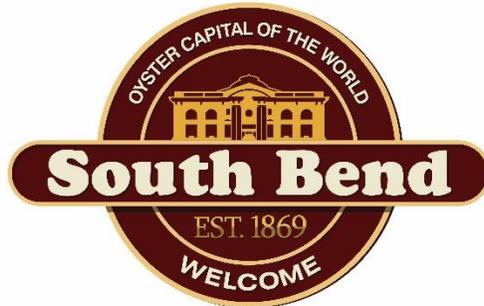


CITY OF SOUTH BEND

PACIFIC COUNTY

WASHINGTON



DEVELOPMENT GUIDELINES

AND

PUBLIC WORKS STANDARDS

G&O #20235
JULY 2020



Gray & Osborne, Inc.
CONSULTING ENGINEERS

TABLE OF CONTENTS

SECTION 1.	INTRODUCTION.....	1-1
SECTION 2.	PERMITS	2-1
2.01	Permit Process.....	2-1
2.02	Variances.....	2-3
SECTION 3.	PUBLIC WORKS CONSIDERATIONS.....	3-1
3.01	Bonding.....	3-1
3.02	Hold Harmless Clause.....	3-1
3.03	Developer’s Public Liability and Property Damage Insurance....	3-2
3.04	Compensation and Employer’s Liability Insurance.....	3-4
3.05	Non-Interference	3-5
3.06	Work Standards.....	3-5
3.07	Inspection.....	3-5
3.08	As-Built Drawings	3-6
SECTION 4.	STREETS STANDARDS	4-1
4.01	General Considerations	4-1
4.02	Streets.....	4-1
4.03	Functional Classification	4-3
4.04	Street Names	4-6
4.05	Traffic Controls and Traffic Studies	4-7
4.06	Right-of-Way	4-7
4.07	Street Frontage Improvements	4-8
4.08	Cul-de-Sac.....	4-8
4.09	Temporary Dead Ends	4-9
4.10	Intersections	4-9
4.11	Driveways	4-10
4.12	Sight Obstruction	4-13
4.13	Subgrade Preparation	4-14
4.14	Crushed Surfacing (Base and Top Course).....	4-14
4.15	Surfacing Requirements.....	4-15
4.16	Temporary Street Patching	4-16
4.17	Trench Backfill and Restoration	4-17
4.18	Survey Staking.....	4-18
4.19	Material and Construction Testing.....	4-19
4.20	Sidewalks, Curbs, and Gutters	4-20
4.21	Street Illumination	4-25
4.22	Roadside Features	4-29
4.23	Parking Lots	4-35
4.24	Utilities.....	4-36
4.25	Sustainable Low-Impact Development Alternative (SLID)	4-38

SECTION 5.	STORM DRAINAGE STANDARDS.....	5-1
5.01	General.....	5-1
5.02	Design Standards	5-1
5.03	Conveyance.....	5-3
5.04	Connections.....	5-4
5.05	Staking	5-5
5.06	Trench Excavation	5-5
5.07	Bedding	5-6
5.08	Backfilling.....	5-7
5.09	Street Patching and Restoration	5-8
SECTION 6.	SANITARY SEWER STANDARDS.....	6-1
6.01	General.....	6-1
6.02	Design Standards	6-1
6.03	General Requirements.....	6-4
6.04	Materials and Testing.....	6-7
6.05	Video Recording	6-18
6.06	State Highway Crossings	6-18
6.07	Staking	6-19
6.08	Trench Excavation	6-19
6.09	Bedding	6-20
6.10	Backfilling.....	6-21
6.11	Street Patching and Restoration	6-21
6.12	Erosion Control.....	6-21
6.13	Adjustment of New and Existing Utility Structures to Grade ...	6-23
6.14	Finishing and Cleanup	6-25
6.15	Final Acceptance.....	6-26
6.16	General Guarantee and Warranty.....	6-26
6.17	Sanitary Sewer Lift Stations	6-26
SECTION 7.	WATER SYSTEM STANDARDS.....	7-1
7.01	General.....	7-1
7.02	Design Standards	7-1
7.03	General Notes.....	7-2
7.04	Materials and Testing.....	7-5
7.05	Staking	7-16
7.06	Trench Excavation	7-16
7.07	Backfilling.....	7-17
7.08	Street Patching and Restoration	7-17
7.09	Erosion Control.....	7-17
7.10	Finishing and Cleanup	7-19
7.11	General Guarantee and Warranty.....	7-20

APPENDIX A MISCELLANEOUS DETAILS

Roadway Details
Storm Drainage Details
Sanitary Sewer Details
Water Details

APPENDIX B MISCELLANEOUS CITY DOCUMENTS

NO.	TITLE OF DOCUMENT
B-01	Bill of Sale for Water
B-02	Bill of Sale for Sanitary Sewer
B-03	Performance Bond
B-04	Assignment of Funds in Lieu of Performance Bond
B-05	Maintenance Bond for Water
B-06	Maintenance Bond for Sewer
B-07	Assignment of Funds in Lieu of Maintenance Bond
B-08	Agreement for Inspection and Maintenance of Privately Maintained Storm Drainage Facilities
B-09	Easement for Water Mains and Appurtenances
B-10	Easement for Sanitary Sewers

SECTION 1
INTRODUCTION

SECTION 1

1. INTRODUCTION

These standards shall apply to all improvements within the public right-of-way and/or public easements, to all improvements required within the proposed public right-of-way of new subdivisions, for all improvements intended for maintenance by the City and for all other improvements for which the City Code requires approval from the City Public Works Department. These standards are intended as guidelines for designers and developers in preparing their plans and for the City Public Works Department in reviewing plans. Where minimum values are stated, greater values should be used whenever practical; where maximum values are stated, lesser values should be used where practical.

Alternate design standards will be accepted when it can be shown, to the satisfaction of the City Public Works Department and City Engineer, that such alternate standards will provide a design equal to or superior to that specified. In evaluating the alternate design, the City Public Works Department and City Engineer shall consider appearance, durability, ease of maintenance, public safety and other appropriate factors.

Any improvements not specifically covered herein by these Standards must meet or exceed the most current edition of the Washington State Department of Transportation (WSDOT) Standard Specifications for Road, Bridge & Municipal Construction, State of Washington, and current amendments thereto, revised as to form to make reference to Local Governments. Said Specifications shall be referred to hereafter as the “WSDOT Standard Specifications.”

Where improvements are not covered by these details or by the WSDOT Standard Specifications, the City Public Works Department and City Engineer will establish appropriate standards.

Plans for major improvements in the public right-of-way or within public easements shall bear an approval signature from the City and City Engineer.

The designer shall submit calculations or other appropriate materials supporting the design of utilities, pavements and storm drainage facilities. The designer shall submit calculations for structures and other designs when requested by the City Public Works Department and/or City Engineer.

SECTION 2

PERMITS

SECTION 2

2. PERMITS

2.01 Permit Process

No person, firm, or corporation shall commence work on the construction, alteration, or repair of any facility located either in the public right-of-way or on a public easement without having first obtained all necessary permits from the City.

Any party requesting such permits shall file a written application with the City at least ten (10) working days before construction is slated to begin.

Every application shall include all necessary information pertinent to the proposed use as specified in South Bend Municipal Code (SBMC) 15.08. At minimum, an application shall include:

- (1) A scale drawing showing the following:
 - a) The location of the proposed right-of-way use;
 - b) The locations of existing and proposed improvements;
 - c) The locations of surface features, such as curbs and gutters;
 - d) The locations of underground features, such as utility lines;
 - e) The locations of the limits of the work area;
 - f) The locations of the limits of the proposed restoration, as well as the associated restoration methods that shall be used within these limits.

- (2) The name, address, email, telephone number, and facsimile number of the Applicant.
 - a) If the Applicant is not the Owner of the facility or facilities to be installed, maintained, or repaired in the public right-of-way, the application shall also include the name, address, email, telephone number, and facsimile number of the Owner.
 - b) If the Applicant is not the Owner of the facility or facilities to be installed, maintained, or repaired in the public right-of-way, the Applicant must demonstrate – in a form and manner specified by the City Supervisor – his or her authorization to act on behalf of the Owner.

- (3) The proposed start date of the use or excavation.
- (4) The proposed duration of the use or excavation, which shall include the duration of the restoration of the public right-of-way physically disturbed by the excavation.
- (5) The following quantities:
 - a) The number of cubic yards to be excavated or filled;
 - b) The amount of impervious surface being added as defined by Chapter 15.78.060 SBMC.
- (6) A copy of the documentation of the franchise, easement, encroachment permit, license, or other legal instrument that authorizes the Applicant or Owner to use or occupy the public right-of-way for the purposes described in the application.
- (7) A Traffic Control Plan, if applicable.
- (8) An estimate of construction costs.
 - a) A draft bond form to be reviewed by the City (see SBMC 15.76.100).
- (9) An environmental checklist, if required by the SEPA official.
- (10) Any other information that may be reasonably required by the City Supervisor and City Engineer based on the particular application at issue.
- (11) An application fee as required by SBMC 15.08.

