

2017

# Design Standards



**City of Gillette  
Engineering Division**

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CITY OF GILLETTE  
DESIGN STANDARDS  
(2017)

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ENGINEERING DIVISION

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# ADOPTING ORDINANCE

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# DEQ DELEGATION

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## ORDINANCE NO 1643

AN ORDINANCE TO AMEND SECTION TWO OF  
ORDINANCE 1437, TO DESIGNATE THE CITY ENGINEERING  
DIVISION AND THE CITY ENGINEER AS THE DELEGATED LOCAL  
OFFICIAL TO ENFORCE THE PERMITTING PROGRAM DELEGATED  
TO THE CITY OF GILLETTE BY THE STATE OF WYOMING  
PURSUANT TO THE APPROVAL OF ORDINANCE 1437

BE IT ORDAINED BY THE GOVERNING BODY OF THE CITY OF GILLETTE  
WYOMING:

SECTION ONE. Section Two of Ordinance 1437 is amended to read as  
follows:

SECTION TWO. The City of Gillette hereby designates the  
City Engineering Division and the City Engineer as the Delegated  
Local Official who is authorized to enforce and administer the  
permitting program delegated by the State of Wyoming, acting  
through the Administrator of the Water Quality Division of the  
Department of Environmental Quality.

PASSED, APPROVED AND ADOPTED this 16th, day of February, 1987.

  
\_\_\_\_\_  
H.A. CARTER, Mayor

( S E A L )

ATTEST:

  
\_\_\_\_\_  
Mildred Huravitch, City Clerk

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# INTRODUCTION

The City of Gillette Design Standards contains the general design standards to be used for Private Development contracted projects and for City contracted projects. The Design Standards document also contains general pre-construction requirements and construction requirements for permitting and obtaining approval of development projects and other public improvements.

The Design Standards document is comprised of the following sections:

1. Section 101 - General Pre-Construction Requirements and Procedures for Development.
2. Section 102 - General Construction Requirements and Procedures for Development.
3. Section 103 - General Requirements and Procedures for Acceptance of A Project.
4. Section 301 - Design of Water Distribution Systems.
5. Section 401 - Design of Sanitary Sewer Systems.
6. Section 403 - Design of Storm Drainage Systems.
7. Section 504 – Design of Concrete Sidewalks and Curb Ramps.
8. Section 609 - Design of Flexible Pavements.
9. Section 610 - Design of Rigid Pavements.
10. Section 611 - Street Geometrics.
11. Standard Drawings - Standard Design Drawings and Details.

The Design Standards are intended to cover the typical design methods, and to give the minimum values the City will accept. The City Engineer encourages the use of the design methods given, but may accept proven alternative design methods.

When submitting the plans and reports for approval by the City Engineer, calculations should be included. The calculations should be submitted in a neat and readable fashion but need not be typed.

Where a reference is made to an ASTM, ANSI, AASHTO, DEQ, MUTCD, or any other standardized document or designation, it shall be the latest revision at the time. Where conflicts regarding design elements for public improvements between the City Design Standards and City Subdivision Regulations exist, the Design Standards shall govern.

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SECTION 101



GENERAL PRE-CONSTRUCTION  
REQUIREMENTS AND PROCEDURES  
FOR DEVELOPMENT

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## SECTION 101

### GENERAL PRE-CONSTRUCTION REQUIREMENTS AND PROCEDURES FOR DEVELOPMENT

#### 101.00 PRELIMINARY PLAN SUBMITTAL REQUIREMENTS AND PROCEDURES:

Applicants seeking review of Preliminary Plans for developments and other public improvements on private development contracted projects as deemed necessary by the City Engineer shall follow the requirements and submittal procedures outlined in this section. Preliminary Plan requirements are administered by the Engineering Division and are to coincide with any Planning Division and/or Building Division preliminary requirements for development and other public improvements on private development contracted projects.

The engineering plans shall be labeled as Preliminary Plans for this stage. The Plans shall be in conformance with the City of Gillette CAD Standards and shall be prepared by a Professional Engineer licensed to practice in Wyoming. The Preliminary Plans shall be submitted through the City of Gillette electronic plans review program (ePlans) through the City Planning Division. The City of Gillette website, under the Engineering, Planning, or Building Divisions, can be referenced for guidance and instructions on using ePlans.

#### 101.01 PRELIMINARY PLAN REQUIREMENTS:

Preliminary Plans shall include the following items. Only the information that applies to each of the associated development processes: Preliminary Platting, Commercial Site Plans, or Development Plans, shall be required for that particular process. Sketch Plat requirements are as identified in the Subdivision Regulations and do not require the Preliminary Plans as related to this section.

A. **PRELIMINARY PLAT.** When preliminary platting a project area, the Preliminary Plans shall include a copy of the preliminary plat in conformance with the current Subdivision Regulations.

B. **UTILITY PLAN.** The Utility Plan shall include the proposed location of water, sanitary sewer, electric, gas, cable TV, and phone lines and all associated easements. Also, the proposed locations of all fire hydrants, water valves and manholes, and the size of the proposed water mains and sanitary sewer mains shall be shown. The Utility Plan shall also include the location of all existing utilities and, if applicable, shall indicate the location of the proposed connections to these existing utility systems.

C. **STREET, DRAINAGE AND GRADING PLANS.** The plans shall include the right-of-way widths, street widths, proposed street grades, and conceptual grading plans. The plans shall also include the boundary of the one hundred (100) year flood plain, known geotechnical hazards, if applicable, existing and proposed contour lines, drainage flow arrows, location of detention ponds, proposed storm sewers, drainage structures, area(s) of disturbance, drainage easements, or any other applicable permanent stormwater Best Management Practices (BMPs) as associated with the project improvements. The Project Contractor is responsible for the BMPs associated with the methods and procedures of their

construction activities and shall be in accordance with DEQ requirements and permitting. City of Gillette Vertical Control Monuments (VCM) shall be used for the elevation datum.

D. **OFFSITE PUBLIC IMPROVEMENTS.** If offsite public improvements are required in order to connect into existing city facilities, the offsite plans shall include the proposed lines, connection locations, and identify the status of the right-of-way or easements for the improvements.

#### **101.02 SUPPLEMENTAL REPORTS TO BE SUBMITTED WITH THE PRELIMINARY PLANS:**

The following documents, as applicable, shall be uploaded into ePlans utilizing the ePlans Preliminary Plan permit numbering system (e.g. BPXX-00000XXX) that is provided by the Planning Division.

A. **PRELIMINARY DRAINAGE REPORT.** A Preliminary Drainage Report shall be prepared in conformance with the requirements of the City of Gillette Storm Drainage Design Manual, and shall be prepared by a Professional Engineer licensed to practice in Wyoming. This report is required with the Preliminary Plans.

B. **PRELIMINARY GEOTECHNICAL REPORT.** If the geotechnical investigation report is completed (See Section 101.20) or if preliminary reports have been made, the City will review these documents with the Preliminary Plans.

C. **TRAFFIC IMPACT ANALYSIS REPORT.** If a Traffic Impact Analysis Report is required as per Section 611, the City will review this report with the Preliminary Plans.

#### **101.03 PRELIMINARY PLAN SUBMITTAL PROCEDURE:**

A. The Applicant shall submit the Preliminary Plans via the ePlans program through the Planning Division. The City of Gillette website, Engineering Division, can be referenced for guidance and instructions on using ePlans. The Application for Permit to Construct for the infrastructure improvements is not required at the preliminary stage.

B. The Preliminary Plans shall be submitted to the Engineering Division at the same time the preliminary plat is submitted to the Planning Division for consideration by the City Planning Commission. This is accomplished by uploading all of the required preliminary plat requirements (Preliminary Plat, Preliminary Plans, and Preliminary Reports) to ePlans utilizing the permit number issued by the Planning Division. The Engineering Division will review the Preliminary Plans and also make any comments regarding the Preliminary Plat to the Planning Division.

C. The Engineering Division will also review the preliminary geotechnical report, if submitted, and may request additional testing or information, if necessary.

D. After reviewing the Preliminary Plans, the Engineering Division will make any comments (markups) through ePlans, which will be presented at the Staff Review Meeting coordinated by the Planning Division. At any time during the review process, the

Applicant may log in to the ePlans program and see any comments that have been made on the documents. No paper copies are required to be submitted to the Engineering Division at this stage.

E. The Applicant shall then revise and resubmit the plans as Final Construction Plans. (See Section 101.20 on FINAL SUBMITTAL REQUIREMENTS AND PROCEDURES).

#### **101.10 MINOR PLAT APPROVAL:**

A plat is considered a Minor Plat when the following conditions are met:

1. The plat is a subdivision or a re-subdivision that adjusts the lot lines of more than two (2) lots without creating additional lots; combines more than two (2) lots into one (1) lot; combines two (2) or more lots into multiple lots; or creates no more than ten (10) new lots from any single or multiple parcels, tracts, or lots.
2. The subdivision is served by existing utilities and does not require extension of streets, utilities or other infrastructure improvements.

According to the Subdivision Regulations, once the plat is declared a Minor Plat, the subdivider may proceed directly to the preparation of the Final Plat.

A. In order to coordinate the Engineering Division's recommendations on the Minor Plat with the Planning Division, the required supporting materials must be submitted to the Engineering Division, through the Planning Division, via ePlans in accordance with their yearly adopted Development Review Schedule.

The supporting materials shall include the existing plat with lot lines and existing water and/or sewer services clearly identified in relation to their proposed alterations.

The Engineering Division will review the supporting materials and make any comments regarding the Minor Plat to the Planning Division.

B. Any water and/or sewer service lines not needed shall be abandoned according to the City of Gillette Design Standards and Standard Construction Specifications prior to the plat being recorded. Any new service lines shall either be installed prior to recording the plat or provided a financial guarantee for their installation on residential lots prior to the plat being recorded. A financial agreement between the applicant and the City of Gillette shall be completed. This agreement is known as a Service Line Agreement and it covers the installation or abandonment of service lines only.

Water and sanitary sewer services may be installed at time of development for commercial, institutional and industrial subdivisions.

#### **101.20 FINAL SUBMITTAL REQUIREMENTS AND PROCEDURES:**

Applicants seeking approval of Final Plans for construction of developments and other public improvements on private developer contracted projects as deemed necessary by the City Engineer shall follow the requirements and submittal procedures outlined in this section. The Final Construction Plan submittal and review process is administered by the

City Engineering Division. This process is directly linked to the associated application for Permit to Construct for the infrastructure improvements presented in the Final Plans. These documents are submitted to the Engineering Division via ePlans and are separate from the Final Plat submittal which is required and administered by the Planning Division.

#### **101.21 FINAL SUBMITTAL REQUIREMENTS:**

A. **CONSTRUCTION DRAWINGS/FINAL PLANS.** The final plans shall include the following, if applicable: cover sheet, notes and legends sheet, final plat, overall grading plan, detailed grading plan, erosion and sediment control plan, final drainage plan, overall utility plan, electrical and dry utility plan, street and alleys (if applicable) plans and profiles, temporary traffic control plan, signing and striping plan, sanitary sewer main plans and profiles, water main plans and profiles, storm sewer plans and profiles, and detail sheets. These plans shall include the applicable information detailed in the Final Submittal Checklist. The Plans shall be in conformance with the City of Gillette CAD Standards and shall be prepared by a Professional Engineer licensed to practice in Wyoming.

B. **GEOTECHNICAL INVESTIGATION REPORT.** The final submittal shall include a geotechnical investigation report, prepared by a Professional Engineer registered to practice in Wyoming, which identifies any special geotechnical hazards, and develops recommendations regarding the hazards, grading, and pavements. Four (4) separate reports: Geotechnical Hazards, Grading, Pavement Design, and Subsurface Profile (Soil Borings) are required and may be submitted together as long as they comprise a complete report.

1. The Geotechnical Hazards portion shall consider but not be limited to: expansive or collapsible soils, slope instability, groundwater, springs, mine subsidence, and any other geotechnical or geological hazards the investigating Engineer becomes aware of. The report shall include a map illustrating the location of potential hazards.

2. The Grading portions shall include: data regarding the distribution and engineering characteristics of the various soils; data about groundwater levels, especially those within the depth of influence to proposed structures; the geotechnical feasibility of development as planned; recommendations concerning mitigation of geotechnical/geologic hazards, grading criteria, and any other information pertinent to the proposed land use.

3. The Pavement Design portion shall include the vertical and horizontal distribution of various subgrade soils, and for each soil type, design tests and correlations to estimate the resilient modulus. The pavement design procedure and all assumptions used (including the average daily traffic and equivalent 18 kip single axle load calculations) to determine the pavement section(s) shall be presented. The selected design procedure must not result in a lesser pavement section than would have resulted from use of the procedures outlined in Sections 609 and 610.

4. Soils shall be classified in accordance with the Unified Soil Classification System (ASTM D:2487 / ASTM D:2488) or the AASHTO (M 145-91) Classification system. The classification and engineering properties of

representative soils shall be confirmed by the appropriate ASTM tests and observations.

Soil strength, effect of engineering properties due to moisture variation in soil, bearing capacity, compressibility/collapse potential, and expansive properties shall be established using the appropriate ASTM test procedures on representative, relatively undisturbed soil samples. It is required there be a minimum of one (1) boring per five-hundred (500) longitudinal feet of R.O.W. being developed or rehabilitated. Each boring shall adequately depict subsurface conditions within the street right-of-way. The minimum depth of each boring shall be five (5) feet below the base of pavement, at least ten (10) feet below the bearing elevation of proposed structures, and at least fifteen (15) feet below the proposed final grade. Drilling methods for borings below the groundwater table shall be by hollow stem auger, mud rotary, or other submitted method approved by the City Engineer.

Soil sampling shall be performed by ASTM D1586-99 (2000) Standard Test Method for Penetration Test and Split Barrel Sampling of Soils. The sampling interval shall be no greater than every five (5) feet of boring depth. In very soft soils, Standard Penetration Tests can be supplemented by ASTM D 1587-94 (2000) Standard Practice for Thin-Walled Tube Geotechnical Sampling of Soils. Alternative sampling methods shall be used only as approved by the City Engineer.

C. WATER AND SANITARY SEWER DESIGN REPORTS. The final submittal shall include a Water System Design Report and a Sanitary Sewer System Design Report, as applicable, and shall be prepared by an Engineer registered to practice in Wyoming. The report(s) shall conform to the requirements of Wyoming Department of Environmental Quality (DEQ) as outlined in their Water Quality Rules and Regulations, Chapters 11 and 12.

D. FINAL DRAINAGE REPORT. The final submittal shall include a Final Drainage Report, prepared in conformance with the City of Gillette Storm Drainage Design Manual by a Professional Engineer licensed to practice in Wyoming.

E. TRAFFIC IMPACT ANALYSIS REPORT. If applicable, the final submittal shall include a Traffic Impact Analysis Report. (see Section 611)

F. STORMWATER PERMIT APPLICATION AND STORMWATER POLLUTION PREVENTION PLAN (SWPPP). The final submittal shall include a copy of the Stormwater Permit Application and SWPPP in accordance with the City of Gillette Storm Drainage Design Manual.

G. SUBMITTAL OF FORMS. The [Application for Permit to Construct](#) (PTC) and [Final Submittal Check List](#) shall be completed, signed, and submitted with the final plans.

H. VARIANCES. If the Applicant desires to design and construct improvements in variance to criteria in these standards, such variance(s) should be identified in the initial submittal of the construction plans. The variance request(s) shall consist of:

1. Identification of the criteria provisions to be waived or varied.

2. Identification of the alternative design or construction criteria to be adhered to.
3. A thorough justification of the variance request including impact on capital and maintenance requirements and cost.

### **101.22 FINAL SUBMITTAL PROCEDURES:**

The Final Plans submittal procedures are completed via the ePlans program through the Engineering Division. This creates a separate permit number that will be associated with the DEQ Permit to Construct (PTC) and is different from the project number that was used to upload the Preliminary Plan documents through the City Planning Division. The City of Gillette website, Engineering Division, can be referenced for guidance and instructions on using ePlans.

A. The Applicant shall submit the completed Final Plans along with the Geotechnical Investigation Report, Water System Design Report, Sanitary Sewer System Design Report, Final Drainage Report, Traffic Impact Analysis Report, Stormwater Permit Application and SWPPP to the City of Gillette Engineering Division for review and approval.

The Application for Permit to Construct and the Final Submittal Check List must be submitted with the Final Plans.

B. The Final Plans along with the associated Final Reports and Application for Permit to Construct must be approved by the Engineering Division before the Permit to Construct will be issued.

C. The Permit to Construct must have been issued at least one (1) week before the resolution approving the final plat is scheduled for reading at the Gillette City Council. If the Permit to Construct has not been issued at least one (1) week prior to the scheduled reading, the reading of the final plat resolution shall be taken off of the City Council Agenda until such time the Permit to Construct is issued.

D. No construction will begin on a project before the Permit to Construct has been issued, except that a Grading Only Permit may be issued by the City Engineer upon approval of the final overall grading plan, erosion and sediment control plan and any applicable detail sheets, and issuance of a Storm Water Permit.

### **101.30 PERMITTING PROCEDURES:**

The City of Gillette has received authority from the State of Wyoming Water Quality Division of the Department of Environmental Quality to regulate publicly owned or controlled sewage collection facilities and publicly owned or controlled water distribution facilities. The delegation of this authority to the City of Gillette requires that the City administer the Permit to Construct.

No construction for developments or other public improvements on private development contracted projects as deemed necessary by the City Engineer, and no construction, installation, or modification of public infrastructure including but not limited to: a public

water supply, sewerage system, treatment works, disposal system, or other facility capable of causing or contributing to pollution shall be allowed unless a Permit to Construct has been obtained from the City Engineer.

### **101.31 APPLICATION REQUIREMENTS:**

A. Any person who proposes to construct, install, or modify a facility required to be permitted shall submit one (1) copy of the Application for Permit to Construct, which is incorporated herein by this reference. A digital version of this document may be emailed to the Engineering Division or can be uploaded into ePlans to start the process, but an original signed copy must also be submitted in order for the Permit to Construct to be issued.

B. The Application for Permit to Construct must be accompanied by the Final Plans, Final Design Report(s), Stormwater Permit Application and SWPPP, other pertinent information covering the project, and any additional information required by the City Engineer.

C. All plans and design reports submitted shall carry the seal and signature of the designing engineer, who must be a Professional Engineer registered in the State of Wyoming.

### **101.32 APPLICATION PROCESSING PROCEDURES:**

All applications for Permit to Construct will be processed in the following manner:

A. The City Engineer shall review each completed application to determine whether:

1. The Application meets minimum applicable standards and the requirements of the City of Gillette Standard Construction Specifications, Design Standards, and D.E.Q. Water Quality Rules and Regulations, and should be authorized; or
2. The Application should be authorized with modification.

B. Incomplete applications will be processed in the following manner:

1. Additional information will be requested from the applicant in order to complete the review.
2. If the application is grossly incomplete, it will be returned to the applicant with a request for completion and re-submittal on a new application.
3. If an application is returned to the applicant because of incompleteness, the applicant shall have a maximum of six (6) months to provide the additional information. If the applicant fails to provide the requested information within that period, the entire incomplete application shall be denied and the application returned to the applicant.
4. If the applicant does not address all comments and make the appropriate revisions identified in the initial review on the re-submittal, a charge of \$100.00 will be assessed for review of each submittal thereafter.

C. The application will be reviewed and final action taken by the City Engineer within fifteen (15) working days. The review time will be lengthened if the submittal is incomplete and additional information is requested.

D. All plans and reports must meet or exceed the City of Gillette Standard Construction Specifications and Design Standards and applicable regulations.

E. Each application will be reviewed on its own merit. Processing of an application with respect to recommendations or required changes will be done in accordance with the provisions of applicable statutes, rules and regulations enforced by the City Engineer.

F. The City Engineer shall promptly notify the applicant in writing of the final action taken on the application. If the conditions of the permit are different from the proposed application submitted by the applicant for review, the notification shall include reasons for the changes made.

G. If, upon review of an application, the City Engineer determines that a permit is not required, the City Engineer shall notify the applicant of this determination in writing. Such notification shall constitute final action on the application.

### **101.33 DURATION, TERMINATION, AND TRANSFER OF PERMITS:**

A. The City Engineer may require an expiration date less than two (2) years on the permit issued. Those permits issued without a specified expiration date will be in force no more than two (2) years from the date of issuance.

B. Permits will be issued only to the official applicant of record, who must be the owner of the permitted facility, for only the type of construction of record and shall be automatically terminated:

1. Within sixty (60) days after sale or exchange of the facility.
2. Upon issuance of a new, renewed or modified permit.
3. Upon written request of the permittee.

C. Permits may be transferred to new owners by completion and submittal of application forms by the new owner to the City Engineer. The new owner shall also submit a written request from the existing owner to transfer ownership. The City Engineer shall act within ten (10) working days after receipt of the request.

D. Any conditions established in a construction, installation or modification permit would be automatically transferred to the new owner whenever a transfer of ownership of the facility occurs.

### **101.34 RENEWAL OF A PERMIT**

A permit may be renewed on the following conditions:

A. A written statement is filed with the City Engineer stating that there will not be any changes in the plans for construction, installation, or modification of a permitted facility.

The written statement should be filed with the City Engineer prior to the expiration date of the permit; and

B. No modifications to the permit are required under Section 101.36 of these regulations.

**101.35 DENIAL OF A PERMIT:**

A. The City Engineer may deny a permit for any of the following reasons:

1. The application is grossly incomplete or does not meet applicable City of Gillette Standard Construction Specifications and Design Standards;
2. The project, if constructed, will cause violation of applicable State surface or groundwater standards;
3. The project does not comply with applicable State and local water quality management plans;
4. The project, if constructed, would result in hydraulic and/or organic overloading of wastewater facilities;
5. The project, if constructed, would result in public water supply demand in excess of source, treatment or distribution capabilities; or
6. Other justifiable reasons necessary to carry out the provisions of the City's Agreement with WDEQ and the Environmental Quality Act.

B. If the City Engineer proposes to deny issuance of a permit, the applicant shall be notified by registered or certified mail of the intent to deny and the reason for denial.

C. In the case of denial of a permit by the City Engineer, the applicant, if he so desires, may request a hearing before the City Administrator. The request for a hearing shall be made in writing within twenty (20) days of notification of this denial to the City Administrator, and shall state the grounds for the request.

**101.36 MODIFICATION OF PERMIT:**

A. When reviewing an application or before construction on a facility is completed, the City Engineer may modify a permit due to the following reasons:

1. Changing site conditions which would result in violations of the City's standards and regulations;
2. Receipt of additional information; or
3. Any other reason necessary to meet applicable statutes, standards or regulations.

B. The City Engineer shall notify the permittee by registered or certified mail of intent to modify the permit.

C. Such notification shall include the proposed modification and the reasons for modification and time frame to have modifications constructed, installed and operational. Modification requirements shall be implemented before construction, installation, or modification of a facility is completed.

D. The modification shall become final within twenty (20) days from the date of receipt of such notice unless within that time the permittee requests a hearing before the appropriate body. Such request for a hearing shall be made in writing to the City Engineer and shall state the grounds for the request. Any hearing held shall be conducted pursuant to Chapter 2 of the City of Gillette City Code.

E. A copy of the modified permit shall be forwarded to the permittee as soon as the modification becomes effective.

### **101.37 SUSPENSION OR REVOCATION OF A PERMIT:**

A. The City Engineer may suspend or revoke a permit before construction, installation or modification of a facility is completed for the reasons set forth below, in item C.

B. Before a permit may be suspended or revoked, the permittee shall be given an opportunity to show compliance with all lawful requirements for the retention of the permit.

C. The City Engineer shall notify the permittee by registered or certified mail of its intent to suspend or revoke the permit in the event that it becomes necessary due to:

1. non-compliance with the terms of the permit; or
2. unapproved changes in design or construction; or
3. false information submitted in the application; or
4. conflict with an approved water quality management plan prepared under Sections 303, 208 and/or 201 of the Federal Clean Water Act, as amended.
5. any other reasons necessary to meet applicable statutes, standards or regulations.

D. The notification shall include the reasons for suspension or revocation.

E. The suspension or revocation shall become final twenty (20) days from the date of receipt of such notice unless within that time the permittee requests a hearing before the appropriate body. Such a request for a hearing shall be made in writing to the City Engineer and shall state the grounds for the request. Any hearing held shall be conducted pursuant to Chapter 2 of the City of Gillette City Code.

F. The City Administrator, and the Director of Environmental Quality Council, may suspend or revoke permits issued by the City Engineer in the event that there is non-compliance with any of the provisions of item (C) above. Suspension or revocation shall become final twenty (20) days from the receipt of such notice unless within that time the permittee or delegated local entity requests a hearing before the Environmental Quality Council. Such a request shall be made in writing to the Director and shall state the grounds for the request. Any hearing shall be conducted pursuant to the regulations of the Department of Environmental Quality.

### **101.38 PROVIDING INFORMATION**

The City Engineer shall return a copy of the executed Permit To Construct with an associated comment letter that contains the pertinent review comments to the permit applicant, and a digital copy of the same documents to the Engineer of Record.

### **101.40 NOTICE OF CHANGE IN ENGINEERING SERVICES:**

If the Owner changes the construction engineering firm or the engineering materials testing firm during the construction phase of the project, the City shall be notified immediately.

### **101.50 FORMS:**

- [Application for Permit to Construct](#)
- [Final Submittal Check List](#)

### **101.60 PRE-CONSTRUCTION MEETING**

The Developer, Engineer, Inspector, and the Contractor's Superintendent shall meet for a pre-construction meeting with the City Engineer, or his representative, before construction begins. The purpose of the meeting is to discuss the following: contractor's schedule, any road closures, construction traffic routes, construction traffic control plans, dust prevention, SWPPP, locations of fill disposal sites, locations of imported borrow sites, and any special conditions of the Permit to Construct.

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**APPLICATION FOR PERMIT TO CONSTRUCT  
CITY OF GILLETTE**

1. **Name of Project** \_\_\_\_\_

2. **Location of Project** \_\_\_\_\_ ¼, \_\_\_\_\_ ¼, Sec \_\_\_\_\_, T \_\_\_\_\_ N, R \_\_\_\_\_ W.

General Physical Address: \_\_\_\_\_

3. **Does this project include:**

A. **Public water supply well?**

\_\_\_\_\_ Yes \_\_\_\_\_ No

B. **Potable water supply pumping station?**

\_\_\_\_\_ Yes \_\_\_\_\_ No

If yes, what is the design flow (GPM)? \_\_\_\_\_ GPM

C. **Potable water storage facility?**

\_\_\_\_\_ Yes \_\_\_\_\_ No

If yes, what is the size (GAL)? \_\_\_\_\_ Gallons

D. **Potable water mains?**

\_\_\_\_\_ Yes \_\_\_\_\_ No ( \_\_\_\_\_ New \_\_\_\_\_ Replacement)

If yes, what is the additional peak day demand (GPD)? \_\_\_\_\_ GPD

E. **Sanitary sewage pumping station and force main?**

\_\_\_\_\_ Yes \_\_\_\_\_ No ( \_\_\_\_\_ New \_\_\_\_\_ Replacement)

If yes, what is the design flow (GPM)? \_\_\_\_\_ GPM

F. **Sanitary sewage collection lines?**

\_\_\_\_\_ Yes \_\_\_\_\_ No ( \_\_\_\_\_ New \_\_\_\_\_ Replacement)

If yes, what is the additional average daily volume (GPD)? \_\_\_\_\_ GPD

G. **Site Drainage?**

i. **Open Channels?**

\_\_\_\_\_ Yes \_\_\_\_\_ No ( \_\_\_\_\_ New \_\_\_\_\_ Replacement)

i. **Storm Drains?**

\_\_\_\_\_ Yes \_\_\_\_\_ No ( \_\_\_\_\_ New \_\_\_\_\_ Replacement)

iii. **Culverts/Hydraulic Structures?**

\_\_\_\_\_ Yes \_\_\_\_\_ No ( \_\_\_\_\_ New \_\_\_\_\_ Replacement)

iv. **Detention Ponds?**

\_\_\_\_\_ Yes \_\_\_\_\_ No ( \_\_\_\_\_ New \_\_\_\_\_ Replacement)

v. Water Quality Structures?  
\_\_\_\_\_ Yes \_\_\_\_\_ No ( \_\_\_\_\_ New \_\_\_\_\_ Replacement)

H. Public Streets/sidewalks/approaches?

\_\_\_\_\_ Yes \_\_\_\_\_ No ( \_\_\_\_\_ New \_\_\_\_\_ Replacement)

I. Earthwork/Overlot Grading

\_\_\_\_\_ Yes \_\_\_\_\_ No

Total area of disturbance \_\_\_\_\_ AC  
Stormwater Permit Application Submitted \_\_\_\_\_ Yes \_\_\_\_\_ No  
WYPDES Permit \_\_\_\_\_ Yes \_\_\_\_\_ No \_\_\_\_\_ NA

J. Drainage Report Completed?

\_\_\_\_\_ Yes \_\_\_\_\_ No

Title of Report: \_\_\_\_\_  
Prepared by: \_\_\_\_\_

K. Water System Design Report Completed?

\_\_\_\_\_ Yes \_\_\_\_\_ No

Title of Report: \_\_\_\_\_  
Prepared by: \_\_\_\_\_

L. Sewer System Design Report Completed?

\_\_\_\_\_ Yes \_\_\_\_\_ No

Title of Report: \_\_\_\_\_  
Prepared by: \_\_\_\_\_

M. Traffic Impact Analysis Report Completed?

\_\_\_\_\_ Yes \_\_\_\_\_ No

Title of Report: \_\_\_\_\_  
Prepared by: \_\_\_\_\_

N. Geotechnical Report Completed?

\_\_\_\_\_ Yes \_\_\_\_\_ No

Title of Report: \_\_\_\_\_  
Prepared by: \_\_\_\_\_

O. Development in the Floodway/Flood Plain?

\_\_\_\_\_ Yes \_\_\_\_\_ No

If yes, describe the type of improvement proposed (within the Flood Plain):

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

And provide a description of the extent to which any watercourse will be altered or

relocated as a result of the proposed development:

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And provide certification by a registered professional engineer or architect that the criteria in City Code, Section 5-85(b) [§ 7-13(b)] SPECIFIC STANDARDS are met.

**I certify that the above described facility has been submitted in accordance with local and state rules and regulations. I have authorized the following engineering and testing firm to act upon my behalf during the design and construction phases of the project. They are authorized on my behalf to receive and release correspondence regarding this project to the City of Gillette. If I fail to comply with the obligations stipulated within local and state rules and regulations, I hereby authorize the City of Gillette to act as necessary, and upon 20 day written notice, on my behalf, and at my expense, to mitigate any known violations such that they are in compliance with all local and state rules and regulations.**

Name of Owner of the Project: \_\_\_\_\_

Mailing Address: \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

Business Phone: \_\_\_\_\_ Home Phone: \_\_\_\_\_

\_\_\_\_\_  
Print Owner Name

\_\_\_\_\_  
Signature of Owner Date

Name of Engineering Firm: \_\_\_\_\_

Mailing Address: \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

Business Phone: \_\_\_\_\_

Name of Professional Engineer \_\_\_\_\_

Engineer's P.E. Number \_\_\_\_\_

\*Name of Testing Firm: \_\_\_\_\_

Mailing Address: \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

Business Phone: \_\_\_\_\_

*\*If the Engineering Firm is responsible for quality control and testing on the project, write "same" on this line.*  
Forms:Application for Permit to Construct

Utility Operator of the Project: \_\_\_\_\_

Mailing Address: \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

Business Phone: \_\_\_\_\_ Home Phone: \_\_\_\_\_

\_\_\_\_\_  
Utility Operator Name

\_\_\_\_\_  
Signature of Operator Date

# FINAL SUBMITTAL CHECK LIST

\_\_\_\_\_  
(Name of Subdivision or Project)

**For City Use Only**

- Preliminary Construction Plans     Record Drawings
- Final Construction Plans

<b>Submitted</b>   <b>N/A</b> (to be completed by the Engineer/applicant)	Accepted No Exceptions Taken	Revise and Resubmit	Construct as Corrected
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**FORMS AND REPORTS**

<input type="checkbox"/>	<input type="checkbox"/>	Application for Permit To Construct (PTC) <i>(can be found on the City Website)</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	Final Drainage Report	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	Water System Design Report	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	Sanitary Sewer System Design Report	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	Geotechnical Report <i>(Subsurface Investigation)</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	Traffic Impact Analysis <i>(only required if projected trip generation equals 250 trips/day or 100 peak hour trips)</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	Construction Drawings <i>(must utilize City CAD Standards)</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	Stormwater Permit Application	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	SWPPP	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**COVER SHEET**

<input type="checkbox"/>	<input type="checkbox"/>	Vicinity Map	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	Subdivision or Development Project Name	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	Project Location	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	Complete Index of Sheets	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	Certification Statement, P.E. Seal, and Signature	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	Identify Benchmark Used for Elevation Data	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**NOTES AND LEGENDS**

<input type="checkbox"/>	<input type="checkbox"/>	Standard Construction Notes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	Linetype Legend	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	Symbol and Hatch Pattern Legend	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**FINAL PLAT**

<input type="checkbox"/>	<input type="checkbox"/>	Bearings	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	North Arrow	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	Scale Bar and Written Scale	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	Block and Lot Numbers and Dimensions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	Street Names	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	Easements for Utilities and Drainage	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	Complete Legend <i>(symbols, linetypes, hatching)</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**For City Use Only**

Submitted   N/A	Accepted No Exceptions Taken	Revise and Resubmit	Construct as Corrected
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**OVERALL GRADING PLAN**

<input type="checkbox"/>	<input type="checkbox"/>	Property Boundary Lines	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	Existing Contour Lines (dashed and shaded)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	Proposed Contour Lines (solid w/ elevation labels)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	Spot Elevations (TBC, PCR, FL, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	Proposed Streets and Lot Lines (shaded)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	Designate Controlled Fill Areas > 2'	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**DETAILED GRADING PLAN**

<input type="checkbox"/>	<input type="checkbox"/>	Existing Contour Lines (dashed and shaded)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	Proposed Contour Lines (solid w/ elevation labels)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	Spot Elevations (TBC, PCR, FL, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	Show Inter-Lot Drainage Flow Patterns Using High (HP) and Low (LP) Point Spot Elevations, Contour Lines, Drainage Swales (Ditches), and Flow Arrows	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	Building or Housing Footprint Locations (shaded)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	Proposed Streets and Lot Lines (shaded)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	Recommended Top of Foundation Elevations (shaded)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**EROSION AND SEDIMENT CONTROL PLAN**

<input type="checkbox"/>	<input type="checkbox"/>	Property Boundary Lines	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	Existing Contour Lines (dashed and shaded)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	Proposed Contour Lines (solid w/ elevation labels)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	Proposed Streets and Lot Lines (shaded)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	Limits of Disturbance (include total area)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	Show the Locations of Necessary BMPs Including: <i>(silt fence, inlet protection, outlet protection, hay bales, wattles, vehicle tracking control, etc.)</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**For City Use Only**

Submitted | N/A

Accepted No Exceptions Taken	Revise and Resubmit	Construct as Corrected
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**FINAL DRAINAGE PLAN**

DRAINAGE BASINS, CONTOURS, AND FLOW PATTERNS

___	___	Existing and Proposed Contour Lines	___	___	___
___	___	Existing and Proposed Drainage Easements	___	___	___
___	___	Location and Elevation of All Existing Floodplain	___	___	___
___	___	Existing Drainage Facility and Structure locations	___	___	___
___	___	Overall Drainage Basin and Sub-basin boundaries	___	___	___
___	___	Drainage Flow Arrows ( <i>post-development patterns</i> )	___	___	___
___	___	Detention Pond Locations and Volume Information	___	___	___

STORM SEWER

___	___	Proposed Storm Sewer and Open Channel Locations Including: ( <i>inlets, manholes, culverts, and other appurtenances; riprap sizing and location; profiles showing existing and proposed pipe sizes, materials, and grades; and hydraulic grade lines for minor and major storm runoff</i> )	___	___	___
___	___	Outlet Structure Location and Information	___	___	___
___	___	Proposed Outfall Points for Runoff from the Site ( <i>post-development</i> )	___	___	___
___	___	Stormwater Quality Facility locations	___	___	___

**OVERALL UTILITY PLAN**

WATER

___	___	Existing and Proposed Fire Hydrant Locations and Spacing Per Latest Edition of the IFC ( <i>Appendix C</i> )	___	___	___
___	___	Length, Size, and Type of Proposed Pipe Material	___	___	___
___	___	Valve and Fitting ( <i>tees, reducers, etc.</i> ) Locations	___	___	___
___	___	All Water Service Connection Locations	___	___	___

**For City Use Only**

Submitted | N/A

Accepted No Exceptions Taken	Revise and Resubmit	Construct as Corrected
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**OVERALL UTILITY PLAN (continued)**

SANITARY SEWER

___	___	Existing and Proposed Manhole Locations and Spacing Per Latest Edition of the Wyoming D.E.Q. Rules & Regulations ( <i>Chapter 11</i> )	___	___	___
___	___	Length, Size, and Type of Pipe Material	___	___	___
___	___	Slope of All Proposed Sewer Lines	___	___	___
___	___	All Sanitary Sewer Service Connection Locations and Existing Invert Elevations of Tie-in Manholes	___	___	___

**ELECTRICAL & DRY UTILITY PLAN**

ELECTRICAL, CABLE TV, TELEPHONE, GAS

___	___	Existing and Proposed dry utility locations	___	___	___
-----	-----	---	-----	-----	-----

**STREET AND ALLEYS (IF APPLICABLE) PLANS AND PROFILES**

___	___	Plans and Profiles for Every Street and/or Alley ( <i>the plan and profile must be located on one sheet and the plan view shall always be located directly above the profile view</i> )	___	___	___
___	___	Grade labels for Every Street and/or Alley	___	___	___
___	___	Arrows Indicating Direction of Stormwater Flow on Plan View	___	___	___
___	___	Show Linework and Label Sidewalk Location/Width	___	___	___
___	___	Show Linework for Curb and Gutter	___	___	___
___	___	Show and Label Right-of-way (R.O.W.) and Street Widths ( <i>per latest edition of the C.O.G. Design Standards and the Subdivision Regulations</i> ), Curves, Radius Points, and Lengths of Cul-de-sacs	___	___	___
___	___	Show Access to All Lots	___	___	___
___	___	Show at Least Two (2) Access Points to the Site	___	___	___
___	___	Detailed Street Cross-Sections (for each street) ( <i>include pavement type &amp; thickness, base thickness, depth of sub-grade prep, and other pertinent measurements (sidewalk, blvd., etc.)</i> )	___	___	___

**For City Use Only**

Submitted | N/A

Accepted No Exceptions Taken	Revise and Resubmit	Construct as Corrected
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**TEMPORARY (DURING CONSTRUCTION) TRAFFIC CONTROL PLAN**

<input type="checkbox"/>	<input type="checkbox"/>	Show Exact Locations of Temporary Traffic Control Devices Including: ( <i>cones, barrels, Type III barricades, flashing warning lights, flaggers, etc.</i> )	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	Show Arrows Indicating Detour Traffic Patterns	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	Show Temporary Sign details and MUTCD Numbers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**SIGNING AND STRIPING PLAN**

<input type="checkbox"/>	<input type="checkbox"/>	Street Name Sign Locations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	Stop Signs and Other Regulatory Signs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	Detailed Sign Size/Shape Information	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	MUTCD Numbers for All Proposed Signs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	Street Striping	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**SANITARY SEWER MAIN PLANS AND PROFILES**

<input type="checkbox"/>	<input type="checkbox"/>	Manhole Locations (including stationing)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	Elevations for All Inverts (IN and OUT)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	Percent Grade (slope) for All Mains	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	Exact Locations of All Sewer Services	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	Length, Size, and Type of Pipe Material	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**WATER MAIN PLANS AND PROFILES**

<input type="checkbox"/>	<input type="checkbox"/>	Locations of All Appurtenances (tees, valves, bends, reducers , etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	Length, Size, and Type of Pipe Material	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	Locations of Fire Hydrants	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	Locations of Meter Pits/Curb Stops	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	Depth of Water Mains (5.5' MIN - 6.0' MAX)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**STORM SEWER PLANS AND PROFILES**

<input type="checkbox"/>	<input type="checkbox"/>	Locations of All Appurtenances (inlets, manholes, culverts, trickle channels, swales, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	Length, Size, and Type of Pipe Material	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	Include Cross-Sections of Any Trickle Channels or Swales on These Sheets (for verification of capacity)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**For City Use Only**

<b>Submitted   N/A</b> Standard Drawing Number and Description	Accepted No Exceptions Taken	Revise and Resubmit	Construct as Corrected
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**DETAILS**

EROSION AND SEDIMENT CONTROL DETAILS

		01500-01 Stabilized Construction Entrance			
---	---	01500-02 Storm Drain Inlet Protection	---	---	---
---	---	01500-03 Stormwater Inlet/Outlet Protection	---	---	---
---	---	01500-04 Check Dam	---	---	---
---	---	01500-05 Wattle Detail	---	---	---
---	---	01500-06 Silt Fence	---	---	---
---	---	01500-07 Silt Fence Winter/Frozen Ground	---	---	---
---	---	01500-08 Silt Fence – Gravel Filter	---	---	---
---	---	01500-09 Filter Berm	---	---	---
---	---	01500-10 Sediment Basin	---	---	---
---	---	01500-11 Sediment Trap	---	---	---
---	---	01500-12 Sediment Trap – Straw Bale	---	---	---
---	---	01500-13 Sediment Trap – Straw Bale 2	---	---	---
---	---	01500-14 Sediment Trap – Excavated	---	---	---
---	---	01500-15 Sediment Trap – Earth Berm	---	---	---
---	---	01500-16 Sediment Trap – Ditch	---	---	---
---	---	01500-17 Sediment Trap – Silt Fence	---	---	---
---	---	01500-18 Diversion Swale/Berm	---	---	---
---	---	01500-19 Diversion Berm and Ditch	---	---	---
---	---	01500-20 Diversion Ditch	---	---	---
---	---	01500-21 Temporary Slope Drain	---	---	---
---	---	01500-22 Erosion Control Blanket	---	---	---
---	---	01500-23 Surface Roughening	---	---	---
---	---	01500-24 Terracing	---	---	---
---	---	01500-25 Excavated Concrete Washout	---	---	---

**For City Use Only**

Submitted | N/A Standard Drawing Number and Description

Accepted No Exceptions Taken	Revise and Resubmit	Construct as Corrected
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**DETAILS (continued)**

TRAFFIC CONTROL DETAILS

—	—	01510-01 Project ID Sign (for Capital Projects)			
—	—	01510-02 Sign Installation Detail			
—	—	01510-03 Minor Speed Road - Shoulder Work			
—	—	01510-04 Lane Closure – Minor Street			
—	—	01510-05 Lane Closure with flaggers			
—	—	01510-06 Lane Closure – Low Vol. Two Lane Rd.			
—	—	01510-07 Center Work – Low Volume Road			
—	—	01510-08 Lane Closure – Center Turn Lane			
—	—	01510-09 Intersection Closure – Center			
—	—	01510-10 Intersection Closure – Side			
—	—	01510-11 Intersection Closure – Far Rt. Side Lane			
—	—	01510-12 Intersection Closure – Far Lt. Side Lane			
—	—	01510-13 Lane Closure – Interior Multi-Lane			
—	—	01510-14 Stationary Lane Closure – Multi-Lane			
—	—	01510-15 Temporary Road Closure			
—	—	01510-16 Channelizing Devices			

STREET DETAILS

—	—	02511-01 Typical Street Repair			
—	—	02512-01 Typical Arterial Street Cross Section (Include thickness of surface and sub sub-surface courses)			
—	—	02512-02 Typical Collector/Local Street Sections (Include thickness of surface and sub sub-surface courses)			
—	—	02512-03 Typical Alley Sections (Include thickness of surface and sub sub-surface courses)			
—	—	02528-01 Typical A & C Curb/Gutter w/Sidewalk			
—	—	02530-01 Street Corner w/ and w/o Crossspan			
—	—	02530-02 Residential Driveway Dimensions			
—	—	02530-03 Com/Industrial Driveway Dimensions			
—	—	02530-04 Standard Residential Driveway Detail			
—	—	02530-05 Handicap Ramp Detached Sidewalk – Arterial and Collector Streets			

**For City Use Only**

<b>Submitted   N/A</b> Standard Drawing Number and Description	Accepted No Exceptions Taken	Revise and Resubmit	Construct as Corrected
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**DETAILS (continued)**

___	___	02530-06 Handicap Ramp Attached Sidewalk – Arterial and Collector Streets	___	___	___
___	___	02530-07 Handicap Ramp Detached – Local Streets	___	___	___
___	___	02530-08 Handicap Ramp Attached – Local Streets	___	___	___
___	___	02530-09 Handicap Ramp Parallel	___	___	___
___	___	02530-10 Sidewalk Chase	___	___	___
___	___	02530-11 High Volume Sidewalk Chase	___	___	___
___	___	03251-01 Transverse Joint Details	___	___	___
___	___	03251-02 Longitudinal Joint Details	___	___	___

TRENCH EXCAVATION DETAILS

___	___	01015-01 Carsonite Marker	___	___	___
___	___	02220-01 Water/Sewer/Storm Sewer Trench and Bedding	___	___	___
___	___	02225-01 Cement Treated Fill Pipe Saddle	___	___	___
___	___	02665-03 Typical Utilities Layout	___	___	___
___	___	02665-04 Insulation Board Installation	___	___	___
___	___	02665-06 Water/Sanitary Sewer Bore Casing Detail	___	___	___

SANITARY SEWER DETAILS

___	___	02570-01 Manhole Adjustment Detail	___	___	___
___	___	02700-01 Sanitary Sewer Manhole (Precast)	___	___	___
___	___	02700-02 Sanitary Sewer Manhole (Flat Top)	___	___	___
___	___	02700-03 Standard Steps for Manholes	___	___	___
___	___	02700-04 Manhole Bases (48", 60", 72")	___	___	___
___	___	02700-05 Manhole Channel Details	___	___	___
___	___	02700-06 Sanitary Sewer Service Line	___	___	___

WATER MAIN DETAILS

___	___	02570-02 Water Valve Adjustment Detail	___	___	___
___	___	02645-01 Fire Hydrant Installation	___	___	___
___	___	02645-02 Fire Hydrant Placement	___	___	___
___	___	02645-03 Fire Hydrant Guards (3 Poles)	___	___	___
___	___	02645-04 Fire Hydrant Guards (4 Poles)	___	___	___
___	___	02645-05 Splash Pad for Fire Hydrant Detail	___	___	___
___	___	02645-06 Fire Hydrant Tracer Wire	___	___	___

**For City Use Only**

Submitted   N/A Standard Drawing Number and Description	Accepted No Exceptions Taken	Revise and Resubmit	Construct as Corrected
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**DETAILS (continued)**

		02665-01 Thrust Blocking for Water Main Fittings			
		02665-02 Water Main Valves			
		02665-05 Cathodic Prot./Tracer Wire Test Stations			
		02665-07 2" Air Vacuum Air Release Valve			
		02665-08 3" Air Vacuum Air Release Valve			
		02665-09 4" Air Vacuum Air Release Valve			
		02665-10 Typical Water Service Connection Detail			
		02665-11 Water Meter Pit Frame Cover			
		02665-12 Meter Pit For 1" and Smaller Meters			
		02665-13 Typical Meter Installation 1" and Smaller			
		02665-14 Thermal-Coil Meter Box			
		02665-15 Meter Pit For 1.5" & 2" Meters			
		02665-16 Typical Meter Inst. for 1.5" & 2" Meters			
		02665-17 Typical Meter Pit Placement			
		02665-18 3" and Larger Meter Vault (Inside)			
		02665-19 3" and Larger Meter Vault (Outside)			
		02665-20 Water Access Manhole Ring & Cover			

**SITE DRAINAGE DETAILS**

		02725-01 Single Inlet Detail			
		02725-02 Double Inlet Detail			
		02725-03 Curb Opening Inlet			
		02725-04 Typical Trickle Channel			
		02725-05 Sub-Drain Detail New Construction			
		02725-06 Sub-Drain Detail Existing Construction			
		02725-07 Storm Sewer Manhole Ring & Cover			
		02725-08 Storm Sewer Manhole			
		02725-09 Storm Sewer Manhole (Flat Top MH)			
		02725-10 Single Area Inlet Detail			
		02725-11 Typical Low Flow Channel			

**For City Use Only**

Submitted   <b>N/A</b>	Accepted No Exceptions Taken	Revise and Resubmit	Construct as Corrected
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**GENERAL NOTES**

		Each sheet must show the name of the streets shown thereon (font provided in CAD Template)			
		Each plan and profile sheet must have a location map that shows the pertinent area within the site			
		All Water Sheets shall contain the following notes:			
		1. "All valves are to be installed in the exact locations shown on this plan."			
		2. "All valves are to be installed 18"-24" from tees or crosses."			
		All Sewer Sheets shall contain the following notes:			
		1. "The maximum amount of adjusting rings shall depend upon the height of the ring and cover that is chosen. See Std. Detail # 02665-20, 02700-07, and 02725-07 for the approved amount."			
		2. "Ram-nek shall be installed between the cone Section and the bottom adjusting ring, between all additional adjusting rings (concrete rings), and between the top adjusting ring (concrete) and the cast iron ring & cover."			

**FINAL CONSTRUCTION REPORT (See Section 103)**

		Compaction (Density) Test Results			
		Asphalt Pavement Test Results			
		Concrete Test Results			
		Water Main Pressure Test Results			
		Water Main Disinfection (Bac-T) Test Results			
		Sewer Light Test Results			
		Sewer Leakage Test Results			
		Sewer Deflection Test Results			

**For City Use Only**

Submitted   <b>N/A</b>	Accepted No Exceptions Taken	Revise and Resubmit	Construct as Corrected
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**RECORD DRAWINGS** (See Section 103)

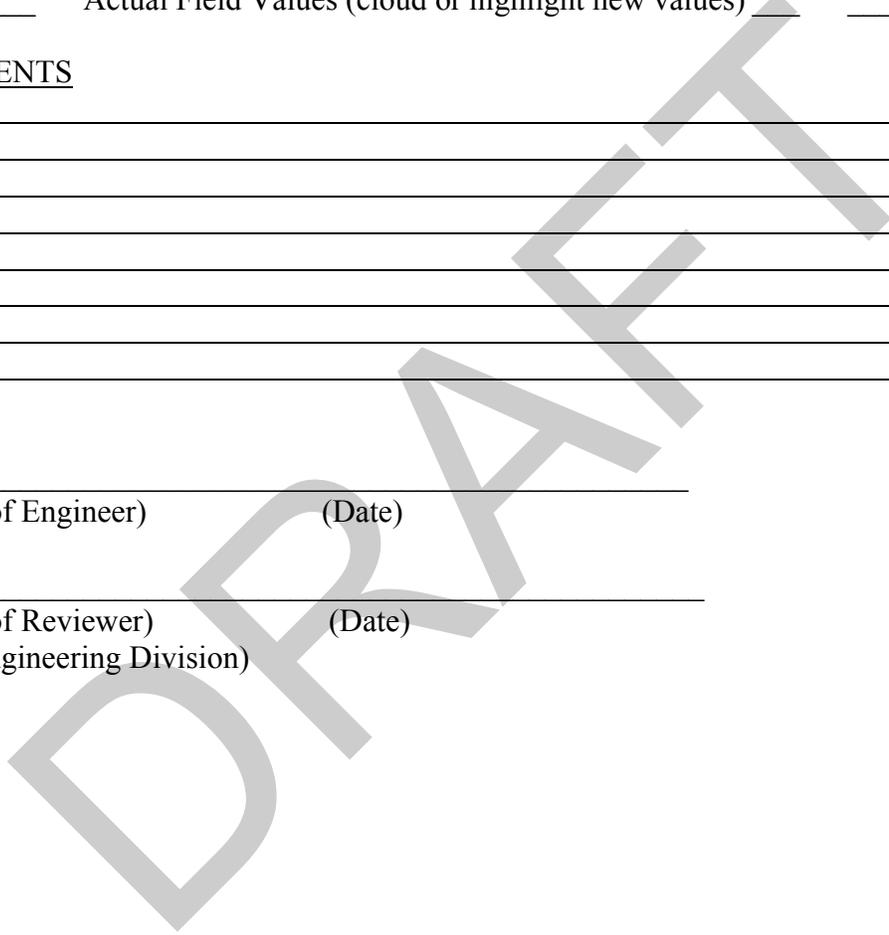
\_\_\_ \_\_\_ Design Values (strike-thru amended values) \_\_\_ \_\_\_ \_\_\_  
\_\_\_ \_\_\_ Actual Field Values (cloud or highlight new values) \_\_\_ \_\_\_ \_\_\_

COMMENTS

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\_\_\_\_\_  
(Name of Engineer) (Date)

\_\_\_\_\_  
(Name of Reviewer) (Date)  
(City Engineering Division)



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SECTION 102

GENERAL CONSTRUCTION  
REQUIREMENTS AND PROCEDURES  
FOR DEVELOPMENT

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## SECTION 102

### GENERAL CONSTRUCTION REQUIREMENTS AND PROCEDURES FOR DEVELOPMENT

#### 102.00 REQUIREMENTS DURING CONSTRUCTION:

##### 102.01 INSPECTIONS:

A. ENGINEER. The Engineer or his project representative shall follow the guidelines set forth in Article 9, ENGINEER'S STATUS DURING CONSTRUCTION, of the General Conditions of the Standard Construction Specifications of the City of Gillette. The Engineer or his project representative shall be present at the site full time for all underground utility installation and backfill, and for a sufficient time during other construction activities to assess compliance with the plans and specifications for each element of the construction. When construction activities warrant the Engineer or his project representative to be on site other than full time, it shall be no less than twice a day.

B. CITY. In addition to the above inspections, the City Engineer's Office shall make periodic inspections during construction of the project.

##### 102.02 WEEKLY REPORTS:

The Engineer or his project representative shall be responsible for submitting weekly progress reports to the City Engineer. The weekly progress report shall include the results of all tests taken during that week. The reports shall be submitted by the end of business on Monday of the following week for the previous week's work.

##### 102.10 TESTING DURING CONSTRUCTION:

Testing during the construction phase shall be done in accordance with the appropriate sections set forth in the City of Gillette Standard Construction Specifications.

##### 102.20 SAFETY:

The Contractor shall comply with and shall require all subcontractors to comply with all applicable health and safety laws, rules and regulations, including without limitations, the Occupational Safety and Health Act of 1970 and the rules and regulations issued pursuant thereto. **Neither the City of Gillette nor the Engineer shall be responsible for safety on the project.**

### **102.30 OPTIONAL INTERIM ACCEPTANCE AND RECORD DRAWINGS PROCEDURES:**

The interim acceptance of water, sanitary sewer, grading, and curb and gutter (as applicable) may be exercised upon request from the Engineer. The curb and gutter requirement is for residential development, or other site improvements that would require the presence of curb and gutter to establish proper foundation elevations above the flow line. This option may be exercised for the potential advancement of the development processes, prior to street surfacing, such as: drawing down the cost of the interim completed infrastructure improvements from the financial guarantee, and/or to gain the ability to obtain building permits within the development project.

This option allows for the Engineer or his project representative to request that the City Engineer inspect the grading, curb and gutter, water, and sanitary sewer improvements after they have been completely installed and before any street surfacing has begun. All required pressure tests and disinfectant tests should have been performed and passed specifications prior to the City inspecting the improvements.

At the time the request for the interim inspection is made, the Engineer shall also submit “Interim Record Drawings” on the curb and gutter grade elevations at the midpoint of each lot, water, and sanitary sewer improvements. Attached to the interim plans will be the “Interim Record Drawings Approval Check List”, included in this section. All items on the checklist shall be completed prior to approval of the interim acceptance by the City Engineer.

Two, size B (11” X 17”), black line copies of the “Interim Record Drawings” plans shall be submitted. Included on those drawings shall be top of curb and gutter elevations at center of each lot, all manhole inverts, the slope of all sanitary sewer lines, the stationing of all sanitary sewer services, inverts on all sanitary sewer service stub-outs, and the stationing of all water services.

The approval of the grading, curb and gutter, water, and sanitary sewer improvements and the “Interim Record Drawings” plans shall be done only to start the process of issuing building permits. The approval does not mean that the water and sanitary sewer improvements are being final accepted for City maintenance.

**INTERIM RECORD DRAWINGS  
APPROVAL CHECK LIST**

1. Inspection of grading (overlot and roadway), curb and gutter, water, and sewer improvements by:
  - a. \_\_\_\_\_ City Engineering Division
  - b. \_\_\_\_\_ City Water Division
  - c. \_\_\_\_\_ City Wastewater Division
  
2. Grading, Sewer, Water, and Curb and Gutter Improvement Interim Record Drawings Checklist:
  - a. \_\_\_\_\_ Water services stationed on drawing
  - b. \_\_\_\_\_ Sewer services stationed on drawing with stub invert elevations
  - c. \_\_\_\_\_ Manhole inverts
  - d. \_\_\_\_\_ Slope of all sanitary sewer lines
  - e. \_\_\_\_\_ Curb and gutter with top of curb elevations at the midpoint of each lot
  
3. Test Results for the following tests (as applicable):
  - a. \_\_\_\_\_ Water Pressure Test
  - b. \_\_\_\_\_ Water Disinfection (City Water Dept. present during filling and flushing)
  - c. \_\_\_\_\_ Sewer Light Test
  - d. \_\_\_\_\_ Sewer Leakage Test
  - e. \_\_\_\_\_ Sewer Deflection Test
  - f. \_\_\_\_\_ Sewer Manhole Vacuum Test (if required due to groundwater)
  - g. \_\_\_\_\_ Trench Compaction Test
  - h. \_\_\_\_\_ Subgrade and Base Course Compaction Tests (as applicable)
  - i. \_\_\_\_\_ Concrete Tests Performed (results as available)
  
4. Site grading and public utility improvements checklist:
  - a. \_\_\_\_\_ Overlot grading per submitted Plans?
  - b. \_\_\_\_\_ Erosion & Sediment Control per submitted Plans?
  - c. \_\_\_\_\_ Water (valves open), sanitary sewer, storm sewer components per Plans?

Comments: \_\_\_\_\_  
\_\_\_\_\_

\_\_\_\_\_  
(Project Engineer)

\_\_\_\_\_  
(City Reviewer)

\_\_\_\_\_  
(Date)

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SECTION 103

GENERAL REQUIREMENTS AND  
PROCEDURES FOR ACCEPTANCE  
OF A PROJECT

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## **SECTION 103**

### **GENERAL REQUIREMENTS AND PROCEDURES FOR ACCEPTANCE OF A PROJECT**

#### **103.00 GENERAL:**

Engineers seeking City acceptance of the completed public improvements on Private Development Contracted Projects and on certain City Contracted Projects shall follow the requirements and procedures outlined in this section.

#### **103.10 REQUIREMENTS:**

##### **103.10.1 FINAL INSPECTION:**

At completion of the project, the Engineer shall request from the City Engineer, in writing, a Final Inspection of the public improvements.

##### **103.10.2 RECORD DRAWINGS:**

At the time the Engineer requests the Final Inspection, he shall submit "Record Drawings" of the project.

A. One electronic copy, two unbound sets and one bound set of size B (11X17) black line prints shall be submitted to the City Engineering Division for review.

B. The "Record Drawings" shall be certified and submitted with the following statement included on the plans:

"I certify that the construction inspection and "Record Drawings" preparation were performed by me or under my direct control and supervision. The construction details as shown on these "Record Drawings" are accurate and complete to the best of my knowledge and belief."

##### **103.10.3 RECORD DRAWING FORMAT**

1. The paper size for Record Drawings shall be size B (11X17).
2. The minimum scale ratio for plan and profile sheets shall be 1" = 60'.
3. CD, DVD, FTP site, Flash/Jump Drive, or other acceptable electronic version of Record Drawings in CAD (.dwg) format.

##### **103.10.4 FINAL SUBMITTAL CHECKLIST:**

The Final Submittal Checklist, available at the City Engineer's Office shall be filled out, signed by the responsible Engineer, and submitted with the "Record Drawings".

(An example copy of the checklist is presented at the end of the Section 101.50)

### **103.10.5 FINAL REPORT:**

A Final Report shall be submitted to the City Engineer upon completion of the project. The Engineer shall compile the Final Report or the Engineer may ask the Engineering Materials Testing Firm to complete the report.

The report shall include a brief summary of the testing on the project and a statement as to whether the observations and tests indicate that the various materials in place comply with the plans and specifications.

Included also in the report shall be the following information:

1. A summary of all Field Density Tests and Compaction Tests on trench backfill, on street subgrade and base material and on any fill material;
2. Asphalt pavement mix design and all results on Marshall, Gradation, Asphalt Content and Compaction Tests;
3. All Concrete mix designs and all test results on Air Content, Slump, Unit Weight, Compressive Strength at 7 and 28 days;
4. A summary of all water pressure, leakage and disinfection tests and sewer light, leakage and deflection tests;
5. A copy of the application for Permit to Construct with any applicable revisions;
6. Any other information that may add to the integrity of the report.

### **103.10.6 CERTIFICATE OF COMPLIANCE:**

A Certificate of Compliance must be submitted to the City Engineer upon completion of the project.

### **103.20 PROCEDURE:**

#### **103.20.1 FINAL INSPECTION:**

The City and the Engineer shall make the final inspection of all public improvements in the project. If there are any items that are not in conformance with the City Specifications, the Private Developer and Engineer will be notified. The Private Developer shall be required to bring the items into conformance. On City contracted projects, the Contractor shall be notified and required to bring the items into conformance.

### **103.20.2 RECORD DRAWINGS:**

The City Engineering Division shall review the “Record Drawings”. If the plans need to be revised or if additional information is required, a set of prints will be returned to the Engineer. The Engineer shall then revise and resubmit the “Record Drawings”.

### **103.20.3 TWO-YEAR WARRANTY STATEMENT:**

Private Development Projects shall provide a two-year warranty statement covering all the public improvements in the project.

### **103.20.4 RECOMMENDATION OF ACCEPTANCE:**

When the public improvements have passed the final inspection, the “Record Drawings” have been stamped and approved, and the Warranty Statement has been provided, the City Engineer shall make a written recommendation to the Gillette City Council to accept the public improvements for maintenance.

### **103.30 WARRANTY PERIOD ON PUBLIC IMPROVEMENTS:**

The warranty period begins on the day that the City Council approves and accepts the public improvements.

During the warranty period, the Private Developer is responsible for repair work on any of the public improvements. The City Engineering Division will periodically inspect the public improvements and will notify the Private Developer if repair work is required. The Private Developer is responsible for having the repair work done prior to the end of the warranty period.

For City Contracted projects, the Contractor shall provide warranty repair work for the duration of the warranty as defined in the City of Gillette Standard Construction Specifications or as defined in the Contract Documents.

Supplementary Condition (SC) 13.07 of the City of Gillette Standard Construction Specifications may be referenced for further information regarding correction periods.

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SECTION 301



DESIGN OF  
WATER DISTRIBUTION SYSTEMS

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## SECTION 301

### DESIGN OF WATER DISTRIBUTION SYSTEMS

**301.00** The City of Gillette adopts the most current version of Chapter XII of the rules of the Wyoming Department of Environmental Quality, Water Quality Division, as the design standards for water distribution systems, well pumps, water storage structures and pumping facilities, except the following which amend, supplement, or revise the above referenced standards.

#### Section 6. **ENGINEERING DESIGN REPORT**

*Add the following language at the end of Subsection 6-b-ii:*

“The average day per capita flow will be two hundred three (203) gallons/day. The maximum day per capita flow will be five hundred sixty two (562) gallons/day. The maximum hourly flow will be eight hundred twelve (812) gallons/day/person. The system shall provide static pressure ranging from fifty (50) psi to one hundred ten (110) psi. The system shall maintain a twenty (20) psi minimum residual pressure at the finish floor elevation of the highest unit proposed during peak day plus fire flow demand or peak hour plus fire flow demand, whichever demand is greater, and a forty (40) psi minimum residual pressure during the peak hour demand. The maximum pressure fluctuation at any location in the distribution system between peak hour demand and average day demand should not exceed thirty (30) psi.”

*Add the following language at the end of Subsection 6-b-iii:*

“Subject to the following minimums, fire flow will be calculated according to the "Guide for Determination of needed Fire Flow," as published by the Insurance Services Office, and will be added to the maximum day hourly average flow to adequately size the system for fire flow conditions. The following minimum fire flows shall be provided based on the zoning type. In areas with multiple zoning types, the greatest fire flow required shall govern. The required fire flow shall be provided by a single hydrant or multiple hydrants. The minimum number of hydrants, as listed below, are required to collectively achieve the minimum flow requirement, as identified by the latest adopted version of the International Fire Code.”

<u>Zoning Type</u>	<u>Fire Flow</u>	<u>Minimum Number of Hydrants</u>
Residential	1500 gpm	1
Commercial	2500 gpm	3
Industrial	3500 gpm	4

## Section 14. **DISTRIBUTION SYSTEMS**

*Add the following language at the end of Subsection 14-b-iii:*

“The design must be in substantial conformance with the latest City's Master Water Plan. Twelve inch mains shall be grid spaced at approximately one mile intervals. Eight inch mains shall be grid spaced at approximately 1/4 mile intervals, subject to the approval of the City Engineer. Pipes will be designed so the maximum velocity obtained will be less than five (5) ft./sec, excluding fire flow.

Dedicated fire sprinkler lines or combination fire/domestic service lines shall be installed at right angles to the distribution main or lateral and be extended directly, without horizontal bends or offsets, to the property line. A valve must be installed in the City right-of-way or easement. If a combination fire/domestic service line is being used, the domestic service line shall be tapped off of the larger combination line inside the structure and metered separately. The fire line shall not be metered. The size of the fire sprinkler lines shall be determined by the needed fire flow required for the building sprinkler system. Any horizontal bends or offsets in the fire service line between the property line and the building shall be accounted for in the fire flow calculations.”

*Add the following language at the end of Subsection 14-b-v:*

“Fire hydrants shall be spaced per Appendix C in the latest edition of the International Fire Code.”

*Delete subsection 14-b-vi in its entirety and insert the following:*

“All waterlines shall be looped. Dead-end lines are prohibited, with the exception of lines extending into cul-de-sacs. These lines shall be limited in length by serving no more than twenty (20) single-family residential units or equivalent demand. Those dead-end lines that are allowed as described above shall be terminated with a fire hydrant or other flushing device.”

*Add a new subsection immediately after Subsection 14-b-vii:*

“(viii) Services.

The latest edition of The International Plumbing Code shall be used as the basis of design for water service lines.

There shall be only one tap and water service line from the main to the property line for each lot. Multiple services on one lot may be divided at the property line with each individual service having a meter and a curb stop. Where multiple structures are on one lot which could be subdivided in the future, one tap and

water service line from the main to the property line for each main structure will be allowed only upon approval by the City Engineer.

Services larger than 2" will need to be approved by the City Engineer and will require a "Permit to Construct." The portion of the service line between the main and the property line shall be one continuous length of Type K copper pipe or HDPE pipe, installed perpendicular from the main to a meter pit or curb stop and box at the property line.

Service lines shall be installed at least ten (10) feet laterally, from any foreign non-potable conduit and a minimum of five (5) feet from the side property line of the lot being served unless the property is zoned Mobile Home or Enhanced Manufacture Home and in that case two services may be installed in a meter pit on the property line.

When serving lots at the end of a cul-de-sac, the length of the service line between the main and the property line shall not exceed seventy (70) feet.

Under no circumstances shall any tap be made on a fire hydrant lateral line.

Service lines shall be adequate to supply the requirements of the property being served. The minimum size allowed for a water service line is one (1) inch. In general, the corporation stop, the meter, and that portion of the service pipe between the meter and the corporation stop on the main, shall all be of the same size for services two (2) inch and smaller. For services larger than two (2) inch the meter may be of a different size than the service pipe as long as the meter is sized appropriately for the anticipated flows. The size for a service line from the City water main to any unit being served shall be selected such that the following design criteria are not exceeded during total peak demand flow:

1. Eighty (80) percent of the manufacturer's maximum meter capacity.
2. Service line pipe flow velocity does not exceed fifteen (15) feet per second (fps).
3. The pressure drop from the City water main to any unit being served shall not be greater than thirty (30) psi and the minimum residual pressure at the finish floor elevation to any unit shall not be less than twenty (20) psi.

The water requirements of the property being served shall be defined as "total peak demand flow." Peak domestic water requirements shall be calculated in accordance with the latest edition of the International Plumbing Code and the American Water Works Association M22 Standard. The irrigation demand flow and continuous load demands (when applicable) shall be added to the peak designed flow to get the total peak demand flow.

Meter pits are required for:

1. all mobile home and enhanced manufactured home lots
2. where the service is over one hundred feet (100') in length

3. for all connections outside the incorporated City Limits.

One meter pit is allowed for two (2) water services as long as both services are to adjacent lots.

For areas served without a meter pit, meters will be installed accordingly:

1. All meters shall be installed within a full-depth basement, or in a location within three (3) feet of the access if in a crawl space.
2. The service line between the curb-stop and the meter shall be a single, continuous (un-spliced) section and will be buried to prevent future connections prior to the meter.
3. If the aforementioned requirements of 1. and 2. cannot be met, a meter pit to be located immediately after the curb stop will be allowed, provided the meter pit conforms to other requirements within adopted City of Gillette Standard Construction Specifications.
4. Depending on the hazard classification of the building, an appropriate backflow prevention device may be installed in the meter pit; however, for high-hazard installations, the required backflow prevention device might need to be installed within the mechanical room of the new building provided appropriate floor drains exist to dispense water discharged from the device during a back-pressure situation.”

*Add a new subsection 14-b-ix*

“(ix) Easements and Right-of-Ways

The minimum width right-of-way or easement for City use in which a water main will be installed is twenty (20) feet. If the final depth, as measured from finished grade to the top of the water main exceeds 6.0 feet, the following table shall be used to determine the minimum width of right-of-way or easement required:”

<b>Depth of water main measured from finished grade to top of pipe (feet).</b>	<b>Minimum distance (feet) from center of proposed water main to edge of building or established R-O-W/easement.</b>
5.5 to 6.0	10.0 (20.0 feet total width)
6.1 to 10.0	15.0 (30.0 feet total width)
Greater than 10.0 feet	At least 20’ (40’ total), and function of soil type.

*Add a new subsection 14-b-x*

“(x) Fittings.

Water main shall be designed to minimize the number of fittings. All fittings shall be in conformance with the City of Gillette Standard Construction Specifications.”

*Delete Subsection 14-C in its entirety and insert the following:*

“(c) Valves.

Valves shall be provided on water mains so inconvenience and sanitary hazards will be minimized during repairs. Valves shall be located at not more than five hundred (500) foot intervals on distribution and lateral mains and one thousand (1000) foot intervals on transmission mains. Valves will be placed at all pipe junctions so that the total number of valves at the junction is one less than the number of branches, except as approved by the City Engineer. Line valves shall also be placed:

- Such that no more than one (1) fire hydrant is isolated at any one time.
- At each end of a line running through an easement on private property.
- On each side of a creek, channel crossing, or arterial street/highway crossing.
- On fire hydrant laterals.”

*Delete Subsections 14-f-i and 14-f-ii in their entirety and insert the following in their place:*

“(i) Excavation.

Shall be in conformance with the City of Gillette Standard Construction Specifications and O.S.H.A. Regulations.

(ii) Bedding.

Shall be in conformance with the City of Gillette Standard Construction Specifications.”

*Add the following language at the end of Subsection 14-f-v:*

“Water mains shall be installed with a minimum of five and a half (5½’) to six (6’) feet of cover from final grade to top of pipe. Any exception to this minimum depth shall be approved by City Engineer.”

*Delete Subsections 14-i in its entirety and insert the following:*

“(i) Cross Connection Control.

All water services connected to the public water system shall comply with the City’s “Cross Connection Control Program” as described within City of Gillette Ordinance No. 3309, as referenced within Section 17-31 of Gillette City Code.”

### **301.10 WATER TRANSMISSION LINES:**

1. Water Transmissions Lines shall be generally defined as any pipeline conveying raw or treated water from a well field or remote storage facility to a treatment plant, distribution system, and/or storage tank, or as otherwise determined by the City Engineer based on the specific transmission functionality of the water line. The City manages different sizes of transmissions lines throughout the City and the Regional Water System connections. All pipelines deemed to be Transmission Lines shall adhere to the following guidelines.
2. No person shall in any manner tap or make any connections for the purpose of providing water to serve areas outside current designated service area boundaries.
3. No person shall tap or connect to any water transmission pipeline unless the applicant has been granted written permission by the City Engineer for doing such.
4. No installation of a utility transmission line, conduit, or underground structure should be nearer than twenty (20) feet clear separation from the outside surface of all 24-inch and larger transmission pipelines when it is required to run parallel to said pipeline(s). No installation of a utility transmission line, conduit, or underground structure should be nearer than two (2) feet clear separation above or below the outside surface of all 18-inch and larger transmission pipelines when it should be required to cross said pipeline(s).
5. Connections to untreated (raw) water transmissions pipelines shall be prohibited.

### **301.20 DEQ REQUIREMENTS FOR SERVICE CONNECTIONS:**

Any potable water supply service connection from any public water supply to the building shall require a "Permit to Construct" from the City of Gillette if any of the following conditions exist:

1. A tee must be installed in order to make the connection.
2. Fire hydrants will be installed.
3. The service pipe is larger than two (2) inches.
4. Any appurtenance will be connected to the service pipe that will have an adverse impact on the quality or quantity of the supply.
5. The service connection is tied to the City of Gillette's water system and is outside of the City Limits.

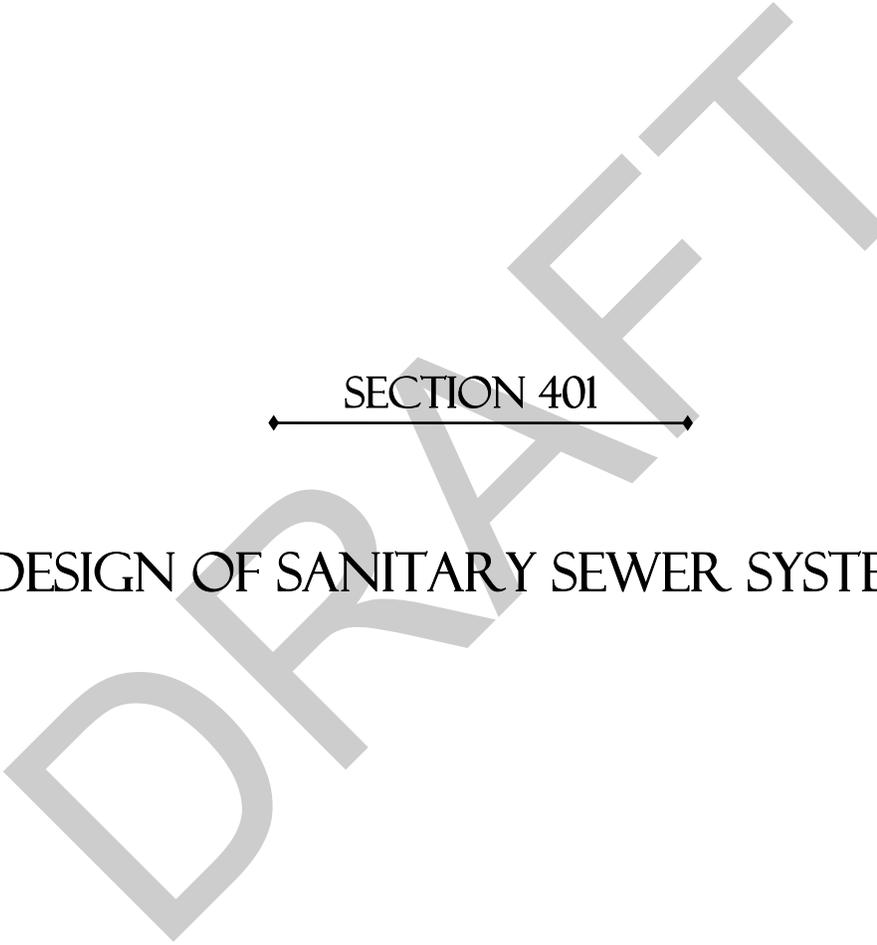
The information to be submitted as an application for "Permit to Construct" may include plan sketches, valve arrangements, material information, hazard classification for back flow preventer, and hydraulic calculations.

### **301.30 PUMP STATIONS:**

Pump stations shall be designed to the current standards of the Wyoming Department of Environmental Quality, Water Quality Division. Pump stations shall include necessary control and telemetry equipment, compatible with the City's existing system, for remote operations of the facility. Water system pump stations shall be permitted through the Wyoming Department of Environmental Quality, Water Quality Division.

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SECTION 401

## DESIGN OF SANITARY SEWER SYSTEMS

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## SECTION 401

### DESIGN OF SANITARY SEWER SYSTEMS

**401.00** The City of Gillette adopts the most current version of Chapter XI of the rules of the Wyoming Department of Environmental Quality, Water Quality Division, as the design standards for sanitary sewers, except the following, which amend, supplement, or revise the above-referenced standards.

#### 401.01 DEFINITIONS

**Lateral Sewer:** A lateral sewer is a sewer with no tributary flow except from sewer services.

**Submain Sewer:** A submain sewer collects flow from one or more laterals as well as sewer services.

**Collector Sewer:** A collector sewer collects flow from several submains as well as laterals.

**Trunk, Outfall Sewer:** A trunk and outfall sewer is a sewer, which carries the collected waste from lateral, submain, and collector sewer to a point of treatment.

#### Section 6 ENGINEERING DESIGN REPORT

Add the following language and tables at the end of Subsection 6-b-ii:

The design flow will be calculated for the entire area tributary to the outfall point as based on best-projected land use. The average daily per capita flow of sewage will be one hundred forty (140) gal. per day. The estimated average equivalent densities for new development in Gillette are as follows:

<b>RESIDENTIAL LAND USE</b>	<b>UNIT DENSITY</b>	<b>EQUIVALENT POPULATION</b>
Single Family	2.5 dwellings/acre	8.8 persons/acre
Mobile Home	6 dwellings/acre	21 persons/acre
Multi-Family	15 dwellings/acre	52.5 persons/acre
<b>COMMERCIAL LAND USE</b>		
		18 persons/acre
<b>INDUSTRIAL LAND USE</b>		
Heavy		15 persons/acre
Light		10 persons/acre

The following peaking factors will be used in the calculation of design flows:

CATEGORY OF SEWER	PEAKING FACTOR
Lateral, Submain Sewers	4.0
Collector Sewers	3.5
Trunk, Outfall Sewers	2.5

The design flow will be calculated by multiplying the anticipated equivalent population for the area served, by the average per capita flow, and then by the appropriate peaking factor.

Section 9 **DESIGN OF SEWERS**

Add the following language to Subsection 9-a:

The design of sanitary sewer mains must be in substantial conformance with the latest City of Gillette Sewer Master Plan.

Delete the following Subsections of 9-b-vi:

C,D,E and J.

Add the following language to Subsection 9-C-i-A:

Sewer mains shall have a minimum of eight (8) feet of cover so that adjacent lots with basements may have service for floor drains. Sewer mains with less than eight (8) feet of cover will be considered on an individual basis and will be allowed only upon approval by the City Engineer.

Delete Subsection 9-C-i-B in its entirety and insert the following in its place:

(B) Sanitary sewer lines subject to having service connections thereon and hereafter referred to as laterals and submains shall be sized to flow at a maximum of seventy five (75) percent full at peak hour flow rates with the minimum size no less than eight (8) inches in diameter. City designated collector, trunk, and outfall lines, lines which require specific City approval for service connections, shall be sized to flow at a maximum of ninety (90) percent full at peak hour flow rates. All sewer lines shall be installed in a straight alignment and on a uniform slope between manholes. Curvilinear alignment between manholes will not be allowed.

Delete the following Subsections of 9-c-i-F:

I,II, and III in their entirety and insert the following in their place:

(I) Excavation. Excavation shall conform to the City of Gillette Standard Construction Specifications and O.S.H.A. Regulations.

(II) Bedding. Bedding shall conform to the City of Gillette Standard Construction Specifications.

(III) Backfill. Backfill shall conform to the City of Gillette Standard Construction Specifications.

Add the following language to Subsection 9-C-iii:

One sewer service line, from the tap to the property line, shall be required for each lot, zoned lot or building to be served.

Add the following language to Subsection 9-C-iii-A:

Four-inch (4") services will be provided for normal residential lots. Commercial and industrial lots sewer services shall be sized according to lot size and grade of property, ranging from four (4) inches to eight (8) inches in diameter. For commercial and industrial applications, service lines eight (8) inches and larger diameter must enter through a manhole.

Delete Subsection 9-C-iii-D in its entirety and insert the following in its place:

(D) Connections: All service connections to sewage collection lines shall be made with a wye for new construction, except as identified above, and a tapping saddle or wye for connection to existing collection lines. Tapping saddles for main line service connections will only be allowed for service connections six (6) inch in diameter or less. Tapping saddles which are six (6) inches in diameter will be permitted on a case-by-case basis, provided the main which is proposed for connection is of adequate size to accept a six (6) inch tapping saddle.

The City discourages the connection of sewer services less than eight (8) inches in diameter directly into manholes, however these connections will be considered on an individual basis and will be allowed only upon approval by the City Engineer.

In general, sewer services will be extended to a point on each lot, which is ten (10) feet from the lower property corner.

Delete Subsection 9-d-i in its entirety and insert the following in its place:

Manholes shall be installed at the end of each main and at changes in direction, size, or slope of the main. The maximum spacing of manholes shall be four hundred (400) feet. Dead-end lateral lines shall terminate in a manhole. Plugged inlets set in the direction of future line expansion shall be provided in the terminating manhole. Upstream terminating manholes shall be located within ten (10) feet of the most distant property line of the lot or building site being served

or perimeter line of a new development. In general, sewers that are in the street should be designed so that manholes are located seven (7) feet from the centerline of the streets. Manholes outside the street area must be accessible to City maintenance vehicles. A minimum horizontal spacing of ten (10) feet (clear separation) or a minimum vertical spacing of eighteen (18) inches (clear separation) must be maintained from water mains. Where vertical or horizontal clearances cannot be maintained, the sewer line shall be placed in a separate conduit pipe.

Add the following language to Subsection 9-d-ii:

Manholes of forty eight (48) inches minimum inside diameter shall be used on eight (8) inch through twenty four (24) inch mains. Larger mains and crowded intersecting mains will have oversized manholes.

Add the following language to subsection 9-d-iv

Flow through inverts in manholes shall provide a minimum of one tenth (0.1) foot drop in a straight through manhole or a manhole angled at ninety (90) degrees to two hundred and seventy (270) degrees; and two tenths (0.2) foot drop in manholes angled less than ninety (90) degrees or greater than two hundred and seventy (270) degrees.

In manholes where the downstream sewer line is larger in diameter than the upstream line, the pipe crown elevations of the two (2) pipes shall match.

Delete Subsection 9-d-vi in its entirety and insert the following:

(vi) Access to manholes shall be provided with non-corrosive, rubber-coated, aluminum or nylon steps spaced at twelve (12) inch minimum and sixteen (16) inch maximum.

Add a new subsection 9-g

9-g EASEMENTS

The minimum width of an easement for City use in which a sanitary sewer will be installed is twenty (20) feet. If the final depth as measured from finished grade to the top of the sewer main exceeds 8.0 feet, the following table shall be used to determine the minimum width of right-of-way or easement required:

<b>Depth of sewer main measured from finished grade to top of pipe (feet).</b>	<b>Minimum distance (feet) from center of proposed sewer main to edge of building or established R-O-W/easement.</b>
8.0 to 9.0	10.0 (20.0 feet total width)
9.1 to 12.0	15.0 (30.0 feet total width)
Greater than 12.0 feet	At least 20' (40' total), and function of soil type.

## **401.02 LIFT STATIONS**

Lift stations shall be designed to meet the minimum requirements of the Wyoming Department of Environmental Quality, Water Quality Division. All lift stations, which are to be operated and maintained by the City, shall include control and telemetry equipment compatible with the City's existing system. The telemetry equipment shall be housed in permanent, above grade structures designed for that purpose. Sanitary Sewer system lift stations shall be permitted through the Wyoming Department of Environmental Quality, Water Quality Division.

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SECTION 403



## DESIGN OF STORM DRAINAGE SYSTEMS

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## SECTION 403

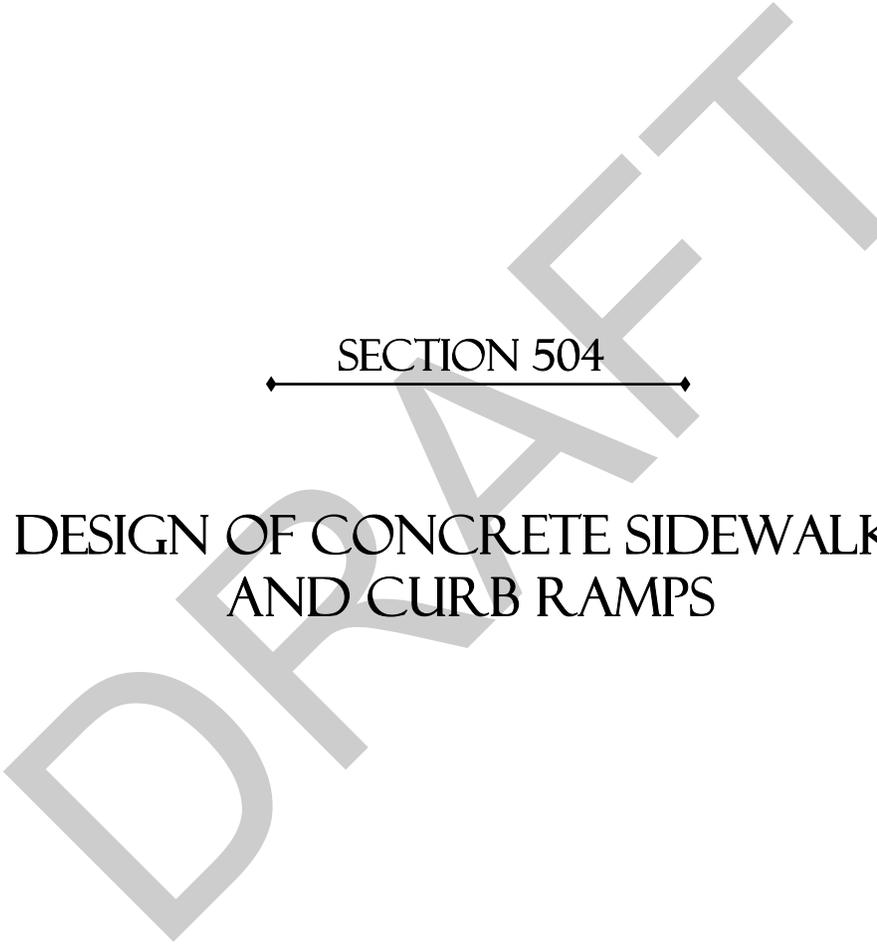
### DESIGN OF STORM DRAINAGE SYSTEMS

#### 403.00 GENERAL

All storm drainage improvements within the City of Gillette (City) shall be designed and constructed according to the latest approved versions of the City of Gillette Storm Drainage Design Manual, the City of Gillette Stormwater Master Plan, the City of Gillette Standard Construction Specifications and other City regulations and ordinances as they apply to storm drainage. Depending on specific site conditions, storm drainage systems may need to exceed these minimum standards in order to meet the goals of City policies and provide adequate protection from flooding. Should these design standards conflict with the requirements of other agencies the designer shall seek direction from the City Engineer to determine the appropriate standard to apply.

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SECTION 504

DESIGN OF CONCRETE SIDEWALKS  
AND CURB RAMPS

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## SECTION 504

### DESIGN OF CONCRETE SIDEWALKS AND CURB RAMPS

#### 504.10 SIDEWALKS

##### 504.10.1 Cross Slope:

The maximum cross slope for sidewalk shall be  $\frac{1}{4}$  inch per foot (1V:48H or 2%). Generally, the sidewalk shall be sloped toward the street at 2% to promote positive drainage away from private property.

##### 504.10.2 Running Slope:

The maximum running (longitudinal) slope shall be 1V:20H (5%). Where terrain dictates that the adjacent roadway grades are steeper than 1V:20H, the same grade may be used for the sidewalk. When a 1:20 running slope must be exceeded and not directly controlled by the roadway slope, the slope then becomes classified as a ramp. A maximum ramp slope of 1V:12H (8.33%) may then be utilized with five (5) ft by five (5) ft level ramp landings every thirty (30) ft minimum.

##### 504.10.3 Thickness:

Sidewalk thickness shall not be less than 4 inches. Sidewalks through driveways shall not be less than six (6) inches thick.

##### 504.10.4 Width:

The minimum sidewalk width in residential areas shall not be less than four (4) feet. Sidewalks adjacent to collector and arterial streets or in commercial, educational, or industrial districts shall not be less than five (5) feet in width.

##### 504.10.5 Jointing:

The spacing of transverse joints shall be equal to the width of the sidewalk. An expansion joint shall be located at the beginning and the end of each straight run, at intervals not to exceed one hundred fifty (150) feet for new construction, at locations where new concrete joins existing concrete or other structures, and at other locations as may be deemed necessary by the City Engineer, or the design engineer.

##### 504.10.5 Alignment:

For detached sidewalks, the property edge of sidewalk shall be set one (1) foot from the property line parallel to the street unless otherwise approved by the City Engineer.

For detached sidewalks, the minimum height above the top of curb shall be a slope of one-fourth ( $\frac{1}{4}$ ) inch per foot from the curb to the property side edge of sidewalk, unless otherwise approved by City Engineer.

## **504.20 SIDEWALK CURB RAMPS**

### **504.20.1**      Curb Ramps:

All curb ramps shall have a maximum running slope of 1V:12H (8.33%) and a maximum cross slope of one-fourth (1/4) inch per foot (2%). Counter slopes of adjoining gutters and roadway surfaces immediately adjacent to the bottom of the curb ramp shall not be steeper than 1V:20H (5%). Curb ramp flares shall not exceed a 1V:10H (10%) slope. The maximum running distance of a curb ramp shall be fifteen (15) feet. Transition points at the top and bottom of the ramp, where the ramp meets the landing and the gutter, shall be flush without abrupt level changes.

### **504.20.2**      Landings:

All ramps are required to have a landing area with no more than a 2% (1/4" per foot) slope in any direction. The landing area shall be a minimum of four foot (4') by four foot (4') in size. Typically, the landing area shall be located where a pedestrian makes a turning movement to line up with the ramp and curb opening. For example, the landing area shall be located where two (2) detached sidewalks join and connect to the ramp. The landing area on a curb side sidewalk shall be located at the curb opening. It may be necessary to have multiple landing areas when combining attached and detached sidewalks. Grade changes from the connecting sidewalk or ramp to the landing area must be perpendicular to the direction of travel.

### **504.20.3**      Detectable Warning Panels:

Install pre-manufactured detectable warning panels in accordance with manufacture's recommendations at all locations where the curb ramp enters into a street or parking lot. The City Engineer's office has an approved list of manufactures on file. See Standard Drawings for detectable warning panel size and location. Detectable warning panels shall be an approved brick red color except in locations where the adjoining concrete sidewalk is red or dark in color. At these locations, the detectable warning panel shall be a contrasting color approved by the City Engineer.

### **504.20.4**      Free Width:

Obstructions such as signal poles, light poles, traffic control cabinets, etc. cannot be located in the landing area or the ramp slope. All sidewalks shall have a four foot (4') minimum width free of obstructions to accommodate pedestrian travel.

### **504.20.5**      Parallel Curb Ramps (Ramps on Curbside Sidewalk):

Depending on adjoining grades and existing conditions, a curb with a maximum height of six inches (6") may need to be installed on the back of the landing area and attached sidewalk. This curb may also need to be installed to ensure street drainage does not overflow the area behind the landing area and ramp. See Standard Drawings for details.

SECTION 609

DESIGN OF FLEXIBLE PAVEMENTS

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## SECTION 609

### DESIGN OF FLEXIBLE PAVEMENTS

#### 609.00 GENERAL

Flexible pavements for all City streets and alleys, and required off-street parking, shall be designed by a Professional Civil Engineer registered to practice in the State of Wyoming. A designed pavement will be required for all new construction or full depth reconstruction. Overlays may be designed using the method contained in this section or by any other acceptable method. The pavement should include site specific stabilization recommendations for subgrade preparation.

This section will serve as a guide for the design of flexible pavements. For detailed information on this design method the designer should refer to the latest edition of the "AASHTO Guide for Design of Pavement Structures", which is published by the American Association of State Highway and Transportation Officials. If another method of thickness design is used, the Engineer must show that the selected design procedure does not result in a lesser pavement section than would have resulted from using this procedure.

A full pavement design report shall be provided to the City by the design engineer documenting all traffic assumptions with vehicle classifications, soils test results including laboratory reports, boring locations, and depth, linear variability of the soil, and values used to calculate the pavement section, including design of proposed subgrade preparation depth.

The design of City Streets by this method will be based on a twenty-year (20) design life.

#### 609.10 THICKNESS DESIGN FACTORS:

The primary factors involved in the design thickness of asphalt pavement are:

1. Traffic
2. Reliability
3. Subgrade, Subbase, and Base Strengths
4. Plant Mix Properties

#### 609.11 TRAFFIC:

Estimates of traffic volume and axle load distribution during the design life are essential, and can be made using the traffic counts and reasonable predictions of traffic growth. Growth predictions should be consistent with current community growth and traffic plans, and the practical design capacity of the street.

For the purpose of design, mixed traffic must be converted to common units. To convert between different axle loads and axle configurations, all vehicles should be converted to 18-kip equivalent single axle loads (E<sub>18</sub>SAL).

Section 2.1.2 of the "AASHTO Guide for Design of Pavement Structures" shall be used to determine the cumulative expected 18-kip equivalent single axle loads (E<sub>18</sub>SAL) during the analysis period.

For Local and Local-Through Streets, the designer shall submit the traffic assumptions incorporated in the design, including the distribution of vehicle classification over the design period. No growth will be considered for Local Streets. In no case shall the design  $E_{18SAL}$  be less than the minimum noted in Section 609.20.

For Collector and Arterial pavement design, the City of Gillette shall provide the initial Average Daily Traffic count (ADT), distribution of vehicle classifications, and anticipated rate of growth over the design period.

**609.12 RELIABILITY:**

Reliability is the probability that the load applications a pavement can withstand in reaching a specified minimum serviceability level is not exceeded by the number of load applications that are actually applied to the pavement. Simply put reliability is a factor of safety. A pavement designed at a fifty (50) percent level of reliability will on the average carry about the same number of  $E_{18SAL}$  for which it was designed. At eighty (80) percent it will carry 1.97 times the  $E_{18SAL}$ , and at ninety-five (95) percent 3.76 times the  $E_{18SAL}$ .

Since reliability is used as a factor of safety in this method, the designer should take care to use best estimate, and average values for the other design factors, rather than using limiting values, to avoid overly conservative designs.

Reliability factors used in this design shall be based on suggested levels of reliability for various functional classifications, and those are as follows:

<u>FUNCTIONAL CLASSIFICATION</u>	<u>RECOMMENDED LEVEL OF RELIABILITY</u>
Local/Local Through	80%
Collector	90%
Arterial	95%

**609.13 RESILIENT MODULUS:**

The standard for material characterization in this design method shall be the resilient modulus. The roadbed soil resilient modulus can be determined using the AASHTO T274 test procedure on representative samples or predicted from correlations with other methods of testing. The resilient modulus must be determined by a soil engineer licensed to practice engineering in the State of Wyoming. To facilitate the use of the more direct CBR test, the Asphalt Institute has determined a conversion factor that can be used to convert the CBR to the resilient modulus value. This is given as  $M_r = 1500 \text{ CBR}$ . The above conversion factor should be used only for material that can be classified under the unified classification system as CL, CH, ML, SC, SM, and SP or when the resulting resilient modulus is less than 30,000 psi.

