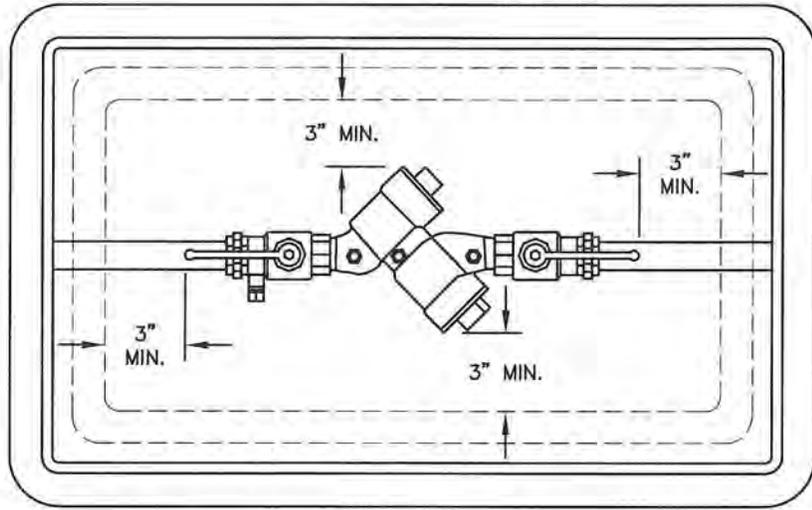
CITY OF CAMAS ~ STREET DETAIL
IRRIGATION MANUAL GATE VALVE

Jan P. Caruth 10-21-14
DETAIL APPROVED BY DATE

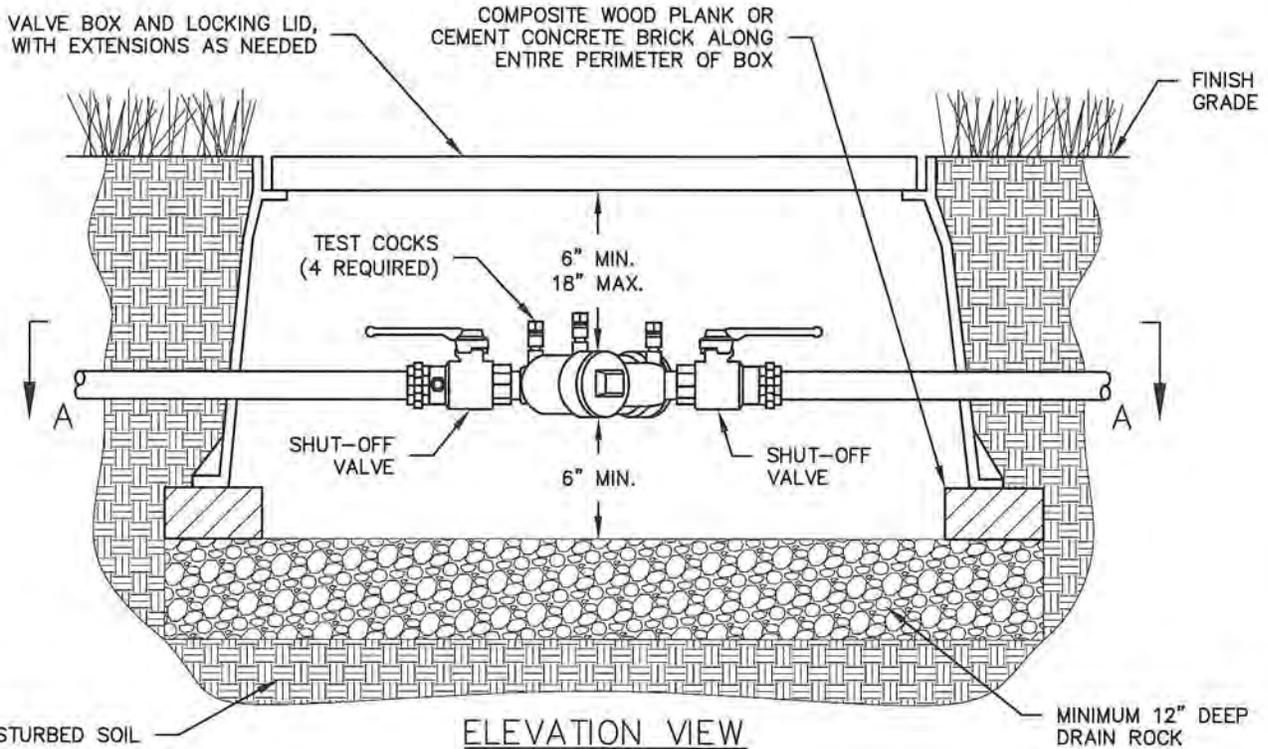
DETAIL NO.