At their discretion, the City Public Works Department may require an Applicant to furnish additional information when, in their opinion, such information is necessary to properly enforce the provisions of this ordinance.

No permit shall be issued until the proposed work has been approved by the appropriate official. Adjudication of disagreements regarding approvals shall be made by the City Supervisor, and his or her decision shall be final.

No plan shall be approved, nor a permit issued, where it appears that the proposed work, or any part thereof, conflicts with the provisions of this ordinance or any other ordinance of the City of South Bend. Furthermore, issuance of a permit shall not be construed as a waiver of the Zoning Ordinance or any other ordinance requirements concerning the plan.

2.02 Variances

A. General

The Board of Adjustment shall have the authority to grant a variance from the requirements of this Specification and from the requirements of this ordinance in the form of a variance permit after considering the matter via the Type 3 project permit review process. Variance permits are intended to provide a property owner relief when a strict interpretation of municipal code would impose unusual, practical difficulties or unnecessary hardships on the Applicant. The Type 3 project permit review process is a quasi-judicial process by which the Board of Adjustment determines whether or not a variance permit application meets the necessary conditions for approval. No application for a variance shall be granted by the Board of Adjustment unless the following conditions for approval are met:

- (1) The variance permit is necessary because unusual, practical difficulties or unnecessary hardships exist for the applicant. These difficulties or hardships may result from special circumstances relating to the size, shape, topography, critical areas, location of existing structures, or surroundings of the property that preclude reasonable use. The unusual, practical difficulties or unnecessary hardships faced by the applicant do not result from the actions of the applicant and are not self-imposed.
- (2) The variance permit will be in harmony with the intent of the code and the comprehensive land use plan.
- (3) The variance permit is for the minimum necessary adjustment to allow reasonable use of the property.
- (4) The variance permit will not confer a special privilege to the applicant not available to other properties in the same zoning district.
- (5) Variances should align with current zoning procedures.

A variance permit shall become invalid if not exercised within the time prescribed in the notice of decision, or, if the date is not specified, within one year of the effective date of approval. Any variance permit issued for a specific time frame shall become null and void after the expiration date stated in the notice of decision.

B. Variance Permit Application Procedure

A property owner, or any agent of the property owner with written authorization of agency, may submit a Type 3 project permit application. Applicants may obtain application materials through the City; optionally, applicants can choose to schedule a preapplication meeting with the City at this stage. Each project permit applicant shall designate on forms provided by the city a single person or entity to receive determinations and notices under this title. The project permit applicant shall be responsible for notifying the city of any change of the designated person or entity. Variance permit applications not exempt under WAC 197-11-800 will require a threshold determination under the State Environmental Policy Act.

Written submittal requirements for a variance permit, including detail and number of copies to be submitted to be deemed complete, shall be prepared by the City Supervisor. The City Supervisor may waive specific submittal requirements determined to be unnecessary for review of an application. The City Supervisor may require additional material such as maps or studies when such material is necessary to adequately assess the variance permit application.

Within 28 calendar days of receiving a project permit application, the City Supervisor shall provide to the applicant a written determination that the application is complete, or that the application is incomplete and what is necessary to make the application complete. If no written determination is provided within 28 calendar days, the application shall be deemed complete. If any additional information is requested by the City Supervisor, the applicant shall have 90 calendar days to submit this information before the application shall be considered withdrawn unless any extensions are granted by the City. Another written determination of completeness shall be issued within 14 calendar days of the requested information being received.

Within 14 calendar days of the determination of completeness, the city shall issue a notice of application. Notice of any SEPA threshold determination comment opportunities shall be combined with the notice of application. The notice of application shall include the following information:

- (1) Dates of application, determination of completeness, and notice of application.
- (2) Name and address of the applicant or the applicant's designated representative.

- (3) Location and description of the project.
- (4) Date, time, and place of any open record hearing, if one is scheduled.
- (5) Identification of any environmental or critical area documents related to the project, if any, and where they are located for review.
- (6) Public comment period, which begins on the date of the notice of application and concludes 21 days later; provided, however, that the comment period for a shoreline substantial development permit, a shoreline conditional use permit, or a shoreline variance permit shall conclude 30 days later.
- (7) A statement of the right for any person to:
 - a) Comment on the application.
 - b) Receive notice of and participate in any hearings.
 - c) Request a copy of the notice of decision when made.
 - d) Appeal the decision, if applicable.
- (8) Name, phone number, and email address of city supervisor for sending comments.
- (9) Any other information the city determines to be appropriate.

The City Supervisor shall mail a notice of decision to the project permit applicant and to any person who, prior to rendering a decision, requested notice of the decision or submitted substantive comments on the application. The notice shall be mailed within 10 days after the decision.

SECTION 3

PUBLIC WORKS CONSIDERATIONS

SECTION 3

3. PUBLIC WORKS CONSIDERATIONS

3.01 Bonding

Developers and Contractors performing work within the public right-of-way or publicly owned easement(s) shall be prepared to satisfy the following two bonding requirements.

- A. Furnishing a performance bond, approved as to surety by the City Supervisor and as to form by the City Attorney, which bond shall be conditioned upon faithful completion of that portion of the work performed pursuant to the permit which will require completion by the City should the permittee or his contractor default. The amount of such bond shall be 150 percent of the approved value of the improvements. The City engineer shall review and provide approval, as may be applicable of the submitted amount.
- B. Furnishing a Maintenance Bond. All work shall be guaranteed by the Contractor for a 2-year period from the time of inspection and final approval of the construction by the City. The amount of such bond shall be 25 percent of the approved value of the improvements. The City Engineer shall review and provide approval, as may be applicable, of the submitted amount.

3.02 Hold Harmless Clause

The Developer shall indemnify and hold harmless the City and the City Engineer, and their agents and employees, from and against all claims damages, losses, and expenses, including Attorney's fees, arising out of or resulting from the performance of the work, and shall, after reasonable notice, defend and pay the expense of defending any suit and will pay any judgment, provided that any such claim, damage, loss, or expense (1) is attributable to bodily injury, sickness, disease, or death, or to injury or destruction of tangible property (other than the work itself), including the loss of use resulting therefrom, and (2) is caused in whole or in part by any negligent act or omission or by any other action giving rise to strict liability of the Developer, any subcontractor, anyone directly or indirectly employed by any of them, or anyone for whose acts any of them may be liable, regardless of whether or not it is caused in part by a party indemnified hereunder.

In any and all claims against the City or City Engineer, or any of their agents or employees, by any employee of the Developer, any subcontractor, anyone directly or indirectly employed by any of them, or anyone for whose acts any of them may be liable, the indemnification obligation under this article shall not be limited in

any way by any limitation on the amount or type of damages, compensation, or under workman's compensation acts, disability benefit acts, or other employee's benefit acts.

The obligations of the Developer under this article shall not include the sole negligence of the City or the City Engineer.

3.03 Developer's Public Liability and Property Damage Insurance

The Developer shall not commence work until he has furnished evidence (in duplicate copy) of insurance required hereunder, and such insurance has been approved by the City Attorney; nor shall the Developer allow any Contractor or subcontractor to commence work on his contract or subcontract until the same insurance requirements have been complied with by such Contractor or subcontractor. Approval of the insurance by the City Attorney shall not relieve or decrease the liability of the Developer thereby.

Companies writing the insurance under this article shall be licensed to do business in the State of Washington or be permitted to do business under the Surplus Line Law of the State of Washington.

The Developer shall maintain, during the life of the Contract, Comprehensive General and Automobile Liability Insurance, as detailed herein. The insurance shall include, as Additional Named Insured, the City. All insurance policies shall be endorsed to provide that the policy shall not be canceled or reduced in coverage until after ten (10) days prior written notice, as evidenced by return receipt of registered letter has been given to the City.

Comprehensive General Bodily Injury and Property Damage Insurance shall include:

- A. Premises and Operations.
- B. Developer's Protective Liability.
- C. Products Liability, including Completed Operations Coverage.
- D. Contractual Liability.
- E. Broad Form Property Damage.

Comprehensive Automobile Bodily Injury and Property Damage Insurance shall include:

- A. All owned automobiles.

B. Non-owned automobiles.

C. Hired automobiles.

The insurance coverages listed above shall protect the Developer from claims for damages for bodily injury, including death resulting therefrom, as well as claims for property damage, which may arise from operations under this contract, whether such operations be by himself or by any subcontractor or by anyone directly employed by either of them, it being understood that it is the Developer's obligation to enforce the requirements of this article as respects any Contractor or subcontractor.

Comprehensive General and Automobile Liability Insurance shall provide coverage for both bodily injury and property damage, as follows:

Comprehensive General and Automobile Bodily Injury Liability Insurance on an occurrence basis of not less than One Million dollars (\$1,000,000.00) for bodily injury, sickness or disease, including death resulting therefrom, sustained by each person; and for limits of not less than One Million Dollars (\$1,000,000.00) for each occurrence.

Comprehensive General Property Damage Liability Insurance on an occurrence as is for limits of not less than One Million Dollars (\$1,000,000.00) for damage to or destruction of property, including loss of use thereof, arising from each occurrence, and in an amount of not less than Two Million Dollars (\$2,000,000.00) in aggregate.