## 609.14 DESIGN SERVICEABILITY LOSS

The following criteria shall be used for all City of Gillette roadways to be dedicated for public use:

Arterials	2.5
Collector	2.5
Local/Local Through	2.0

## 609.15 STRUCTURAL LAYER COEFFICIENTS:

The structural coefficient is an index derived by correlation with the resilient modulus for each structural material in the pavement section.

The following layer coefficients shall be used for City of Gillette materials:

City of Gillette Plant Mix Asphalt Pavement - 0.40

Aged existing asphalt pavement - 0.25

Base (COG Grading W or L) - 0.12

Sub-base - 0.09 (shall meet COG requirements for sub-base and have a CBR of at least 20)

Acceptable base course materials shall be grading L, crushed limestone, and grading W as provided in the Aggregates section of the City of Gillette Standard Construction Specifications.

Table 1 gives recommended drainage modifiers for structural coefficients. Unless an edge drain is provided, the drainage coefficient shall not be greater than 0.8.

For further details in determining structural coefficients for various structural materials along with modifiers to the coefficients for drainage conditions, the designer is referred to Section 2.3.5 of the "AASHTO Guide for Design of Pavement Structures".

The designer may consider the use of geosynthetics for separation or reinforcement of the base if there is a demonstrated cost and/or pavement section performance advantage.

**Table 1**

Recommended  $m_i$  values for modifying structural layer coefficients of untreated base and sub-base materials in flexible pavements. Unless an edge drain is provided, the drainage coefficient shall not be greater than 0.8.

Quality of Drainage	Percent of Time Pavement Structure is Exposed to Moisture Levels Approaching Saturation			
	Less than 1%	1-5%	5-25%	Greater Than 25%
Excellent	1.40-1.35	1.35-1.30	1.30-1.20	1.20
Good	1.35-1.25	1.25-1.15	1.15-1.00	1.00
Fair	1.25-1.15	1.15-1.05	1.00-0.80	0.80
Poor	1.15-1.05	1.05-0.80	0.80-0.60	0.60
Very Poor	1.05-0.95	0.95-0.75	0.75-0.40	0.40

**609.20 MINIMUM PAVEMENT SECTION:**

The following table provides the minimum acceptable pavement sections for public roadways in the City of Gillette. These pavement and base course thicknesses are based on the given  $E_{18SAL}$  and CBR values for each road classification. Any proposed pavement section of lesser thicknesses or alternate materials shall be fully documented by the design engineer to substantiate that such alternate will provide an equivalent capacity as the pavement noted below and must be approved by the City Engineer.

Classification	$E_{18SAL}$ (20 yrs)	CBR	Composite Section	
			Asphalt (inches)	Aggregate Base (inches)
<b>Alleys</b>		3	4.0	6.0
<b>Local/Local Through</b>	65,600	3	4.5	6.0
<b>Collector</b>	231,000	3	5.5	6.0
<b>Arterial</b>	539,500	3	6.5	6.0

### 609.30 PAVEMENT DESIGN PROCEDURE:

The following procedure should be used in determining the structural number (SN) of the pavement being designed:

- A. Determine the  $E_{18}SAL$  per Section 2.1.2 of the “AASHTO Guide for Design of Pavement Structures”.
- B. Determine the reliability as shown in Section 609.12.
- C. The overall standard deviation ( $S_o$ ) for design shall be  $S_o = 0.45$ .
- D. Determine the effective roadbed soil resilient modulus ( $M_r$ ).
- E. Determine the Design Serviceability Loss as shown in Section 609.14.
- F. Using the above information determine the Structural Number (SN) from the appropriate design nomograph shown in Figure 1.

Once the design structural number (SN) for a pavement structure is determined, it is necessary to identify a set of pavement layer thicknesses which when combined, will provide the load-carrying capacity corresponding to the design SN. The following equation provides the basis for converting SN into actual thicknesses of surfacing, base and subbase:

$$SN = a_1D_1 + a_2D_2m_2 + a_3D_3m_3$$

where

$a_1, a_2, a_3$  = layer coefficients representative of surface, base, and subbase courses, respectively.

$D_1, D_2, D_3$  = actual thicknesses of surface, base, and subbase courses.

$m_2, m_3$ , = drainage coefficients for base and subbase layers.

The thickness of the flexible pavement layers shall be rounded up to the next one-half (½)-inch. When selecting appropriate values for the layer thicknesses, it is necessary to consider their cost effectiveness along with the construction and maintenance constraints in order to avoid the possibility of producing an impractical design. From a cost-effective view, if the ratio of costs for layer one (1) to layer two (2) is less than the corresponding ratio of layer coefficients times the drainage coefficient, then the optimum economical design is one where the minimum base thickness is used.

The design charts in Section 2.3.5 of the “AASHTO Guide for Design of Pavement Structures” may be used when conditions allow to determine the appropriate layer coefficients.

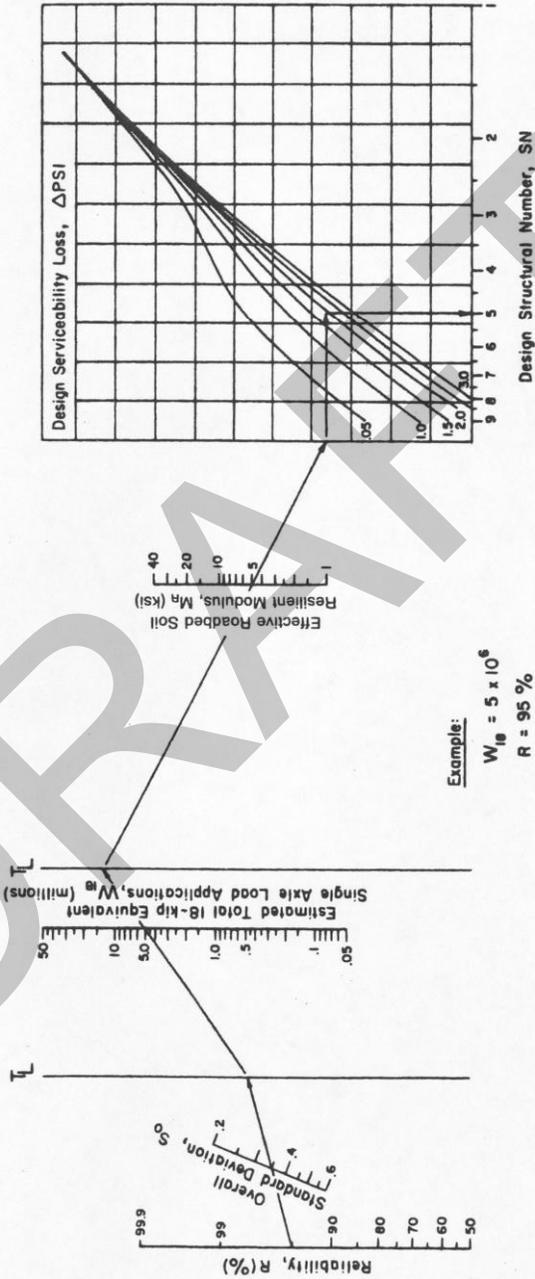
For design thickness using soil strengths or reliability factors other than those shown, interpolation may be used. Thicknesses should be rounded up to the next one-half (½)-inch.

### 609.40 SPECIFICATIONS FOR PLANT MIX MATERIALS:

The material specifications for flexible pavements are given in Section 02512 and 02545 of the current edition of the City of Gillette Standard Construction Specifications.

NOMOGRAPH SOLVES:

$$\log_{10} W = Z_R \cdot S_o + 9.36 \cdot \log_{10} (SN+1) - 0.20 + \frac{1094}{0.40 + \frac{1094}{(SN+1)^{5.19}}} + 2.32 \cdot \log_{10} M_R - 8.07$$



Example:

- $W_{18} = 5 \times 10^6$
- $R = 95\%$
- $S_o = 0.35$
- $M_R = 5000 \text{ psi}$
- $\Delta \text{PSI} = 1.9$
- Solution:  $SN = 5.0$

Figure 4 Design Chart for Flexible Pavements Based on Using Mean Values for Each Input

SECTION 610

DESIGN OF RIGID PAVEMENTS

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## SECTION 610

### DESIGN OF RIGID PAVEMENTS

#### 610.00 GENERAL:

Concrete pavements for all City streets and alleys, and required off-street parking, shall be designed by a Professional Civil Engineer registered to practice in the State of Wyoming. A designed pavement will be required for all new construction or full depth reconstruction. Overlays may be designed using the method contained in this section or by any other acceptable method. The pavement design shall include site specific stabilization recommendations for subgrade preparation.

This section will serve as a guide for the design of rigid concrete pavements. For detailed information on this design method, the designer should refer to the latest addition of the "AASHTO Guide for the Design of Pavement Structures", which is published by the American Association of State Highway and Transportation Officials. If another method of thickness design is used, the Engineer must show that the selected design procedure does not result in a lesser pavement section than would have resulted from using this procedure.

A full pavement design report shall be provided to the City by the design engineer documenting all traffic assumptions with vehicle classifications, soils test results including laboratory reports, boring locations, and depth, linear variability of the soil, and values used to calculate the pavement section.

The design of City Streets by this method will be based on a twenty (20)-year design life.

#### 610.10 THICKNESS DESIGN FACTORS:

The primary factors involved in the design thickness of concrete pavement are:

- A. Traffic
- B. Reliability
- C. Subgrade Strength
- D. Concrete Properties

#### 610.11 TRAFFIC:

Estimates of traffic volume and axle load distribution during the design life are essential, and can be made using traffic counts and reasonable predictions of traffic growth. Growth predictions should be consistent with current community growth and traffic plans, and the practical design capacity of the street.

For the purpose of design, mixed traffic must be converted to common units. To convert between different axle loads and axle configurations, all vehicles should be converted to 18-kip equivalent single axle loads (E<sub>18</sub>SAL).

Section 2.1.2 of the "AASHTO Guide for Design of Pavement Structures" shall be used to determine the cumulative expected 18-kip equivalent single axle loads (E<sub>18</sub>SAL) during the analysis period.

For Collector and Arterial pavement design, the City of Gillette shall provide the initial Average Daily Traffic count (ADT), distribution of vehicle classifications, and anticipated rate of growth over the design period.

### **610.12 RELIABILITY:**

Reliability is the probability that the load applications a pavement can withstand in reaching a specified minimum serviceability level is not exceeded by the number of load applications that are actually applied to the pavement. Simply put reliability is a factor of safety. A pavement designed at a fifty (50) percent level of reliability will on the average carry about the same number of E<sub>18</sub>SAL for which it was designed. At eighty (80) percent it will carry 1.97 times the E<sub>18</sub>SAL, and at ninety-five (95) percent 3.76 times the E<sub>18</sub>SAL.

Since reliability is used as a factor of safety in this method, the designer should take care to use best estimate, and average values for the other design factors, rather than using limiting values, to avoid overly conservative designs.

Reliability factors used in this design shall be based on the suggested levels of reliability for various functional classifications and which are as follows:

<u>FUNCTIONAL CLASSIFICATION</u>	<u>RECOMMENDED LEVEL OF RELIABILITY</u>
Local/Local Through	80%
Collector	90%
Arterial	95%

### **610.13 SUBGRADE REACTION (*k*):**

Economical concrete pavements that will give good performance can be built on most in-place soils. Subgrade soils should be of uniform material and density for satisfactory pavement performance. Soft spots that show up during construction should be excavated and re-compacted with the same type of material found in the adjacent subgrade.

The supporting power of the subgrade is expressed as values of '*k*', the modulus of subgrade reaction, and can be determined by plate bearing tests. The *k* may be estimated by correlation to M<sub>R</sub> using Figure 3.3 of the 1986 AASHTO Guide for Design of Pavements. The *k*-value must be determined by a soil engineer licensed to practice engineering in the State of Wyoming.

### **610.14 CONCRETE QUALITY AND MATERIAL SPECIFICATIONS:**

Concrete paving mixes are designed: 1) for economy; 2) to give satisfactory durability under the conditions the pavement will be subject to; and 3) to produce the desired flexural strength.

The material specifications for concrete pavements are given in Section 02520 of the current edition City of Gillette Standard Construction Specifications.

**610.15 DESIGN SERVICEABILITY LOSS**

The following criteria shall be used for all City of Gillette roadways to be dedicated for public use:

Arterial	2.5
Collector	2.5
Local/Local Through	2.0

**610.20 MINIMUM PAVEMENT SECTION:**

The following table provides the minimum acceptable pavement sections for public roadways in the City of Gillette. These pavement and aggregate base thicknesses are based on the given E<sub>18</sub>SAL and CBR values and road classification. Any proposed pavement section of lesser thicknesses or alternate materials shall be fully documented by the design engineer to substantiate that such alternate will provide an equivalent capacity as the pavement noted below and must be approved by the City Engineer.

Classification	E <sub>18</sub> SAL (20 yrs)	CBR	Concrete (inches)	Aggregate Base
<b>Alleys</b>		3	5.0	6
<b>Local/Local Through</b>	83,900	3	5.0	6
<b>Collector</b>	319,970	3	5.5	6
<b>Arterial</b>	839,000	3	6.5	6

**610.30 THICKNESS DESIGN CRITERIA:**

The following procedure should be used in determining the required pavement thickness

- A. Determine the E<sub>18</sub>SAL per Section 2.1.2 of the “AASHTO Guide for Design of Pavement Structures”.
- B. Determine the reliability as shown in 610.12
- C. The overall standard deviation (S<sub>o</sub>) for design shall be S<sub>o</sub>=0.35
- D. Determined the Design Serviceability Loss as shown in Section 610.15
- E. Determine the concrete elastic modulus
- F. Determine the concrete modulus of rupture
- G. Determine the load transfer coefficient (j) (without curb and gutter=3.6, with curb and gutter=3.1)
- H. Determine the drainage coefficient

In these design charts "with curb and gutter" refers to curbs poured integral with the pavement or tied to the pavement in such a manner the curb and gutter act structurally as a thickened edge of the pavement.

For design thicknesses using K values, concrete strength, or reliability factors other than shown, interpolation may be used.

For design thicknesses on projects with radically different conditions than those shown, see the "AASHTO Guide for Design of Pavement Structures". Pavement thickness obtained using these design charts shall be rounded up to the next one-half ( $\frac{1}{2}$ )-inch.

## **610.40 JOINTS**

Joints must be carefully designed and constructed to ensure good performance. Details of actual joint pattern will be included in design, and shall be approved by City Engineer prior to use.

### Longitudinal Joints

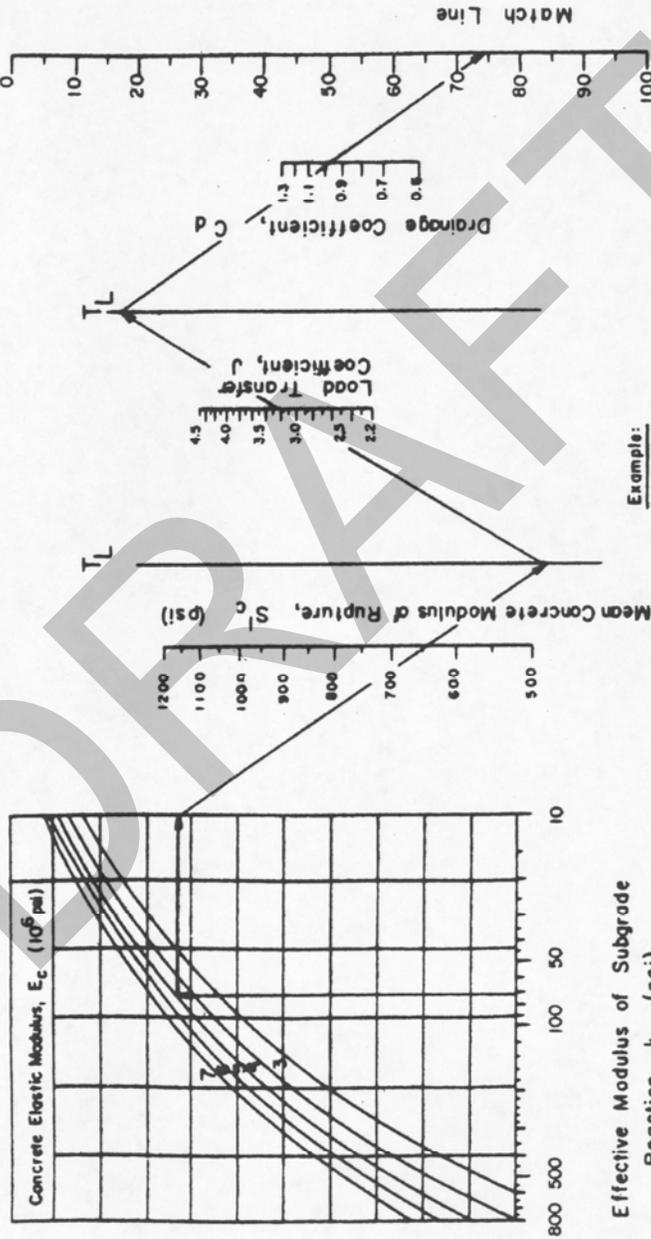
Longitudinal joints are installed to control longitudinal cracking. Unless otherwise specified by Engineer, all longitudinal joints, sawed or construction, including curb and gutter, shall be tied with rebar. They shall be spaced to coincide with lane markings at eight (8) to twelve (12) feet intervals. Longitudinal joint spacing should not be greater than thirteen (13) feet. The depth of longitudinal joints should be one-fourth ( $\frac{1}{4}$ ) to one-third ( $\frac{1}{3}$ ) of the pavement thickness ( $D/4$  to  $D/3$ ).

### Transverse Joints

Transverse contraction joints are used to control transverse cracking. Contraction joints relieve (1) tensile stresses that occur when the slab contracts and (2) curling and warping stresses caused by differential temperatures and moisture contents within the slab. The depth of the transverse joint shall be equal to one-quarter ( $D/4$ ) of the pavement thickness. This depth should be increased to  $D/3$  for pavements built on stabilized (cement or asphalt) subbase. For plain jointed concrete city street pavements, the joint spacing should not exceed twenty-four (24) to thirty (30) times the pavement thickness with the maximum of fifteen (15) feet. Smooth dowels shall be used on transverse joints for pavements seven (7) inches or thicker (see Engineering Design Standard details).

**NOMOGRAPH SOLVES:**

$$\log_{10} W_{18} = Z_R S_o + 7.35 \log_{10} (D+1) - 0.06 + \frac{\log_{10} \left[ \frac{\Delta \text{ PSI}}{4.5 - 1.5} \right]}{1 + \frac{1.624 \times 10^7}{(D+1)^{8.46}}} + (4.22 - 0.32 Z_R) \log_{10} \left[ \frac{S'_c \cdot C_d \left[ D^{0.75} - 1.132 \right]}{215.63 \Delta \left[ D^{0.75} - \frac{18.42}{(E_c/k)^{0.25}} \right]} \right]$$



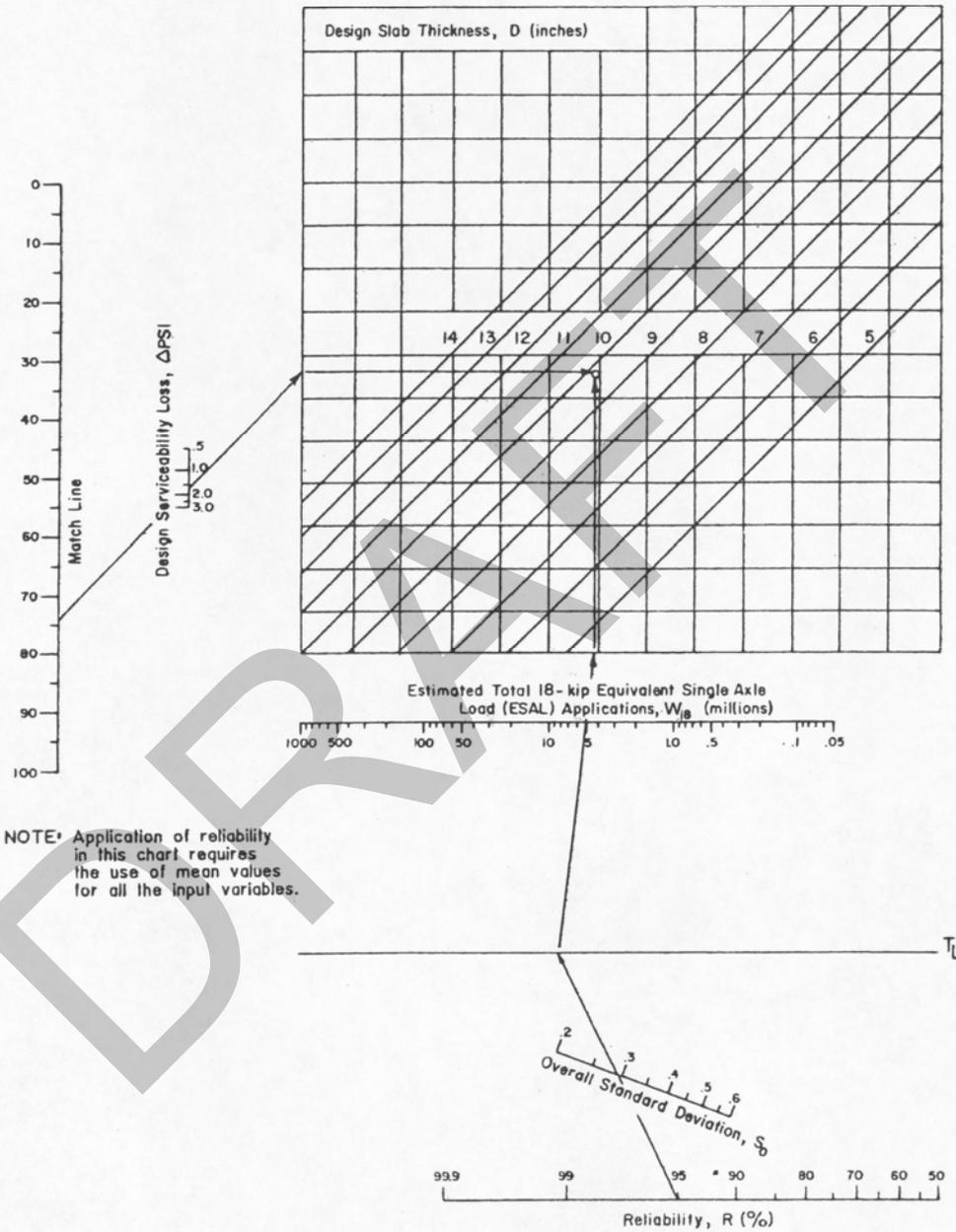
Concrete Elastic Modulus,  $E_c$  ( $10^6$  psi)

Effective Modulus of Subgrade Reaction,  $k$  (pci)

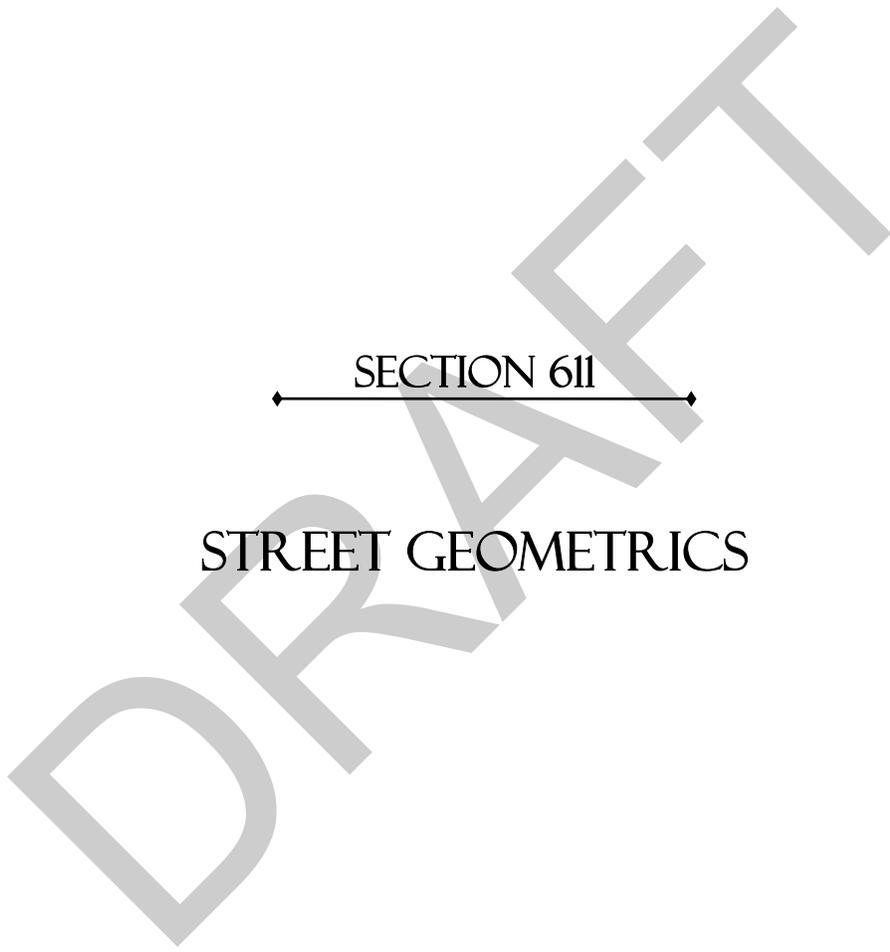
**Example:**

- $k = 72$  pci
- $E_c = 5 \times 10^6$  psi
- $S'_c = 650$  psi
- $J = 3.2$
- $C_d = 1.0$
- $S_o = 0.29$
- $R = 95\%$  ( $Z_R = -1.645$ )
- $\Delta \text{ PSI} = 4.2 - 2.5 = 1.7$
- $W_{18} = 5.1 \times 10^6$  (18 kip ESAL)
- Solution:  $D = 10.0$  inches (nearest half-inch, from segment 2)

**Design Chart for Rigid Pavement Based on Using Mean Values for Each Input Variable (Segment 1)**



Continued—Design Chart for Rigid Pavements Based on Using Mean Values for Each Input Variable (Segment 2)



SECTION 611

STREET GEOMETRICS

DRAFT

## SECTION 611

### STREET GEOMETRICS

#### 611.0 GENERAL

All curb, gutter, sidewalk, street design, and rights-of-way width shall conform to the minimum requirements of the City of Gillette Standard Construction Specifications and the City Subdivision Regulations. Where standards differ between the Subdivision Regulations and the Design Standards the Design Standards shall govern. Care shall be taken to ensure continuity of grades, widths, etc., of proposed, existing and future installations. Private non-commercial streets and parking lots shall be built to these Standards, including curbs, gutter, and sidewalks unless otherwise approved by the City Engineer.

#### 611.01 REPORTS

##### 611.01.1 Traffic Impact Analysis Report

A Traffic Impact Analysis (TIA) shall be required with applications for development review and approval when the trip generation is expected to exceed more than one hundred (100) trips during any one-hour (1) peak or to exceed two hundred fifty (250) trips per day, based on traffic generation estimates of the Institute of Transportation Engineer's Trip Generation Manual (or any successor publication). The City may also require a TIA for any of the following conditions:

1. Any project that has significant impact to the existing Level of Service (LOS) on any collector or arterial street;
2. Any application for rezoning;
3. Any case where the previous TIA for the property is more than two (2) years old;
4. Any case where increased land use density will result in increased traffic generation; and
5. As may be required by the City Engineer to address traffic issues that may be affected by the proposed project.

Traffic Impact Analysis reports shall be completed by a Professional Civil Engineer licensed in the state of Wyoming. The report shall be based on the following outline at minimum, and include appropriate background information, and supporting data.

1. Executive summary
2. Purpose and objectives
3. A description of the site and study area
4. Existing conditions in the area of development
5. Anticipated nearby development
6. Trip generation
7. Trip distribution
8. Modal split
9. Traffic assignment resulting from the development

10. Projected future traffic volumes
11. Assessment of the change in roadway operating conditions resulting from the development traffic
12. Recommendations for site access and transportation improvements needed to maintain traffic flow to, from, within, and past the site at an acceptable and safe level of service.

### **611.01.2**      Pavement Design Report

All roadway construction in the City of Gillette shall require a pavement design report. The report content shall be in accordance with Section 609 and Section 610 of these Standards and include a supporting geotechnical report.

## **611.02 STREET CLASSIFICATIONS**

### **611.02.1**      Local (see local standard detail 02512-02 for cross sections and additional information)

A local street is a general term denoting a roadway designed or operating with the following characteristics:

- A. Street Width (b/c to b/c)- thirty-six feet to forty feet (36' to 40)'.
- B. Design Speed- twenty-five (25) miles per hour with a generally posted speed limit of twenty to twenty-five (20-25) miles per hour.
- C. Traffic Volumes- Generally less than one thousand five hundred (1,500) vehicles per day.
- D. Function/Access- Designed for ease of direct access to adjacent parcels of land. Residential properties may front on local streets. Driveway widths shall be twelve feet (12') minimum and thirty-two feet (32') maximum.
- E. Traffic Control- Regulation of traffic is accomplished through stops signs, yield signs, or right-of-way rules for uncontrolled intersection as in accordance with the current edition of the Manual on Uniform Traffic Control Devices (MUTCD).
- F. Cul-De-Sacs- In accordance with Section 611.08 of these standards.
- G. Alleys- In accordance with Section 611.09 of these standards.

### **611.02.2**      Local Through (see Local through standard detail 02512-02 for cross sections and additional information)

A local through is a general term denoting a roadway designed or operating with the following characters:

- A. Street Width (b/c to b/c)- forty feet to 44 feet (40' to 44').
- B. Design Speed – between twenty- five (25) and thirty-five (35) miles per hour with a generally posted speed limit of twenty-five to thirty (25-30) miles per hour.
- C. Traffic Volume – Generally between one thousand five hundred (1,500) and two thousand five hundred (2,500) vehicles per day.

- D. Level of Service – Designed to a minimum Level of Service (LOS) C with a volume to capacity ratio of 0.40 based on the twenty-year (20) forecasted volumes.
- E. Function/Driveway Access – Local through are designed to handle traffic volumes loading from and onto private drives, locals, other collectors, and arterial roadways. Local through collect and distribute traffic between local streets and collector and arterial streets. Residential properties may front on and have direct access to local through streets. Driveway widths shall be twelve feet (12') minimum and thirty-two feet (32') maximum. The minimum driveway access spacing shall be one hundred (100) feet for non-residential areas.
- F. Traffic Control – Regulation of traffic is accomplished through the use of signs, traffic signals and channelization in accordance with the current edition of the Manual on Uniform Traffic Control Devices (MUTCD).

**611.02.3** Collector (see collector standard detail 02512-02 for cross sections and additional information)

A collector is a general term denoting a roadway designed or operating with the following characteristics:

- A. Street Width (b/c to b/c) – thirty-six feet to fifty-six feet (36' to 56')
- B. Design Speed – Between thirty-five (35) and forty-five (45) miles per hour with a generally posted speed limit between thirty (30) and forty (40) miles per hour.
- C. Traffic Volumes – Generally between two thousand five hundred (2,500) to three thousand five hundred (3,500) vehicles per day.
- D. Level of Service – Designed to a minimum Level of Service (LOS) C with a volume to capacity ratio of 0.40 based on the twenty (20) year forecasted volumes.
- E. Function/Driveway Access – Collectors are designed to handle traffic volumes loading from and onto local, local through, other collector, and arterial roadways. Collector streets collect and distribute traffic within the community. Left turn lanes and channelization may be required at intersections and driveway access points by the City Engineer. Driveway access is generally limited and may be restricted. Single-family residential frontage is discouraged and back-out drives are prohibited except in unique circumstances. Driveway access widths shall be twelve feet (12') minimum and forty feet (40') maximum. The minimum driveway access spacing shall be one hundred (100) feet.
- F. Traffic Control – Regulation of traffic is accomplished through the use of signs, traffic signals, and channelization in accordance with the current edition of the Manual on Uniform Traffic Control Devices (MUTCD).

**611.02.4** Arterial (see arterial standard detail 02512-01 for cross section and additional information)

An arterial street is a general term denoting a roadway designated or operating with the following characteristics:

- A. Street Width (b/c to b/c) – Minor forty-eight feet (48’) to seventy-four feet (74’), Major sixty feet (60’) to ninety-eight feet (98’).
- B. Design Speed – Between forty (40) and fifty (50) miles per hour with a generally posted speed limit between thirty-five (35) and forty-five (45) miles per hour.
- C. Traffic Volumes – Generally greater than three thousand five hundred (3,500) vehicles per day.
- D. Level of Service – Designed to a minimum Level of Service (LOS) C with a volume to capacity ratio of 0.40 based on the twenty (20) year forecasted volumes.
- E. Function/Driveway Access – Arterial streets are designed to handle traffic loading from other arterials, collector streets and occasionally from local streets. They are intended to serve regional and intra-city multi-modal travel. Direct driveway access from residential properties is prohibited. Direct driveway access from all other land uses may require a traffic impact analysis demonstrating that the driveway access can function safely with minimal impact to travel on the arterial. Driveway access movements may be restricted or prohibited. Driveway widths shall be twelve feet (12’) minimum and 40’ maximum. The minimum driveway access spacing shall be two hundred fifty (250) feet.
- F. Traffic Control – Regulation of traffic is accomplished by signs, traffic signals, and channelization in accordance with the current edition of the Manual on Uniform Traffic Control Devices (MUTCD).

### 611.03 HORIZONTAL ALIGNMENT

#### 611.03.1 Horizontal Curves

The minimum horizontal curves for roadway alignment shall be in accordance with the table below. AASHTO design guidelines shall be considered and must be approved by the City Engineer for unique or unusual circumstances that are different from this table.

**TABLE 611.1  
HORIZONTAL CURVES**

	Arterial	Collector	Local Through	Local
Minimum Curve Radius (ft)	AASHTO Standards	AASHTO Standards	300	180

**611.03.2**      Curb Return Radii

Minimum return radii shall be as shown in the table below:

**TABEL 611.2**  
**CURB RETURN RADII**  
(Measured Along back of curb)

<b>Through Street</b>	<b>Intersecting Streets</b>		
	<b>Arterial</b>	<b>Collector</b>	<b>Local/Local Through</b>
Arterial	50 ft*	40 ft*	20 ft*
Collector	40 ft*	30 ft	20 ft
Local	20 ft	20 ft	20 ft

(\* May deviate as per the City Engineer’s considerations to multi-modal uses)

**611.03.3**      Superelevation

All roadway designs using superelevation are subject to review and approval by the City Engineer. Recommendations of the AASHTO “A Policy on Geometric Design of Highways and Streets”, latest edition shall be consulted in the design of superelevation.

Superelevation shall not be used on local or local through roads without approval from the City Engineer.

**611.03.4**      Stopping Sight Distance

The minimum stopping sight distance is the distance required by the driver of a vehicle traveling at the design speed to bring the vehicle to a stop after an object on the street becomes visible. Stopping sight distance is calculated in accordance with the latest edition of the AASHTO “A Policy on Geometric Design of Highways and Streets”. Object height is assumed to be two (2.0) feet above road surface and viewer’s eye height is three and a half (3.50) feet above road surface. A likely obstruction may be a bridge abutment or line of columns, wall, cut side slope, or a side or corner of a building. The sight distance design procedure shall assume a six (6.0) foot fence (as measured from actual finished grade) exists at all property lines except in the sight-distance triangles required at all intersections.

Where an object off the pavement restricts sight distance, the stopping sight distance determines the minimum radii of curvature. In no case shall the stopping sight distance be less than as specified in Table 611.3. To allow for the effect of grade on stopping sight distance the factors in table 611.4 shall be used.

**TABLE 611.3  
STOPPING SIGHT DISTANCE**

DESIGN SPEED (mph)	STOPPING SIGHT DISTANCE (ft)
25	155
30	200
35	250
40	305
45	360
50	425

**TABLE 611.4  
EFFECT OF GRADE ON STOPPING SIGHT DISTANCE**

DESIGN SPEED (MPH)	STOPPING SIGHT DISTANCE ADJUSTMENT					
	Increase for Down Grade (ft)			Decrease for Upgrades (ft)		
	3%	6%	9%	3%	6%	9%
25	3	10	18	7	12	15
30	5	15	27	10	16	21
35	7	21	37	13	21	28
40	10	32	49	16	27	36
45	18	40	67	16	29	40
50	21	49	82	20	37	50

**611.03.5**      Alignment at Bridges

Ending a curve on a bridge is undesirable and adds to the complication of design and construction. Likewise, curves beginning or ending near a bridge should be placed so that no part of any transition extends onto the bridge. Compound curves on a bridge are equally undesirable. If curvature is unavoidable, every effort should be made to keep the bridge within the limits of the simple curve.

**611.03.6**      Coordination With Vertical Alignment

To avoid the possibility of introducing serious traffic hazards, coordination is required between horizontal and vertical alignment. Particular care must be exercised to maintain proper sight distance at all times. Sharp horizontal curves introduced at or near the top of pronounced crest or bottom of sag vertical curves should be avoided.

**611.03.7**      Railroad Crossings

All railroad crossings on arterial streets shall be steel reinforced rubber or concrete panels for the full width of the roadway. A timber pedestrian walk and vehicle recovery area shall be provided on both sides of the steel reinforced rubber.

Timber crossings may be considered for use in place of steel reinforced rubber on local streets only. Minimum crossing width shall be the full width of the right-of-way to provide for pedestrians and vehicle recovery area.

The appropriate railroad company must approve all railroad crossings.

**611.04 VERTICAL ALIGNMENT**

**611.04.1** Permissible Roadway Grade

The minimum desirable grade for roadways is one (1) percent. Maximum desirable grades for local streets are eight (8) percent, collectors are seven (7) percent, and arterials are six (6) percent. Maximum grades should only be used in extreme topographic conditions, and the designer should strive to minimize the use of maximum grades for considerable lengths. The City Engineer must approve grades in excess of the maximum or below the minimum desirable.

**611.04.2** Permissible Intersection Grades (public rights-of-way)

The maximum permissible grade at intersections shall be as shown in the table below. These grades are maximum instantaneous flowline grades for the stated distances (each side of the street) for the minor (intersecting) street.

**TABLE 611.5**

<b>Maximum Grades and Length of Grades at Intersection Approaches</b>				
<b>Intersection of:</b>	<b>Local</b>	<b>Collector</b>	<b>Arterial</b>	<b>Maximum Grade</b>
Local Street with	35'	100'	100'	4%
Collector Street with	100'	100'	200'	3%

The intersection grade of the major (through) street at the intersection may be dictated by design considerations for the street. However, if the major street intersection grade exceeds three (3) percent, the type of access and access control will be as directed by the City Engineer.

In general, all private commercial driveways with curb return radii shall have a maximum grade of four (4) percent, with the length of the maximum grade for the commercial driveway a minimum of fifty (50) feet measured from the flowline intersection of the public roadway.

**611.04.3** Changing Grades

Instantaneous grade changes shall not be permitted. The use of grade breaks in lieu of vertical curves is discouraged. However, if a grade break is necessary and the algebraic difference in grade does not exceed four-tenths of a percent (0.004 ft./ft.) along the roadway, the grade break may be permitted. The maximum grade break allowed at the point of tangency at a curb return for local and collector roads shall be two (2) percent and

a maximum of one (1) percent for arterial roadways. Special consideration shall be given to necessary drainage structures.

#### 611.04.4 Vertical Curves

When the algebraic difference in grade (A) is at, or exceeds, four tenths of a percent (0.004 ft./ft.), a vertical curve is to be used. All vertical curves shall be symmetrical. The minimum gradients into and out of a sag vertical curve shall be one (1) percent (0.01 ft./ft.). All vertical curves shall be labeled in the profile with length of curve (L),  $K=L/A$  values, PVC, PVT, PVI, and stationing and elevation of these components. In addition, the low point or high point of the vertical curve shall be shown. The minimum vertical curve K values are shown in Table 611.6.

**TABLE 611.6**

**MINIMUM VERTICAL CURVE DESIGN CRITERIA**

Design Speed	K Value (Length = K X Algebraic Difference in Grades)	
	Crest	Sag
25	12	26
30	19	37
35	29	49
40	44	64
45	61	79
50	84	96

#### 611.04.5 Intersections

In addition, the following criteria shall apply at intersections:

- A. The grade of the “through” street shall take precedence at intersections. At the intersections of roadways with the same classification, the more important roadway, as determined by the City Engineer, shall have this precedence. The design should warp side streets to match through streets with as short of a transition as possible. Crown warping of the major street shall be considered to allow for higher speeds of cross street traffic at signalized intersections.
- B. The key criteria for determining the elevation of the curb return on the side street and the amount of warp needed on a side street transitioning to a through street are:
  - 1. Permissible grade in the stop/start lane (See section 611.04.2).
  - 2. Pavement cross slope at the PCR’s on the side street and permissible warp in pavement cross slope (see section 611.06.1(B)).
  - 3. Normal vertical curve criteria.
  - 4. Vertical controls within the curb return itself.
- C. The elevation at the PCR on the through street is always set by the grade of the through street in conjunction with the pavement cross slope.

- D. Carrying the crown at a side street into the through street is permitted only when drainage consideration warrants such a design.
- E. A more detailed review shall be performed for arterial intersections to maximize drivability.
- F. Whenever possible, intersections shall be made at right angles or radial to a curve. No intersecting angle of less than eighty (80) degrees will be allowed without approval of the City Engineer.
- G. Intersections for Collector and Arterial Streets should be four (4) legged, as opposed to two (2) tee intersections.
- H. Street jogs with centerline offsets of less than one hundred fifty feet (150') shall not be permitted.

#### **611.04.6**      Curb Returns

Minimum fall around curb returns for flow along the curb line shall be a minimum of one and one half (1.5) percent.

#### **611.04.7**      Curb Return Profiles

Curb return profiles are required for radii equal to or greater than thirty (30) feet within the public right-of-way. A mid-point elevation along the arc length of the curb return shall be shown in the plan view for radii less than thirty (30) feet. Curb return design shall be set in accordance with the following design procedure. General standards for flowline control and profiles with the curb returns shall be as follows:

- A. The point of tangency at each curb return shall be determined by the projected tangent grade beginning at the point of intersection (PI) of the flowlines.
- B. The arc length and external distance of the curb return shall be computed and indicated on the drawing.
- C. Show the corresponding flowline (or top of curb) grade for each roadway beyond the Point of Curvature of the Return (PCR).
- D. Design the curb return flowline such that a maximum cross slope between the mid-point of the curve and the Point of Intersection of the Return (PICR) (external distance) does not exceed five (5) percent. Grade breaks at the PCRs shall not exceed two (2) percent for local and collector streets and one (1) percent for arterials. The flowline design of the curb return shall be accomplished within the return without affecting street grades beyond the PCR. The elevation and location of the high or low point within the return, if applicable, is to be called out in the profile.
- E. Scale for the curb return profile to be one inch equals one foot (1"=1') vertically and one inch equals ten feet (1"=10') horizontally.
- F. Curb return radii, existing and proposed, shall be shown.

#### **611.04.8**      Connection with Existing Roadways

- A. Connection with existing roadways shall be smooth transitions conforming to normal vertical curve criteria if the algebraic difference in grade between the existing and proposed grade exceeds four-tenths of a percent (0.004 ft/ft). When a vertical curve is used to make this transition, it shall be fully

accomplished prior to the connection with the existing improvements and shall also comply with the grade requirements at intersection approaches.

- B. Existing center line grade shall be shown for at least three hundred (300) feet with field verified as-builts showing stations and elevations at twenty-five (25) foot intervals. In the case of connection with an existing intersection, these as-builts are to be shown within a three hundred (300) foot radius of the centerline of the intersection. This information will be included in the plan and profile that shows that proposed roadway. Limits and characteristics of the proposed improvements are the primary concern in the plan view. Such characteristics include horizontal alignment, off-site intersections, limits of the improvements, etc.
- C. Previously approved designs for the proposed improvement are not an acceptable means of establishing existing grades. However, they are to be referenced on the construction plan where they occur.
- D. The basis of the as-built elevations shall be the same as the design elevations (both proposed and existing flow line or both proposed and existing top of curbs, etc.) when possible.
- E. If a connection to a Wyoming Department of Transportation (WYDOT) road is required, an access permit must be obtained from WYDOT.

#### **611.04.9**      Off-Site Design

The design grade, and existing ground at that design grade, of all roadways that dead end due to project phasing, subdivision boundaries, etc. shall be continued, in the same plan and profile as the proposed design, for at least five hundred (500) feet or to its intersection with an existing collector or arterial roadway which ever is less. This limit shall be extended to one thousand (1,000) feet when arterial roadways are being designed.

### **611.05 INTERSECTION AND DRIVEWAY SIGHT DISTANCES**

#### **611.05.1**      General

Adequate intersection design necessitates the provision of safe ingress and egress from one street or driveway to the other, based in part on the ability of a driver to see oncoming vehicles or pedestrians. The following guidelines shall be used in the design of intersections, private driveways, and public streets that intersect other traffic carrying facilities.

#### **611.05.2**      Sight Distance Triangle

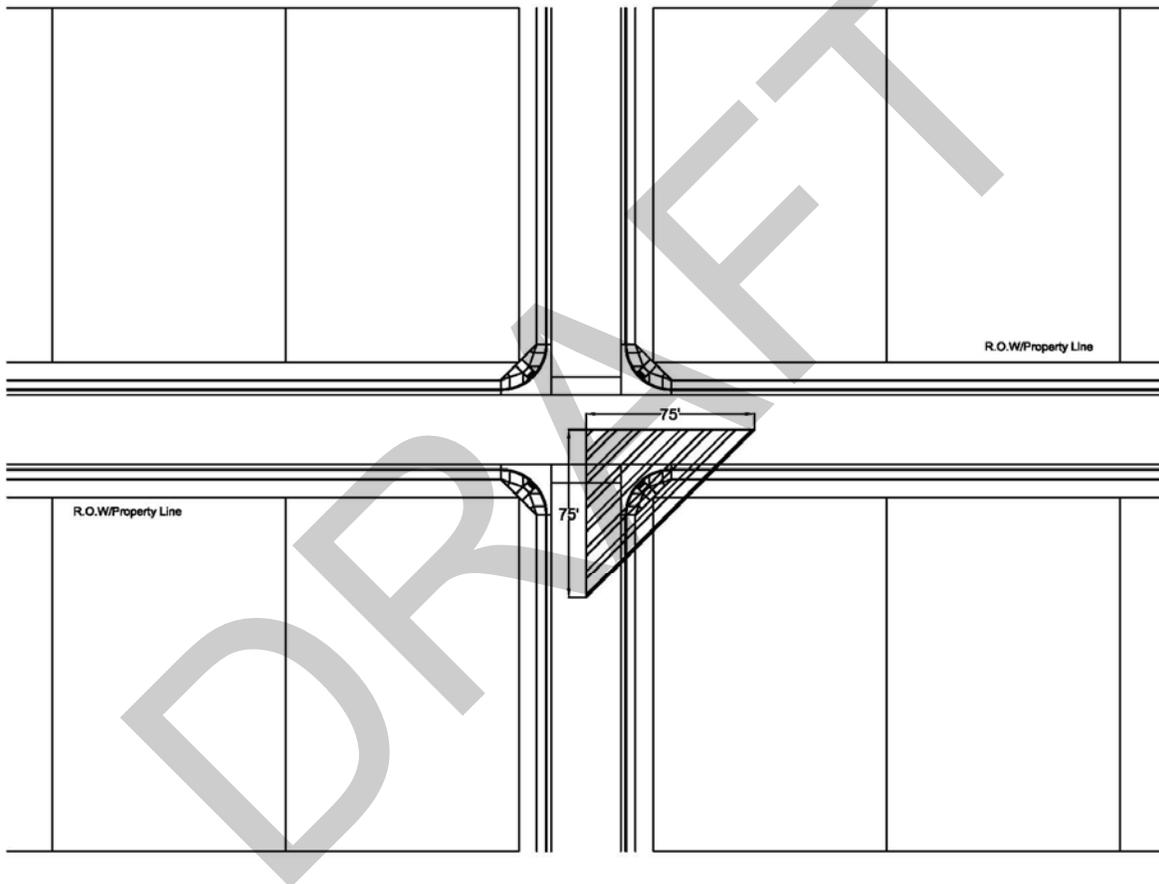
At the intersection of two (2) public streets or a private driveway and a public street, sight distance shall be evaluated across a “sight distance triangle” where obstructions are restricted according to the following criteria. Within the area of the triangle there must be no wall, fence, sign, foliage, berming, or other structure, which will obscure the driver’s view of traffic approaching that intersection. The structures or berms within the sight distance triangle can extend no higher than two (2) feet above the curb elevation and no lower than eight (8) feet above the curb. Exceptions to this requirement exist for public facilities such as fire hydrants, utility poles, and traffic control devices. These

facilities must be located to minimize visual obstruction. Two (2) types of clear sight triangles are considered based on the functional classification of the street.

#### 611.05.2.1 Local and Local Through Street Sight Triangles

Each quadrant of an intersection should contain a triangular area free of obstructions that might block an approaching driver's view of potentially conflicting vehicles. The length of the legs of this triangular area, along both intersecting roadways, should be seventy-five feet (75') measured from the center of the intersection as shown in Figure 611.1.

**Figure 611.1  
Sight Triangles**



#### 611.05.2.2 Collector and Arterial Street Sight Triangles

All Collector and Arterial street sight triangles shall be designed in accordance with the latest addition of AASHTO Policy on Geometric Design of Highways and Streets.

### 611.06 ROADWAY CROWN

#### 611.06.1 Cross Slope

Except at intersections or where superelevation is required, roadways shall have no more than one (1) foot difference in elevation from top of curb to top of curb (or flowline to

flowline). Design for new high-type surfaced roadways, such as asphalt or concrete paving, shall have a minimum of two (2) percent to a maximum of two and one-half (2.5) percent cross slope for Local, and Local Through streets and two (2) percent cross slope for Collector and Arterial streets. This cross slope may be increased to three (3) percent for rehabilitation efforts, such as milling and overlaying asphalt surfaces, for Local and Local Through streets. Within one hundred fifty feet (150') of an intersection, the maximum elevation difference between flow lines shall be dictated by the allowable intersection grade and the actual distance between flowlines.

- A. Parabolic or curved crowns are not allowed. In no case shall the pavement cross slope at warped intersections exceed the grade of the through street.
- B. The rate of change in pavement cross slope when warping side streets at intersections shall not exceed one (1) percent every twenty-five (25) feet horizontally on a local/local through roadway, one (1) percent every thirty-seven-and one-half (37.5) feet horizontally on a collector roadway, or one percent (1%) every (56.5) fifty-six and one-half feet horizontally on an arterial roadway.
- C. In the case of conflict caused by requirements of the Storm Drainage Design Section, the drainage requirements shall govern.

#### **6.11.07 SIDEWALKS, CURB AND GUTTER, CURB RAMPS, AND DRIVEWAYS**

- A. Roadway typical sections shall be as specified by the City of Gillette Standard Construction Specifications.
- B. Sidewalks and/or bicycle paths shall be constructed as depicted in the typical roadway cross-section details unless specifically deleted by action of the City Council.
- C. Curb ramps shall be constructed in accordance with the City of Gillette Standard Construction Specifications, Design Standards, and ADA requirements.
- D. Drainage structures shall not be placed off the end of curb ramps. Location of curb ramps shall take precedence over location of the drainage structure.
- E. Where curb cuts are allowed based on traffic considerations, concentrated storm water runoff must not be discharged across the sidewalk. These flows must be directed to a sidewalk chase section. If this is not possible due to grading restraints, radius returns, and cross-pan shall be used.
- F. Curb cuts and driveways shall be constructed in accordance with the City of Gillette Standard Construction Specifications.

#### **6.11.08 CUL-DE-SACS**

The following criteria shall be used for cul-de-sac horizontal geometry.

- A. The minimum right-of-way radius shall be sixty (60) feet
- B. The minimum flowline radius shall be forty-eight (48) feet
- C. The minimum width of the street shall be forty (40) feet from back of curb to back of curb.

- D. The length of a cul-de-sac shall be determined by the average number of daily trips made to and from the cul-de-sac. No cul-de-sac shall contain a number of lots that exceeds two hundred (200) average daily trips. The two hundred (200) average daily trips number is derived from the latest edition of the Institute of Transportation Engineers Trip Generation informational report and accompanying handbook.
- E. Vertical alignment shall be in accordance with Section 611.04 of these standards.
- F. Cul-de-sacs are not allowed in commercial and industrial developments unless approved by the City Engineer.
- G. The City Engineer may allow the use of hammerhead designs or other non-standard designs.

### **611.09 ALLEYS**

The following criteria shall be used for alley geometry.

- A. The minimum right-of-way shall be twenty (20) feet.
- B. The minimum width of the paved section shall be sixteen (16) feet in residential areas and twenty (20) feet for commercial and industrial areas.
- C. See alley standard detail 02512-03 for cross sections and additional information.

### **611.10 AUXILIARY LANES (ACCELERATION AND DECELERATION LANES)**

The design of the arterial street system depends upon the proper control of access to developments. The location and design of access points must minimize traffic hazards and interference to through traffic movements. To ensure proper control, the following standards for acceleration and deceleration lanes have been established. The approved traffic impact analysis study or the City Engineer shall establish the need for acceleration and deceleration lanes.

Right and left turn lanes from arterial streets shall have a minimum of one hundred fifty (150) feet of storage length and one hundred fifty (150) feet of transition taper. Additional storage length may be required dependent on the volume of turn movements. At the discretion of the City Engineer, consideration may be given to require longer minimum length of tapers as may be necessary for acceleration lanes.

### **611.11 STREET LIGHTING**

Street lights shall be provided at all arterial street/road intersections and as required on all newly developed and dedicated public streets in the City. In general, street light poles shall not be placed within sidewalk or curb ramps and, at minimum, shall not interfere with the required four (4) foot free width for pedestrian travel as per ADA guidelines.

The land developer shall contact the City's Electrical Division to initiate street light design for any new development during the plan review process. The private developer must

provide a copy of the proposed site plan, which will be used for proposed street light layout design. The plan will be returned to the private developer showing all required street lights.

### **611.12 SIGNING AND STRIPING**

Signing/stripping plans of new streets/roads and re-signing/stripping of existing streets/roads necessitated by development shall be submitted as part of the construction plans. All signing/stripping shall be in accordance with the Manual on Uniform Traffic Control Devices (MUTCD) and must be approved by the City Engineer. Depending on the street construction in relation to development build-out, final installation of signage/stripping may not be required prior to opening the street for traffic, as warranted by the City Engineer, but will still be provided to the City.

### **611.13 DRAINAGE**

All streets shall be designed to provide continuous surface drainage directed to storm drain inlets and drainage courses. Grades shall permit flow without ponding. Inlets shall be located to intercept the curb flow at the point flow capacity is exceeded by storm runoff according to the Design Standards, Section 403. Inlets shall also be installed to intercept cross-pavement flows at points of transition in superelevation. Due to the presence of handicap ramps, inlets shall not be allowed in the curb return but shall be located outside the tangent points of the curb returns. Gutter transition sections abutting inlets shall not be within the curb return.

Eight feet (8') wide concrete cross-pans shall normally be installed across those streets at intersections carrying traffic, which must stop. Installation of cross-pans between intersections or across streets carrying through traffic at intersections shall be avoided in all cases. Cross-pans are not permitted across collector or arterial roadways. The use of any cross-pan on arterial roadways where the vertical grade exceeds four and one-half percent (4.5%) will be considered only after all alternatives have been exhausted. Mid block cross-pans are discouraged and must be approved by the City Engineer.

Storm water from concentrated points of discharge shall not be allowed to flow over sidewalks, but shall drain to the roadway or storm inlet by use of chase sections. Sidewalk chase sections shall not be located within a curb cut or driveway. Hydraulic design shall be in accordance with the Design Standards, Section 403. Sidewalk chases will only be allowed where approved by the City Engineer. Sidewalk chases will only be used to allow surface drainage to enter into the street gutter, rather than being used to avoid the use of standard inlet. Sidewalk chase sections shall be constructed in accordance with City of Gillette Design Standards, Standard Drawings.

A check shall be made to be sure of continuity of drainage design between the proposed construction, and existing and/or future construction. In no case shall surface drainage be permitted to be disposed of overland except by approved storm drainage facilities.

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STANDARD DRAWINGS

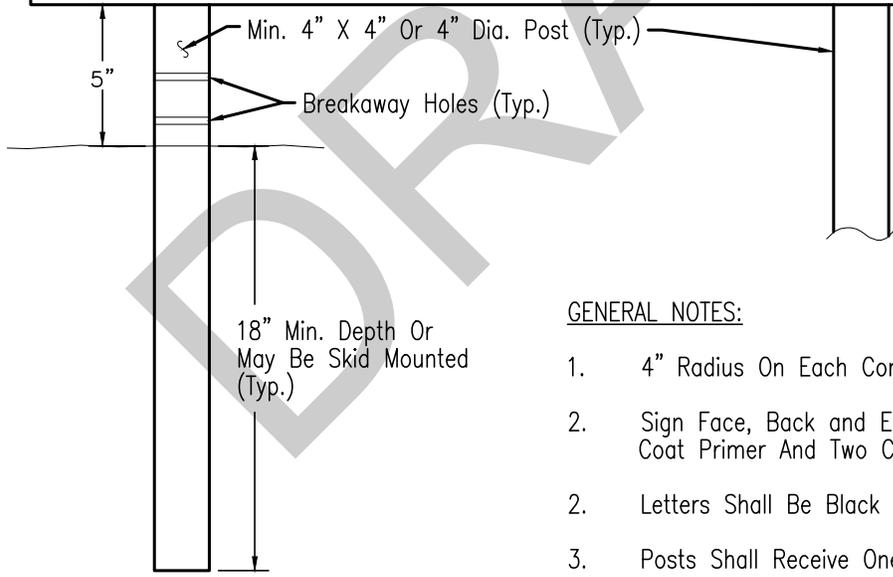
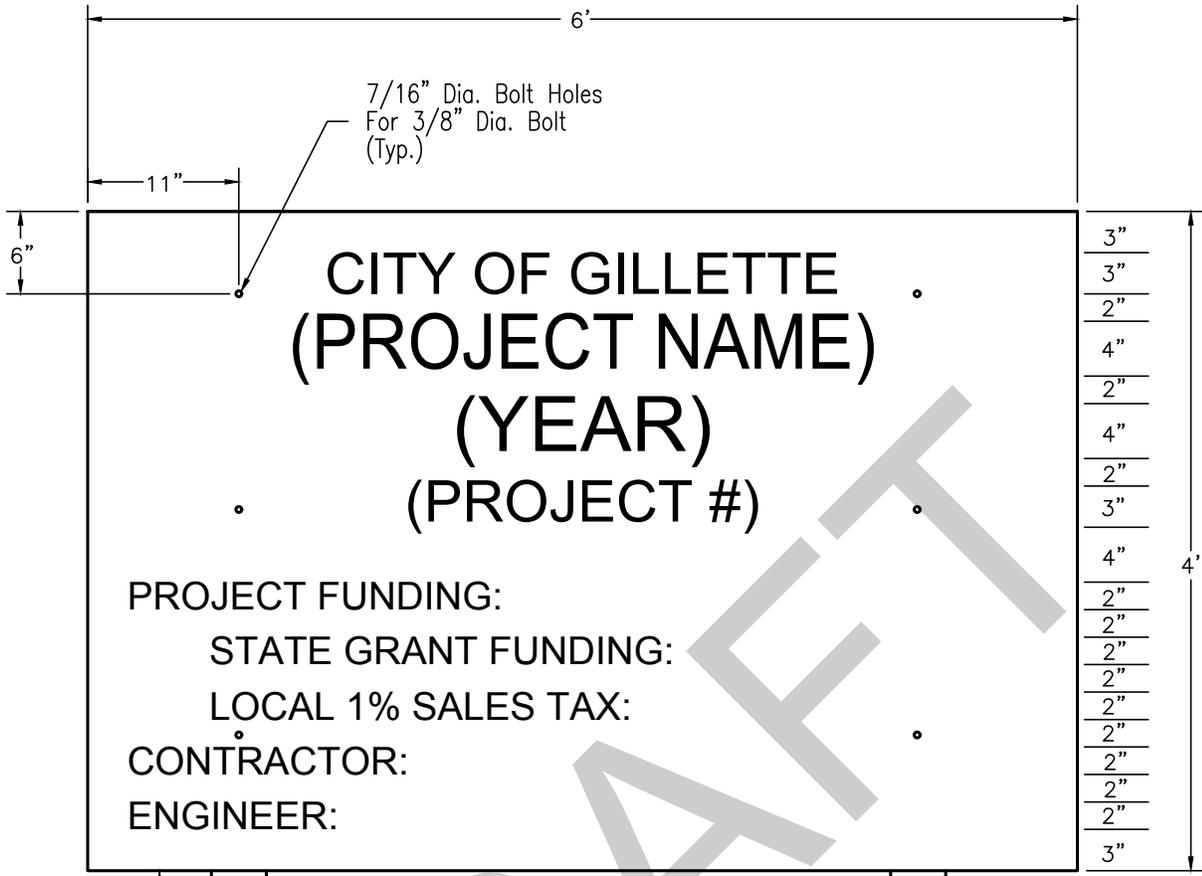
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# STANDARD DRAWING INDEX

DRAWING NAME	NO.	DRAWING NAME	NO.
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Storm Drain Inlet Protection	01500-02	Intersection Closure - Side Location	01510-09
Stormwater Inlet & Outlet Protection	01500-03	Intersection Closure - Far Side, Right Lane	01510-10
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Silt Fence - Gravel Filter	01500-08	Channelizing Devices	01510-15
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Sediment Trap - Concentrated Flow	01500-13	Typical Collector and Local Street Sections	02512-02
Sediment Trap - Excavated	01500-14	Typical Alley Section	02512-03
Sediment Trap - Earth Berm	01500-15	Typical Type 'A' and 'C' Curb and Gutter - Attached Sidewalk	02528-01
Sediment Trap - Ditch	01500-16	Street Corner With & Without Valley Gutter	02530-01
Sediment Trap - Silt Fence	01500-17	Residential Access Control & Offsets	02530-02
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Excavated Concrete Washout Area	01500-25	Curb Ramp for Parallel Sidewalk	02530-09
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# STANDARD DRAWING INDEX

DRAWING NAME	NO.	DRAWING NAME	NO.
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Fire Hydrant Guard Poles (3 Poles)	02645-03	Multiple Inlet	02725-02
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Splash Pad For Fire Hydrant	02645-05	Typical Trickle Channel	02725-04
Fire Hydrant Tracer Wire	02645-06	Low Flow Channel	02725-05
Thrust Blocking For Water Main Fittings	02665-01	Sub-Drain For New & Existing Construction	02725-06
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3" Air Vacuum Air Release Valve	02665-08	B&B Tree Planting with Staking	02900-01
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Typical Water Service Connection	02665-10	Quick Coupler Valve Assembly	02920-01
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Typical Meter Installation for 1" & Smaller Meters	02665-13	Mainline Isolation Valve for 3" and Larger Valves	02920-04
Thermal-Coil Meter Box	02665-14	Irrigation Pop-Up Assembly	02920-05
Meter Pit for 1.5" - 2" Meters	02665-15	Pedestal & Interior Wall Mount Controllers	02920-06
Typical Meter Installation for 1.5" - 2" Meters	02665-16	Irrigation Rotor Assembly	02920-07
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Flat Top Manhole for 3" & Larger Meters	02665-19	Backflow Preventer Unit With Metal Enclosure 2.5 in to 10 in	02920-11
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Sanitary Sewer Manhole (Flat Top)	02700-02	Thrust Blocking for Irrigation Main Fittings	02920-15
Standard Steps for Manholes	02700-03	Transverse Joint Details	03251-01
Manhole Bases (48", 60" & 72")	02700-04	Longitudinal Joint Details	03251-02
Manhole Channel Details	02700-05		



GENERAL NOTES:

1. 4" Radius On Each Corner Is Optional
2. Sign Face, Back and Edges Shall Receive One Coat Primer And Two Coats Of White Paint.
2. Letters Shall Be Black Enamel.
3. Posts Shall Receive One Coat Of Cedar Stain.
4. \*Dollar Amounts To Be Determined After Contract Award.



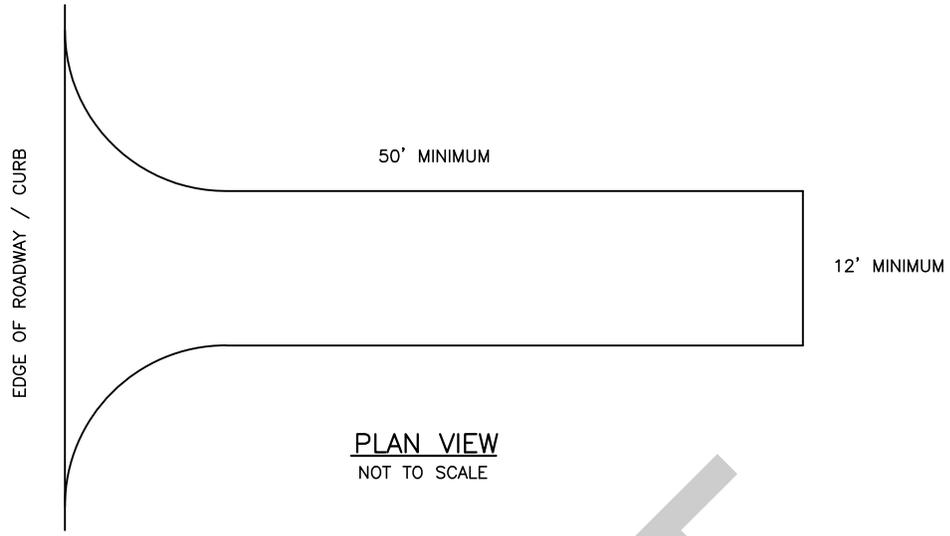
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P.O. BOX 3003, 201 E. 5TH STREET  
GILLETTE, WYOMING 82717  
PHONE: (307) 686-5311

**PROJECT ID SIGN**

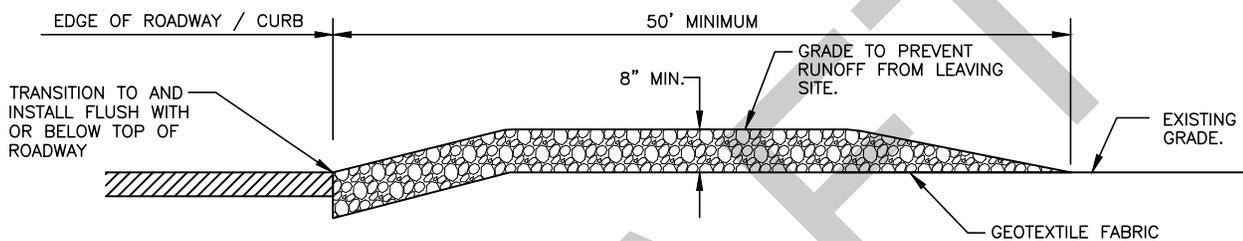
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APPROVED BY: CITY ENGINEER           HV/KDS          

DATE:
MARCH 2012
DRAWING NO.
01015-01



PLAN VIEW  
NOT TO SCALE



STABILIZED CONSTRUCTION ENTRANCE DETAIL  
NOT TO SCALE

NOTES:

1. TO BE INSTALLED PRIOR TO CONSTRUCTION ACTIVITIES.
2. STONE SIZE SHALL BE 2" - 4" OPEN GRADED ROCK.
3. THICKNESS OF CRUSHED STONE PAD TO BE NOT LESS THAN 8".
4. LENGTH SHALL BE A MINIMUM OF 50' FROM ACTUAL ROADWAY, AND WIDTH NOT LESS THAN FULL WIDTH OF INGRESS/EGRESS. (12' MINIMUM)
5. ENTRANCE SHALL BE PROPERLY GRADED TO PREVENT RUNOFF FROM LEAVING THE CONSTRUCTION SITE.  
THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHTS OF WAY. ALL SEDIMENT SPILLED, DROPPED, WASHED OR TRACKED ONTO PUBLIC RIGHTS OF WAY MUST BE REMOVED IMMEDIATELY BY CONTRACTOR.  
AS NECESSARY, WHEELS MUST BE CLEANED TO REMOVE SEDIMENT PRIOR TO ENTRANCE ONTO PUBLIC RIGHT OF WAY. WHEN WASHING IS REQUIRED, IT SHALL BE DONE ON AN AREA STABILIZED WITH CRUSHED STONE WHICH DRAINS INTO AN APPROVED SEDIMENT TRAP OR SEDIMENT BASIN. ALL SEDIMENT SHALL BE PREVENTED FROM ENTERING ANY STORM DRAIN, DITCH OR WATERCOURSE USING APPROVED METHODS.
6. ALL ROCK AND FABRIC TO BE REMOVED UPON COMPLETION OF CONSTRUCTION, AND THE AREA BACKFILLED AND RECLAIMED, OR RE-SEEDED, APPROPRIATE TO THE SITE.



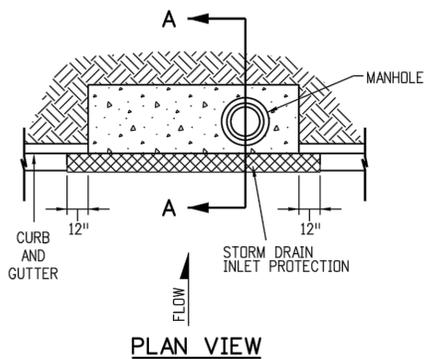
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**STABILIZED CONSTRUCTION ENTRANCE**

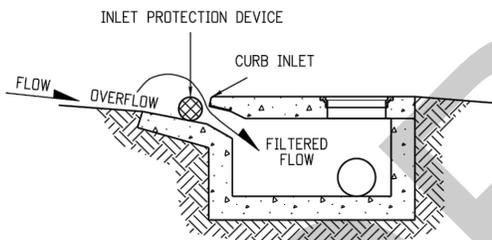
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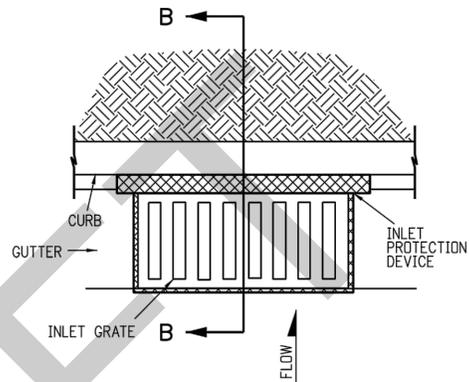
**PLAN VIEW**



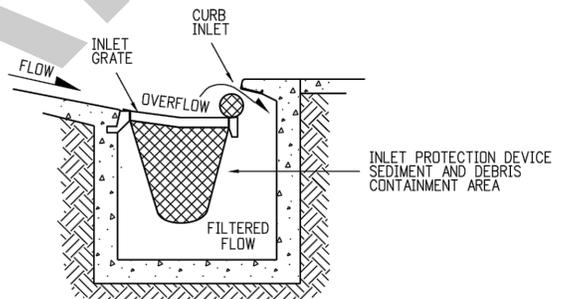
**SECTION A-A**

**STORM DRAIN INLET PROTECTION (CURB OPENING)**

INLET PROTECTION SHALL EXTEND 12 IN. PAST EACH END OF THE INLET.



**PLAN VIEW**



**SECTION B-B**

**STORM DRAIN INLET PROTECTION (COMBINATION)**

INLET PROTECTION SHALL EXTEND 12 IN. PAST EACH END OF THE INLET.

**NOTES:**

1. INLET PROTECTION BMP SHALL BE INSTALLED BEFORE CONSTRUCTION BEGINS.
2. INLET PROTECTION SHALL BE MAINTAINED THROUGHOUT THE CONSTRUCTION PERIOD.
3. INLET PROTECTION SHALL BE REMOVED ONCE CONSTRUCTION IS COMPLETED.



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**STORM DRAIN INLET PROTECTION**

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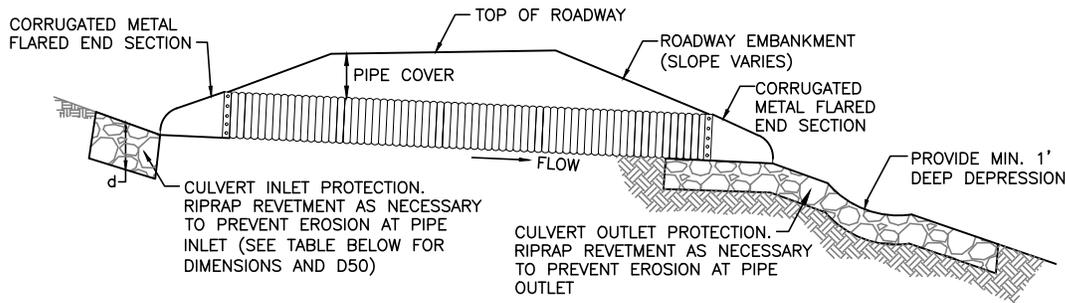
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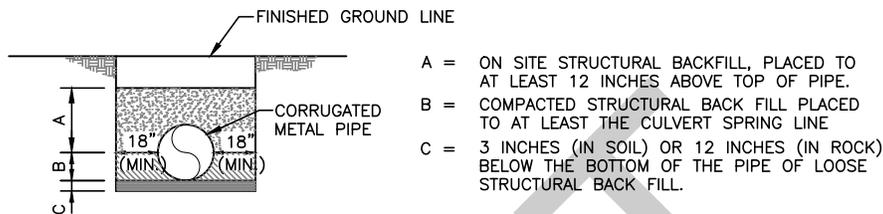
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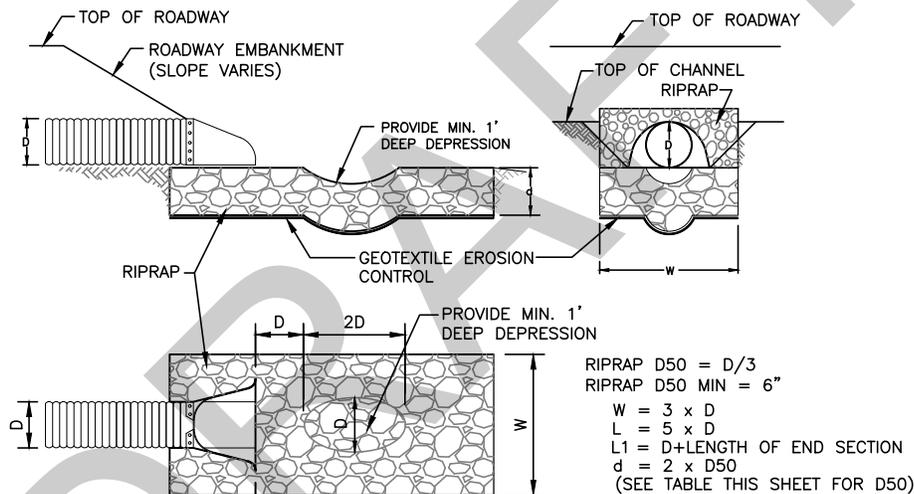
**METAL PIPE INSTALLATION PROFILE**

NOT TO SCALE



**PIPE TRENCHING DETAIL**

NOT TO SCALE



**CULVERT OUTLET PROTECTION DETAIL**

NOT TO SCALE

RIP-RAP APRON SIZING DIMENSIONS - INLET AND OUTLET							
PIPE DIA. (D)	RIP-RAP D50 (D/3)	END SECTION LENGTH	L1	LENGTH (L)	WIDTH (W)	d (2 x D50)	DEPRESSION DIM.
24"	8"	78"	102"	120"	72"	16"	24"x48"x12"
30"	10"	96"	126"	150"	90"	20"	30"x60"x12"
36"	12"	96"	132"	180"	108"	24"	36"x72"x12"

**CONSTRUCTION SPECIFICATIONS:**

- CORRUGATED METAL PIPE SIZING VARIES, SEE PLANS FOR LENGTH AND DIAMETER.
- PIPE SLOPE: MINIMUM SLOPE => 0.5%, MAXIMUM SLOPE => 10%.
- MINIMUM PIPE COVER IS TWO FEET. MAXIMUM PIPE COVER IS FIFTEEN FEET OR MANUFACTURER'S RECOMMENDED VALUES.
- STRUCTURE BACKFILL SHALL BE COMPOSED OF SUITABLE MATERIALS DEVELOPED ON THE PROJECT. TO BE SUITABLE FOR USE UNDER THIS CLASSIFICATION, BACKFILL SHALL BE FREE OF FROZEN LUMPS, WOOD, OR OTHER ORGANIC MATERIAL. IF THE MATERIAL CONTAINS ROCK FRAGMENTS THAT, IN THE OPINION OF THE ENGINEER, WILL BE INJURIOUS TO THE STRUCTURE, THE NATIVE MATERIAL SHALL NOT BE USED FOR BACKFILLING AND IMPORTED STRUCTURE BACKFILL SHALL BE USED.
- CONNECT END SECTION TO PIPE AS RECOMMENDED BY THE MANUFACTURER.



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**STORMWATER INLET & OUTLET PROTECTION**

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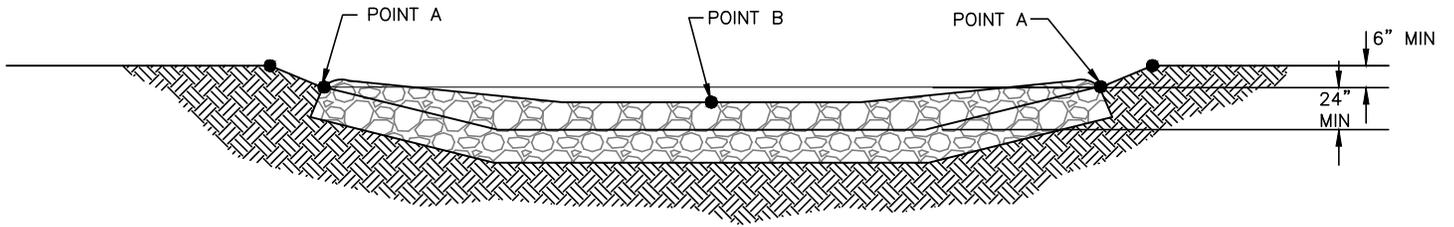
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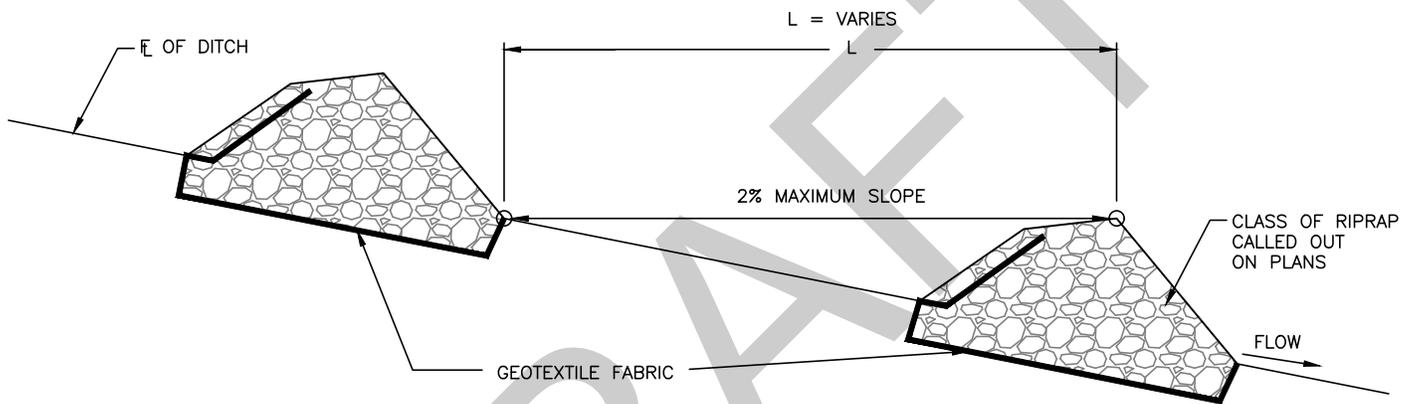
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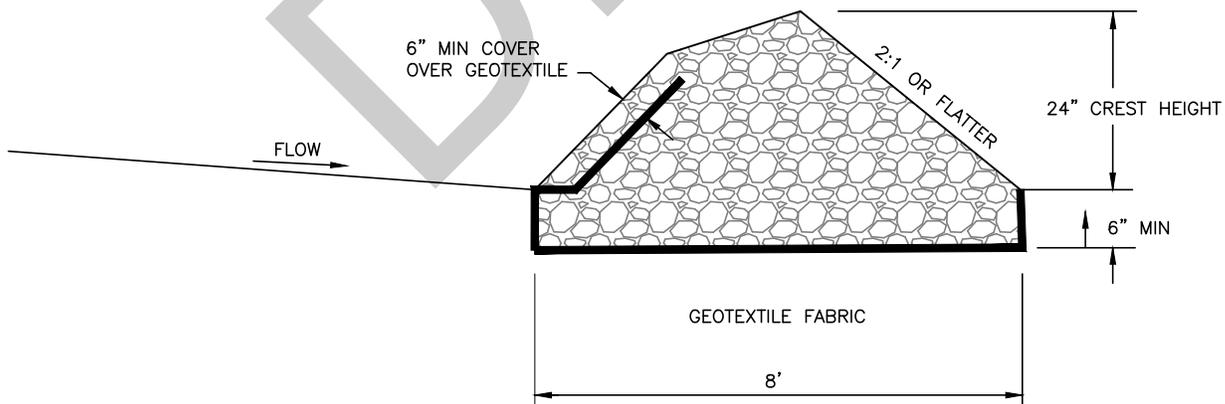
01500-03



TYPICAL SECTION VIEW



SECTION VIEW ALONG DITCH FLOWLINE



SECTION DETAIL



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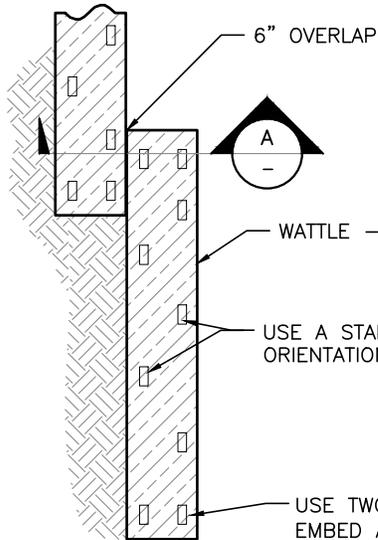
CHECK DAM

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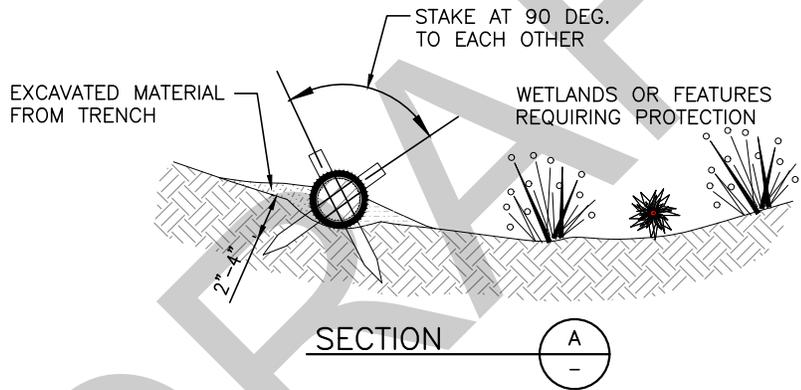
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MARCH 2012  
DRAWING NO.

01500-04



DITCH INSTALLATION	
GRADE	SPACING (FT)
2%	150
3%	100
4%	75
5%	50

CUT OR FILL SLOPE INSTALLATION	
SLOPE	SPACING (FT)
1:1	10
2:1	20
3:1	30
4:1	40



WATTLE INSTALLATION NOTES

1. SEE PLAN VIEW FOR LOCATION AND LENGTH OF WATTLE.
2. WATTLES INDICATED ON INITIAL SWMP PLAN SHALL BE INSTALLED PRIOR TO ANY LAND-DISTURBING ACTIVITIES.
3. WATTLES SHALL CONSIST OF STRAW, COMPOST, EXCELSIOR, OR COCONUT FIBER.
4. NOT FOR USE IN CONCENTRATED HIGH FLOW AREAS.
5. THE WATTLE SHALL BE TRENCHED INTO THE GROUND A MINIMUM OF 2".
6. EXTEND END OF WATTLE UPSLOPE TO AVOID FLOW AROUND END.

WATTLE MAINTENANCE NOTES

1. SEDIMENT ACCUMULATED UPSTREAM WATTLE SHALL BE REMOVED WHEN THE UPSTREAM SEDIMENT DEPTH IS WITHIN 1/2 THE HEIGHT OF THE CREST OF WATTLE.



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**SEDIMENT CONTROL WATTLE**

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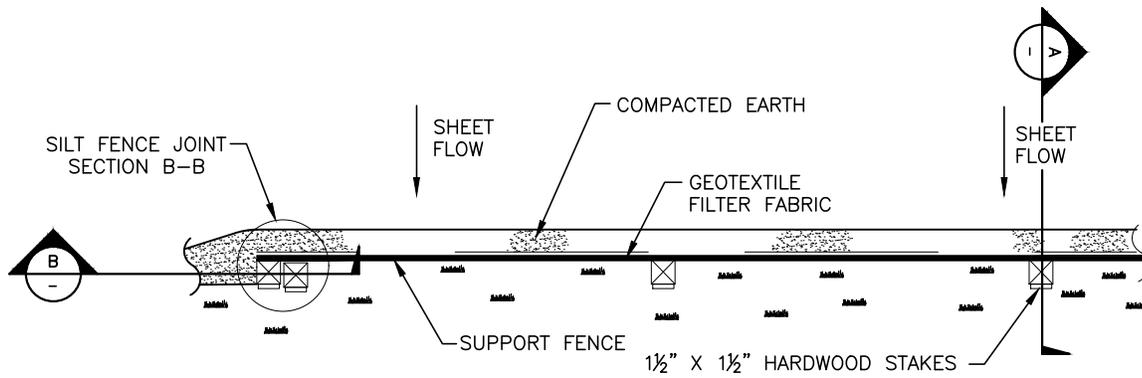
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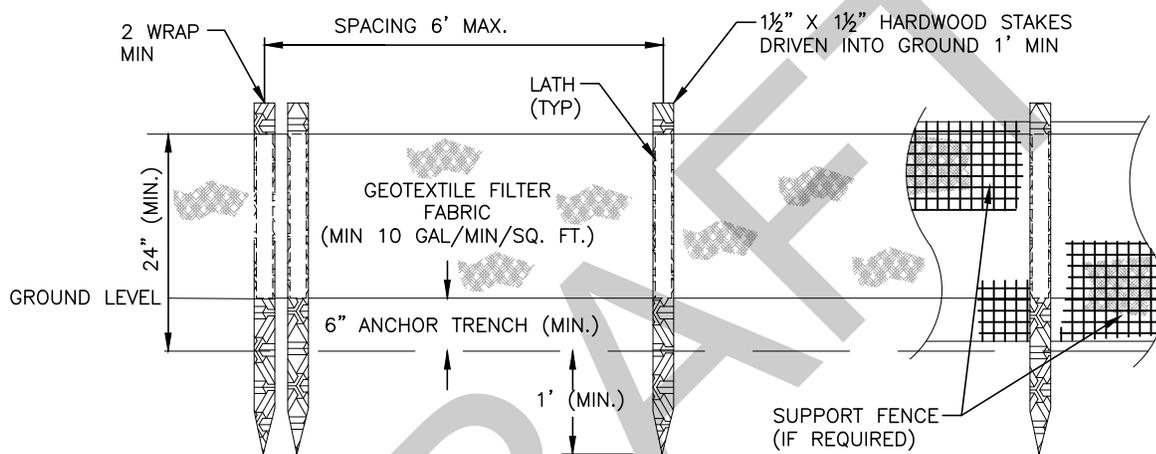
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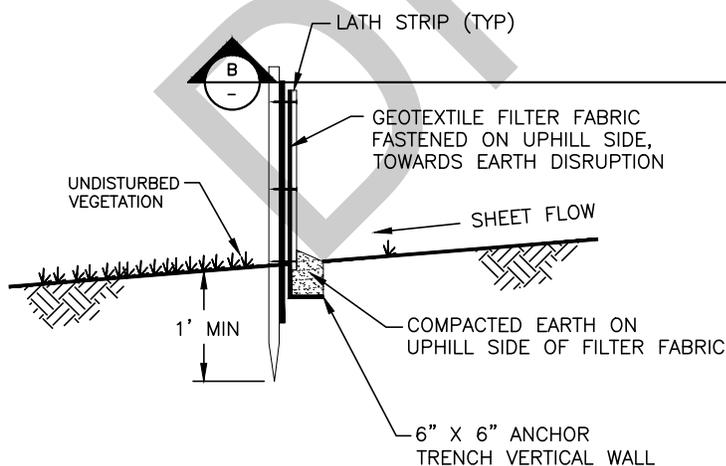
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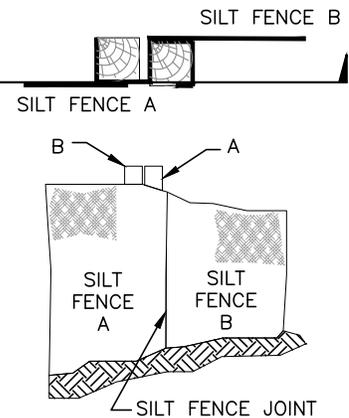
PLAN VIEW



FRONT VIEW



SECTION A



SECTION B



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# SILT FENCE

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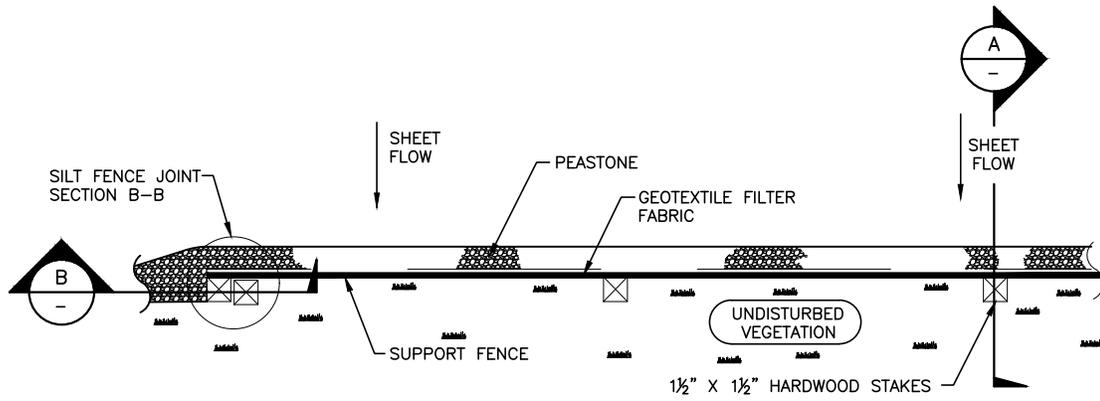
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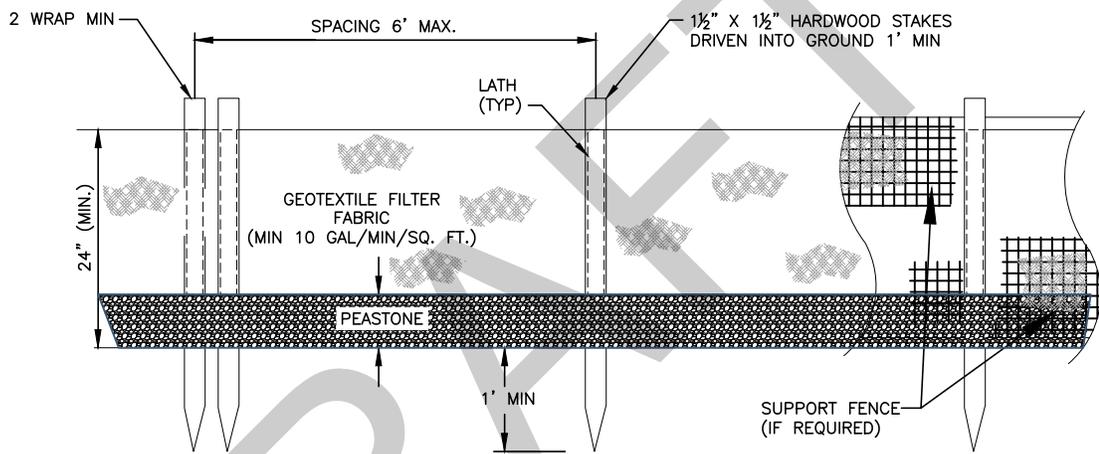
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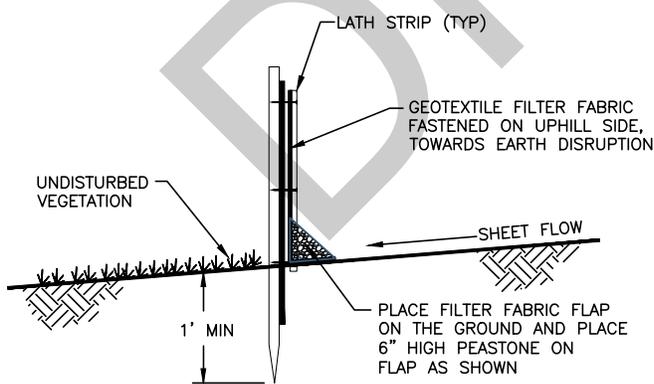
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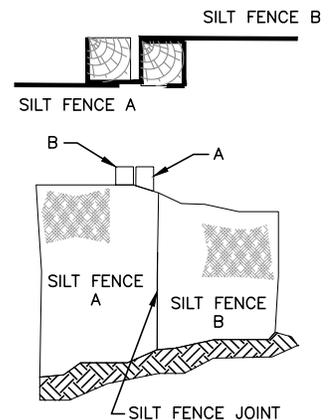
PLAN VIEW



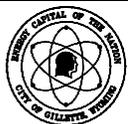
FRONT VIEW



SECTION A



SECTION B



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# WINTER/FROZEN GROUND SILT FENCE

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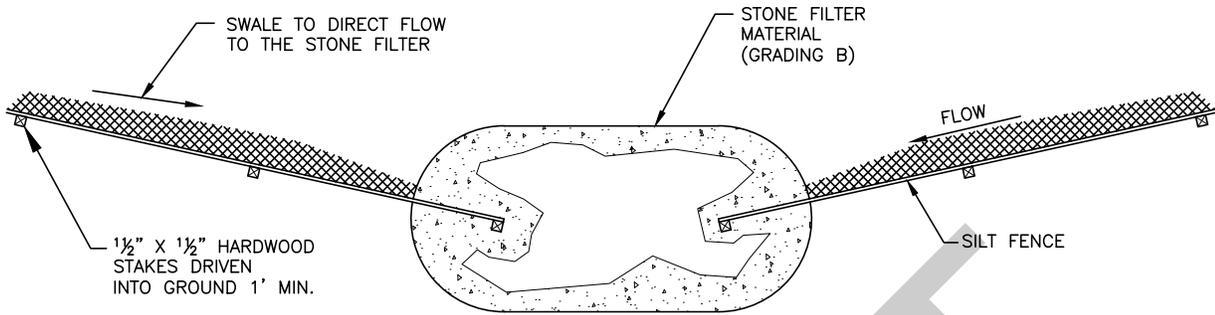
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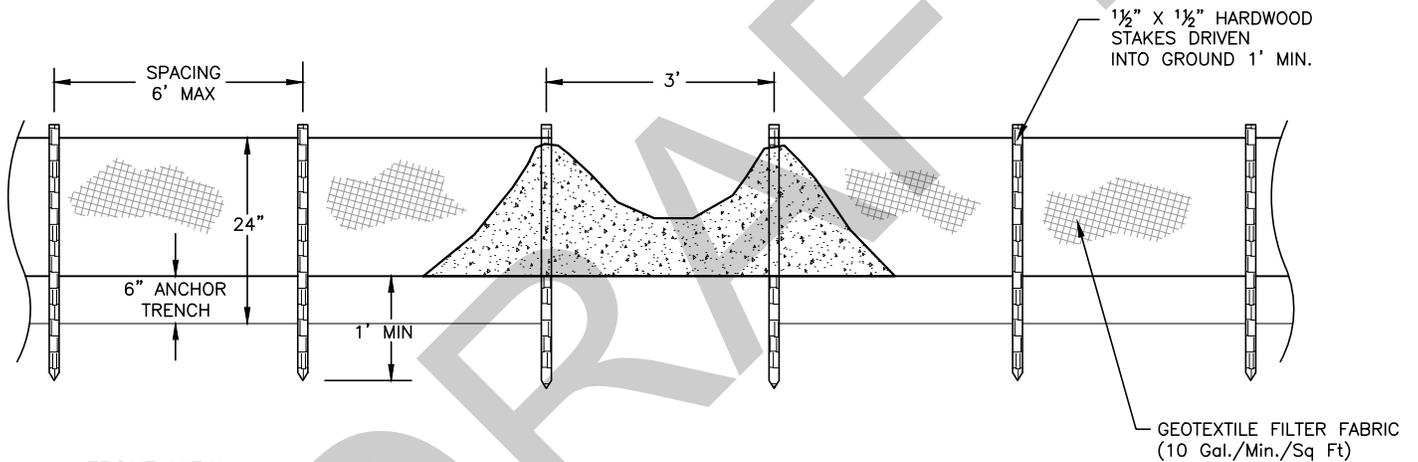
MARCH 2012

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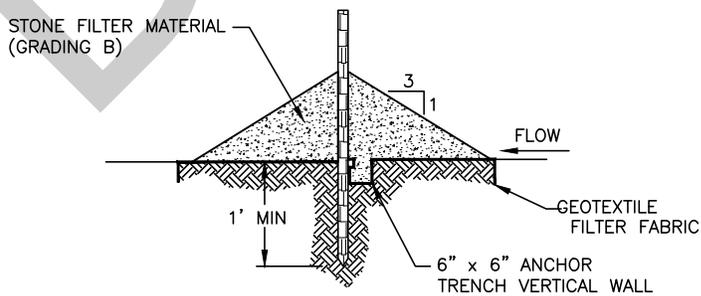
01500-07



PLAN VIEW



FRONT VIEW



CROSS SECTION

PLACE GEOTEXTILE FABRIC UNDER STONE WITH 6 INCH MIN. OVERLAP AND TRENCHED IN 6 INCH MIN.