IR12

NOT TO SCALE



VIEW A-A



ELEVATION VIEW

NOTES:

1. CONTRACTOR SHALL PROVIDE AN APPROPRIATELY SIZED POLYMER IRRIGATION VALVE BOX LARGE ENOUGH TO CONTAIN THE SPECIFIED COMPONENTS. VALVE BOXES SHALL BE RAINBIRD VB SERIES, CARSON, OR APPROVED EQUIVALENT.
2. APPROVED DOUBLE CHECK VALVE ASSEMBLY TO LAY HORIZONTAL WITH GROUND. TEST COCKS TO EITHER FACE OUTWARDS OR UPWARDS FROM ASSEMBLY.
3. DESIGNED FOR BACK SIPHONING AND BACK PRESSURE.
4. THOROUGHLY FLUSH LINES PRIOR TO INSTALLATION OF BACKFLOW PREVENTER.
5. THE DCVA MAY BE INSTALLED ABOVE OR BELOW THE GROUND PROVIDED ALL CLEARANCES ARE MET.
6. DO NOT INSTALL IN AN AREA SUBJECT TO FLOODING. MUST BE ACCESSIBLE AND PROTECTED FROM FREEZING CONDITIONS.
7. THE DOUBLE CHECK VALVE BACKFLOW PREVENTER ASSEMBLY SHALL BE ASSE LISTED 1015 APPROVED AND INCLUDE FULL PORT BALL VALVES WITH RESILIENT SEATS AND UNION CONNECTIONS.
8. A PLUMBING PERMIT IS REQUIRED. PLEASE CONTACT THE CITY OF CAMAS BUILDING DEPARTMENT.
9. MUST BE TESTED AFTER INSTALLATION BY A WASHINGTON STATE CERTIFIED BACKFLOW ASSEMBLY TESTER. TEST RESULTS SHALL BE SENT TO THE CITY OF CAMAS WATER DEPARTMENT.