Comprehensive Automobile Property Damage Liability Insurance on an occurrence basis for limits of not less than One Million Dollars (\$1,000,000.00) for damage to or destruction of property, including loss of use thereof, arising from each occurrence.

Comprehensive Liability Insurance shall include the City and the as Additional Named Insured.

Comprehensive General Property Damage Liability Insurance shall include liability coverage for damage to or destruction of property of other, including loss of use of property damaged or destroyed, and all other indirect and consequential damage for which liability exists in connection with such damage to or destruction of property of others, and shall include coverage for:

("X") Injury to or destruction of any property arising out of blasting or explosion;

("C") Injury to or destruction of any property arising out of the collapse of/or structural injury to any building or structure due:

1. To excavation, including borrowing, filling or backfilling in connection therewith, or tunneling, pile driving, coffer-dam work or caisson work, or
2. To moving, shoring, underpinning, raising or demolition of any building or structure or removal or rebuilding of any structural support thereof.

("U") Injury to or destruction of wires, conduits, pipes, mains, sewers or other similar property or any apparatus in connection therewith, below the surface of the ground, if such injury or destruction is caused by and occurs during the use of mechanical equipment for the purpose of excavating or drilling, or

1. Injury to or destruction of property at any time resulting therefrom.

There shall be included in the liability insurance, contractual coverage sufficiently broad to insure the provisions of "Hold Harmless Clause."

Nothing contained in these insurance requirements is to be construed as limiting the extent of the Developer's responsibility for payment of damages resulting from his operations under this Contract.

In the event the Developer is required to make corrections on the premises after the work has been inspected and accepted, he shall obtain, at his own expense, and prior to commencement of any corrective work, full insurance coverage, as specified herein.

The Developer shall furnish, upon request by the City, certified copies of the insurance policy or policies within two weeks of the City's request.

3.04 Compensation and Employer's Liability Insurance

The Developer shall maintain Workmen's Compensation Insurance or, as may be applicable, Maritime Workmen's Insurance, as required by state or federal statute for all of his employees to be engaged in work on the Project and, in case any such work is sublet, the Developer shall require the Contractor or subcontractor similarly to provide Workmen's Compensation Insurance or Maritime Workmen's Insurance for all of the latter's employees to be engaged in such work. The Developer's Labor & Industries account number shall be noted in the Proposal in the space provided.

In the event any class of employees engaged in work at the site of the Project is not covered under the Workmen's Compensation Insurance or Maritime Workmen's Insurance, as required by state and federal statute, the Developer shall maintain and shall cause each contractor or subcontractor to maintain Employer's Liability Insurance with a private insurance company for limits of at least One Hundred Thousand Dollars (\$100,000.00), each person, and Three Hundred

Thousand Dollars (\$300,000.00), each accident, and furnish satisfactory evidence of same.

3.05 Non-Interference

The permittee shall be responsible for minimum interference with:

- A. Traffic Routing.
- B. Fire Facility Clearance.
- C. Adjoining Property.
- D. Utility Facilities.
- E. Natural Surface Drainage.

Prior to construction, these items are to be discussed with the City Public Works Department, and/or City Fire and Police Departments and/or the City Building Inspector, and special provisions may be included in any applicable City Permit(s).

3.06 Work Standards

All work performed pursuant to a permit issued shall be done in accordance with these “Development Guidelines and Public Works Standards” and WSDOT Standard Specifications. Where conflicts exist between these “Development Guidelines and Public Works Standards” and the aforementioned WSDOT Standard Specifications, the City’s Development Standards shall take precedence.

3.07 Inspection

- A. General. The City shall exercise full right of inspection of all excavating, construction, and other invasions of City right-of-way or public easements. The City Public Works Department shall be notified on the working day prior to commencing any work in the City’s right-of-way or public easements. The City Public Works Department and/or City Engineer is authorized to and may issue immediate stop work orders in the event of noncompliance with this chapter and/or any of the terms and provisions of the permit or permits issued hereunder.
- B. Final Inspection. Prior to final approval of construction, a visual inspection of the job site will be made by the City Public Works Department. Restoration of the area shall be complete with all improvements being restored to substantially their original or superior condition. Final approval of construction shall not be given earlier than

thirty (30) days after completion of construction, as witnessed by the City's Public Works Department and/or City Engineer.

3.08 As-built Drawings

Permittees who install systems within, on, or below the City's public rights-of-way or public easements shall furnish the City Public Works Department with accurate drawings, plans and profiles, showing the location and curvature of all underground structures installed, including abandoned installations. Horizontal locations of utilities are to be referenced to street centerlines, as marked by survey monuments, and shall be accurate to a tolerance of plus or minus 1/2 foot. The depth of such structure may be referenced to the elevation of the finished street above said utility, with depths to the nearest one-tenth foot being shown in a minimum of 50-foot intervals along the location of said utility. All development improvements including private service for sewer, water, and storm drainage, shall be marked where they intersect the curb with metal tags embedded in the curb face.

Such as-built drawings shall be submitted to the City Public Works Department office within thirty (30) calendar days after completion of the work.

In the event that the permittee does not have qualified personnel to furnish the as-built drawing required by this section, he shall advise the City Public Works Department in order that necessary field measurement may be taken during construction for the preparation of as-built drawings. All costs of such field inspection and measurement, to include the preparation of the as-built drawings, shall be at the sole expense of the permittee.

Drawing Standards:

Minimum scale - 1" = 50' horizontal; 1" = 5' vertical

Detail scale - Larger as necessary

As-built drawings shall be submitted as a hard copy with a signature and data which verifies the "as-built" condition of the project. All data as shown on the drawings shall be "fixed line" or ink. In addition, as-built drawings shall be provided in an electronic form compatible with the CAD system used by the City Engineer. The Applicant shall contact the City Engineer to determine which version of CAD is being used by the City.

SECTION 4
STREET STANDARDS

SECTION 4

4. STREET STANDARDS

4.01 General Considerations

A. General

The overall goal of this chapter is to encourage the uniform development of an integrated, fully accessible public transportation system that will facilitate present and future travel demand with minimal environmental impact to the community as a whole.

Note that this chapter defines *minimum* street design standards. More stringent design and construction standards may be warranted in some cases due to localized conditions and construction parameters.

4.02 Streets

A. General

All street designs must provide for the maximum traffic loading and capacity conditions anticipated. The width and grade of the pavement must conform to specific standards set forth herein for safety and uniformity.

B. Design Standards

The design of streets and roads shall depend upon their type and usage. The design elements of streets shall conform to City Standards as set forth herein and good engineering design practice.

The layout of streets shall provide for the continuation of existing arterial streets in adjoining subdivisions or of their proper projection when adjoining property is not subdivided. Local access streets, which serve primarily to provide access to abutting property, shall be designed to discourage through traffic. See the table of the Minimum Street Design Standards.

1. Grade. Street profile grade should conform closely to the natural contour of the land. In some cases, a different grade may be required by the City Engineer. The minimum “desired” profile grade shall be 0.7 percent. Local conditions may, in the opinion of the City’s Supervisor, require a less allowable profile grade, in which case (if specifically approved by the City Public Works Department) the absolute minimum allowable profile grade shall

be 0.5 percent. The absolute maximum allowable grade shall be 12 percent, depending upon the street classification. However, the “desired” grade is 8 percent or less for fire apparatus accessibility.

2. Width. Road right-of-way shall be a sufficient width to accommodate all transportation, parking, utility, and buffer requirements. In general, public streets shall have right-of-way widths no less than 60 feet, and private streets shall have right-of-way widths no less than 40 feet. However, pending City approval, reduced right-of-way widths may be permissible where geometric or physical factors warrant. The minimum pavement width depends upon a street’s functional classification. These widths are shown in the table of Minimum Street Design Standards in Section 4.03.

Street widths shall be measured from face of vertical curb to face of vertical curb on streets with cement concrete curb and gutter, and from centerline of gutter to centerline of gutter for streets without concrete vertical curb and gutter.

3. The General Notes numbered 1 through 7, as shown and further referenced herein, shall be included or referenced on any plans submitted to the City for construction approval dealing with street design.

GENERAL NOTES (STREET CONSTRUCTION)

1. All workmanship and materials shall be in accordance with current City of South Bend Standards and current amendments thereto and the WSDOT Standard Specifications.
2. The Contractor shall be responsible for all traffic control in accordance with the most current edition of the Manual on Uniform Traffic Control Devices (MUTCD), and current amendments thereto. Prior to disruption of any traffic, traffic control plans shall be prepared and submitted to the City for consideration and/or approval. No work shall commence until all approved traffic control is in place.
3. All curb and gutter, street grades, sidewalk grades, and any other vertical and/or horizontal alignment shall be staked by engineering or surveying firm capable of performing such work. Such firms shall be currently licensed in the State of Washington to perform such work.