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# GRAVEL FILTER FOR SILT FENCE

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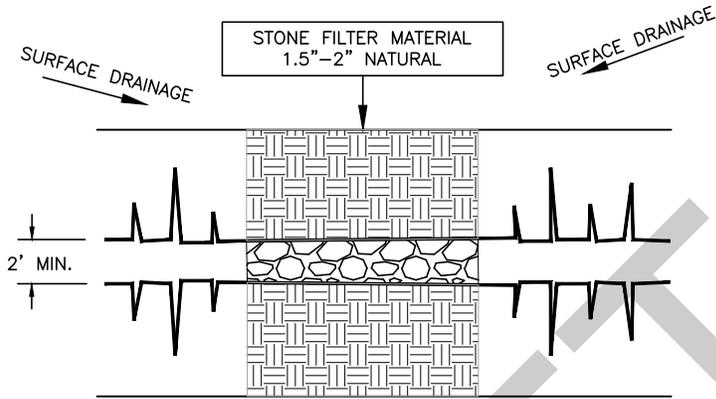
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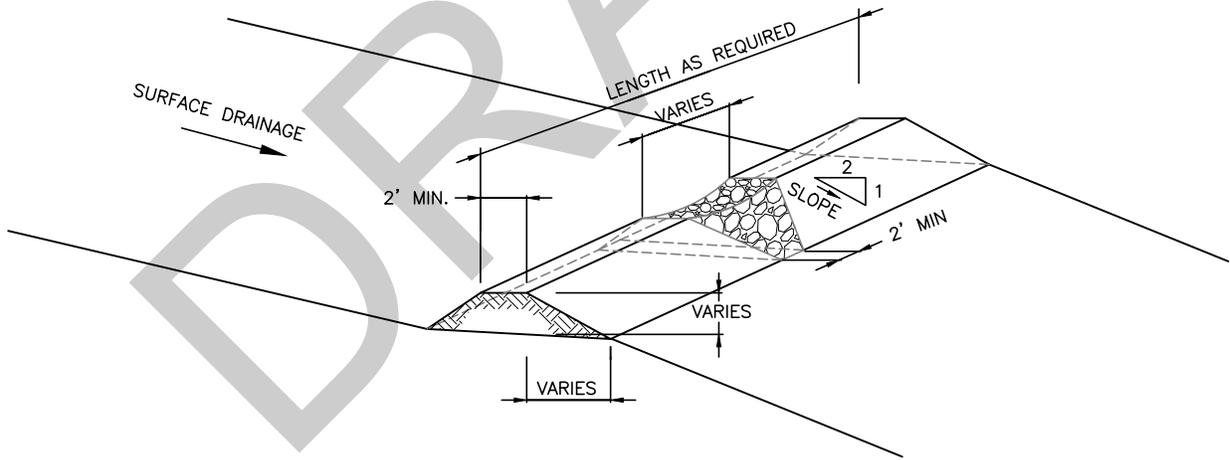
MARCH 2012

DRAWING NO.

01500-08



PLAN VIEW



ISOMETRIC VIEW



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# FILTER BERM

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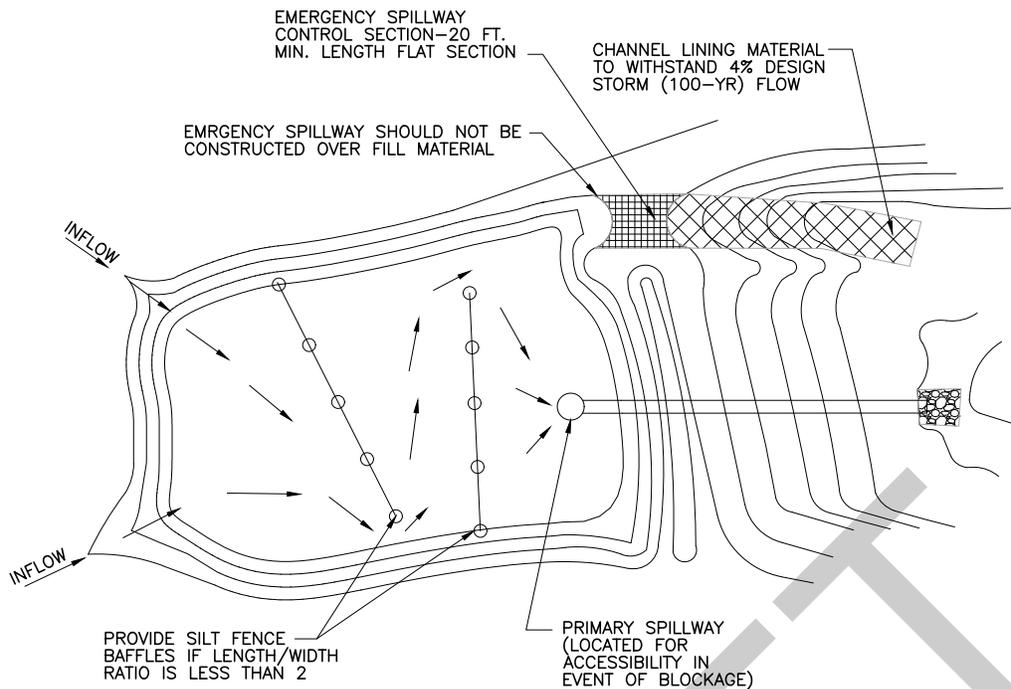
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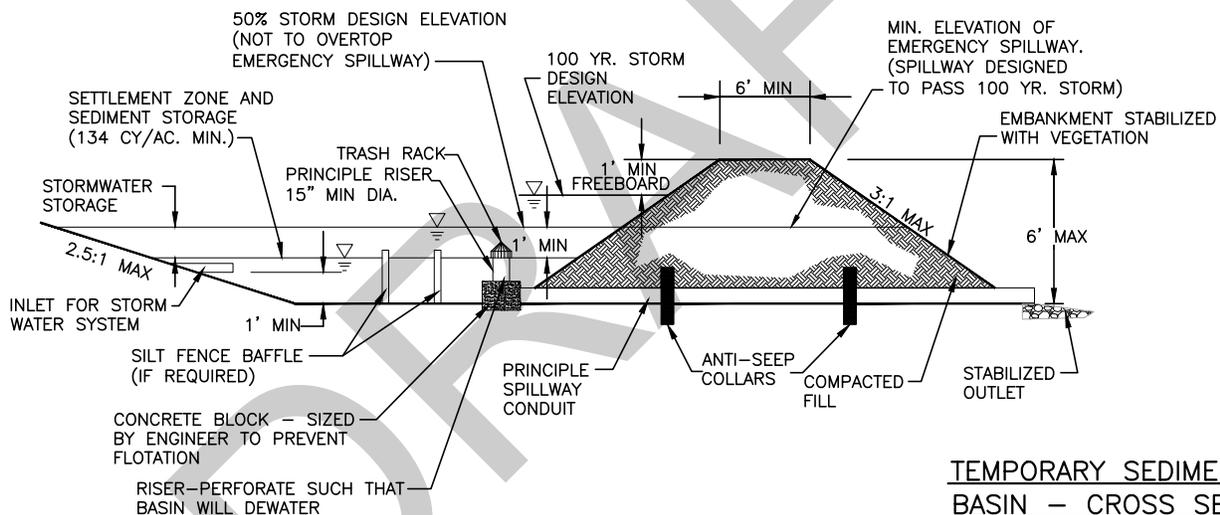
MARCH 2012

DRAWING NO.

01500-09



PLAN VIEW



TEMPORARY SEDIMENT BASIN - CROSS SECTION

SEDIMENT BASIN NOTES

DESIGN REQUIREMENTS:

1. THE PLAN AND PROFILES ARE SCHEMATIC IN NATURE. CONSTRUCTION PLANS MUST PROVIDE SPECIFIC SITE CONSTRUCTION ARRANGEMENTS. DETAILS GIVEN IN THIS DRAWING SHALL BE USED UNLESS ALTERNATE DETAILS ARE SHOWN IN PLAN AND APPROVED BY THE CITY OF GILLETTE.
2. IF THE LENGTH TO WIDTH RATIO IS LESS THAN 2, INTERIOR SEDIMENT FENCE BAFFLES SHALL BE PROVIDED TO REDUCE SHORT-CIRCUITING OF THE BASIN.
3. EMERGENCY SPILLWAYS TO BE LOCATED IN A NON-FILL LOCATION WHEN FEASIBLE AND SHALL BE LINED WITH A NON-ERODIBLE MATERIAL SUCH AS RIP-RAP OR TURF REINFORCEMENT MATERIAL.

MANTENANCE/SAFETY REQUIREMENTS:

4. CLEAN OUT DEPOSITED SEDIMENT WHEN SEDIMENT STORAGE HAS BEEN REDUCED BY 50% OF THE ORIGINAL DESIGN STORAGE VOLUME. THE CLEANOUT LEVEL SHALL BE INDICATED ON THE RISER PIPE WITH PAINTED RED HORIZONTAL LINE.
5. SEDIMENT BASINS SHALL BE FENCED USING CONSTRUCTION FENCE OR OTHER MATERIAL FOR SAFETY REASONS AND INCLUDE SIGNS READING: "DANGER - KEEP OUT"



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**TEMPORARY SEDIMENT BASIN**

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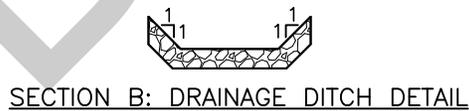
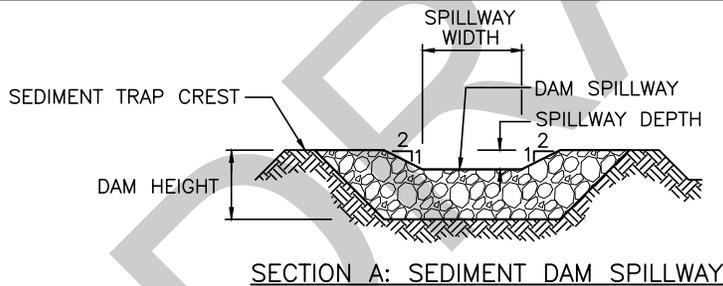
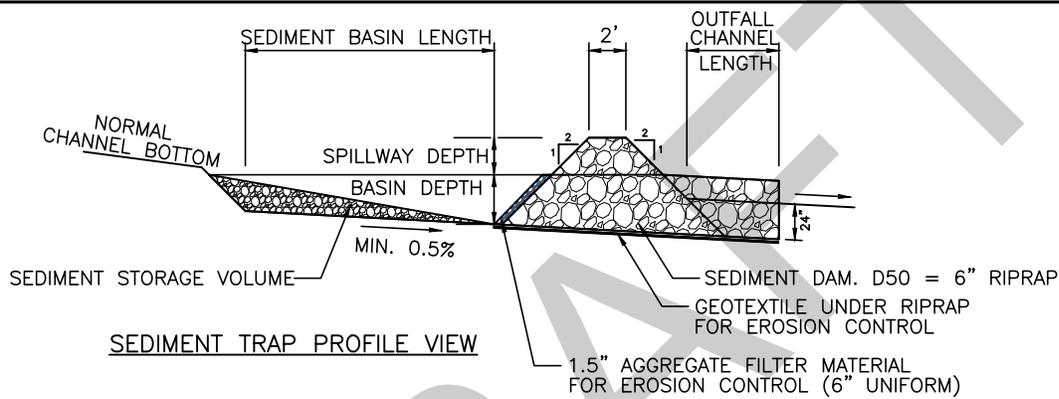
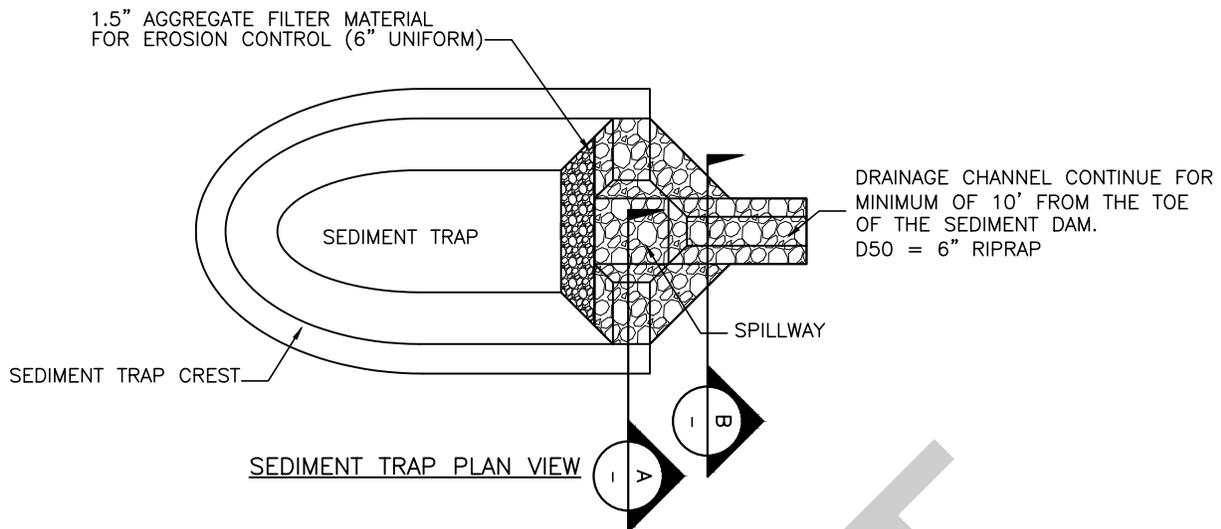
APPROVED BY: CITY ENGINEER HV/KDS

DATE:

MARCH 2012

DRAWING NO.

01500-10



CONSTRUCTION SPECIFICATIONS:

1. RIPRAP SHOULD BE MECHANICALLY PLACED AND SHAPED.
2. SEDIMENT TRAP MUST BE CLEANED OUT WHEN SEDIMENT STORAGE VOLUME IS HALF FULL.
3. ALL AREAS OF THE SEDIMENT TRAP SHALL BE TEMPORARILY SEEDED EXCEPT FOR THE BOTTOM OF THE BASIN.
4. FOLLOW-UP INSPECTION AND ANY NEEDED MAINTENANCE SHALL BE PERFORMED EVERY 14 DAYS AND AFTER EACH STORM.



*City Of Gillette*

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PHONE: (307) 686-5311

**SEDIMENT TRAP & DAM**

DRAWN BY:           KEB          

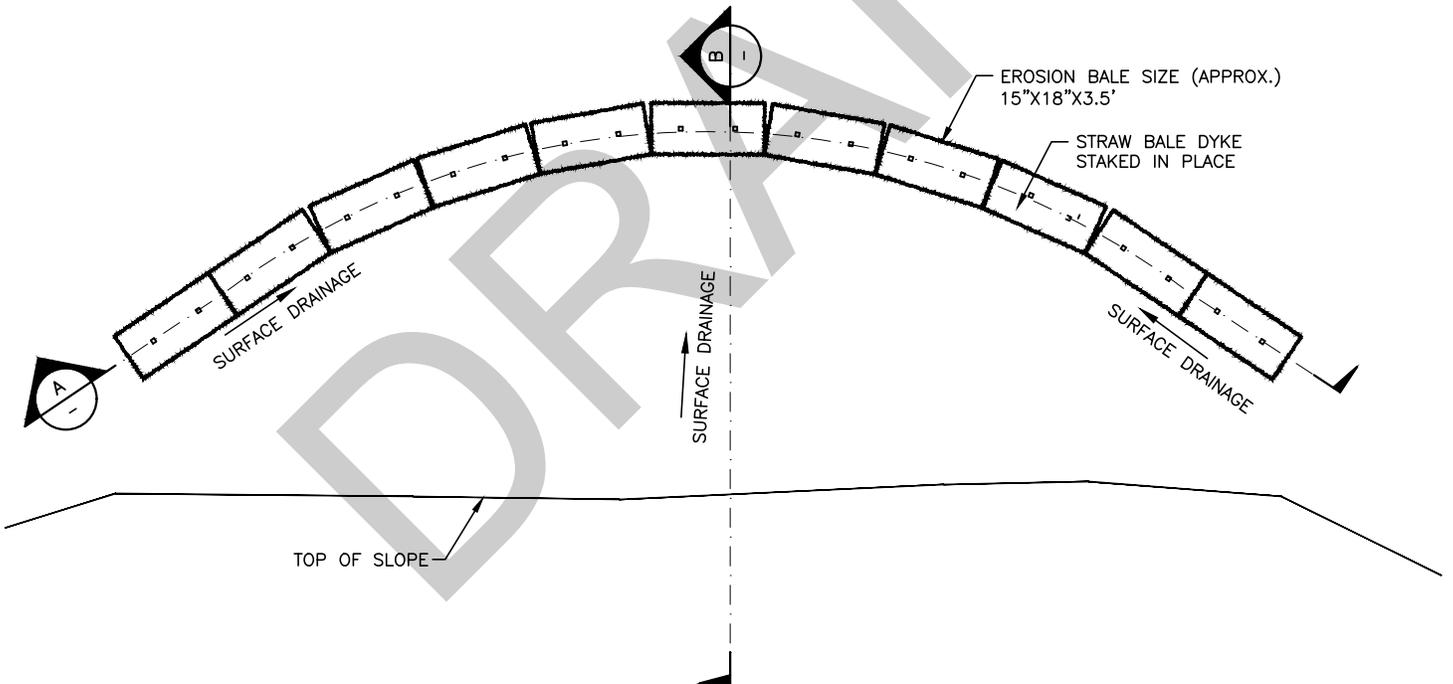
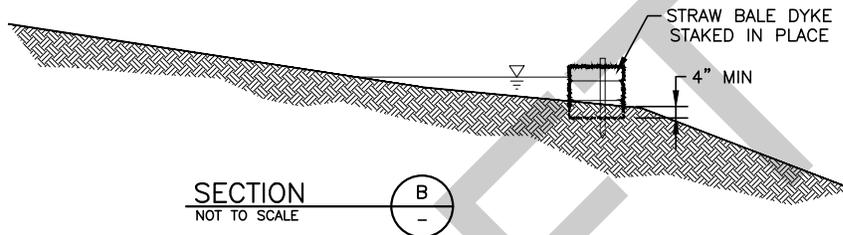
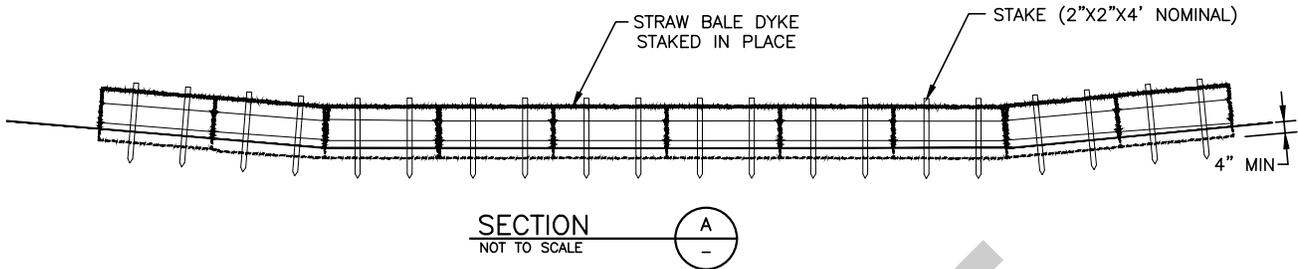
APPROVED BY: CITY ENGINEER           HV/KDS          

DATE:

MARCH 2012

DRAWING NO.

01500-11



**EROSION BALE INSTALLATION**

1. EROSION BALES SHALL BE ENTRENCHED 4" MIN. INTO SOIL, TIGHTLY ABUTTED WITH NO GAPS, STAKED AND BACKFILLED AROUND THE ENTIRE OUTSIDE PERIMETER.
2. IT IS RECOMMENDED THAT STRAW BALES SHALL BE USED IN CONJUNCTION WITH SILT FENCE IN ORDER TO BE AN EFFECTIVE BMP.



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**SEDIMENT TRAP WITH STRAW BALE DIKE**

DRAWN BY:           KEB          

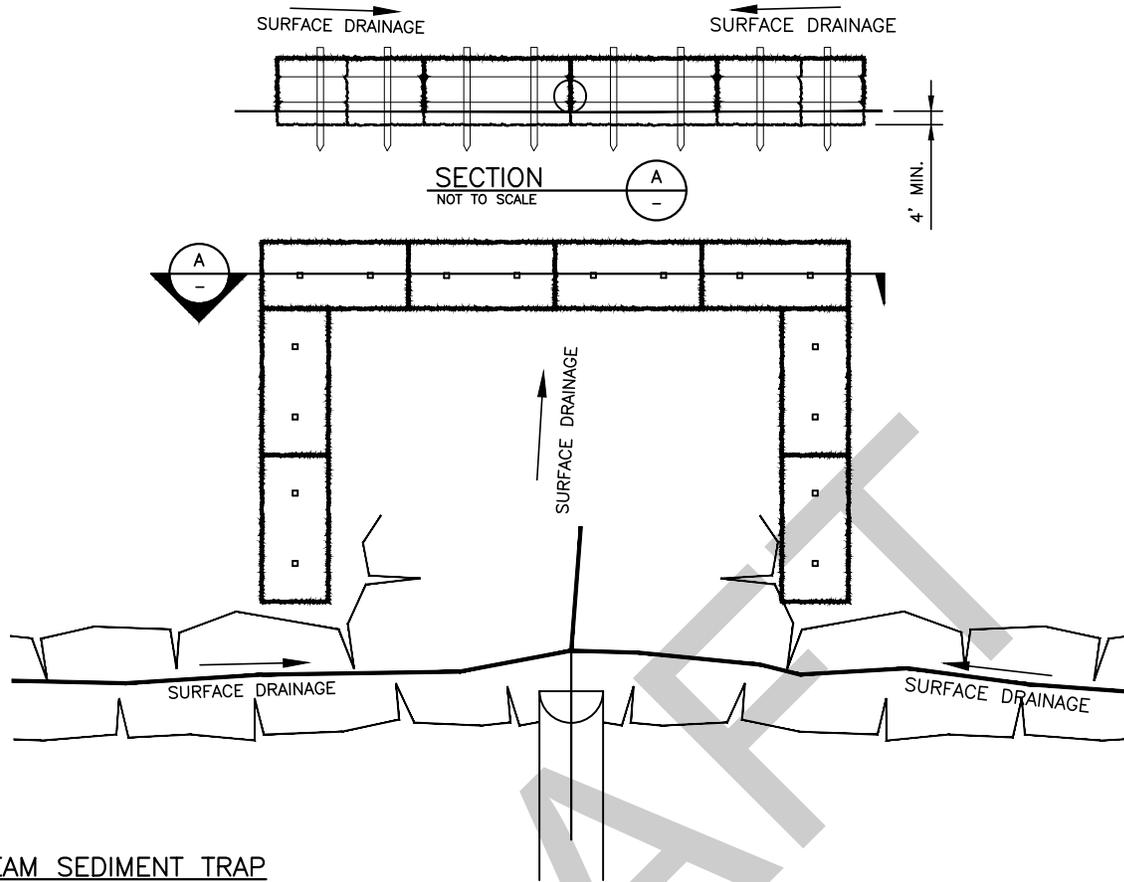
APPROVED BY: CITY ENGINEER           HV/KDS          

DATE:

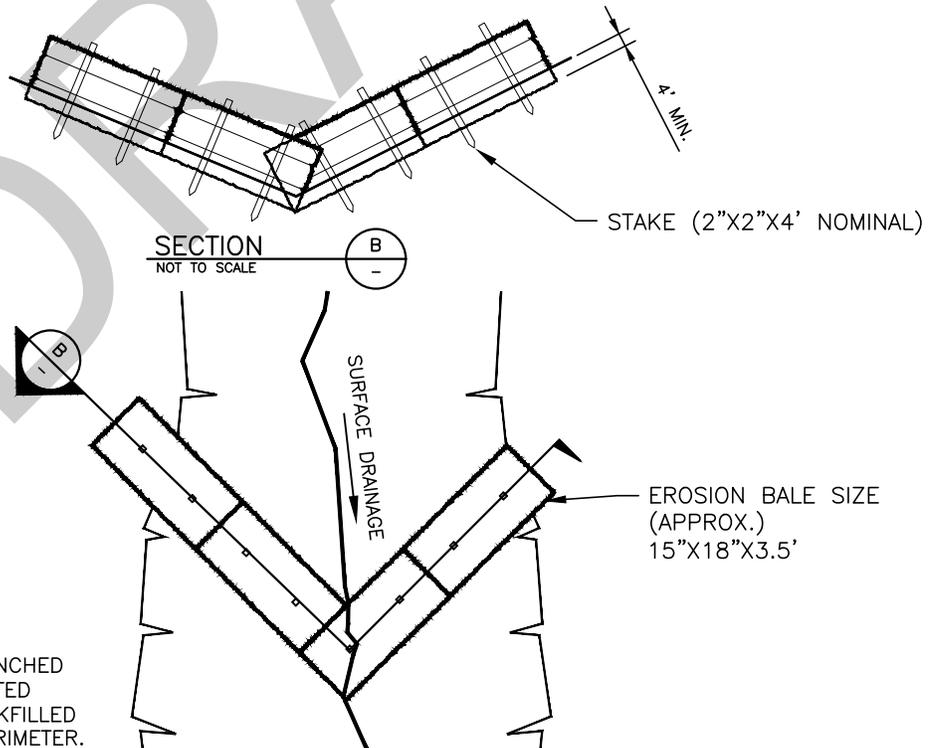
MARCH 2012

DRAWING NO.

01500-12



**DOWNSTREAM SEDIMENT TRAP**  
NOT TO SCALE



**EROSION BALE INSTALLATION**

1. EROSION BALES SHALL BE ENTRENCHED 4" MIN. INTO SOIL, TIGHTLY ABUTTED WITH NO GAPS, STAKED AND BACKFILLED AROUND THE ENTIRE OUTSIDE PERIMETER.



*City Of Gillette*

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GILLETTE, WYOMING 82717  
PHONE: (307) 686-5311

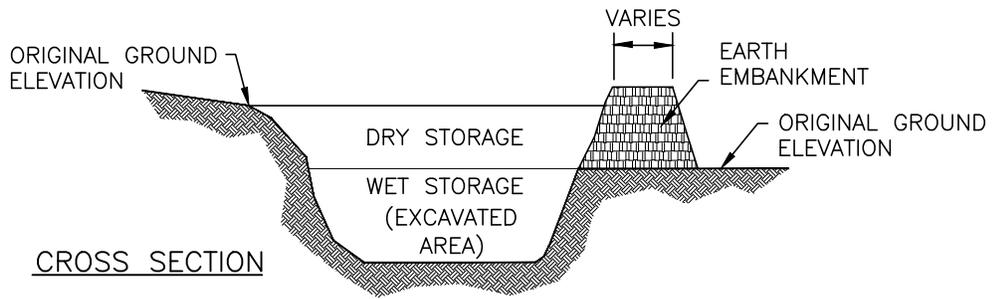
**SEDIMENT TRAP FOR  
CONCENTRATED FLOW**

DRAWN BY:           KEB          

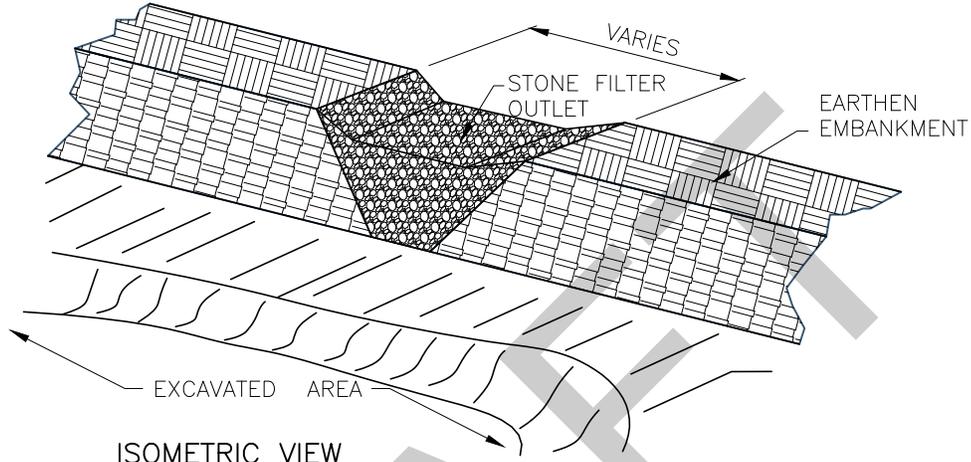
APPROVED BY: CITY ENGINEER           HV/KDS          

DATE:  
MARCH 2012  
DRAWING NO.

01500-13



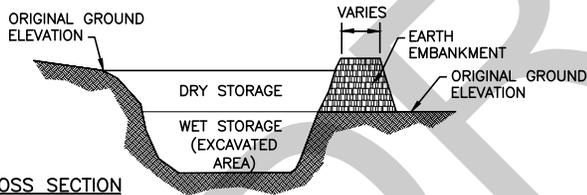
CROSS SECTION



ISOMETRIC VIEW

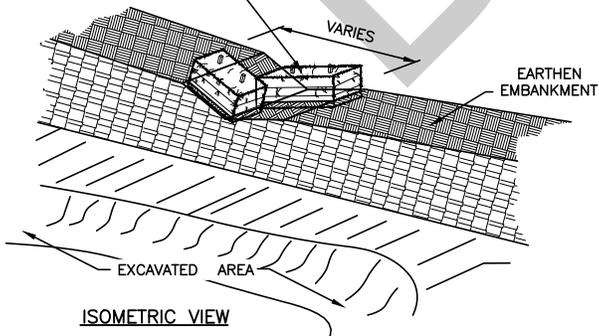
**EXCAVATED SEDIMENT TRAP  
STONE FILTER OUTLET**

NOT TO SCALE



CROSS SECTION

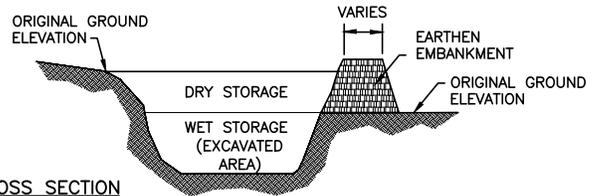
EROSION BALES SHALL BE ENTRENCHED 4 IN. MINIMUM INTO THE SOIL, TIGHTLY ABUTTED WITH NO GAPS, STAKED, AND BACKFILLED AROUND THE ENTIRE OUTSIDE PERIMETER.



ISOMETRIC VIEW

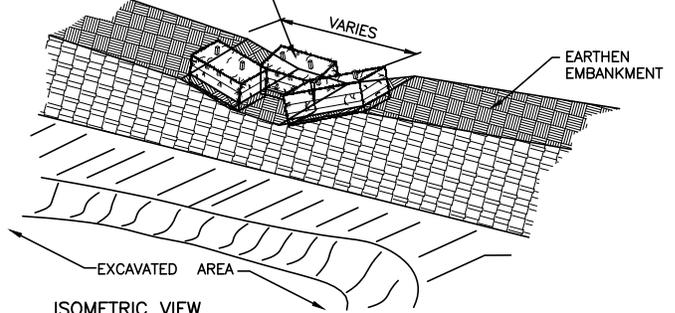
**EXCAVATED SEDIMENT TRAP  
STRAW BALE OUTLET-TYPE A**

NOT TO SCALE



CROSS SECTION

EROSION BALES SHALL BE ENTRENCHED 4 IN. MINIMUM INTO THE SOIL, TIGHTLY ABUTTED WITH NO GAPS, STAKED, AND BACKFILLED AROUND THE ENTIRE OUTSIDE PERIMETER.



ISOMETRIC VIEW

**EXCAVATED SEDIMENT TRAP  
STRAW BALE OUTLET-TYPE B**

NOT TO SCALE



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PHONE: (307) 686-5311

**SEDIMENT TRAP - EXCAVATED**

DRAWN BY: KEB

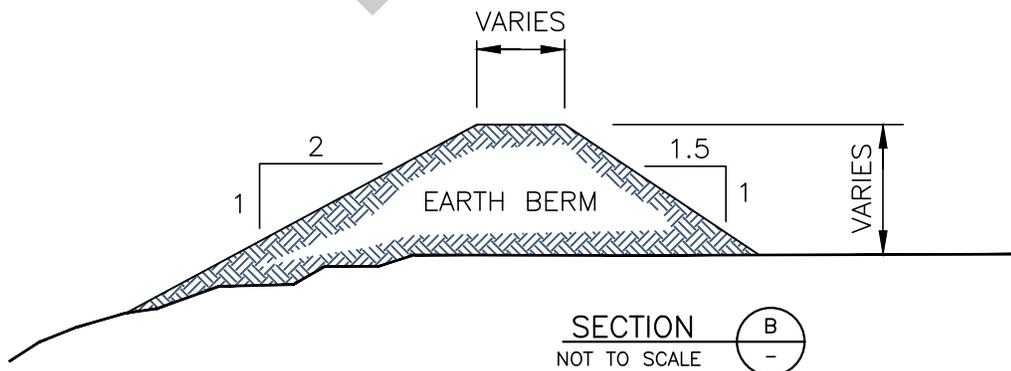
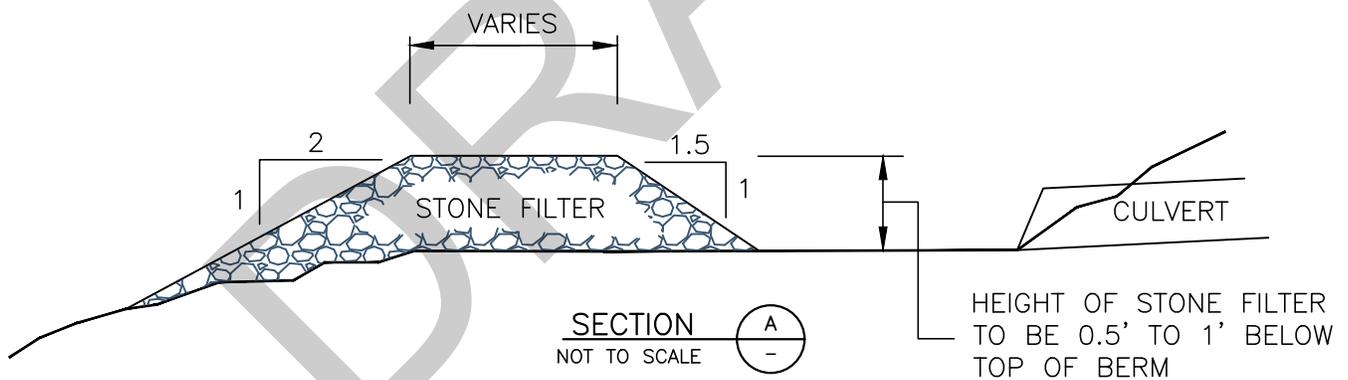
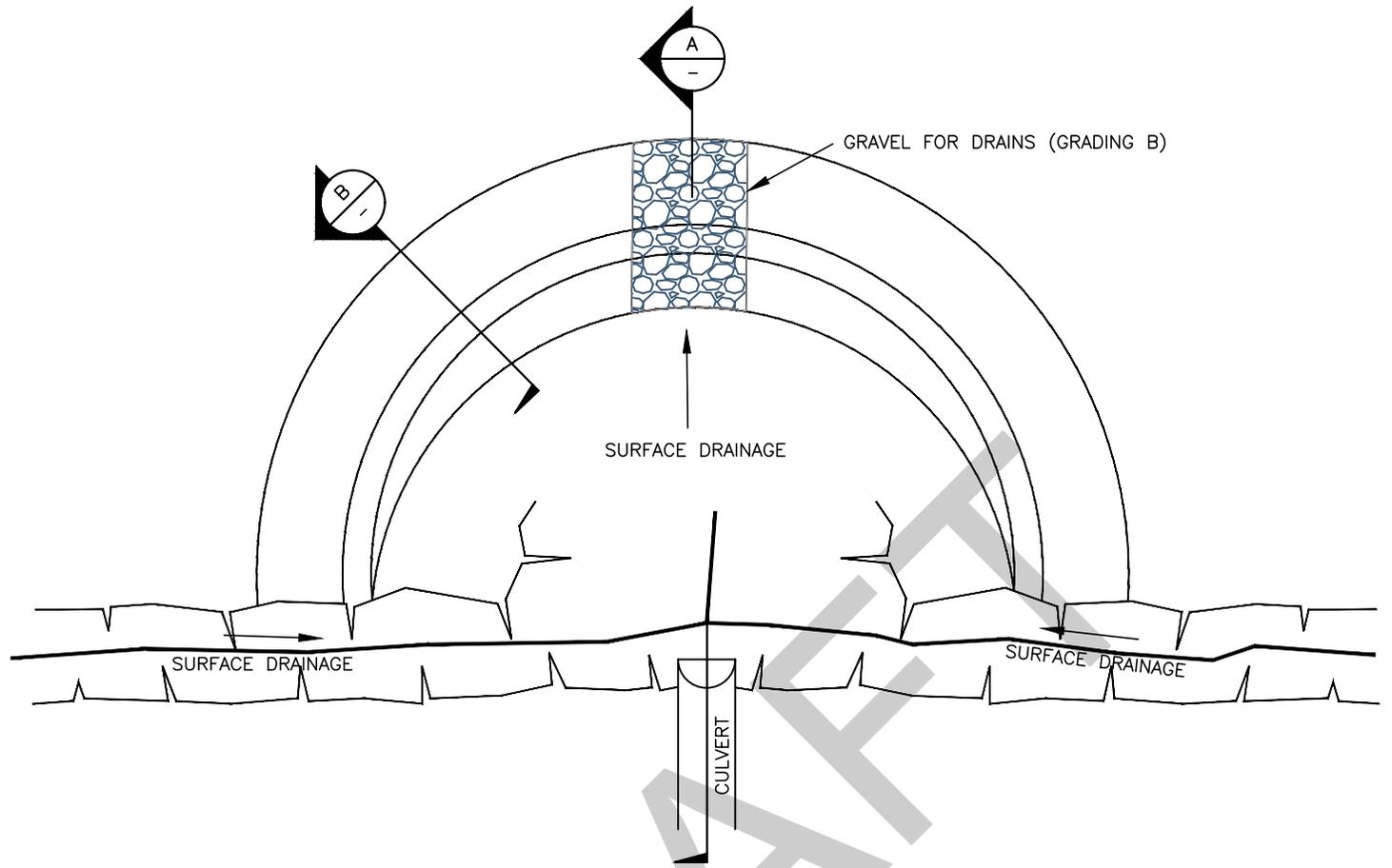
APPROVED BY: CITY ENGINEER HV/KDS

DATE:

MARCH 2012

DRAWING NO.

01500-14

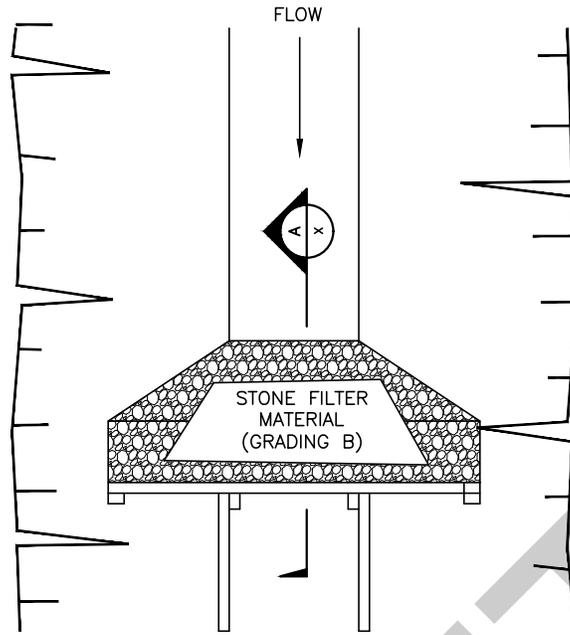


## SEDIMENT TRAP - EARTH BERM

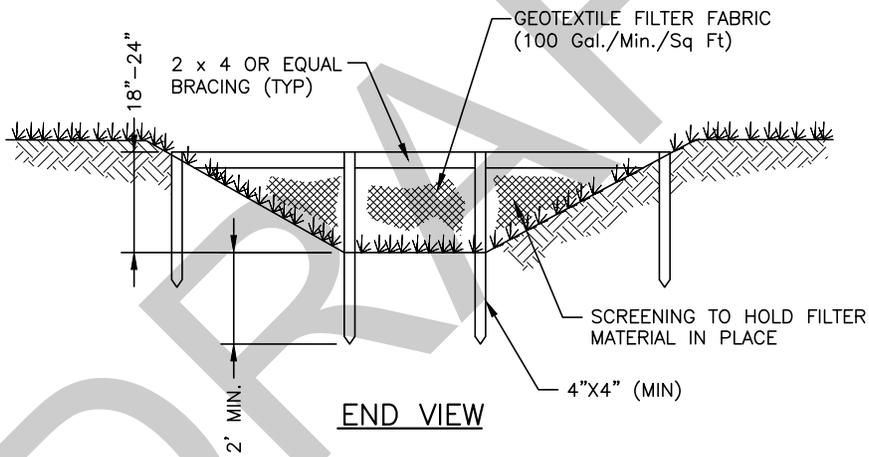
DRAWN BY: KEB

APPROVED BY: CITY ENGINEER HV/KDS

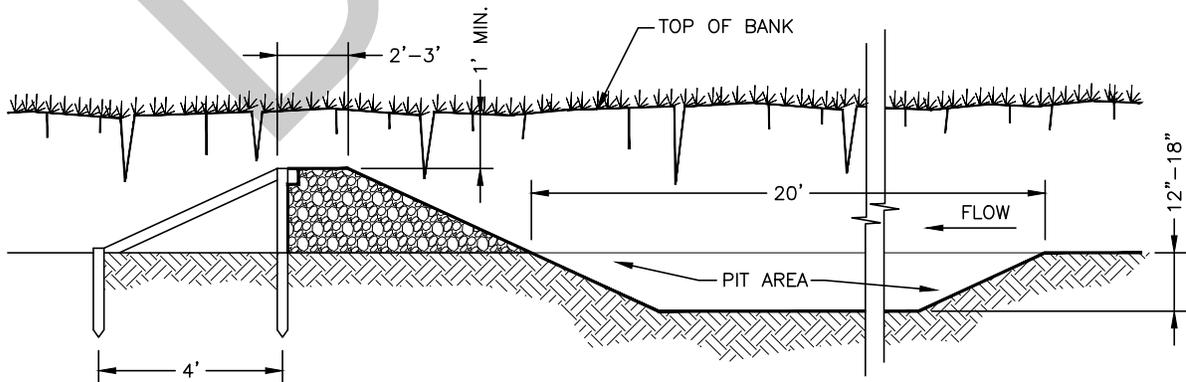
DATE:  
 MARCH 2012  
 DRAWING NO.  
 01500-15



PLAN VIEW



END VIEW



SECTION A



City Of Gillette

ENGINEERING DIVISION  
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PHONE: (307) 686-5311

SEDIMENT TRAP - DITCH

DRAWN BY: KEB

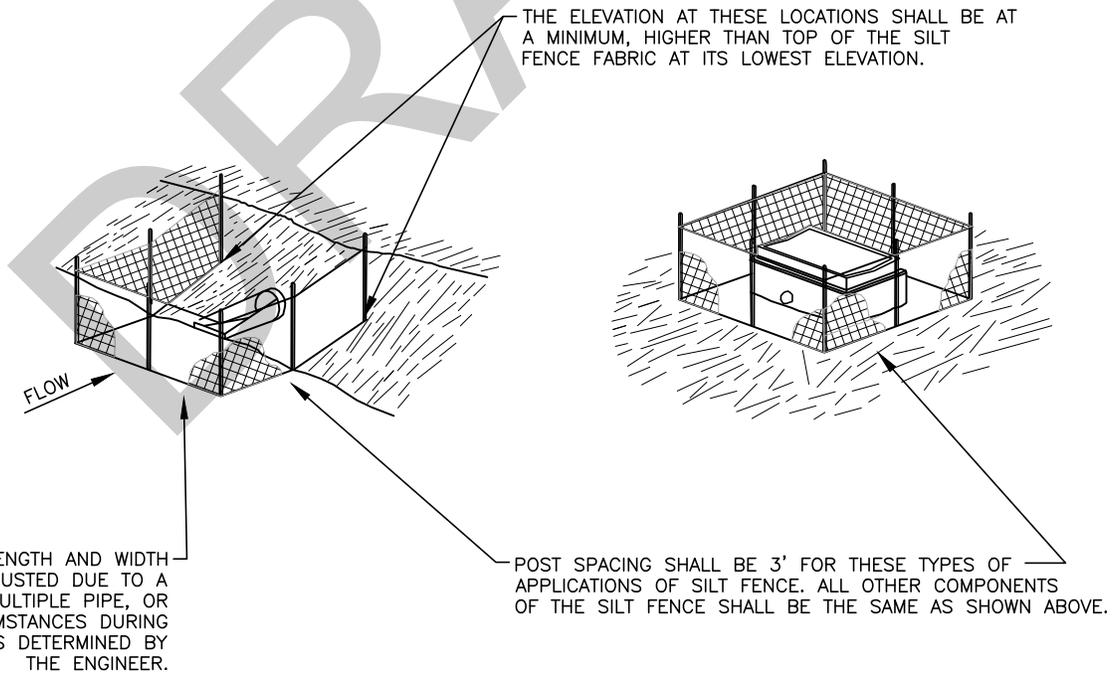
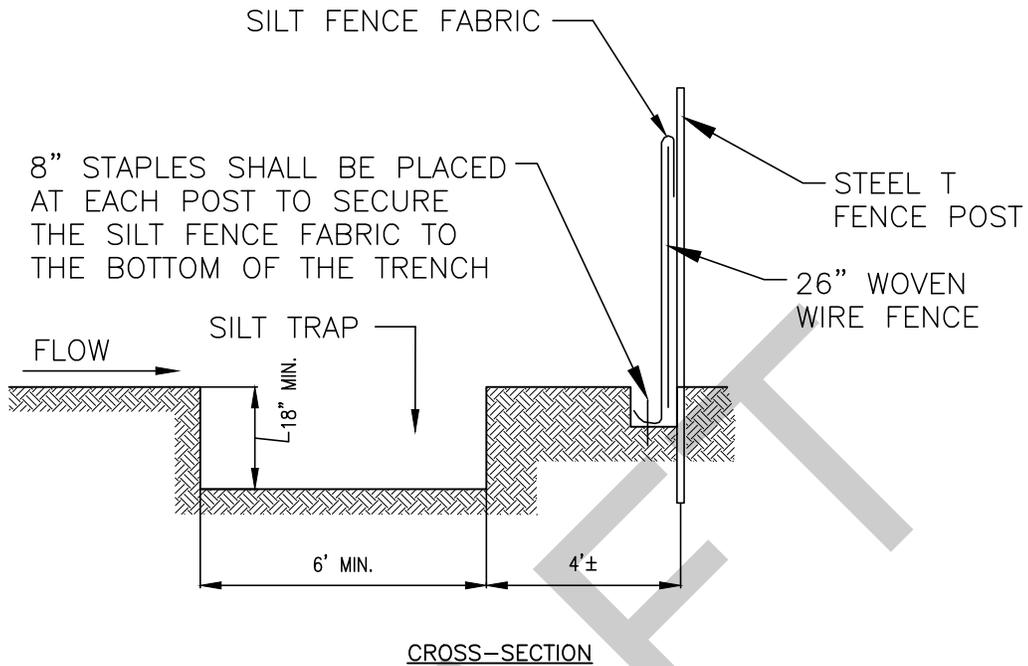
APPROVED BY: CITY ENGINEER HV/KDS

DATE:

MARCH 2012

DRAWING NO.

01500-16



*City Of Gillette*

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P.O. BOX 3003, 201 E. 5TH STREET  
GILLETTE, WYOMING 82717  
PHONE: (307) 686-5311

## SEDIMENT TRAP - SILT FENCE

DRAWN BY: KEB

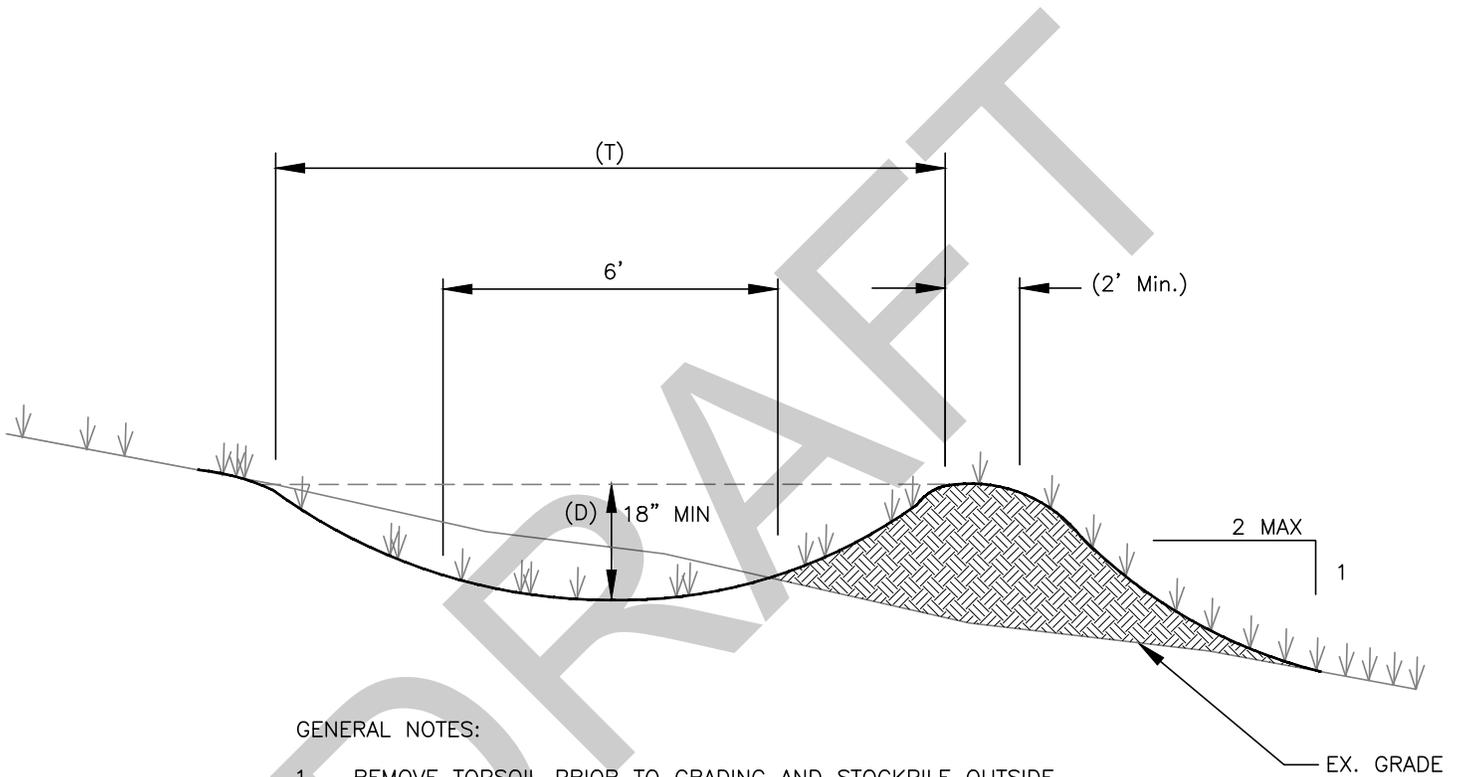
APPROVED BY: CITY ENGINEER HV/KDS

DATE:

MARCH 2012

DRAWING NO.

01500-17



GENERAL NOTES:

1. REMOVE TOPSOIL PRIOR TO GRADING AND STOCKPILE OUTSIDE
2. PROVIDE MINIMUM 4" OF TOPSOIL TO FACILITATE REVEGETATION.
3. IF THE EXPECTED LIFE SPAN OF THE DIVERSION STRUCTURE IS GREATER THAN 15 DAYS, BOTH THE BERM AND DITCH MUST BE SEEDED.



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PHONE: (307) 686-5311

**DIVERSION SWALE / BERM**

DRAWN BY:           KEB          

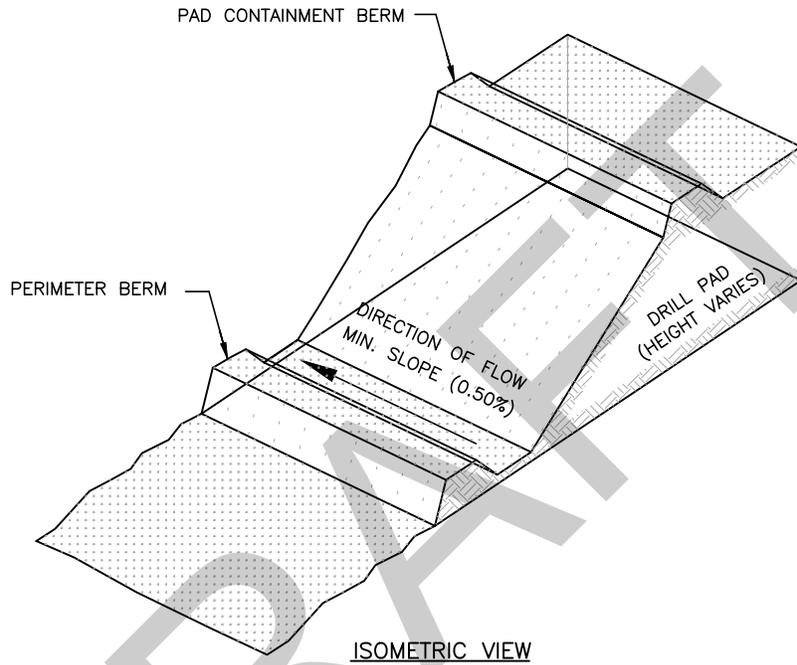
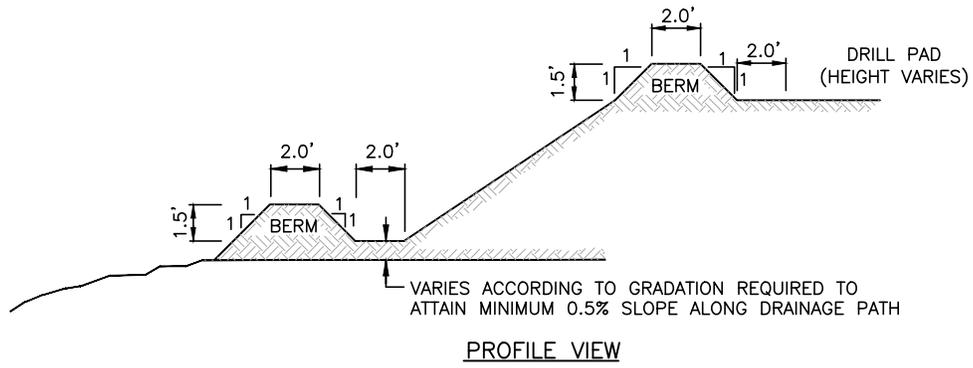
APPROVED BY: CITY ENGINEER           HV/KDS          

DATE:

MARCH 2012

DRAWING NO.

01500-18

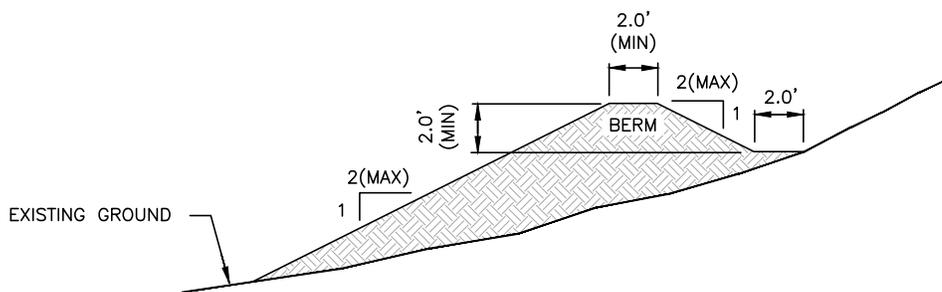


CONSTRUCTION SPECIFICATIONS:

1. THE AREA UP-SLOPE OF THE BERM AT THE BASE OF INITIAL FILL SLOPE SHALL HAVE A MINIMUM SLOPE OF 0.5%.
2. COMPACT BERMS WITH HAND HELD COMPACTION DEVICE, TRACKHOE BUCKET OR OTHER METHOD CAPABLE OF ATTAINING 85% DENSITY.
3. FOLLOW-UP INSPECTION AND ANY NEEDED MAINTENANCE SHALL BE PERFORMED EVERY 14 DAYS AND AFTER EACH STORM.
4. SEE PLAN FOR BERM WIDTH, DEPTH AND LOCATIONS.

PERIMETER BERM DETAIL

NOT TO SCALE



DIVERSION BERM/DITCH DETAIL

NOT TO SCALE



*City Of Gillette*

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PHONE: (307) 686-5311

**DIVERSION BERM & DITCH**

DRAWN BY: KEB

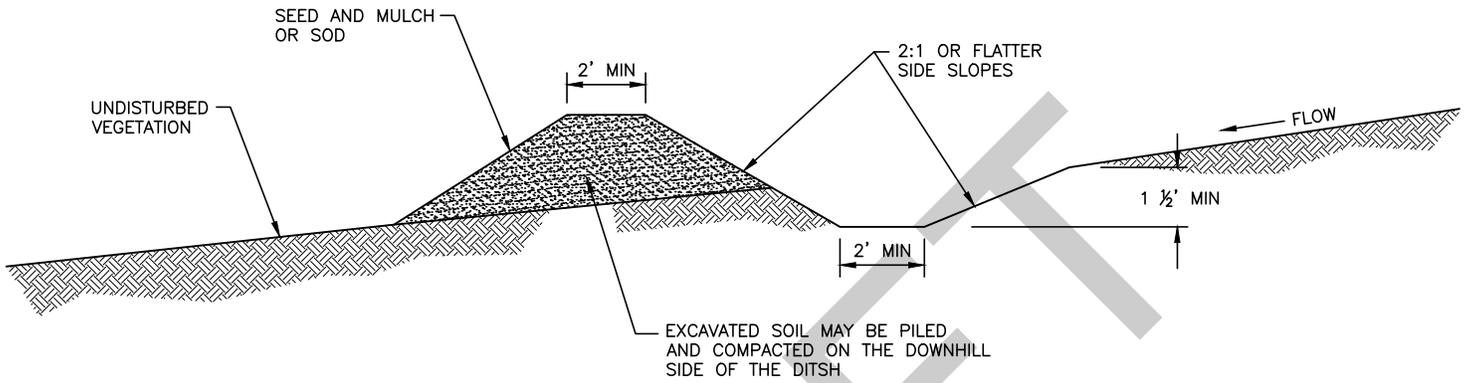
APPROVED BY: CITY ENGINEER HV/KDS

DATE:

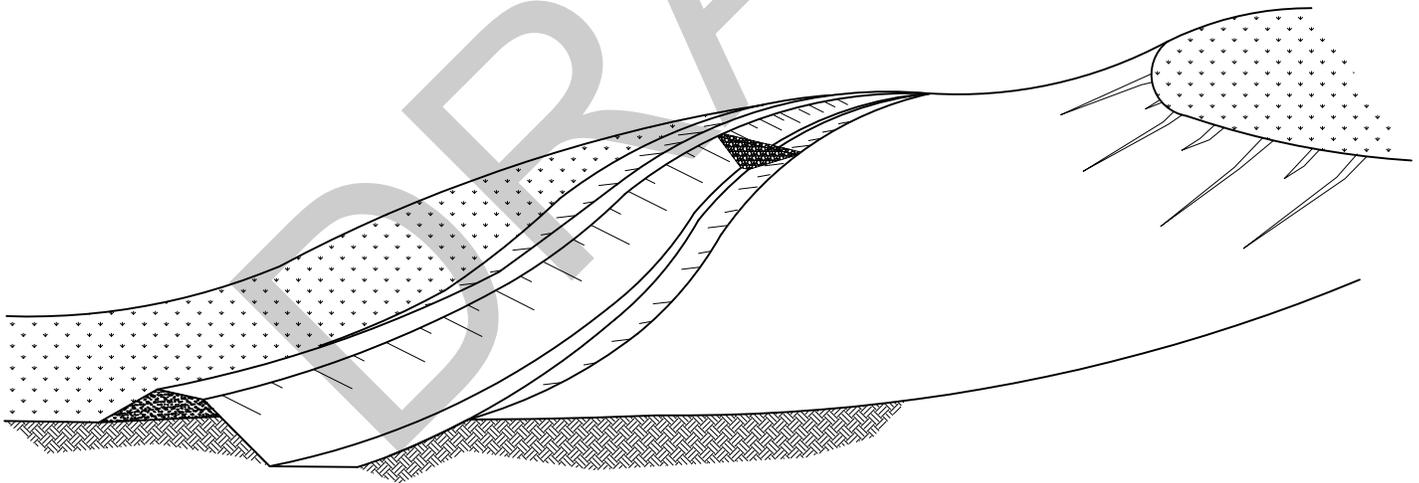
MARCH 2012

DRAWING NO.

01500-19



CROSS-SECTION



ISOMETRIC VIEW



*City Of Gillette*

ENGINEERING DIVISION  
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 GILLETTE, WYOMING 82717  
 PHONE: (307) 686-5311

# DIVERSION DITCH

DRAWN BY: KEB

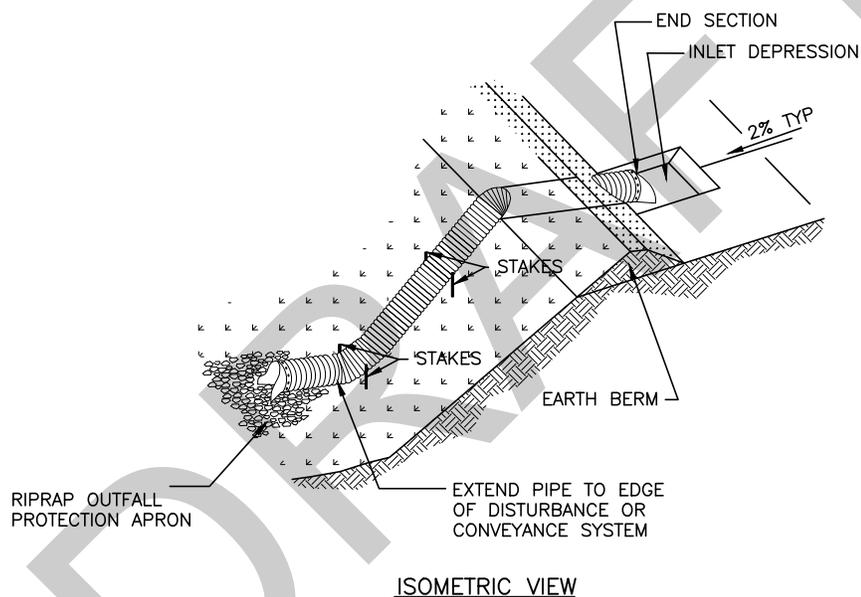
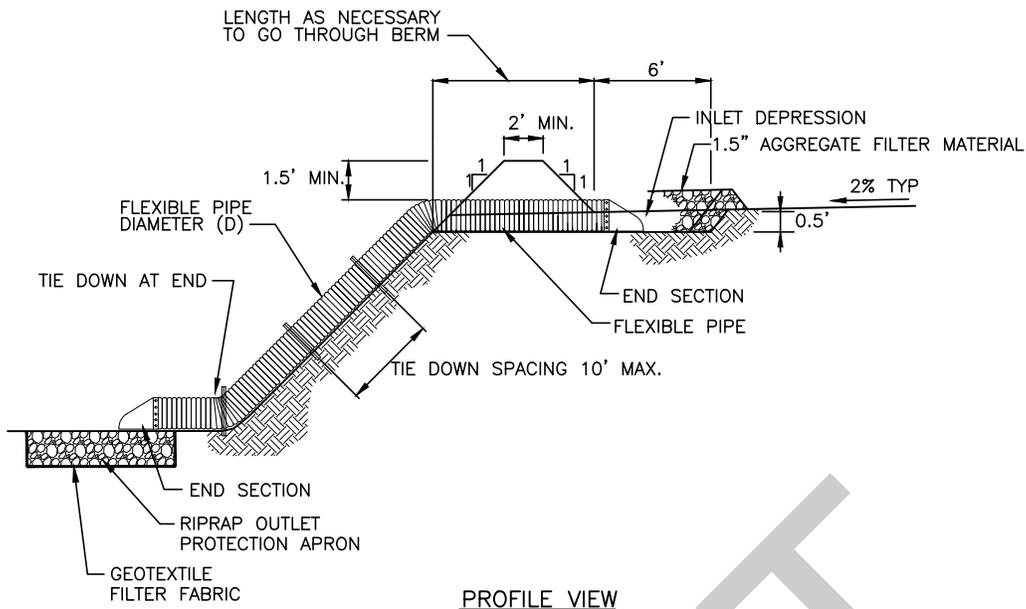
APPROVED BY: CITY ENGINEER HV/KDS

DATE:

MARCH 2012

DRAWING NO.

01500-20



**CONSTRUCTION SPECIFICATIONS:**

1. THE SLOPE DRAIN SHALL HAVE A MINIMUM SLOPE OF 5%.
2. THE TOP OF THE EARTH BERM OVER THE INLET PIPE AND THOSE BERMS CARRYING WATER TO THE PIPE SHALL BE AT LEAST 1.5 FEET HIGHER THAN THE TOP OF THE INLET PIPE.
3. THE PIPE SHALL BE FLEXIBLE WITH WATER TIGHT CONNECTING BANDS. FLEXIBLE PIPE SHOULD BE STAKED ON EITHER SIDE.
4. A RIPRAP APRON SHALL BE PROVIDED AT THE OUTLET.
5. THE SOIL AROUND AND UNDER THE INLET PIPE AT THE ENTRANCE SECTION SHALL BE HAND TAMPED IN 4" LIFTS TO THE TOP OF THE EARTH BERM.
6. FOLLOW-UP INSPECTION AND ANY NEEDED MAINTENANCE SHALL BE PERFORMED EVERY 14 DAYS AND AFTER EACH RAINFALL EVENT.
7. SEE PLAN FOR PIPE DIAMETER, LENGTH AND LOCATIONS.



*City of Gillette*

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**TEMPORARY SLOPE DRAIN**

DRAWN BY: KEB

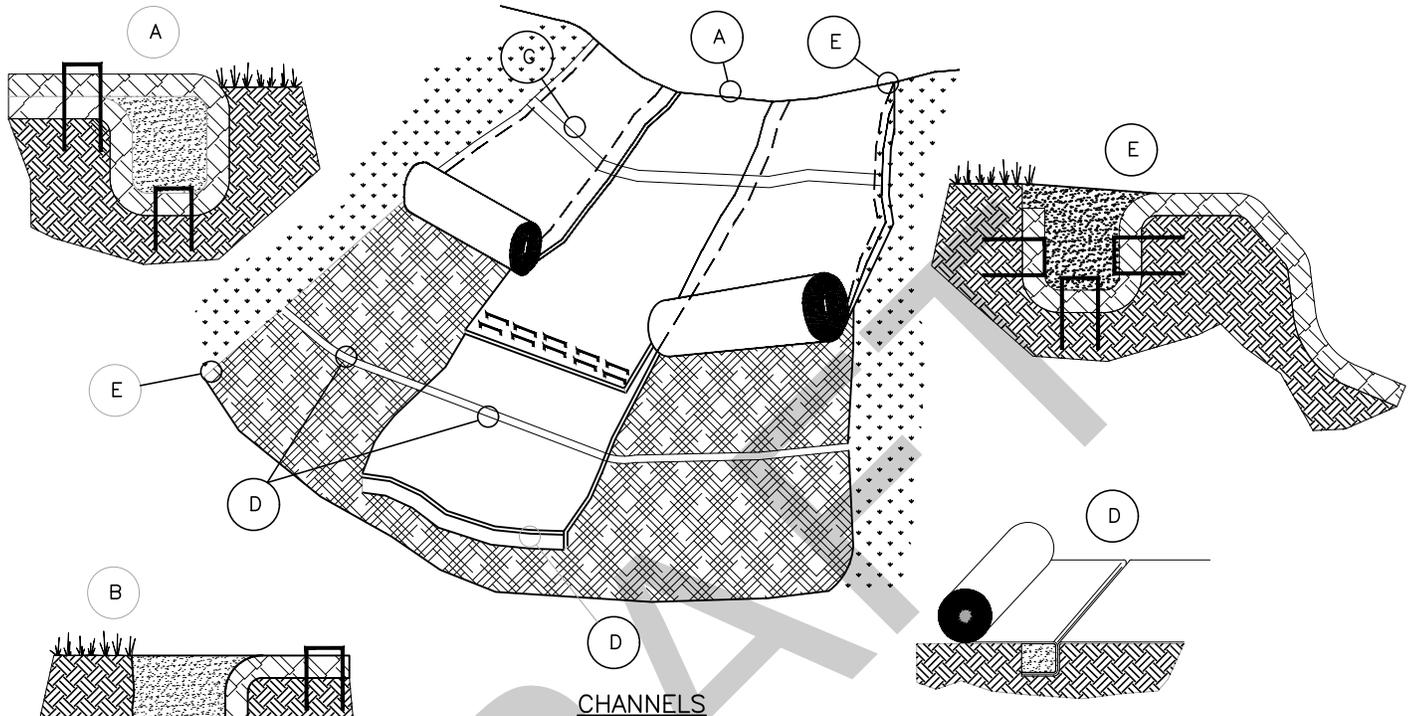
APPROVED BY: CITY ENGINEER HV/KDS

DATE:

MARCH 2012

DRAWING NO.

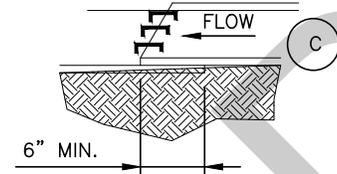
01500-21



CHANNELS

UNDISTURBED VEGETATION

SLOPES



OVERLAPS ARE A MINIMUM OF 6" OR PER MANUFACTURERS SPECS.

SECURE BY USING AN APPROPRIATE PINNING PATTERN PER MANUFACTURERS SPECIFICATIONS

NOTES:

1. ALL FABRIC TRENCHING (A, B, D, E) ARE TO BE 6" D X 6" W MINIMUM.
2. DEPENDING ON THE VELOCITY, SLOPE, SOILS, USE PROPER BLANKET OR TURF MAT LINING PER MANUFACTURERS SPECIFICATIONS TO HANDLE SHEAR STRESSES OF THE SLOPE/CHANNEL.



City Of Gillette

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EROSION CONTROL BLANKET & TURF MAT

DRAWN BY: KEB

APPROVED BY: CITY ENGINEER HV/KDS

DATE:

MARCH 2012

DRAWING NO.

01500-22

UNDISTURBED  
VEGETATION

DIVERSION DITCH

DOZER TREADS  
CREATE GROOVES  
PERPENDICULAR TO  
SLOPE DIRECTION

SLOPE

UNVEGETATED SLOPES SHOULD BE TEMPORARILY  
SCARIFIED TO MINIMIZE RUNOFF VELOCITIES



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## SURFACE ROUGHENING & SCARIFICATION

DRAWN BY: KEB

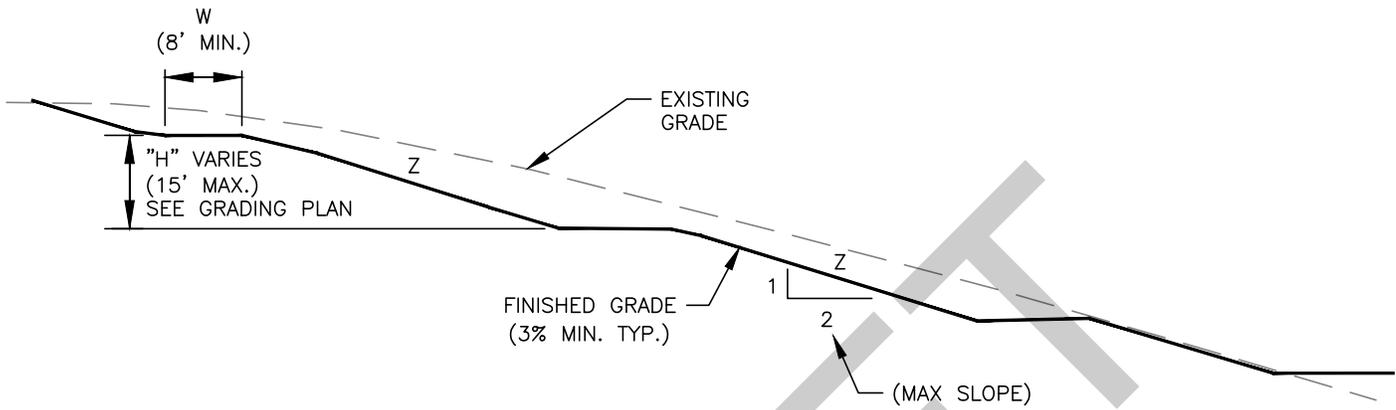
APPROVED BY: CITY ENGINEER HV/KDS

DATE:

MARCH 2012

DRAWING NO.

01500-23



INSTALLATION NOTES:

1. SEE GRADING PLAN VIEW FOR LOCATION OF TERRACING, WIDTH (W), AND SLOPE (Z).
2. TERRACING IS TYPICALLY NOT REQUIRED FOR SLOPES OF 4:1 OR FLATTER.
3. GRADE TERRACES TO DRAIN BACK TO SLOPE AT A MINIMUM OF 3% GRADE.

MAINTENANCE NOTES:

1. RILL EROSION OCCURRING ON TERRACED SLOPES SHALL BE REPAIRED, RESEDED, MULCHED OR STABILIZED IN A MANNER APPROVED BY THE CITY.
2. TERRACING MAY NEED TO BE RE-GRADED TO RETURN THE SLOPE TO THE FINAL DESIGN GRADE. THE SLOPE SHALL THEN BE COVERED WITH TOPSOIL, SEEDED AND MULCHED, OR OTHERWISE STABILIZED AS APPROVED BY THE CITY.



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## TEMPORARY TERRACING

DRAWN BY: KEB

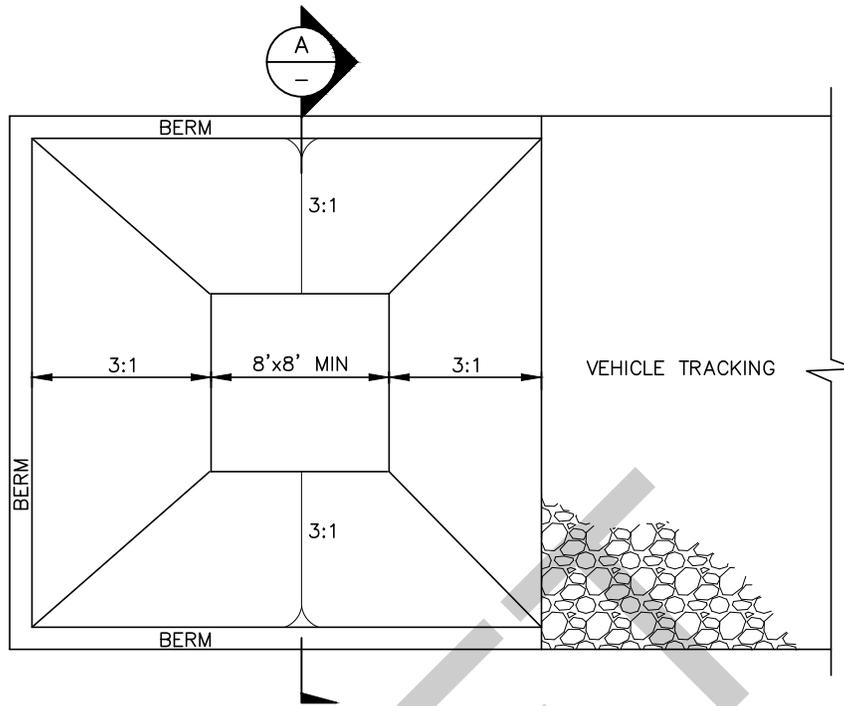
APPROVED BY: CITY ENGINEER HV/KDS

DATE:

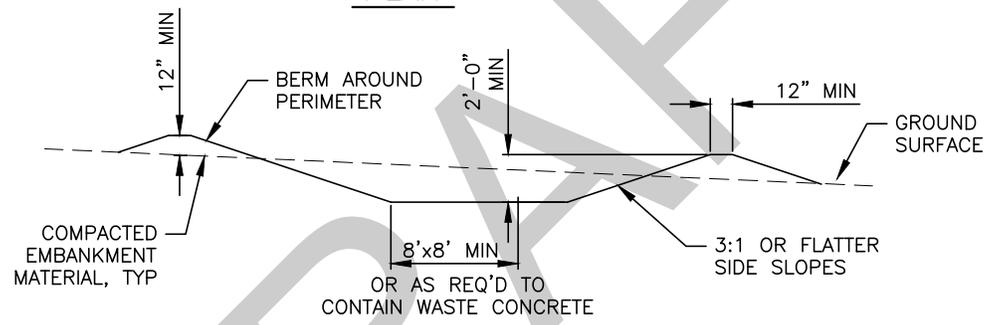
MARCH 2012

DRAWING NO.

01500-24



PLAN



SECTION

CONCRETE WASHOUT AREA INSTALLATION NOTES

1. SEE PLAN VIEW FOR LOCATIONS OF WASHOUT AREA
2. THE CONCRETE WASHOUT AREA SHALL BE INSTALLED PRIOR TO ANY CONCRETE PLACEMENT ON SITE.
3. VEHICLE TRACKING CONTROL IS REQUIRED AT ACCESS POINT.
4. SIGNS SHALL BE PLACED AT THE CONSTRUCTION ENTRANCE, AT THE WASHOUT AREA, AND ELSEWHERE AS NECESSARY TO CLEARLY INDICATE THE LOCATION OF THE CONCRETE WASHOUT AREA TO OPERATORS OF CONCRETE TRUCKS AND PUMP RIGS.
5. EXCAVATED MATERIAL SHALL BE UTILIZED IN PERIMETER BERM CONSTRUCTION.

CONCRETE WASHOUT MAINTENANCE NOTES

1. THE CONCRETE WASHOUT AREA SHALL BE REPAIRED AND ENLARGED OR CLEANED OUT AS NECESSARY TO MAINTAIN CAPACITY FOR WASHED CONCRETE.
2. AT THE END OF CONSTRUCTION, ALL CONCRETE SHALL BE REMOVED FROM THE SITE AND DISPOSED OF AT AN APPROVED WASTE SITE.
3. WHEN THE CONCRETE WASHOUT AREA IS REMOVED, THE DISTURBED AREA SHALL BE STABILIZED.
4. INSPECT WEEKLY, DURING AND AFTER ANY STORM EVENT.



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 PHONE: (307) 686-5311

**EXCAVATED CONCRETE WASHOUT AREA**

DRAWN BY: KEB

APPROVED BY: CITY ENGINEER HV/KDS

DATE:	
MARCH 2012	
DRAWING NO.	
01500-25	

CITY OF GILLETTE  
(307) 686-5262



C U U  
A N T  
U D I  
T E L  
I R I  
O G T  
N R Y  
O U  
N D

CARSONITE INTERNATIONAL CRM 307208  
MARKED WITH CW-112 DECAL FOR WATER  
LINES, CW-116 DECAL FOR WATER VALVES,  
CRM 307207 MARKED WITH CS-225 DECAL  
FOR SEWER LINES OR CRM 307205 MARKED  
WITH SE-161 DECAL FOR POWER LINES OR  
APPROVED EQUAL.

PROVIDE CARSONITE MARKER AT  
500' INTERVALS ALONG PIPELINE  
AND AT ALL VALVE BOXES,  
BENDS, MANHOLES, OR JUNCTION  
BOXES.

BEFORE DIGGING,  
CALL UTILITY

## UTILITY MARKER

**NOTE:**

1. UTILITY MARKERS WILL BE PROVIDED BY THE CITY OF GILLETTE AT COST.
2. INSTALLATION OF UTILITY MARKERS ARE THE RESPONSIBILITY OF THE CONTRACTOR/DEVELOPER.



*City Of Gillette*  
ENGINEERING DIVISION  
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PHONE: (307) 686-5311

## UTILITY (CARSONITE) MARKER

DRAWN BY: JAC

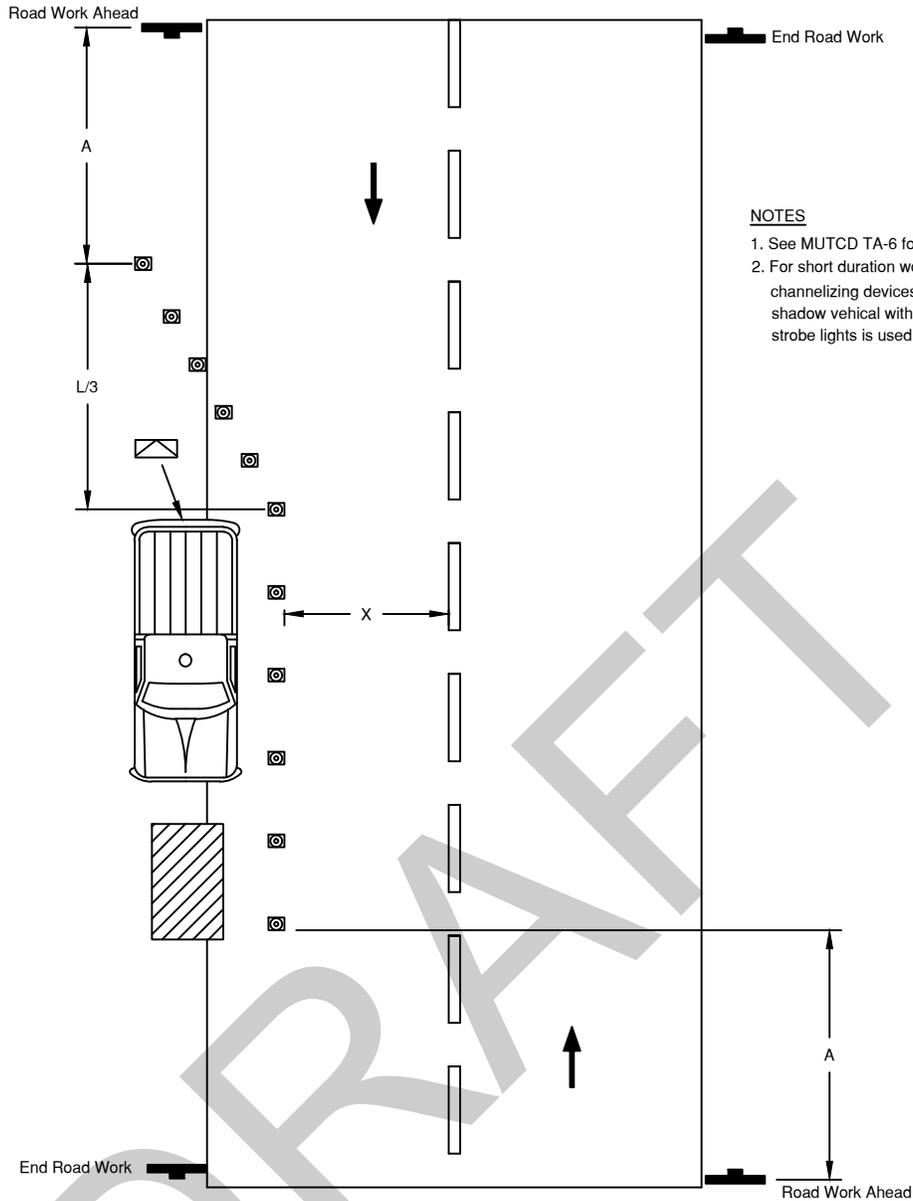
APPROVED BY: CITY ENGINEER DLH/KDS

DATE:

MAY 2009

DRAWING NO.

01510-01



**NOTES**

1. See MUTCD TA-6 for additional guidance.
2. For short duration work, the taper and channelizing devices may be omitted if a shadow vehical with activated rotating or strobe lights is used.

Road Type	Distance Between Signs (feet) (A, B, C)
Urban (Low Speed)	100
Urban (High Speed)	350
Rural	500

Type of Taper	Taper Length (L)
Merging Taper	at least L
Shifting Taper	at least 0.5L
Shoulder Taper	at least 0.33L
One-Lane, Two-Way Traffic Taper	100 ft Max
Downstream Taper	100 ft per lane
One-Way Section w/ Flagger	100 ft max w/ 20 ft spacings

\* where  $L = WS^2/60$  for 40 mph or less and  
 $L = WS$  for 45 mph or greater  
 L = Taper Length (feet)  
 W = Width of offset (feet)  
 S = Posted Speed Limit (mph)

A, B, and C

L

X



Spacing of advanced Warning Signs

Taper Length

Width of Travel Way (10' min, 9' if few trucks & low volume)

Arrow Panel

Channelizing Device

Direction of Traffic

Flagger Station

High-Level Warning Device (Flag Tree)

Sign (Shown Facing Left)

Truck Mounted Attenuator

Warning Light (or Flags)

Type III Barricade

Work Vehical

Work Area



**City Of Gillette**  
 ENGINEERING DIVISION  
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**MINOR LOW SPEED ROADS  
 SHOULDER WORK**

DRAWN BY: JAC

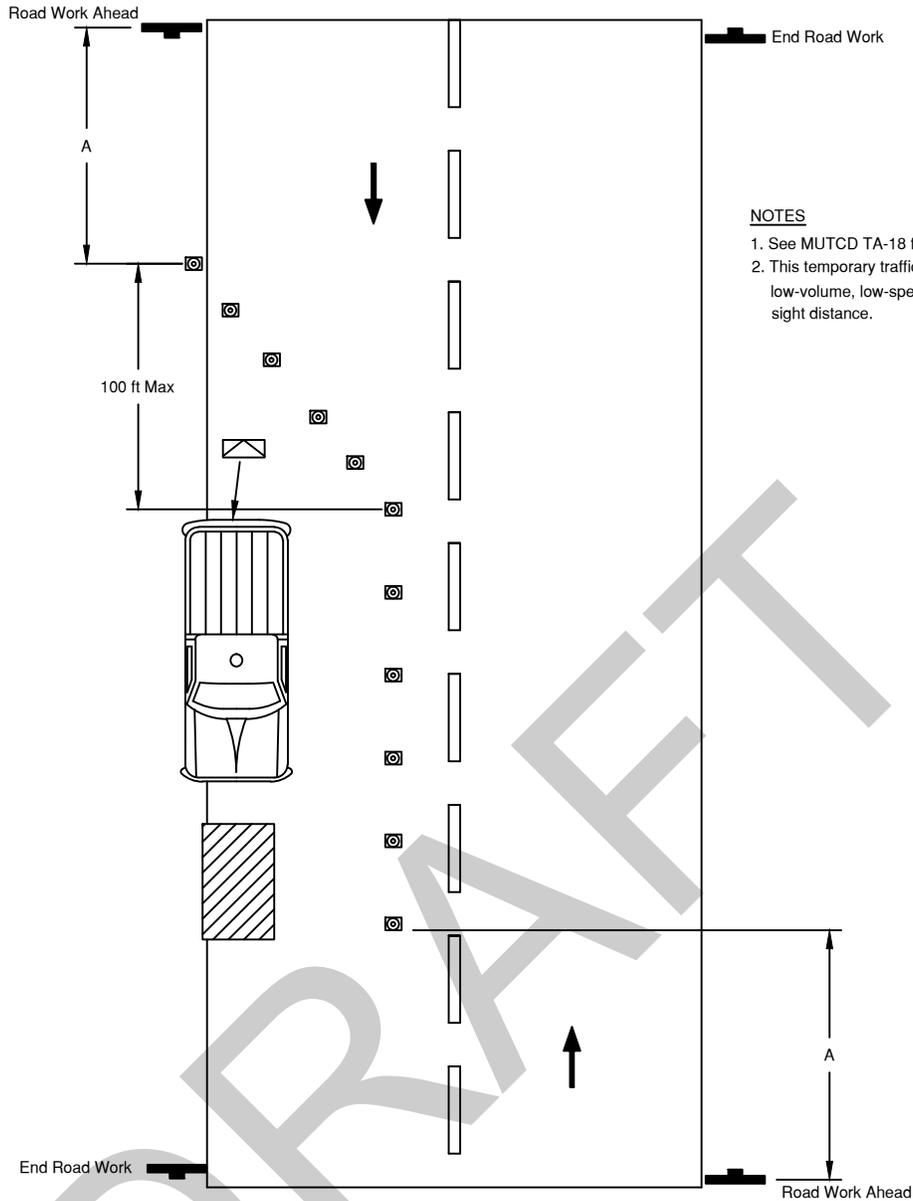
APPROVED BY: CITY ENGINEER DLH/KDS

DATE:

MAY 2009

DRAWING NO.

01510-02



**NOTES**

1. See MUTCD TA-18 for additional guidance.
2. This temporary traffic control is only used for low-volume, low-speed facilities with adequate sight distance.

Road Type	Distance Between Signs (feet) (A, B, C)
Urban (Low Speed)	100
Urban (High Speed)	350
Rural	500

Type of Taper	Taper Length (L)
Merging Taper	at least L
Shifting Taper	at least 0.5L
Shoulder Taper	at least 0.33L
One-Lane, Two-Way Traffic Taper	100 ft Max
Downstream Taper	100 ft per lane
One-Way Section w/ Flagger	100 ft max w/ 20 ft spacings

\* where  $L = WS^2/60$  for 40 mph or less and  
 $L = WS$  for 45 mph or greater  
 L = Taper Length (feet)  
 W = Width of offset (feet)  
 S = Posted Speed Limit (mph)

A, B, and C

L

X



Spacing of advanced Warning Signs

Taper Length

Width of Travel Way (10' min, 9' if few trucks & low volume)

Arrow Panel

Channelizing Device

Direction of Traffic

Flagger Station

High-Level Warning Device (Flag Tree)

Sign (Shown Facing Left)

Truck Mounted Attenuator

Warning Light (or Flags)

Type III Barricade

Work Vehical

Work Area



**City Of Gillette**  
 ENGINEERING DIVISION  
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 GILLETTE, WYOMING 82717  
 PHONE: (307) 686-5311

**LANE CLOSURE  
 (MINOR STREET)**

DRAWN BY: JAC

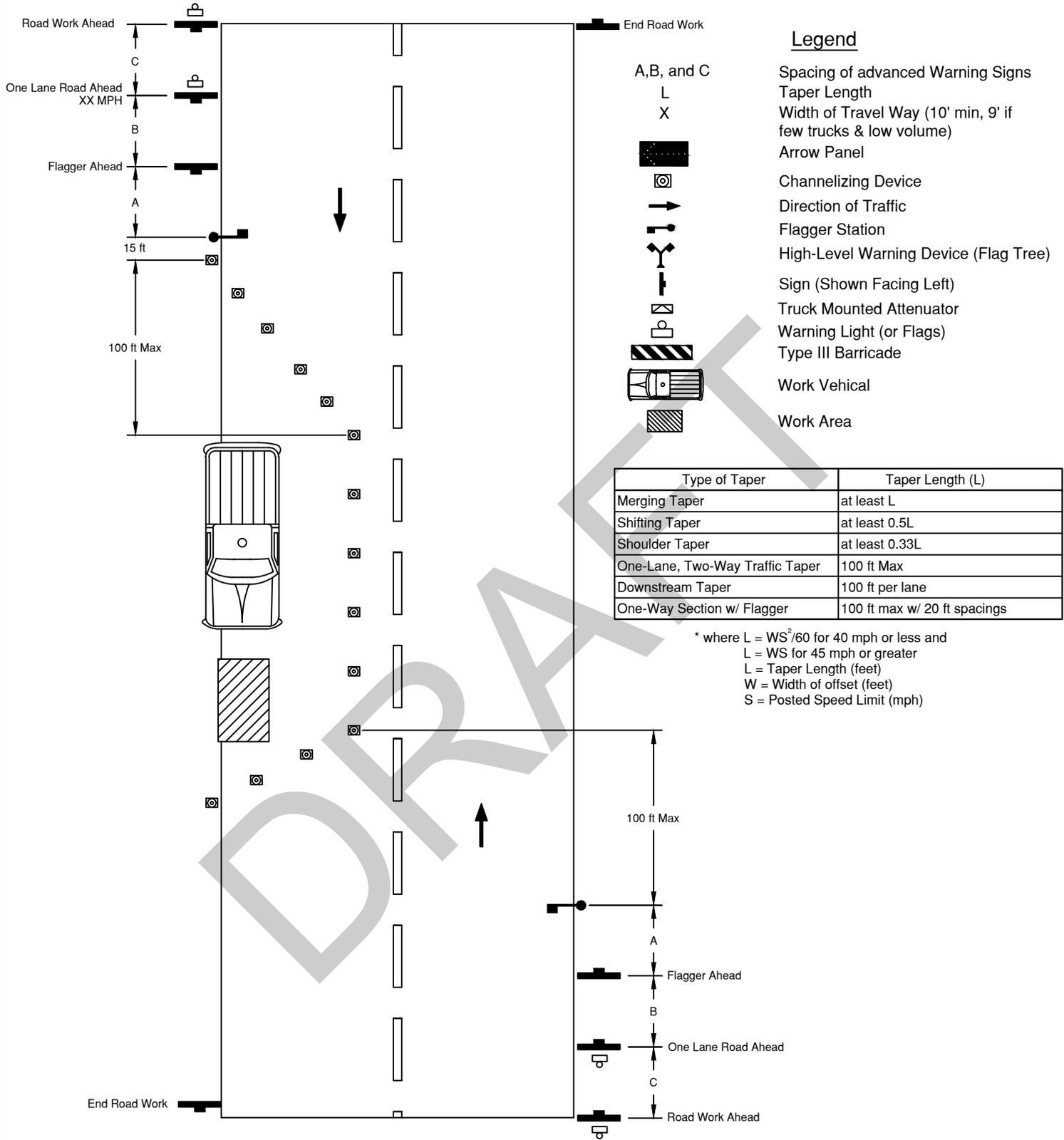
APPROVED BY: CITY ENGINEER DLH/KDS

DATE:

MAY 2009

DRAWING NO.