REV. NO.	DATE	BY	APPR.
1	10/21/14	SCD	JC



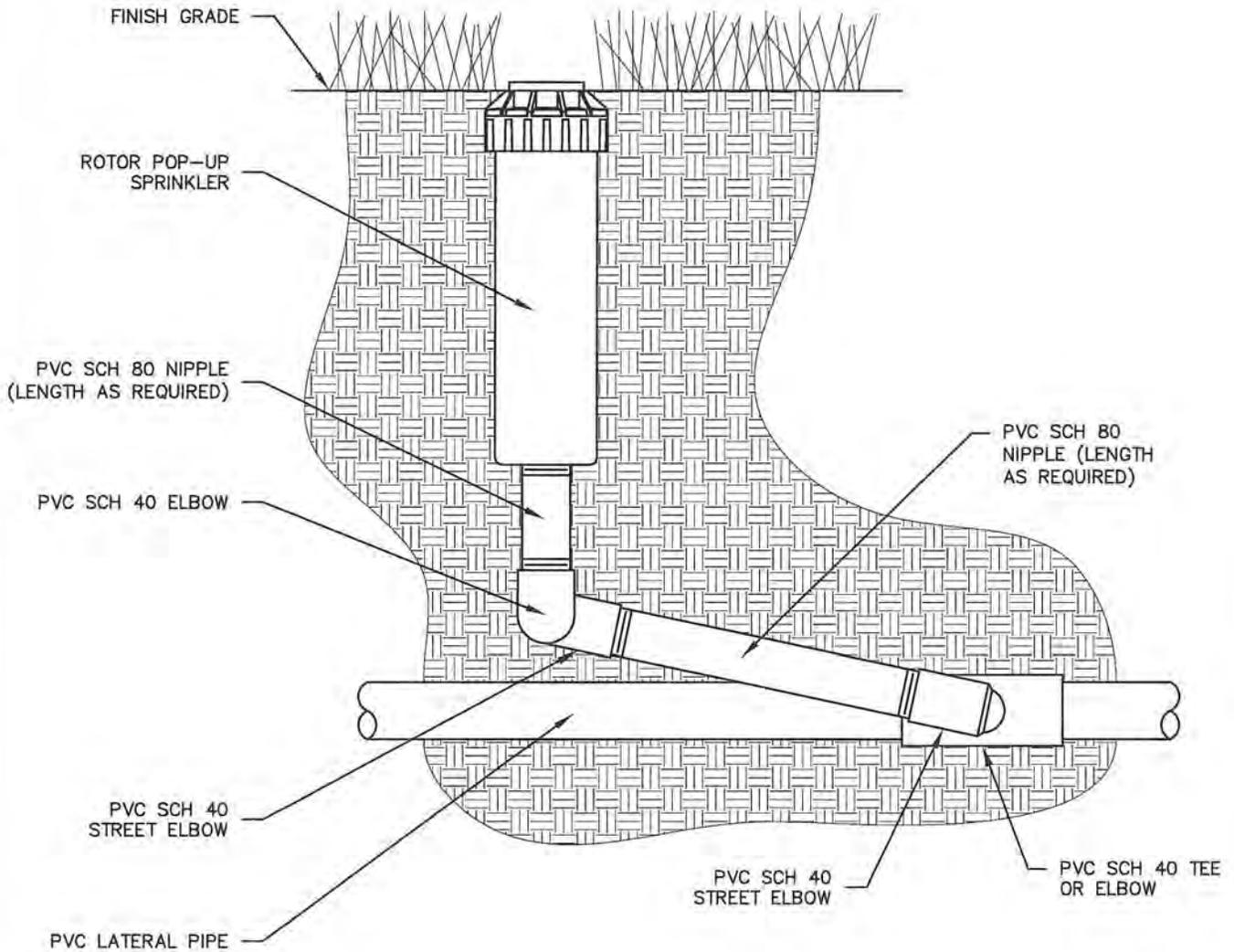
CITY OF CAMAS ~ STREET DETAIL
IRRIGATION DOUBLE CHECK VALVE ASSY

Carla J. Coe 10-21-14
DETAIL APPROVED BY DATE

DETAIL NO.

IR13

NOT TO SCALE



NOTES:

1. ALL THREADED FITTINGS SHALL BE WRAPPED WITH TEFLON TAPE.
2. SWING JOINT SIZE SHALL NOT BE LESS THAN HEAD INLET SIZE.
3. ROTARY SPRAY HEADS SHALL BE HUNTER I-40, I-25, OR APPROVED EQUAL, SUBMITTAL REQUIRED.
4. WHEN SPRAY HEADS ARE LOCATED ALONG SIDEWALK OR CURBING THE HEADS SHALL BE MINIMUM 3" FROM HARDSCAPE AND PIPES MINIMUM 6" FROM HARDSCAPE.
5. PRE-FABRICATED SWING JOINT ASSEMBLY WITH O-RINGS MAY BE USED INSTEAD OF INDIVIDUAL PARTS AS SHOWN.