4. Where new asphalt joins existing, the existing asphalt shall be cut to a neat vertical edge and tacked with Asphalt Emulsion type CSS-1 in accordance with the WSDOT Standard Specifications. The new asphalt shall be feathered back over existing to provide for a seal at the saw cut location and the joint sealed with grade AR-4000W paving asphalt.
5. Compaction of subgrade, rock, and asphalt shall be in accordance with the WSDOT Standard Specifications.
6. Form and subgrade inspection by the City is required before pouring concrete. A minimum forty-eight hour notice is required to be provided to the City Public Works Department for form inspection.
7. See City of South Bend Standards for testing and sampling frequencies.

C. Private Streets

Acceptance of existing private streets as public streets will be considered only if the streets meet all applicable public street standards, including right-of-way widths. New private streets may be allowed at the City's discretion. Permeable pavement may be considered if approved by the City.

All private roads shall, at a minimum, meet City of South Bend Public Works Standards for pavement width, sidewalk and planter strip. Street lighting is required at the intersection of the private street with the public right-of-way. Rights and responsibilities of each served property must be established by written document approved by the City Attorney and recorded in the County.

4.03 Functional Classification

City streets are divided into major (or principal) arterial, minor (or secondary) arterials, collectors and local access streets in accordance with regional transportation needs and the functional use each serves. Function is the controlling element for classification and shall govern right-of-way, road width, and road geometrics. The following list is provided to assist the developer in determining the classification of a particular street. Streets not listed are classified as local access streets. New streets will be classified by the City.

A. Major (Principal) Arterials

1. US 101.

B. Minor (Secondary) Arterials

There are no minor arterial roadways within the City of South Bend.

C. Major Collector Streets

1. “A” Street (US 101 to First Street).
2. Alder Street (US 101 to Cedar Street).
3. Broadway Avenue (US 101 to Harrison Street).
4. Cedar Street (Alder Street to First Street).
5. First Street (“A” Street to Cedar Street).
6. Harrison Street (US 101 to Broadway Avenue).

D. Minor Collector Streets

1. “A” Street (First Street to city limits).
2. Central Avenue (US 101 to First Street).
3. Cowlitz Street (Cedar Street to Memorial Drive).
4. First Street (Monroe Street to Kendrick Street).
5. Kendrick Street (US 101 to First Street).
6. Memorial Drive (US 101 to Cowlitz Street).
7. Monroe Street (US 101 to First Street).
8. Raymond South Bend Road (Harrison Street to city limits).
9. Pacific Avenue (US 101 to First Street).
10. Summit Avenue (US 101 to city limits).
11. Willapa Avenue (US 101 to city limits).

STREET STANDARDS

E. Local Access Streets

All streets not listed, with the exception of private access streets, are to be classified as local access streets.

MINIMUM STREET DESIGN STANDARDS

Refer to the appropriate street (ST) details in Appendix A for more detailed information on minimum street design standards according to street functional classification.

Design Standard	Major Arterial	Major Collector	Minor Collector	Local Access	Private Access	Alleys
Minimum Right-of-Way/Access Easement*	60'	60'	60'	60'	40'	16'
Minimum Pavement Width	40'	24'	22'	22'	12'	12'
Parking Lane	None	Both sides	Both sides	Both sides except one side in cul-de-sac	N/A	N/A
Minimum/Maximum Grade	0.7%-8%	0.7%-10%	0.7%-10%	0.7%-12%	0.7%-12%	0.7%-12%
Curb	Cement concrete vertical curb and gutter only	Cement concrete vertical curb and gutter only	Rolled asphalt curb allowed	Rolled asphalt curb allowed	N/A	N/A
Sidewalks**	10' sidewalk on both sides of street.	8' sidewalk on both sides of street.	6' sidewalk on both sides of street.	5' sidewalk on one side of street.	N/A	N/A
Planter Strips***	Planter strips shall not reduce width of Pedestrian Access Route to below 8'.	Planter strips shall not reduce width of Pedestrian Access Route to below 6'.	Planter strips shall not reduce width of Pedestrian Access Route to below 5'.	Planter strips shall not reduce width of Pedestrian Access Route to below 5'.	N/A	N/A
Cul-De-Sac Radius (right-of-way/access easement width)	N/A	N/A	N/A	50'	50'	N/A

MINIMUM STREET DESIGN STANDARDS (continued)

Design Standard	Major Arterial	Major Collector	Minor Collector	Local Access	Private Access	Alleys
Cul-De-Sac Radius (pavement width)	N/A	N/A	N/A	35'	35'	N/A
Intersection Curb Radius	55'	55'	30'	30'	30'	30'
Design Speed (MPH)	Per City Ordinance	30	25	25	10	10
Minimum Centerline Radius for Normal Crown	460'	460'	460'	200'	N/A	N/A
Stopping Sight Distance	250'	250'	250'	160'	N/A	N/A
Traffic Control Signage and/or Pavement Striping	Required	Required	Required	Required	N/A	N/A

*Subject to City approval, public right-of-way widths under 60' may be permissible where geometric or physical factors warrant.

**Subject to City approval, alternative sidewalk designs, such as low-impact meandering sidewalks, may be allowed.

***Subject to City approval, planter strips on local access streets may reduce the width of the Public Access Route to a width of 4' so long as widened passing spaces are provided at regular intervals pursuant to the provisions of the most current WSDOT Design Manual.

4.04 Street Names

The Developer must check with the City Planning Department regarding the naming of streets. This should be done at the time the preliminary plat is submitted and again upon approval of the final plat. The City Planning Department will ensure that the name assigned to a new street is consistent with policies of the City.

For individual lots an address number will be assigned to all new buildings at the time of building permit application. For subdivisions, short plats and/or binding site plans address numbers will be assigned during preliminary application review and recorded with final approval. It is then the Owner's responsibility to see that address numbers are displayed in accordance with the most current edition of the International Building Code/International Residential Code (IBC/IRC).

4.05 Traffic Controls and Traffic Studies

A. Signing and Pavement Striping

The Developer is responsible for providing all traffic control signs and pavement striping as required by the City. Traffic control signing and pavement striping shall comply with the provisions as established by the MUTCD.

Street designation signs, including poles and hardware, striping and other delineations as required will be paid for and installed by the developer. All required signing (traffic control and street name signs), striping, and other delineation as required, shall be shown on the street improvement plans prior to plan approval. Street designation signs shall display street names or grid numbers as applicable. All signs, posts, locations, post anchoring, etc., and pavement striping shall be approved by the City prior to acquisition and installation of same.

B. All residential commercial and/or industrial development which generates more than 25 peak hour trips/day, as defined by the most current edition of the Federal Trip Generation Manual (FTGM), or will result in more than eight (8) parking stalls may be required to perform and submit a formal Traffic Study.

4.06 Right-of-Way

Road right-of-way shall be a sufficient width to accommodate all transportation, parking, utility, and buffer requirements. In general, public streets shall have right-of-way widths no less than 60 feet, and private streets shall have right-of-way widths no less than 40 feet. However, pending City approval, reduced right-of-way widths may be permissible where geometric or physical factors warrant. Developers proposing right-of-way widths below these minimum values must prove that such decreases are warranted, and they must prove that their designs shall adequately accommodate all transportation, parking, utility, and buffer requirements to the fullest extent possible.

As detailed in Section 4.08, right-of-way requirements may be more stringent on cul-de-sac streets. Right-of-way requirements may also become more stringent if additional lanes, pockets, transit lanes, bus loading zones, operational speeds, bike lanes, utilities, schools or other factors are proposed and/or required by the City Public Works Department. Right-of-way shall be conveyed to the City on a recorded plat or by a right-of-way dedication deed. All costs of same to be borne by the property owner/Developer.

4.07 Street Frontage Improvements

- A. All new commercial and residential development, plats, and short plats shall install street frontage improvements at the time of construction and/or prior to final platting as required by the City. For the purpose of this requirement development shall mean new construction on undeveloped sites or redevelopment of an existing site that equals more than 50 percent of the value of the existing structure. Additional accessory structures such as garages, outbuildings, greenhouses, etc. on an existing developed site, are not considered as new development as long as they comply with the zoning requirements of the zone in which located. Such improvements may include curb and gutter, sidewalk, street storm drainage, street lighting system, utility relocation, landscaping and irrigation, and street widening all per these Standards. Full extent of the improvements required shall be determined by the City Engineer during application and shall take into consideration existing facilities adjacent to the area, future plans and extensions to existing systems, topographical and infrastructure constraints, site limitations, and impacts related to the development. Plans shall be prepared and signed by a licensed civil engineer currently registered in the State of Washington and reviewed and approved by the City at the expense of the property owner/Developer.
- B. All frontage improvements shall be made across full frontage of property from centerline to right-of-way line.
- C. Exceptions. When the City Supervisor and City Engineer deems that due to utility or infrastructure conflicts, topographic conditions, project location(s) or on-site limitations the above such improvements should not or cannot be accomplished at the time of building construction, the City may waive, limit or modify the requirement(s) for such improvements. The City Supervisor and City Engineer may require that a recorded agreement be completed on forms provided by the City which provide for these improvements to be installed at a later date by the Applicant with monies and/or a bond provided to insure future improvements, and the Applicant signing of a waiver of protest in a Local Improvement District (L.I.D.), or Utility Local Improvement District (U.L.I.D.).