01510-03



Road Type	Distance Between Signs (feet) (A, B, C)
Urban (Low Speed)	100
Urban (High Speed)	350
Rural	500

**NOTES**

1. See MUTCD TA-10 for additional guidance.



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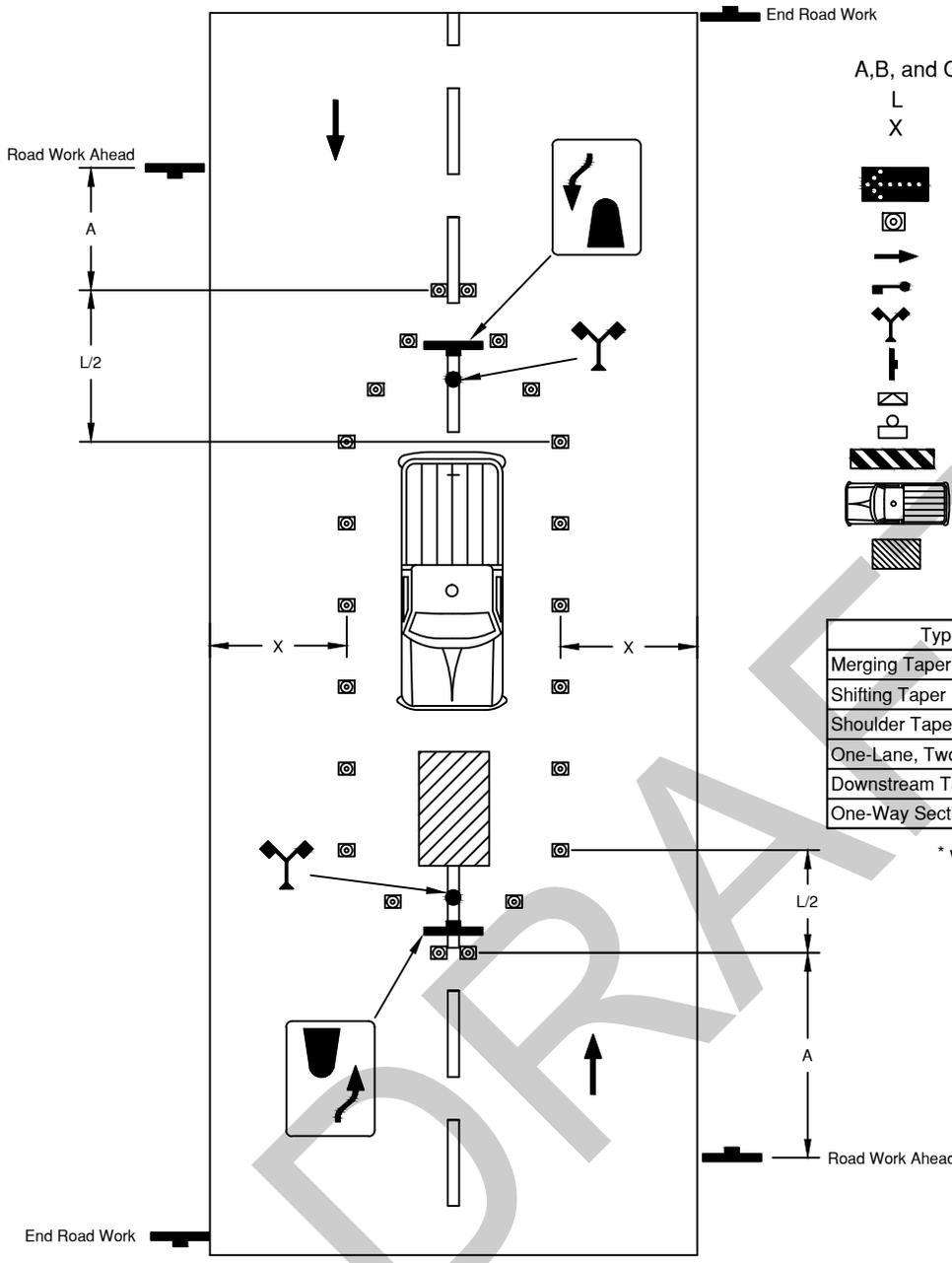
# LANE CLOSURE USING FLAGGERS (LOW-VOLUME TWO-LANE ROAD)

DRAWN BY: JAC

APPROVED BY: CITY ENGINEER DLH/KDS

DATE: MAY 2009  
 DRAWING NO. 01510-04





**Legend**

- A, B, and C Spacing of advanced Warning Signs
- L Taper Length
- X Width of Travel Way (10' min, 9' if few trucks & low volume)
- [Symbol] Arrow Panel
- [Symbol] Channelizing Device
- [Symbol] Direction of Traffic
- [Symbol] Flagger Station
- [Symbol] High-Level Warning Device (Flag Tree)
- [Symbol] Sign (Shown Facing Left)
- [Symbol] Truck Mounted Attenuator
- [Symbol] Warning Light (or Flags)
- [Symbol] Type III Barricade
- [Symbol] Work Vehical
- [Symbol] Work Area

Type of Taper	Taper Length (L)
Merging Taper	at least L
Shifting Taper	at least 0.5L
Shoulder Taper	at least 0.33L
One-Lane, Two-Way Traffic Taper	100 ft Max
Downstream Taper	100 ft per lane
One-Way Section w/ Flagger	100 ft max w/ 20 ft spacings

\* where  $L = WS^2/60$  for 40 mph or less and  
 $L = WS$  for 45 mph or greater  
 L = Taper Length (feet)  
 W = Width of offset (feet)  
 S = Posted Speed Limit (mph)

**NOTES**

1. See MUTCD TA-15 for additional guidance.

Road Type	Distance Between Signs (feet) (A, B, C)
Urban (Low Speed)	100
Urban (High Speed)	350
Rural	500



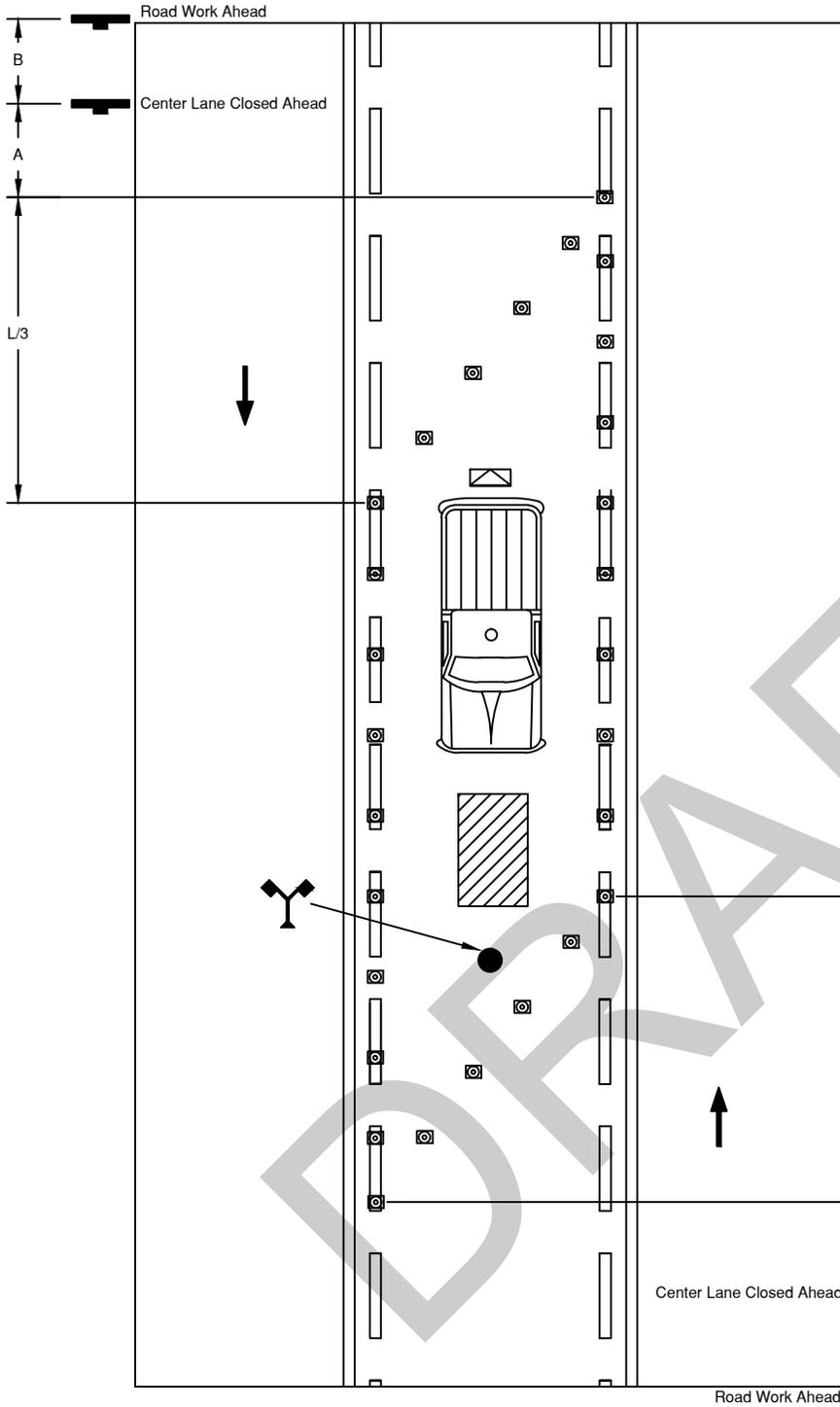
*City Of Gillette*  
 ENGINEERING DIVISION  
 P.O. BOX 3003, 201 E. 5TH STREET  
 GILLETTE, WYOMING 82717  
 PHONE: (307) 686-5311

**CENTER WORK  
 (LOW-VOLUME ROAD)**

DRAWN BY: JAC

APPROVED BY: CITY ENGINEER DLH/KDS

DATE:	
	MAY 2009
DRAWING NO.	
	01510-06



**Legend**

- A, B, and C      Spacing of advanced Warning Signs
- L                  Taper Length
- X                  Width of Travel Way (10' min, 9' if few trucks & low volume)
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 

Type of Taper	Taper Length (L)
Merging Taper	at least L
Shifting Taper	at least 0.5L
Shoulder Taper	at least 0.33L
One-Lane, Two-Way Traffic Taper	100 ft Max
Downstream Taper	100 ft per lane
One-Way Section w/ Flagger	100 ft max w/ 20 ft spacings

\* where  $L = WS^2/60$  for 40 mph or less and  
 $L = WS$  for 45 mph or greater  
 L = Taper Length (feet)  
 W = Width of offset (feet)  
 S = Posted Speed Limit (mph)

Road Type	Distance Between Signs (feet) (A, B, C)
Urban (Low Speed)	100
Urban (High Speed)	350
Rural	500



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 PHONE: (307) 686-5311

**LANE CLOSURE  
 (CENTER TURN LANE)**

DRAWN BY: JAC

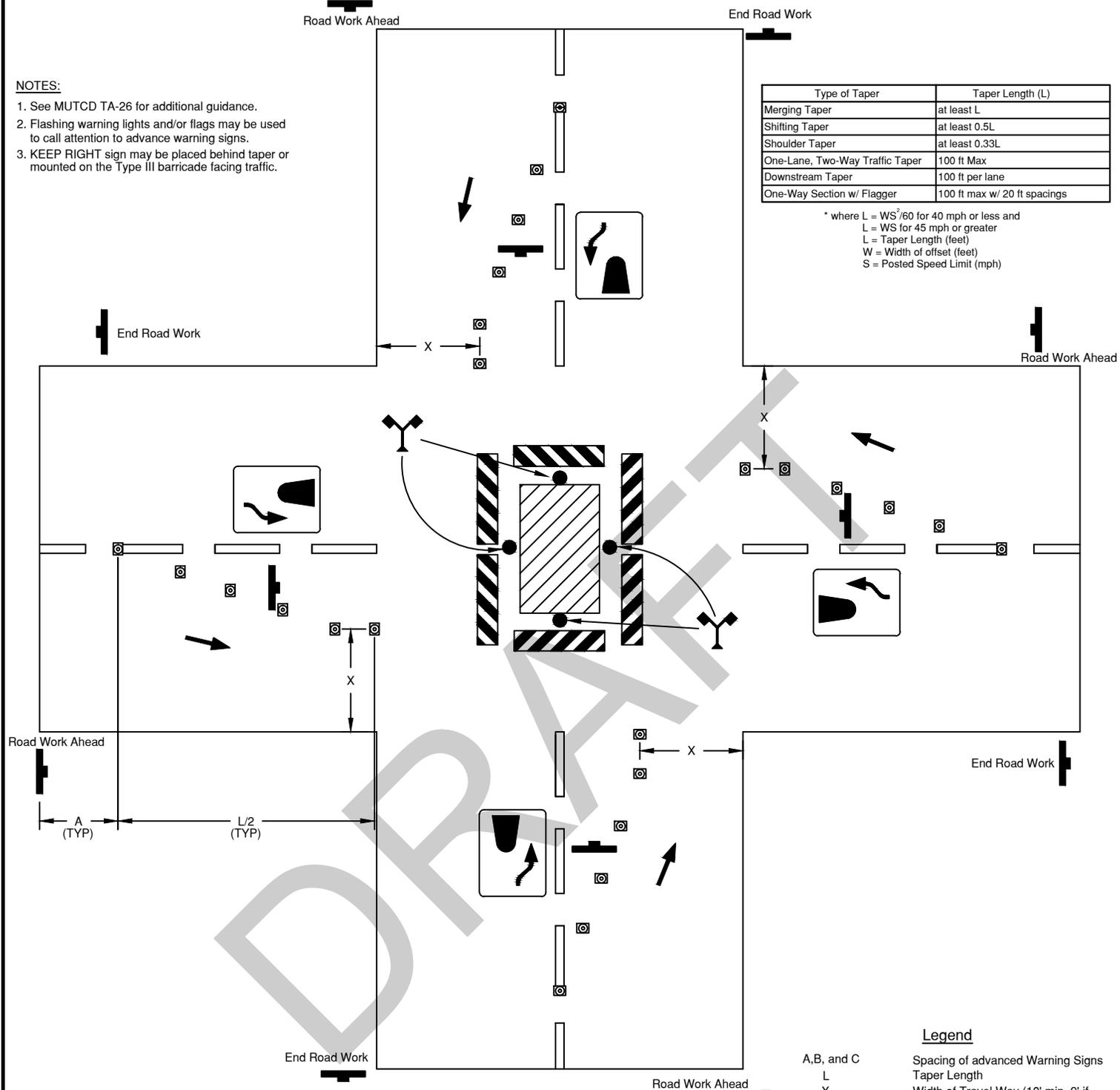
APPROVED BY: CITY ENGINEER DLH/KDS

DATE: \_\_\_\_\_  
 MAY 2009  
 DRAWING NO. \_\_\_\_\_  
 01510-07

- NOTES:**
1. See MUTCD TA-26 for additional guidance.
  2. Flashing warning lights and/or flags may be used to call attention to advance warning signs.
  3. KEEP RIGHT sign may be placed behind taper or mounted on the Type III barricade facing traffic.

Type of Taper	Taper Length (L)
Merging Taper	at least L
Shifting Taper	at least 0.5L
Shoulder Taper	at least 0.33L
One-Lane, Two-Way Traffic Taper	100 ft Max
Downstream Taper	100 ft per lane
One-Way Section w/ Flagger	100 ft max w/ 20 ft spacings

\* where  $L = WS^2/60$  for 40 mph or less and  
 $L = WS$  for 45 mph or greater  
 L = Taper Length (feet)  
 W = Width of offset (feet)  
 S = Posted Speed Limit (mph)



Road Type	Distance Between Signs (feet) (A, B, C)
Urban (Low Speed)	100
Urban (High Speed)	350
Rural	500

- Legend**
- A, B, and C Spacing of advanced Warning Signs
  - L Taper Length
  - X Width of Travel Way (10' min, 9' if few trucks & low volume)
  - Arrow Panel
  - Channelizing Device
  - Direction of Traffic
  - Flagger Station
  - High-Level Warning Device (Flag Tree)
  - Sign (Shown Facing Left)
  - Truck Mounted Attenuator
  - Warning Light (or Flags)
  - Type III Barricade
  - Work Vehical
  - Work Area



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 PHONE: (307) 686-5311

## INTERSECTION CLOSURE (CENTER LOCATION)

DRAWN BY: JAC

APPROVED BY: CITY ENGINEER DLH/KDS

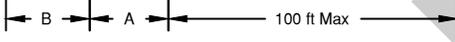
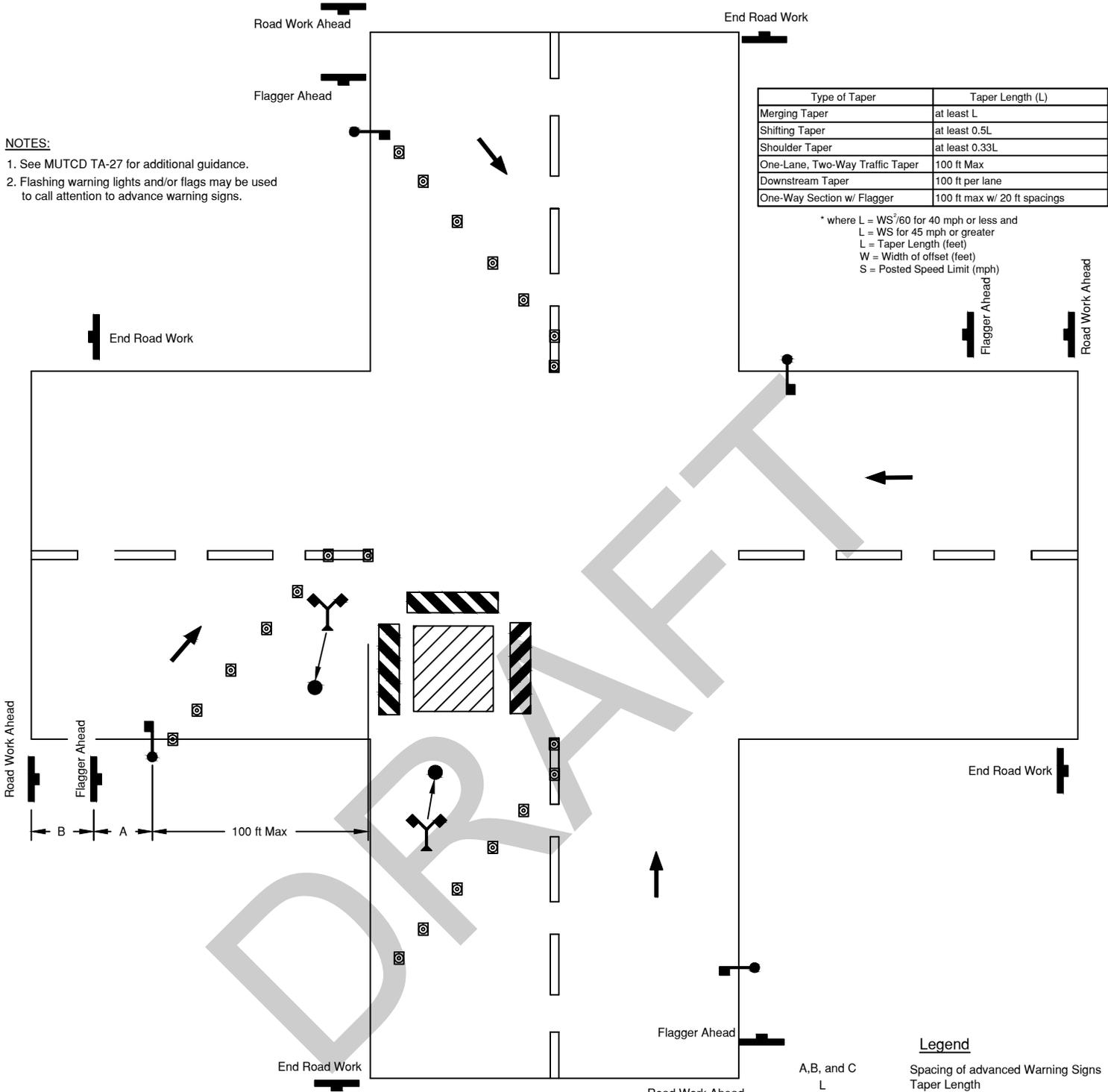
DATE: MAY 2009  
 DRAWING NO. 01510-08

**NOTES:**

1. See MUTCD TA-27 for additional guidance.
2. Flashing warning lights and/or flags may be used to call attention to advance warning signs.

Type of Taper	Taper Length (L)
Merging Taper	at least L
Shifting Taper	at least 0.5L
Shoulder Taper	at least 0.33L
One-Lane, Two-Way Traffic Taper	100 ft Max
Downstream Taper	100 ft per lane
One-Way Section w/ Flagger	100 ft max w/ 20 ft spacings

\* where  $L = WS^2/60$  for 40 mph or less and  
 $L = WS$  for 45 mph or greater  
 L = Taper Length (feet)  
 W = Width of offset (feet)  
 S = Posted Speed Limit (mph)



Road Type	Distance Between Signs (feet) (A, B, C)
Urban (Low Speed)	100
Urban (High Speed)	350
Rural	500

- Legend**
- A, B, and C Spacing of advanced Warning Signs
  - L Taper Length
  - X Width of Travel Way (10' min, 9' if few trucks & low volume)
  - Arrow Panel
  - Channelizing Device
  - Direction of Traffic
  - Flagger Station
  - High-Level Warning Device (Flag Tree)
  - Sign (Shown Facing Left)
  - Truck Mounted Attenuator
  - Warning Light (or Flags)
  - Type III Barricade
  - Work Vehical
  - Work Area



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## INTERSECTION CLOSURE (SIDE LOCATION)

DRAWN BY: JAC

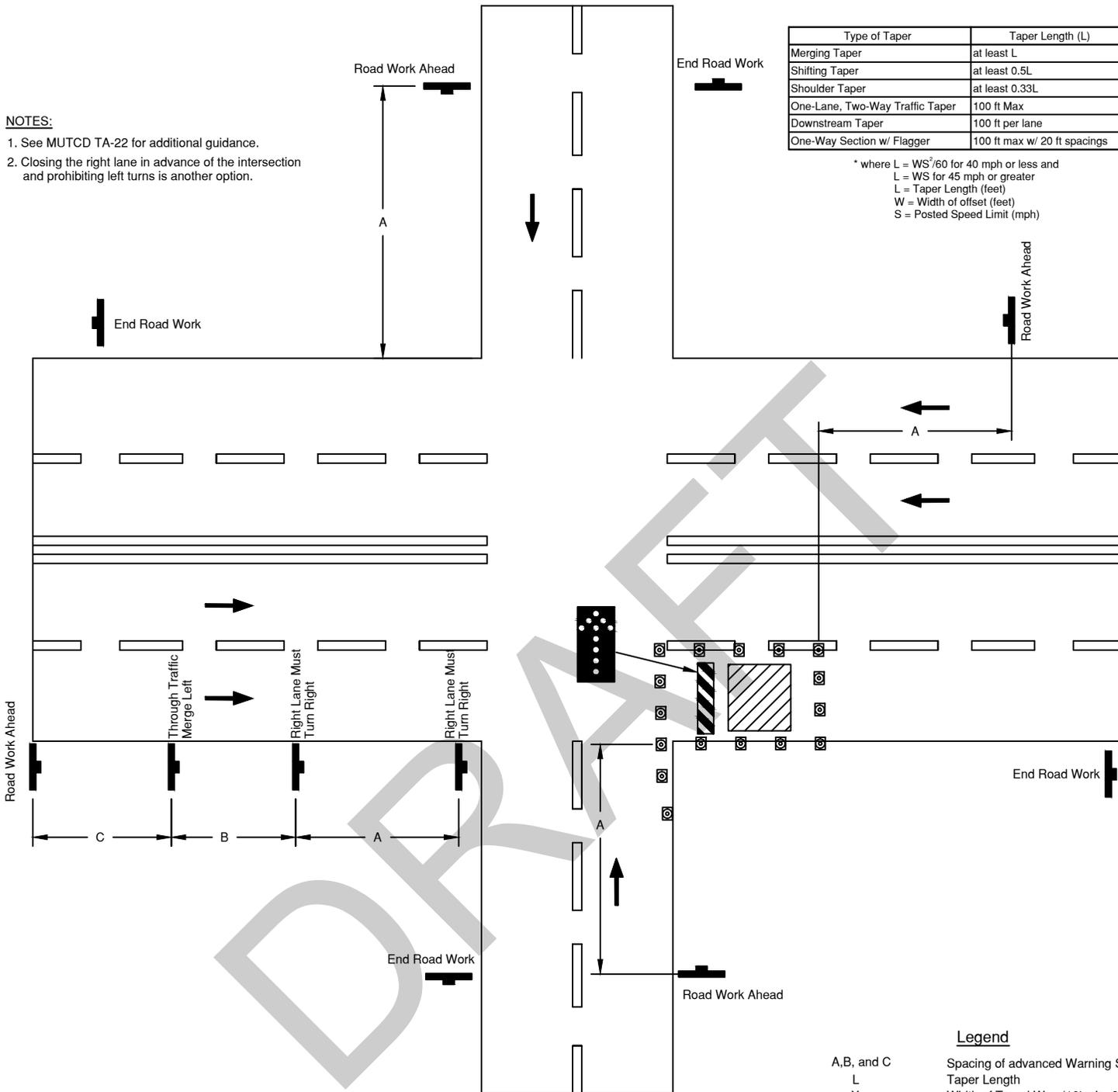
APPROVED BY: CITY ENGINEER DLH/KDS

DATE: \_\_\_\_\_  
 MAY 2009  
 DRAWING NO. \_\_\_\_\_  
 01510-09

- NOTES:**
1. See MUTCD TA-22 for additional guidance.
  2. Closing the right lane in advance of the intersection and prohibiting left turns is another option.

Type of Taper	Taper Length (L)
Merging Taper	at least L
Shifting Taper	at least 0.5L
Shoulder Taper	at least 0.33L
One-Lane, Two-Way Traffic Taper	100 ft Max
Downstream Taper	100 ft per lane
One-Way Section w/ Flagger	100 ft max w/ 20 ft spacings

\* where  $L = WS^2/60$  for 40 mph or less and  
 $L = WS$  for 45 mph or greater  
 L = Taper Length (feet)  
 W = Width of offset (feet)  
 S = Posted Speed Limit (mph)



Road Type	Distance Between Signs (feet) (A, B, C)
Urban (Low Speed)	100
Urban (High Speed)	350
Rural	500

- Legend**
- A, B, and C Spacing of advanced Warning Signs
  - L Taper Length
  - X Width of Travel Way (10' min, 9' if few trucks & low volume)
  - [Sign Symbol] Arrow Panel
  - [Sign Symbol] Channelizing Device
  - [Sign Symbol] Direction of Traffic
  - [Sign Symbol] Flagger Station
  - [Sign Symbol] High-Level Warning Device (Flag Tree)
  - [Sign Symbol] Sign (Shown Facing Left)
  - [Sign Symbol] Truck Mounted Attenuator
  - [Sign Symbol] Warning Light (or Flags)
  - [Sign Symbol] Type III Barricade
  - [Sign Symbol] Work Vehical
  - [Sign Symbol] Work Area

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# INTERSECTION CLOSURE (FAR SIDE, RIGHT LANE)

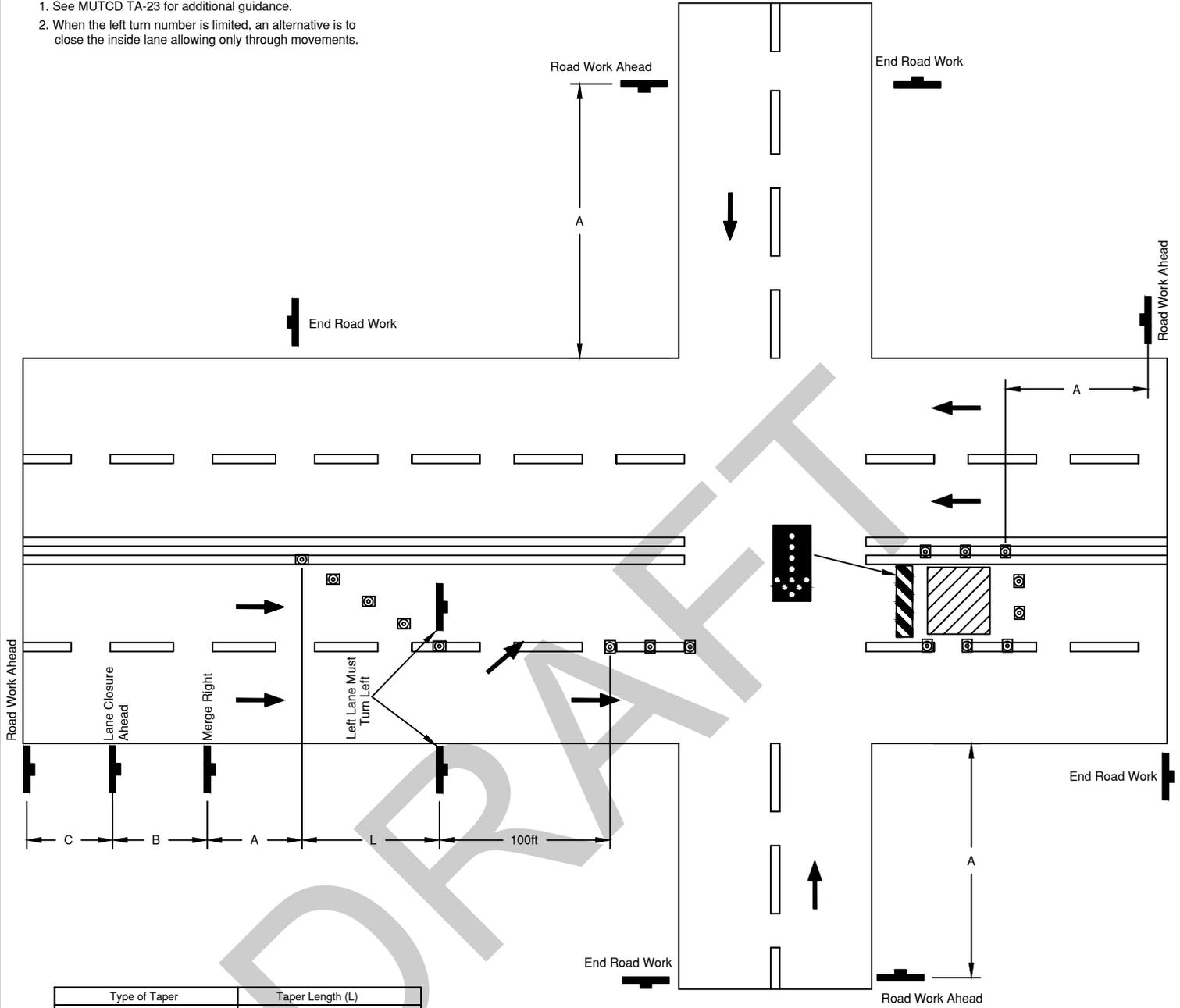
DRAWN BY: JAC

APPROVED BY: CITY ENGINEER DLH/KDS

DATE:  
 MAY 2009  
 DRAWING NO.  
 01510-10

**NOTES:**

1. See MUTCD TA-23 for additional guidance.
2. When the left turn number is limited, an alternative is to close the inside lane allowing only through movements.



Type of Taper	Taper Length (L)
Merging Taper	at least L
Shifting Taper	at least 0.5L
Shoulder Taper	at least 0.33L
One-Lane, Two-Way Traffic Taper	100 ft Max
Downstream Taper	100 ft per lane
One-Way Section w/ Flagger	100 ft max w/ 20 ft spacings

\* where  $L = WS^2/60$  for 40 mph or less and  
 $L = WS$  for 45 mph or greater  
 L = Taper Length (feet)  
 W = Width of offset (feet)  
 S = Posted Speed Limit (mph)

Road Type	Distance Between Signs (feet) (A, B, C)
Urban (Low Speed)	100
Urban (High Speed)	350
Rural	500

**Legend**

A, B, and C	Spacing of advanced Warning Signs
L	Taper Length
X	Width of Travel Way (10' min, 9' if few trucks & low volume)
	Arrow Panel
	Channelizing Device
	Direction of Traffic
	Flagger Station
	High-Level Warning Device (Flag Tree)
	Sign (Shown Facing Left)
	Truck Mounted Attenuator
	Warning Light (or Flags)
	Type III Barricade
	Work Vehical
	Work Area



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# INTERSECTION CLOSURE (FAR SIDE, LEFT LANE)

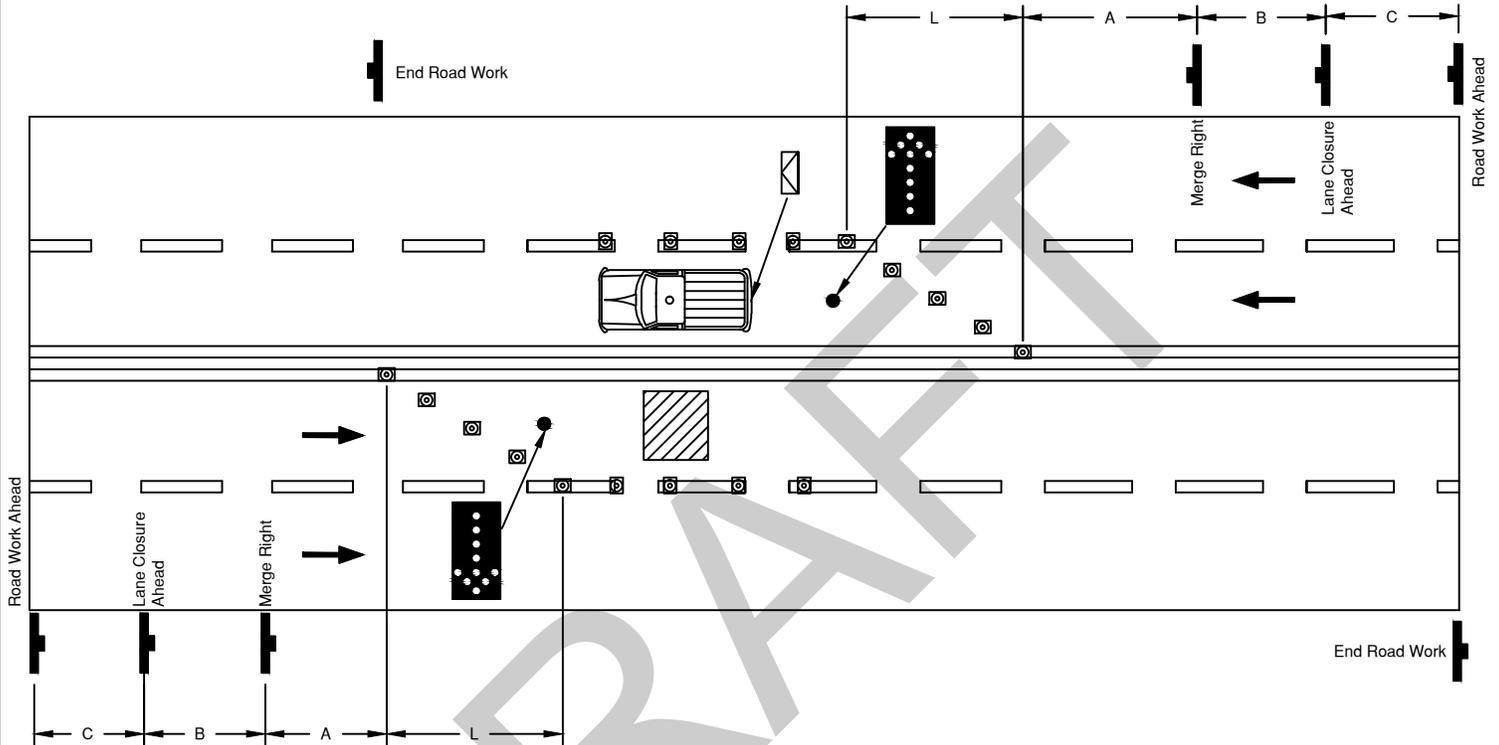
DRAWN BY: JAC

APPROVED BY: CITY ENGINEER DLH/KDS

DATE: \_\_\_\_\_  
 MAY 2009  
 DRAWING NO. \_\_\_\_\_  
 01510-11

**NOTES:**

1. See MUTCD TA-30 for additional guidance.



Type of Taper	Taper Length (L)
Merging Taper	at least L
Shifting Taper	at least 0.5L
Shoulder Taper	at least 0.33L
One-Lane, Two-Way Traffic Taper	100 ft Max
Downstream Taper	100 ft per lane
One-Way Section w/ Flagger	100 ft max w/ 20 ft spacings

\* where  $L = WS^2/60$  for 40 mph or less and  
 $L = WS$  for 45 mph or greater  
 L = Taper Length (feet)  
 W = Width of offset (feet)  
 S = Posted Speed Limit (mph)

Road Type	Distance Between Signs (feet) (A, B, C)
Urban (Low Speed)	100
Urban (High Speed)	350
Rural	500

**Legend**

- A, B, and C Spacing of advanced Warning Signs
- L Taper Length
- X Width of Travel Way (10' min, 9' if few trucks & low volume)
- Arrow Panel
- Channelizing Device
- Direction of Traffic
- Flagger Station
- High-Level Warning Device (Flag Tree)
- Sign (Shown Facing Left)
- Truck Mounted Attenuator
- Warning Light (or Flags)
- Type III Barricade
- Work Vehical
- Work Area



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**LANE CLOSURE  
 (INTERIOR OF MULTI-LANE)**

DRAWN BY: JAC

APPROVED BY: CITY ENGINEER DLH/KDS

DATE:

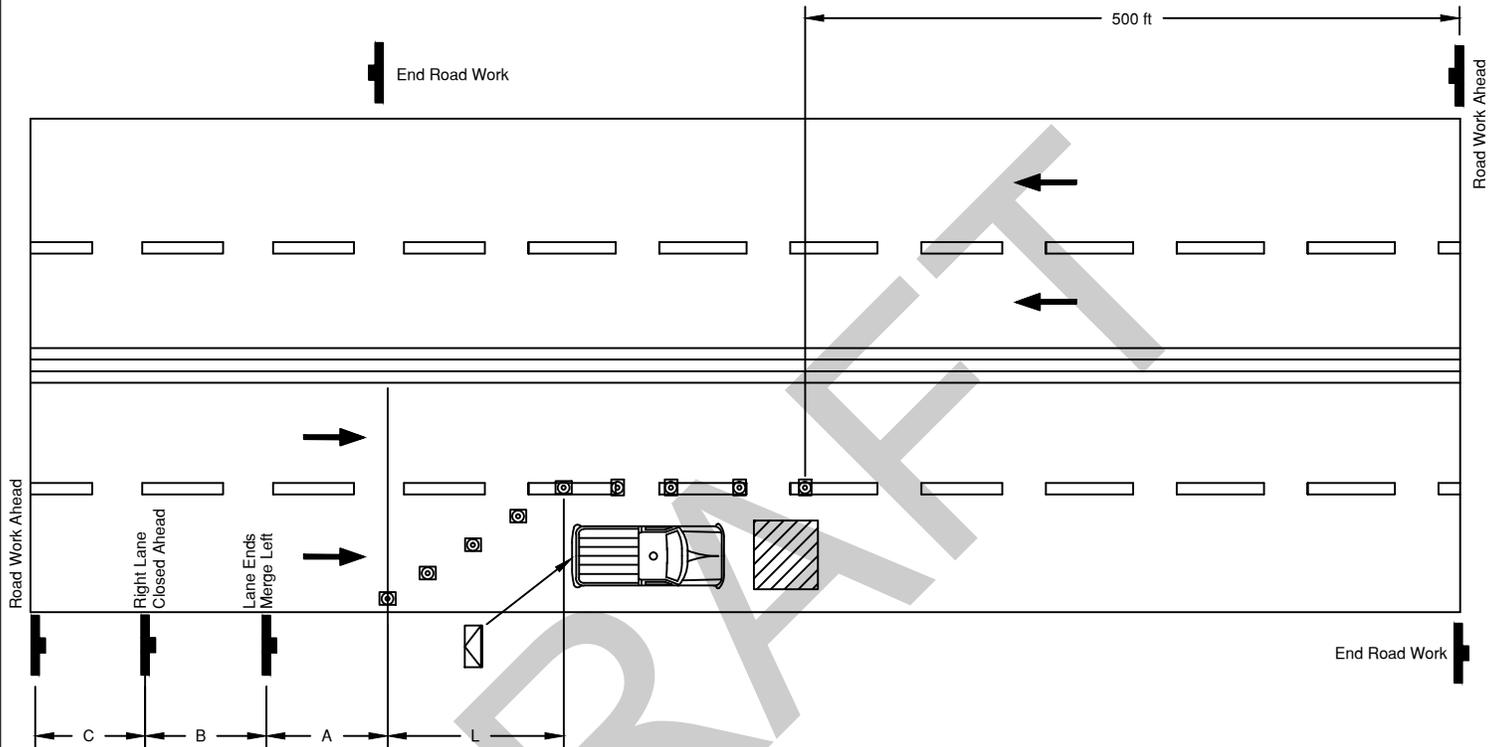
MAY 2009

DRAWING NO.

01510-12

**NOTES:**

1. See MUTCD TA-6 for additional guidance.



Type of Taper	Taper Length (L)
Merging Taper	at least L
Shifting Taper	at least 0.5L
Shoulder Taper	at least 0.33L
One-Lane, Two-Way Traffic Taper	100 ft Max
Downstream Taper	100 ft per lane
One-Way Section w/ Flagger	100 ft max w/ 20 ft spacings

\* where L =  $WS^2/60$  for 40 mph or less and  
 L =  $WS$  for 45 mph or greater  
 L = Taper Length (feet)  
 W = Width of offset (feet)  
 S = Posted Speed Limit (mph)

Road Type	Distance Between Signs (feet) (A, B, C)
Urban (Low Speed)	100
Urban (High Speed)	350
Rural	500

**Legend**

- A, B, and C Spacing of advanced Warning Signs
- L Taper Length
- X Width of Travel Way (10' min, 9' if few trucks & low volume)
- Arrow Panel Arrow Panel
- Channelizing Device Channelizing Device
- Direction of Traffic Direction of Traffic
- Flagger Station Flagger Station
- High-Level Warning Device (Flag Tree) High-Level Warning Device (Flag Tree)
- Sign (Shown Facing Left) Sign (Shown Facing Left)
- Truck Mounted Attenuator Truck Mounted Attenuator
- Warning Light (or Flags) Warning Light (or Flags)
- Type III Barricade Type III Barricade
- Work Vehical Work Vehical
- Work Area Work Area



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**STATIONARY LANE CLOSURE  
 (MULTI-LANE HIGHWAY)**

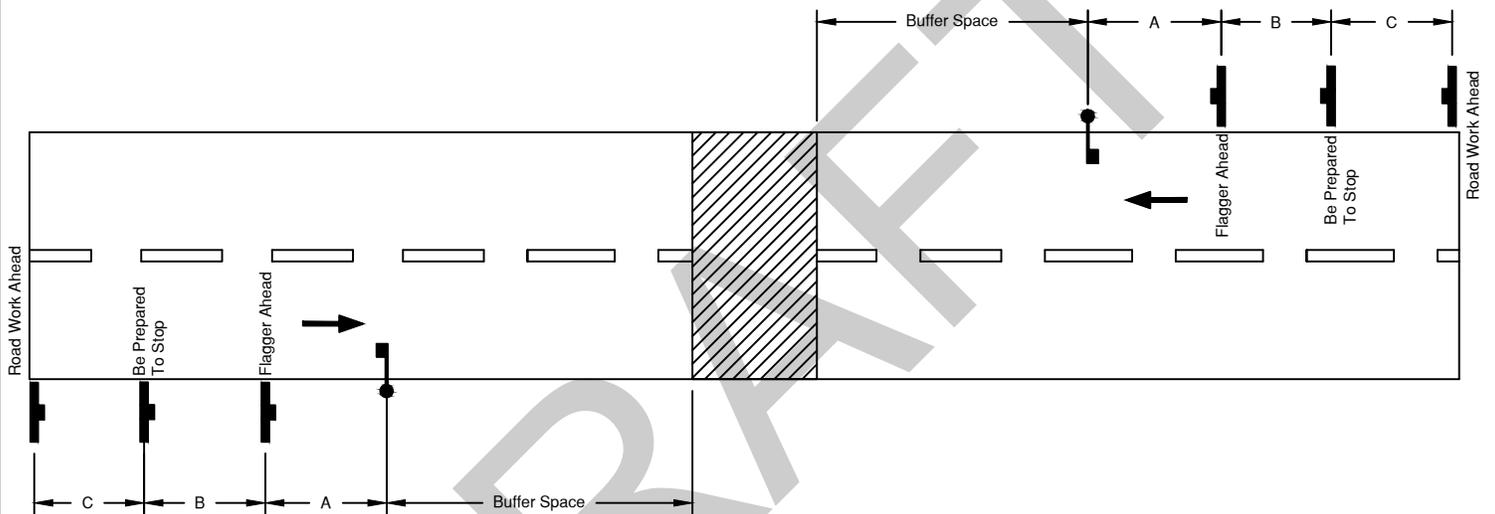
DRAWN BY: JAC

APPROVED BY: CITY ENGINEER DLH/KDS

DATE:  
 MAY 2009  
 DRAWING NO.  
 01510-13

**NOTES:**

1. See MUTCD TA-13 for additional guidance.
2. This temporary traffic control is only used for daylight work where the closure is not more than 20 minutes.



Type of Taper	Taper Length (L)
Merging Taper	at least L
Shifting Taper	at least 0.5L
Shoulder Taper	at least 0.33L
One-Lane, Two-Way Traffic Taper	100 ft Max
Downstream Taper	100 ft per lane
One-Way Section w/ Flagger	100 ft max w/ 20 ft spacings

\* where  $L = WS^2/60$  for 40 mph or less and  
 $L = WS$  for 45 mph or greater  
 L = Taper Length (feet)  
 W = Width of offset (feet)  
 S = Posted Speed Limit (mph)

Road Type	Distance Between Signs (feet) (A, B, C)
Urban (Low Speed)	100
Urban (High Speed)	350
Rural	500

**Legend**

- A, B, and C Spacing of advanced Warning Signs
- L Taper Length
- X Width of Travel Way (10' min, 9' if few trucks & low volume)
- Arrow Panel Arrow Panel
- Channelizing Device Channelizing Device
- Direction of Traffic Direction of Traffic
- Flagger Station Flagger Station
- High-Level Warning Device (Flag Tree) High-Level Warning Device (Flag Tree)
- Sign (Shown Facing Left) Sign (Shown Facing Left)
- Truck Mounted Attenuator Truck Mounted Attenuator
- Warning Light (or Flags) Warning Light (or Flags)
- Type III Barricade Type III Barricade
- Work Vehical Work Vehical
- Work Area Work Area



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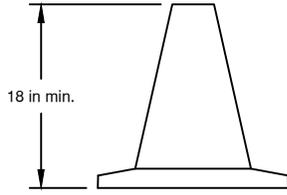
**ROAD CLOSURE  
(TEMPORARY)**

DRAWN BY: JAC

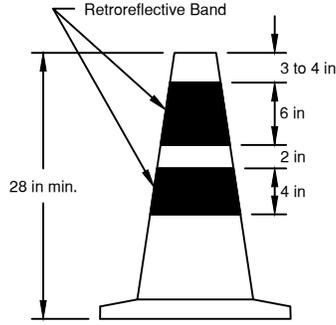
APPROVED BY: CITY ENGINEER DLH/KDS

DATE: MAY 2009  
 DRAWING NO. 01510-14

**CONES**

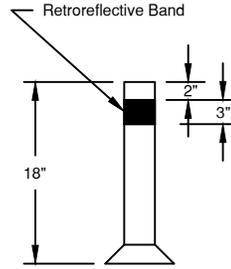


Day and Low Speed Roadways (≤ 40 mph)

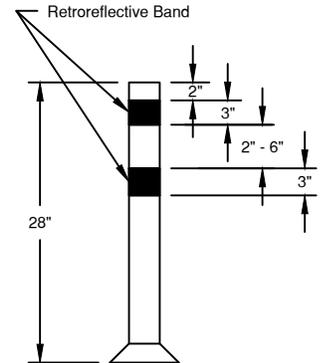


Night and/or Freeway High Speed Roadways (> 45 mph)

**TUBULAR MARKERS**

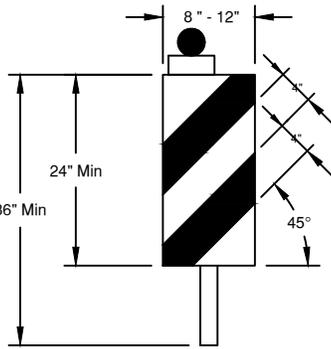


Day and Low Speed Roadways (≤ 40 mph)

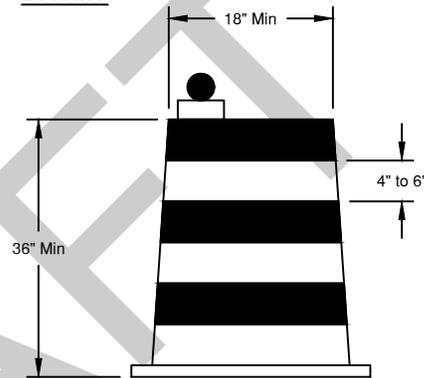


Night and/or Freeway High Speed Roadways (> 45 mph)

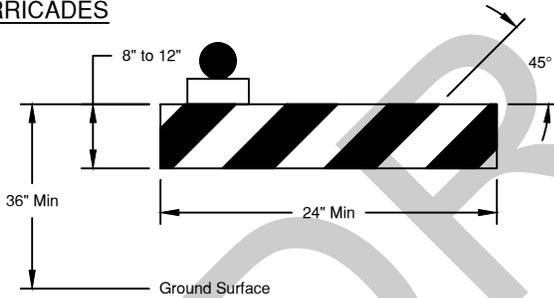
**VERTICAL PANELS**



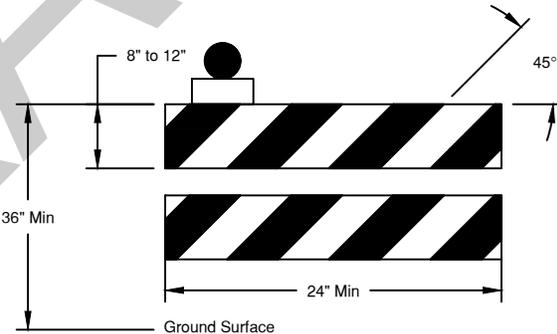
**DRUMS**



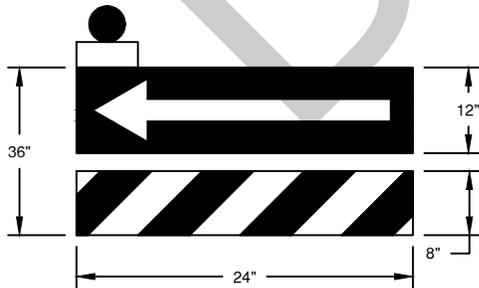
**BARRICADES**



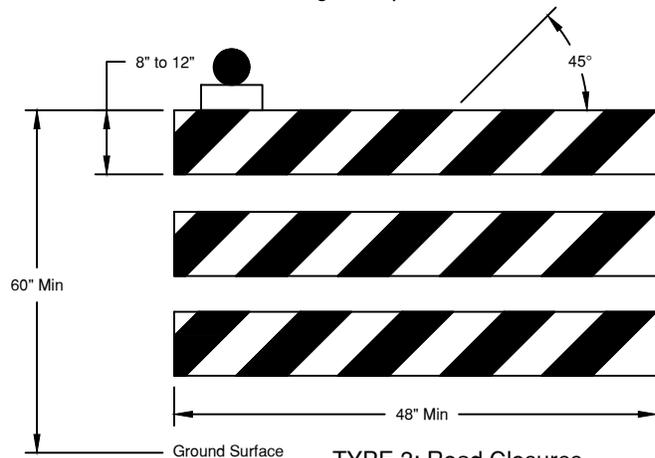
TYPE 1: Low Speed Roads



TYPE 2: Higher Speed Roads



Direction Indicator



TYPE 3: Road Closures

**NOTE:**  
 THESE EXHIBITS ARE FOR GENERAL INFORMATION ONLY.  
 ALL TRAFFIC CONTROL COMPONENTS SHALL BE DESIGNED  
 ACCORDING TO THE LATEST EDITION OF THE MUTCD.



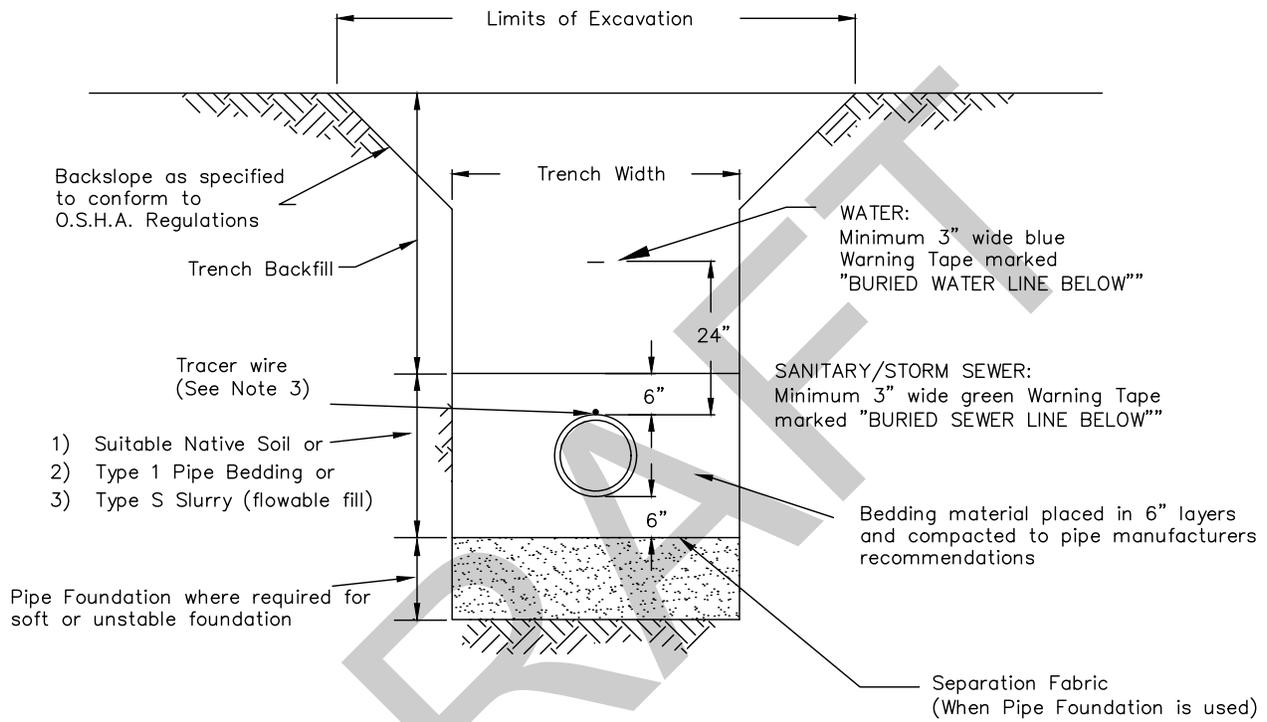
*City of Gillette*  
 ENGINEERING DIVISION  
 P.O. BOX 3003, 201 E. 5TH STREET  
 GILLETTE, WYOMING 82717  
 PHONE: (307) 686-5311

**CHANNELIZING DEVICES**

DRAWN BY: KEB

APPROVED BY: CITY ENGINEER HV/KDS

DATE:  
 JULY 2012  
 DRAWING NO.  
 01510-15



**NOTES:**

1. Comply with Specification Section 02220 and 02225 for trench excavation & backfill.
2. Tracer wire and/or warning tape will be provided as shown on the plans and/or where applicable.
3. Tracer wire is required on all water lines and may be required on sanitary and storm sewer lines on a case by case basis or as specified on the plans. Wire type shall be as specified in Section 02665.



*City Of Gillette*

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**WATER/SANITARY SEWER/STORM SEWER  
TRENCH & BEDDING**

DRAWN BY: KEB

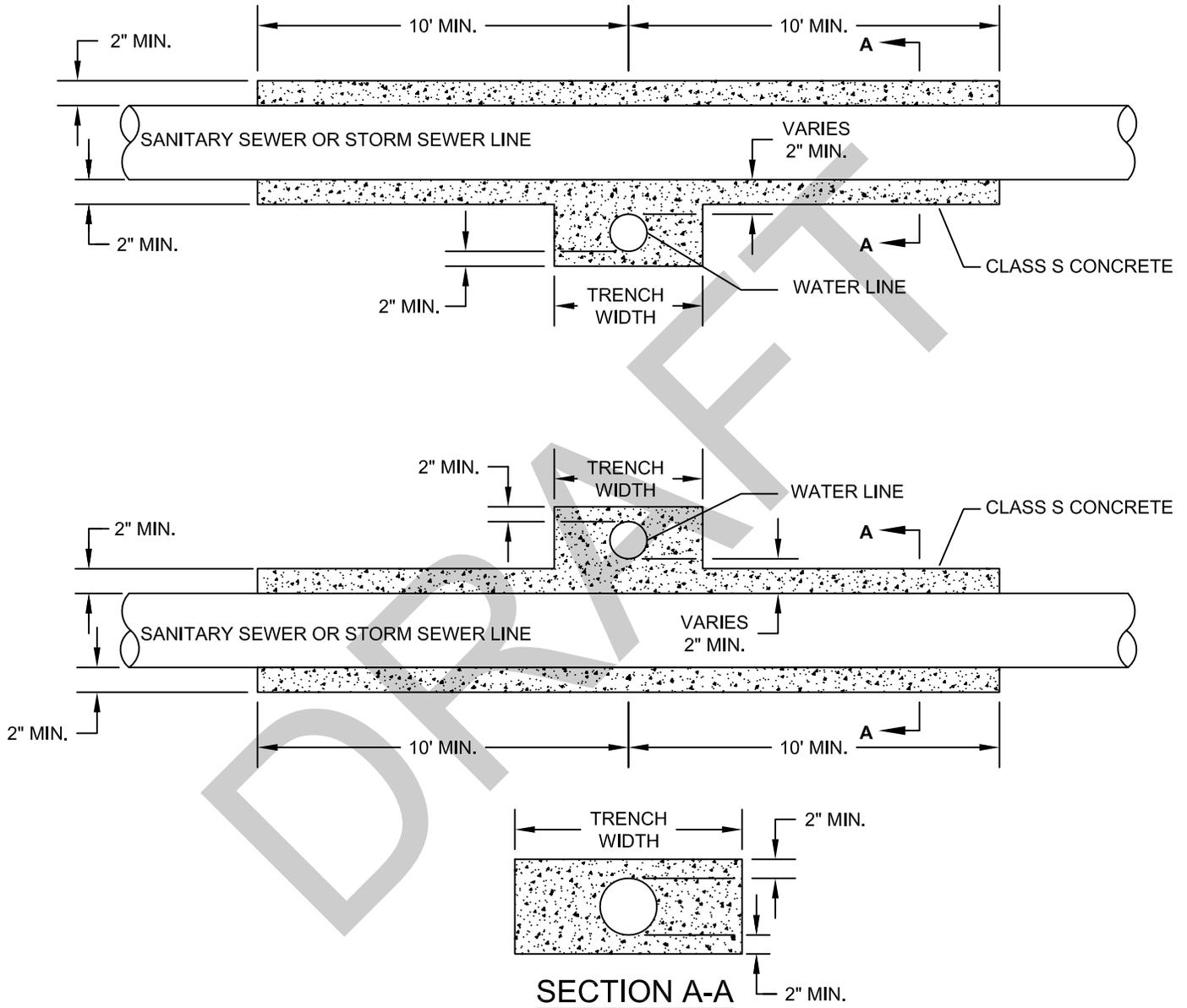
APPROVED BY: CITY ENGINEER HV/KDS

DATE:

MAY 2017

DRAWING NO.

02220-01



*City Of Gillette*

ENGINEERING DIVISION  
 P.O. BOX 3003, 201 E. 5TH STREET  
 GILLETTE, WYOMING 82717  
 PHONE: (307) 686-5311

## CEMENT TREATED FILL PIPE SADDLE

DATE:

JANUARY 2009

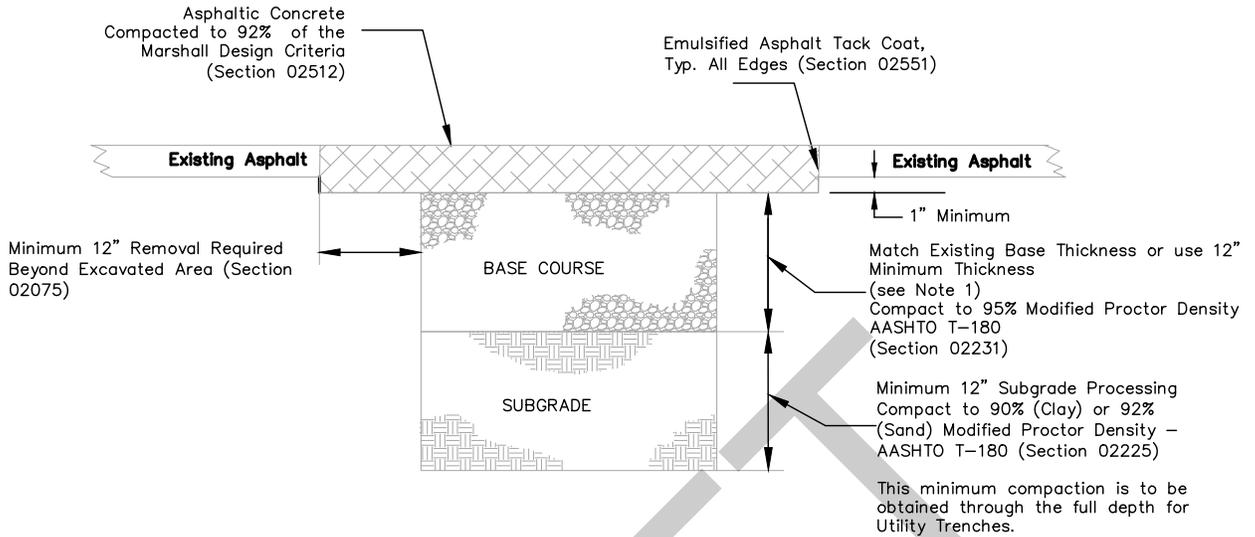
DRAWING NO.

02225-01

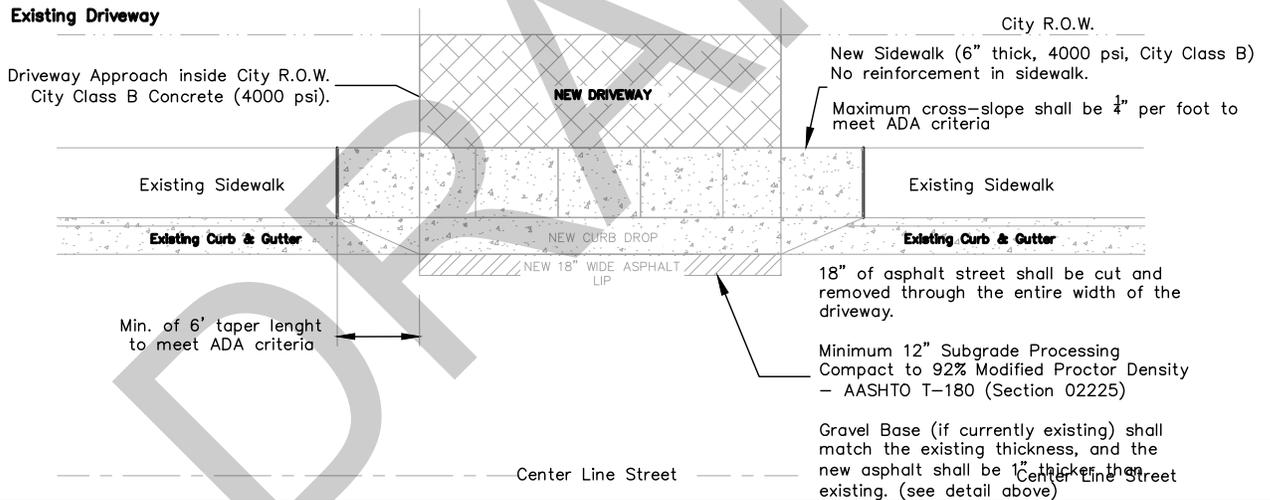
DRAWN BY: SLP

APPROVED BY: CITY ENGINEER DLH/KDS

PAVEMENT REPAIR AND TRENCH BACKFILL DETAIL



DRIVEWAY/CURB & GUTTER REPLACEMENT DETAIL



NOTES:

1. For pavement failure areas a minimum of 12" of base course shall be used. Alternatively, in areas where no failures have occurred (i.e. "Cut Permit" patch over new water or sewer service), the same depth of base course as existing can be used.
2. All repair areas shall be cut in a square or rectangular shape. Irregular shapes are not allowed.
3. All Section numbers referenced correspond with the current City of Gillette Standard Construction Specifications.
4. Compaction requirements on concrete street repairs shall be the same as asphalt streets.
5. When the saw cut on a concrete street repair is within 10' of the joint, the concrete shall be removed to the joint.
6. All joints on concrete street repairs shall be resealed.
7. The thickness of a Portland Cement Concrete Pavement (PCCP) patch shall match the existing PCCP pavement thickness.



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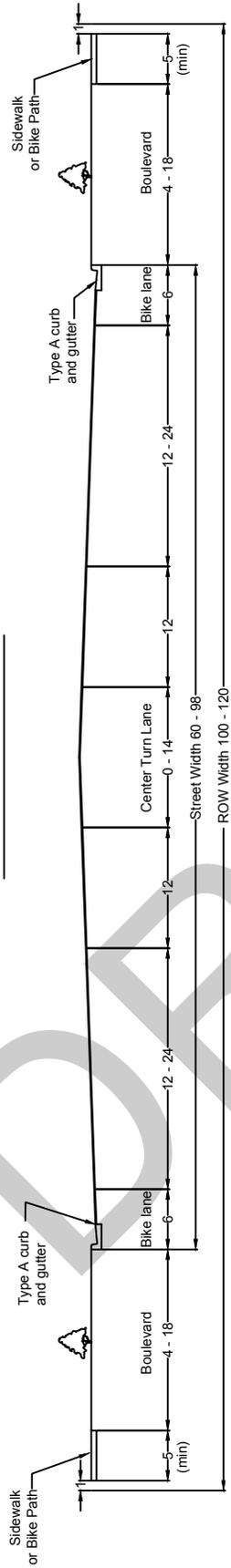
TYPICAL STREET REPAIR

DRAWN BY: KEB \_\_\_\_\_

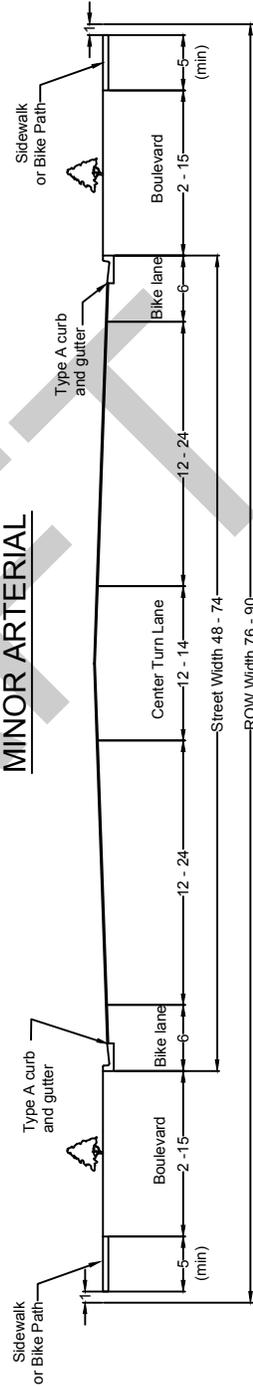
APPROVED BY: CITY ENGINEER HV/KDS \_\_\_\_\_

DATE:  
 MAY 2017  
 DRAWING NO.  
**02511-01**

**MAJOR ARTERIAL**



**MINOR ARTERIAL**



**TYPICAL ARTERIAL STREET  
CROSS SECTION**



*City of Gillette*

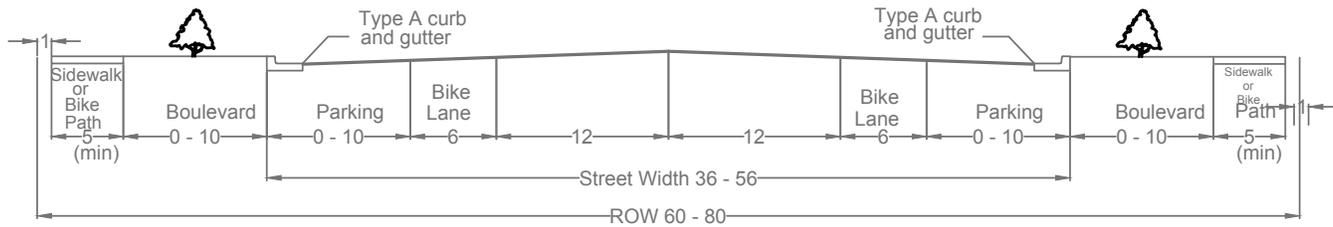
ENGINEERING DIVISION  
P.O. BOX 3003, 201 E. 5TH STREET  
GILLETTE, WYOMING 82717  
PHONE: (307) 686-5311

DRAWN BY:           B.A.H.          

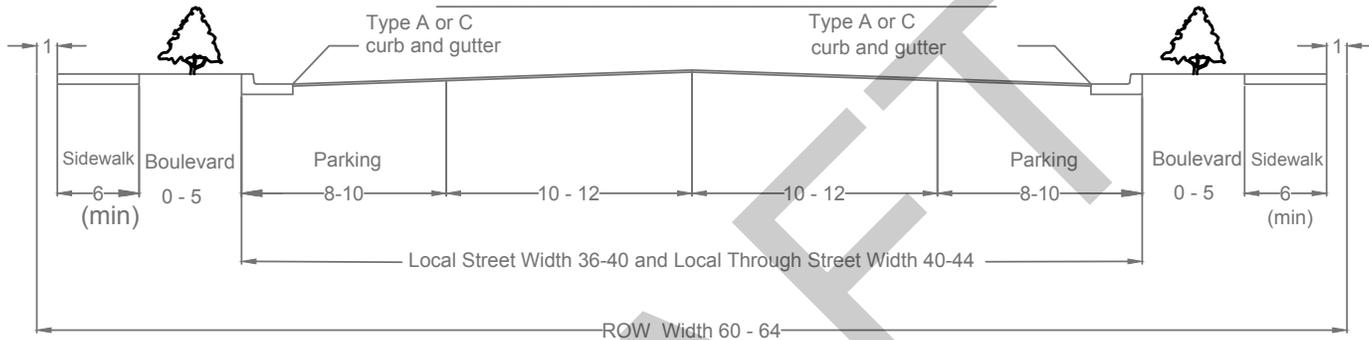
APPROVED BY: CITY ENGINEER           DLH/KDS          

DATE:	JANUARY 2009
DRAWING NO.	02512-01

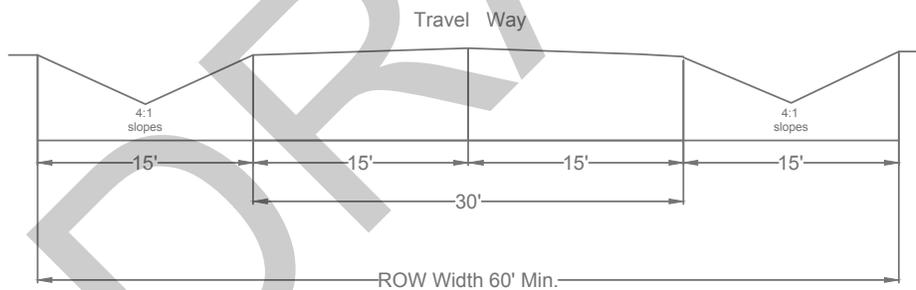
## COLLECTOR



## LOCAL OR LOCAL THROUGH



## Local Residential Street R-S and R-R Zones\*



\*Local street option where streets have no, or limited, continuity and serving properties in an R-S and R-R Zone.

- NOTES: 1. Sidewalks shall be min. 5' in commercial/industrial areas  
 2. Sidewalks shall be min. 4' in residential areas  
 3. C & G shall be Type A in commercial/industrial areas  
 4. C & G shall be Type A or C in residential areas



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## TYPICAL COLLECTOR AND LOCAL STREET SECTION

DRAWN BY:           KEB          

APPROVED BY: CITY ENGINEER           HV/KDS          

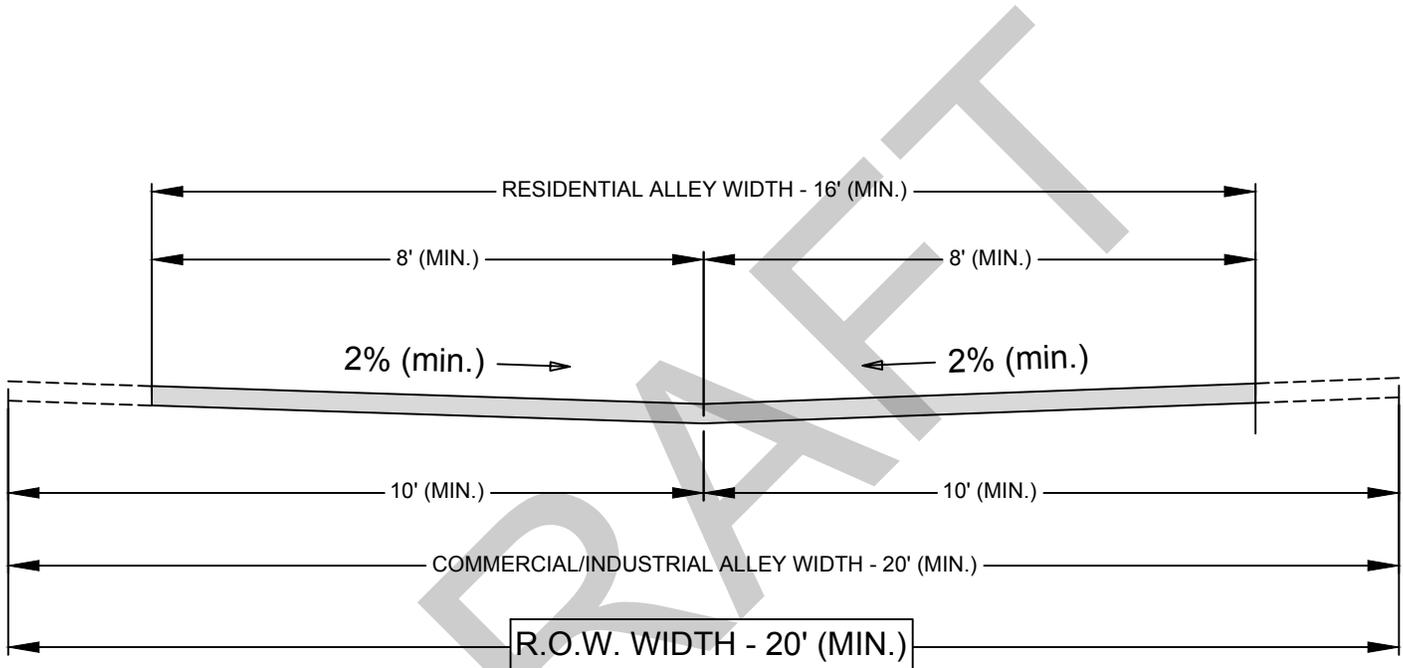
DATE:

MAY 2017

DRAWING NO.

**02512-02**

# INVERTED CROWN-STYLE ALLEY RESIDENTIAL & COMMERCIAL / INDUSTRIAL



**NOTE:**

1. The invert location may be offset from the centerline if conditions warrant and with approval by the City Engineer.



*City Of Gillette*

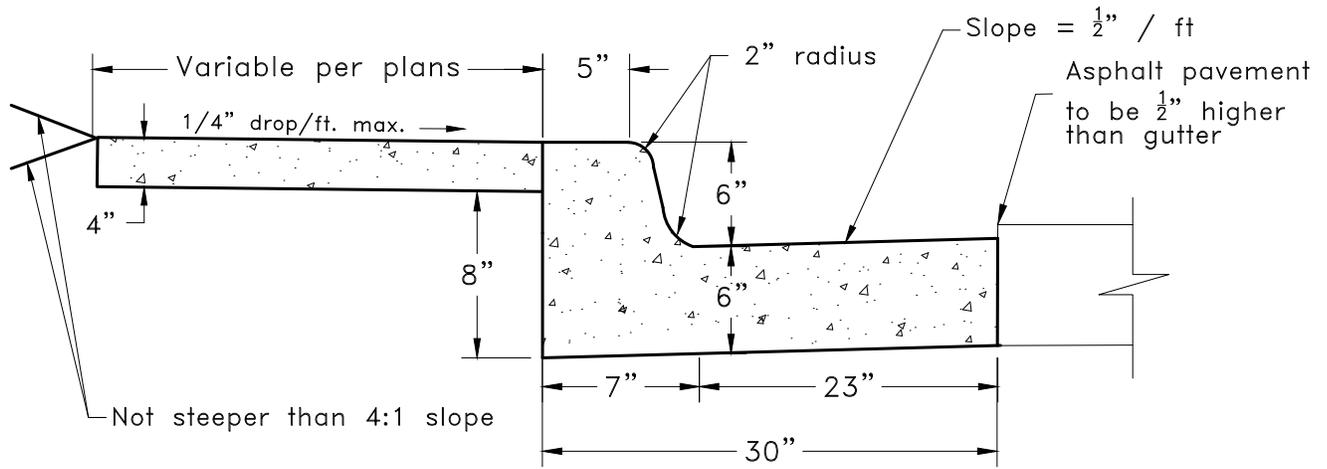
ENGINEERING DIVISION  
P.O. BOX 3003, 201 E. 5TH STREET  
GILLETTE, WYOMING 82717  
PHONE: (307) 686-5311

## TYPICAL ALLEY SECTION

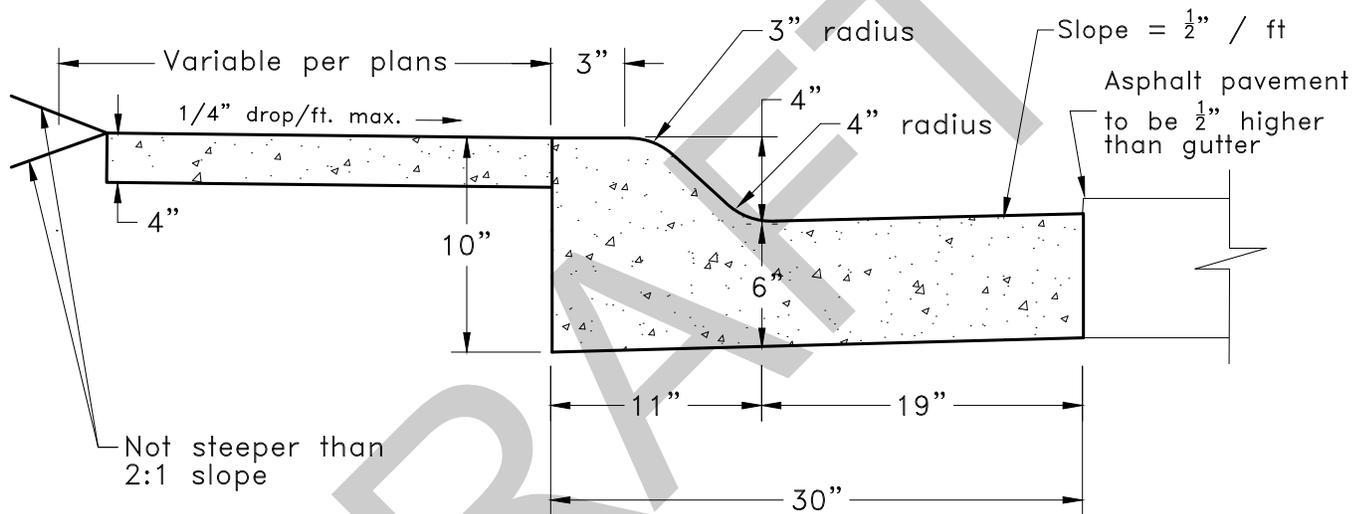
DRAWN BY:           CJS          

APPROVED BY: CITY ENGINEER           TLW          

DATE:
SEPTEMBER 2011
DRAWING NO.
02512-03



**TYPE "A" HIGH BACK CURB & GUTTER WITH SIDEWALK**



**TYPE "C" ROLLOVER CURB & GUTTER WITH SIDEWALK**

**NOTES:**

1. Subgrade compaction shall conform to SECTION 02528.
2. 3/4" expansion joint material shall be placed at P.C., P.T, curb returns and straight run at 150' maximum.
3. Jointing shall comply with SECTION 02528 and 03251.
4. No curb and gutter shall be placed without a final form or stringline inspection by the ENGINEER.
5. Curb and gutter shall be Class B concrete used unless otherwise specified.
6. Contraction joints shall be constructed by sawing or scoring. When scoring, a tool shall be used which will leave corners rounded and destroy aggregate interlock for specified minimum depth.
7. Detached sidewalk must be installed within 1' of the property boundary.
8. The sidewalk shall be 6" in depth through all driveway areas.



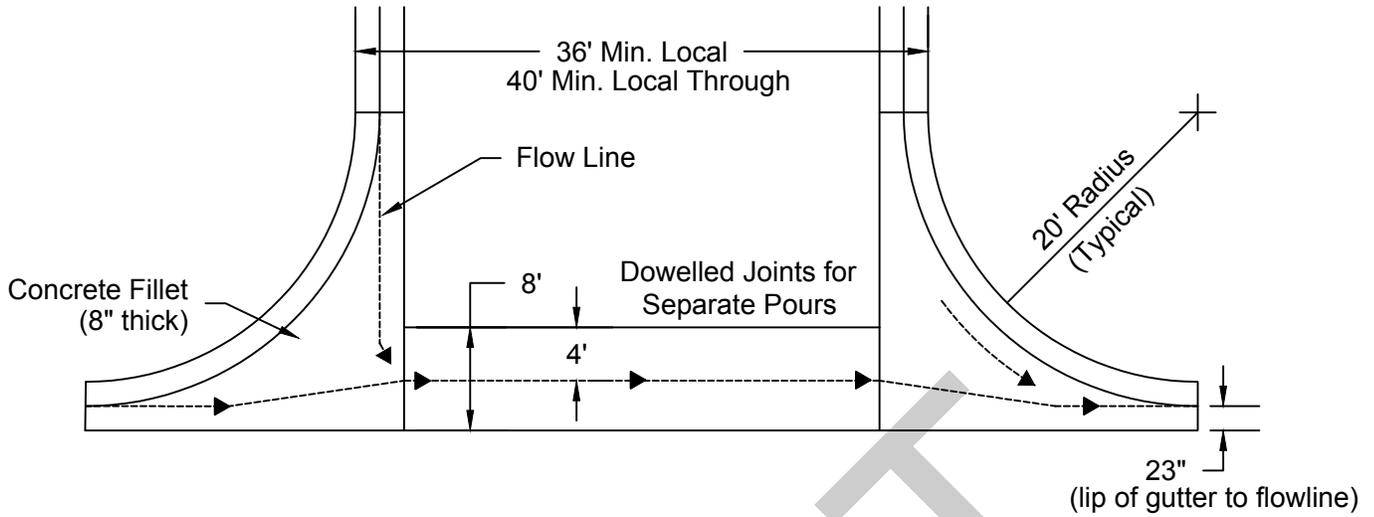
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 PHONE: (307) 686-5311

**TYPICAL TYPE "A" AND TYPE "C"  
 CURB & GUTTER WITH ATTACHED SIDEWALK**

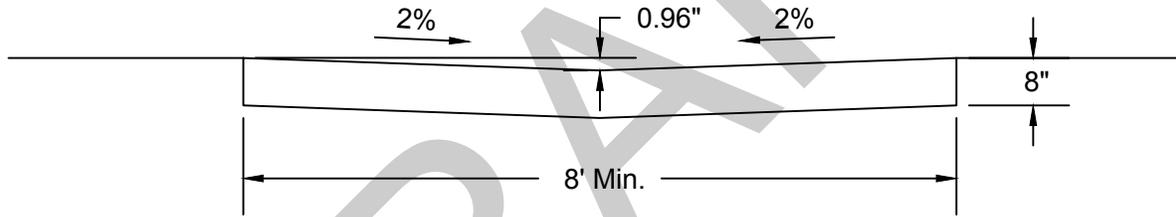
DRAWN BY: CJS

APPROVED BY: CITY ENGINEER HV/KDS

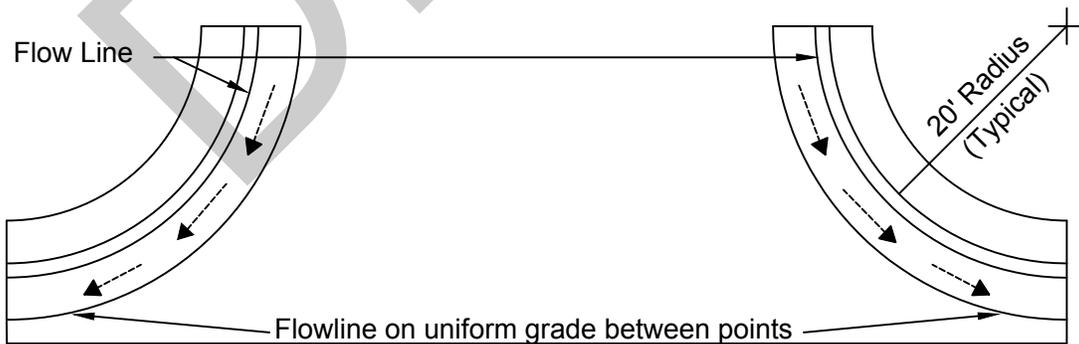
DATE: OCTOBER 2012  
 DRAWING NO. 02528-01



PLAN OF CORNER WITH VALLEY GUTTER



VALLEY GUTTER DETAIL



PLAN OF CORNER WITHOUT VALLEY GUTTER



City Of Gillette

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STREET CORNER WITH / WITHOUT  
VALLEY GUTTER

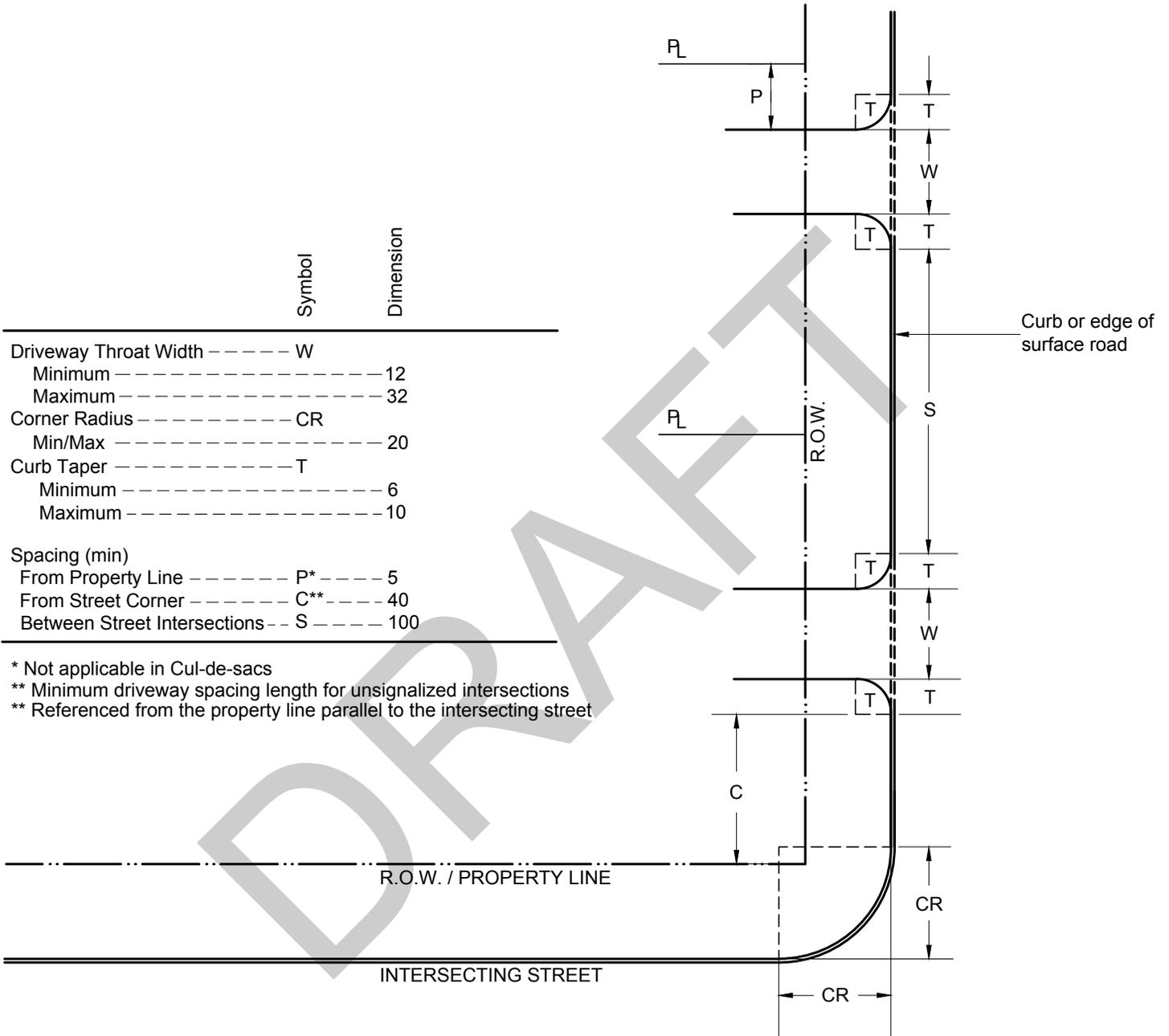
DRAWN BY: CJS

APPROVED BY: CITY ENGINEER HV/KDS

DATE:	
	MARCH 2012
DRAWING NO.	
	02530-01

Symbol	Dimension
Driveway Throat Width ----- W	
Minimum ----- 12	
Maximum ----- 32	
Corner Radius ----- CR	
Min/Max ----- 20	
Curb Taper ----- T	
Minimum ----- 6	
Maximum ----- 10	
Spacing (min)	
From Property Line ----- P* ----- 5	
From Street Corner ----- C** ----- 40	
Between Street Intersections -- S ----- 100	

- \* Not applicable in Cul-de-sacs
- \*\* Minimum driveway spacing length for unsignalized intersections
- \*\* Referenced from the property line parallel to the intersecting street



**NOTES:**

1. Driveway spacing length from signalized intersections shall be individually determined taking into consideration signal cycle length, traffic volumes, lane tapers and vehicle stacking lengths.
2. The City Engineer may require larger driveway spacing from what is listed above if the street geometrics and traffic volumes warrant larger spacing.



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## RESIDENTIAL ACCESS CONTROL AND OFFSETS

DATE:	
	OCTOBER 2012
DRAWING NO.	

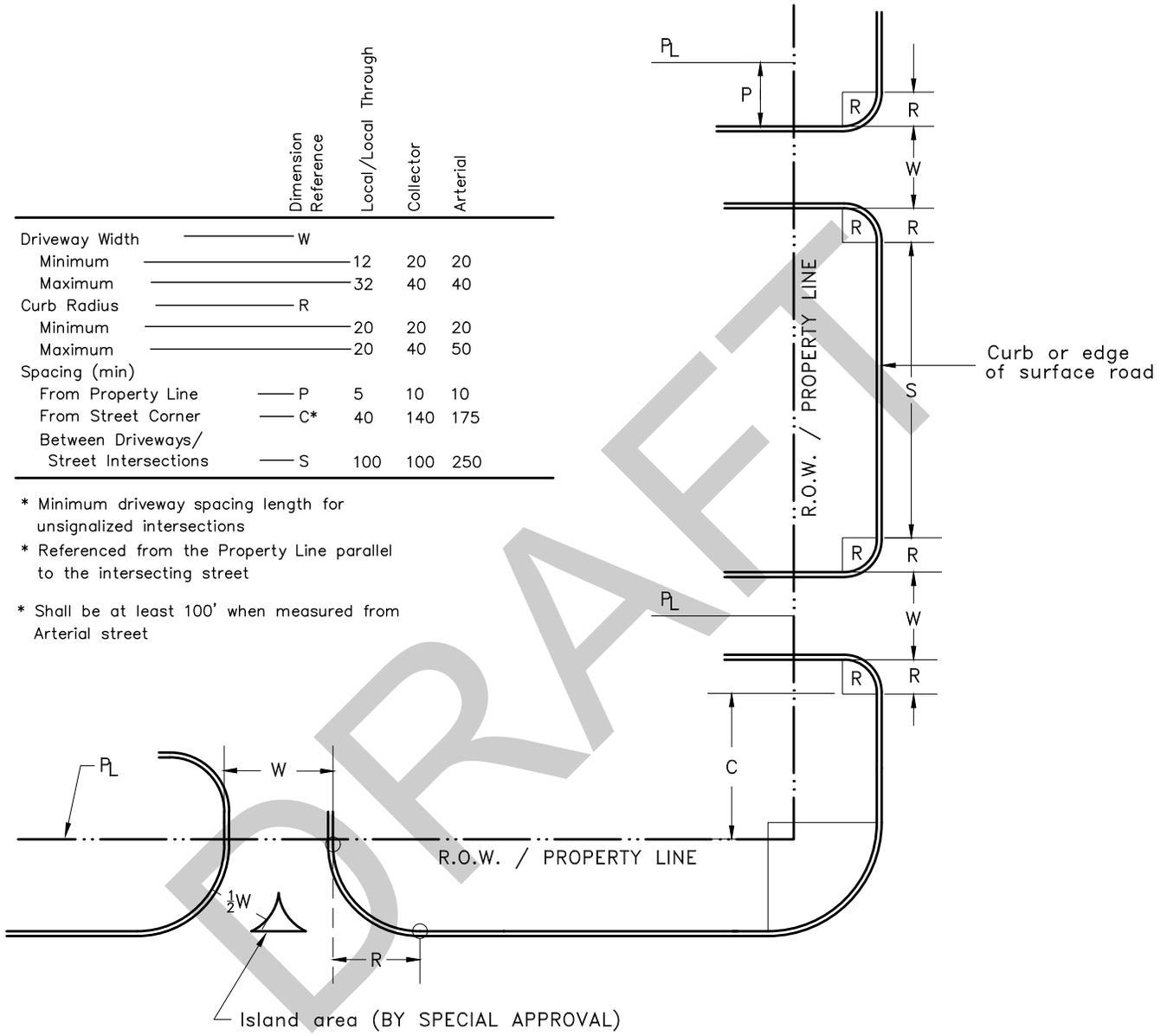
DRAWN BY: CJS

APPROVED BY: CITY ENGINEER HV/KDS

02530-02

	Dimension Reference	Local/Local Through	Collector	Arterial
Driveway Width	W			
Minimum		12	20	20
Maximum		32	40	40
Curb Radius	R			
Minimum		20	20	20
Maximum		20	40	50
Spacing (min)				
From Property Line	P	5	10	10
From Street Corner	C*	40	140	175
Between Driveways/ Street Intersections	S	100	100	250

- \* Minimum driveway spacing length for unsignalized intersections
- \* Referenced from the Property Line parallel to the intersecting street
- \* Shall be at least 100' when measured from Arterial street



**NOTES:**

1. Driveway spacing length from signalized intersections shall be individually determined taking into consideration signal cycle length, traffic volumes, lane tapers and vehicle stacking lengths.
2. The City Engineer may require larger distances from street corners or driveway spacing from what is listed above if the street geometrics, roadway classifications, or traffic volumes warrant larger spacing.