REV. NO.	DATE	BY	APPR.
1	10/21/14	SCD	JC



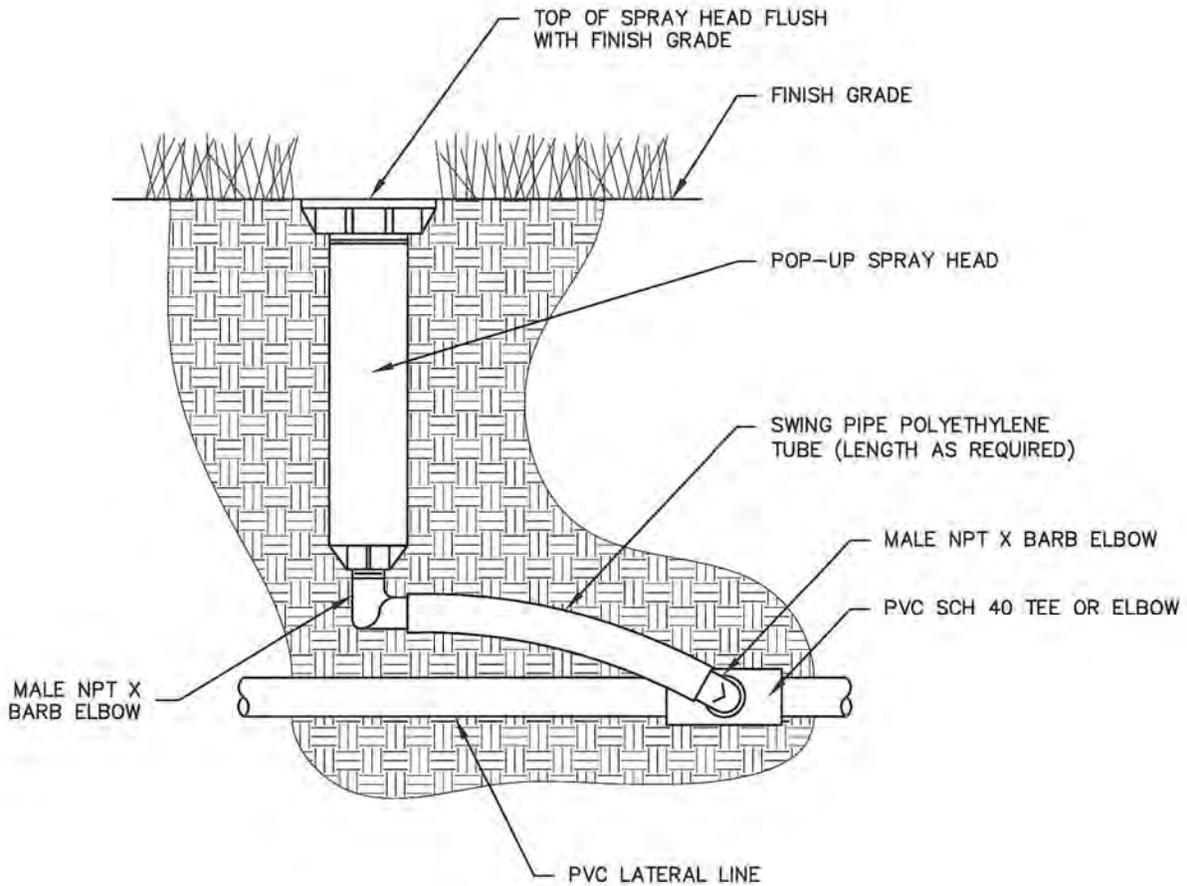
CITY OF CAMAS ~ STREET DETAIL
IRRIGATION ROTARY SPRAY HEAD

Jan P. [Signature] 10-21-14
DETAIL APPROVED BY DATE

DETAIL NO.

IR14

NOT TO SCALE



NOTES:

1. ALL THREADED FITTINGS SHALL BE WRAPPED WITH TEFLON TAPE.
2. SWING PIPE SHALL BE POLYETHYLENE AND SIZE SHALL NOT BE LESS THAN HEAD INLET SIZE.
3. POP-UP SPRAY HEADS SHALL BE RAIN BIRD 1800 OR APPROVED EQUAL, SUBMITTAL REQUIRED.
4. WHEN SPRAY HEADS ARE LOCATED ALONG SIDEWALK OR CURBING THE HEADS SHALL BE MINIMUM 3" FROM HARDSCAPE AND PIPES MINIMUM 6" FROM HARDSCAPE.