4.08 Cul-de-Sacs

Streets designed to have one end permanently closed shall be no longer than 400 feet. Decreases in the minimum right-of-way along the lengths of these roads are not permissible. At the closed end, there shall be a widened “bulb” having a minimum paved traveled radius of 35 feet and a right-of-way radius of 50 feet. Landscaped stormwater flow control and treatment islands are permitted within the widened bulb area.

4.09 Temporary Dead Ends

Where a street is temporarily dead ended, turnaround provisions must be provided where the road serves more than one lot. The turn-around may be a hammerhead with a minimum distance on both sides at the centerline intersection of 55 feet to facilitate emergency vehicle turn-around. The “hammerhead” must be approved by the City Fire Department.

4.10 Intersections

- A. Traffic control will be as specified in the MUTCD or as may be specifically modified by the City Engineer as a result of appropriate traffic engineering studies.
- B. Street intersections shall be laid out so as to intersect as nearly as possible at right angles. Sharp angled intersections shall be avoided. For reasons of traffic safety, a “T” intersection (three-legged) is preferable to the crossroad (four-legged) intersection for local access streets. For safe design, the following types of intersection features should be avoided:
 - 1. Intersections with more than four intersecting streets.
 - 2. “Y” type intersections where streets meet at acute angles.
 - 3. Intersections adjacent to bridges and other sight obstructions.
- C. Spacing between adjacent intersecting streets, whether crossing or “T”, should be as follows:

When highest classification involved is:	Minimum centerline offset should be:
Major Arterial	230 feet
Major Collector	230 feet
Minor Collector	125 feet
Local Access	125 feet

When different class streets intersect, the higher standard shall apply on curb radii. Deviations to this may be allowed at the discretion of the City Supervisor.

- D. On sloping approaches at an intersection, landings shall be provided with grade not to exceed one foot difference in elevation for a distance of 30 feet approaching any arterial or collector or 20 feet approaching a local access street, measured from nearest right-of-way line (extended) of intersecting street.

4.11 Driveways

- A. General

- 1. Driveway details are located at the end of these Standards.
- 2. All abandoned driveway areas on the same frontage shall be removed and the curbing and sidewalk or shoulder and ditch section shall be properly restored, at the property owner's expense.
- 3. All driveways in subdivisions, and new construction on existing city lots shall be constructed of Portland Concrete Cement, and shall be at least 6 inches thick, over a 4-inch crushed surfacing (5/8" minus) top course. Driveways shall be subject to the same testing and inspection requirements as curb, gutter, and sidewalk construction. Driveways for existing dwellings may be constructed with asphalt upon written request and approval of the Public Works Department.
- 4. Joint-use driveways serving two adjacent parcels may be built on their common boundary upon formal written agreement by both property owners and approval of the City. The agreement shall be a recorded easement for both parcels of land specifying joint usage.
- 5. Grade breaks, including the tie to the roadway, shall be constructed as smooth vertical curves. The maximum change in driveway grade shall be 8 percent within any 10 feet of distance on a crest and 12 percent within any 10 feet of distance in a sag vertical curve. The grades of all driveway approaches are to be approved by the City.
- 6. No commercial driveway shall be approved where backing onto the sidewalk or street will occur.

7. No driveway aprons shall extend into the street further than the face of the curb.
8. The angle between any driveway and the street shall be not less than 45°.
9. The two edges of each driveway shall be parallel.
10. Every driveway must provide access to a garage, carport, parking apron or other structure on private property requiring the entrance of vehicles. No public curb shall be cut unless a driveway is installed.
11. Maintenance of driveway approaches shall be the responsibility of the Owners whose property they serve.
12. Two track driveways may be considered and approved by the City in residential construction as an LID measure.

B. Arterial Streets

1. No driveway may access an arterial street within 75 feet (measured along the arterial) of any other such arterial street access on either side of the street; provided, that such access may be located directly opposite another access.
2. No driveway access shall be allowed to an arterial street within 150 feet of the nearest right-of-way line of an intersecting street. No driveway shall be located within 20 feet of a crosswalk.
3. Within the limitations set forth above, access to arterial streets within the City shall be limited to one driveway for each tract of property separately owned, except that automobile service stations may be allowed two driveways per Section C below.
4. Driveways giving direct access onto arterials may be denied if alternate access is available. Deviations of these standards may be permitted by the City Engineer.
5. No driveway shall be located so as to conflict with power poles, street lights, fire hydrants, traffic regulating devices or other above-ground facilities, and shall not create a hazard to pedestrians or motorists.
6. To minimize access points along principal arterials the City may require adjacent parcels to share (joint-use) driveways. Joint-use

driveways serving two adjacent parcels shall be built on their common boundary upon formal written agreement by both property owners in a form approved by the City. The agreement shall be a recorded easement for both parcels of land specifying joint-use.

C. Width

1. In general, residential and commercial driveways, except automobile service stations, shall not exceed the following maximum widths:

PRIVATE OR COMMERCIAL DRIVEWAYS (EXCEPT AUTOMOBILE SERVICE STATIONS)

<u>PROPERTY FRONTAGE</u>	<u>MAXIMUM DRIVEWAY WIDTH</u>
<16'	8'
16' to 30'	8' or 40% of frontage
>30' to 50'	12' or 40% of frontage
>50' to 75'	22'
>75' to 100'	24'
>100'	32'

2. In general, service station driveways shall not exceed the following maximum widths.

AUTOMOBILE SERVICE STATIONS

<u>PROPERTY FRONTAGE</u>	<u>MAXIMUM NUMBER OF DRIVEWAYS</u>	<u>MAXIMUM DRIVEWAY WIDTH</u>
<16'	1	8'
16' to 30'	1	50% of frontage
>30' to 50'	1	22'
>50' to 75'	1	26'
>75' - 1,000'	or 2	18'
	1	30'
	or 2	22'

3. A road approach or wider driveway width may be required by the City where a substantial percentage of oversized vehicle traffic exists, where divisional islands are desired, or where multiple exit or entrance lanes are needed.

4. Parking lot circulation and signing needs shall be met on site. The public right-of-way shall not be utilized as part of a parking lot flow.
5. Road approaches and/or ingress and egress tapers may be required in industrial and commercially zoned areas as directed by the City Engineer.
6. The total width of all driveways on a street for any one ownership, shall not exceed 40 percent of that ownership along the street, shall not be more than two in number, and shall be separated by at least 3 feet along the curb.

4.12 Sight Obstruction

The following sight clearance requirements take into account the proportional relationship between speed and stopping distance.

The sight distance area is a clear-view triangle formed on all intersections by extending two lines of specified length (A) and (B) as shown below from the center of the intersecting streets along the centerlines of both streets and connecting those endpoints to form the hypotenuse of the triangle. See detail at the end of these Standards. The area within the triangle shall be subject to restrictions to maintain a clear view on the intersection approaches.

Sight Distance Triangle:

Stop or Yield Controlled Intersection:

<u>Speed Limit</u>	<u>Sight Distance (Ft.)</u>	
	(A) <u>Major Street</u>	(B) <u>Minor Street</u>
20 mph	200	*
25 mph	250	*
30 mph	300	*
35 mph	350	*
40 mph	400	*

* Sight distance measured from a point on the minor road 15 feet from the edge (extended) of the major road pavement and measured from a height of eye at 3.50 feet on the minor road to height of object at 4.25 feet on the major road.

Uncontrolled Intersection:

<u>Speed Limit</u>	<u>Sight Distance (Ft.)</u>	
	(A) <u>Major Street</u>	(B) <u>Minor Street</u>
20 mph	90	90
25 mph	115	115
30 mph	140	140
35 mph	165	165
40 mph	195	195

- A. The vertical clearance area within the sight distance triangle shall be free from obstructions to a motor vehicle operator’s view between a height of 3 feet and 10 feet above the existing surface of the street.

- B. Exclusions. Sight obstructions that may be excluded from these requirements include: fences in conformance with this chapter, utility poles, regulatory signs, trees trimmed from the base to a height of 10 feet above the street, places where the contour of the ground is such that there can be no cross visibility at the intersection, saplings or plant species of open growth habits and not in the form of a hedge which are so planted and trimmed as to leave at all seasons a clear and unobstructed cross view, buildings constructed in conformance with the provisions of appropriate zoning regulations and preexisting buildings.

4.13 Subgrade Preparation

The subgrade area of the street right-of-way shall be cleared of brush, weeds, vegetation, grass and debris, per Section 2-01 of the WSDOT Standard Specifications (See Section 3.06). All cleared and grubbed material shall be satisfactorily removed and disposed of at an approved dumpsite per regulatory requirements. All depressions, or ruts, which contain water, will be drained.

The subgrade shall then be bladed and dragged to remove inequalities and secure a uniform surface. The existing subgrade will be compacted to a minimum density as specified in the WSDOT Standard specifications (See Section 3.06) and/or as required by the City Engineer.