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**COMMERCIAL & INDUSTRIAL  
ACCESS CONTROL**

DRAWN BY: KEB

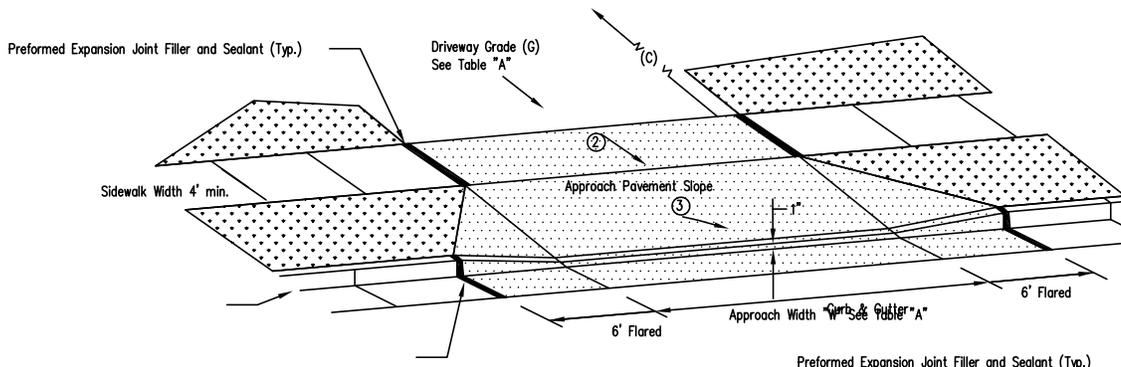
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DATE:

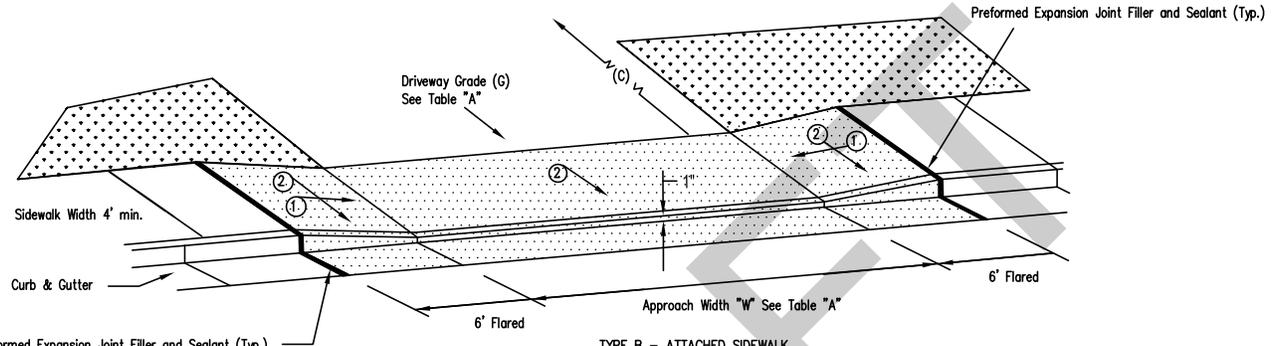
MAY 2017

DRAWING NO.

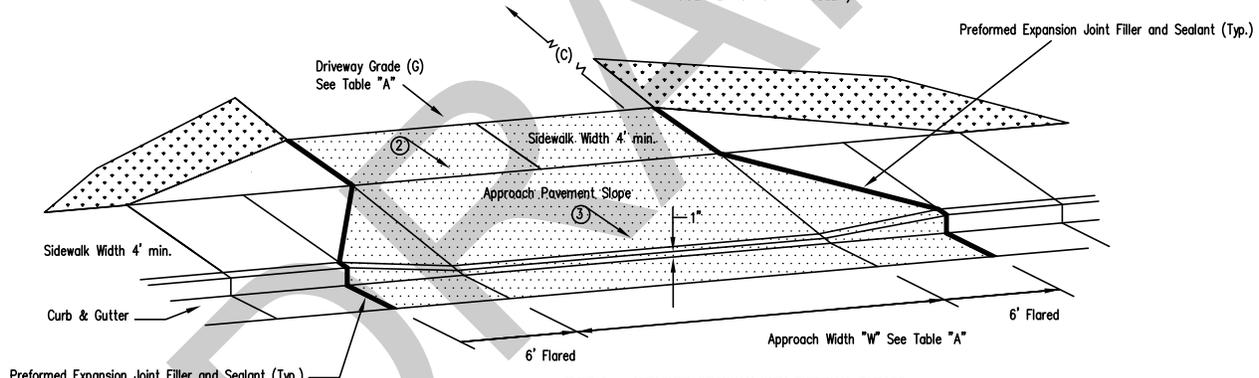
**02530-03**



**TYPE A - DETACHED SIDEWALK**  
(MOST DESIRABLE TREATMENT)



**TYPE B - ATTACHED SIDEWALK**  
(CONSIDER USE ONLY WHEN DRAINAGE BEHIND SIDEWALK IS NOT A PROBLEM)



**TYPE C - ATTACHED SIDEWALK WITH EXTERNAL BYPASS**  
(USE FOR SIDEWALK ADJACENT TO CURB WHERE RIGHT-OF-WAY PERMITS CONSTRUCTION)

**GENERAL NOTES:**

- A. All required offstreet parking areas shall be paved. Overflow parking may be gravel, base, crushed asphalt or concrete. All access shall be paved through the ROW, at minimum.
- B. Refer to the standard specifications for pavement type and thickness.
- C. Where site or other conditions warrant, the City Engineer may require or allow an alternate curb cut design.
- D. Residential driveways are generally not allowed on collector or arterial streets.
- E. The maximum cross slope for any sidewalk, including through driveways or approach pavement shall be  $\frac{1}{4}$  inch/ft.

**GENERAL SLOPE REQUIREMENTS:**

- ① RAMP SLOPE: Do not exceed a 1V:12H (8.33%) ramp slope
- ② CROSS SLOPE: Slope sidewalk towards street. Do not exceed 1V:48H (2%)
- ③ APPROACH PAVEMENT SLOPE: The approach pavement slope may exceed the slope required for a ramp when it is not used as a combined approach and wheelchair ramp. A by-pass must be provided around approach pavement slopes exceeding 1V:48H (2%) so pedestrians don't encounter steeper cross slopes.

Street Type	Width of Throat (W)	Maximum Driveway Grade (G)		
		Desirable	Maximum	Control Dist. (C)
Local and Local Through	12' - 32'	6 %	13 %	20' min
Collector	Curb cuts by special approval only	3 %	4 %	50'
Arterial		1 %	4 %	50'



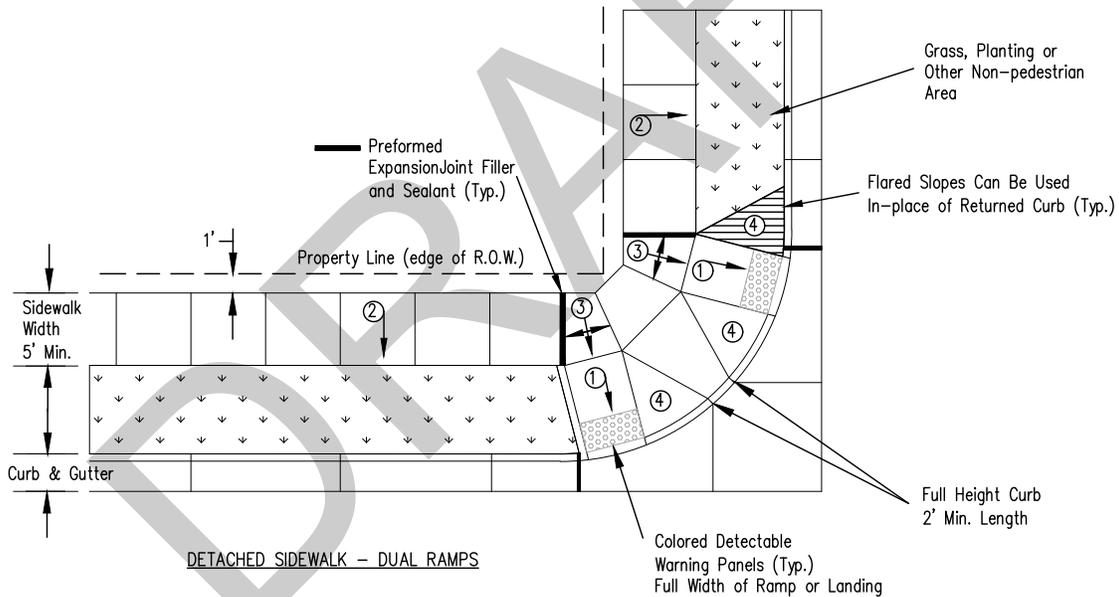
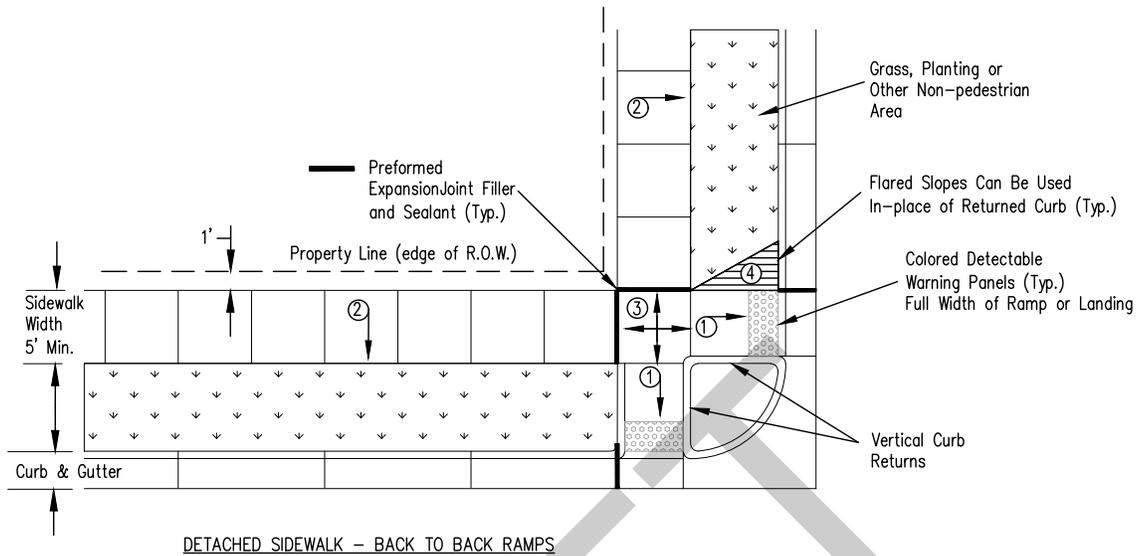
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GILLETTE, WYOMING 82717  
PHONE: (307) 686-5311

# STANDARD RESIDENTIAL DRIVEWAY DETAIL

DRAWN BY: KEB

APPROVED BY: CITY ENGINEER HV/KDS

DATE:  
MAY 2017  
DRAWING NO.  
**02530-04**



**GENERAL NOTES:**

- A. 5 foot minimum sidewalk width adjacent to Collector and Arterial Streets.
- B. 4 Foot minimum for existing infrastructure where it is not feasible to construct 5 foot width. Use 5 foot x 5 foot minimum passing zones every 200 foot maximum.
- C. Provide 1V:48H (2%) cross slope for sidewalks and landings for drainage. Slope towards curb and gutter unless otherwise shown.
- D. Provide colored detectable warning panels at all curb ramp locations.

**GENERAL REQUIREMENTS:**

- 1. RAMP SLOPE: Do not exceed a 1V:12H (33%) ramp slope.
- 2. CROSS SLOPE: Slope sidewalk towards street. Do not exceed 1V:48H (2%).
- 3. LANDING SLOPE: Do not exceed 1V:48H (2%) in any direction.
- 4. RAMP FLARES: Do not exceed 1V:10H (10%) flared ends.



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**CURB RAMP  
ARTERIAL AND COLLECTOR STREETS (Detached Sidewalk)**

DRAWN BY: KEB

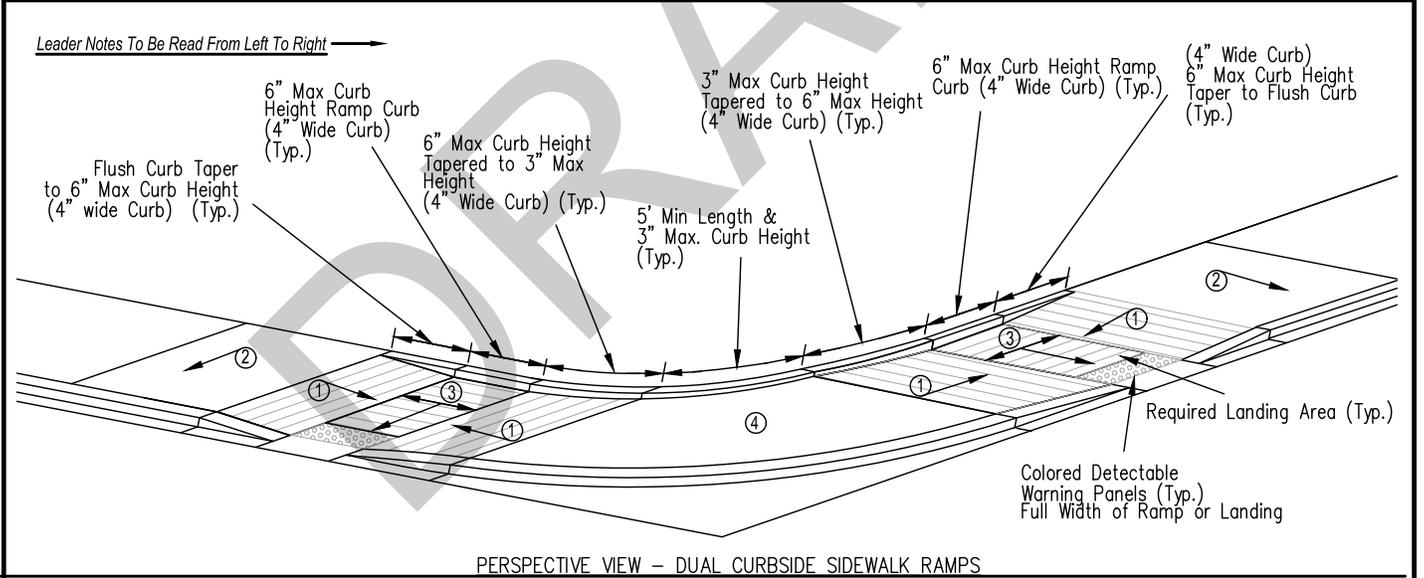
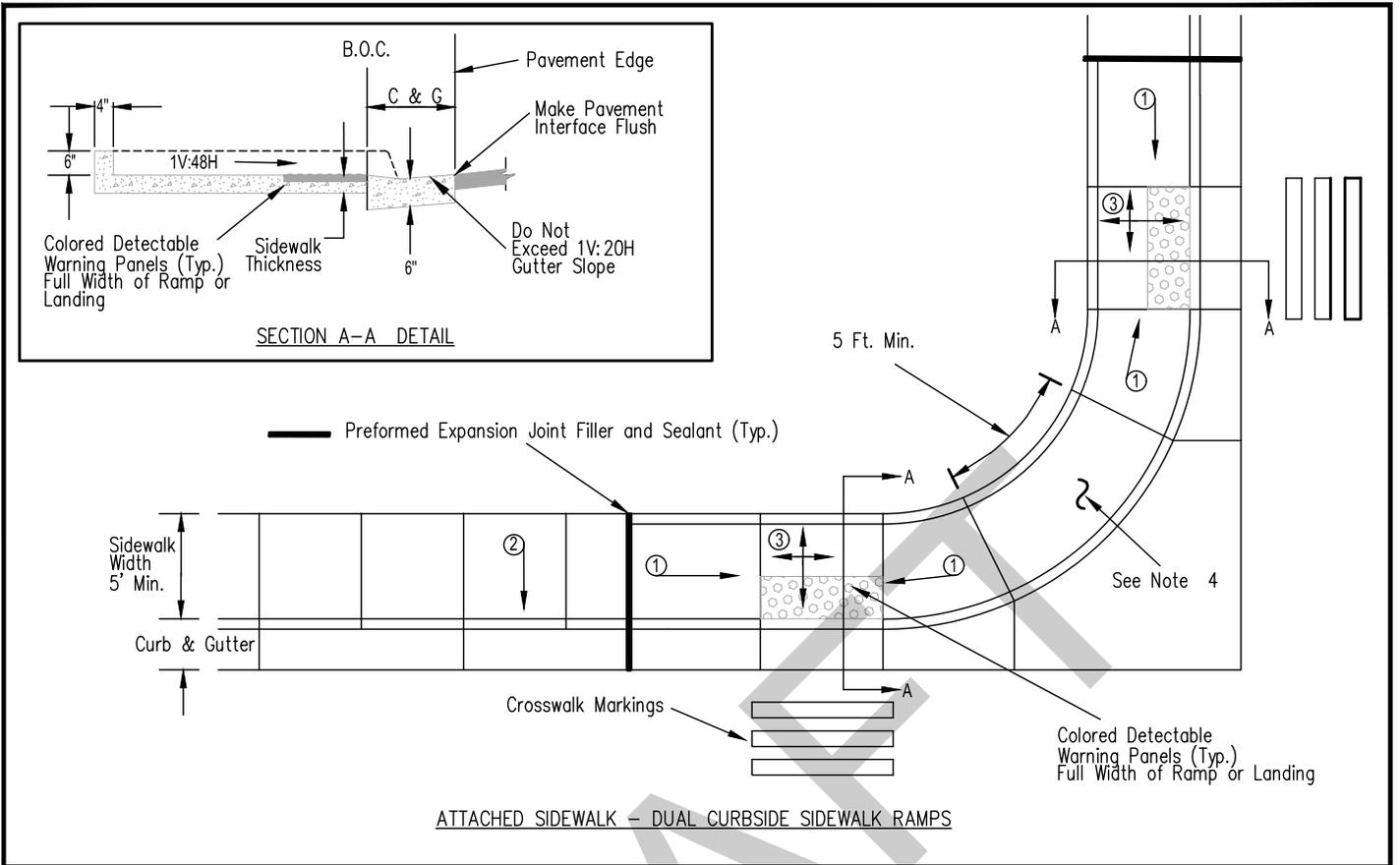
APPROVED BY: CITY ENGINEER HV/KDS

DATE:

MAY 2017

DRAWING NO.

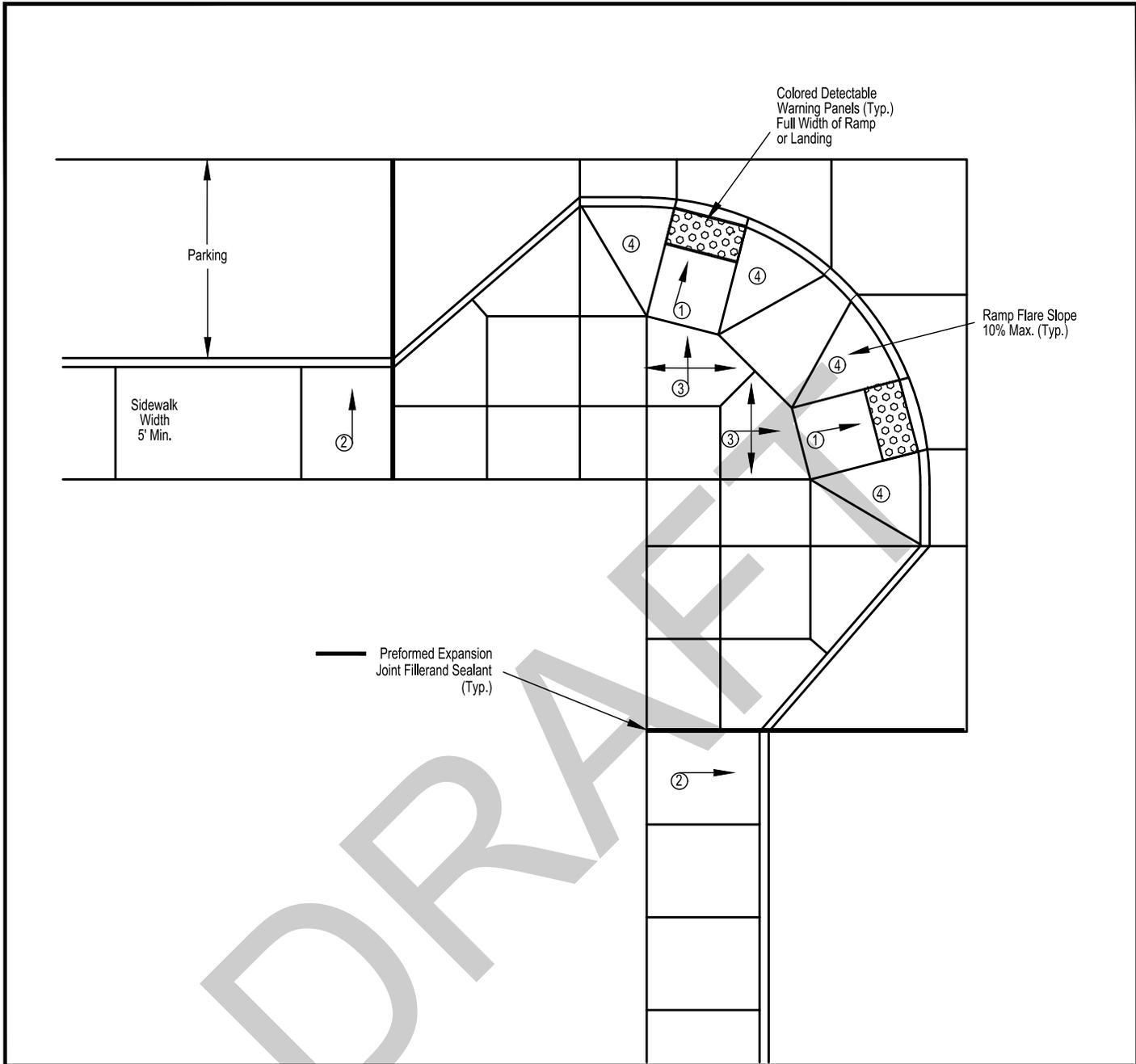
02530-05



**GENERAL SLOPE REQUIREMENTS:**

- 1 **RAMP SLOPE:** Do not exceed a 1V:12H (8.33%) ramp slope
- 2 **CROSS SLOPE:** Slope sidewalk towards street. Do not exceed 1V:48H (2%)
- 3 **LANDING SLOPE:** Do not exceed 1V:48H (2%) in any direction
- 4 **When Necessary Provide 3 Inch High Landing Above Flow Line Between Ramps To Shorten Length And Bring Ramps Closer To Intersection. Provide Rear Curb To Contain High Flows. Joint Spacing Of Radius Sidewalk Determined By Radius Length**

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	<b>ARTERIAL AND COLLECTOR STREETS (Attached Sidewalk)</b>		MAY 2017	
	DRAWN BY: <u>KEB</u>		APPROVED BY: CITY ENGINEER <u>HV/KDS</u>	DRAWING NO.
				<b>02530-06A</b>



BULB INTERSECTION

GENERAL SLOPE REQUIREMENTS:

- ① RAMP SLOPE: Do not exceed a 1V:12H (8.33%) ramp slope
- ② CROSS SLOPE: Slope sidewalk towards street.  
Do not exceed 1V:48H (2%)
- ③ LANDING SLOPE: Do not exceed 1V:48H (2%) in any direction
- ④ RAMP FLARES: Do Not Exceed 1V:10H (10%) Flared Slope

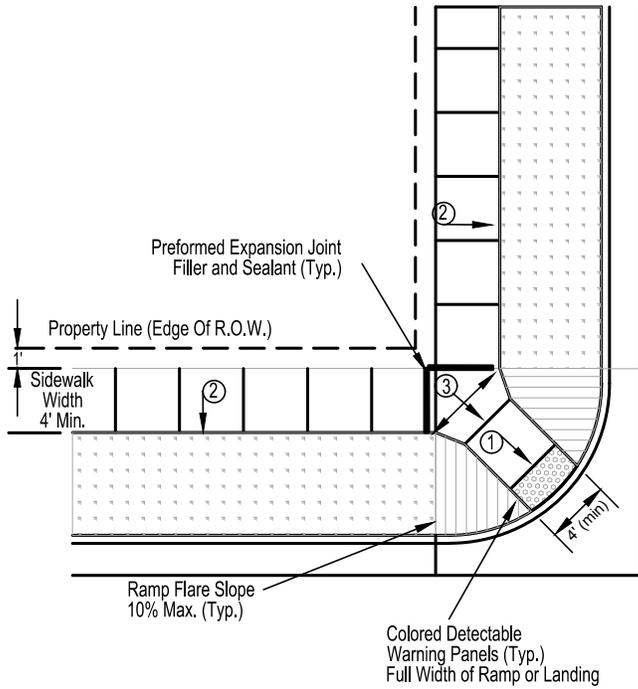


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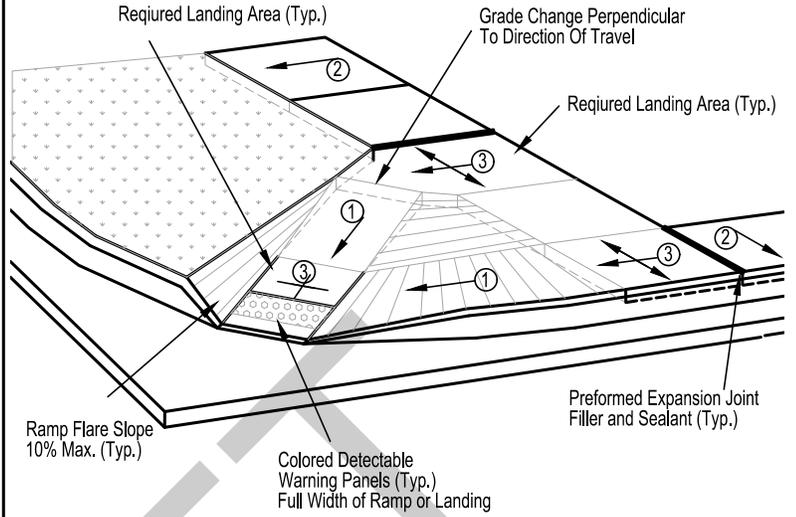
**CURB RAMP**  
**ARTERIAL & COLLECTOR STREETS (Bulb Intersection)**

DRAWN BY: KEB      APPROVED BY: CITY ENGINEER HV/KDS

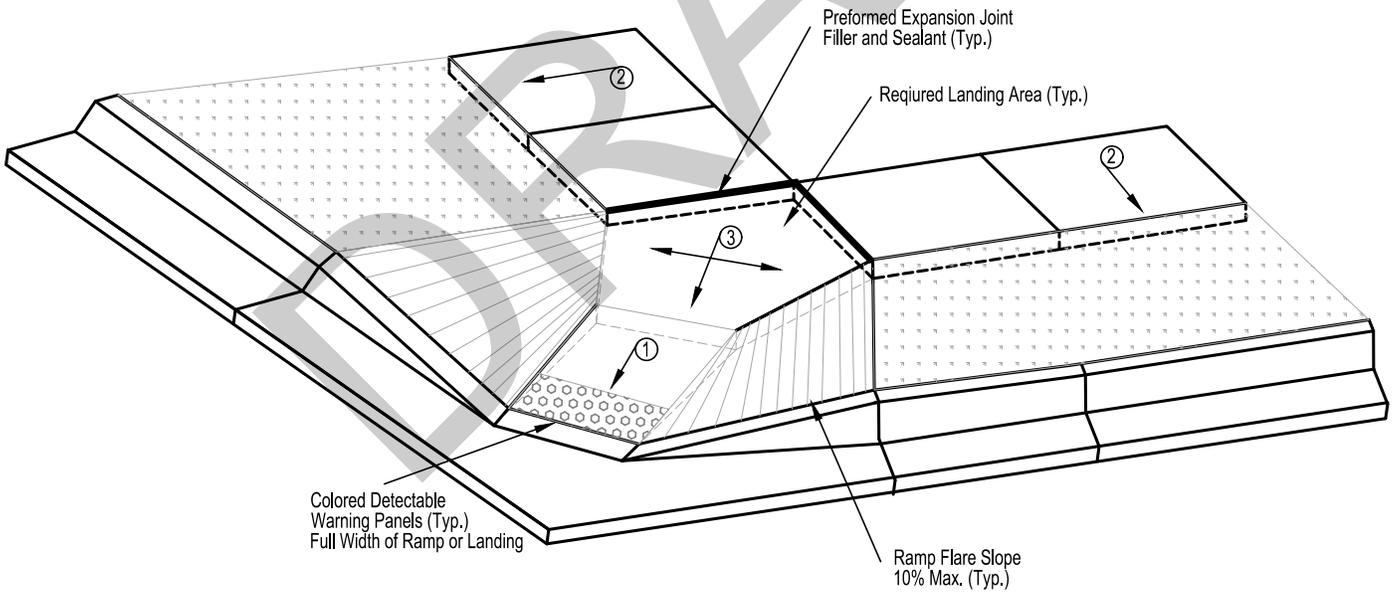
DATE:	
MAY 2017	
DRAWING NO.	
02530-06B	



PLAN VIEW - DIAGONAL CURB RAMP



PERSPECTIVE VIEW - BOULEVARD AND CURBSIDE COMBO SIDEWALK



PERSPECTIVE VIEW - DIAGONAL CURB RAMP

GENERAL SLOPE REQUIREMENTS:

- ① Ramp Slope: Do Not Exceed 1V:12H (8.33 %)
- ② Cross Slope: Do Not Exceed 1V:48H (2%)
- ③ Landing Slope: Do Not Exceed 1V:48H (2%) In Any Direction



*City Of Gillette*

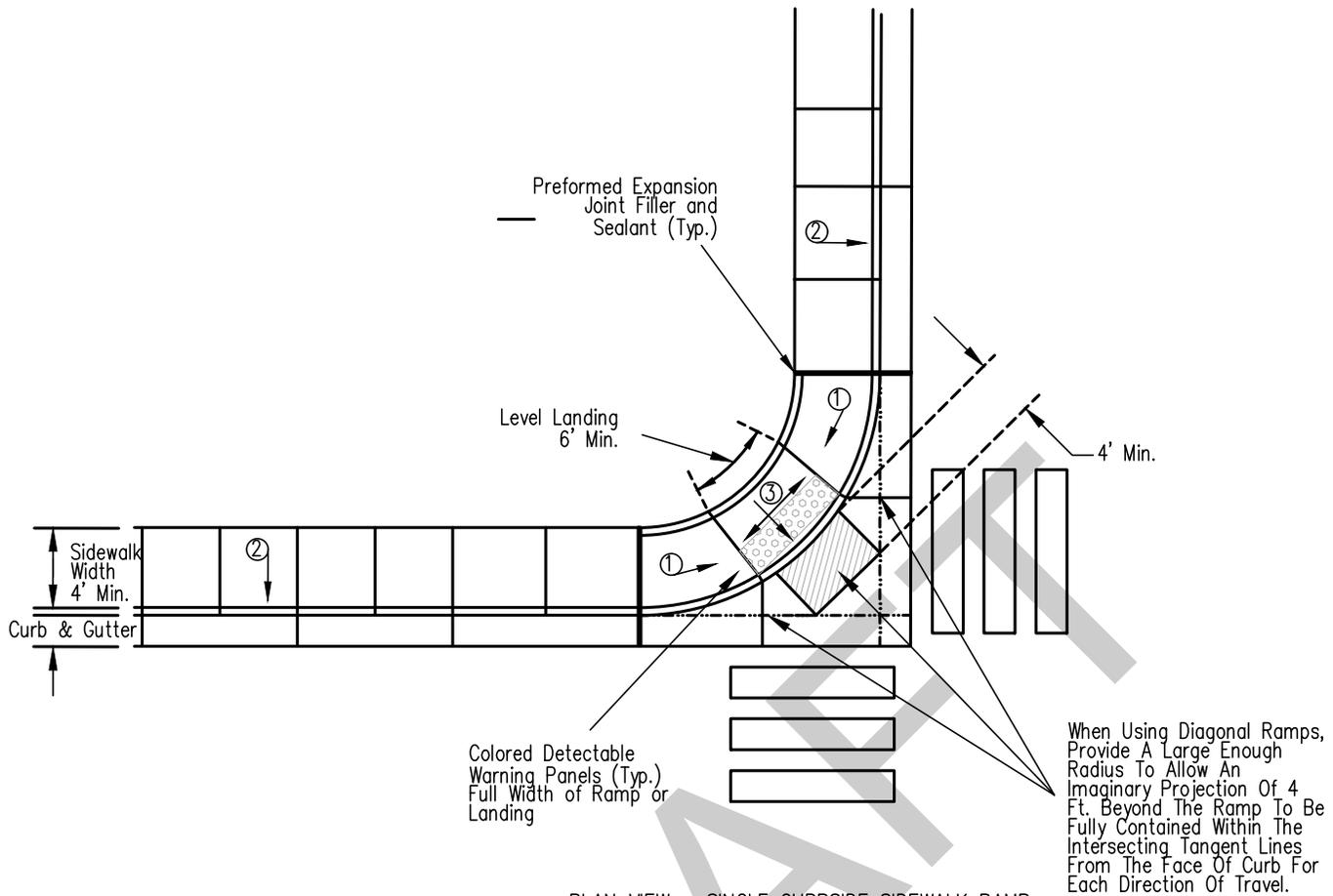
ENGINEERING DIVISION  
P.O. BOX 3003, 201 E. 5TH STREET  
GILLETTE, WYOMING 82717  
PHONE: (307) 686-5311

**CURB RAMP**  
**LOCAL/LOCAL THROUGH STREETS (Detached Sidewalk)**

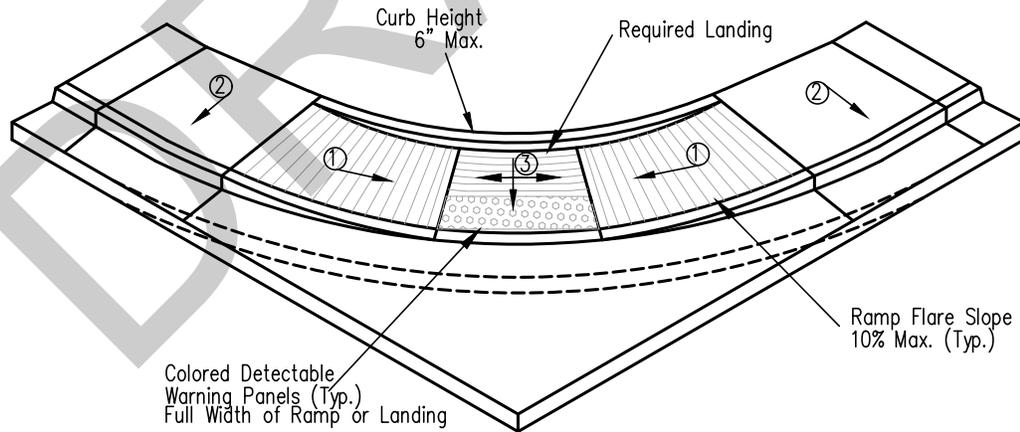
DRAWN BY: KEB

APPROVED BY: CITY ENGINEER HV/KDS

DATE: \_\_\_\_\_  
MAY 2017  
DRAWING NO. \_\_\_\_\_  
02530-07



PLAN VIEW – SINGLE CURBSIDE SIDEWALK RAMP



PERSPECTIVE VIEW – SINGLE CURBSIDE SIDEWALK RAMP

**GENERAL SLOPE REQUIREMENTS:**

- ① RAMP SLOPE: Do not exceed a 1V:12H (8.33%) ramp slope
- ② CROSS SLOPE: Slope sidewalk towards street  
Do not exceed 1V:48H (2%)
- ③ LANDING SLOPE: Do not exceed 1V:48H (2%) in any direction



*City Of Gillette*

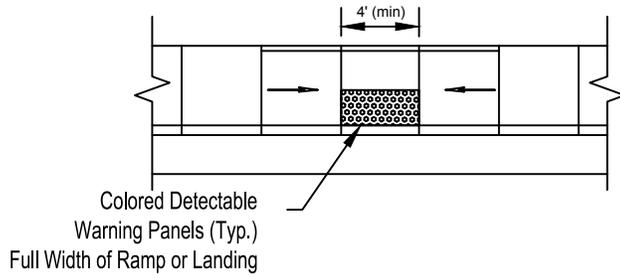
ENGINEERING DIVISION  
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GILLETTE, WYOMING 82717  
PHONE: (307) 686-5311

**CURB RAMP**  
**LOCAL/LOCAL THROUGH STREETS (Attached Sidewalk)**

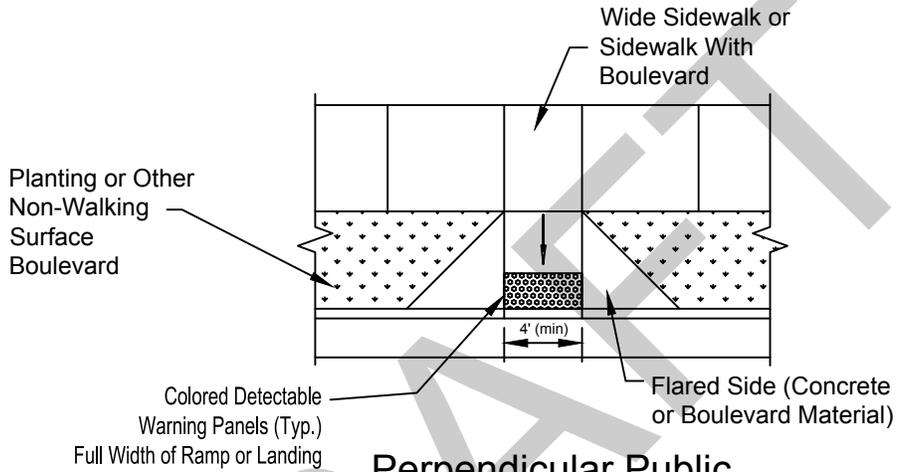
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APPROVED BY: CITY ENGINEER HV/KDS

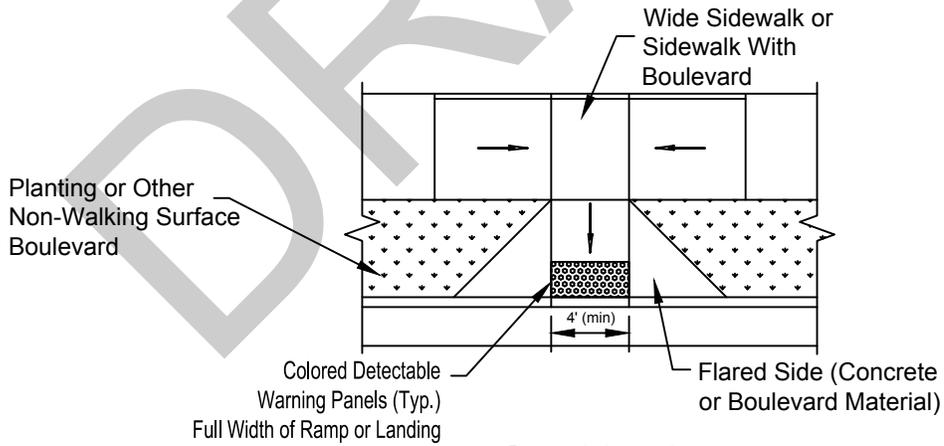
DATE: \_\_\_\_\_  
MAY 2017  
DRAWING NO. \_\_\_\_\_  
02530-08



**Parallel Public Sidewalk Curb Ramp**



**Perpendicular Public Sidewalk Curb Ramp**



**Combined Parallel/Perpendicular Public Sidewalk Curb Ramp**



*City Of Gillette*

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**CURB RAMP  
Parallel Sidewalk**

DATE:

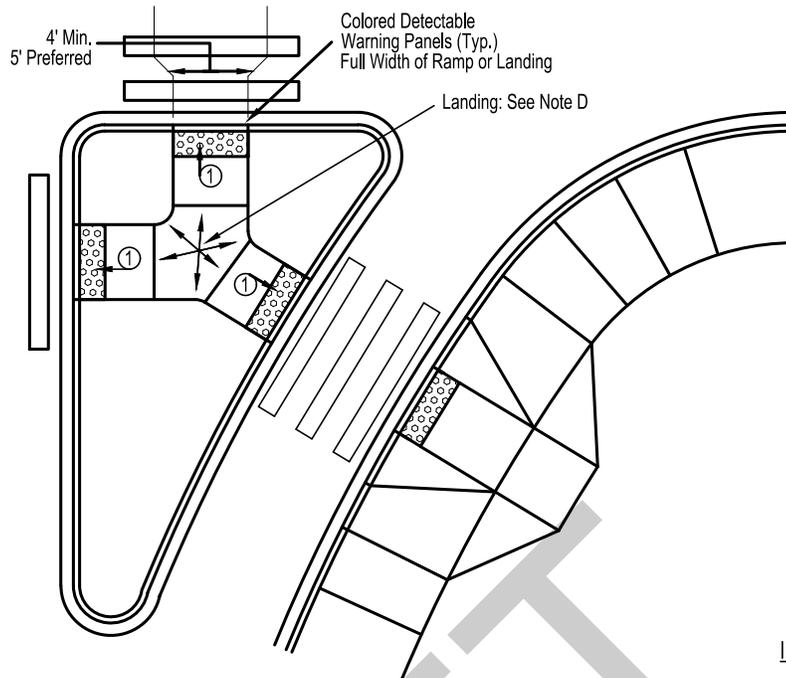
MAY 2017

DRAWING NO.

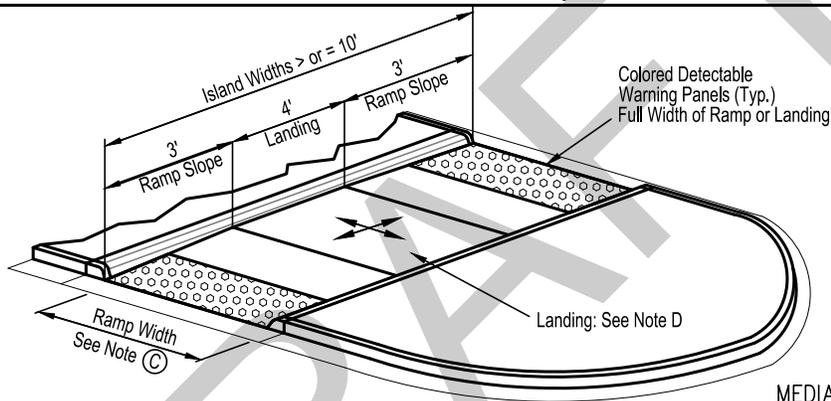
02530-09

DRAWN BY: KB

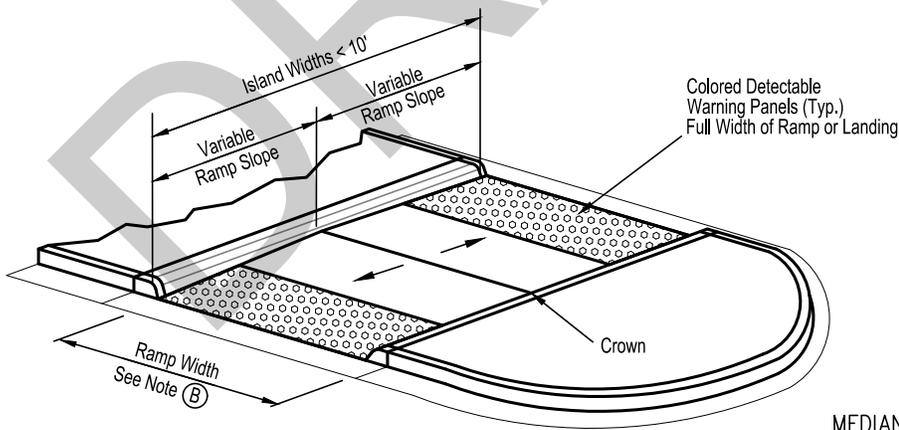
APPROVED BY: CITY ENGINEER HV/KDS



ISLAND CUT DETAIL



MEDIAN CUT DETAIL (10' OR WIDER)



MEDIAN CUT DETAIL (LESS THAN 10')

**GENERAL NOTES:**

- A. Provide Pedestrian Cuts Through Medians That Are Aligned For All Directions Of Travel
- B. For Median Cuts Less Than 10 Ft. Wide, Provide A Crown At The Center Of The Median. Slope ramps Toward The Street. Do Not Exceed A Slope Of 1V:20H. Use A Ramp Width Of 5 Ft. When Possible . If Not, Maintain An Absolute Minimum Ramp Width Of 4 Ft.
- C. For Median Cuts 10 Ft. Wide And Wider, Provide A Level Landing. Do Not exceed A 1V:12H Ramp Slope. Use A Ramp Width Of 5 Ft. When Possible. If Not, Maintain An Absolute Ramp Width Of 4 Ft.
- D. Use A 4 Ft. Minimum Landing. Do Not Exceed A Slope Of 1V:48H In Any Direction.



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**CURB RAMP  
MEDIAN OR ISLAND CUTS**

DATE:

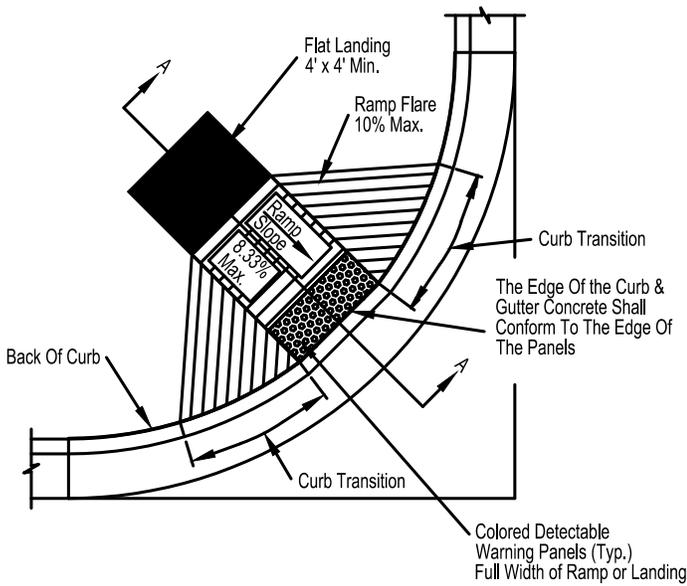
May 2017

DRAWING NO.

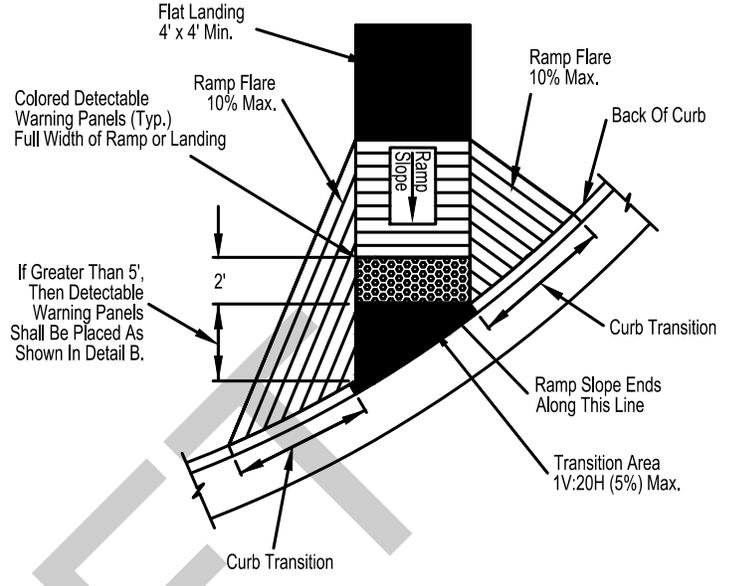
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DRAWN BY: KEB

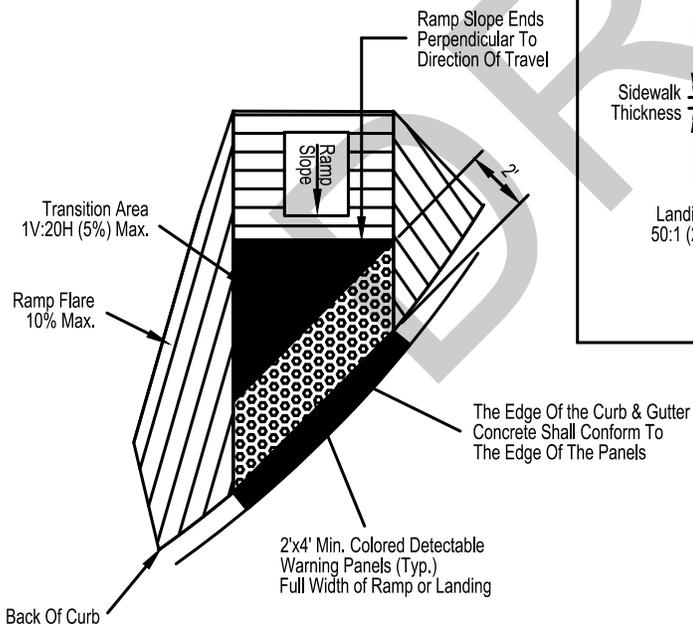
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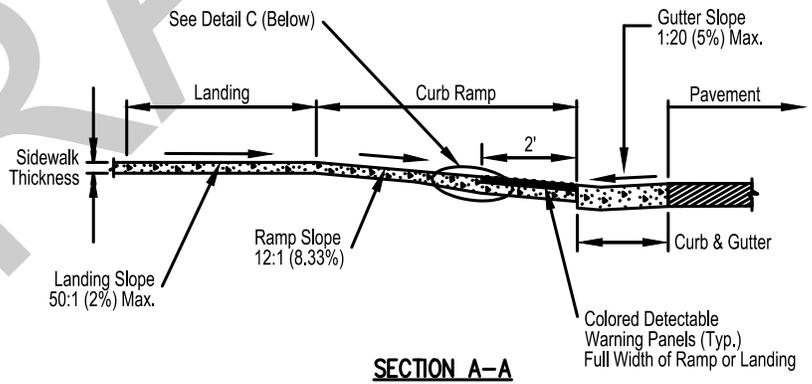
**CURB RAMP - PLAN VIEW**



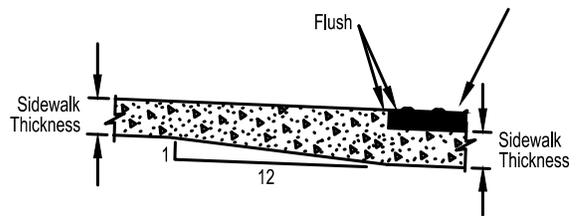
**CURB RAMP - PLAN VIEW**



**DETAIL - B**



**SECTION A-A**



**DETAIL - C**



**City Of Gillette**

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**DETECTABLE WARNING PANELS**

DRAWN BY: KEB

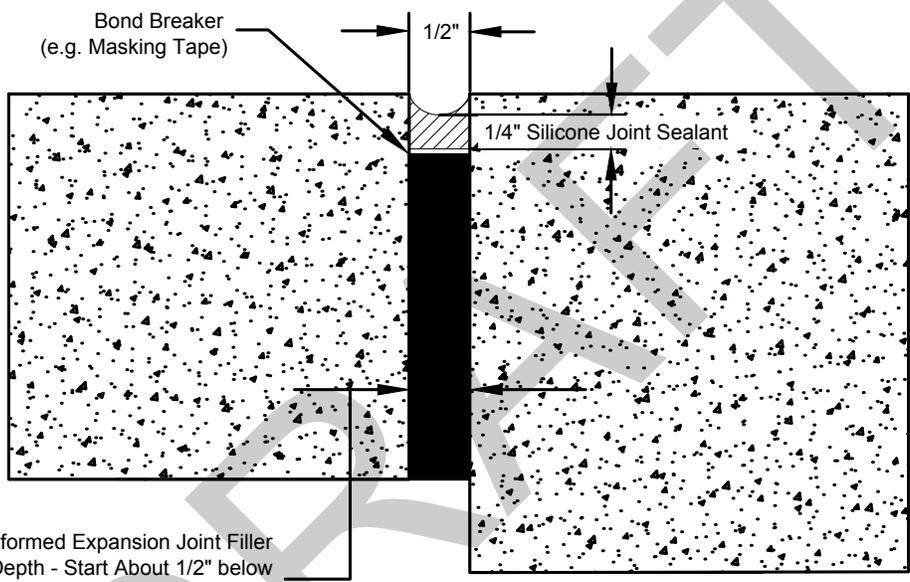
APPROVED BY: CITY ENGINEER HV/KDS

DATE:

MAY 2017

DRAWING NO.

02530-11



Preformed Expansion Joint Filler  
 (Full Depth - Start About 1/2" below  
 Surface To Allow Room For Silicone  
 Sealant)

**TYPICAL PREFORMED EXPANSION JOINT DETAIL**



*City Of Gillette*

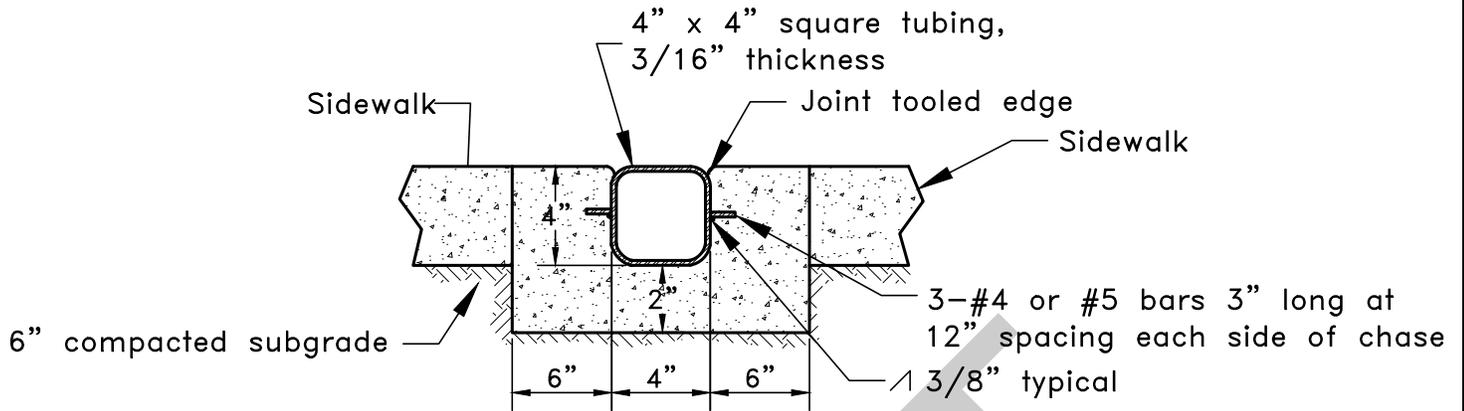
ENGINEERING DIVISION  
 P.O. BOX 3003, 201 E. 5TH STREET  
 GILLETTE, WYOMING 82717  
 PHONE: (307) 686-5311

**TYPICAL EXPANSION JOINT DETAIL**

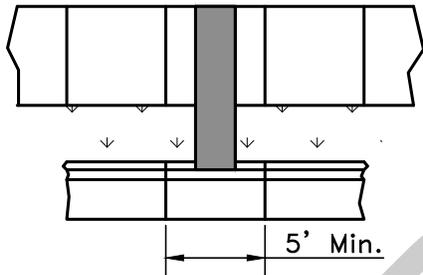
DRAWN BY: KEB

APPROVED BY: CITY ENGINEER HV/KDS

DATE:
FEBRUARY 2012
DRAWING NO.
02530-12

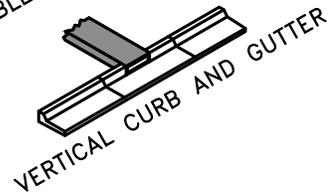
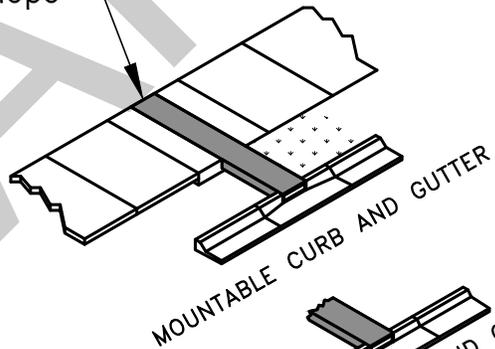


TYPICAL CHASE SECTION

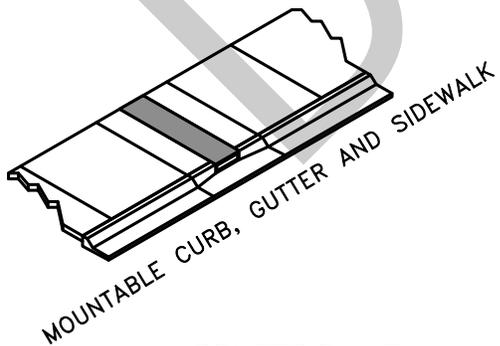


PLAN VIEW  
(Detached curb & gutter)

Min. 2% Slope



ISOMETRIC VIEW  
(Detached curb & gutter)



ISOMETRIC VIEW  
(Attached curb & gutter)



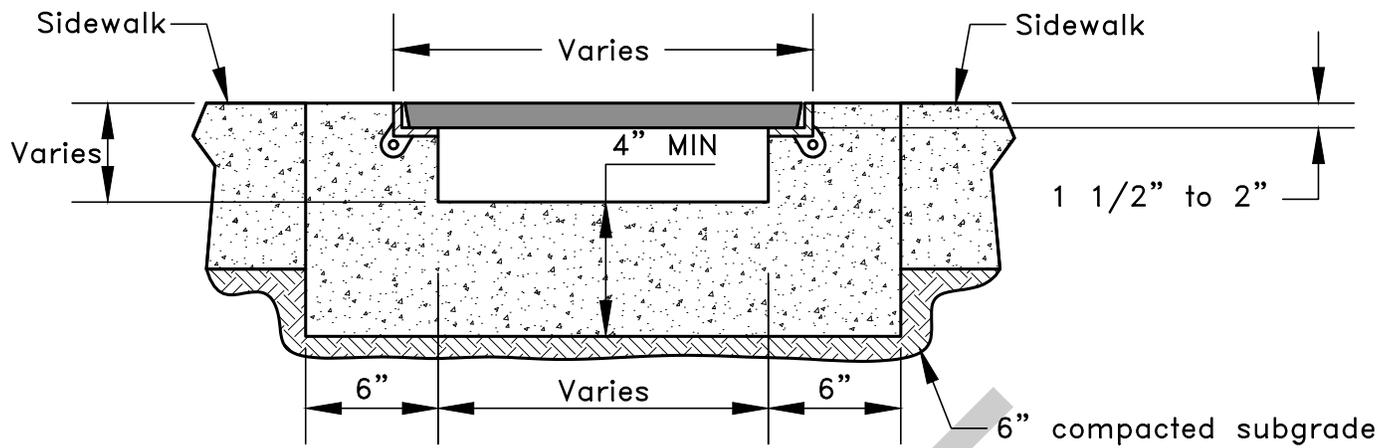
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ENGINEERING DIVISION  
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GILLETTE, WYOMING 82717  
PHONE: (307) 686-5311

**LOW VOLUME SIDEWALK CHASE**

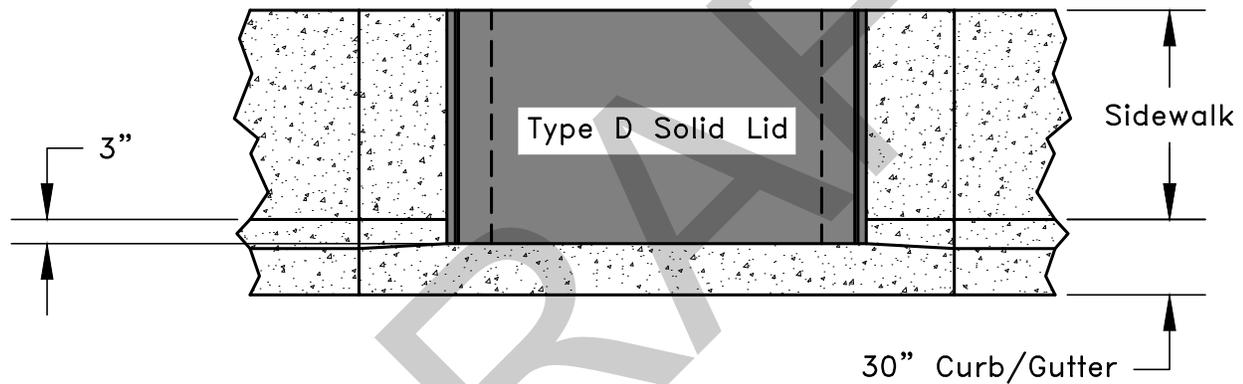
DRAWN BY: JAC

APPROVED BY: CITY ENGINEER DLH/KDS

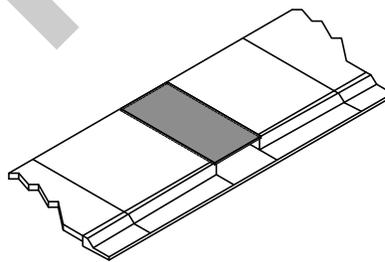
DATE:  
MARCH 2012  
DRAWING NO.  
02530-13



TYPICAL CHASE SECTION



PLAN VIEW



ISOMETRIC VIEW

**NOTE:**

1. Neenah Series R-4990 and R-4999, Type D or approved equal.
2. Installation to be per Manufactures Recommendations.
3. Depth of chase channel will vary based on type of curb. Highback curb chase to be 4.5" deep and Roll Over curb chase to be 2.5" deep. Both channels to align with flowline of curb.



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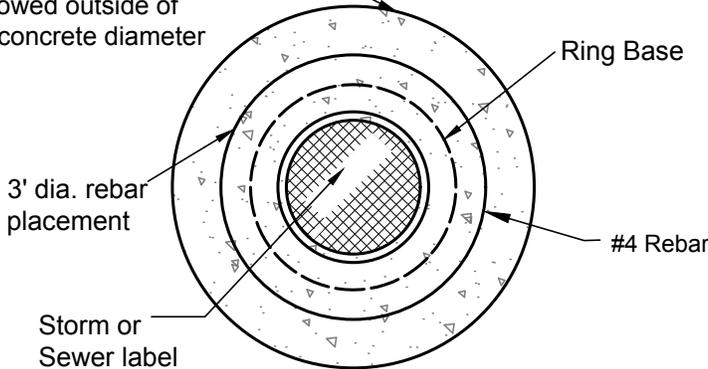
**HIGH VOLUME SIDEWALK CHASE**

DRAWN BY: JAC

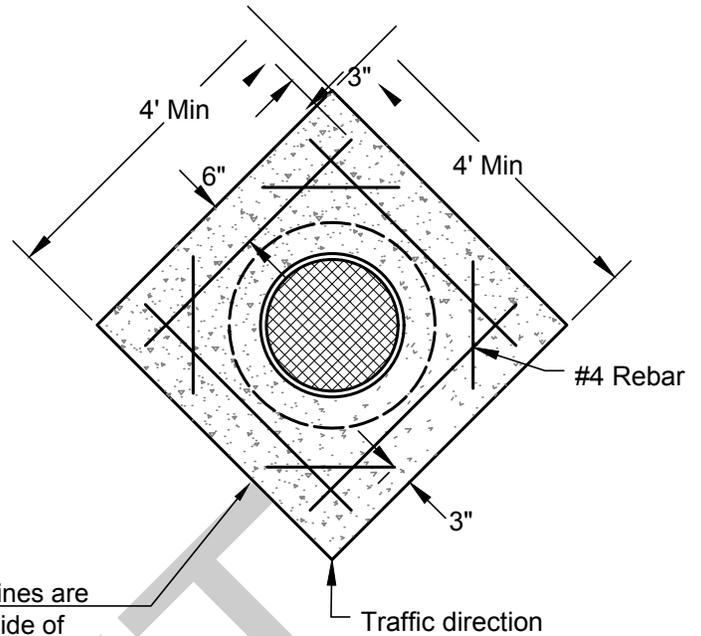
APPROVED BY: CITY ENGINEER DLH/KDS

DATE:
MARCH 2012
DRAWING NO.
02530-14

4' dia. concrete collar  
No saw cut lines are allowed outside of 4' concrete diameter



CIRCULAR CONCRETE COLLAR



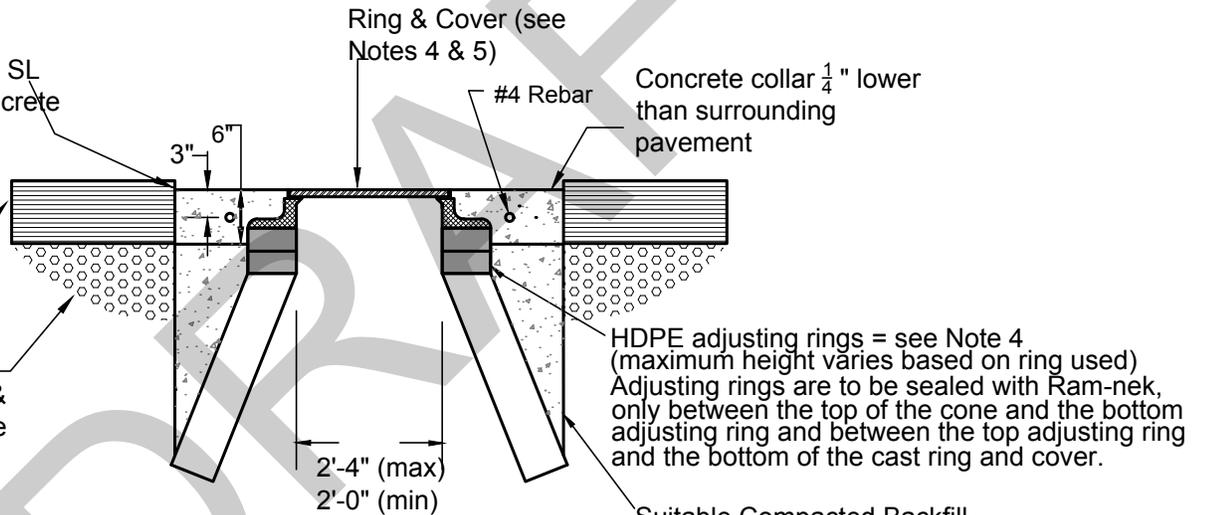
DIAMOND CONCRETE COLLAR

No saw cut lines are allowed outside of 4' concrete diamond

Dowl Corning 890 SL Seal between concrete and surrounding pavement

P.C.C. or Asphaltic Concrete Paving

Compacted base & subgrade



CONCRETE MANHOLE COLLAR

Concrete collar  $\frac{1}{4}$ " lower than surrounding pavement

HDPE adjusting rings = see Note 4 (maximum height varies based on ring used) Adjusting rings are to be sealed with Ram-nek, only between the top of the cone and the bottom adjusting ring and between the top adjusting ring and the bottom of the cast ring and cover.

Suitable Compacted Backfill or Class S Concrete (slurry) (slurry is recommended for repairs)

NOTES:

1. Grout shall only be used in and around the invert of the pipe and shall not be used around the adjusting rings.
2. HDPE adjusting rings shall be used in increments of  $\frac{1}{4}$  inch in order to obtain the optimal final grade adjustments.
3. If any shimming of the adjusting rings is used, the shims shall be inserted from the outside of the manhole.
4. All rings shall be D&L Foundry A-1071 (4"), A-1043 (6"), A-1161 (8"), or Engineer-approved equal. The combined height of manhole ring used and adjusting rings shall not exceed 16" total.
5. The lid (cover) shall be D&L Foundry A-1161 labeled STORM or SEWER (non-ventilated, self-sealing, with closed pick hole).
6. Retrofits, Manhole Adjustments, and other repairs of existing Manhole applications may require diamond collar configuration, and shall only be used as identified on the plans or as approved.
7. Round collars shall be used for all installations in new pavement



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MANHOLE COLLAR DETAIL

DRAWN BY: KEB

APPROVED BY: CITY ENGINEER HV/KDS

DATE:

MAY 2017

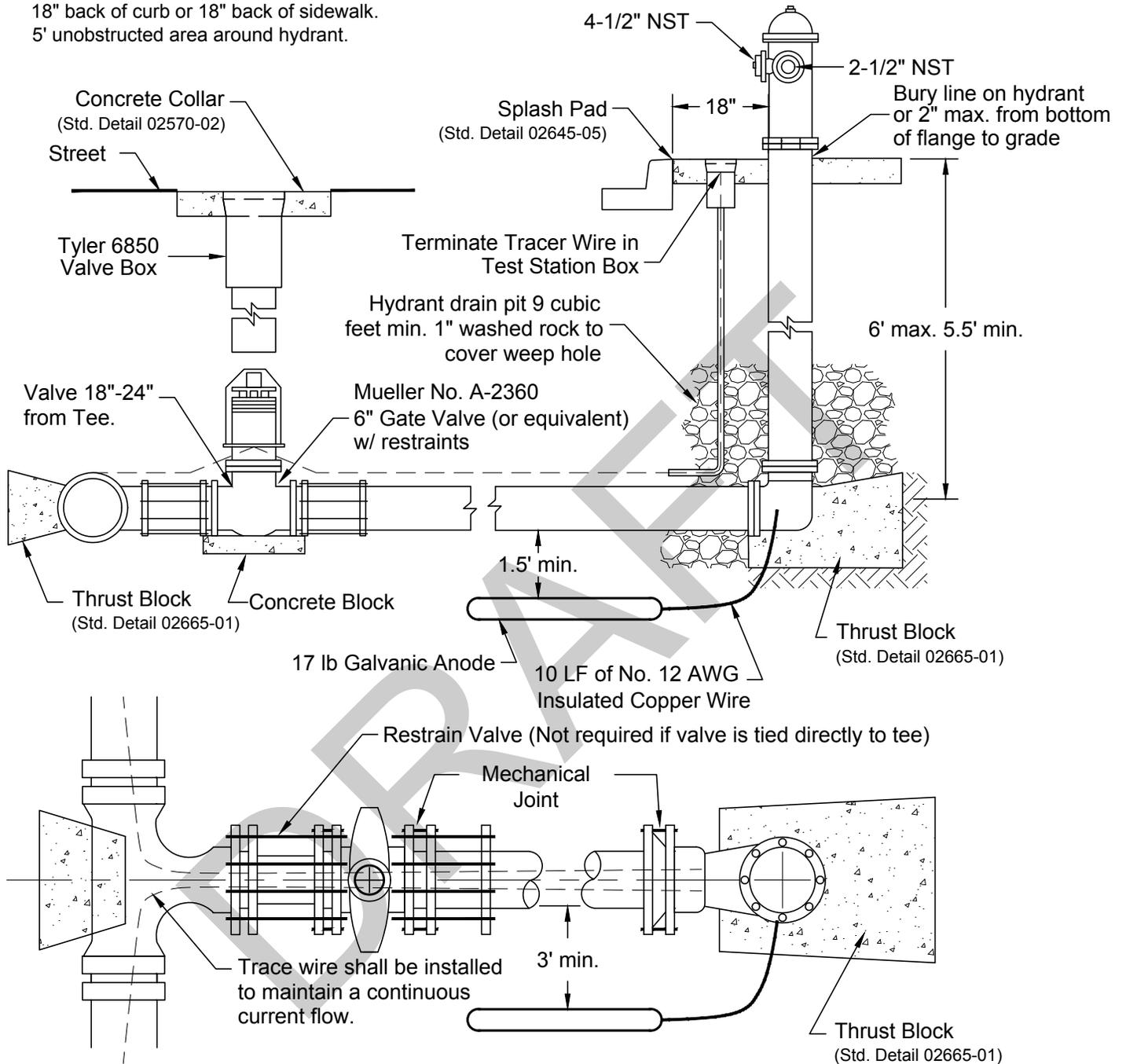
DRAWING NO.

02570-01



**FIRE HYDRANT:**

- A) Mueller Super Centurion 250 or American AVK 2780 or American Flow Control Waterous Pacer WB-67-250 (5 1/4" barrel).
- B) 18" back of curb or 18" back of sidewalk.
- C) 5' unobstructed area around hydrant.



**NOTES:**

1. Wrap all D.I. fittings with 8 mil. polyethylene in accordance with ANSI/AWWA A21.5/C105.
2. The 6" pipe connection from the water main to the hydrant will be direct. Vertical or horizontal offset using elbows shall not be allowed.
3. Tracer wire shall be installed per Standard Detail 02645-06.
4. Mars Company, Zinc Anode Caps along with a Mechanical Joint Shoe may be used in place of the 17lb Galvanic Anode Bags.
5. Whenever a fire hydrant is taken out of service, it shall immediately be bagged with an orange or black bag that completely covers the hydrant.



*City of Gillette*

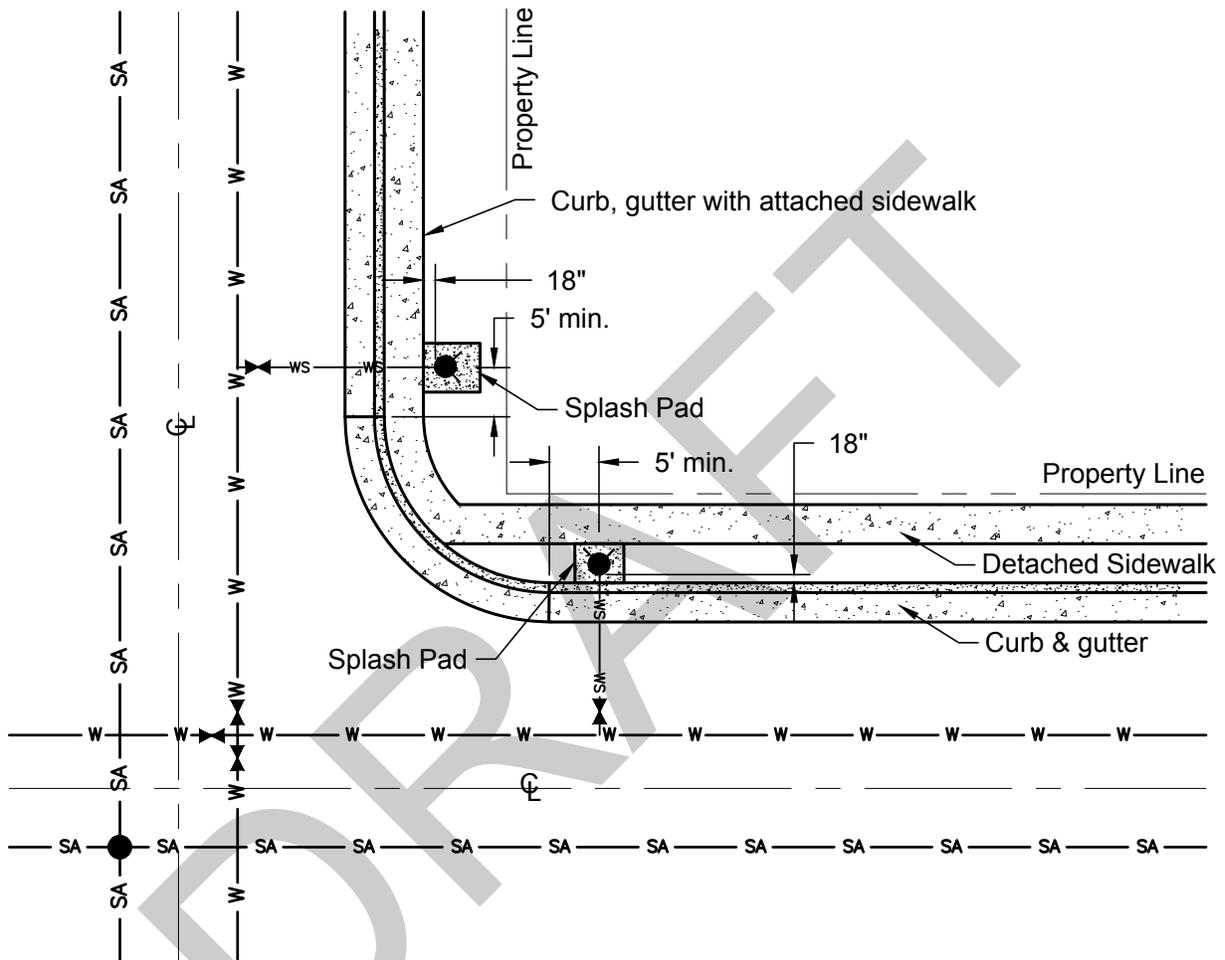
ENGINEERING DIVISION  
P.O. BOX 3003, 201 E. 5TH STREET  
GILLETTE, WYOMING 82717  
PHONE: (307) 686-5311

**FIRE HYDRANT INSTALLATION**

DRAWN BY: CJS

APPROVED BY: CITY ENGINEER HV/KDS

DATE:	
	MARCH 2012
DRAWING NO.	
	02645-01



**NOTE:**

1. A minimum 5' 0" unobstructed area is required around Fire Hydrants.
2. Whenever a fire hydrant is taken out of service, it shall immediately be bagged with an orange or black bag that completely covers the hydrant.



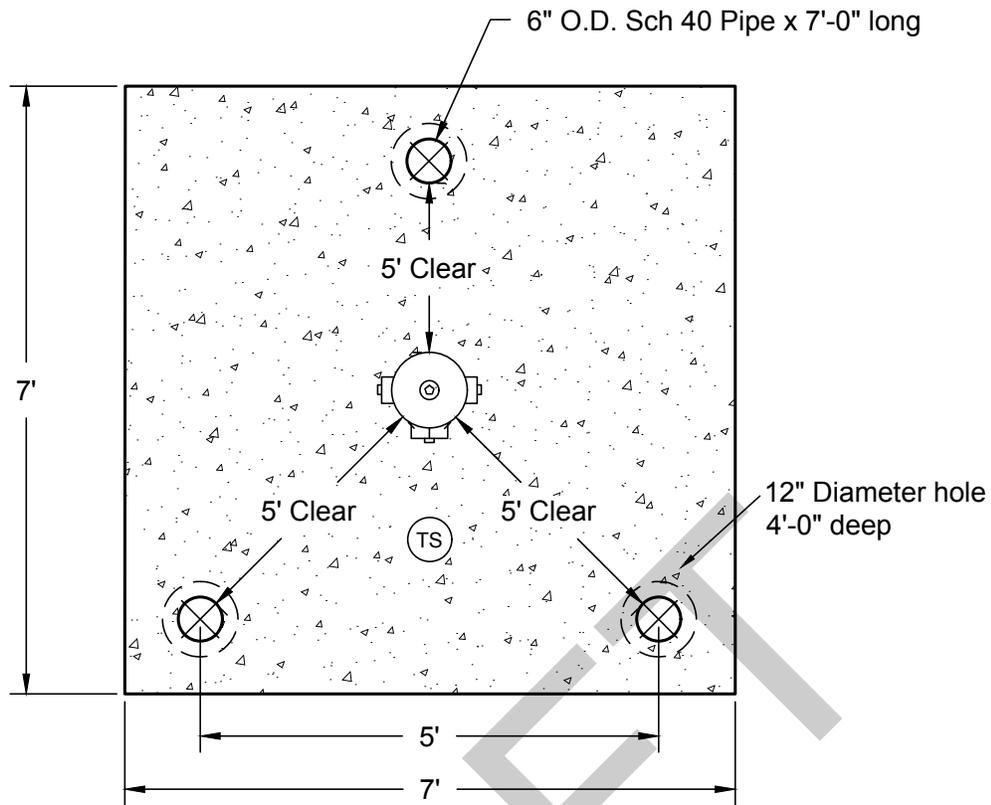
*City Of Gillette*  
 ENGINEERING DIVISION  
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 GILLETTE, WYOMING 82717  
 PHONE: (307) 686-5311

## FIRE HYDRANT PLACEMENT

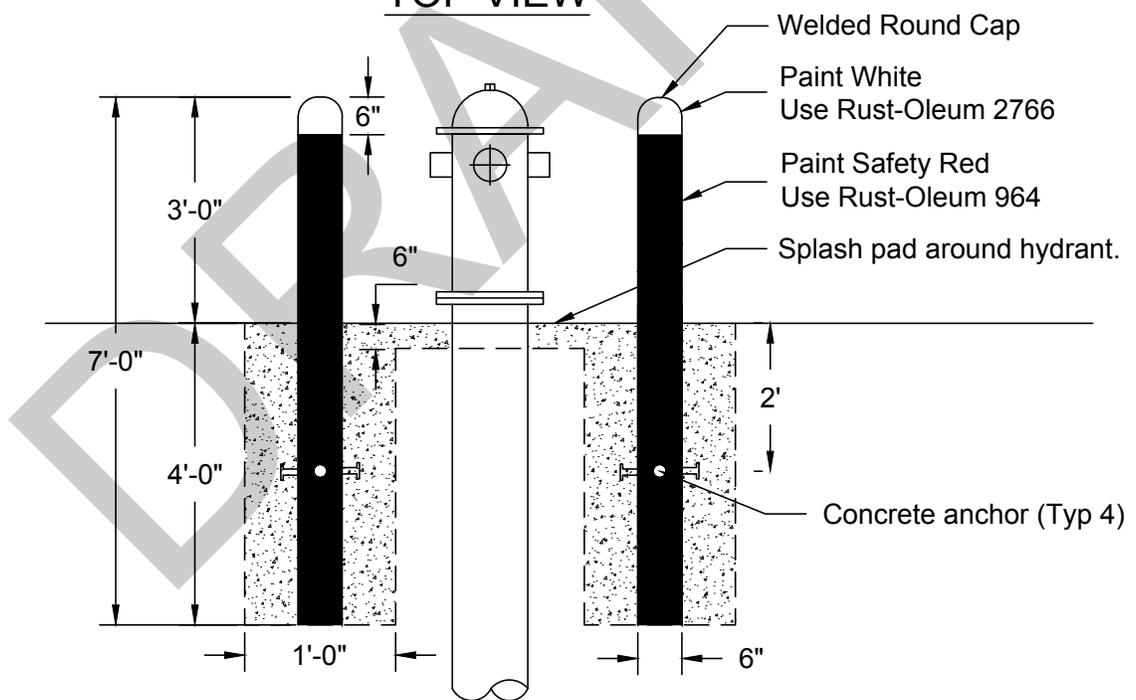
DRAWN BY: JAC

APPROVED BY: CITY ENGINEER DLH/KDS

DATE:
MARCH 2012
DRAWING NO.
02645-02



**TOP VIEW**



**SIDE VIEW**

**NOTE:**

Generally, fire hydrant guards are only installed in areas where there is no curb and gutter.



*City Of Gillette*

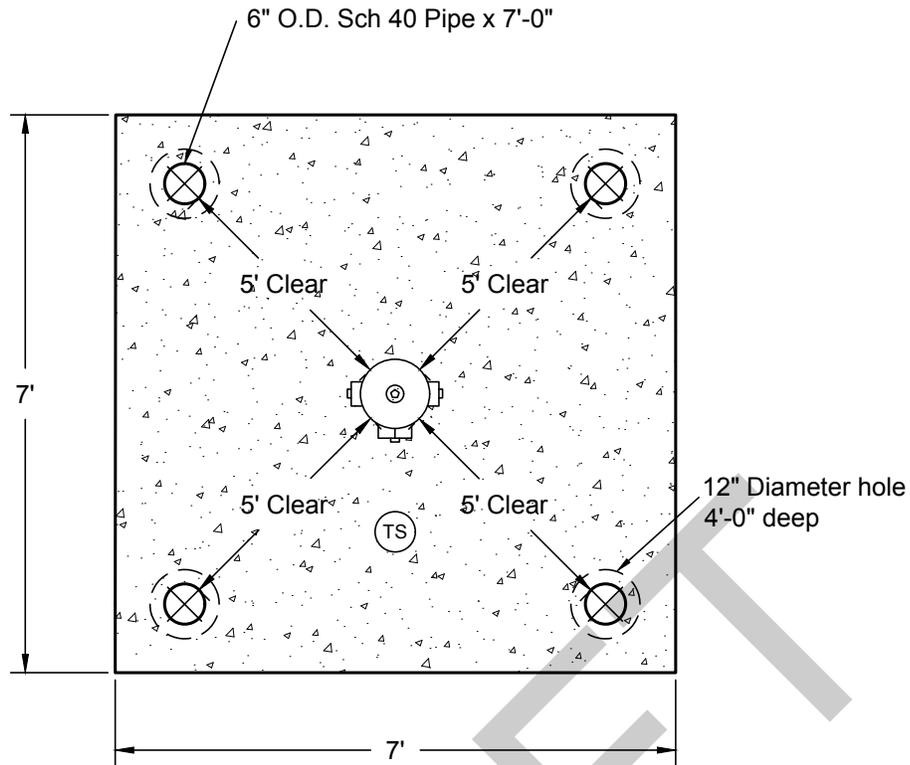
ENGINEERING DIVISION  
P.O. BOX 3003, 201 E. 5TH STREET  
GILLETTE, WYOMING 82717  
PHONE: (307) 686-5311

**FIRE HYDRANT GUARD  
(3 POLES)**

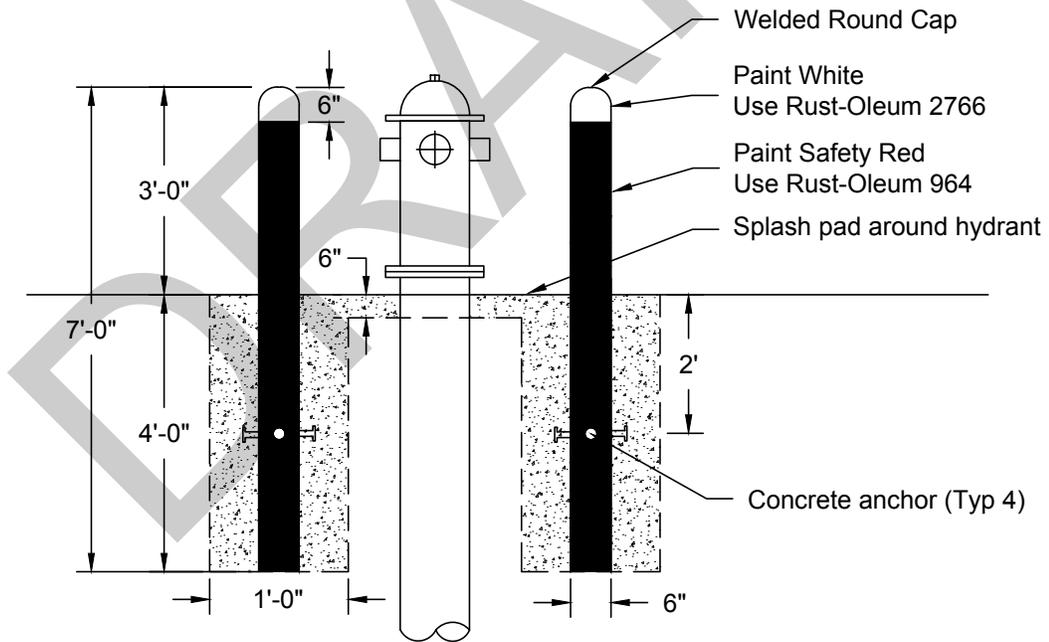
DRAWN BY: CJS

APPROVED BY: CITY ENGINEER HV/KDS

DATE:	
	MARCH 2012
DRAWING NO.	
	02645-03



**TOP VIEW**



**SIDE VIEW**

**NOTE:**

Generally, fire hydrant guards are only installed in areas where there is no curb and gutter.



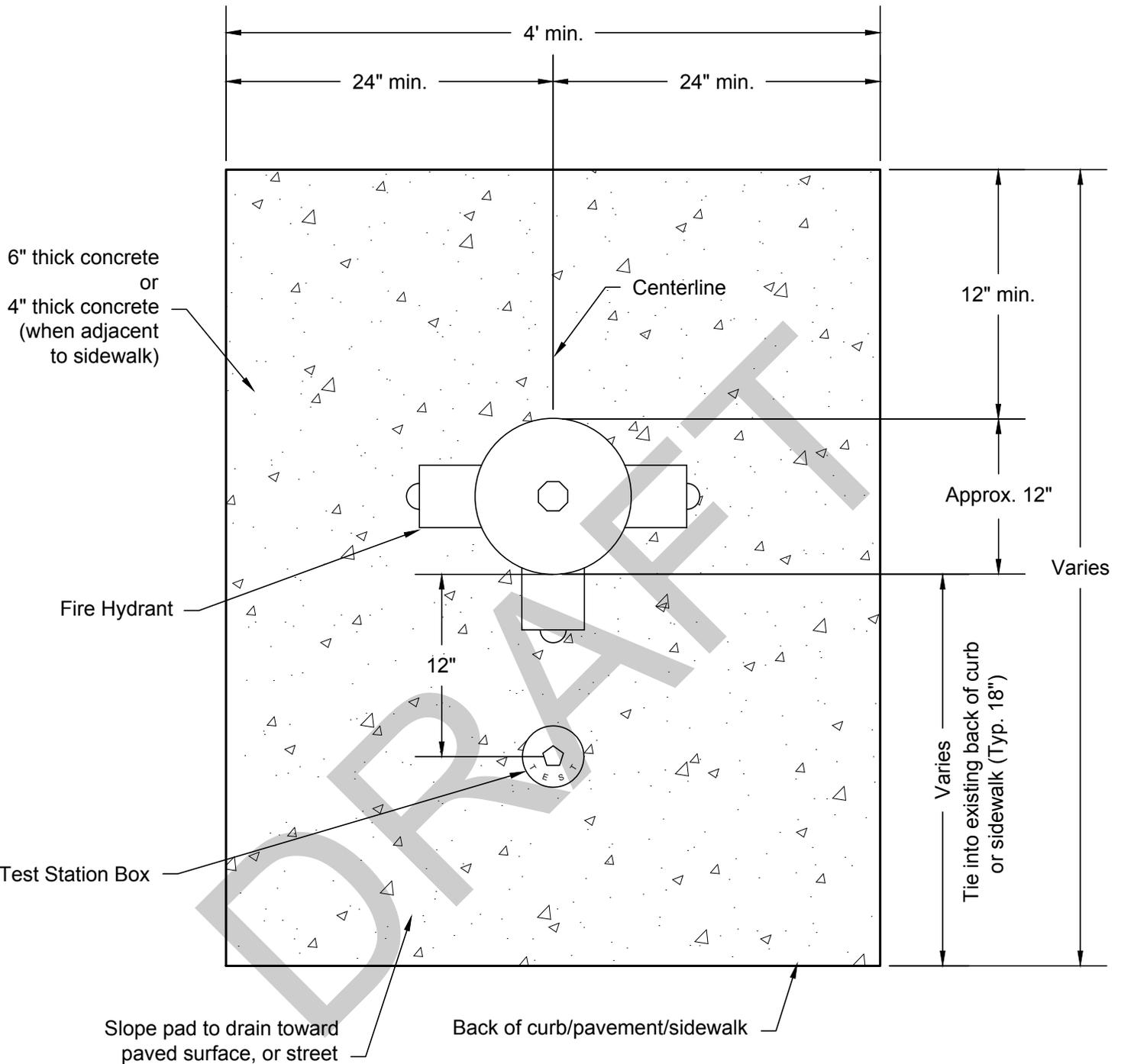
*City Of Gillette*  
 ENGINEERING DIVISION  
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 GILLETTE, WYOMING 82717  
 PHONE: (307) 686-5311

**FIRE HYDRANT GUARD  
 (4 POLES)**

DRAWN BY: CJS

APPROVED BY: CITY ENGINEER HV/KDS

DATE:	
	MARCH 2012
DRAWING NO.	
	02645-04



**NOTES:**

1. The hydrant is to be located 18" from the back of the curb for detached sidewalk or 18" from the back of attached sidewalk. The splash pad shall be attached to the back of the sidewalk or curb and gutter. A narrow strip will not be allowed between the front edge of the splash pad and the sidewalk or curb and gutter.
2. For hydrants not located immediately adjacent to the street, a larger splash pad with dimensions of 24" (2') behind and 48" (4') in front of the hydrant shall be used.
3. If the fire hydrant and splash pad sit at the back edge of a steep slope, such as a borrow ditch, and there is significant chance for erosion in front of the hydrant, a smaller (4'x4') splash pad may be allowed in addition to the placement of appropriately sized riprap (3" nominal diameter rock) in front of the hydrant and down the slope adjacent to the street.