REV. NO.	DATE	BY	APPR.
1	10/21/14	SCD	JC



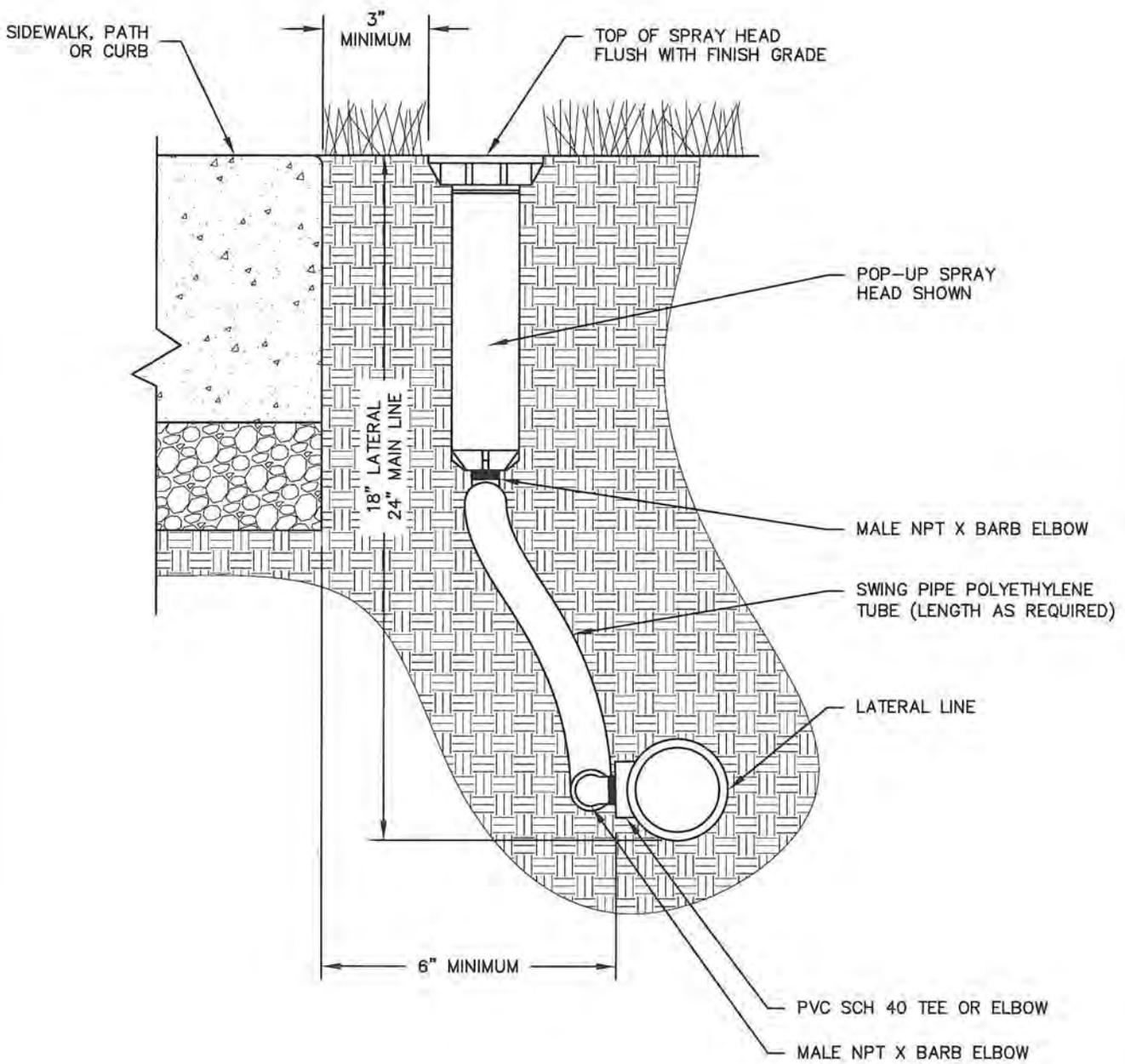
CITY OF CAMAS ~ STREET DETAIL
IRRIGATION POP-UP SPRAY HEAD

Jim P. Coe 10-21-14
DETAIL APPROVED BY DATE

DETAIL NO.

IR15

NOT TO SCALE



NOTES:

1. ALL THREADED FITTINGS SHALL BE WRAPPED WITH TEFLON TAPE.
2. SWING PIPE SHALL BE POLYETHYLENE AND SIZE SHALL NOT BE LESS THAN HEAD INLET SIZE.
3. WHEN SPRAY HEADS ARE LOCATED ALONG SIDEWALK OR CURBING THE HEADS SHALL BE MINIMUM 3" FROM HARDSCAPE AND PIPES MINIMUM 6" FROM HARDSCAPE.

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1	10/21/14	SCD	JC



CITY OF CAMAS ~ STREET DETAIL
 IRRIGATION HEAD PLACEMENT ALONG HARDSCAPE

Jan P. Crutcher 10-21-14
 DATE

DETAIL NO.
 IR16

NOT TO SCALE