4.14 Crushed Surfacing (Base and Top Course)

Surfacing shall consist of the construction of two or more courses of crushed stone upon an existing roadway surface, or upon a subgrade properly prepared as outlined above or when approved by the City Engineer the SLID alternative identified in Section 4.26. Crushed surfacing material shall be uniform in quality and substantially free from wood, roots, bark and other extraneous material. It

will compact into a dense and unyielding mass which will be true to line, grade and cross-section. It shall meet the following test requirements:

Los Angeles Wear, 500 Rev. (ASTM Designation C 131)	35% Max.
Degradation Factor-Top Course	25 min.
Degradation Factor-Base Course	15 min.

<u>Sieve Size</u>	<u>Base Course</u>	<u>Top Course</u>
	<u>Percent Passing</u>	
1-1/4"	99-100	
1"	80-100	
3/4"		99-100
5/8"	50 to 80	
1/2"		80-100
No. 4.....	25-45	46-66
No. 40.....	3-18	8-24
No. 200.....	7.5 Max	10 Max.
% Fracture.....	75 min	75 min.
Sand equivalent.....	40 Min	40 Min.

All percentages are by weight.

The fractured requirement shall be at least one fractured face and will apply to the combined aggregate retained on the No. 4 sieve in accordance with FOP for AASHTO T 335.

The portion of crushed surfacing retained on a No. 4 sieve shall not contain more than 0.15 percent wood waste.

Base courses and top courses shall be placed in accordance with the approved cross-section. Compaction shall be a minimum of 95 percent of standard density as determined by the compaction control test for granular materials.

4.15 Surfacing Requirements

All streets in the City of South Bend will be paved with either Asphalt Concrete or Cement Concrete, in strict compliance with these standards. Alleys, utility access's, loading areas, trails, and parking areas may utilize the SLID surfacing requirements of Section 4.26 as an alternative based upon approval by the City Engineer.

The pavement design shall meet the requirements in the most current edition of the American Associations of State Highway and Transportation Officials (AASHTO) Guide for Design of Pavement Structure and current amendments thereto. The pavement section shall be designed and stamped by an engineer currently licensed in the State of Washington.

One soil sample per each 500 LF of centerline with three minimum per project representative of the roadway subgrade shall be taken to determine a statistical representation of the existing soil conditions.

Soil tests shall be performed by an engineering firm specializing in soils analysis and currently licensed in the State of Washington.

The soils report, signed and stamped by a soils engineer licensed by the State of Washington, shall be based on actual soils tests and submitted with the plans. All depths indicated are a minimum compacted depth.

Construction of streets paved with Asphalt Concrete shall conform to Section 5-04 of the WSDOT Standard Specifications. Pavement material will be HMA CL 1/2" PG 64.22 and be constructed at least 2 inches thick (minimum compacted thickness) over the prepared crushed surface, top course, or asphalt treated base. Mechanical spreading and finishing will be as described in Section 5-04.3(9) of the WSDOT Standard Specifications. Compaction will be performed by the equipment and methods presented in Section 5-04.3(10) of the WSDOT Standard Specifications, and Surface Smoothness shall satisfy the requirement of Section 5-04.3(13) of the WSDOT Standard Specifications.

Cement concrete streets will be constructed as specified in Section 5-05 of the WSDOT Standard Specifications.

Permanent pavement patching will be performed as described in the pavement repair detail listed herein, and in compliance with Section 5-04 of the WSDOT Standard Specifications. All fill material will be placed in lifts no thicker than six inches and mechanically compacted to 95 percent of standard density, as described in Section 2-03 of the WSDOT Standard Specifications and to the satisfaction of the City Engineer.

4.16 Temporary Street Patching

Temporary restoration of trenches shall be accomplished by using 2" HMA CL 1/2" PG 64.22 when available or 4" medium-curing (MC-250) liquid asphalt (cold mix), 3" Asphalt Treated Base (ATB), or steel plates suitable for supporting H2O loading. Steel plates shall be provided with a cold mix "lip" and pinned down to accommodate a smooth transition from pavement to steel plate.

ATB used for temporary restoration may be dumped directly into the trench, bladed and rolled. After rolling, the trench must be filled flush with asphalt concrete pavement to provide a smooth riding surface.

All temporary patches shall be maintained by the contractor until such time as the permanent pavement patch is in place.

If the contractor is unable to maintain a patch for whatever reason, the City will patch it at actual cost plus overhead and materials. The property Owner/Developer/permittee shall be invoiced for any City expenses incurred to comply with this Contractor requirement.

4.17 Trench Backfill and Restoration

- A. Trench restoration shall be either by a patch or patch plus overlay as required by the City.
- B. All trench and pavement cuts shall be made by saw-cuts. The cuts shall be a minimum of 1 foot outside the trench width on undisturbed base.
- C. All trenching shall be backfilled with gravel base, Class B, or crushed surfacing materials conforming to Section 4 of the WSDOT Standard Specifications. The trench shall be compacted to 95 percent maximum density, as described in Section 2-03 of the WSDOT Standard Specifications.

If the existing material is determined by the City to be suitable for backfill, the contractor may use the native material except that the top 4 inches of trench shall be 5/8-inch minus crushed rock. All trench backfill materials shall be compacted to 95 percent density.

Backfill compaction shall be performed in 6 inch lifts.

Replacement of the HMA CL 1/2" PG 64.22 or Portland concrete cement shall match existing HMA CL 1/2" PG 64.22 or Portland concrete cement depth, except HMA CL 1/2" PG 64.22 shall be a minimum compacted thickness of 2 inches and concrete cement shall be a minimum compacted thickness of 6 inches.

- D. Tack shall be applied to the existing pavement and edge of cut and shall be emulsified asphalt grade CSS-1 as specified in Section 9-02.1(6) of the WSDOT Standard Specifications. Tack coat shall be applied as specified in Section 5-04 of the WSDOT Standard Specifications.

- E. HMA CL 1/2" PG 64.22 shall be placed on the prepared surface by an approved paving machine and shall be in accordance with the applicable requirements of Section 5-04 of the WSDOT Standard Specifications, except that longitudinal joints between successive layers of asphalt concrete shall be displaced laterally a minimum of 12 inches unless otherwise approved by the City. Fine and coarse aggregate for asphalt concrete shall be in accordance with Section 9-03.8 of the WSDOT Standard Specifications. HMA CL 1/2" PG 64.22 over 2 inches thick shall be placed in equal lifts not to exceed 2 inches each.

All street surfaces, walks or driveways within the street trenching areas affected by the trenching shall be feathered and shimmed to an extent that provides a smooth-riding connection and expeditious drainage flow for the newly paved surface. Shimming and feathering as required by the City Engineer shall be accomplished by raking out the oversized aggregates from the HMA CL 1/2" PG 64.22 mix as appropriate.

Surface smoothness shall be per Section 5-04.3(13) of the WSDOT Standard Specifications. The paving shall be corrected by removal and repaving of the trench only.

- F. All joints shall be sealed using paving asphalt AR4000W.
- G. When trenching within the roadway shoulder(s), the shoulder shall be restored to its original or better condition.
- H. The final patch shall be completed as soon as possible and shall be completed within 30 days after first opening the trench. This time frame may be adjusted if delays are due to inclement paving weather, or other adverse conditions that may exist. However, delaying of final patch of overlay work is allowable only subject to the City Public Works Supervisor's approval. The City Supervisor may deem it necessary to complete the work within the 30 day time frame and not allow any time extension. If this occurs, the Contractor shall perform the necessary work as directed by the City Supervisor.

4.18 Survey Staking

All surveying and staking shall be performed by an engineering or surveying firm capable of performing such work. The engineer or surveyor performing and directing such work shall be currently licensed by the State of Washington to perform said task.

A preconstruction meeting shall be held with the City prior to commencing staking. All construction staking shall be inspected by the City prior to construction.

The minimum staking of streets shall be as follows:

- A. Stake centerline alignment every 25 feet (50 feet in tangent sections), with cuts and/or fills to subgrade.
- B. Stake top of ballast and top of crushed surfacing at centerline and edge of pavement every 25 feet.
- C. Stake top back of curb at a consistent offset for vertical and horizontal alignment and every 25 feet (50 feet in tangent sections).

4.19 Material and Construction Testing

Testing shall be required at the developer’s or contractor’s expense. The testing shall be ordered by the Developer or Contractor and the chosen testing lab shall be preapproved by the City. Testing shall be done on all materials and construction as specified in the WSDOT Standard Specifications and with frequency as specified herein.

In addition, the City shall be notified before each phase that street construction commences (i.e., staking, grading, subgrade, ballast, base, top course, and surfacing).