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**SPLASH PAD FOR FIRE HYDRANT**

DRAWN BY: CJS

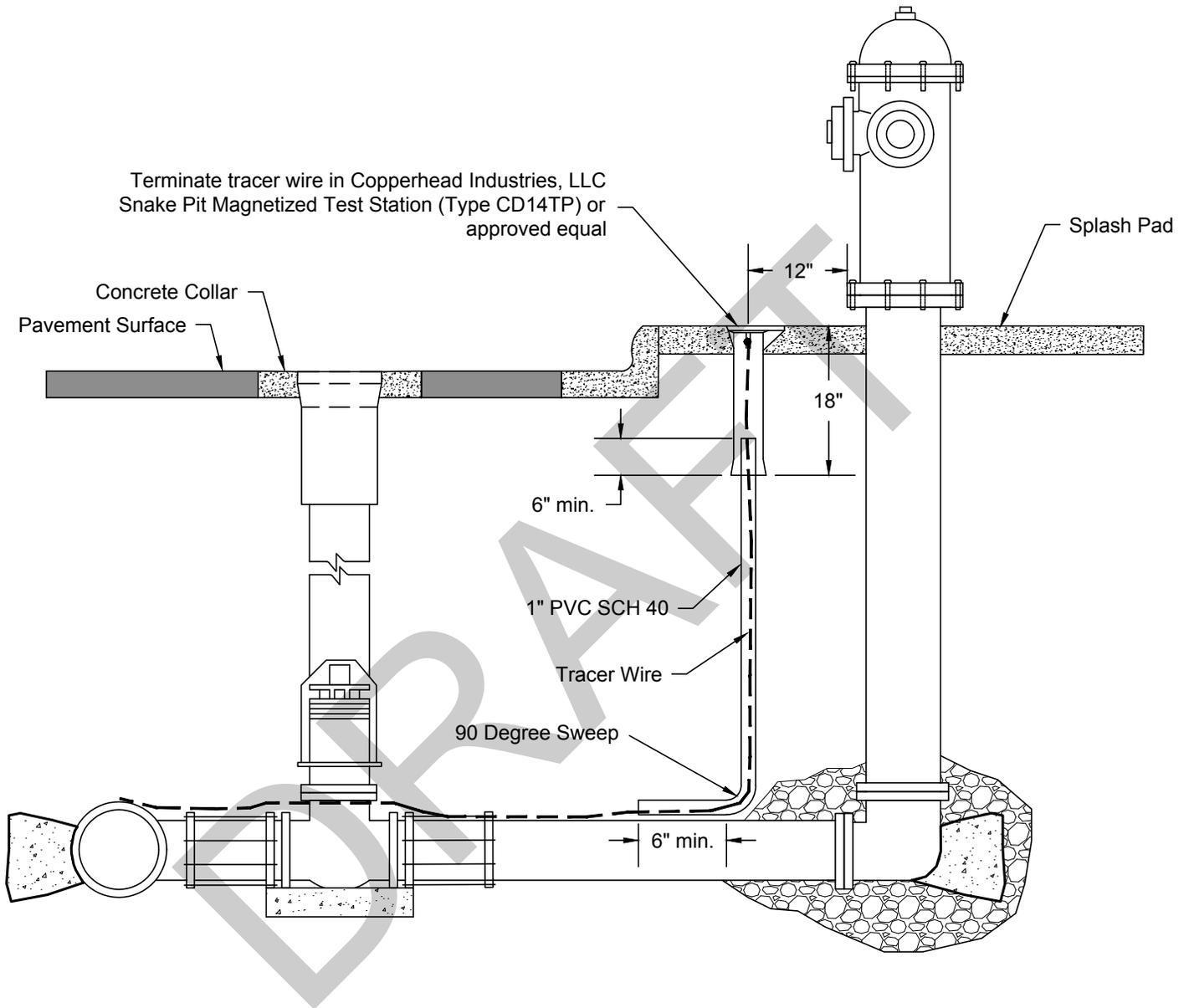
APPROVED BY: CITY ENGINEER HV/KDS

DATE:

MARCH 2012

DRAWING NO.

02645-05



**NOTE:**

1. Tracer wire shall be installed to maintain a continuous current flow.



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**FIRE HYDRANT TRACER WIRE**

DRAWN BY: CJS

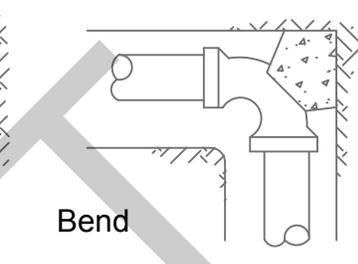
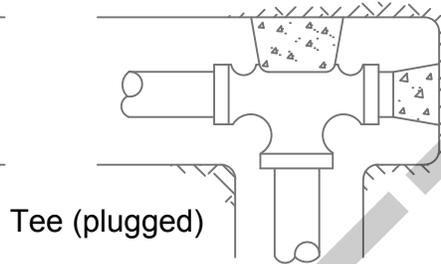
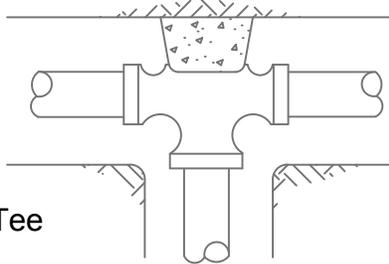
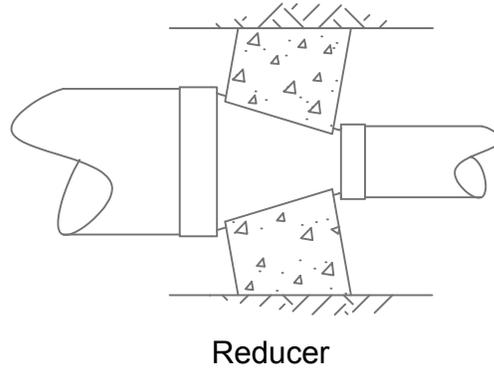
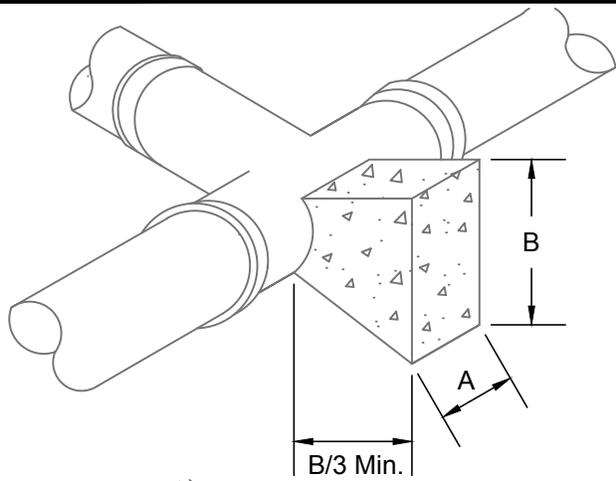
APPROVED BY: CITY ENGINEER HV/KDS

DATE:

OCTOBER 2012

DRAWING NO.

02645-06



Tee

Tee (plugged)

Bend

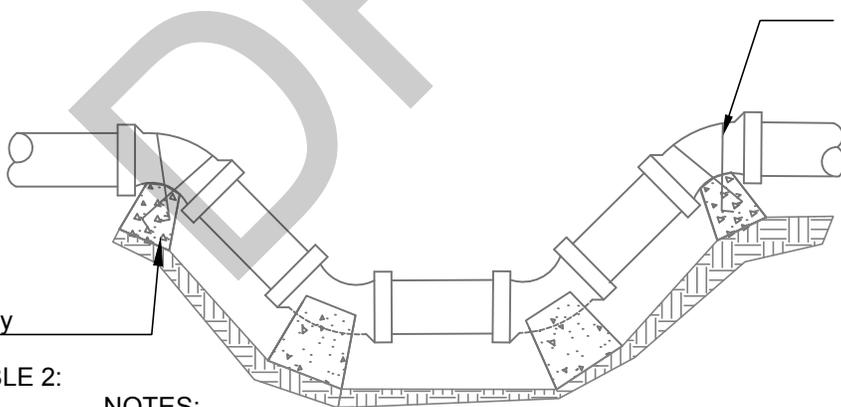
TABLE 1: DIMENSION FOR THRUST BLOCKING

FITTING SIZES	TEES & PLUGS		90° BEND		45° BEND & WYES		REDUCERS, 11-1/4° & 22-1/2° BENDS	
	A	B	A	B	A	B	A	B
4"	1'-7"	1'-2"	1'-9"	1'-6"	1'-8"	0'-10"	1'-7"	0'-6"
6"	2'-0"	1'-11"	2'-5"	2'-2"	1'-10"	1'-7"	1'-9"	0'-10"
8"	2'-8"	2'-6"	3'-2"	3'-0"	2'-5"	2'-1"	1'-9"	1'-6"
10"	3'-4"	3'-3"	4'-0"	3'-10"	3'-0"	2'-9"	2'-2"	1'-11"
12"	4'-0"	3'-10"	4'-8"	4'-8"	3'-8"	3'-3"	2'-7"	2'-3"
14"	5'-5"	3'-10"	6'-6"	4'-11"	4'-9"	3'-5"	3'-5"	2'-5"

TABLE 2: GRAVITY BLOCK VOLUME (C.Y.)

SIZES	REBAR TIES	ANGLE OF DOWNTURN		
		11.25°	22.5°	45°
6"	2-# 4	.030	0.60	1.20
8"	2-# 4	0.60	1.10	2.10
10"	2-# 5	0.90	1.70	3.30
12"	2-# 5	1.2	2.50	4.80

FACTOR OF SAFETY = 1.5



Concrete Gravity thrust block (Typ.) SEE TABLE 2:

NOTES:

1. Wrap all metallic fittings with 8 mil. polyethylene in accordance with ANSI/AWWA A21.5/C105.
2. Comply with Specification Section 02665 (Pipe installation for water mains)
3. These tables are based on 150 PSI Main Pressure 2000 PSF Soil Bearing Pressure.
4. For other conditions, size of thrust blocks must be computed and approved by Engineer.
5. All thrust blocks must be placed against undisturbed soil. Class "C" or "B" concrete
6. Ensure all bolts are unobstructed by concrete.



City of Gillette

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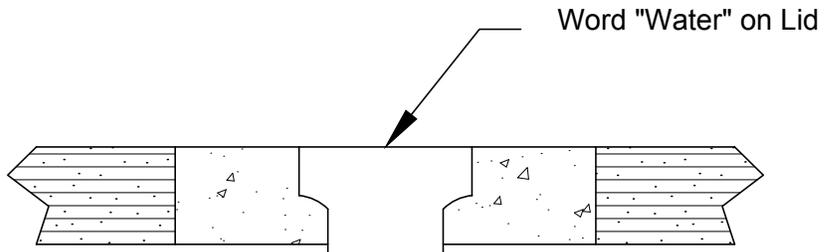
THRUST & GRAVITY BLOCKING FOR WATER MAIN FITTINGS

DRAWN BY: KEB

APPROVED BY: CITY ENGINEER HV/KDS

DATE:  
MAY 2017  
DRAWING NO.

02665-01

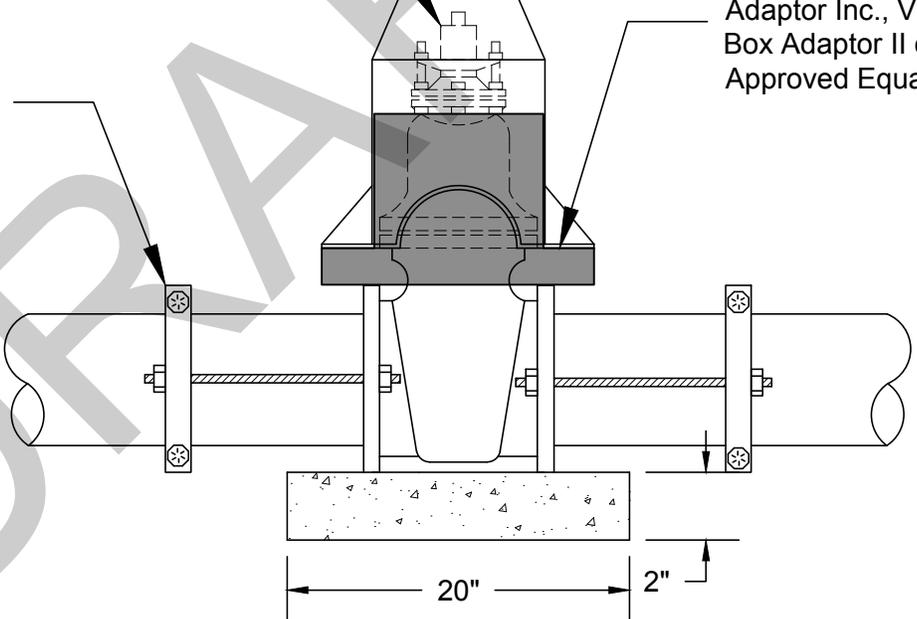


Gate Valves:  
 Mueller A-2360,  
 American AVK Series 25,  
 American Flow Control Series 2500  
 Butterfly Valves:  
 Mueller Line Seal III  
 or Approved equal

Valve Box  
 Tyler 6850 or  
 Approved Equal

Restrain both sides of Valve:  
 MJ Valve - EBAAIron Series 2000  
 Push-On Valve - Ford Series 1300  
 or EBAA Iron Series 1600  
 or Approved Equal

Adaptor Inc., Valve  
 Box Adaptor II or  
 Approved Equal



**NOTES:**

1. Fire Hydrant Isolation Valves may be restrained directly to the tee.
2. All Valves 14" and larger are required to be Butterfly Valves.
3. When a valve is located at a fitting, (tee, cross's, etc... ), it must be installed 18" to 24" away from the fitting.



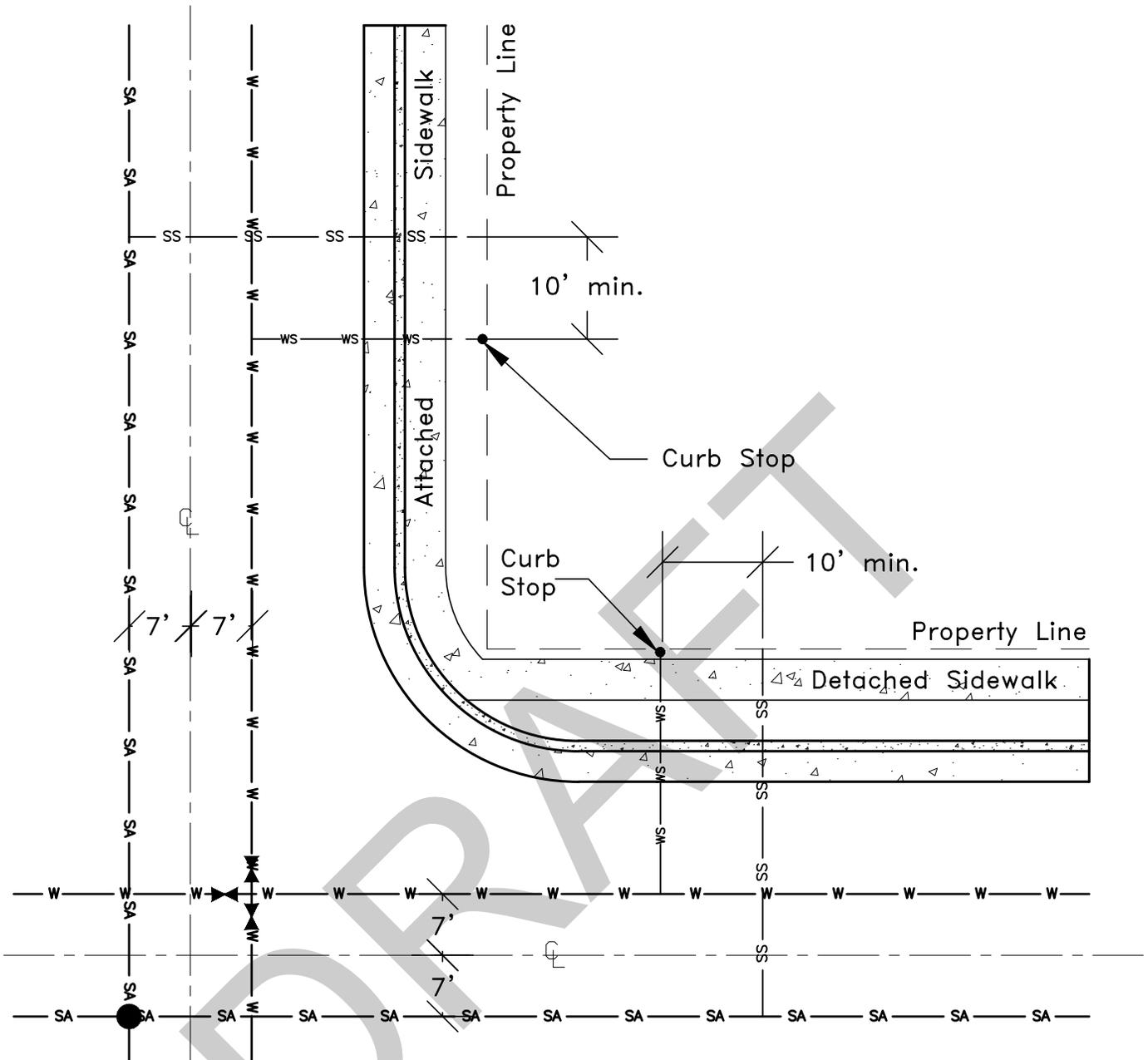
*City Of Gillette*  
 ENGINEERING DIVISION  
 P.O. BOX 3003, 201 E. 5TH STREET  
 GILLETTE, WYOMING 82717  
 PHONE: (307) 686-5311

**WATER MAIN VALVES**

DRAWN BY:       CJS      

APPROVED BY: CITY ENGINEER       HV/KDS      

DATE:
MARCH 2012
DRAWING NO.
02665-02



**NOTES:**

1. Mark curb where service crosses beneath: A "W" for water, and an "S" for sewer shall be either stamped into newly finished concrete or ground into cured concrete to appropriately mark the utility location.
2. All services to be stubbed to property line.
3. Locate water service uphill from sanitary sewer services.
4. Fire hydrants should be located on the northwest corner of each intersection, where practical.
5. All water lines shall have a 5'-6" to 6'-0" of cover.
6. All sanitary sewer line shall have 8'-0" (minimum) of cover, unless the City Engineer authorizes less cover based on justified design.



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**TYPICAL UTILITIES LAYOUT**

DRAWN BY: JAC

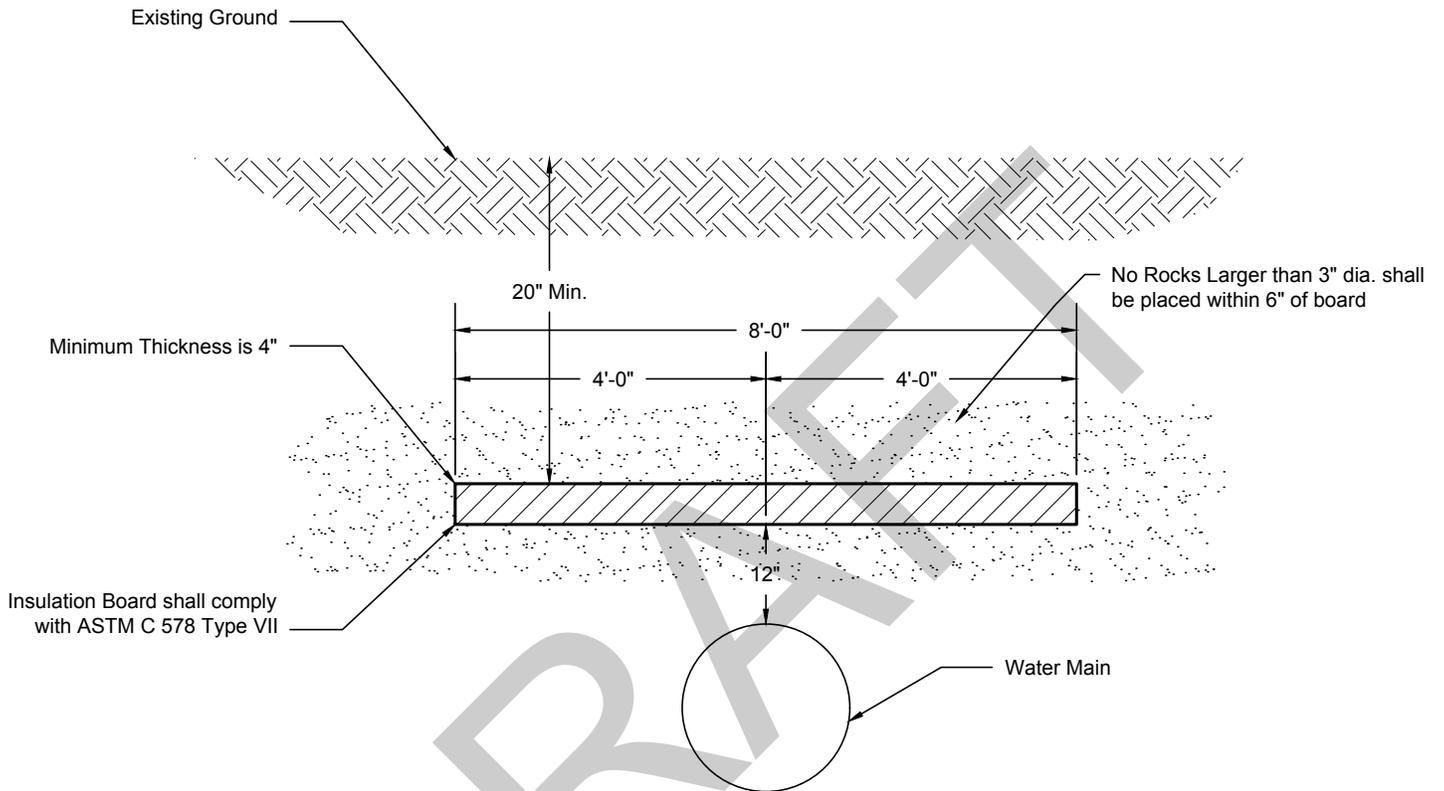
APPROVED BY: CITY ENGINEER DLH/KDS

DATE:

MARCH 2012

DRAWING NO.

02665-03



Insulation Board shall comply with ASTM C 578 Type VII

Water Main

**NOTES:**

1. If depth of cover is between 3.0 and 5.0 feet, board shall extend a minimum of four feet either side of pipe.



*City Of Gillette*

ENGINEERING DIVISION  
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**INSULATION BOARD INSTALLATION**

DRAWN BY: CJS

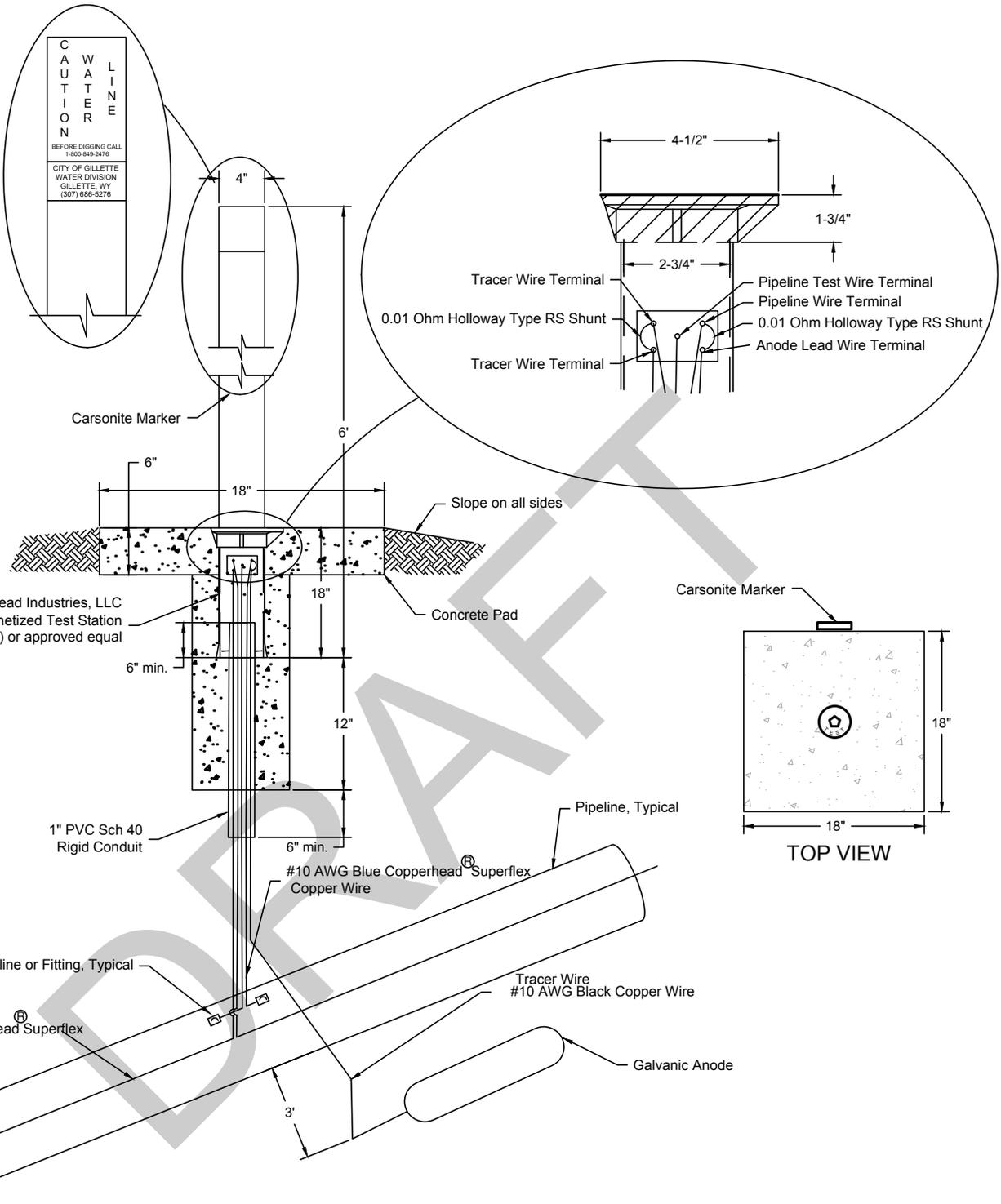
APPROVED BY: CITY ENGINEER HV/KDS

DATE:

MARCH 2012

DRAWING NO.

02665-04



**Notes:**

1. Install Galvanic Anode 1' below pipeline invert elevation.
2. Provide sufficient slack in test wires/tracer wires to allow terminal block to extend 18" out of test station.
3. Carsonite Markers shall be required only in non-urban areas.
4. If Cathodic protection is not required and a Test Station is provided exclusively for trace wire, a two (2) terminal Test Station is acceptable.



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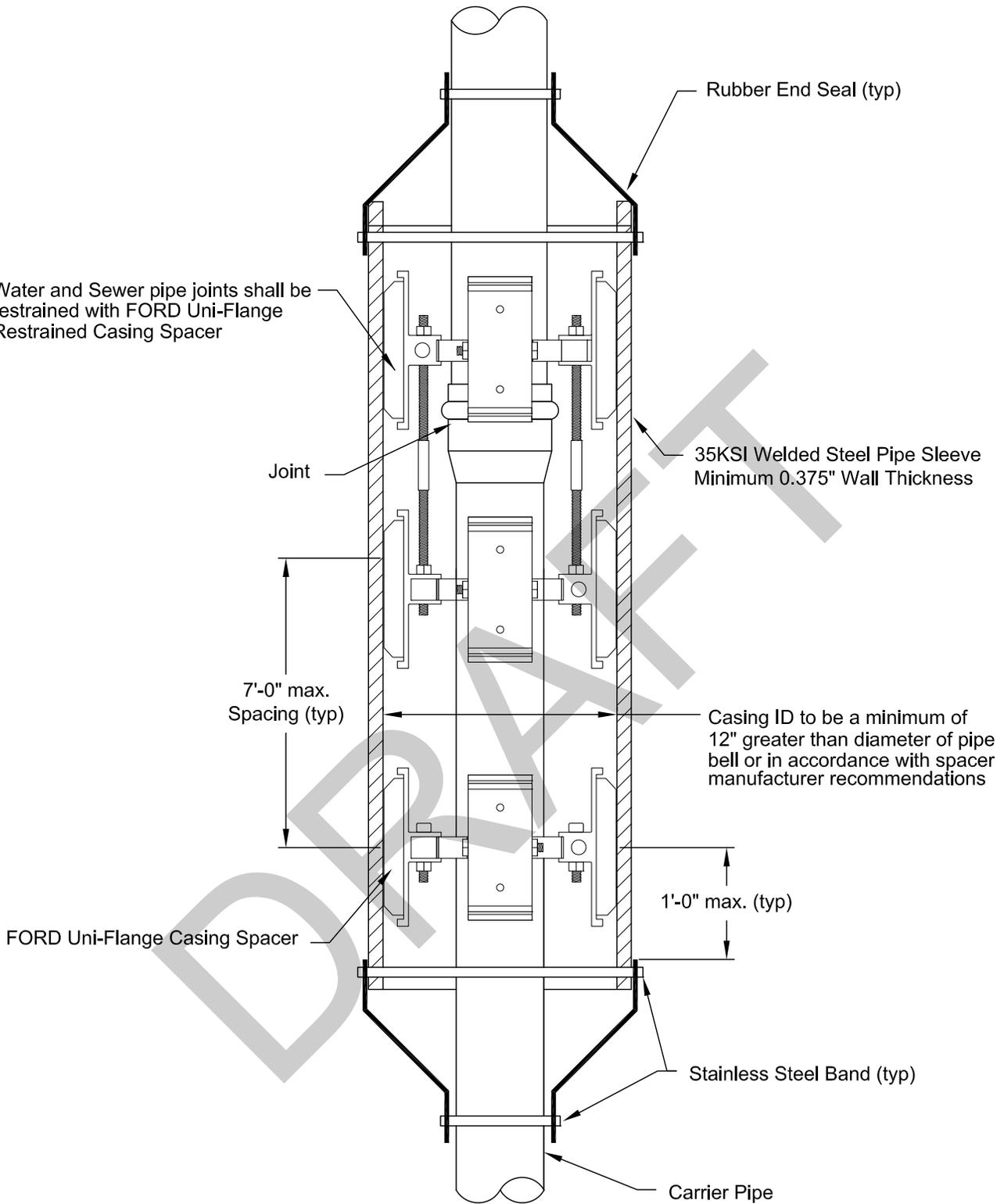
**CATHODIC PROTECTION /  
 TRACER WIRE TEST STATIONS**

DRAWN BY: KEB

APPROVED BY: CITY ENGINEER HV/KDS

DATE:
MAY 2017
DRAWING NO.
<b>02665-05</b>

Water and Sewer pipe joints shall be restrained with FORD Uni-Flange Restrained Casing Spacer



**NOTE:**

1. Casing pipe that is bored shall have 32 lb. anode bags cad welded to each end.



*City Of Gillette*

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**WATER / SANITARY SEWER  
BORE CASING**

DRAWN BY: CJS

APPROVED BY: CITY ENGINEER HV/KDS

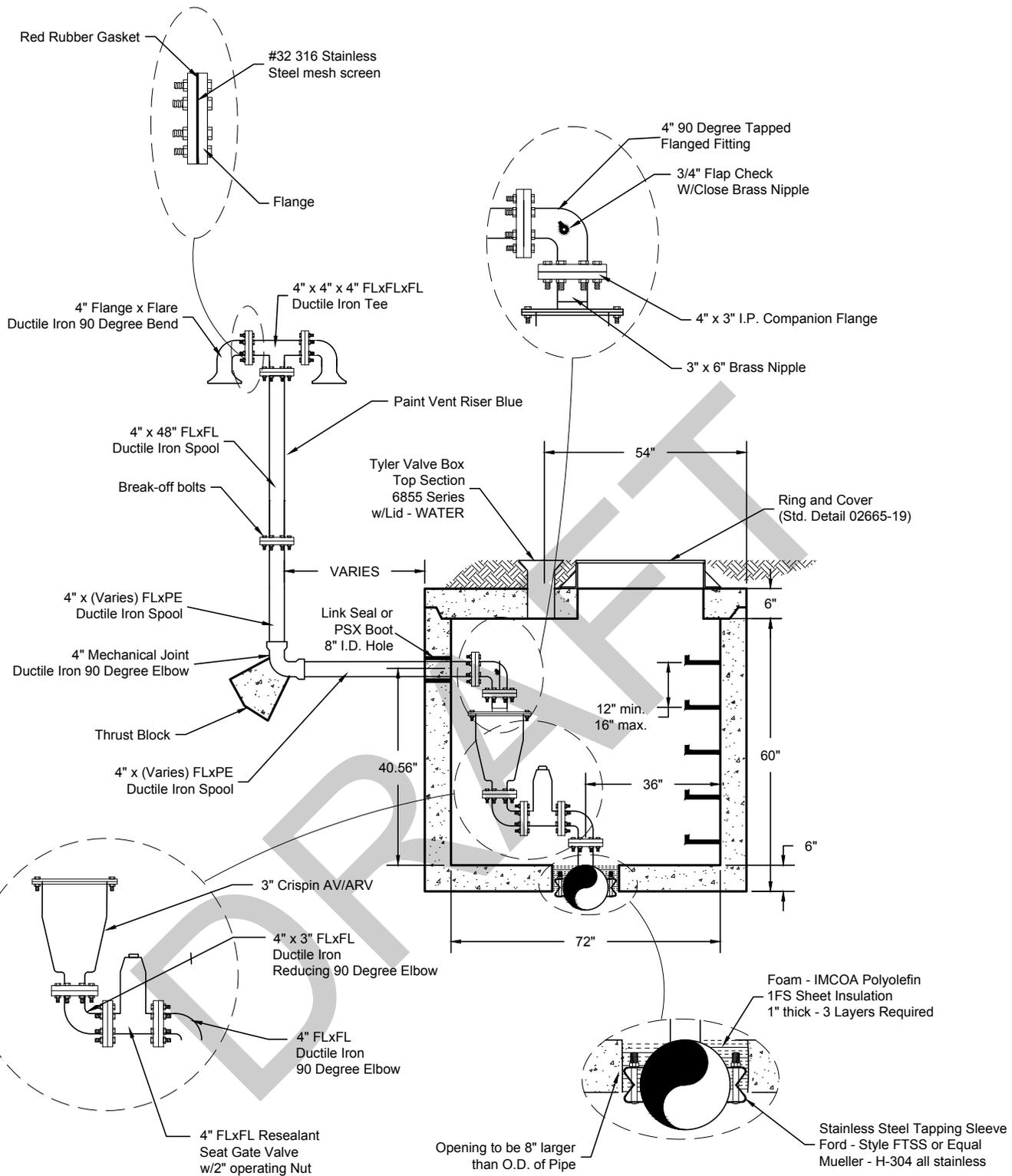
DATE:

MARCH 2012

DRAWING NO.

02665-06





**Notes:**

1. Concrete - 4000 psi 28 day strength.
2. Reinforcement - ASTM A-615 Grade 60 and A-185 WWF.
3. Cement - Type V or Type II with W/C ratio < 0.45.
4. ASTM C-478 governs.
5. Steps shall be non corrosive rubber coated aluminum or nylon and be supplied with the vault.
6. The vault shall be 72" in diameter.



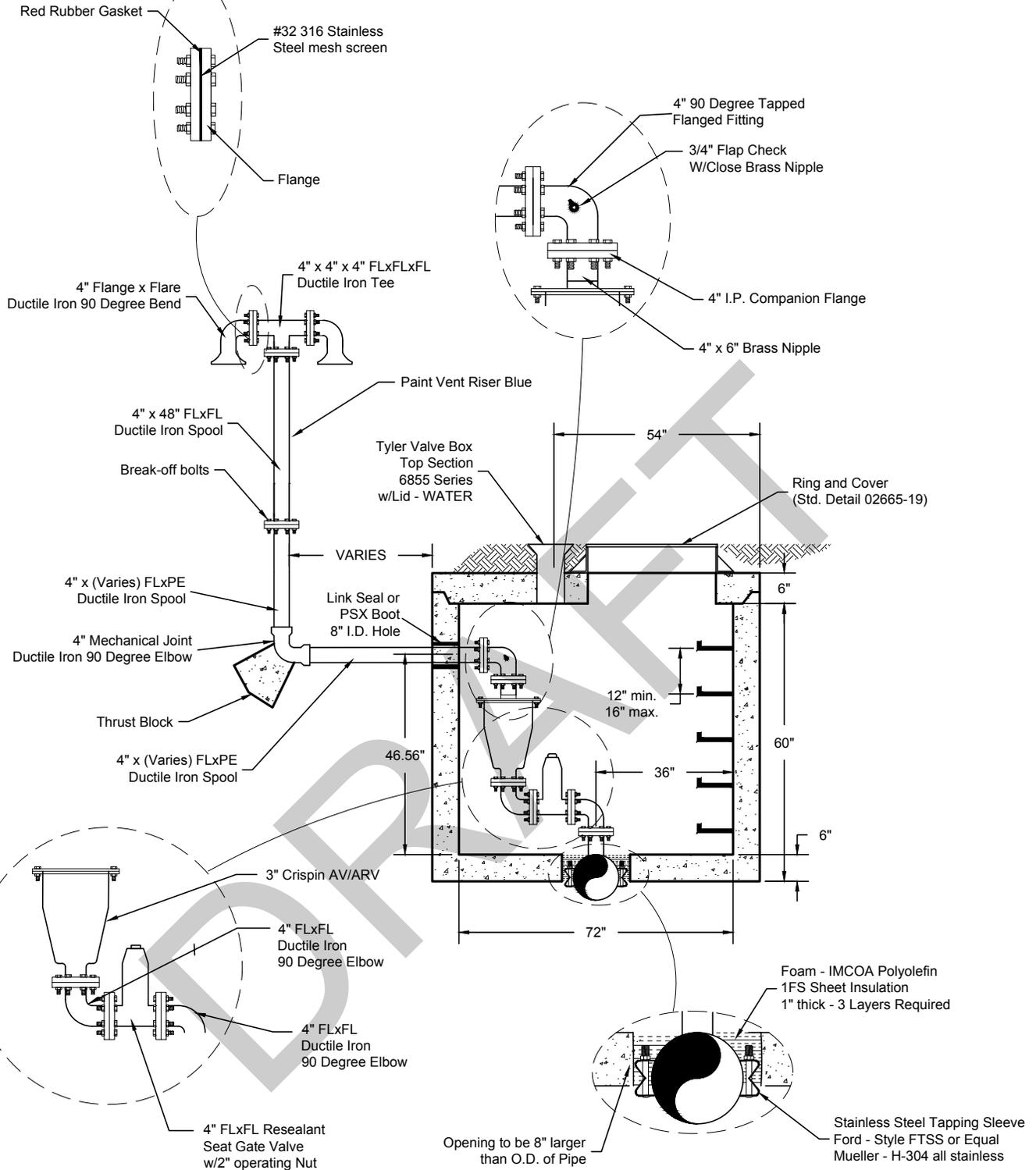
*City Of Gillette*  
 ENGINEERING DIVISION  
 P.O. BOX 3003, 201 E. 5TH STREET  
 GILLETTE, WYOMING 82717  
 PHONE: (307) 686-5311

**3" AIR VACUUM  
 AIR RELEASE VALVE**

DRAWN BY: CJS

APPROVED BY: CITY ENGINEER HV/KDS

DATE:	MARCH 2012
DRAWING NO.	02665-08



Notes:

1. Concrete - 4000 psi 28 day strength.
2. Reinforcement - ASTM A-615 Grade 60 and A-185 WWF.
3. Cement - Type V or Type II with W/C ratio < 0.45.
4. ASTM C-478 governs.
5. Steps shall be non corrosive rubber coated aluminum or nylon and be supplied with the vault.
6. The vault shall be 72" in diameter.



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PHONE: (307) 686-5311

## 4" AIR VACUUM AIR RELEASE VALVE

DRAWN BY:           CJS          

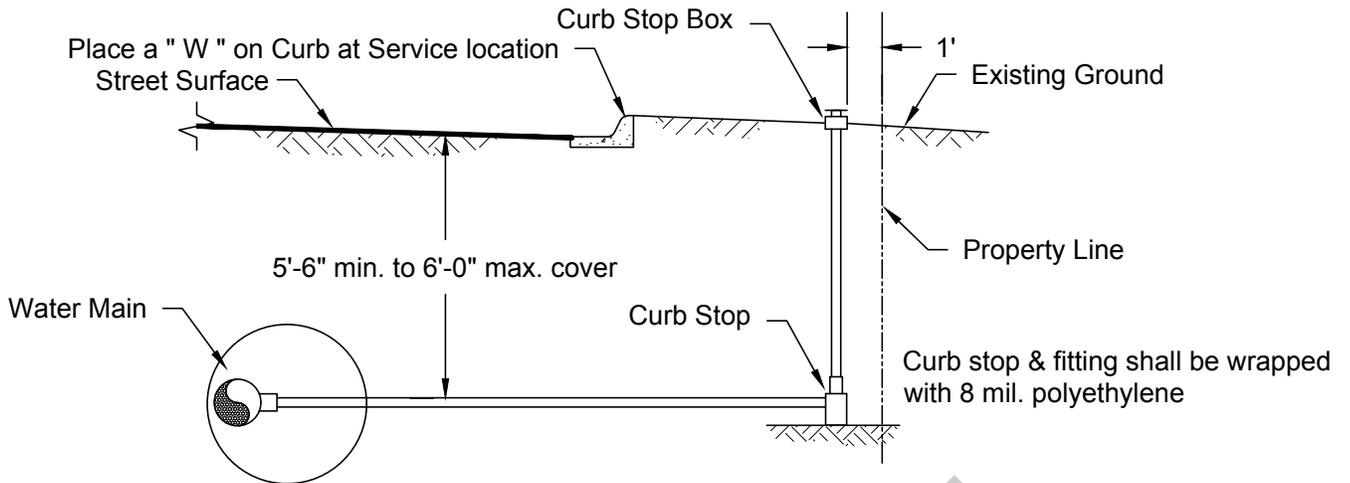
APPROVED BY: CITY ENGINEER           HV/KDS          

DATE:

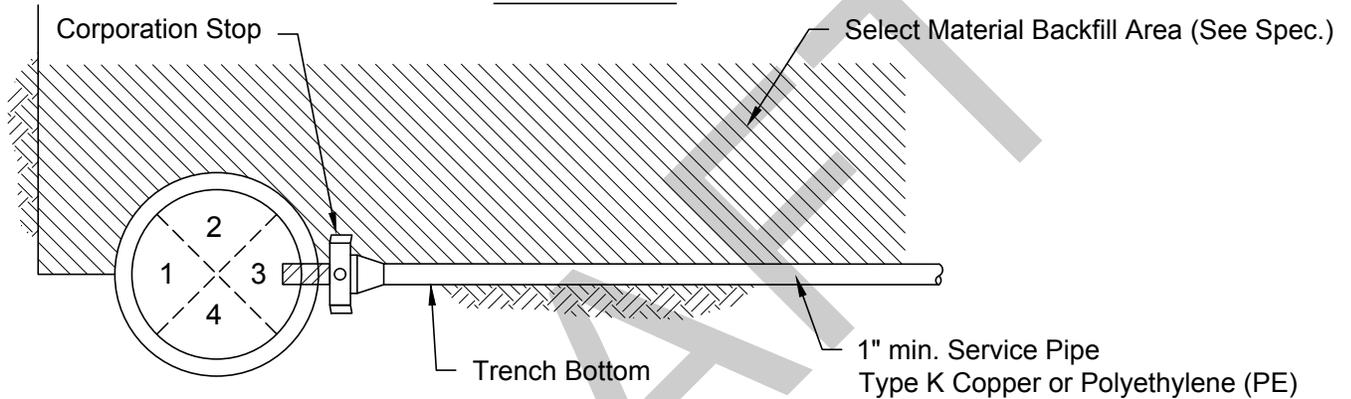
MARCH 2012

DRAWING NO.

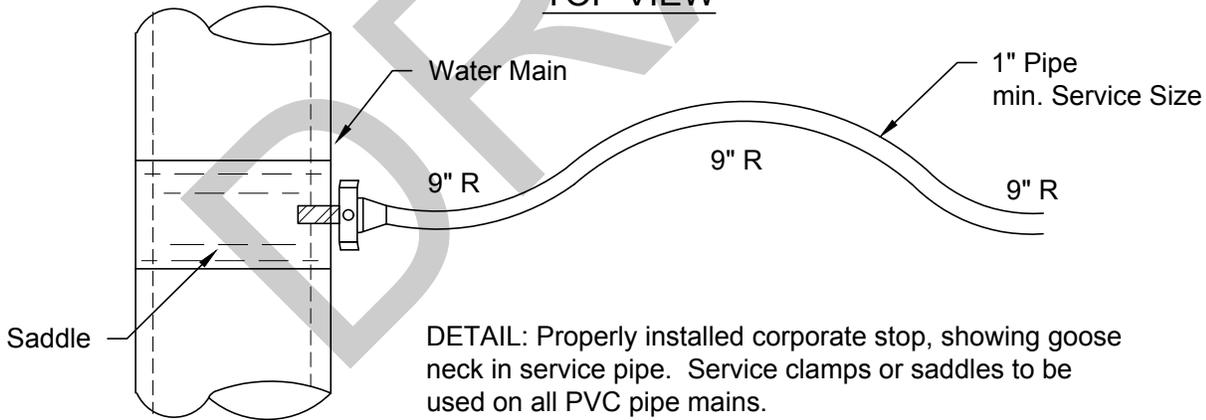
02665-09



**SIDE VIEW**



**TOP VIEW**



DETAIL: Properly installed corporate stop, showing goose neck in service pipe. Service clamps or saddles to be used on all PVC pipe mains.

**NOTES:**

1. Water Service lines shall have a minimum 5'-6" to 6'-0" maximum cover measured from the existing ground surface, except that cover shall be measured from centerline street grade when service lines are laid to a street side which has an uphill slope.
2. Water Service lines shall be installed EXACTLY where shown on the drawings or as specified.
3. Bedding shall be 1" diameter (maximum) within 6" of service pipe.
4. All brass fittings shall be lead-free.



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 GILLETTE, WYOMING 82717  
 PHONE: (307) 686-5311

**TYPICAL WATER SERVICE CONNECTION**

DATE:
MARCH 2012
DRAWING NO.
02665-10

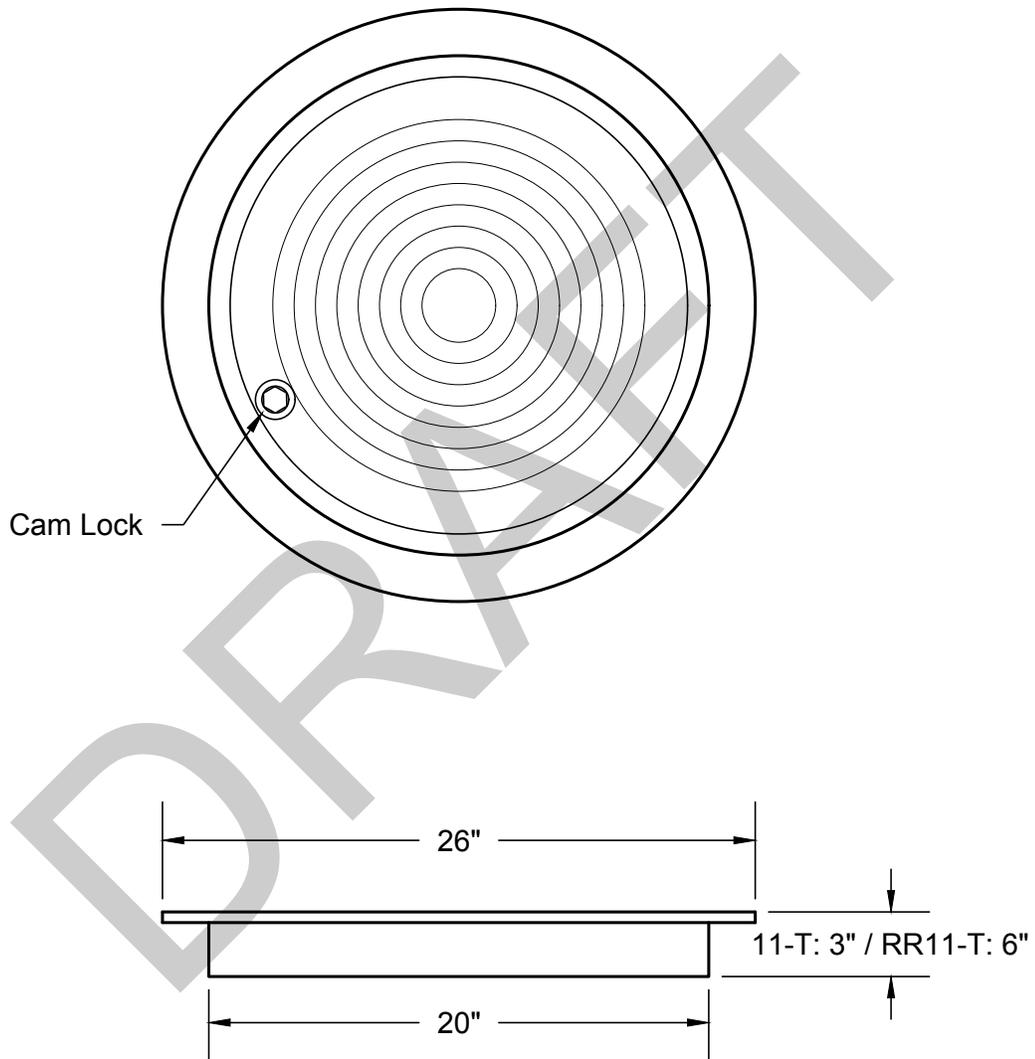
DRAWN BY: CJS

APPROVED BY: CITY ENGINEER HV/KDS

FORD - No. 11-T round pit ring  
and extra heavy lid (3" height).

FORD - RR11-T ring casting  
with extra heavy duty top lid (6"  
height).

MATERIAL: Cast gray iron  
ASTM A-48 Class 35B



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### WATER METER PIT FRAME COVER

DRAWN BY: CJS

APPROVED BY: CITY ENGINEER HV/KDS

DATE:

MARCH 2012

DRAWING NO.

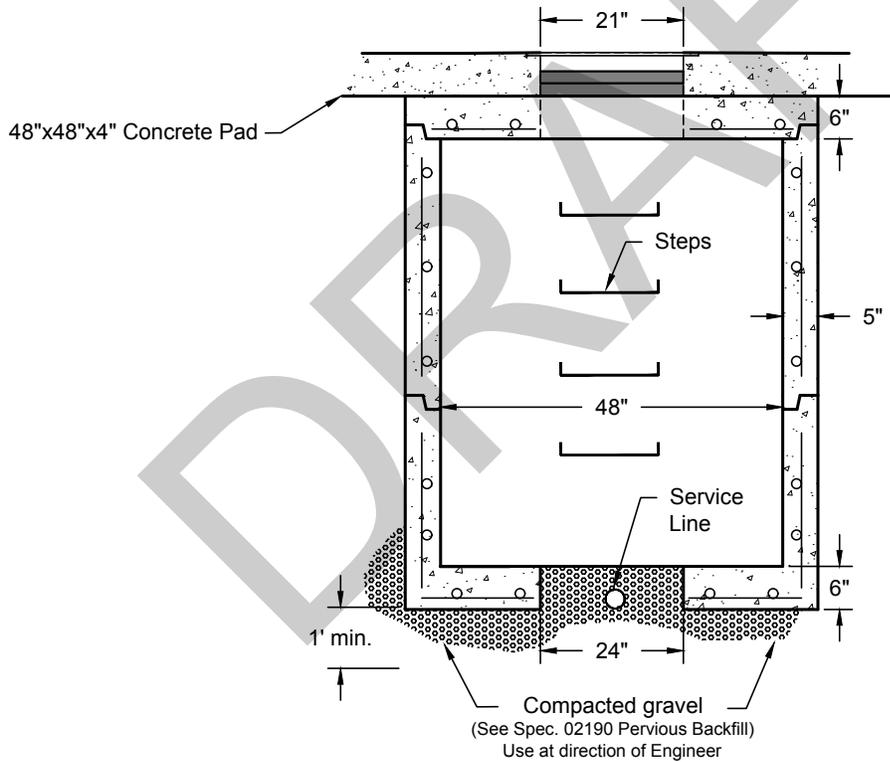
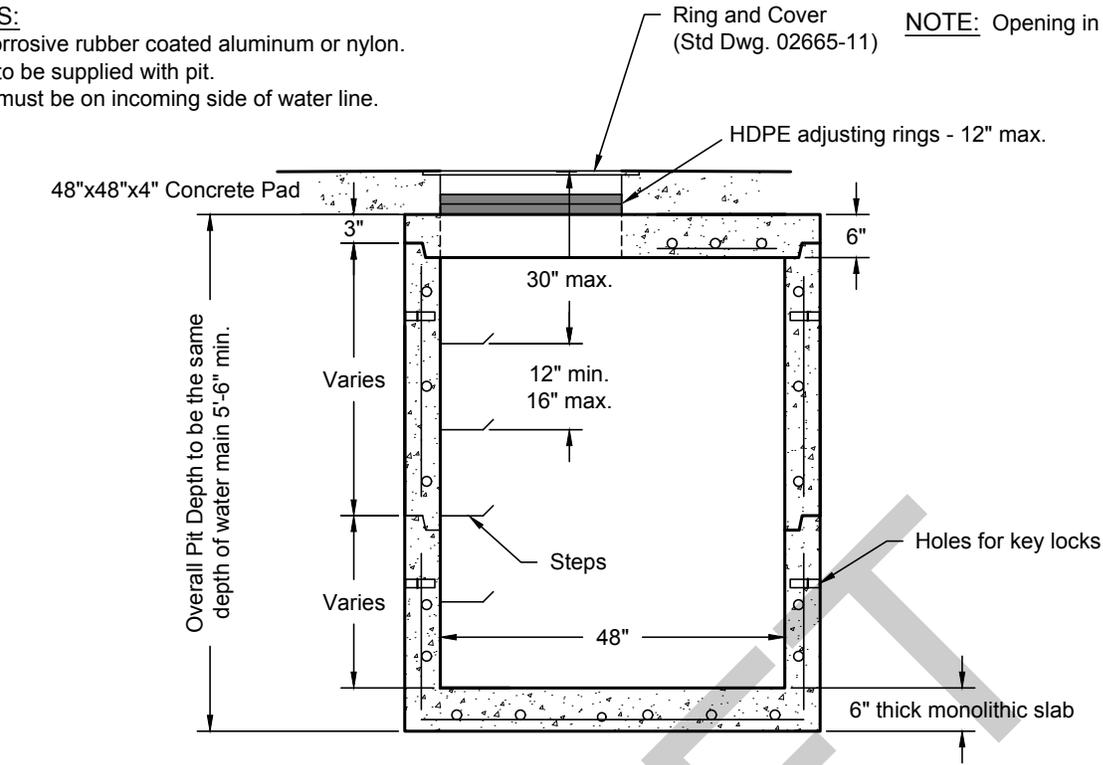
02665-11

**STEPS:**

Non corrosive rubber coated aluminum or nylon.  
 Steps to be supplied with pit.  
 Steps must be on incoming side of water line.

Ring and Cover  
 (Std Dwg. 02665-11)

**NOTE:** Opening in lid to be above steps.



- NOTES:**
1. Concrete - 4000 PSI 28 day strength.
  2. Reinforcement - ASTM A-615 Grade 60 and A-185 WWF.
  3. Cement - Type V or Type II with 5.5 bag mix and W/C ratio < 0.45.
  4. ASTM C-478 governs.
  5. Meter Pit installation to be located outside of sidewalk perimeters.



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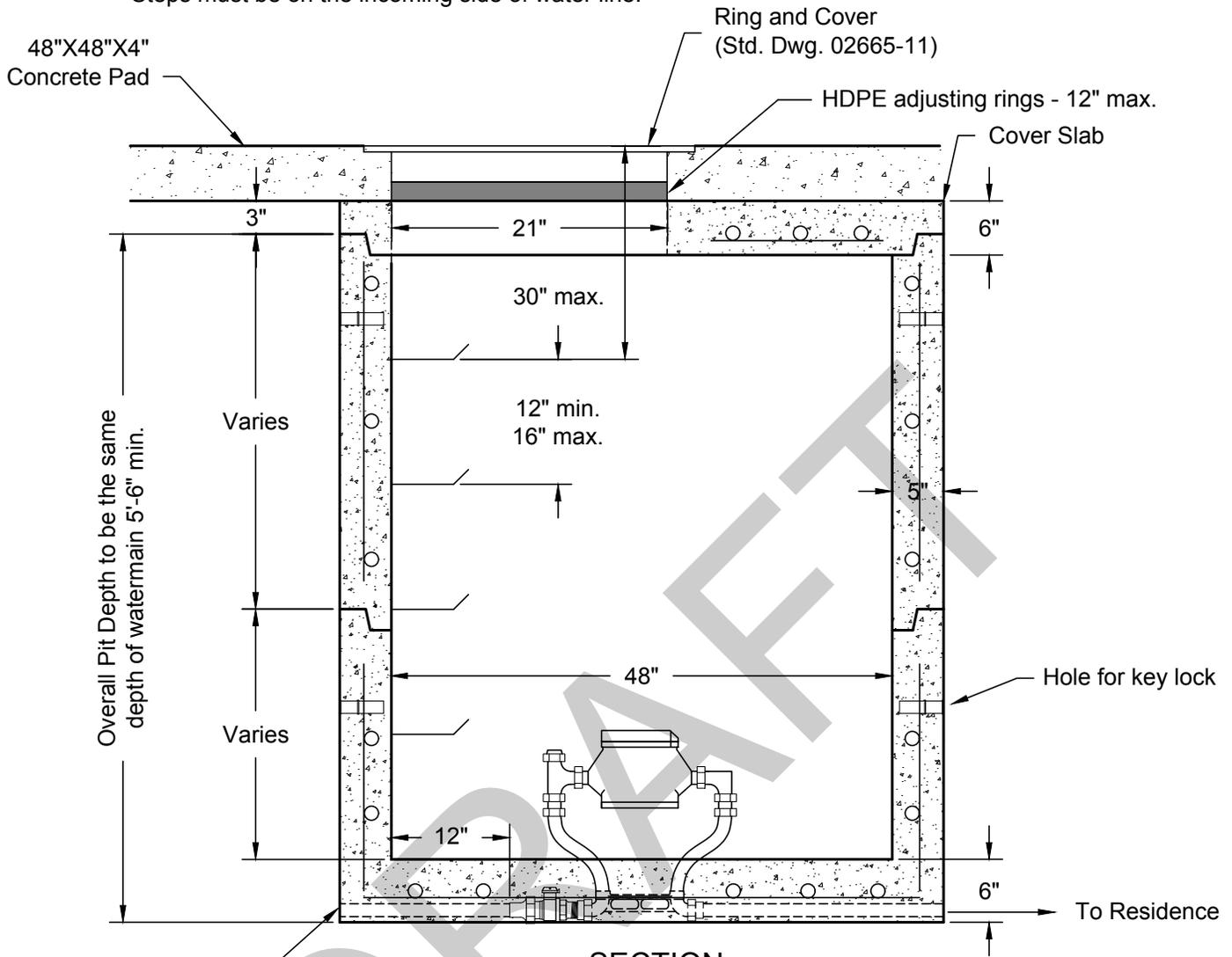
**METER PIT FOR  
 1" AND SMALLER METERS**

DRAWN BY: CJS

APPROVED BY: CITY ENGINEER HV/KDS

DATE:
MARCH 2012
DRAWING NO.
02665-12

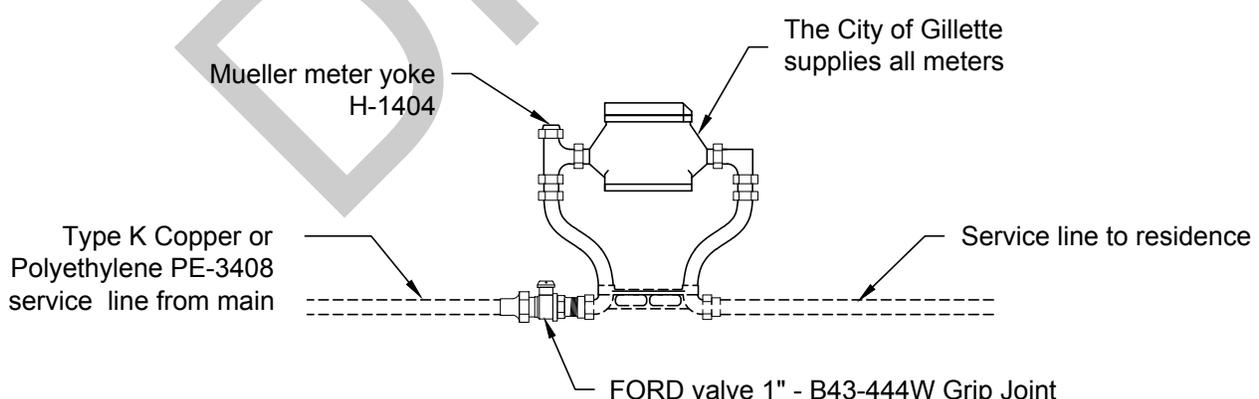
**STEPS** Non-corrosive rubber coated aluminum or nylon.  
 Steps to be supplied with pit.  
 Steps must be on the incoming side of water line.



**SECTION**

Flow from main

To Residence



**NOTES:**

1. Opening in lid to be above steps and valve.
2. 48"x48"x4" Concrete Pad is required when not located within a paved area.
3. Meter Pit Installation not allowed within sidewalk perimeters.



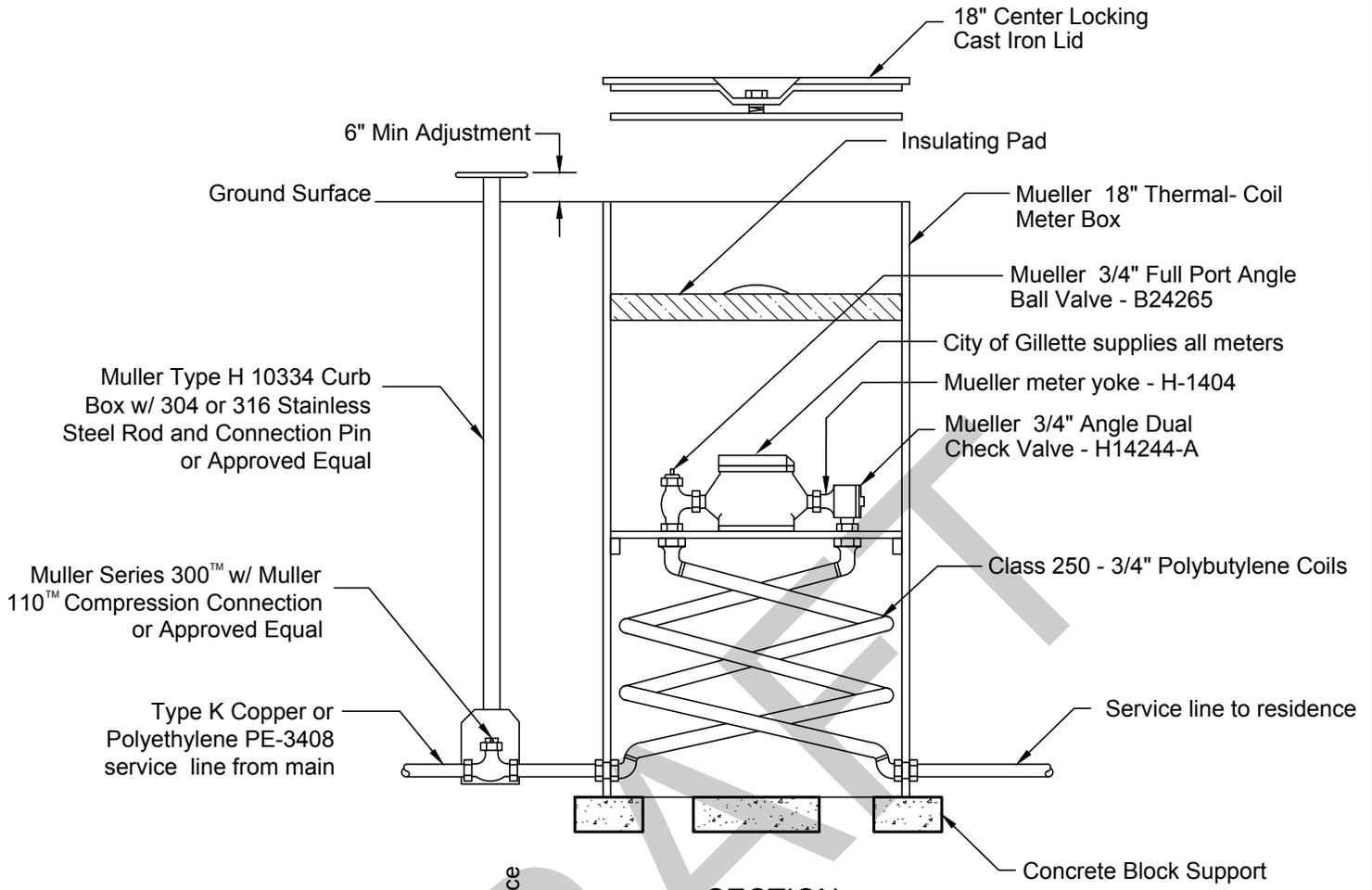
*City Of Gillette*  
 ENGINEERING DIVISION  
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 GILLETTE, WYOMING 82717  
 PHONE: (307) 686-5311

**TYPICAL METER INSTALLATION FOR  
 1" AND SMALLER METERS**

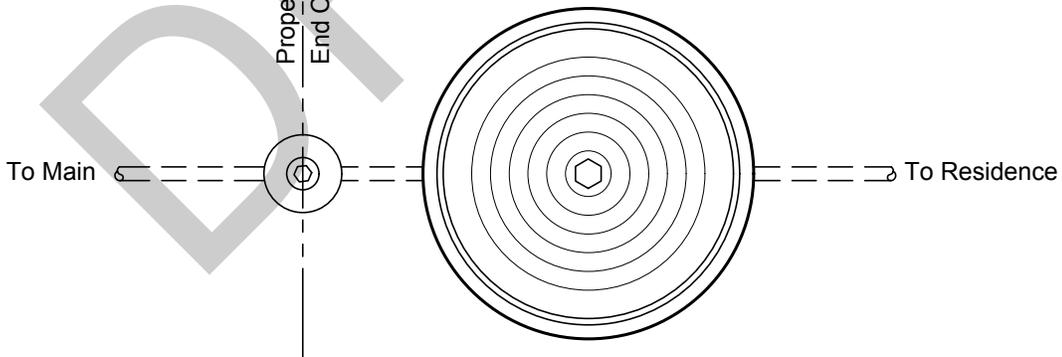
DRAWN BY: CJS

APPROVED BY: CITY ENGINEER HV/KDS

DATE:  
 MARCH 2012  
 DRAWING NO.  
 02665-13



SECTION



PLAN VIEW

**NOTES:**

1. City Maintenance Ends at Property Line. City will not Maintain Meter Pit.
2. Meter Pit shall not be installed within driveways or sidewalks.
3. All meters are to be supplied by the City of Gillette.



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**THERMAL-COIL METER BOX**

DRAWN BY: CJS

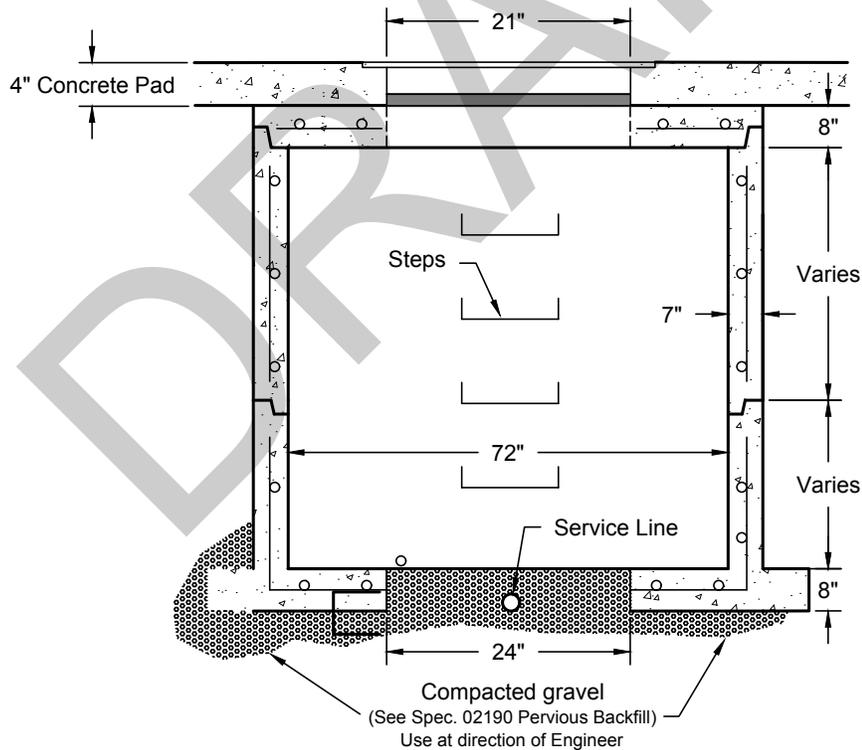
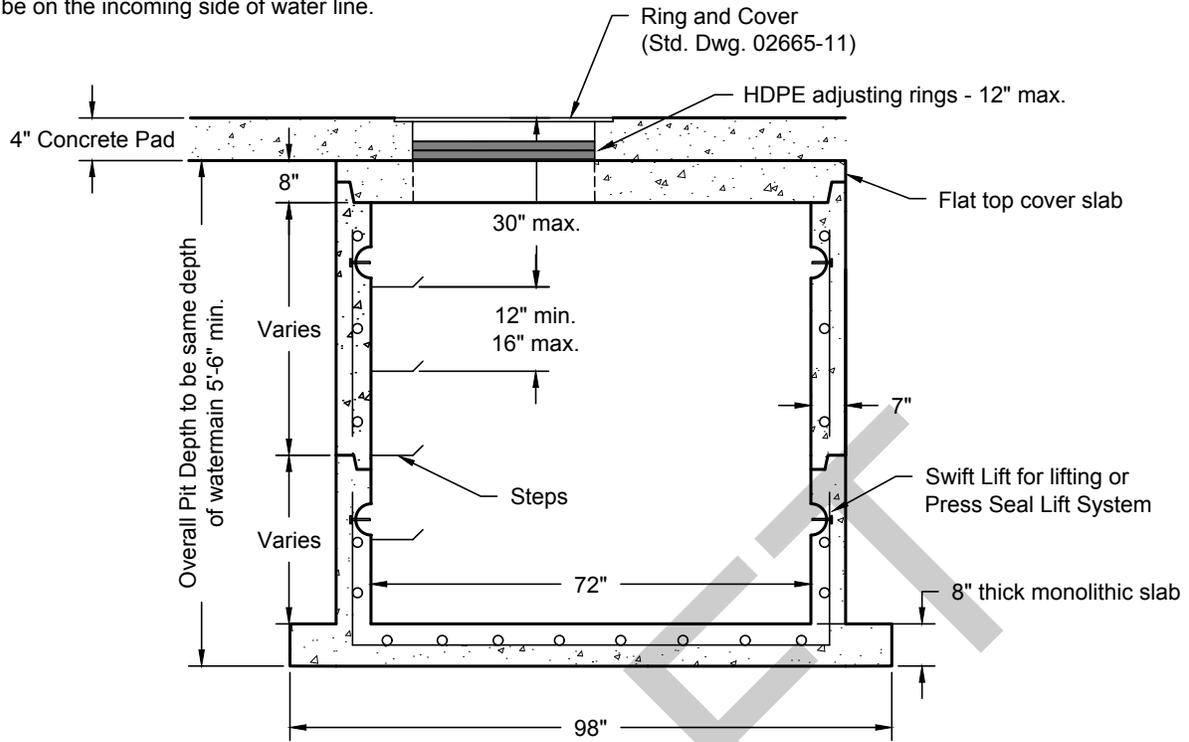
APPROVED BY: CITY ENGINEER HV/KDS

DATE:
MARCH 2012
DRAWING NO.
02665-14

**STEPS:**

Non corrosive rubber coated aluminum or nylon.  
 Steps to be supplied with pit.  
 Steps must be on the incoming side of water line.

**NOTE:** Opening in lid is to be above steps and Valve.



**NOTES:**

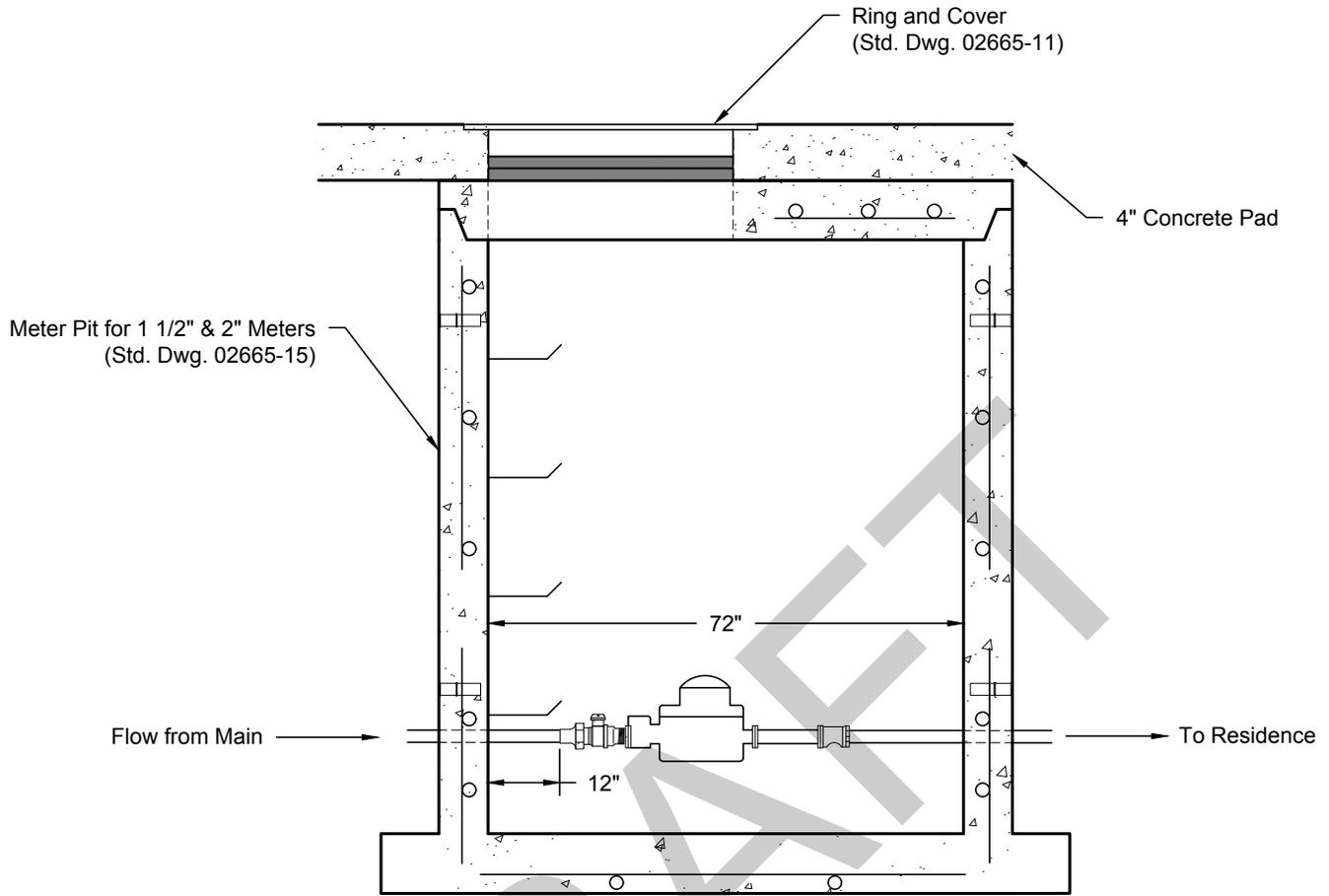
1. Concrete - 4000 PSI 28 Day strength.
2. Reinforcement - ASTM A-615 Grade 60 and A-185 WWF.
3. Cement - Type V or Type II modified.
4. ASTM C-478 governs.
5. Meter Pit Installation to be located outside of sidewalk perimeters.
6. 48"x48"x4" Concrete Pad is required when not in a paved area.


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 PHONE: (307) 686-5311

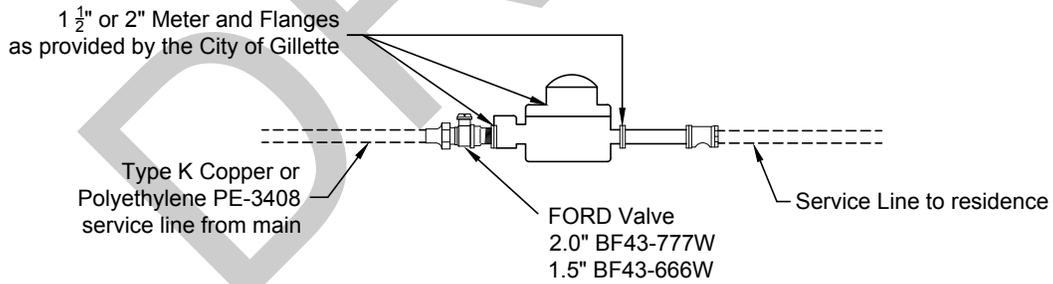
**METER PIT FOR**  
**1 1/2" & 2" METERS**

DRAWN BY: CJS      APPROVED BY: CITY ENGINEER HV/KDS

DATE:  
 MARCH 2012  
 DRAWING NO.  
 02665-15



**SECTION**



**NOTES:**

1. Opening in lid to be above steps and valve.
2. 48"x48"x4" Concrete Pad is required when not located within a paved area.
3. Meter Pit installation to be located outside of sidewalk perimeter.



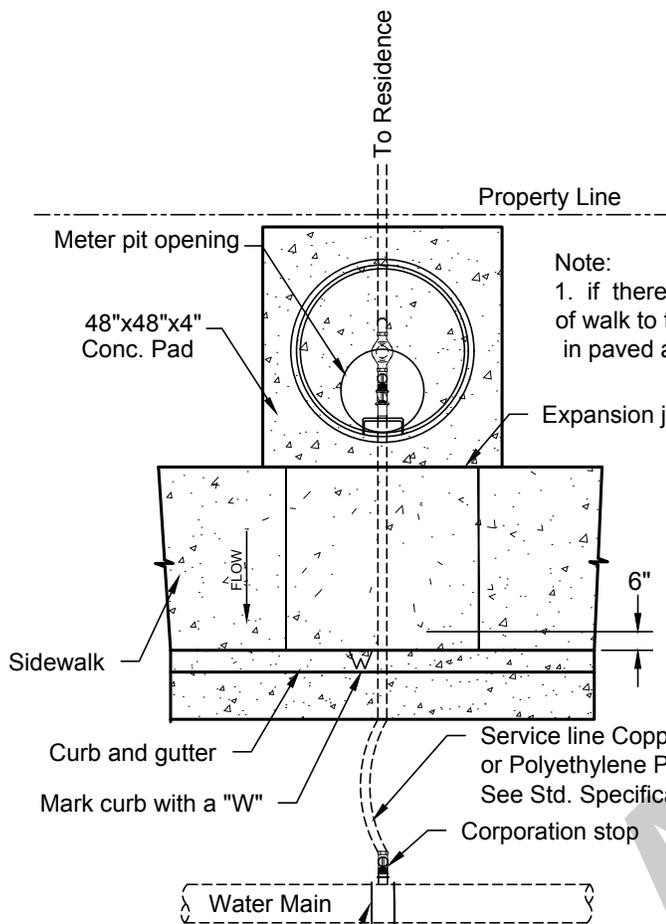
*City Of Gillette*  
 ENGINEERING DIVISION  
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 GILLETTE, WYOMING 82717  
 PHONE: (307) 686-5311

**TYPICAL METER INSTALLATION FOR  
 1 1/2" & 2" METERS**

DRAWN BY: CJS

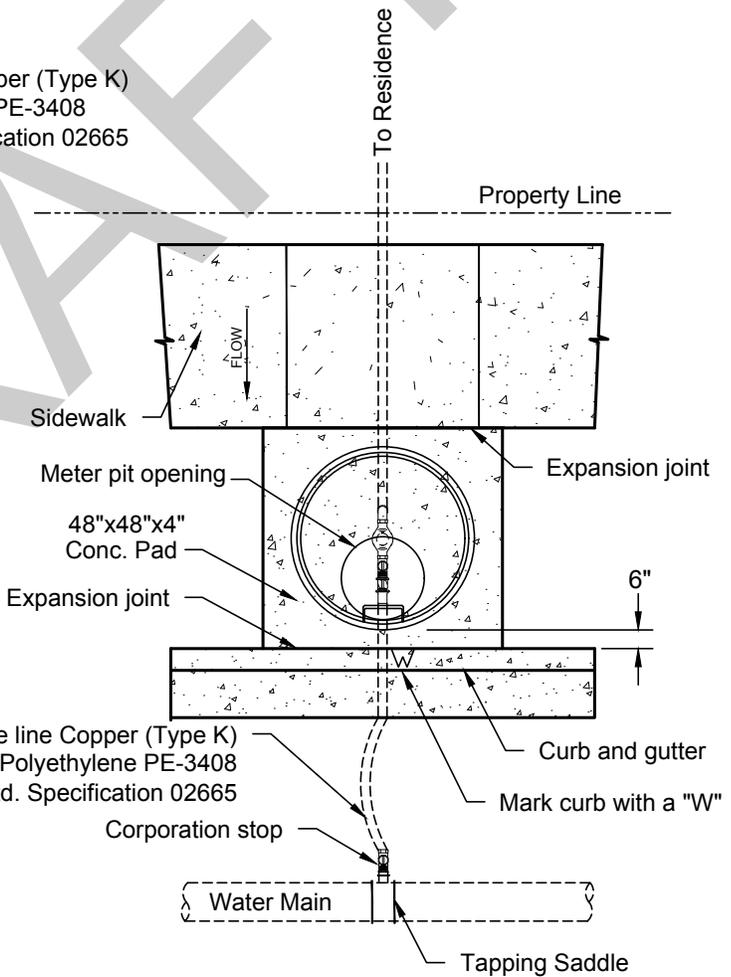
APPROVED BY: CITY ENGINEER HV/KDS

DATE:	MARCH 2012
DRAWING NO.	02665-16



Note:  
1. if there is not enough distance from Back of walk to the Property Line install Meter Pit in paved area.

Plan View - Attached Sidewalk



Plan View - Detached Sidewalk

**NOTE:**

1. Not Applicable for Thermal-Coil Meter Pits.



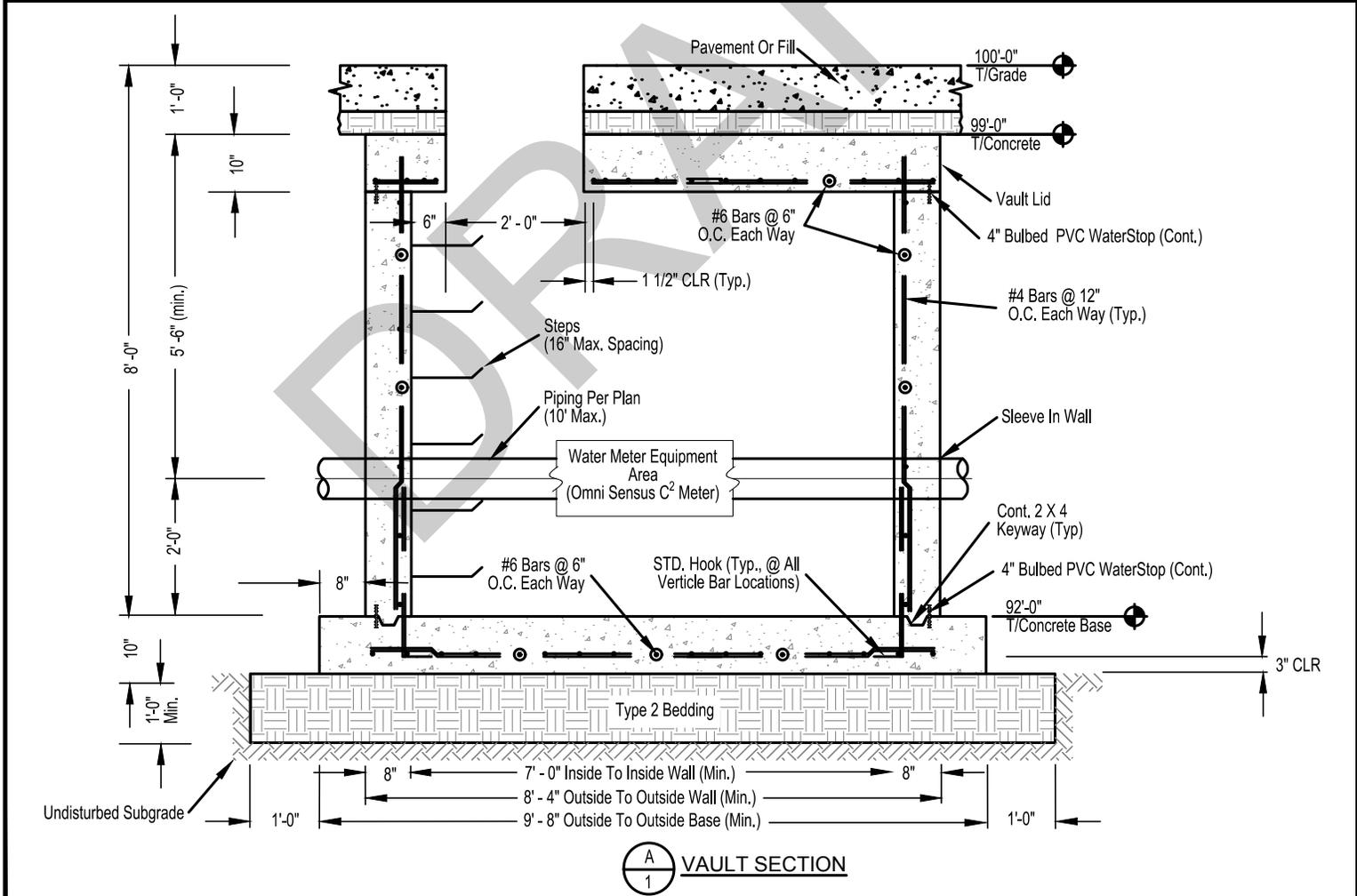
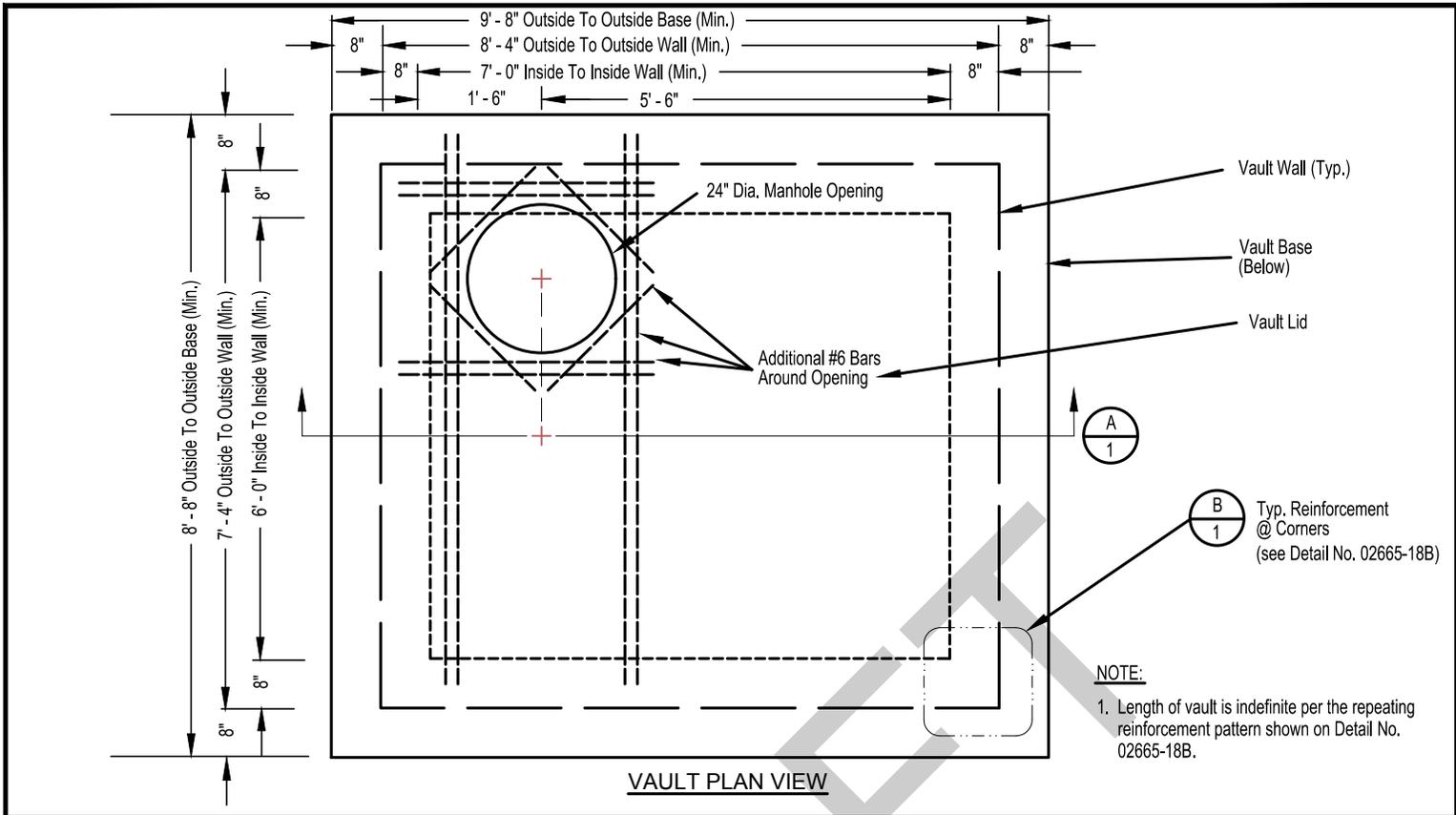
*City Of Gillette*  
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GILLETTE, WYOMING 82717  
PHONE: (307) 686-5311

**TYPICAL METER PIT PLACEMENT**

DRAWN BY: CJS

APPROVED BY: CITY ENGINEER HV/KDS

DATE:
MARCH 2012
DRAWING NO.
02665-17



*City of Gillette*

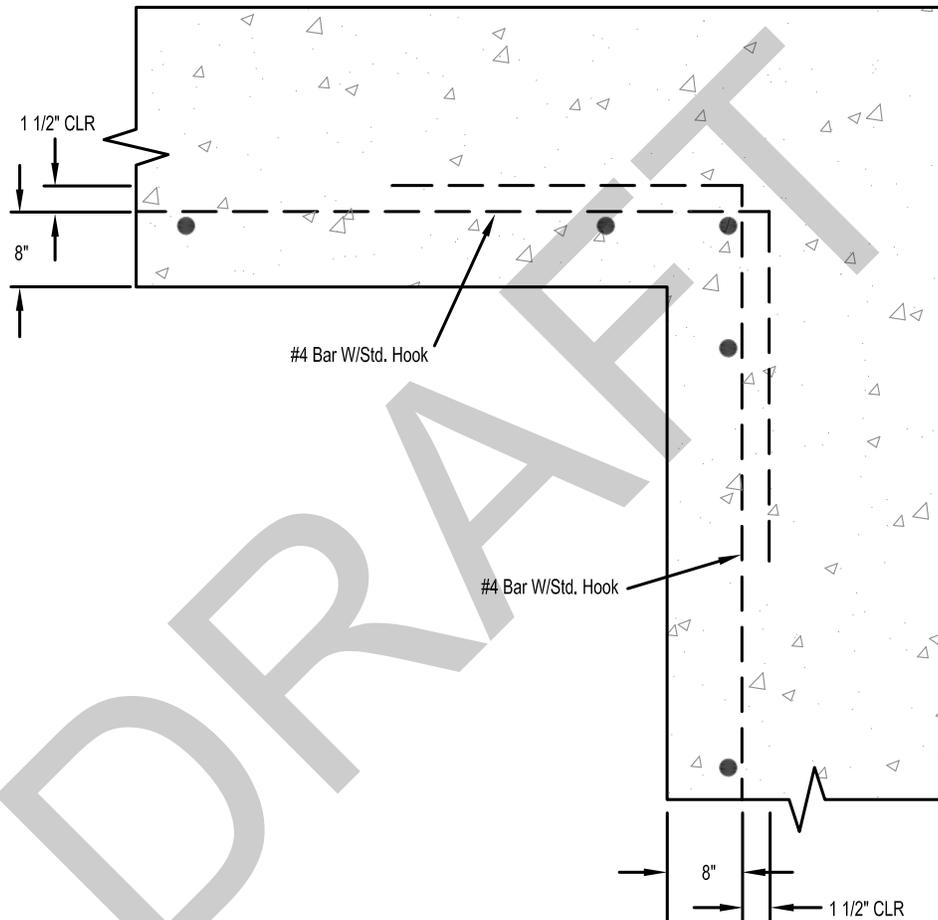
ENGINEERING DIVISION  
P.O. BOX 3003, 201 E. 5TH STREET  
GILLETTE, WYOMING 82717  
PHONE: (307) 686-5311

**WATER METER VAULT (6' X 7') FOR  
3" AND LARGER METERS**

DRAWN BY: KEB

APPROVED BY: CITY ENGINEER HV/KDS

DATE:  
MARCH 2012  
DRAWING NO.  
02665-18A



$\frac{B}{1}$  TYPICAL DETAIL @ WALL CORNERS



*City Of Gillette*

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 GILLETTE, WYOMING 82717  
 PHONE: (307) 686-5311

METER VAULT REINFORCEMENT  
 @ WALL CORNERS

DRAWN BY: KEB

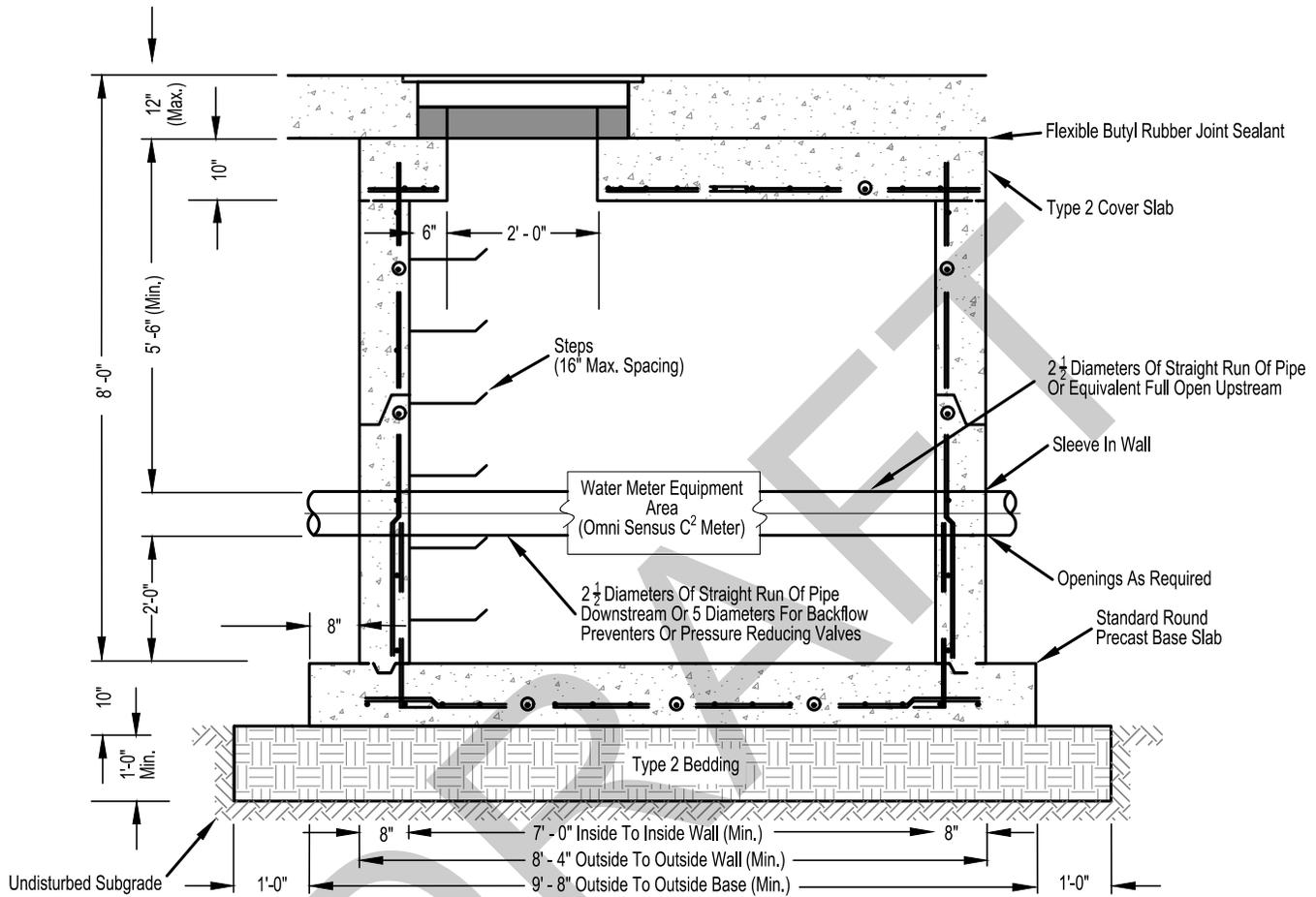
APPROVED BY: CITY ENGINEER HV/KDS

DATE:

MARCH 2012

DRAWING NO.