TESTING AND SAMPLING FREQUENCY GUIDE

Item	Type of Tests	Minimum Number	Frequency
Gravel Borrow	Grading & SE	1 Each	1-4000 Ton
Sand and Drainage Blanket	Grading	1 Each	1-4000 Ton
CSTC	Grading, SE & Fracture	1 Each	1-2000 Ton
CSBC	Grading, SE & Fracture	1 Each	1-2000 Ton
Ballast	Grading, SE & DR	1 Each	1-2000 Ton
Backfill/Sand Drains	Grading	1 Each	1-2000 Ton
Gravel Backfill For:			
Foundations	Grading, SE & DR	1 Each	1-1000 Ton
Walls	Grading, SE & DR	1 Each	1-1000 Ton
Pipe-Bedding	Grading, SE & DR	1 Each	1-1000 Ton
Drains	Grading	1 Each	1-100 Ton

TESTING AND SAMPLING FREQUENCY GUIDE (continued)

Item	Type of Tests	Minimum Number	Frequency
PCC Structures: (Sidewalk, Curb and Gutter, Foundations):			
Coarse Aggregate	Grading	1 Each	1-1000 Ton
Fine Aggregate	Grading	1 Each	1-500 Ton
Consistency	Slump	1 Each	1-100 CY
Air Content	Air	1 Each	1-100 CY
Cylinders (28 Day)	Compressive Strength	2 Each	1-100 CY
Cement	Chemical & Physical Certification	1	1-Job
Asphalt Cement Concrete:			
Blend Sand	SE	1 Each	1-1000 Ton
Completed Mix	Fracture, SE, Grading, Asphalt Content,	2 Each	1-1000 Ton
	Compaction	1 Each	1-100 Ton
Asphalt Treated Base:			
Completed Mix	SE, Grading, Asphalt Content	1 Each	1-1000 Ton
	Compaction	1 Each	1-100 Ton
Asphalt Materials:			
	Certification	1	1-Job
Rubberized Asphalt:			
	Certification	1	1-Job
Cement Treated Base:			
Native Subgrade Soil	Moisture Density Relationship (Modified Proctor)	1	2-Job
Cement	Chemical and Physical Certification	1	1-Job
	Application Rate	1	??
Completed Mix	Moisture Content, Compaction, Compressive Strength Cylinders (7 Day)	1 Each	??
	Depth of Cement Layer	1	??

TESTING AND SAMPLING FREQUENCY GUIDE (continued)

Item	Type of Tests	Minimum Number	Frequency
Compaction Testing:			
Embankment	Compaction	1 Each	1-500 LF
Cut-Section	Compaction	1 Each	1-500 LF
CSTC	Compaction	1 Each	1-500 LF
CSBC	Compaction	1 Each	1-500 LF
Ballast	Compaction	1 Each	1-500 LF
Trench Backfill	Compaction	1 Each	1-500 LF

SE = Sand Equivalency, DR = Dust Ratio

4.20 Sidewalks, Curbs, and Gutters

A. General

All properties within commercial zones of the City, properties abutting arterial streets, collectors or local access streets shall, in conjunction with new construction on such properties or alternations, reconstruction, or improvements shall have sidewalks, curbs and gutters constructed along abutting streets unless exempted pursuant to Section 4.07 of this chapter. See Details provided herein.

B. Design Standards

Plans for the construction of sidewalks, curbs and gutters are to be submitted as part of the street plans when applicable.

The City has set forth *minimum* standards as referenced herein and further shown in details which must be met in the design and construction of sidewalks, curbs and gutters. Because these are minimum standards, they may be modified by the City should the City Supervisor or the City Engineer feel circumstances warrant same.

C. Sidewalks

Sidewalks shall be constructed of Portland Cement Concrete, 4 inches thick per Section 8-14 of the WSDOT Standard Specifications, unless the sidewalk is to be constructed using the SLID method referenced in Section 4.26 and approved by the City Engineer. When the sidewalk, curb and gutter are contiguous, the width of the sidewalk shall be measured from back of curb to back of sidewalk.

Sidewalks will be constructed on a compacted gravel base, (Class B), or 5/8-inch minus crushed rock of suitable thickness to provide a firm and unyielding base. Sidewalks will be constructed of Portland Cement Concrete as described in Section 8-14 of the WSDOT Standard Specifications and be designed and constructed in compliance with those Details as shown herein. In commercially zoned areas the sidewalks shall abut the curb unless otherwise approved by the City.

The sidewalk thickness shall be as follows:

<u>SIDEWALK LOCATION</u>	<u>SIDEWALK THICKNESS</u>
Planting strip more than 4 feet wide	4" thick
Planting strip 0-4 feet wide	4" thick
Driveway sections	6" thick

The sidewalks will be divided into five foot lengths by contraction joints and expansion joints will be at intervals of no more than 15 feet. Joints will be filled with an asphalt mastic material.

1. Arterial, Collector and Local Access Streets. Sidewalks, curbs and gutters shall be required on both sides of all major and minor arterial streets and on collector and local access streets interior to the development including cul-de-sacs. Sidewalks, curbs and gutters shall also be required on the development side of streets abutting the exterior of said development.

Sidewalk widths shall be as listed in the “Minimum Street Design Standards” in Section 4.03 (D) of this standard. See Detail.

2. The design and construction of all sidewalks, curbs, gutters and walkways shall meet the following minimum standards:

The width of sidewalks shall be as shown in details. The City Public Works Department shall require that the design of all sidewalks provide for a gradual rather than an abrupt transition between sidewalks of different widths or alignments.

3. Form and subgrade inspection by the City, are required before sidewalk is poured.
4. Monolithic pour of curb, gutter and sidewalk will not be allowed.
5. For driveway requirements, see Section 4.11 herein.

6. When the air temperature is expected to reach the freezing point during the day or night, the concrete shall be protected from freezing. The Contractor shall provide a sufficient supply of straw, hay, grass, earth, blankets, or other suitable blanketing material and spread it over the pavement to a sufficient depth to prevent freezing of the concrete, per ACI 306. The Contractor shall be responsible for the quality and strength of the concrete thus cured. Any concrete injured by frost action or freezing shall be removed and replaced at the Contractor's expense in accordance with these Specifications.

D. Curb and Gutter

Cement concrete vertical curb and gutter shall be used for the edges of all major arterial streets and major collector streets unless otherwise approved by the City Supervisor. These curbs and gutters shall be constructed of Commercial Class Cement Concrete in accordance with the WSDOT Standard Specifications, and as further shown in Detail(s) located herein.

Extruded curb and gutter per the WSDOT Standard Specifications are allowed only with the specific approval of the City Public Works Department.

Form and subgrade inspection by the City are required before curb and gutter are poured. Forms, wood or steel, shall be staked securely in place, true to line and grade. Sufficient support shall be given to the form to prevent movement in any direction, resulting from the weight of the concrete or the concrete placement. Forms shall not be set until the subgrade has been compacted within one inch of the established grade. Forms shall be clean and well-oiled prior to setting in place. When set, the top of the form shall not depart from grade more than 1/8-inch when checked with a 10-foot straightedge. The alignment shall not vary more than 1/4-inch in 10 feet. Immediately prior to placing the concrete, forms shall be carefully inspected for proper grading, alignment and rigid construction. Adjustments and repairs as needed shall be completed before placing concrete.

The subgrade shall be properly compacted and brought to specified grade before placing concrete. The subgrade shall be thoroughly dampened immediately prior to the placement of the concrete. Concrete shall be spaded and tamped thoroughly into the forms to provide a dense, compacted concrete, free of rock pockets. The exposed surfaces shall be floated, finished and brushed longitudinally with a fiber hair brush approved by the City Engineer.

The face form of the curb shall be stripped at such time in the early curing as will enable inspection and correction of all irregularities that appear thereon.

Forms shall not be removed until the concrete has set sufficiently to retain its true shape. The face of the curb shall be troweled with a tool cut to the exact section of the curb and at the same time maintain the shape, grade and alignment of the curb. The exposed surface of the curb shall be brushed with a fiber hair brush.

White pigmented or transparent curing compounds shall be applied to all exposed surfaces immediately after finishing. Transparent curing compounds shall contain a color dye of sufficient strength to render the film distinctly visible on the concrete for a minimum period of 4 hours after application.

When the curb section is to be placed separately, the surface of the gutter directly underneath the curb section shall be covered with a protective cover to protect that area from the curing agent when the gutter is sprayed. This cover must remain in place until the curb is placed. Care shall be taken in the placing of this cover to prevent the steel dowels from puncturing the cover.

If, at any time during the curing period any of the forms are removed, a coat of curing compound shall be applied immediately to the exposed surface. The curing compound shall be applied in sufficient quantity to obscure the natural color of the concrete. Additional coats shall be applied if the City Engineer determines that the coverage is not adequate. The concrete shall be cured for the minimum period of 72 hours set forth in Section 8-04 of the WSDOT Standard Specifications.

Joints shall be constructed in the manner and at the locations shown in Detail SW-1. They shall be cleaned and edged as shown on the drawings. All expansion and contraction joints shall extend entirely through the curb section above the pavement surface. Joint filler in the curb shall be normal to the pavement and in full but contact with pavement joint filler.

Use of Hot Mix Asphalt (HMA) rolled curbs for the edges of minor collector streets and local access streets is permissible where curbs are needed, but vertical curbs are unsuitable. HMA curbs, gutters, and spillways shall be constructed of Commercial HMA as specified in the WSDOT Standard Specifications. The HMA will have a dense, uniform surface and will fully retain its shape, grade, and line after placement.

E. Handicap (Curb) Ramps

All sidewalks shall be constructed to provide for handicap (curb) ramps in accordance with the current standards of applicable state and federal law. Details provided herein are current as of the date of this publication and are subject to change. It is the Developer's responsibility to verify current ADA requirements and to furnish and install these amenities per current standards. Since these standards are subject to change, the Developer is cautioned that the detail enclosed may, or may not be current.