02665-18B



**NOTE:**

1. Full Open Gate Valve Included In Straight Run Of Pipe.



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 PHONE: (307) 686-5311

## FLAT TOP MANHOLE (PRECAST) FOR 3" AND LARGER METERS

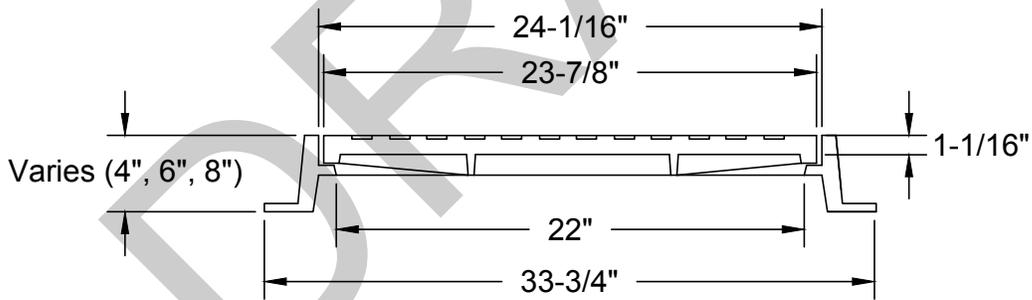
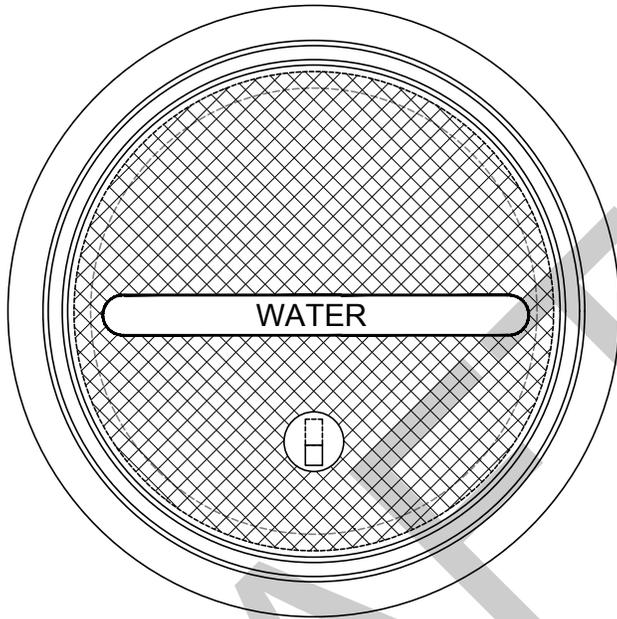
DRAWN BY: KEB

APPROVED BY: CITY ENGINEER HV/KDS

DATE:  
 MARCH 2012  
 DRAWING NO.

02665-19

MATERIAL: Cast gray iron (ASTM A-48 Class 35B)	LID #: D&L FOUNDRY #A-1161 = Lid (cover) to be used for all rings
	RING #: D&L FOUNDRY #A-1071 (4") = 12" adjusting rings (max.)
FINISH: No paint	RING #: D&L FOUNDRY #A-1043 (6") = 10" adjusting rings (max.)
LID: SELF SEALING	RING #: D&L FOUNDRY #A-1161 (8") = 8" adjusting rings (max.)



NOTES: (all of the following must be specified when ordering)

1. Furnished with machined horizontal bearing surface.
2. "WATER" lettering on cover.
3. All lids shall have a cross-hatched pattern with a closed pick hole.
4. All lids shall be self-sealing.



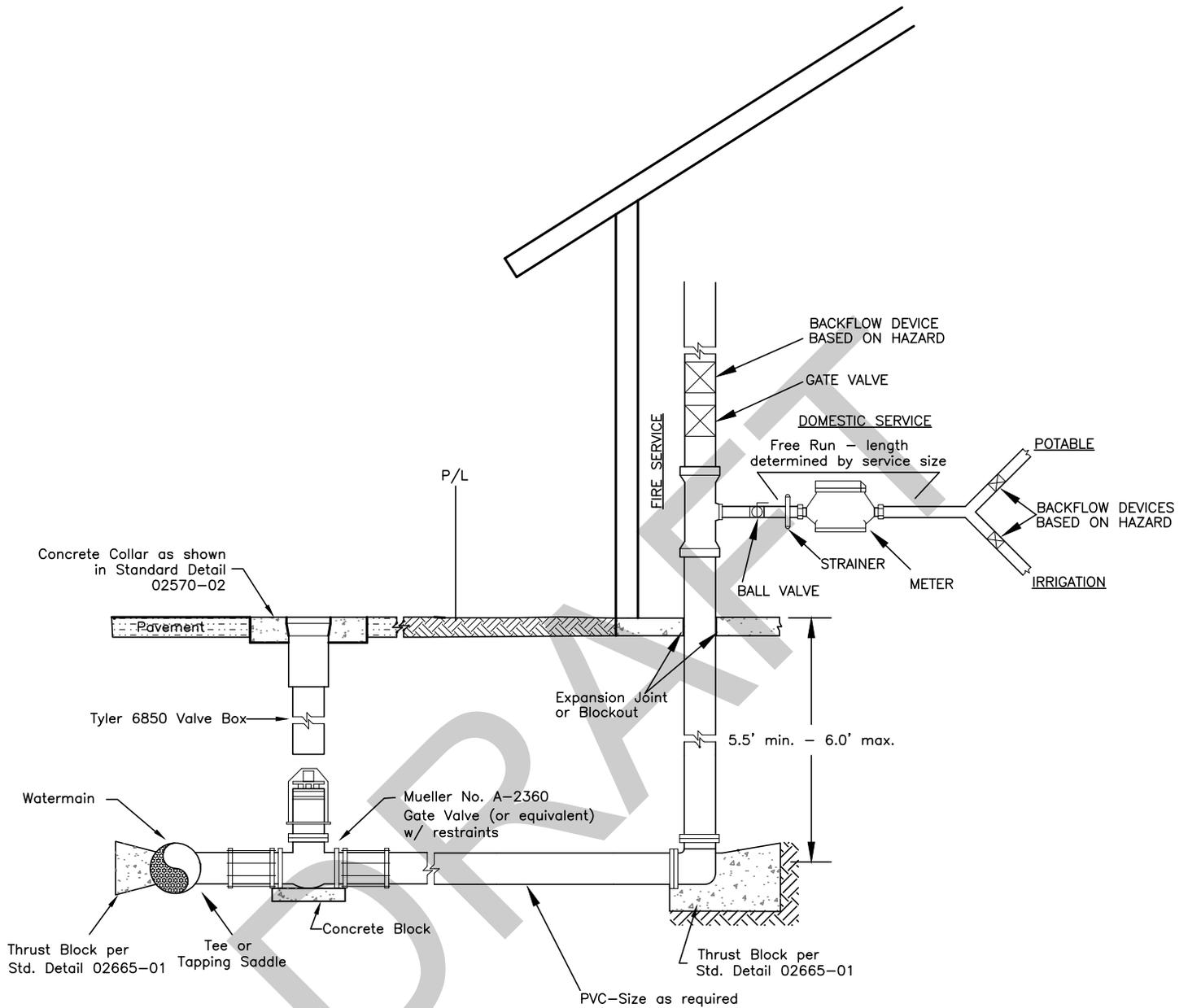
*City Of Gillette*  
 ENGINEERING DIVISION  
 P.O. BOX 3003, 201 E. 5TH STREET  
 GILLETTE, WYOMING 82717  
 PHONE: (307) 686-5311

**WATER ACCESS MANHOLE  
 RING & COVER**

DRAWN BY: CJS

APPROVED BY: CITY ENGINEER HV/KDS

DATE:
MARCH 2012
DRAWING NO.
02665-20



**NOTE:**

1. Tapping Saddle shall be Smith-Blair 622 Series, Dresser Style 610, or engineer approved equal.
2. If Tee is used, Valve shall be located 18" - 24" from Tee and be restrained to pipe.
3. Free Runs before and after meter are only required for domestic services 1.5" and larger. The length of the free run shall be determined by the service size.
4. Zinc caps shall be provided for Cathodic protection of all tapping sleeve bolts.



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PHONE: (307) 686-5311

**TYPICAL FIRE SERVICE  
WITH DOMESTIC SERVICES**

DRAWN BY: DLH

APPROVED BY: CITY ENGINEER HV/KDS

DATE:

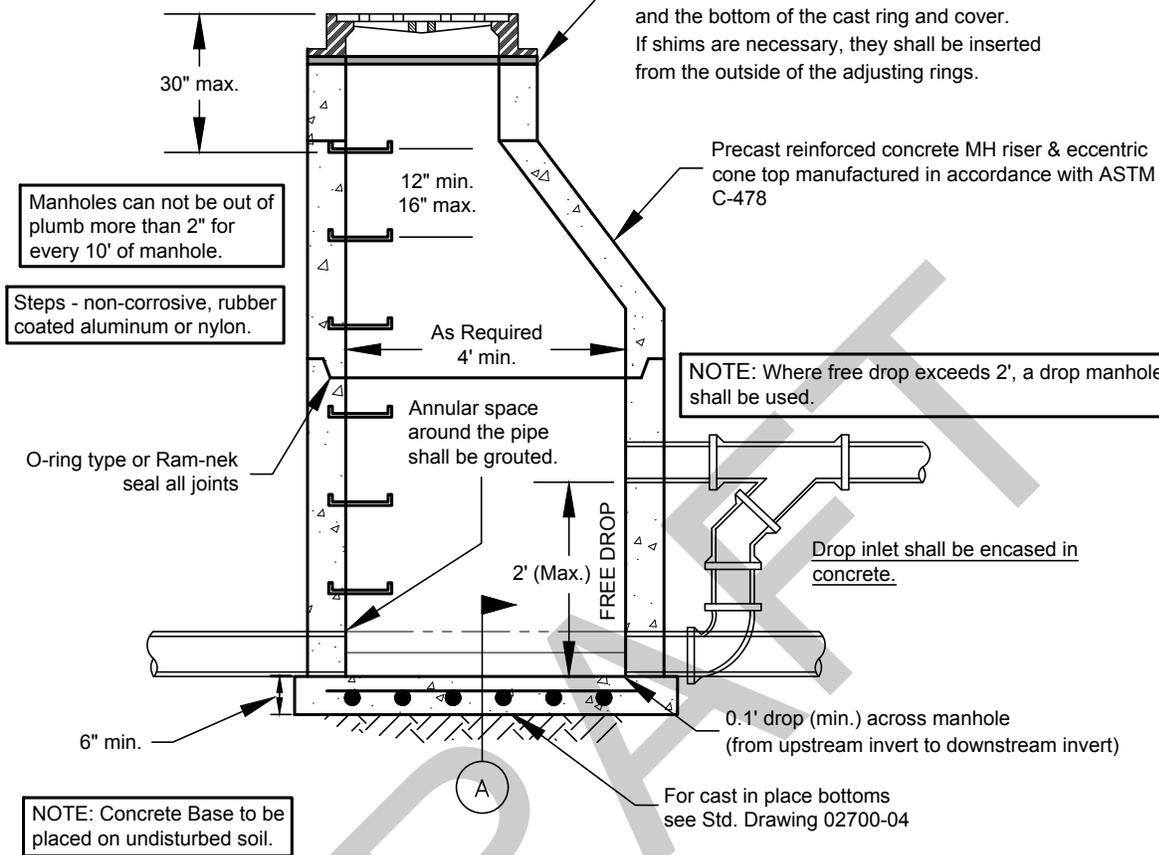
MARCH 2012

DRAWING NO.

02665-21

HDPE adjusting rings =  
 (height varies based on ring used - see Note 2)  
 (see details 02665-20, 02700-07, 02725-07)

Adjusting rings are to be sealed with Ram-nek,  
 only between the top of the cone and the bottom  
 adjusting ring and between the top adjusting ring  
 and the bottom of the cast ring and cover.  
 If shims are necessary, they shall be inserted  
 from the outside of the adjusting rings.



NOTE: Where free drop exceeds 2', a drop manhole shall be used.

Drop inlet shall be encased in concrete.

NOTE: Concrete Base to be placed on undisturbed soil.

For cast in place bottoms see Std. Drawing 02700-04

Shelf - Slope 1" / ft (min.)  
 2" / ft (max.)  
 Varies (Half Pipe Dia.)

4" Min.

SECTION A

**NOTES:**

1. All Sanitary Sewer MH covers shall be non-ventilated, self-sealing, D&L Foundry A-1161 with closed pick hole and a cross-hatched lid design, or Engineer-approved equal.
2. All rings shall be D&L Foundry A-1071 (4"), A-1043 (6"), A-1161 (8"), or Engineer-approved equal. The combined height of manhole ring used and adjusting rings shall not exceed 16" total.
3. No grout shall be used anywhere in the interior of the manhole except for the pipe invert. **NO GROUTING AROUND ADJUSTING RINGS.**
4. Channelization of flowline between pipe inverts may be formed directly in the concrete of the base or may be a half-pipe laid in concrete.

**SANITARY SEWER MANHOLE  
 (PRECAST)**

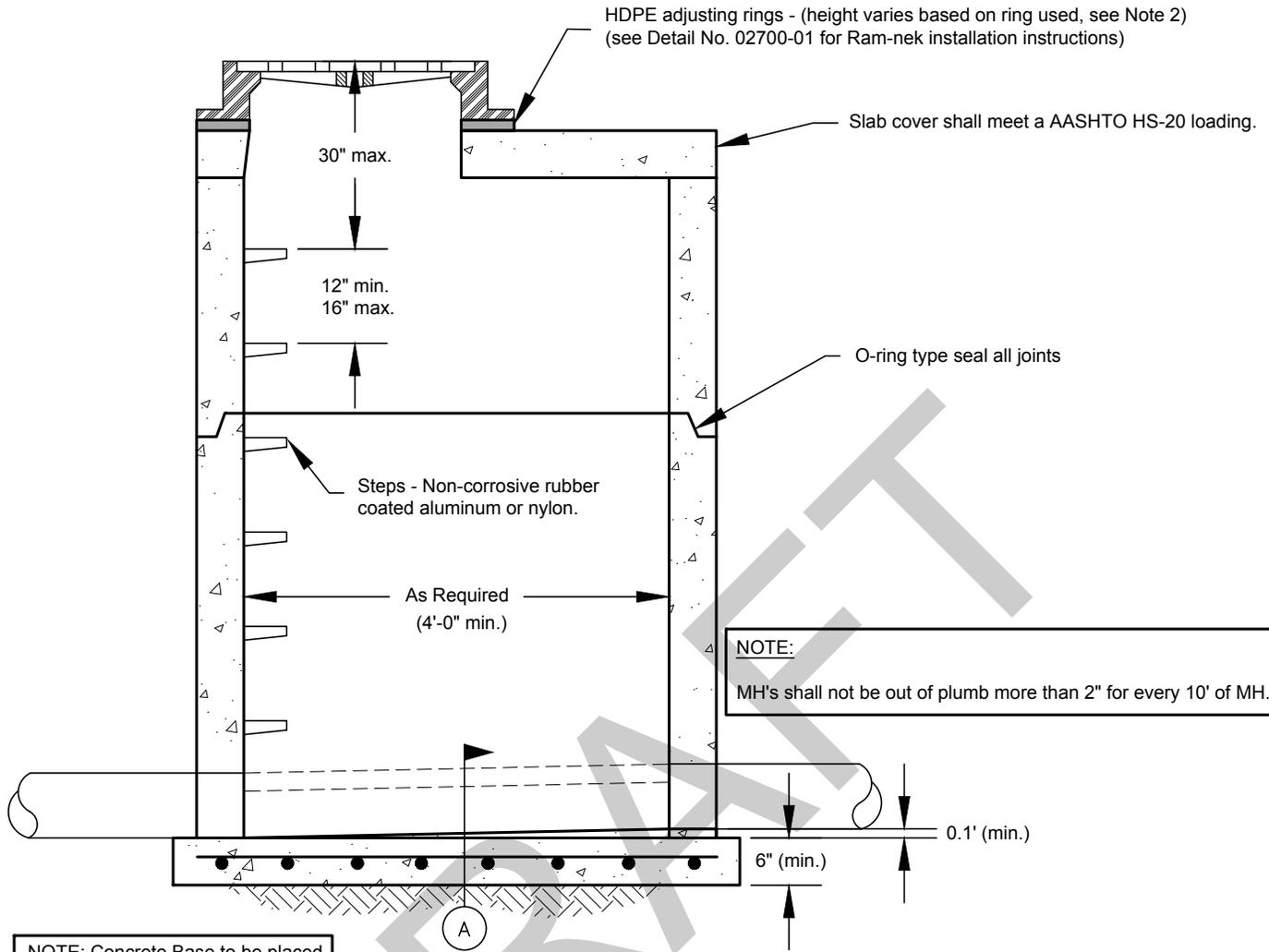


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 P.O. BOX 3003, 201 E. 5TH STREET  
 GILLETTE, WYOMING 82717  
 PHONE: (307) 686-5311

DRAWN BY: CJS

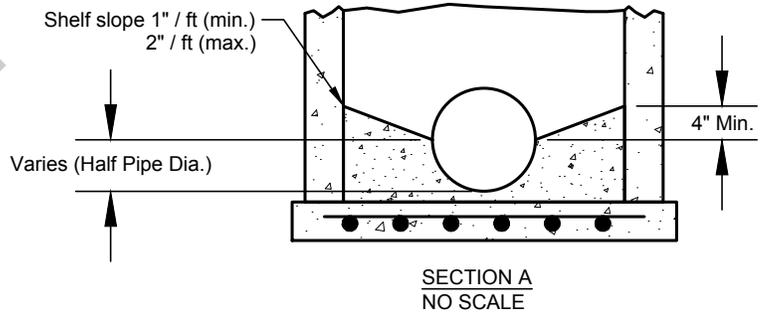
APPROVED BY: CITY ENGINEER HV/KDS

DATE:	
MARCH 2012	
DRAWING NO.	
	02700-01



**NOTE:**  
MH's shall not be out of plumb more than 2" for every 10' of MH.

**NOTE:** Concrete Base to be placed on undisturbed soil.



**NOTES:**

1. All Sanitary Sewer MH covers shall be non-ventilated, self-sealing, D&L Foundry A-1161 with closed pick hole and a cross-hatched lid design, or Engineer-approved equal.
2. All rings shall be D&L Foundry A-1071 (4"), A-1043 (6"), A-1161 (8"), or Engineer-approved equal. The combined height of manhole ring used and adjusting rings shall not exceed 16" total.
3. No grout shall be used anywhere in the interior of the manhole except for the pipe invert. **NO GROUTING AROUND ADJUSTING RINGS.**
4. Channelization of flowline between pipe inverts may be formed directly in the concrete of the base or may be a half-pipe laid in concrete.



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**SANITARY SEWER MANHOLE  
(FLAT TOP)**

DRAWN BY:           CJS          

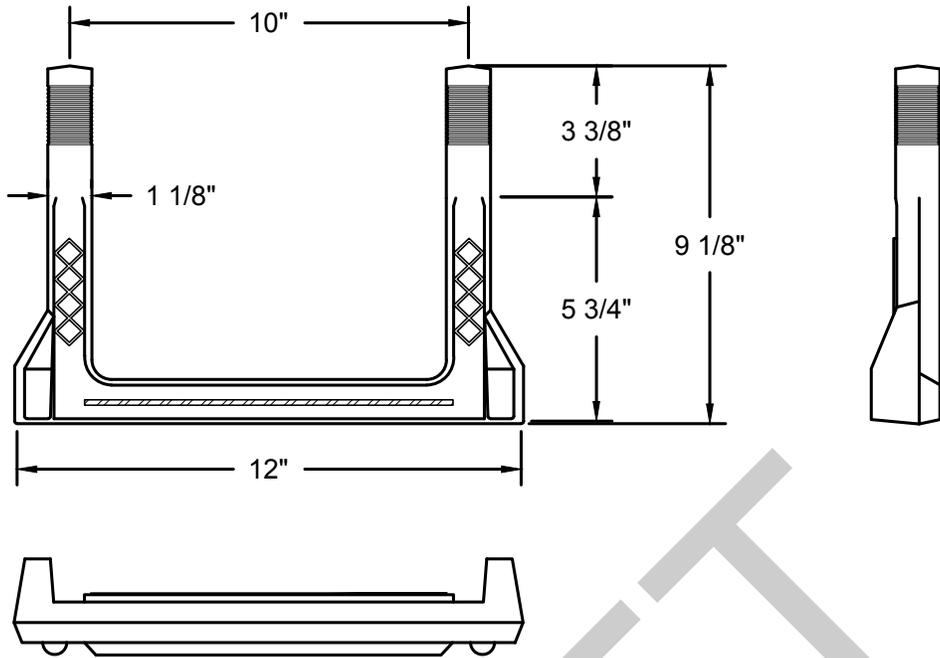
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DATE:

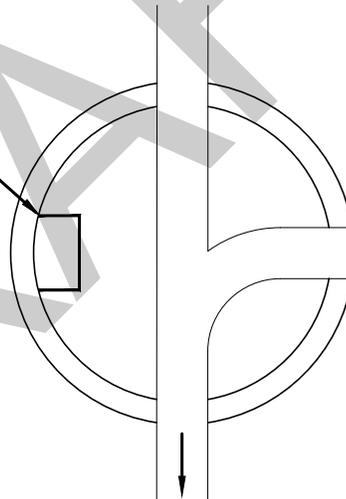
JULY 2012

DRAWING NO.

02700-02



Step Location Over Shelf



**NOTES:**

1. Manhole Step PSI-PF, as manufactured by M.A. Industries, Inc. Peachtree City Georgia, 404-487-7761.
2. Copolymer Polypropylene coating meets ASTM D-4101-Latest Revision.
3. Steps meet ASTM C478 requirements and are on a 12" min./16" max. vertical spacing.
4. Step legs are driven into 1" diameter holes in the manhole wall.
5. Steps are nonsparking, nonconducting and nonabrasive.



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**STANDARD STEPS FOR MANHOLES**

DRAWN BY:           E.G.          

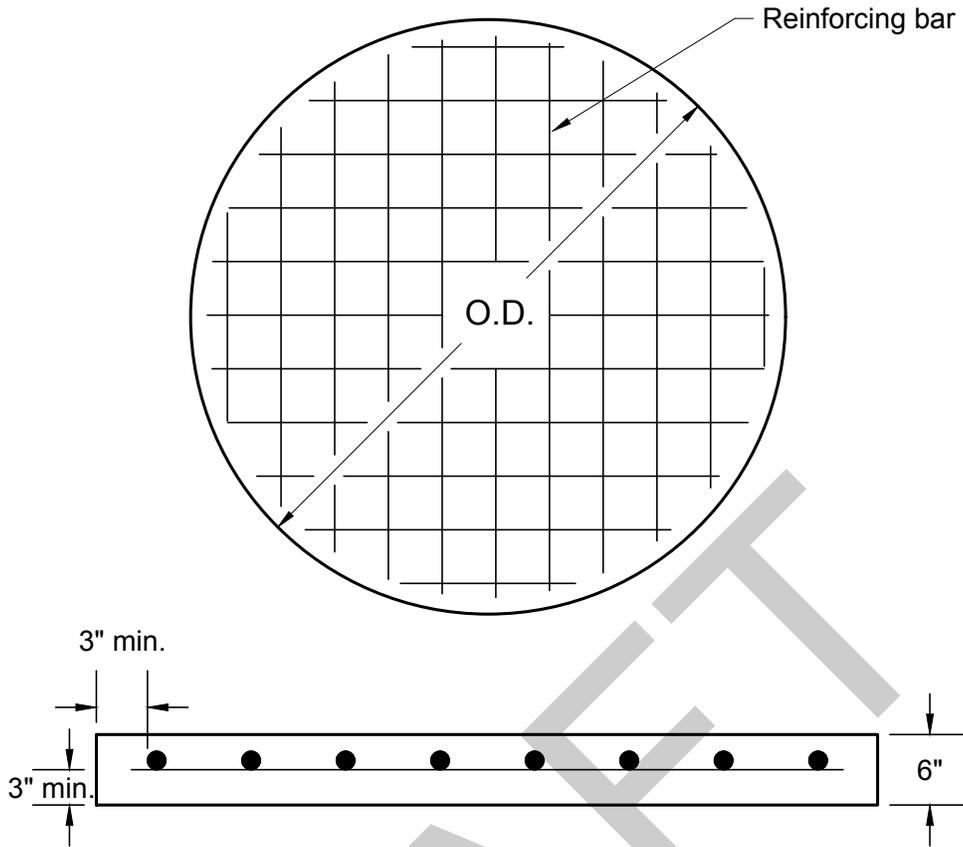
APPROVED BY: CITY ENGINEER           HV/KDS          

DATE:

MARCH 2012

DRAWING NO.

02700-03



MANHOLE SIZE	BASE O.D.	BASE REINFORCING	TOTAL WT.
48"	64"	#4@8" EACH WAY	1675+
60"	78"	#4@8" EACH WAY	2409+
72"	92"	#4@6" EACH WAY	3465+

**NOTES:**

1. Bases may be cast in place or precast.
2. All concrete shall be City Class B.
3. Bases to be placed on undisturbed soil.
4. If over-excavated, shall re-establish elevation with compacted base.



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**MANHOLE BASES**  
(48", 60", 72")

DATE:

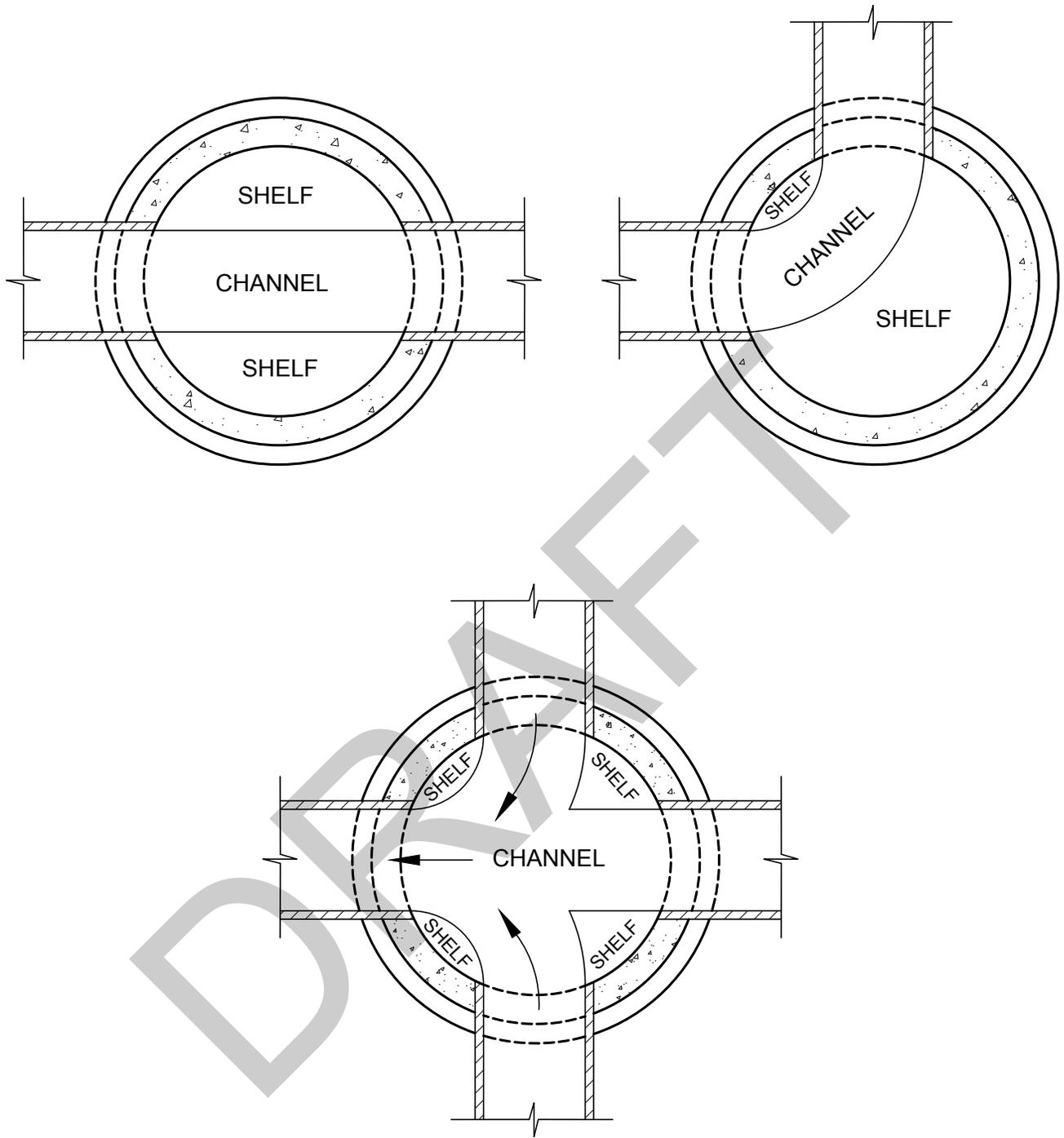
MARCH 2012

DRAWING NO.

02700-04

DRAWN BY:           E.G.          

APPROVED BY: CITY ENGINEER           HV/KDS



NOTES:

1. Slope all shelves to channel at min. 1" per foot or 2" per foot max.
2. See plan and profile sheets for slope of channel.



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 PHONE: (307) 686-5311

MANHOLE CHANNEL DETAILS

DRAWN BY:           E.G.          

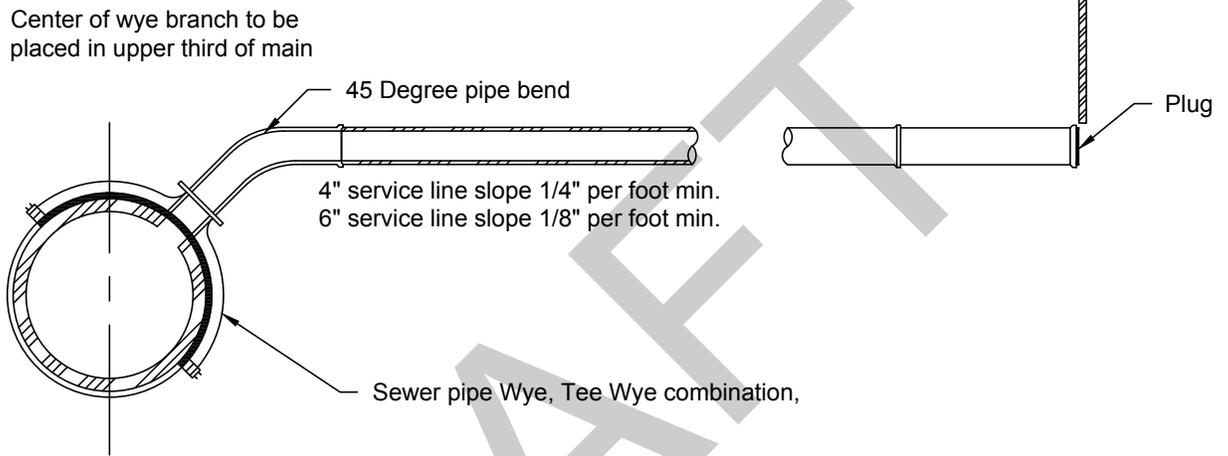
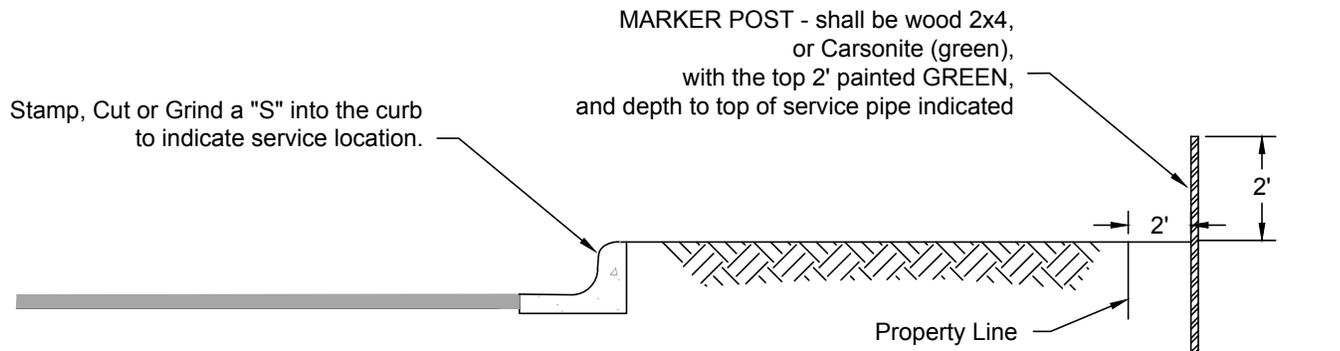
APPROVED BY: CITY ENGINEER           HV/KDS          

DATE:

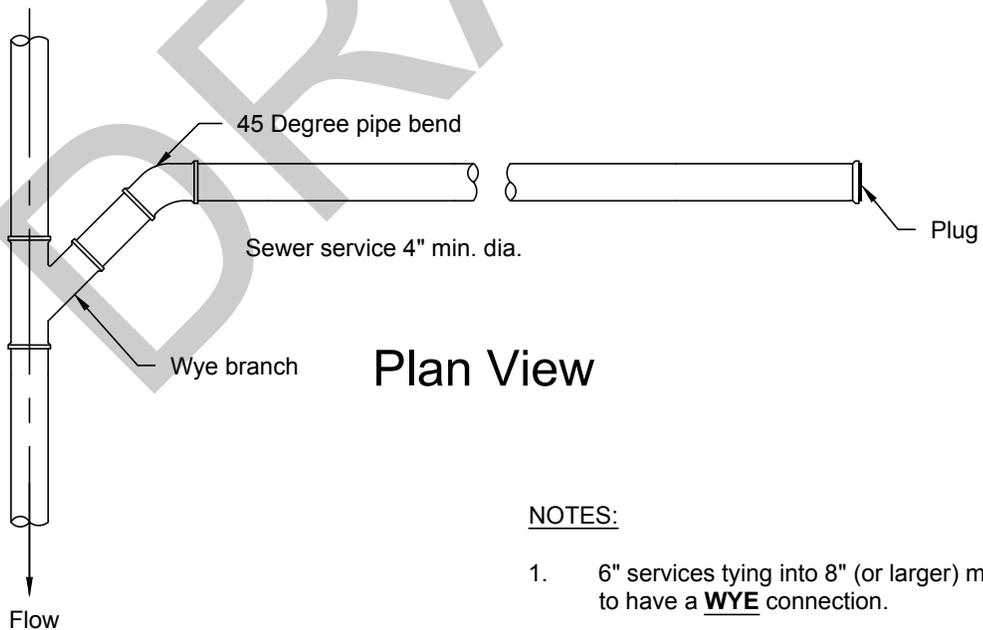
MARCH 2012

DRAWING NO.

02700-05



### Cross-Sectional View



### Plan View

**NOTES:**

1. 6" services tying into 8" (or larger) mains are required to have a **WYE** connection.
2. In general all service lines, 8" and larger, should enter through manholes.
3. Fernco-type flexible connections are **NOT** permitted.



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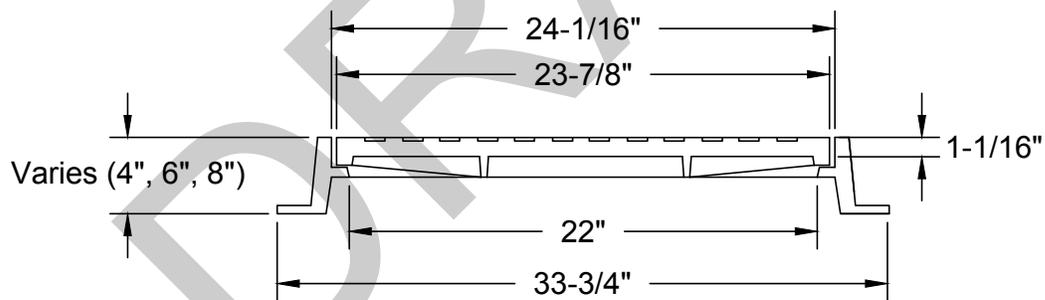
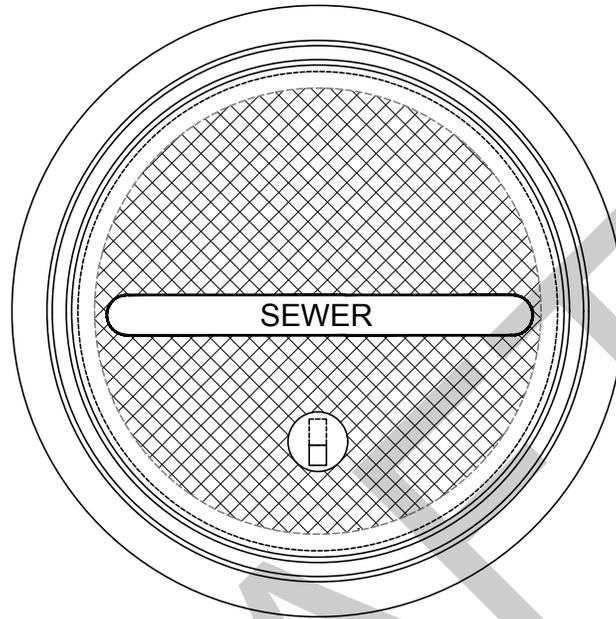
## SANITARY SEWER SERVICE LINE

DRAWN BY: KEB

APPROVED BY: CITY ENGINEER HV/KDS

DATE:	
MAY 2017	
DRAWING NO.	
02700-06	

MATERIAL: Cast gray iron (ASTM A-48 Class 35B)	LID #: D&L FOUNDRY #A-1161 = Lid (cover) to be used for all rings
	RING #: D&L FOUNDRY #A-1071 (4") = 12" adjusting rings (max.)
FINISH: No paint	RING #: D&L FOUNDRY #A-1043 (6") = 10" adjusting rings (max.)
LID: SELF SEALING	RING #: D&L FOUNDRY #A-1161 (8") = 8" adjusting rings (max.)



NOTES: (all of the following must be specified when ordering)

1. Furnished with machined horizontal bearing surface.
2. "SEWER" lettering on cover.
3. All lids shall have a cross-hatched pattern with a closed pick hole.
4. All lids shall be self-sealing.



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## SANITARY SEWER ACCESS MANHOLE RING & COVER

DATE:

MARCH 2012

DRAWING NO.

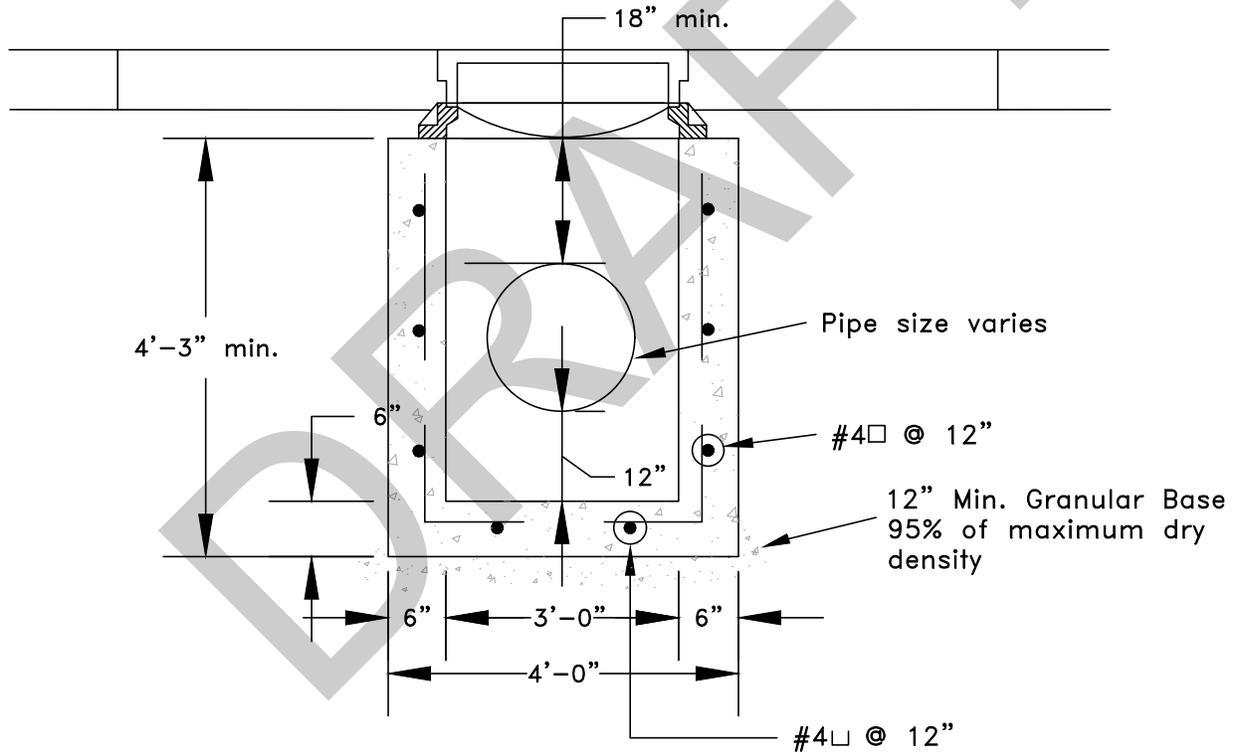
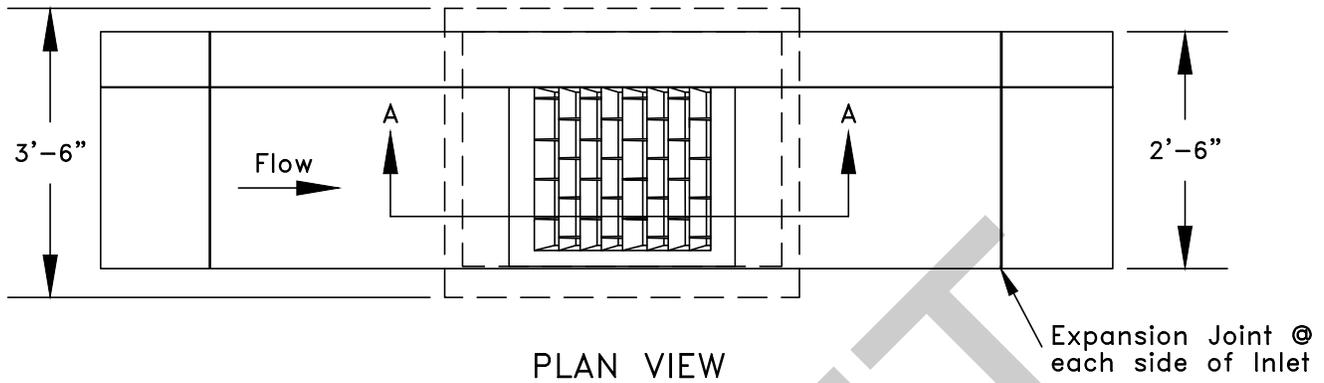
02700-07

DRAWN BY:           E.G.          

APPROVED BY: CITY ENGINEER           HV/KDS

**NOTE:**

Curb radius point should fall at edge of basin



SECTION A-A

**NOTE:**

1. Sag condition inlets will require a Type "C" grate.
2. Inlet frames and gratings shall be Neenah R-3246-AL "type L", D & L Foundry I-3520 "type L" or approved equal or as specified in the Special Provision



*City Of Gillette*

ENGINEERING DIVISION  
P.O. BOX 3003, 201 E. 5TH STREET  
GILLETTE, WYOMING 82717  
PHONE: (307) 686-5311

**SINGLE INLET**

DRAWN BY: KEB

APPROVED BY: CITY ENGINEER HV/KDS

DATE:

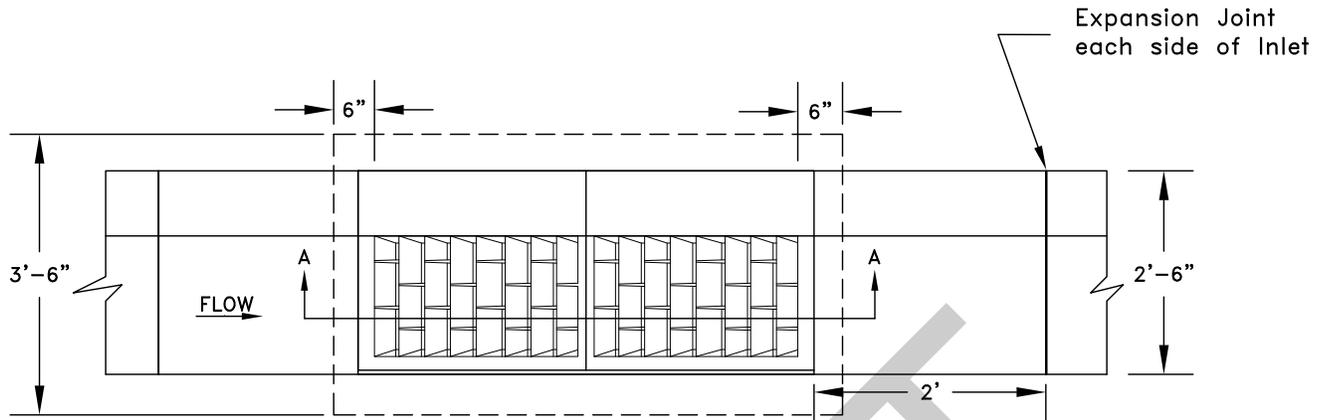
MAY 2017

DRAWING NO.

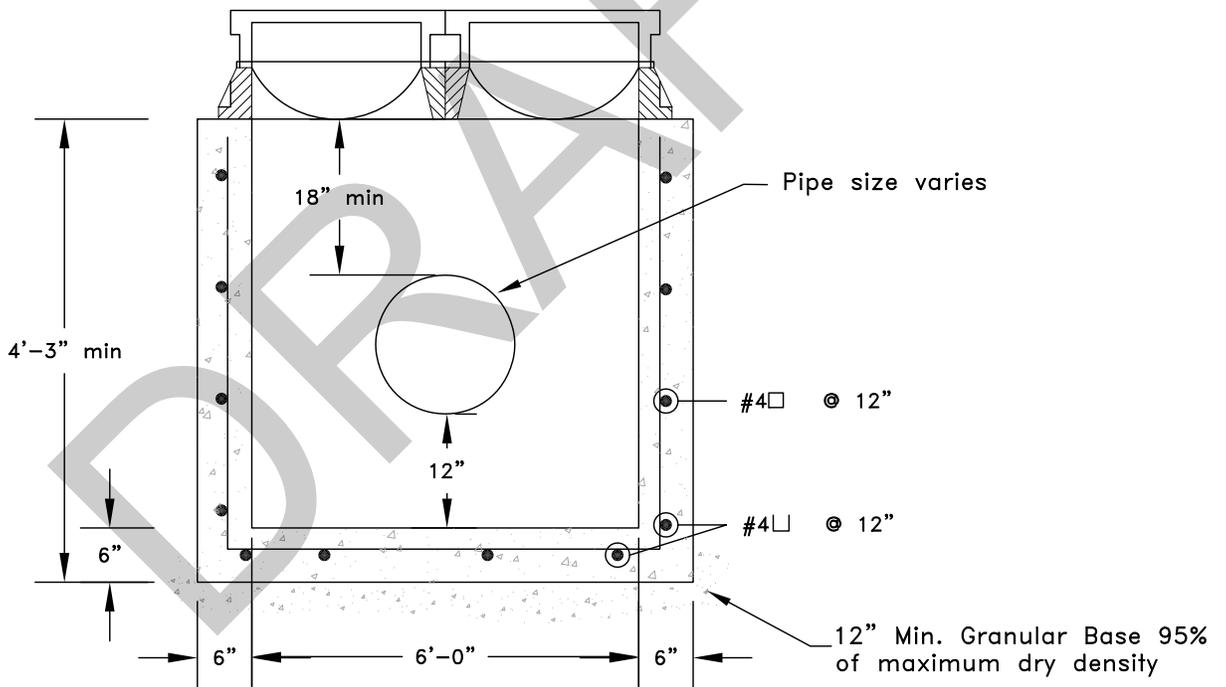
02725-01

**NOTE:**

Curb radius point should fall at edge of expansion joint



PLAN VIEW



SECTION A-A

**NOTE:**

1. Sag condition inlets will require a Type "C" grate.
2. Inlet frames and gratings shall be Neenah R-3293-2 & R-3293-3 "type L", D & L Foundry I-3520 "type L" or approved equal or as specified in the Special Provision



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**MULTIPLE INLET**

DATE:

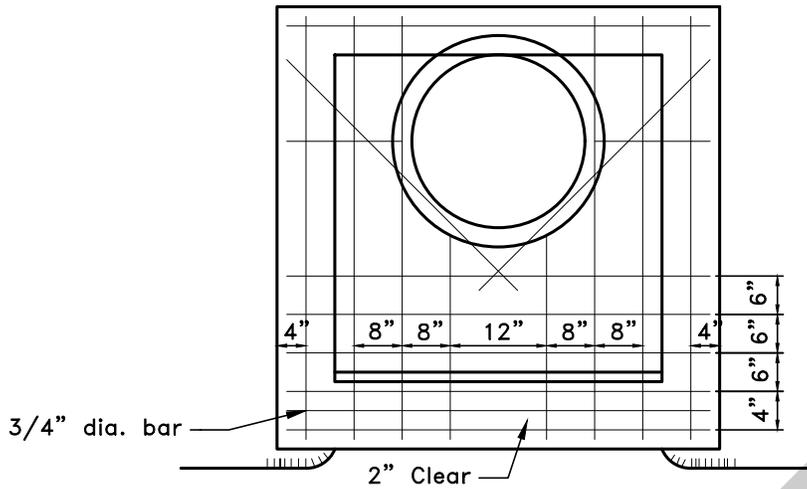
MAY 2017

DRAWING NO.

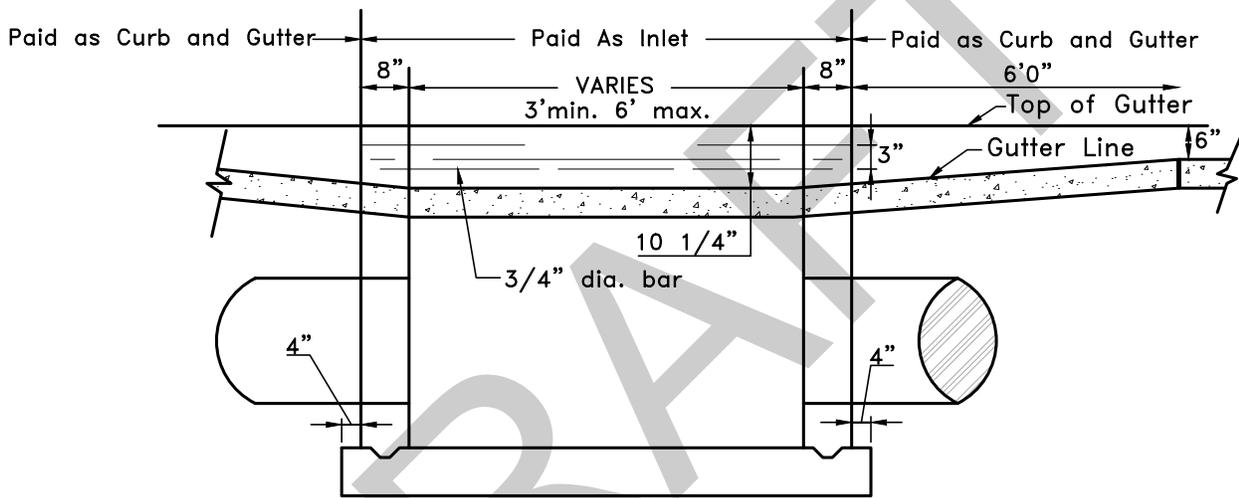
02725-02

DRAWN BY: KEB

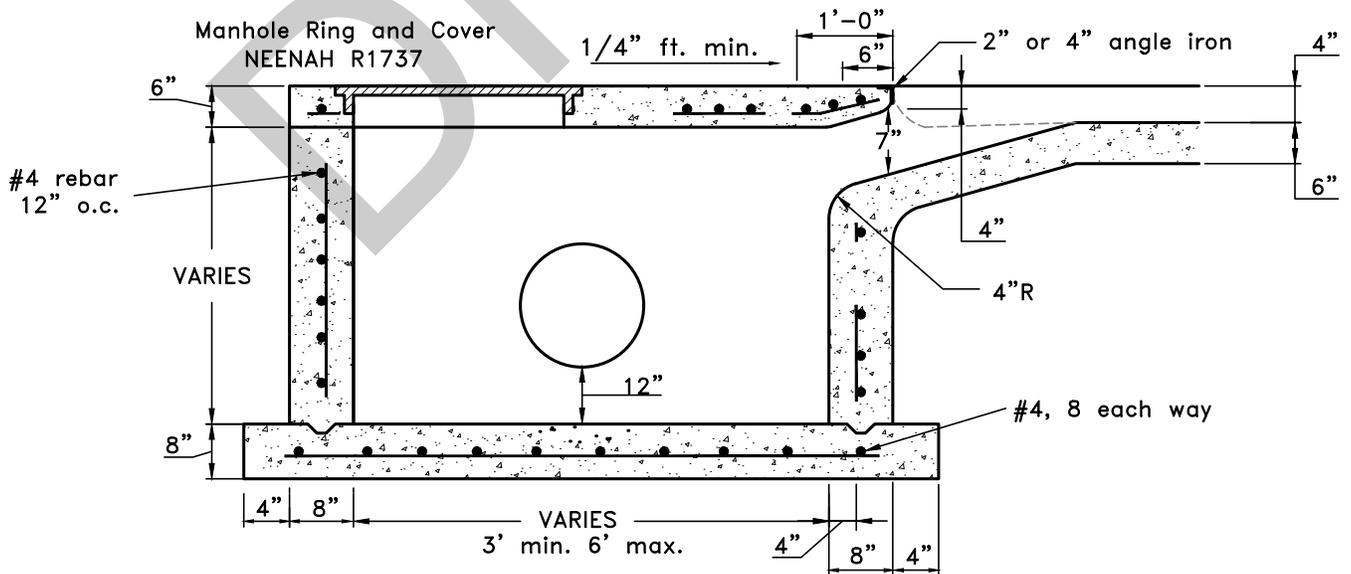
APPROVED BY: CITY ENGINEER HV/KDS



PLAN



ELEVATION



SECTION



City Of Gillette

ENGINEERING DIVISION  
P.O. BOX 3003, 201 E. 5TH STREET  
GILLETTE, WYOMING 82717  
PHONE: (307) 686-5311

# CURB OPENING INLET

DRAWN BY: E.G.

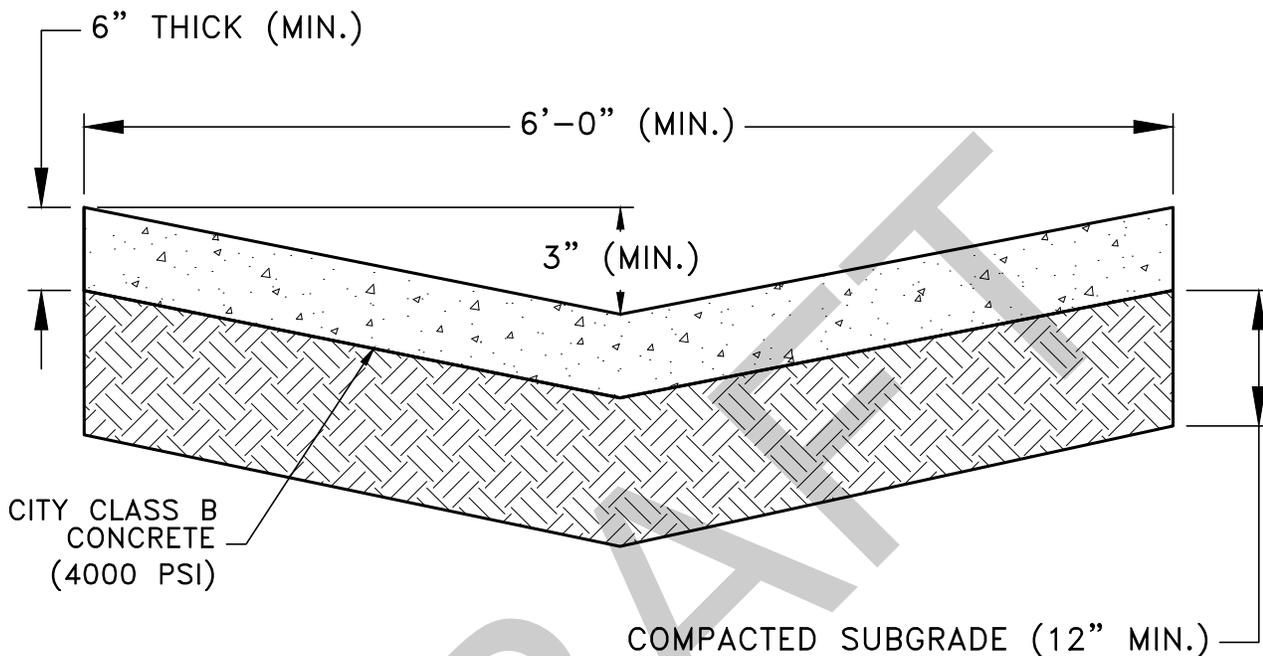
APPROVED BY: CITY ENGINEER HV/KDS

DATE:

MARCH 2012

DRAWING NO.

02725-03



**NOTES:**

1. Bottom width of channel may exceed the 6'-0" (minimum).
2. Tolerances - 1/2" on design grade and 1" on design alignment.
3. Contraction joints cut a maximum of every 10 feet.



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**TYPICAL TRICKLE CHANNEL**

DRAWN BY:           E.G.          

APPROVED BY: CITY ENGINEER           HV/KDS          

DATE:

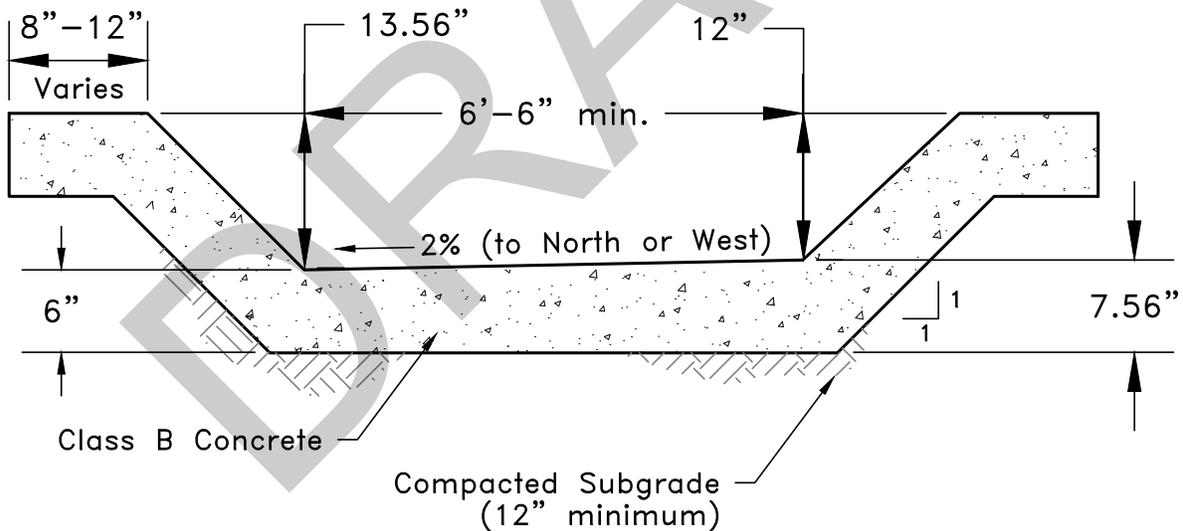
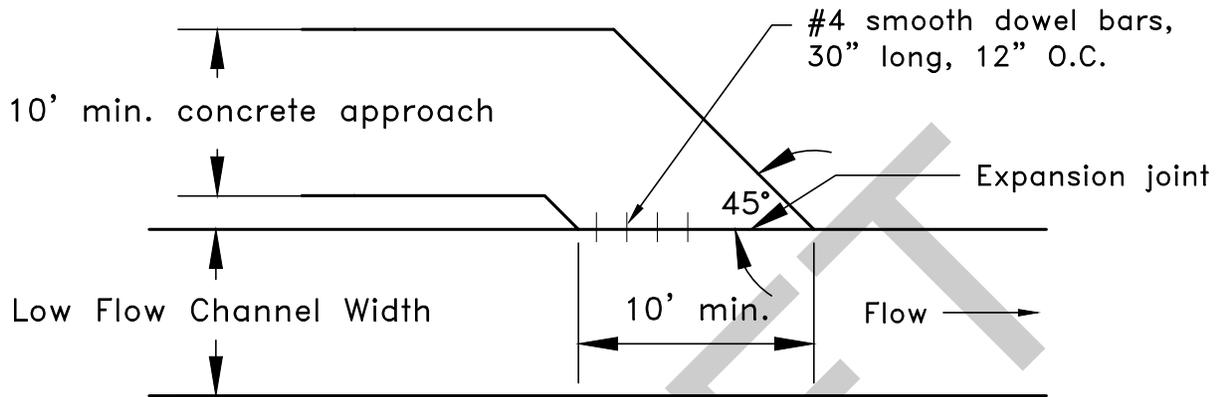
MARCH 2012

DRAWING NO.

02725-04

**NOTE:**

Access to low flow channel will be provided every 400' and one at each street intersection for cleaning purposes. The maximum slope for access to low flow channel shall be 10%.



**NOTES:**

1. Bottom width of channel may exceed the 6'-6" min.
2. Tolerances – 1/2" on design grade and 1" on design alignment.
3. Contraction joints cut a maximum of every 10 feet.



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**LOW FLOW CHANNEL**

DRAWN BY:           E.G.          

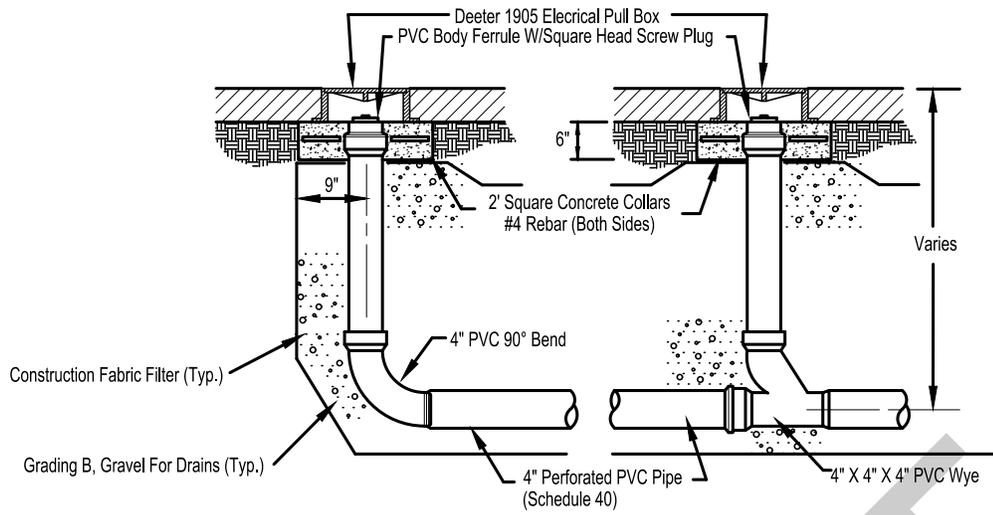
APPROVED BY: CITY ENGINEER           HV/KDS          

DATE:

MARCH 2012

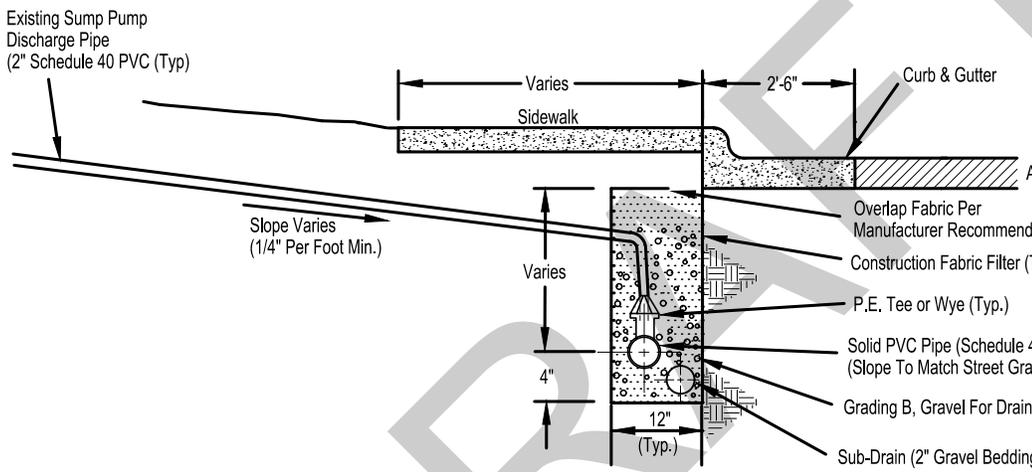
DRAWING NO.

02725-05



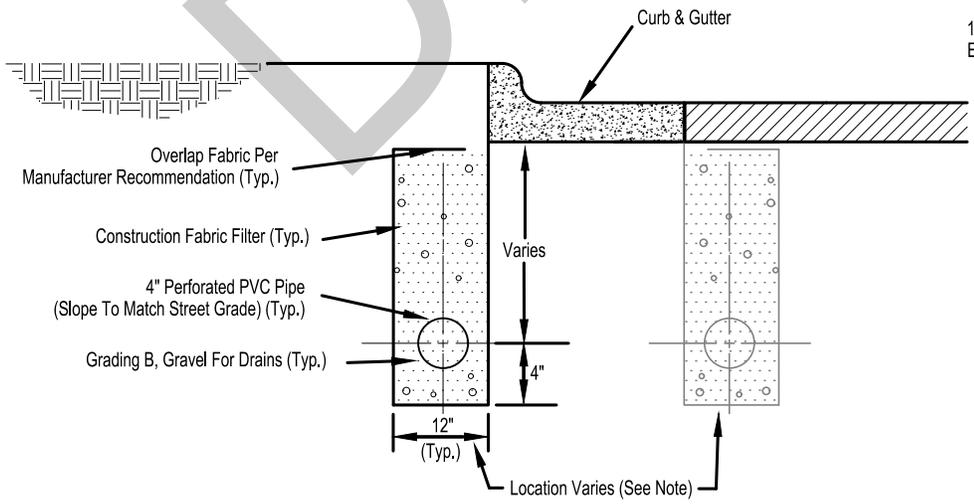
- NOTE:**
1. A Concrete Collar Shall Be Required On All Sub-Drain Cleanouts In Absence Of Sidewalk (Reference Drawing 02570-02).
  2. If Located In The Street, A Non-Ventilated, Self-Sealing, D & L Foundry H-8012 With Closed Pick Hole And Cross-Hatch Lid Design Will Be Required, Or Engineer-Approved Equal.

**SUB-DRAIN CLEANOUT**



- NOTE:**
1. Slit To Be Cut In Filter. A Small Piece Of Fabric Shall Also Be Wrapped Around Pipe To Ensure A Tight Fit To Prevent Infiltration.
  2. Maintain sump pump discharge line separate from street subdrain in all circumstances.

**SUB-DRAIN WITH SUMP PUMP DETAIL (where allowed as per outfall storm sewer design flow capacity)**



- NOTE:**
1. Location Varies Per Application. Front Of Curb For Existing Retro-Fit, And Back Of Curb For New Construction.

**SUB-DRAIN DETAIL (with or without Curb & Gutter)**



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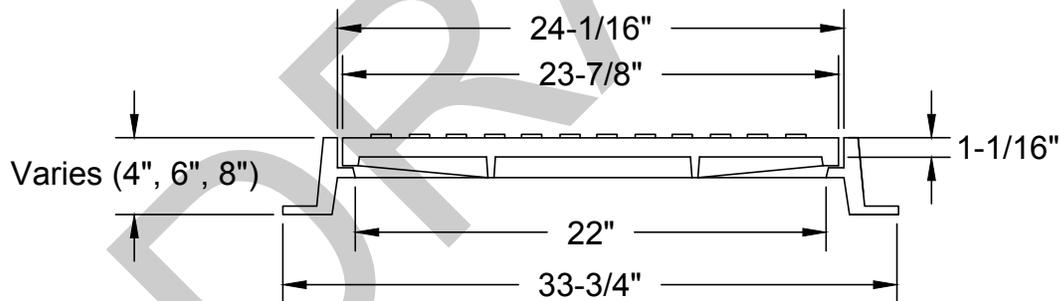
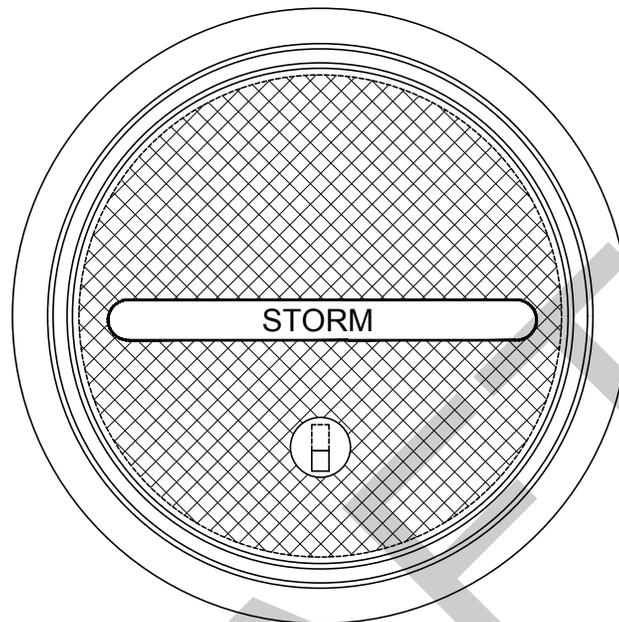
**SUB-DRAINING DETAIL FOR  
 NEW/EXISTING CONSTRUCTION**

DRAWN BY:           E.G.          

APPROVED BY: CITY ENGINEER           HV/KDS          

DATE:  
 MARCH 2012  
 DRAWING NO.  
 02725-06

MATERIAL: Cast gray iron (ASTM A-48 Class 35B)	LID #: D&L FOUNDRY #A-1161 = Lid (cover) to be used for all rings
FINISH: No paint	RING #: D&L FOUNDRY #A-1071 (4") = 12" adjusting rings (max.)
LID: SELF SEALING	RING #: D&L FOUNDRY #A-1043 (6") = 10" adjusting rings (max.)
	RING #: D&L FOUNDRY #A-1161 (8") = 8" adjusting rings (max.)



NOTES: (all of the following must be specified when ordering)

1. Furnished with machined horizontal bearing surface.
2. "STORM" lettering on cover.
3. All lids shall have a cross-hatched pattern with a closed pick hole.
4. All lids shall be self-sealing.



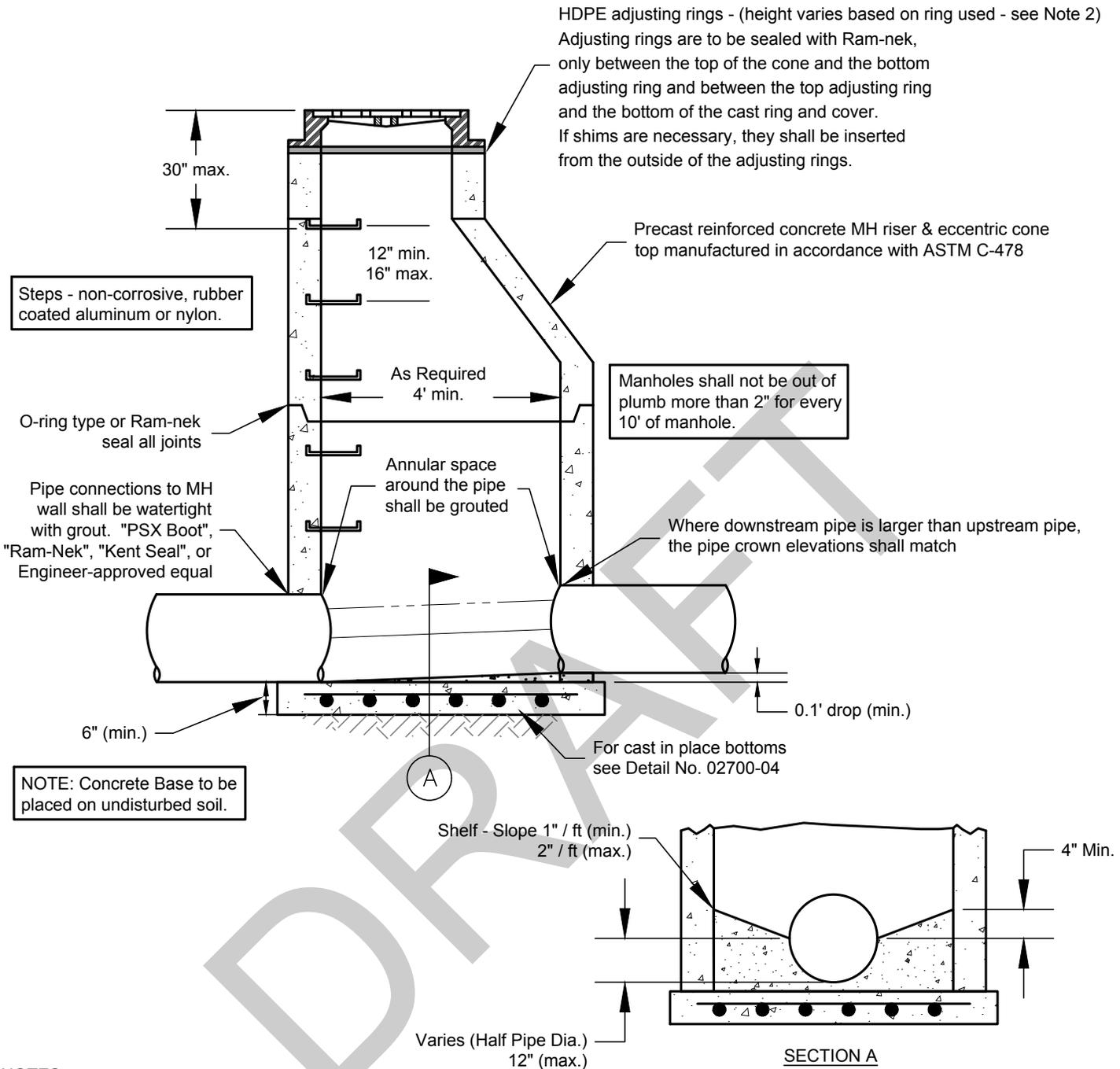
City Of Gillette  
ENGINEERING DIVISION  
P.O. BOX 3003, 201 E. 5TH STREET  
GILLETTE, WYOMING 82717  
PHONE: (307) 686-5311

## STORM SEWER ACCESS MANHOLE RING & COVER

DRAWN BY: CJS

APPROVED BY: CITY ENGINEER HV/KDS

DATE:  
MARCH 2012  
DRAWING NO.  
02725-07



NOTE: Concrete Base to be placed on undisturbed soil.

**NOTES:**

1. All Storm Sewer MH covers shall be non-ventilated, self-sealing, D&L Foundry A-1161 with closed pick hole and recessed lug lid design, or Engineer-approved equal.
2. All rings shall be D&L Foundry A-1071 (4"), A-1043 (6"), A-1161 (8"), or Engineer-approved equal. The combined height of manhole ring used and adjusting rings shall not exceed 16" total.
3. No grout shall be used anywhere in the interior of the manhole except for the pipe invert. **NO GROUTING AROUND ADJUSTING RINGS.**
4. Channelization of flowline between pipe inverts may be formed directly in the concrete of the base or may be a half-pipe laid in concrete.
5. Pipe shall protrude into manhole a sufficient distance to accommodate manufacturer's installation instructions for watertight joint sealing material.

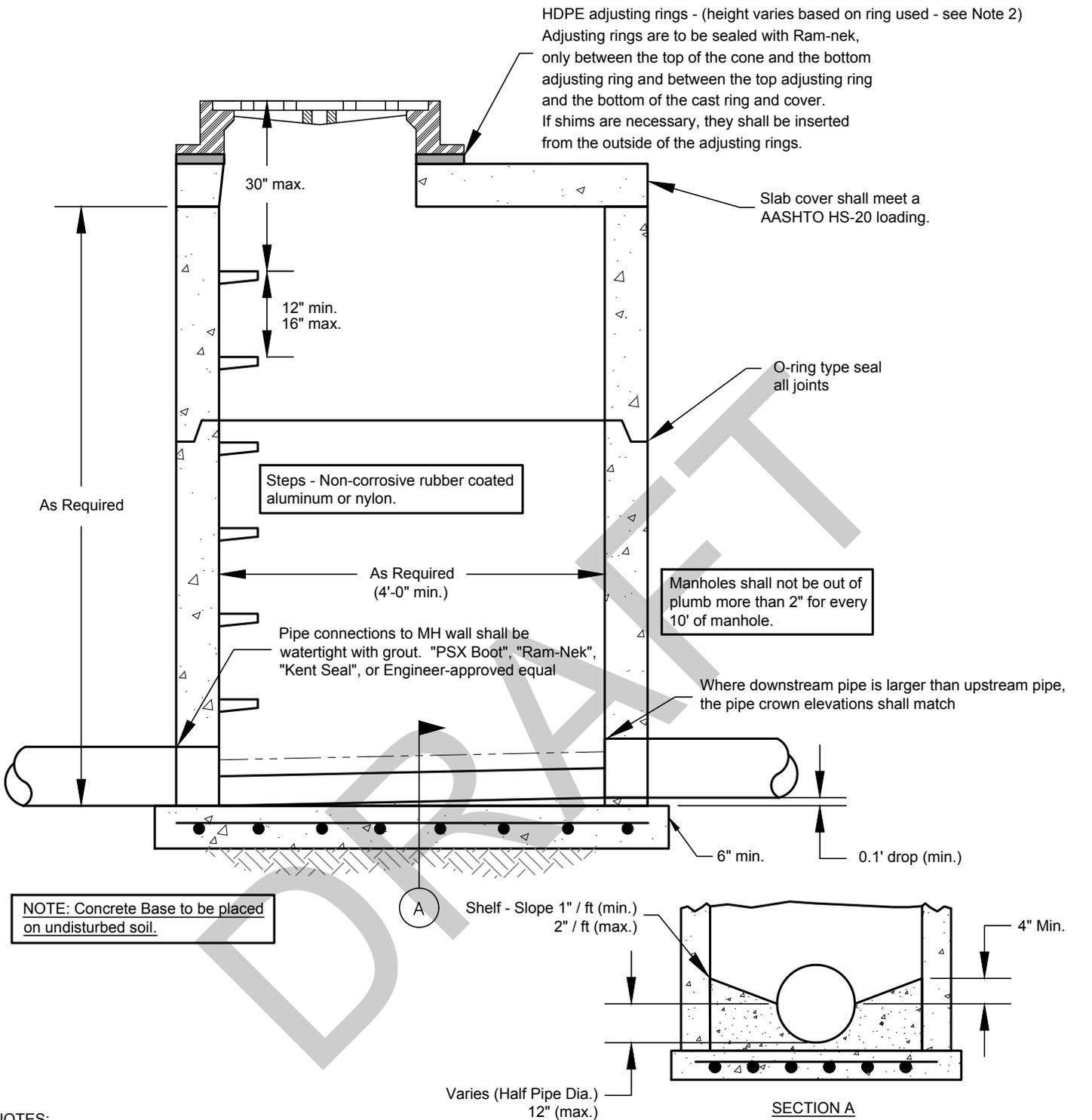


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**STORM SEWER MANHOLE  
(PRECAST)**

DRAWN BY: KEB      APPROVED BY: CITY ENGINEER HV/KDS

DATE:
MAY 2017
DRAWING NO.
02725-08



**NOTES:**

1. All Storm Sewer MH covers shall be non-ventilated, self-sealing, D&L Foundry A-1161 with closed pick hole and recessed lug lid design, or Engineer-approved equal.
2. All rings shall be D&L Foundry A-1071 (4"), A-1043 (6"), A-1161 (8"), or Engineer-approved equal. The combined height of manhole ring used and adjusting rings shall not exceed 16" total.
3. No grout shall be used anywhere in the interior of the manhole except for the pipe invert. NO GROUTING AROUND ADJUSTING RINGS.
4. Channelization of flowline between pipe inverts may be formed directly in the concrete of the base or may be a half-pipe laid in concrete.
5. Pipe shall protrude into manhole a sufficient distance to accommodate manufacturer's installation instructions for watertight seal jointing material.



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**STORM SEWER MANHOLE  
 (FLAT TOP MANHOLE)**

DRAWN BY:           CJS          

APPROVED BY: CITY ENGINEER           HV/KDS          

DATE:

AUGUST 2012

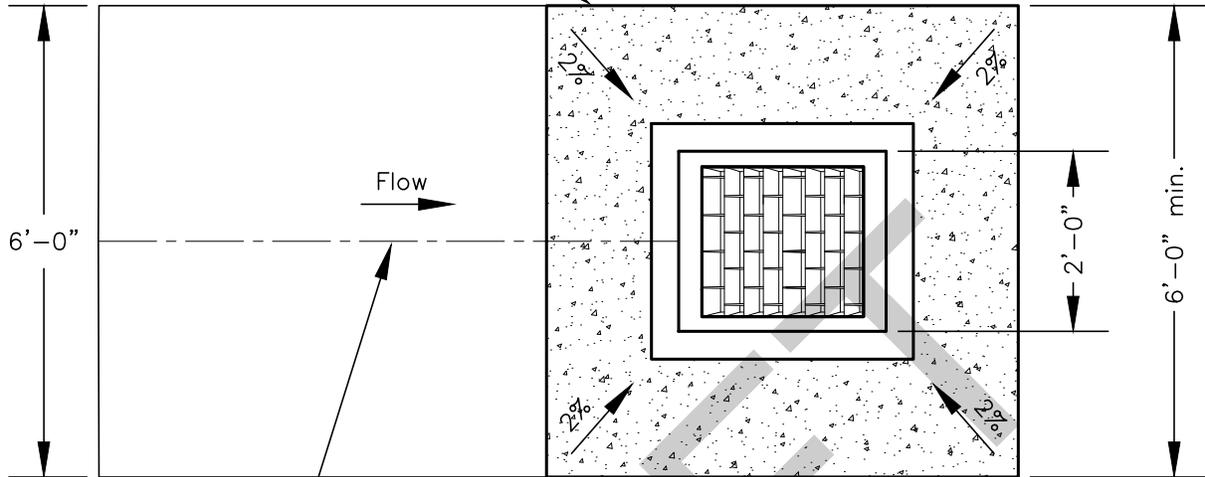
DRAWING NO.

02725-09

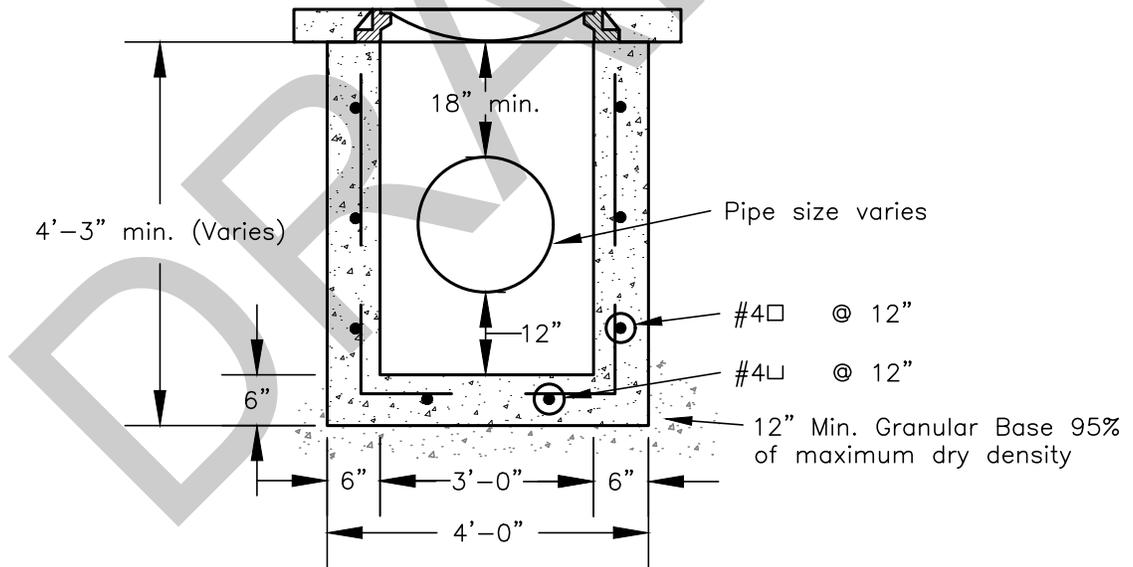
**NOTE:**

1. Neenah R-3362-L, Deeter 2501, or D&L Foundry I-3386 inlet frame, grate, or equivalent

Concrete Apron  
(Minimum 2'-0" wide  
around perimeter of frame  
and grate)



☒ Trickle Channel (optional)  
May be a natural or  
grass-lined drainage swale



**NOTE:**

1. Sump condition inlets will require a Type "C" grate.
2. Grate and Frame is available as a double unit.



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# SINGLE AREA INLET

DRAWN BY:           E.G.          

APPROVED BY: CITY ENGINEER           HV/KDS          

DATE:

MARCH 2012

DRAWING NO.

02725-10

Allow 3" for Sign Clip on Stop or Yield Sign  
(All other signs are to be mounted flush to the top of the post)

Residential Stop signs are to be 30" diameter

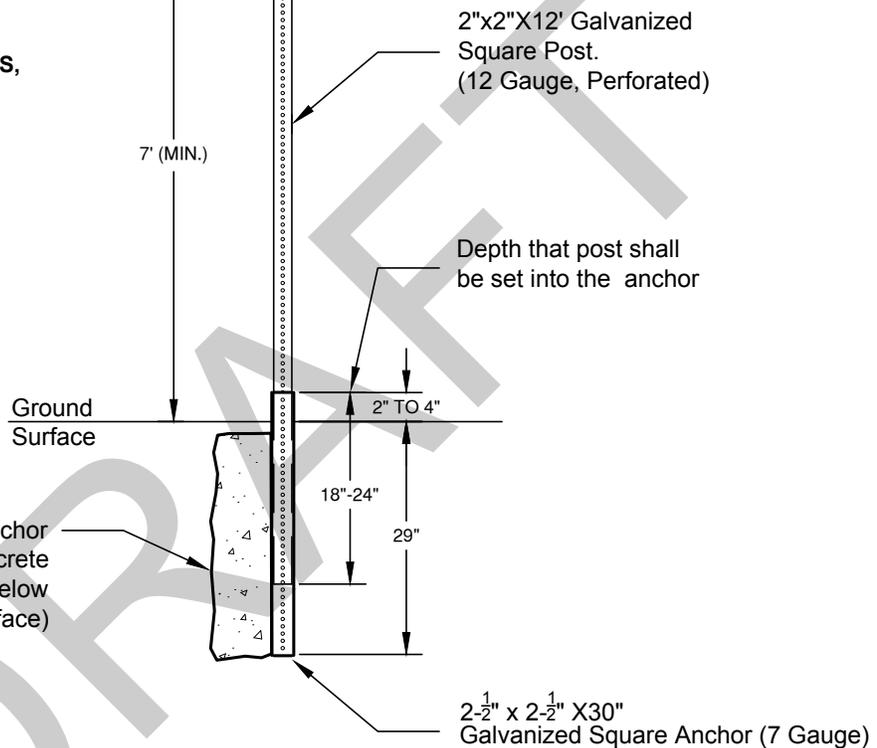
SIGN SURFACING NOTES:

**WARNING SIGNS :**

Diamond Grade VIP Reflective Sheeting, Type IX

**PEDESTRIAN SIGNS, BIKE LANE SIGNS, AND DOWNWARD ARROWS:**

Strong Yellow Green Diamond Grade VIP Reflective Sheeting, Type IX



NOTES:

1. Drill or vactor out a 8" diameter hole.
2. Use only High Intensity Prismatic Sheeting for Regulatory Signs (Types III, IV, and X).
3. All signs to be 100 gauge aluminum.
4. All signs to be mounted with 3/8" x 3" grade 5 bolts using NYLOCK nuts, with flat washers on both sides (one on each side).
5. The contractor shall contact the City of Gillette Engineering Traffic Safety Division @ 686-5265 prior to installing signs. The Traffic Safety Division will mark the location of signs and inspect installation upon completion of the installation.

NEW SUBDIVISION SPECIFICATIONS:

1. When an additional information sign is placed directly under the main sign, the distance from the ground surface to the bottom of the lowest sign may be six feet (6').
2. All signs will be **perpendicular to approaching traffic** to allow the street name sign to be legible from the street. (signs shall not be angled or twisted)
3. The City of Gillette Sign Technician will fabricate, provide, and install the street name signs with all the hardware included. The developer is responsible for bearing the cost of all signs associated with the project.
4. Round posts are 2- $\frac{3}{8}$ " x 12' x 10 gauge and can be used for Parking Restriction signs only.
5. When necessary to mount signs on street light poles, permission shall be obtained from the City Engineer. Use  $\frac{5}{8}$ " stainless steel banding with the correct hardware for mounting.



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**TYPICAL STREET SIGN INSTALLATION**

DRAWN BY: CJS

APPROVED BY: CITY ENGINEER HV/KDS

DATE:
AUGUST 2012
DRAWING NO.
02805-01

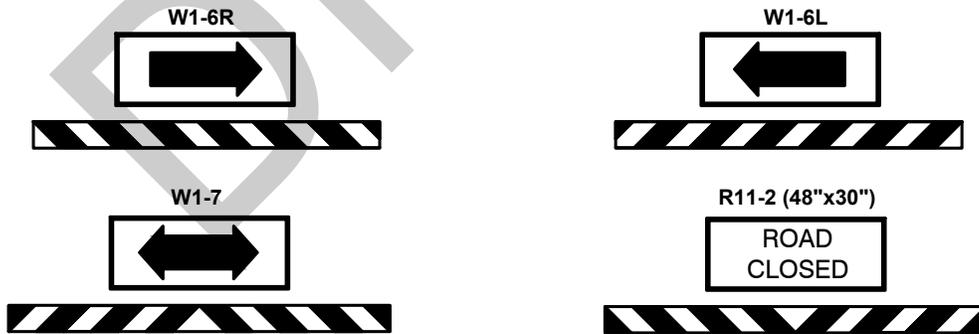
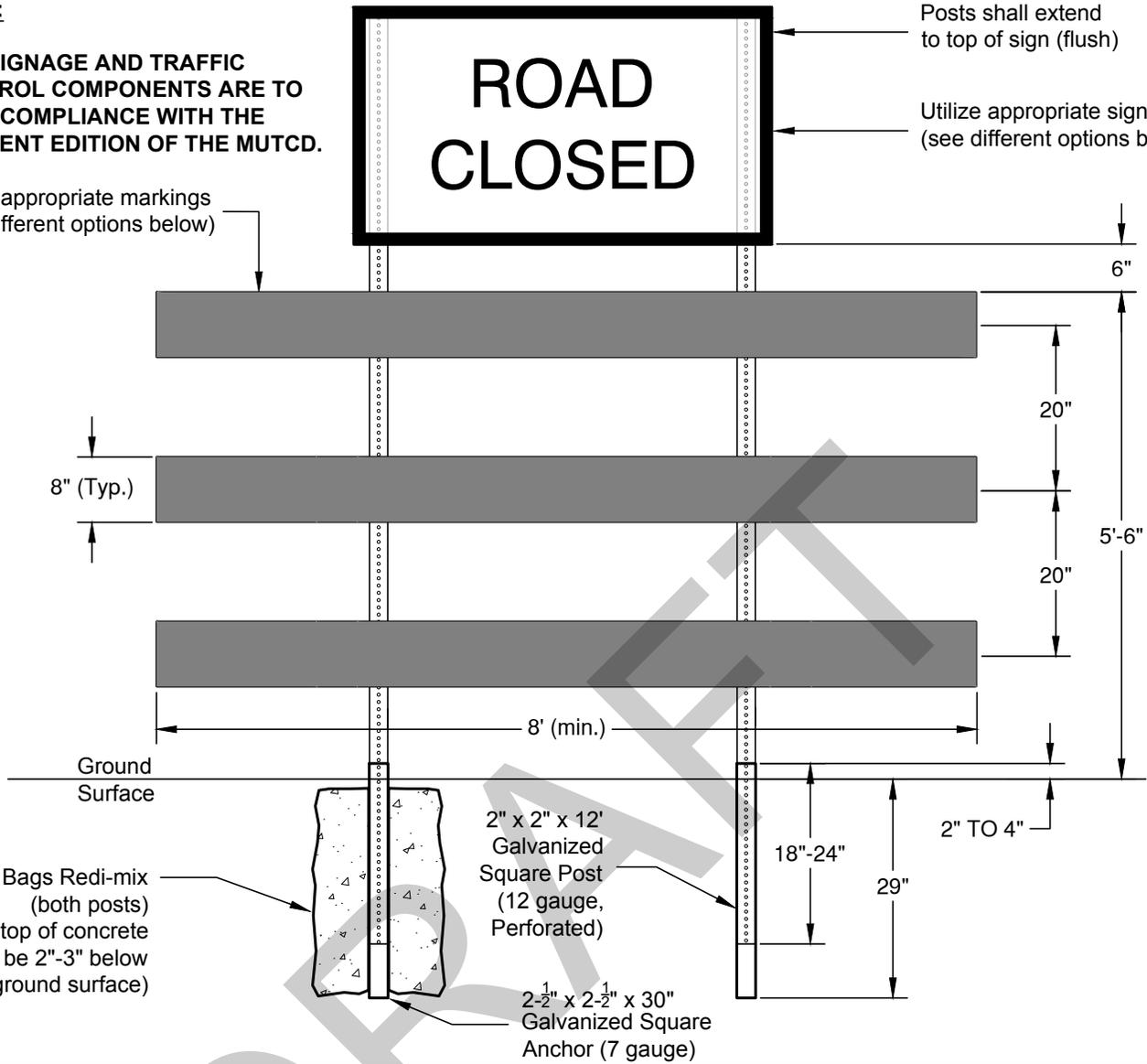
**NOTE:**

**ALL SIGNAGE AND TRAFFIC CONTROL COMPONENTS ARE TO BE IN COMPLIANCE WITH THE CURRENT EDITION OF THE MUTCD.**

Utilize appropriate markings (see different options below)

Posts shall extend to top of sign (flush)

Utilize appropriate sign (see different options below)



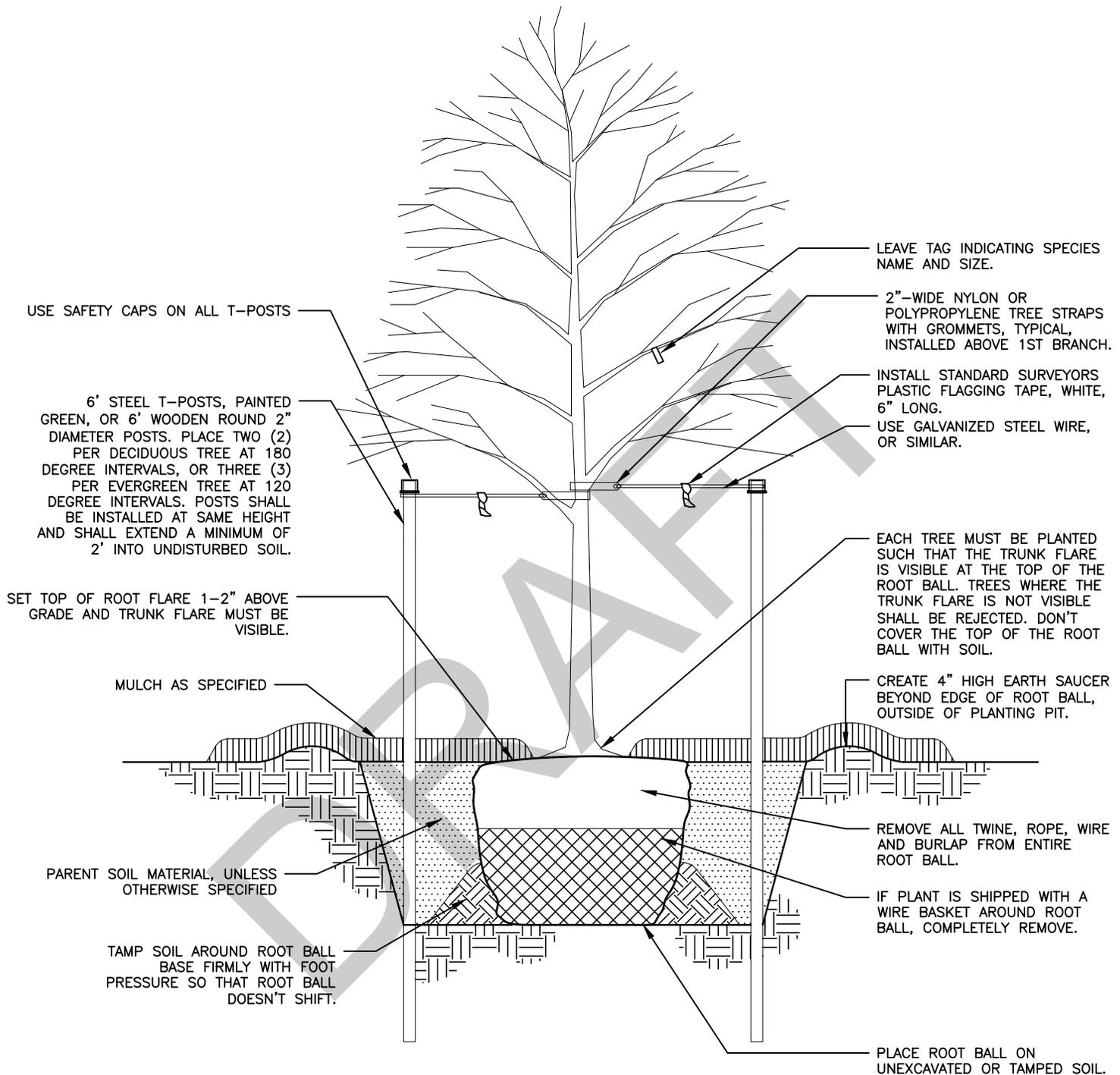
**NOTES:**

1. Use steel telespan 2" x 2" - 12 gauge posts with 2 1/2" x 2 1/2" - 7 gauge anchors.
2. All signs and panels are to be mounted with 3/8" x 3" - grade 5 bolts, using NYLOCK nuts, with flat washers on both sides.
3. Marking for barricade rails shall be alternating between red and white for permanent installations, and orange and white for temporary installations. The stripes shall be 6" wide, sloping downward at an angle of 45 degrees in the direction traffic is to pass. The material shall be High Intensity Sheeting.
4. Barricade panels shall be 96" (length) x 8" (height) x 3/4" (width) - Material: Dapco-Plastic, or aluminum.

**BARRICADE INSTALLATION  
TYPE III**

DRAWN BY:           CJS                APPROVED BY: CITY ENGINEER           HV/KDS          

DATE:
AUGUST 2012
DRAWING NO.
02805-02



USE SAFETY CAPS ON ALL T-POSTS

6' STEEL T-POSTS, PAINTED GREEN, OR 6' WOODEN ROUND 2" DIAMETER POSTS. PLACE TWO (2) PER DECIDUOUS TREE AT 180 DEGREE INTERVALS, OR THREE (3) PER EVERGREEN TREE AT 120 DEGREE INTERVALS. POSTS SHALL BE INSTALLED AT SAME HEIGHT AND SHALL EXTEND A MINIMUM OF 2' INTO UNDISTURBED SOIL.

SET TOP OF ROOT FLARE 1-2" ABOVE GRADE AND TRUNK FLARE MUST BE VISIBLE.

MULCH AS SPECIFIED

PARENT SOIL MATERIAL, UNLESS OTHERWISE SPECIFIED

TAMP SOIL AROUND ROOT BALL BASE FIRMLY WITH FOOT PRESSURE SO THAT ROOT BALL DOESN'T SHIFT.

LEAVE TAG INDICATING SPECIES NAME AND SIZE.

2"-WIDE NYLON OR POLYPROPYLENE TREE STRAPS WITH GROMMETS, TYPICAL, INSTALLED ABOVE 1ST BRANCH.

INSTALL STANDARD SURVEYORS PLASTIC FLAGGING TAPE, WHITE, 6" LONG.

USE GALVANIZED STEEL WIRE, OR SIMILAR.

EACH TREE MUST BE PLANTED SUCH THAT THE TRUNK FLARE IS VISIBLE AT THE TOP OF THE ROOT BALL. TREES WHERE THE TRUNK FLARE IS NOT VISIBLE SHALL BE REJECTED. DON'T COVER THE TOP OF THE ROOT BALL WITH SOIL.

CREATE 4" HIGH EARTH SAUCER BEYOND EDGE OF ROOT BALL, OUTSIDE OF PLANTING PIT.

REMOVE ALL TWINE, ROPE, WIRE AND BURLAP FROM ENTIRE ROOT BALL.

IF PLANT IS SHIPPED WITH A WIRE BASKET AROUND ROOT BALL, COMPLETELY REMOVE.

PLACE ROOT BALL ON UNEXCAVATED OR TAMPED SOIL.

NOTES:

1. REMOVE ALL TWINE AND OTHER NON-BIODEGRADABLE MATERIALS ATTACHED TO PLANT OR ROOT MASS, INCLUDING TRUNK PROTECTORS.
2. DO NOT HEAVILY PRUNE THE TREE AT PLANTING. PRUNE ONLY CROSSOVER LIMBS, CO-DOMINANT LEADERS, AND BROKEN OR DEAD BRANCHES. SOME INTERIOR TWIGS AND LATERAL BRANCHES MAY BE PRUNED; HOWEVER, DO NOT REMOVE THE TERMINAL BUDS OF BRANCHES THAT EXTEND TO THE EDGE OF THE CROWN.



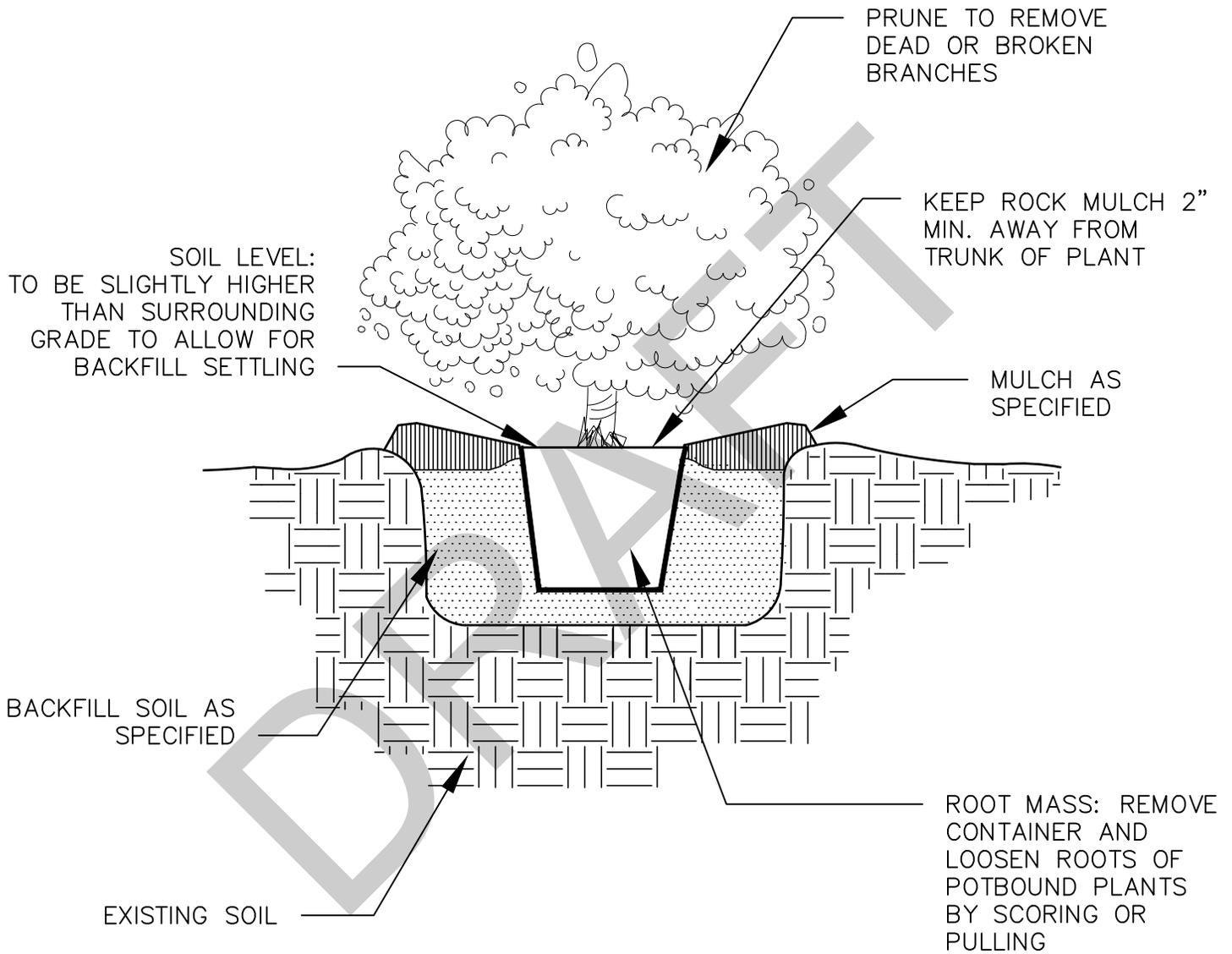
*City Of Gillette*  
 ENGINEERING DIVISION  
 P.O. BOX 3003, 201 E. 5TH STREET  
 GILLETTE, WYOMING 82717  
 PHONE: (307) 686-5311

# B&B TREE PLANTING WITH STAKING

DRAWN BY: JB

APPROVED BY: CITY ENGINEER HV/KDS

DATE:
MAY 2017
DRAWING NO.
02900-01



NOTES:

1. REMOVE ALL TWINE AND OTHER NON-BIODEGRADABLE MATERIALS ATTACHED TO PLANT OR ROOT MASS, INCLUDING TRUNK PROTECTORS.
2. LEAVE TAG INDICATING SPECIES NAME.



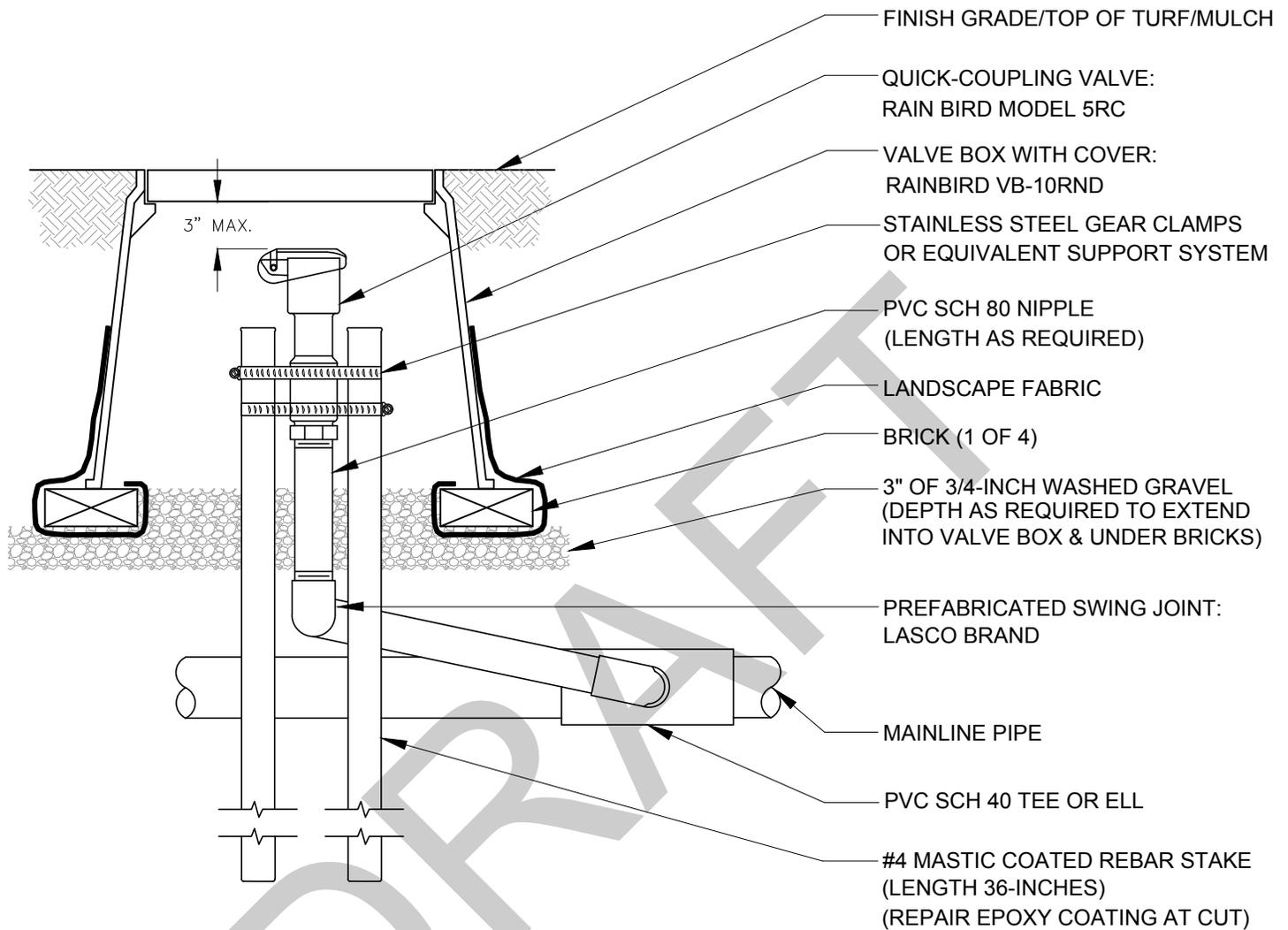
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 P.O. BOX 3003, 201 E. 5TH STREET  
 GILLETTE, WYOMING 82717  
 PHONE: (307) 686-5311

## CONTAINER SHRUB PLANTING

DRAWN BY: JB

APPROVED BY: CITY ENGINEER HV/KDS

DATE:
MAY 2017
DRAWING NO.
02900-02



**NOTES:**

1. FURNISH FITTINGS AND PIPING NOMINALLY SIZED IDENTICAL TO NOMINAL QUICK COUPLER VALVE INLET SIZE.
2. INSTALL SWING JOINT LAY ARM BETWEEN 30 AND 45 DEGREES OF LATERAL PIPE IN ORDER TO ABSORB DOWNWARD IMPACT. IF LATERAL PIPE IS NOT INSTALLED AT SPECIFIED DEPTH, CONSULT PROJECT MANAGER PRIOR TO INSTALLATION OF SWING JOINT.
3. MAINLINE SIZES OF 3" AND LARGER REQUIRE THE USE OF GASKETED CONNECTIONS AND DUCTILE IRON FITTINGS.



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## QUICK COUPLER VALVE ASSEMBLY

DRAWN BY: JB

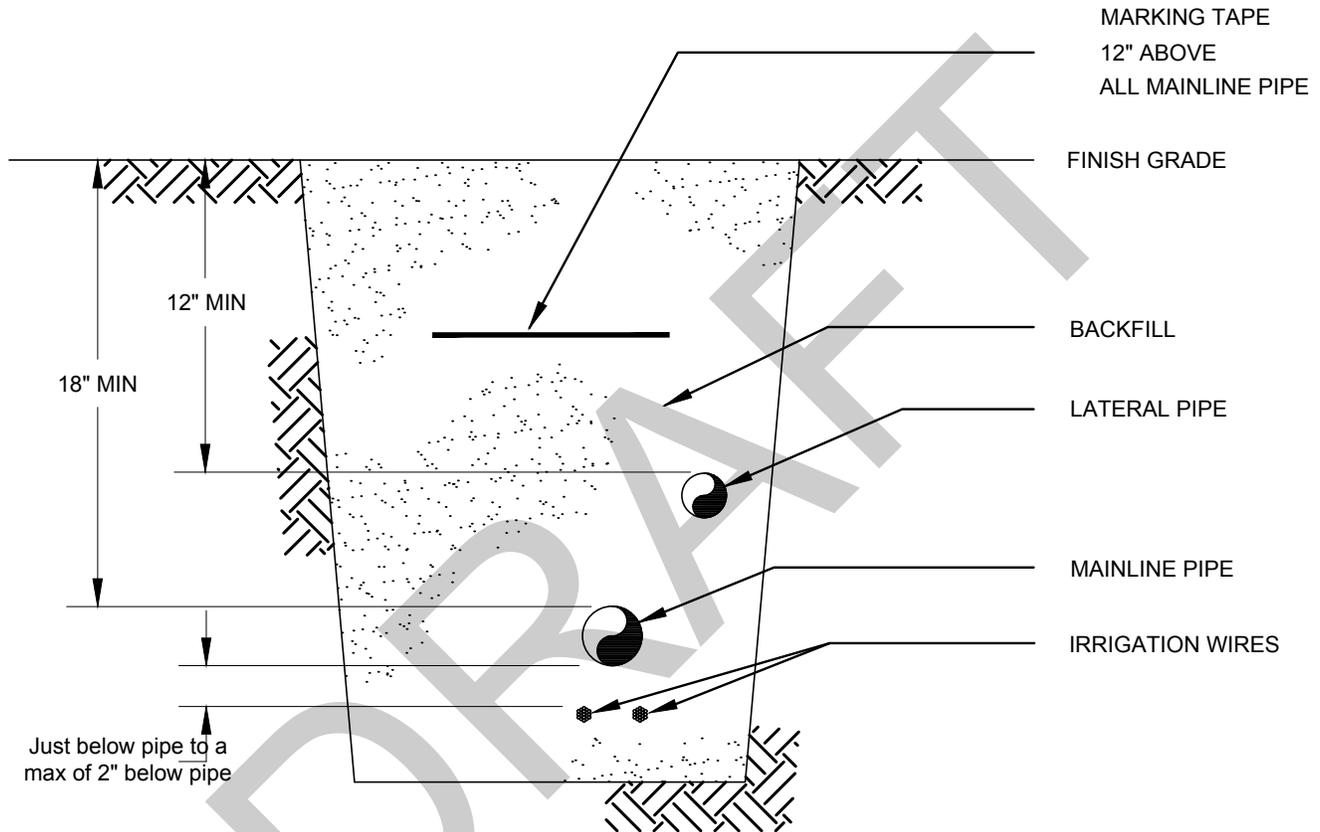
APPROVED BY: CITY ENGINEER HV/KDS

DATE:

MAY 2017

DRAWING NO.

02920-01



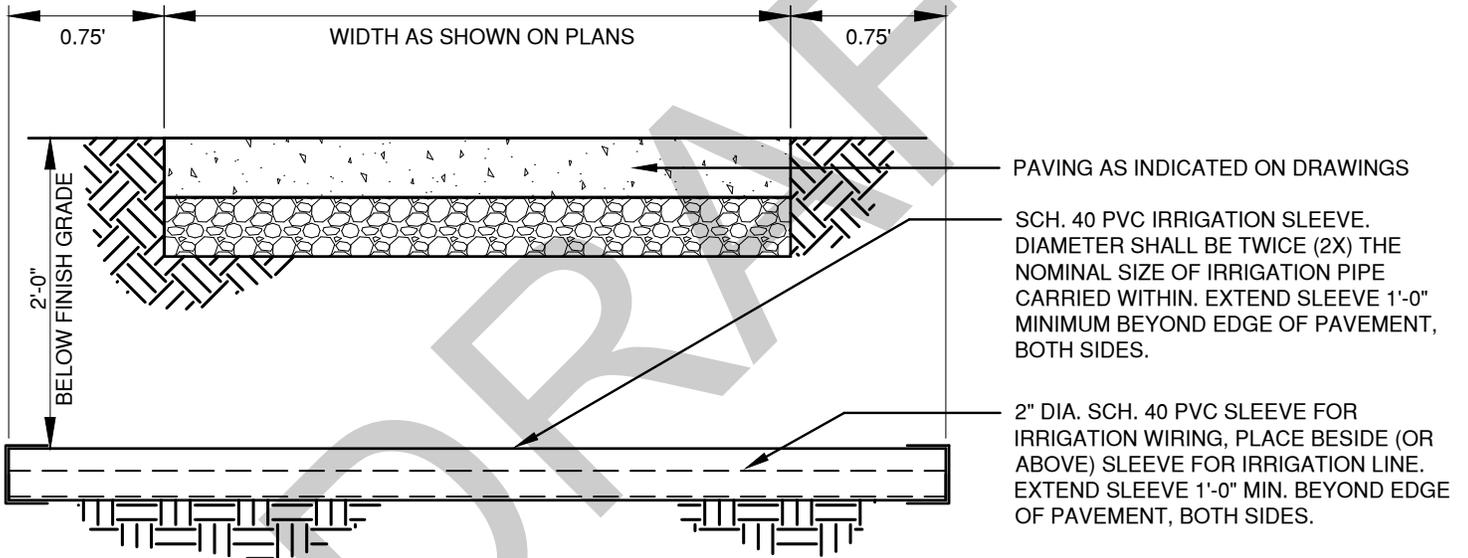
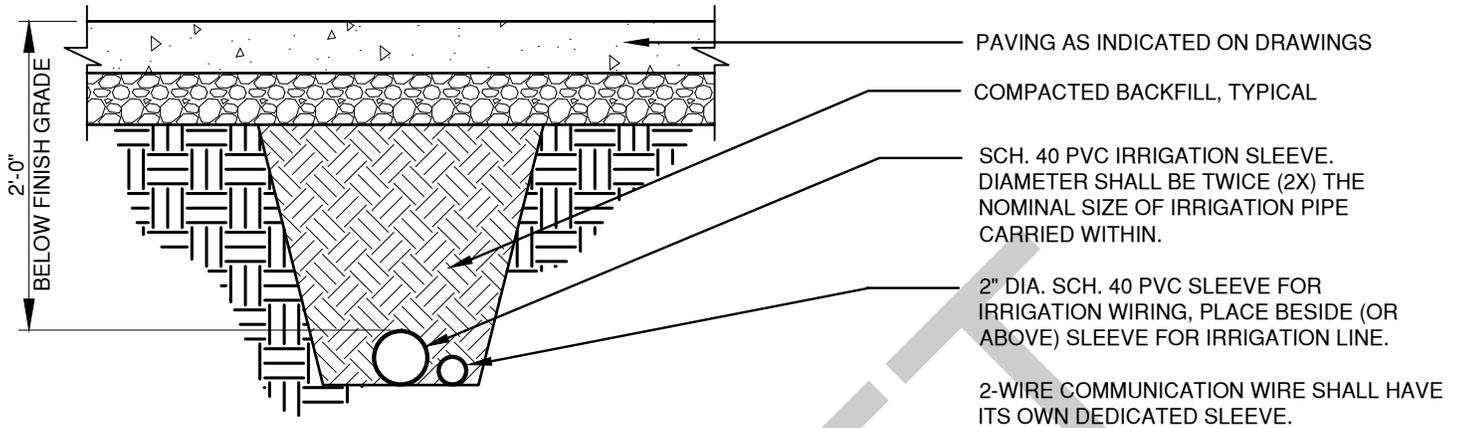
*City Of Gillette*  
ENGINEERING DIVISION  
P.O. BOX 3003, 201 E. 5TH STREET  
GILLETTE, WYOMING 82717  
PHONE: (307) 686-5311

## IRRIGATION TRENCHING

DRAWN BY: JB

APPROVED BY: CITY ENGINEER HV/KDS

DATE:	
	MAY 2017
DRAWING NO.	
	02920-02



**NOTES:**

- 1) TAPE OR CAP ENDS OF SLEEVES AND MARK SLEEVE LOCATIONS WITH ABOVE GRADE STAKES AT WITH APPROPRIATE ANNOTATION, I.E. "IRRIGATION SLEEVES".
- 2) IF CONCRETE CONTRACTOR IS INSTALLING THE SLEEVE, THE SURFACE OF THE CONCRETE SHALL BE MARKED WITH "SLV" IN 3" LETTERS ON BOTH SIDES OF SLEEVE CROSSINGS.



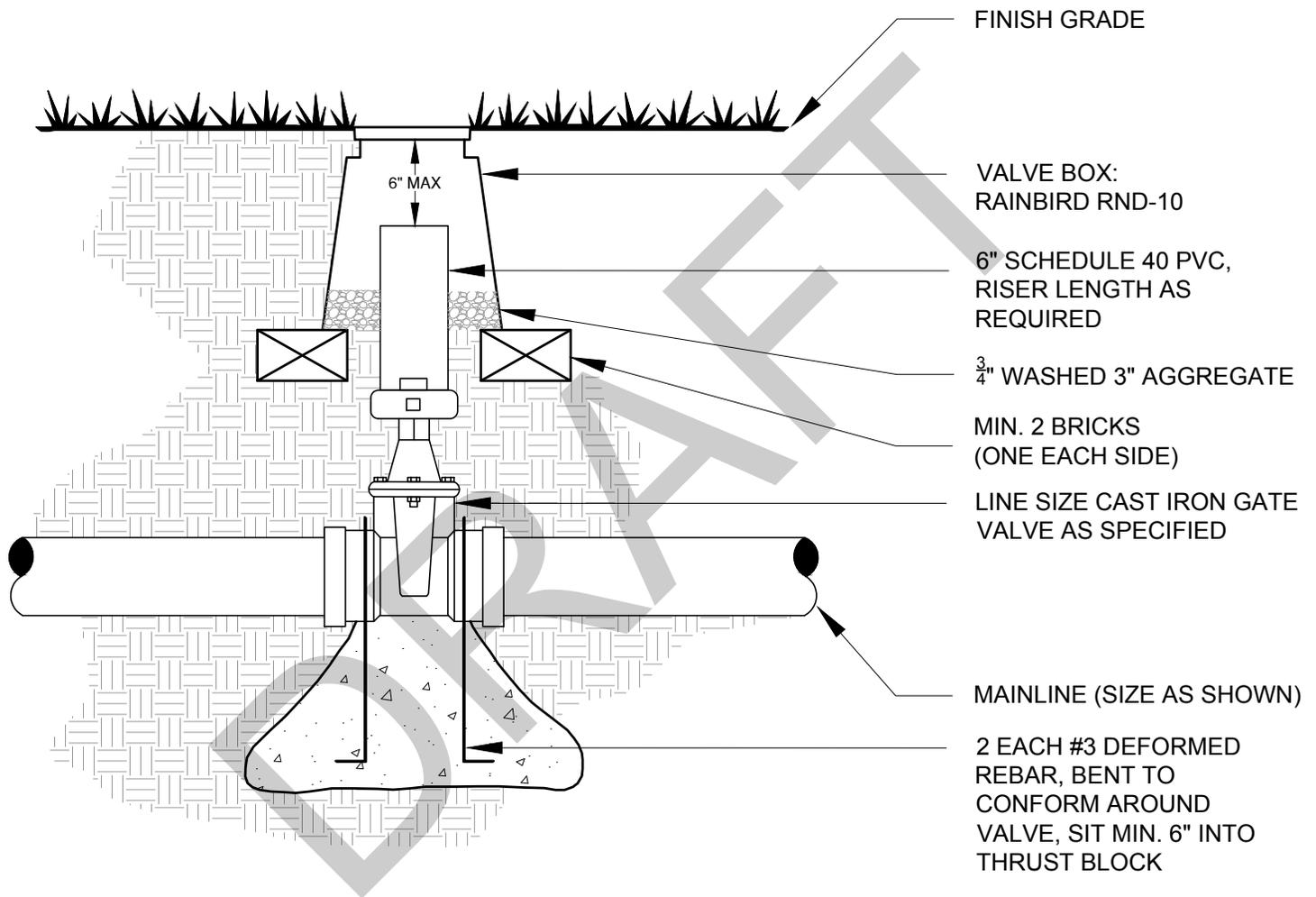
*City Of Gillette*  
 ENGINEERING DIVISION  
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 PHONE: (307) 686-5311

**PVC IRRIGATION SLEEVE PLACEMENT**

DRAWN BY: JB

APPROVED BY: CITY ENGINEER HV/KDS

DATE:	
MAY 2017	
DRAWING NO.	
02920-03	



**NOTES:**

1. FOR THRUST BLOCK SIZES, SEE THRUST BLOCK DETAIL AND SIZE THRUST BLOCK BASED ON TEES OF SAME SIZE AS ISOLATION VALVE.
2. THIS DETAIL IS ONLY TO BE USED FOR VALVES 3" AND LARGER.
3. IF APPROVED, THRUST BLOCKS CAN BE REPLACED WITH JOINT RESTRAINTS.



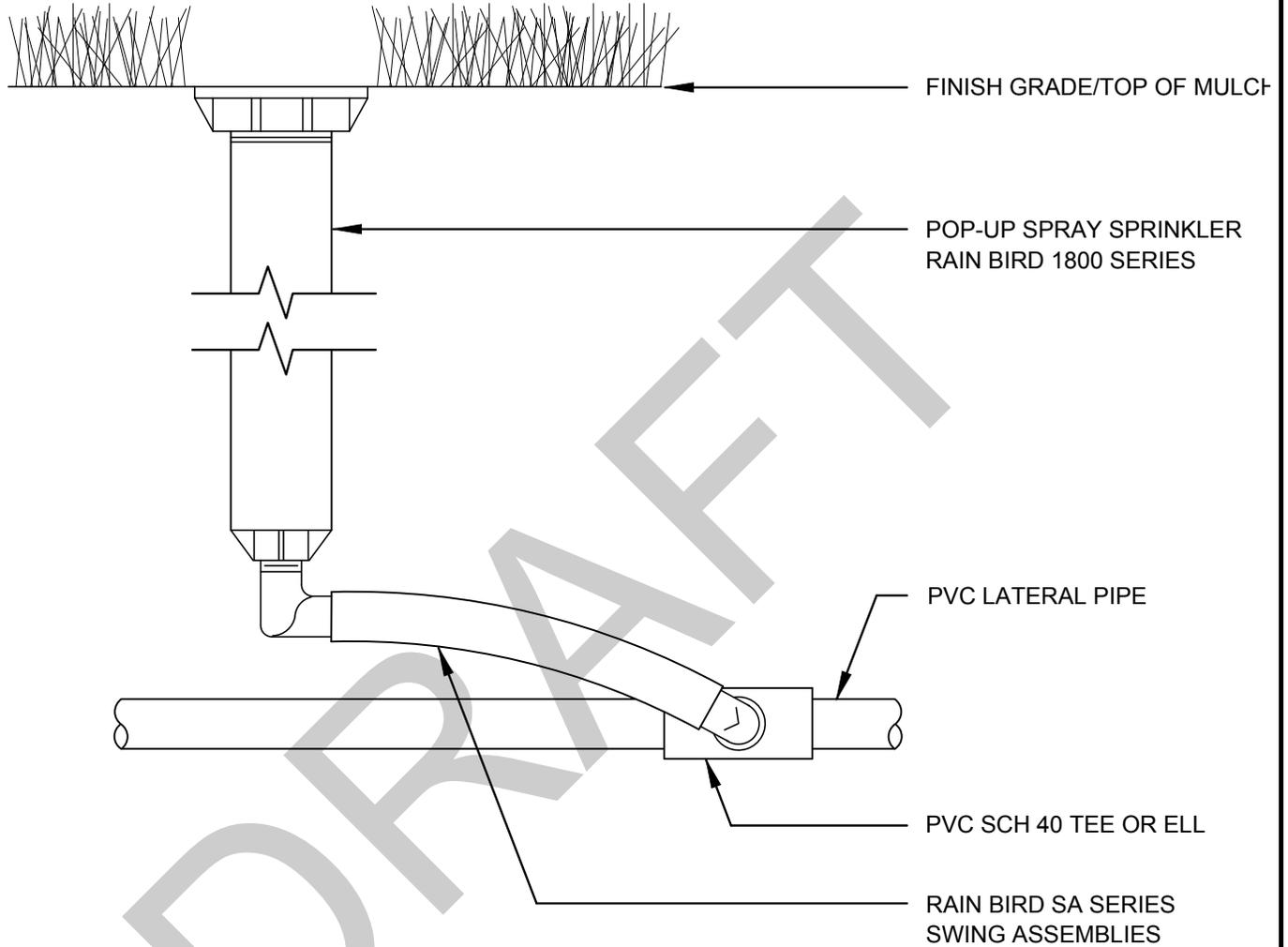
*City Of Gillette*  
 ENGINEERING DIVISION  
 P.O. BOX 3003, 201 E. 5TH STREET  
 GILLETTE, WYOMING 82717  
 PHONE: (307) 686-5311

**MAINLINE ISOLATION VALVE FOR  
 3" AND LARGER VALVES**

DRAWN BY: JB

APPROVED BY: CITY ENGINEER HV/KDS

DATE:	
	MAY 2017
DRAWING NO.	
	02920-04



NOTE:

1. IF USING EITHER 1806 OR 1812 HEADS, THE SWING PIPE ASSEMBLY MUST BE INSTALLED IN THE BOTTOM INLET. THE USE OF THE SIDE INLET IS PROHIBITED.



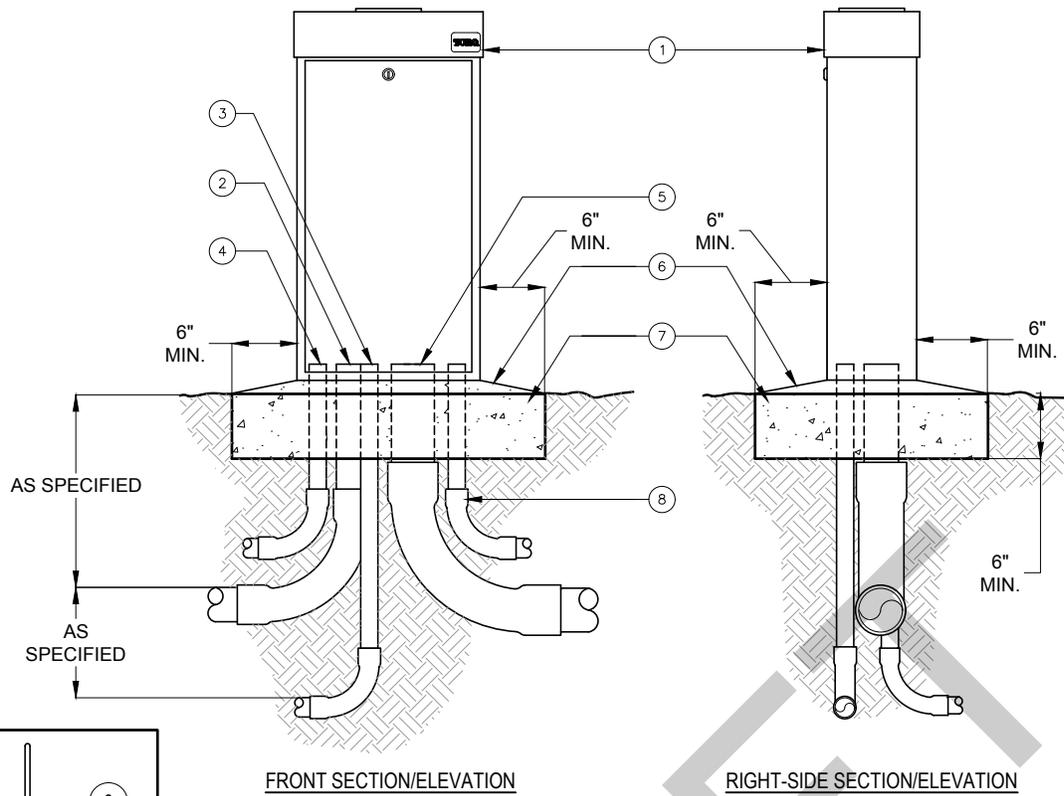
*City Of Gillette*  
 ENGINEERING DIVISION  
 P.O. BOX 3003, 201 E. 5TH STREET  
 GILLETTE, WYOMING 82717  
 PHONE: (307) 686-5311

## IRRIGATION POP-UP ASSEMBLY

DRAWN BY: JB

APPROVED BY: CITY ENGINEER HV/KDS

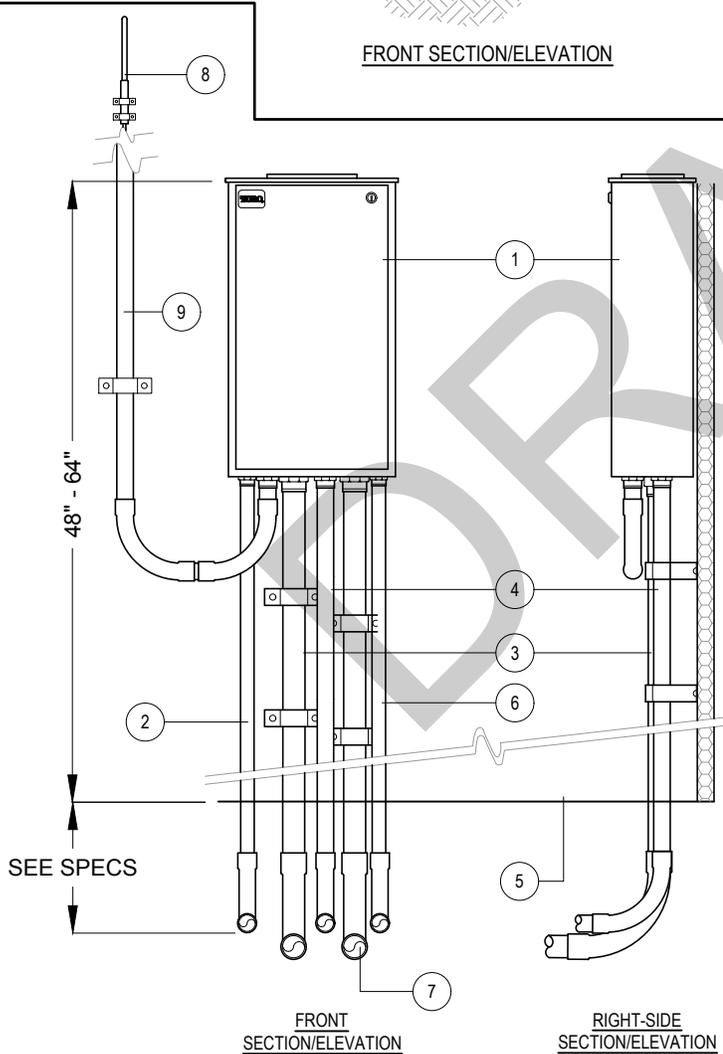
DATE:
MAY 2017
DRAWING NO.
02920-05



- ① TORO SENTINEL TOP ENTRY IRRIGATION CONTROLLER MODEL NO. SSAK12PS16NS1
- ② 2" CONDUIT FOR FIELD WIRES UP TO 24 STATIONS
- ③ 3/4" CONDUIT FOR GROUND
- ④ 3/4" CONDUIT FOR INPUT POWER PER LOCAL & NATIONAL ELECTRICAL CODES
- ⑤ 2" CONDUIT FOR FIELD WIRES 25-48 STATIONS
- ⑥ FINISHED SURFACE SLOPE TO DRAIN
- ⑦ CONCRETE FOOTING
- ⑧ 1/2" CONDUIT FOR SENSOR WIRES

FRONT SECTION/ELEVATION

RIGHT-SIDE SECTION/ELEVATION



- ① TORO SENTINEL IRRIGATION CONTROLLER MODEL NO. SSAKXXWS26NSX  
SEE PLAN FOR NUMBER OF STATIONS  
ANCHOR SECURELY TO WALL
- ② 3/4" CONDUIT FOR ELECTRICAL POWER CONDUCTORS PER LOCAL AND NATIONAL CODES
- ③ 2" CONDUIT FOR UP TO 24 REMOTE CONTROL VALVES WIRES  
SECURE TO WALL WITH APPROPRIATE PIPE CLAMPS
- ④ 3/4" CONDUIT FOR EARTH GROUND
- ⑤ FINISHED SURFACE
- ⑥ 1/2" CONDUIT FOR SENSOR WIRES
- ⑦ 2" CONDUIT FOR 24 TO 48 REMOTE CONTROL WIRES
- ⑧ OPTIONAL OMNI DIRECTIONAL ANTENNA PER SITE SURVEY RECOMMENDATIONS
- ⑨ OPTIONAL 1 1/2" CONDUIT FOR ANTENNA WIRE MINIMUM RADIUS ON SWEEP SHALL BE 1 1/2"

NOTES:

- 1. INSTALLATION TO BE COMPLETED IN ACCORDANCE WITH MANUFACTURERS SPECIFICATIONS.
- 2. DO NOT SCALE DRAWINGS.
- 3. CONTRACTORS NOTE: FOR PRODUCT AND COMPANY INFORMATION VISIT [www.CADdetails.com/info](http://www.CADdetails.com/info) REFERENCE NUMBER 065-121.



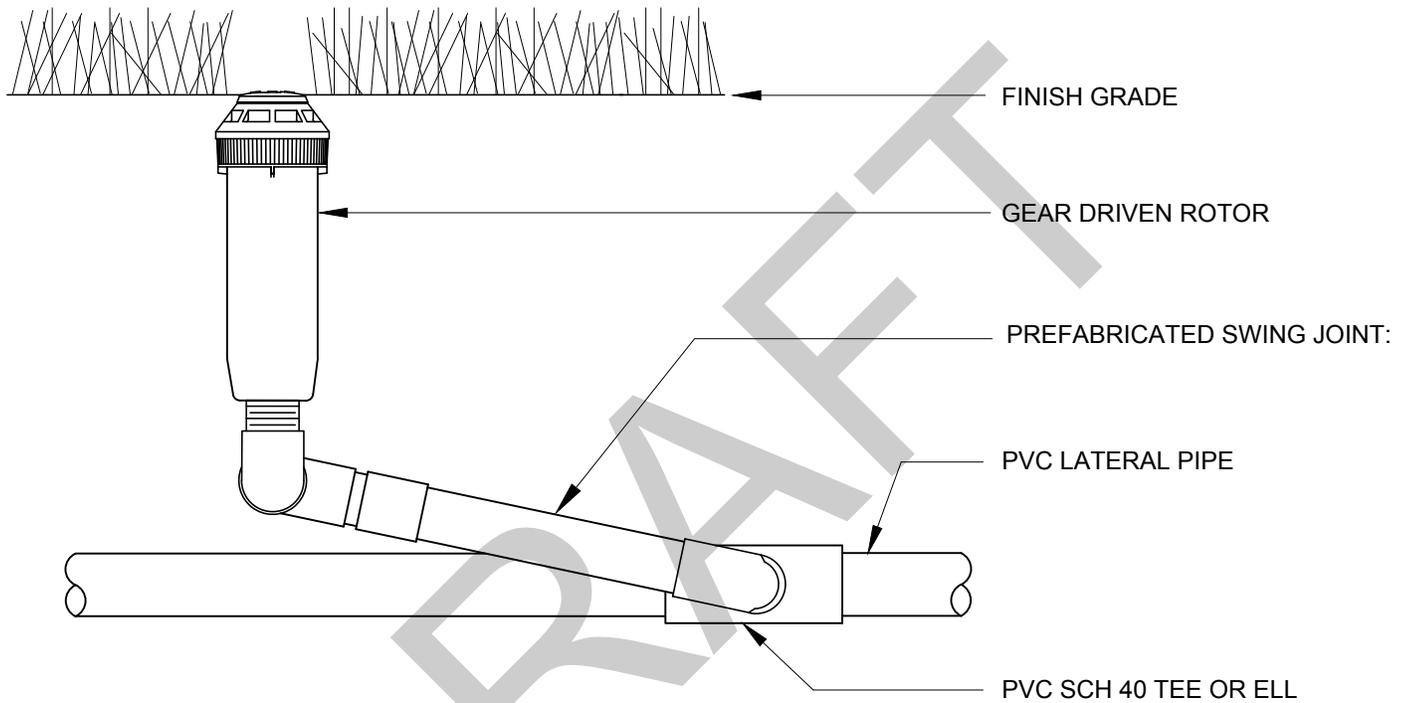
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PHONE: (307) 686-5311

## PEDESTAL & INTERIOR WALL MOUNT CONTROLLERS

DRAWN BY: JB

APPROVED BY: CITY ENGINEER HV/KDS

DATE: \_\_\_\_\_  
MAY 2017  
DRAWING NO. \_\_\_\_\_  
02920-06



**NOTE:**

1. INSTALL SWING JOINT LAY ARM BETWEEN 30 AND 45 DEGREES OF LATERAL PIPE IN ORDER TO ABSORB DOWNWARD IMPACT. IF LATERAL PIPE IS NOT INSTALLED AT SPECIFIED DEPTH, CONSULT PROJECT MANAGER PRIOR TO INSTALLATION OF SWING JOINT.
2. WHEN INSTALLING NEXT TO CONCRETE OR OTHER HARD SURFACE KEEP TOP OF SPRINKLER  $\frac{1}{4}$ " -1" LOW.



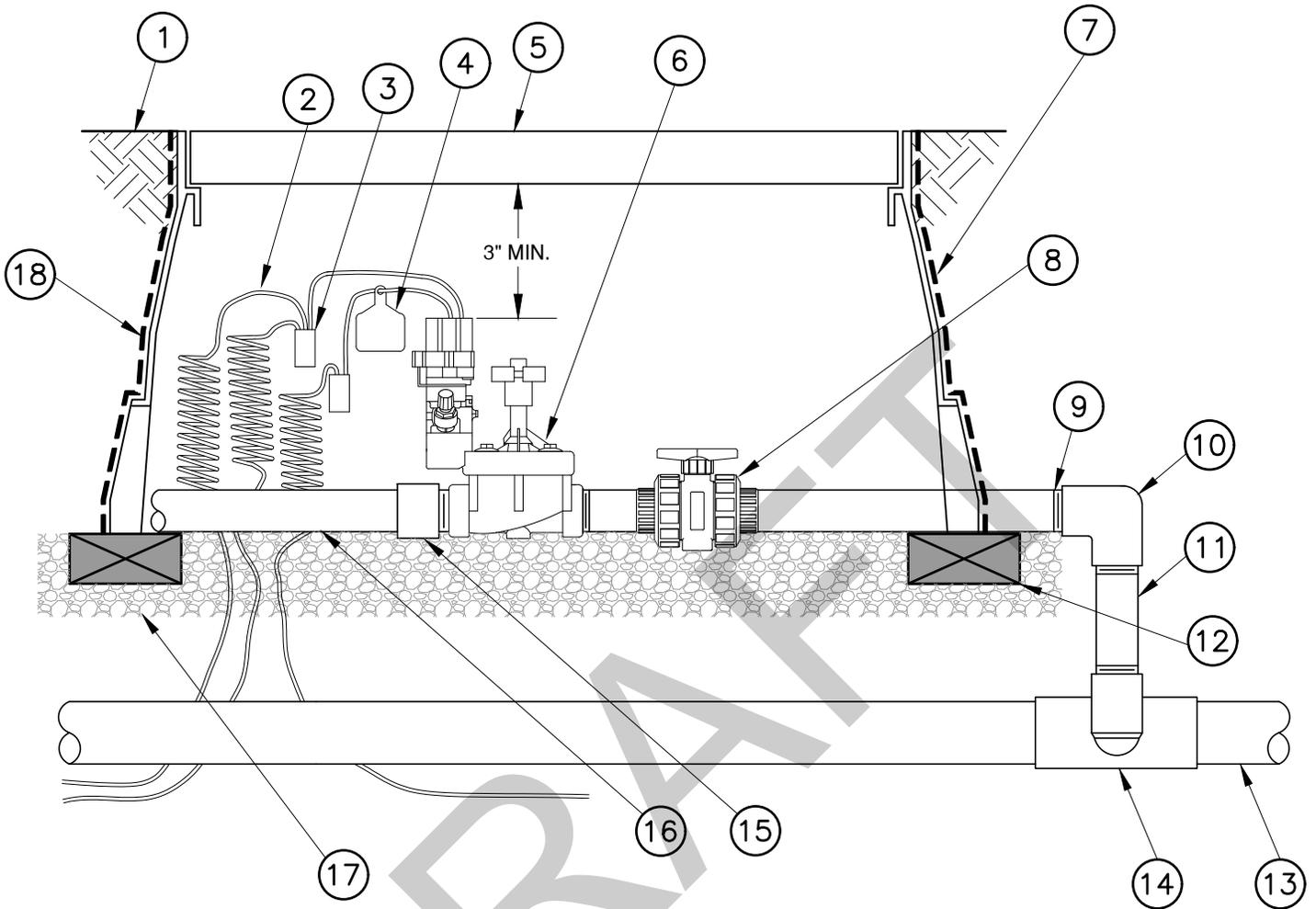
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## IRRIGATION ROTOR ASSEMBLY

DRAWN BY: JB

APPROVED BY: CITY ENGINEER HV/KDS

DATE:	
	MAY 2017
DRAWING NO.	
	02920-07



- |  |  |
|--|--|
| <ul style="list-style-type: none"> <li>① FINISH GRADE</li> <li>② 30-INCH LINEAR LENGTH OF WIRE, COILED</li> <li>③ WATERPROOF CONNECTION</li> <li>④ ID TAG</li> <li>⑤ VALVE BOX WITH COVER:<br/>RAIN BIRD VB-JMB</li> <li>⑥ REMOTE CONTROL VALVE:<br/>RAIN BIRD PESB</li> <li>⑦ WRAP VALVE BOX IN GEOTEXTILE FABRIC</li> <li>⑧ PVC TRU UNION QUARTER-TURN BALL<br/>VALVE. SIZE TO MATCH CONTROL VALVE,<br/>TYPICAL.</li> <li>⑨ PVC SCH 80 NIPPLE (CLOSE)</li> </ul> | <ul style="list-style-type: none"> <li>⑩ PVC SCH 40 ELL</li> <li>⑪ PVC SCH 40 PIPE</li> <li>⑫ BRICK (1 OF 4)</li> <li>⑬ PVC MAINLINE PIPE (NOT INCLUDED)</li> <li>⑭ PVC SCH 80 SOLVENT WELD TEE</li> <li>⑮ UNION FITTING</li> <li>⑯ PVC LATERAL PIPE (NOT INCLUDED)</li> <li>⑰ 3" MINIMUM DEPTH OF <math>\frac{3}{4}</math>" WASHED GRAVEL<br/>TO EXTEND 3" OUTSIDE OF VALVE BOX</li> <li>⑱ INSTALL FABRIC TO SEAL PENETRATIONS<br/>AND OTHER VOIDS, SECURE WITH DUCT<br/>TAPE.</li> </ul> |
|--|--|



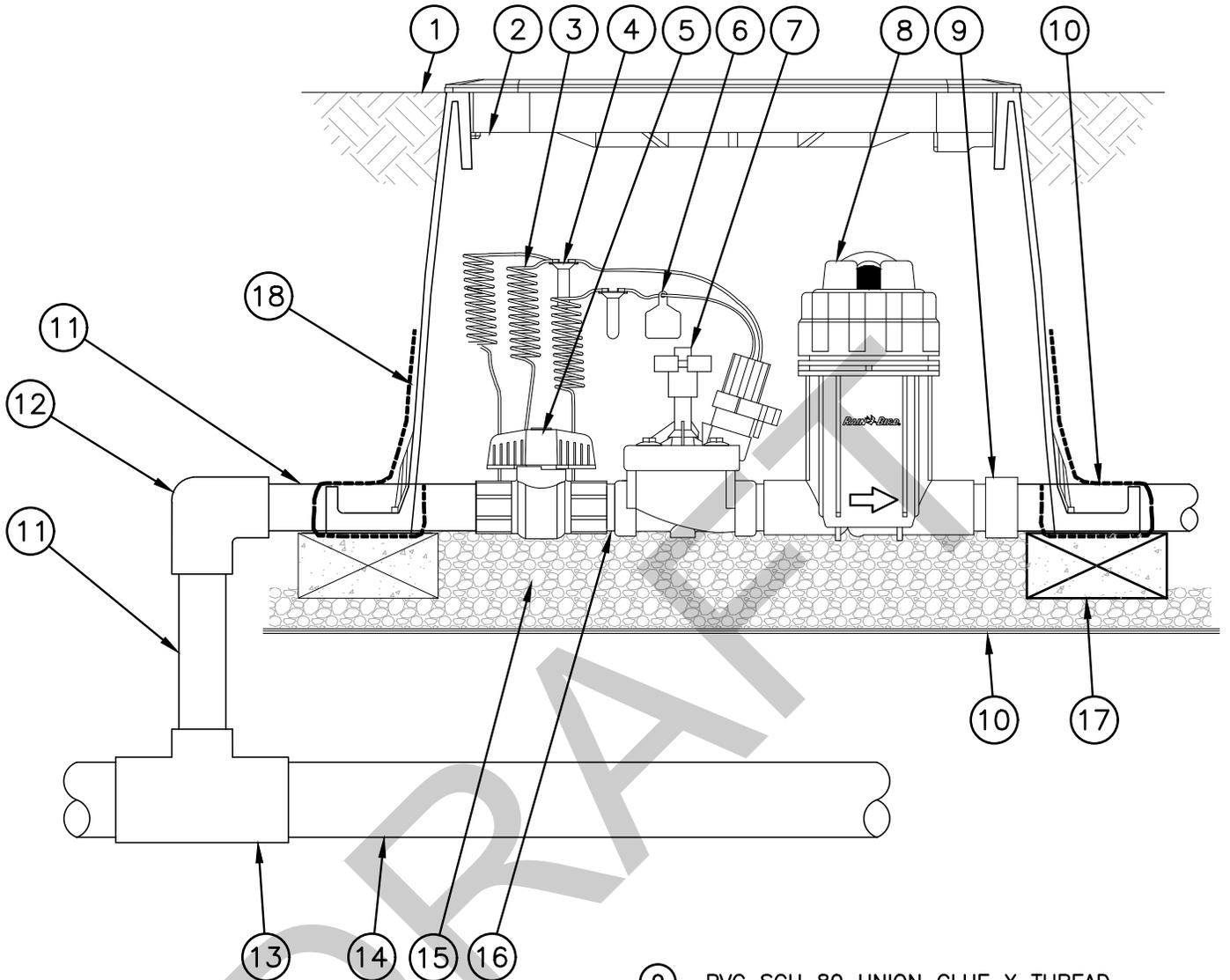
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## ELECTRIC CONTROL VALVE ASSEMBLY

DRAWN BY: JB

APPROVED BY: CITY ENGINEER HV/KDS

DATE:
MAY 2017
DRAWING NO.
02920-08



- ① FINISH GRADE
- ② VALVE BOX WITH COVER:  
RAIN BIRD VB-JMB
- ③ 30-INCH LINEAR LENGTH OF WIRE, COILED
- ④ WATERPROOF CONNECTION:
- ⑤ 1-INCH TRU-UNION, THREADED X SOLVENT WELD
- ⑥ ID TAG
- ⑦ REMOTE CONTROL VALVE:  
RAIN BIRD PESB
- ⑧ PRESSURE REGULATING QUICK CHECK  
BASKET FILTER: RAIN BIRD PRB-QKCHK-100
- ⑨ PVC SCH 80 UNION GLUE X THREAD
- ⑩ LANDSCAPE FABRIC
- ⑪ PVC SCH 40 PVC PIPE
- ⑫ PVC SCH 80 SOLVENT WELD FITTING
- ⑬ PVC SCH 80 TEE, SOLVENT WELD
- ⑭ MAINLINE PIPE
- ⑮ 3" MINIMUM DEPTH OF  $\frac{3}{4}$ " WASHED GRAVEL  
TO EXTEND 3" OUTSIDE OF VALVE BOX
- ⑯ PVC SCH 80 NIPPLE
- ⑰ BRICK (1 OF 4)
- ⑱ INSTALL FABRIC TO SEAL PENETRATIONS AND  
OTHER VOIDS, SECURE WITH DUCT TAPE.



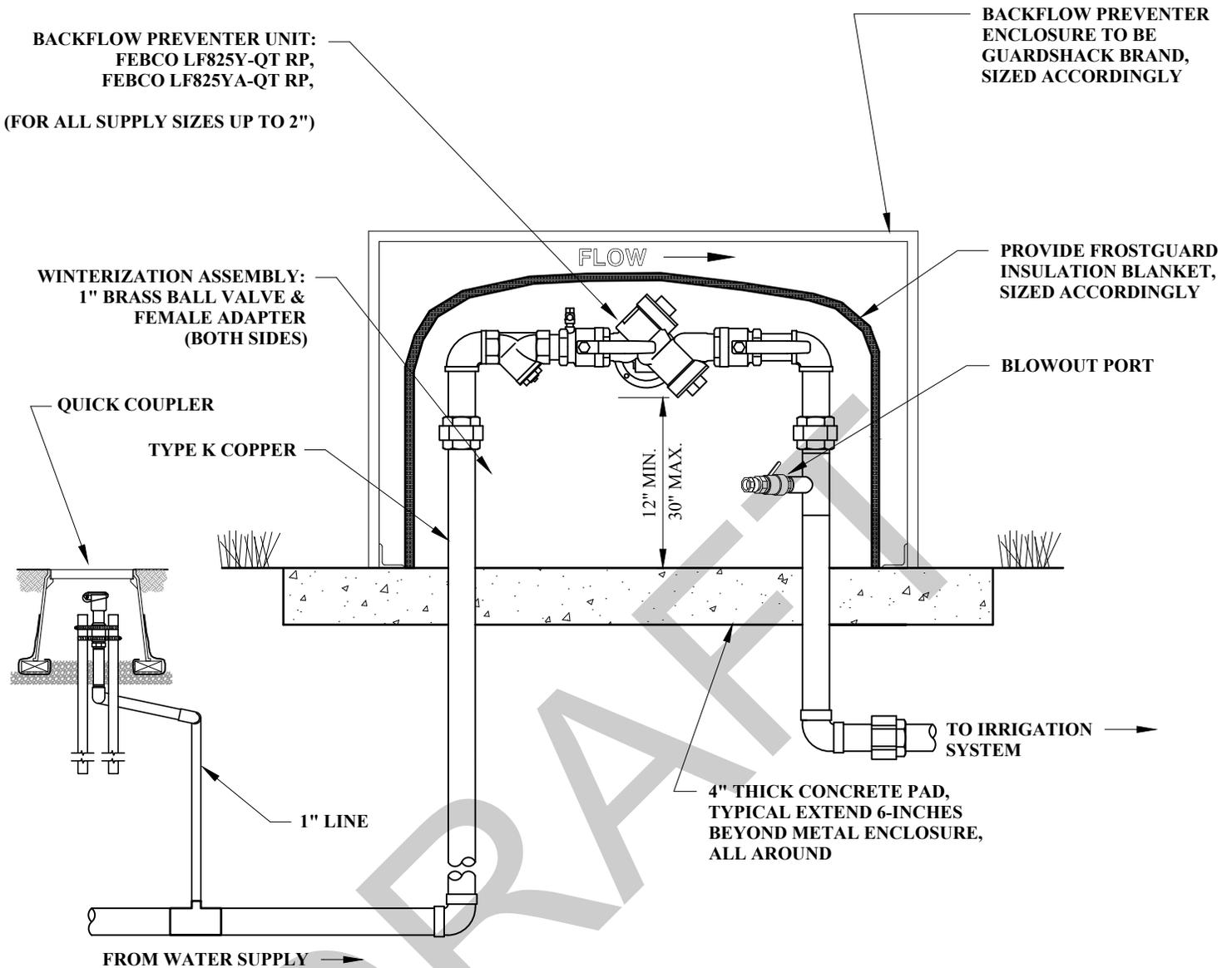
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## LOW FLOW REMOTE CONTROL VALVE ASSEMBLY

DRAWN BY: JB

APPROVED BY: CITY ENGINEER HV/KDS

DATE:	
	May 2017
DRAWING NO.	
	02920-09



**NOTES:**

1. INSTALL REDUCED PRESSURE BACKFLOW PREVENTER UNITS AS REQUIRED BY LOCAL CODES AND HEALTH DEPARTMENT.
2. VERIFY LOCAL REQUIREMENTS PRIOR TO INSTALLATION.
3. CONTRACTOR TO PROVIDE SHOP DRAWING INDICATING LOCATIONS OF BACKFLOW PREVENTER UNIT, VALVES, BLOW-OUT ASSEMBLIES, CONNECTIONS, PAD, ENCLOSURE, LOCKS, ETC. FOR REVIEW BY ENGINEER PRIOR TO COMMENCING IRRIGATION WATER SERVICE INSTALLATION.
4. IF METER IS HOUSED IN A THERMAL-COIL METER BOX, THEN QUICK COUPLER IS NOT NEEDED.
5. INSTALL WINTERIZATION ASSEMBLY TO ALLOW AIR HOSE CONNECTION.



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**BACKFLOW PREVENTER UNIT WITH METAL  
 ENCLOSURE FOR  $\frac{3}{4}$ " TO 2" WATER SERVICE**

DRAWN BY: JB

APPROVED BY: CITY ENGINEER HV/KDS

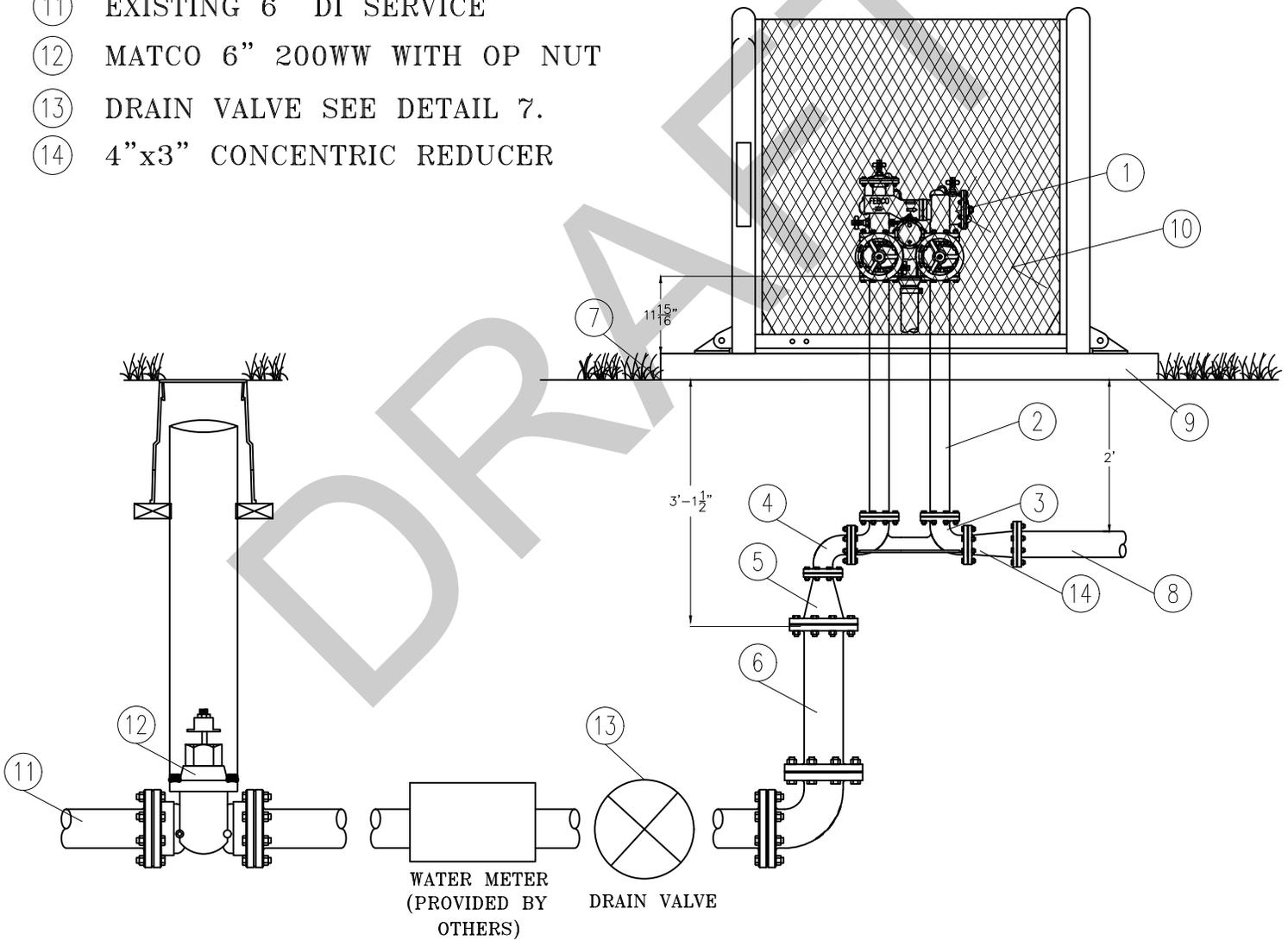
DATE: \_\_\_\_\_

MAY 2017

DRAWING NO. \_\_\_\_\_

02920-10

- ① FEBCO 880V 3" BACKFLOW PREVENTER
- ② 36" X 3" DI SPOOLS
- ③ FEBCO 3" 611 VALVE SETTER
- ④ 3" FLANGE 90 ELL
- ⑤ 6"X 3" CONCENTRIC REDUCER
- ⑥ 6" DI SPOOL, LENGTH AS NEEDED
- ⑦ FINISH GRADE
- ⑧ TO IRRIGATION
- ⑨ CONCRETE PAD 4"
- ⑩ GUARD SHACK GS-NP-2T
- ⑪ EXISTING 6" DI SERVICE
- ⑫ MATCO 6" 200WW WITH OP NUT
- ⑬ DRAIN VALVE SEE DETAIL 7.
- ⑭ 4"x3" CONCENTRIC REDUCER



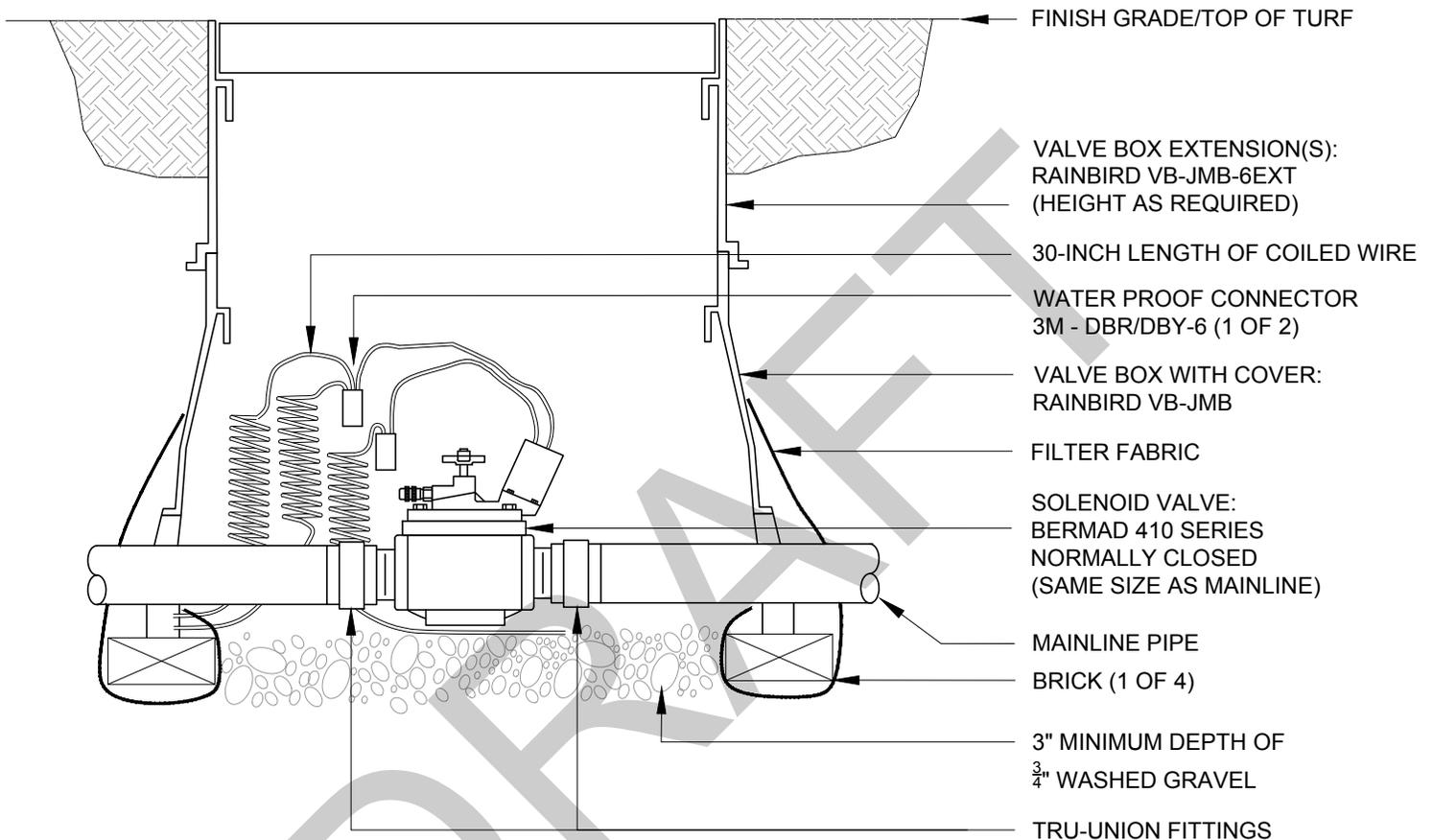
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**BACKFLOW PREVENTER UNIT WITH METAL ENCLOSURE FOR 2 1/2" TO 10" WATER SERVICE**

DRAWN BY: JB

APPROVED BY: CITY ENGINEER HV/KDS

DATE:	
MAY 2017	
DRAWING NO.	
02920-11	



**NOTES:**

1. PROVIDED NORMALLY CLOSED MASTER VALVE.
2. INSTALL FILTER FABRIC AROUND EXTERIOR OF VALVE BOX. USE DUCT TAPE TO SECURE FABRIC TO PIPE AND VALVE BOX.
3. PROVIDE AND INSTALL NECESSARY PERIPHERAL DEVICES AND MAKE ALL NECESSARY CONNECTIONS TO IRRIGATION CONTROLLER.



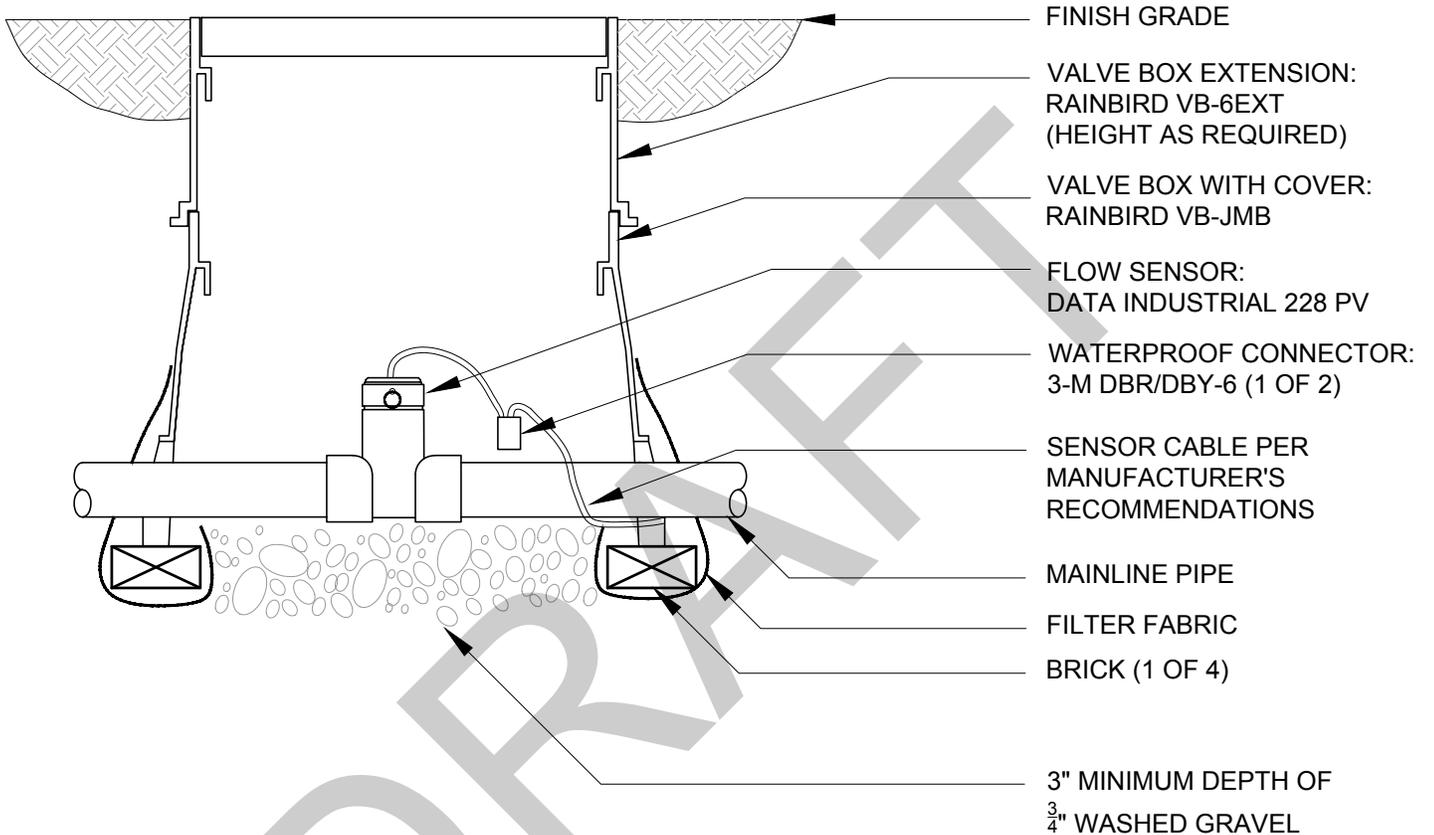
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## MASTER VALVE ASSEMBLY

DRAWN BY: JB

APPROVED BY: CITY ENGINEER HV/KDS

DATE:
MAY 2017
DRAWING NO.
02920-12



**NOTES:**

1. ALLOW 10 PIPE DIAMETERS UPSTREAM AND 5 PIPE DIAMETERS DOWNSTREAM OF STRAIGHT RUN OF PIPE TO ACHIEVE PROPER FLOW READINGS.
2. PROVIDE AND INSTALL ALL NECESSARY PERIPHERAL DEVICES AND MAKE ALL NECESSARY CONNECTIONS TO IRRIGATION CONTROLLER.
3. INSTALL FILTER FABRIC AROUND EXTERIOR OF VALVE BOX. USE DUCT TAPE TO SECURE FABRIC TO PIPE AND VALVE BOX.



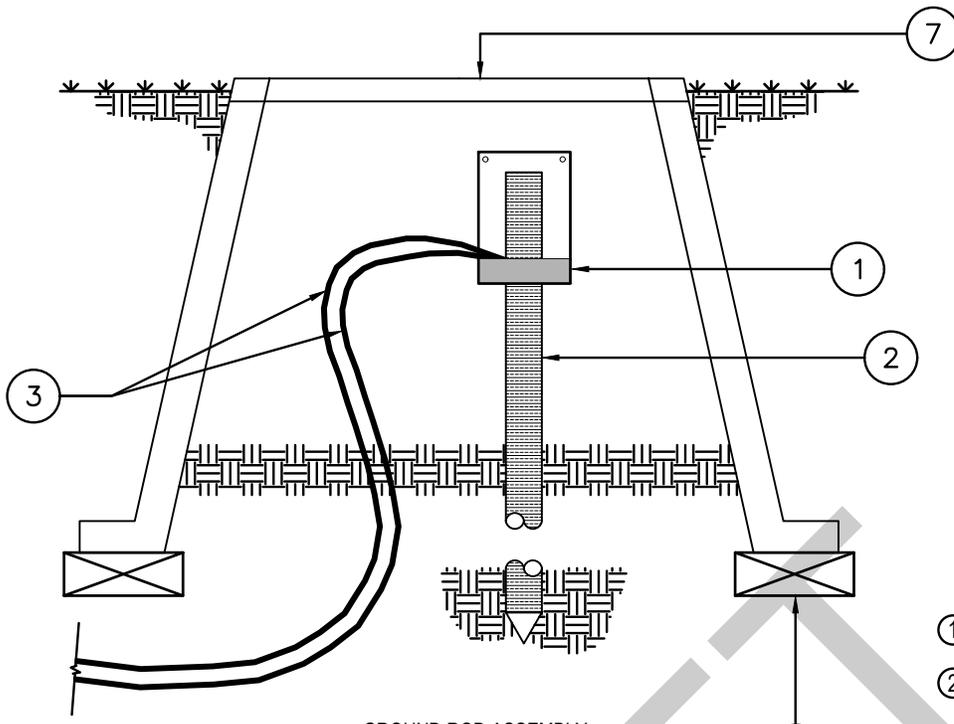
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## FLOW SENSOR ASSEMBLY

DRAWN BY: JB

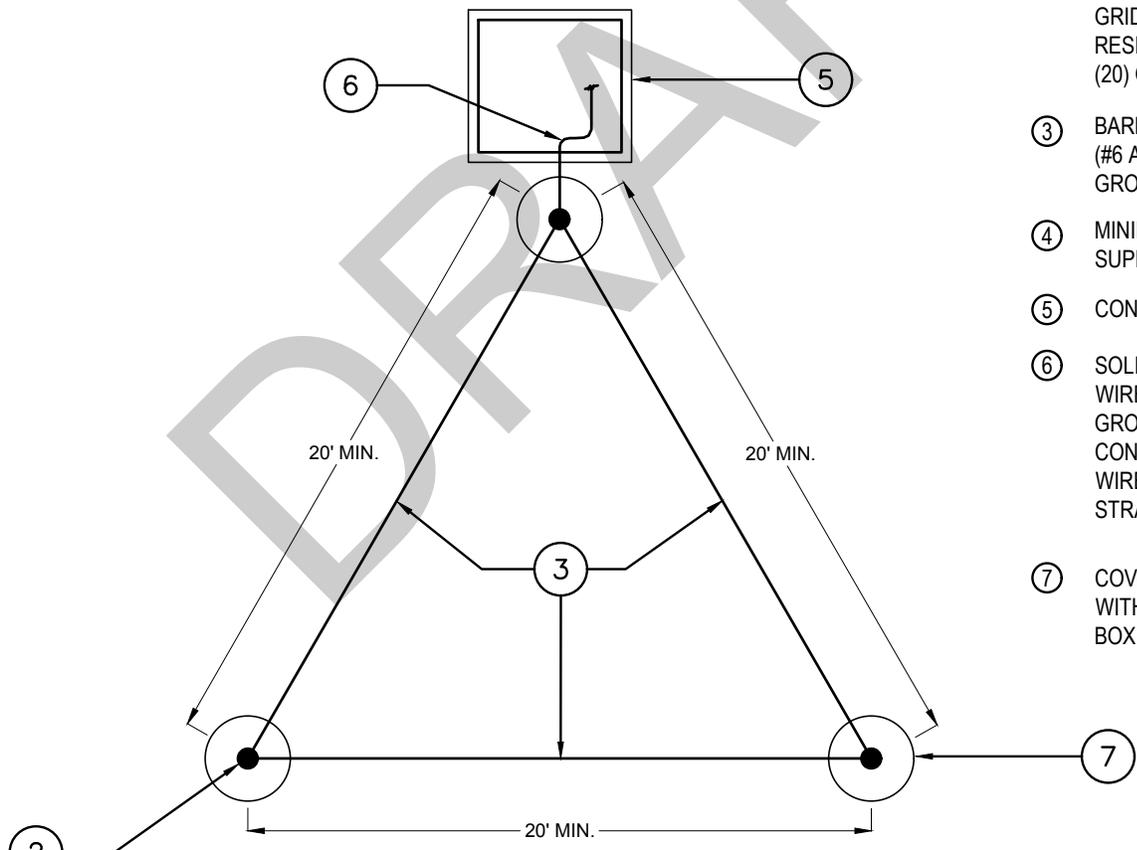
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DATE:
MAY 2017
DRAWING NO.
02920-13



GROUND ROD ASSEMBLY

- ① CADWELD CONNECTOR
- ②  $\frac{5}{8}$ " X 8' COPPER-CLAD UL LISTED GROUNDING ROD. INSTALL RODS IN SOIL IN A TRIANGULAR PATTERN SPACED A MINIMUM OF 20' APART. GROUNDING GRID SHALL HAVE A RESISTANCE OF TWENTY (20) OHMS OR LESS.
- ③ BARE COPPER WIRE (#6 AWG) BETWEEN GROUNDING RODS.
- ④ MINIMUM OF 2 CONCRETE SUPPORT BLOCKS
- ⑤ CONTROL EQUIPMENT
- ⑥ SOLID BARE COPPER WIRE (#6 AWG) FROM GROUNDING ROD TO CONTROLLER. (MAKE WIRE AS SHORT AND STRAIGHT AS POSSIBLE)
- ⑦ COVER GROUNDING ROD WITH 10" ROUND VALVE BOX. (RAINBIRD VB-10RND)



GROUND ROD LAYOUT



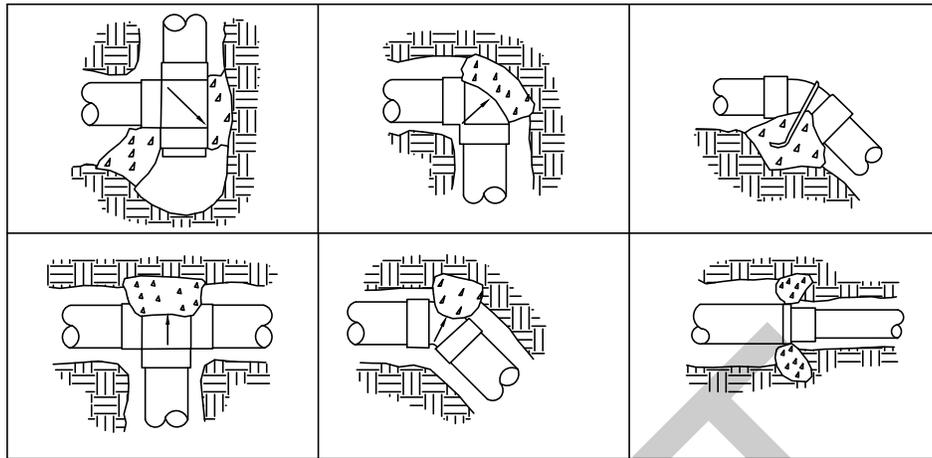
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**GROUND ROD ASSEMBLY & CONTROLLER GROUNDING**

DRAWN BY: JB

APPROVED BY: CITY ENGINEER HV/KDS

DATE:
MAY 2017
DRAWING NO.
02920-14



THRUST BLOCK SURFACE AREA AGAINST UNDISTURBED SOIL (SF)

FITTING SIZE	11 1/4° BEND	22 1/2° BEND	45° BEND	90° BEND	TEE OR DEAD END
3"	0.23	0.43	0.84	1.52	1.08
4"	0.37	0.70	1.37	2.49	1.77
6"	0.78	1.51	2.95	5.39	3.83
8"	1.33	2.56	5.02	9.16	6.5
10"	2.07	3.97	7.79	14.21	10.10

NOTES:

1. INSTALL AND TEST ALL MAINLINE ACCORDING TO MANUFACTURER'S INSTALLATION SPECIFICATIONS.
2. REFER TO SPECIFICATIONS FOR ALL TRENCH DEPTHS AND WIDTHS.
3. USE NO. 4 REBAR WITH MASTIC COATING WHERE PIPE MUST BE ANCHORED TO THRUST BLOCK.
4. INSTALL THRUST BLOCK SO THE HORIZONTAL AND VERTICAL DIMENSIONS OF THE THRUST BLOCK ARE APPROXIMATELY EQUAL.
5. THRUST BLOCK SIZES ARE BASED ON SOIL BEARING CAPACITY OF 1000 POUNDS/CUBIC FOOT.



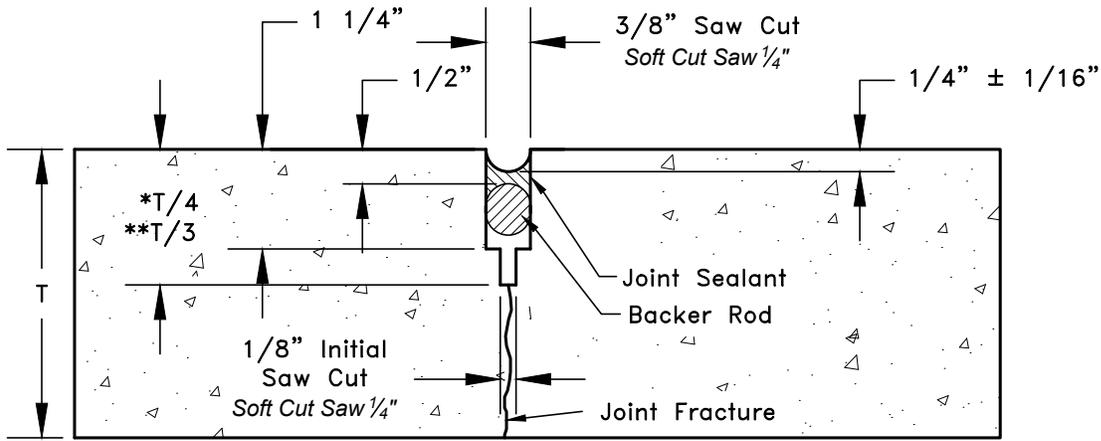
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**THRUST BLOCKING FOR IRRIGATION  
 MAIN FITTINGS**

DRAWN BY: JB

APPROVED BY: CITY ENGINEER HV/KDS

DATE: May 2017  
 DRAWING NO. 02920-15

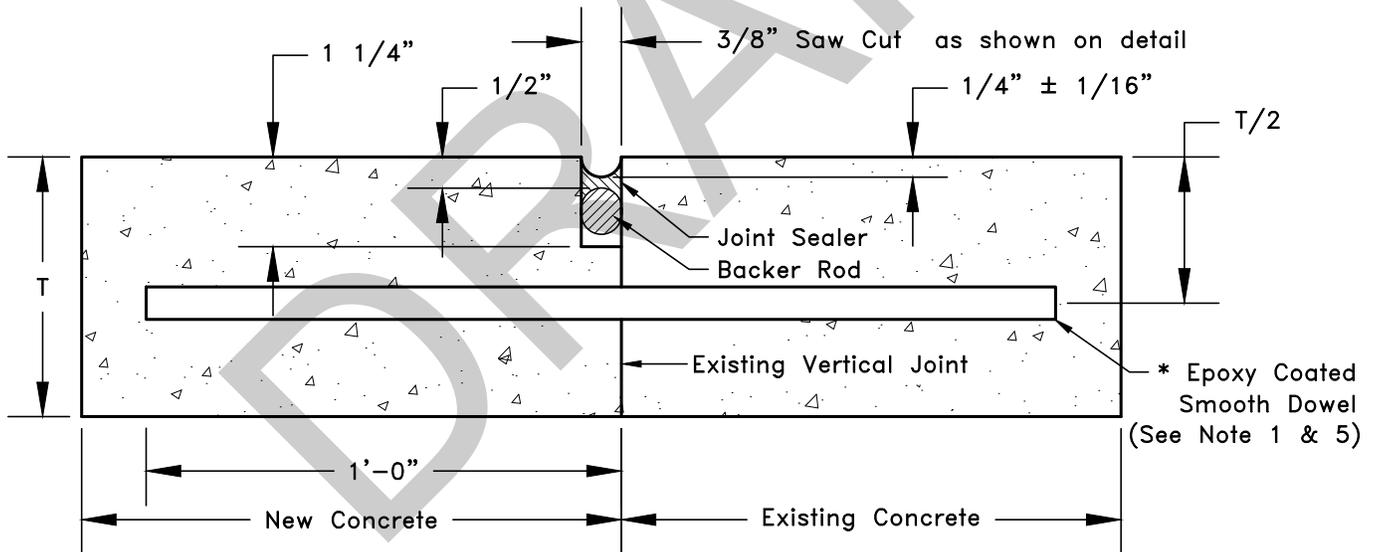


**CONSTRUCTION AND NEW CONTRACTION TRANSVERSE WEAKENED PLANE JOINTS  
(FOR INSTALLATION OF CONCRETE PAVING SECTIONS LESS THAN 7" IN THICKNESS)**

\* Slab Thickness Less Than 7": T/4  
 \*\*Slab Thickness More Than 7": T/3

**NOTES:**

1. The initial saw cut may be 3/8" wide for the full T/3 and T/4 depth at the contractor's option.
2. See Typical Sections details for values of T.
3. All joint sealant shall be as specified in the specifications or special provisions.
4. If the transverse joints do not fracture at the joint on the outer edges of the slab, the ENGINEER may direct that the saw cut depth be increased for no additional payment.



**CONSTRUCTION AND NEW CONTRACTION TRANSVERSE JOINTS  
(FOR INSTALLATION OF CONCRETE PAVING SECTIONS 7" THICK & GREATER)  
OR ON SECTIONS < 7" WHEN REQUIRED**

**NOTES:**

1. Drill hole for 1 1/4" Dia. x 24" steel \*epoxy-coated Smooth Dowel Bars, (lightly greased on one end), @ 24" centers. Use #4 steel \*epoxy-coated Smooth Dowel Bars for pavement sections < 7".
2. The first dowel bar shall be 6" from any concrete edge parallel to bar.
3. All joint sealant shall be as specified in the specifications or special provisions.
4. All backer rod shall be 1/2" closed cell polyethylene foam.
- \*5. Refer to Standard Construction Specs. Sections 2520 and 3200 for epoxy coating requirements.



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**TRANSVERSE JOINT DETAILS**

DRAWN BY: KEB

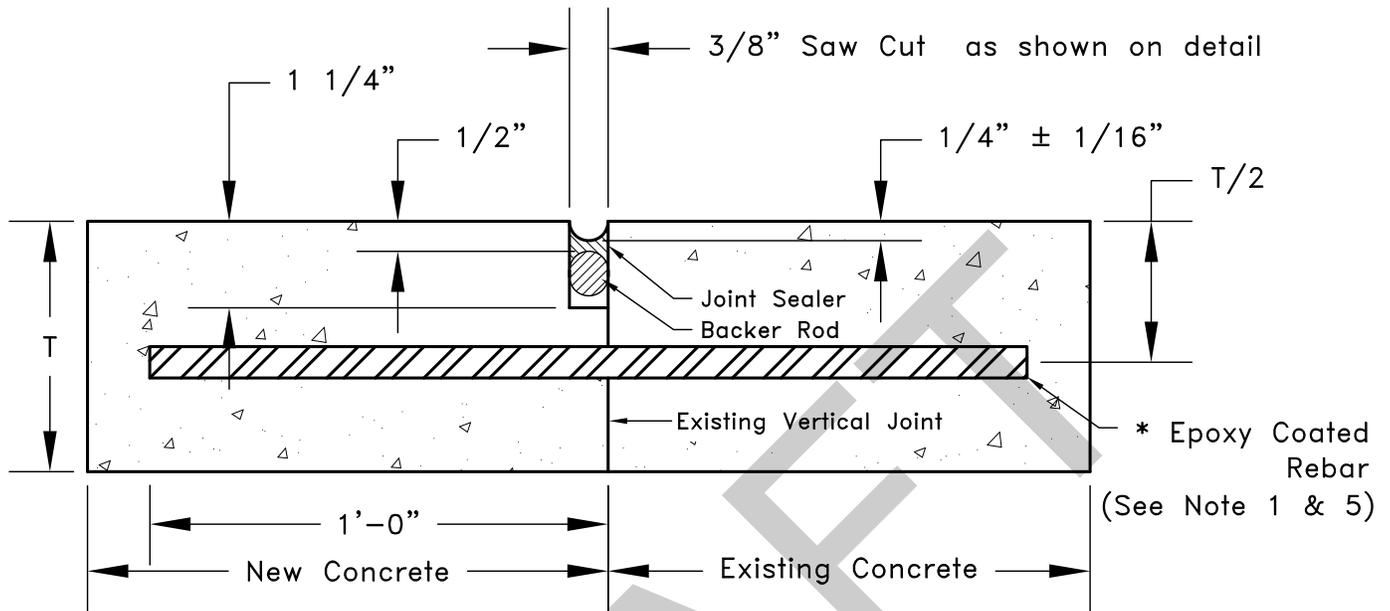
APPROVED BY: CITY ENGINEER HV/KDS

DATE:

MAY 2017

DRAWING NO.

03251-01



\* To be utilized for Mid-Panel Repair Joints

LONGITUDINAL CONTRACTION (NEW) AND/OR CONSTRUCTION JOINTS

NOTES:

1. Drill hole for #4 x 24" \*epoxy-coated Rebar on 24" centers
2. All backer rod shall be 1/2" closed cell polyethylene foam.
3. The first tie bar shall be 6" from any concrete edge parallel to bar.
4. All joint sealant shall be as specified in the specifications or special provisions.
- \*5. Refer to Standard Construction Specs. Sections 2520 and 3200 for epoxy coating requirements.



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## LONGITUDINAL JOINT DETAILS

DRAWN BY: E.G.

APPROVED BY: CITY ENGINEER HV/KDS

DATE:

MARCH 2012

DRAWING NO.

03251-02