Handicap curb ramps shall be constructed of Portland Cement Concrete. Form and subgrade inspection by the City are required before ramp is poured.

F. Staking

All surveying and staking shall be performed by an engineer or surveying firm capable of performing such work. The engineering or surveyor directing and/or performing such work shall be currently licensed by the State of Washington to perform said task.

A preconstruction meeting shall be held with the City prior to commencing staking. All construction staking shall be inspected by the City prior to construction.

The minimum staking of curb, gutter and sidewalk shall be as follows:

Stake top back of curb at a consistent offset for vertical and horizontal alignment every 25 feet (50 feet in tangent sections).

G. Testing

Testing shall be required at the Developer's or contractor's expense on all materials and construction as specified in the WSDOT Standard Specifications.

At a minimum, one slump test and two test cylinders shall be taken once per day. All other testing frequencies shall be as specified in the Testing and Sampling Table in Section 4.19.

In addition, the City shall be notified before each phase of sidewalk, curb and gutter construction commences.

4.21 Street Illumination

Street Illumination shall require LED luminaires

Street lighting systems design shall conform to the Illuminating Engineering Society of North American (IES) Standards Specification for Roadway Lighting as outlined in (RP-8-00). Pacific County PUD No. 2 owns and maintains the street illumination system for the City of South Bend.

- A. Plats and Short Plats, Commercial, Industrial or Institutional Property Development. Street lighting is required for all public streets. The street lighting design shall be reviewed and approved by the City Engineer prior to final plat approval. The cost of all street lighting shall be paid for by the Developer.

The City will accept maintenance and power cost responsibility for the public street light system when a plat is 50 percent or more occupied. Until the plat is 50 percent occupied, the developer is responsible for the maintenance and energy charges for the street lighting system.

Street lighting is not required on private streets within a plat. However, a street lighting system is encouraged. The City does not install or maintain private street lighting systems. On private streets, all street light maintenance and power cost shall be paid by the developer, homeowner, or homeowners association.

- B. Existing Residential Areas. If a resident or group of residents desires the installation of a new street light they must apply to the City Supervisor.
- C. Commercial. Street lighting is required on all public street frontages. The developer is responsible for design, installation or relocation of new or existing lighting. Commercial development shall replace existing lighting systems on power poles with a new lighting system serviced by underground power if the system will not conflict with essential distribution lines.
- D. Ownership and Maintenance. Pacific County PUD No. 2 under franchise with the City provides, installs, owns and maintains the street illumination system for the City. Maintenance of the completed lighting system is provided by Pacific County PUD No. 2.

The property owner or homeowners association shall maintain private lighting systems.

E. General Considerations

Existing street light systems that extend along the frontage of a new development project, or within the limits of a roadway improvement project will not be generally required to be brought into conformance with these street lighting standards, unless the project is required to install full frontage improvements. If the City determines that existing street light systems should be brought into conformance with these requirements due to special circumstances, the Applicant will be notified of this requirement during the City's development review process.

When required, the Applicant is responsible for the installation of streetlights and all accessories necessary to energize the street light system consistent with Standards.

For all new street light installations, the applicant shall coordinate jointly with Pacific County PUD No. 2 and the Public Works Department to prepare a street lighting plan for submittal to and approval by the City Engineer. The type of installation shall be as set forth in (IES) Standard Specifications and these Standards. The Applicant can request that Pacific County PUD No. 2 design the street illumination system.

Street lighting plans shall be designed and submitted to the City Engineer for review and approval prior to construction. All lighting plans shall be prepared by a licensed engineer experienced with lighting design or by Pacific County PUD No. 2. Lighting plans shall pursuant to IES Standard Specifications and these Standards.

The Applicant shall coordinate with Pacific County PUD No. 2 for the availability and location of power sources for new light system.

All public street light systems shall be accessible for public maintenance by a wheeled vehicle weighing 20,000 pounds.

All street light installations including wiring, conduit, and power connections shall be located underground. Exception: existing residential areas with existing above ground utilities may have street lighting installed on the existing power poles. The Applicant will be responsible for providing or obtaining necessary easements for underground power for street lighting systems designed and constructed as part of an approved development permit.

As-built drawings on 22-inch x 34-inch or 24-inch x 36-inch Mylar are required for all new or relocated underground street lighting systems prior to receiving a final occupancy permit.

Street light circuitry will be provided with available voltage.

The exact location of the power source should be indicated. System continuity and extension should be considered.

Particular attention shall be given to locating luminaires near intersections, at all street ends and at pedestrian crossings.

- F. **Illumination.** Calculations should include luminaire spacing, illumination level, uniformity ratio, line losses, power source and other necessary details for the electrical and physical installation of the street lighting system.

Design Standards

- A. **Illumination Levels** utilizing cut-off luminaires.

Street light illumination levels shall conform to the levels listed in the table below:

**Illumination Standards Average
Maintained Horizontal Illumination (Foot Candles)**

Road Class	Area Class	
	Residential	Industrial/Commercial
Private(Access)	0.4	N/A
Residential (Local Access)	0.4	0.6 to 0.9
Residential (Collector)	0.6	0.6 to 0.9
Arterial*	0.8	0.6 to 0.9
*Intersection lighting is required. Street lights shall be placed in accordance with the Standards listed below.		

Average illumination levels at intersections shall be 1.5 times the illumination required on the more highly illuminated street. Exception: Local residential streets intersecting other local residential streets shall not require 1.5 times the illumination at other intersections, provided that one luminaire is placed at the intersection.

At signalized intersections, all signal poles shall include a street light. Lighting levels at these locations may be higher than the criteria listed above.

- B. Luminaires shall be cut-off.
1. The following luminaires have been approved for use in the City of South Bend.

Arterials:

Fixtures, Arms, and Poles shall be pre-approved by the City of South Bend.

Residential:

Fixtures, Arms, and Poles shall be pre-approved by the City of South Bend.
 2. All luminaires shall be LED color temperature 4000k.

C. Light Standards

1. Street Light Requirements for Each Street Classification

Light standards should be staggered on either side of the road. Each completed intersection should have a minimum of two luminaires at the intersection. If the developer is only performing half street improvements, luminaire spacing shall approved by the City of South Bend. Junction boxes and conduit stubs across roadway may be required for half street improvements.
2. In areas where the street width differs from the City Standard, or there are other factors influencing the location of the street lights, the City Engineer will provide input to the applicant on acceptable options.

Street light poles shall be direct buried as specified by Pacific County PUD No. 2. Line loss calculations shall show that no more than a 5 percent voltage drop occurs in any circuits. Branch circuits shall serve a minimum of four luminaires.

Conductors: Conductor size will be determined by the wattage and circuit lengths provided through the IES design. The minimum wire size for any illumination circuit shall be No. 6 Aluminum. No. 10 wire will be acceptable for the pole and bracket cable within the light standard only.

4.22 Roadside Features

A. General

Miscellaneous features included herein shall be developed and constructed to encourage the uniform development and use of roadside features wherever possible.

B. Design Standards

The design and placement of roadside features included herein shall adhere to the specific requirements as listed for each feature.

C. Staking

All surveying and staking shall be performed by an engineering or surveying firm capable of performing such work. The engineer or surveyor directing and/or performing such work shall be currently licensed by the State of Washington to perform said tasks.

A preconstruction meeting shall be held with the City prior to commencing staking. All staking shall be inspected by the City prior to construction, and subject to the City's approval.

D. Testing

Testing shall be required at the Developer's or Contractor's expense on all materials and construction as specified in the WSDOT Standard Specifications and with a frequency as specified in the most current edition of the WSDOT Construction Manual, and amendments thereto.

Survey Monuments

1. All existing (or new) survey control monuments and/or markers which are disturbed, lost, or destroyed during surveying or building shall be replaced with the proper monument as outlined below, by a land surveyor currently registered (licensed) in the State of Washington at the expense of the responsible Contractor, Builder or Developer.
2. Street type: Major Arterial or Minor Arterial; Collector Street;

A pre-cast concrete monument with cast iron monument case and cover installed per City of South Bend Standards is required.

If the monument case and cover are placed in cement concrete pavement, the precast base will not be necessary.

3. Street type: Local Access;

A cast-in-place concrete surface monument with sufficient ferrous metal embedded to allow for detection by a magnetic detection device per City of South Bend Standards is required.

4. Monument Locations

Appropriate monuments shall be placed:

- a. At all street intersections;
- b. At the PC and PT's of all horizontal curves;
- c. At PI of all horizontal curves of streets where the PI lies within the limits of the traveled roadway;
- d. At all corners, control points and angle points around the perimeter of subdivisions as determined by the City;
- e. At all section corners, quarter corners, and sixteenth corners that fall within the right-of-way.

E. Mailboxes

1. During construction, existing mailboxes shall be accessible for the delivery of mail or, if necessary, moved to a temporary location. Temporary relocation shall be coordinated with the local U.S. Postal Service. The mailboxes shall be reinstalled at the original location or to a new location as may be required by the local Postmaster, as further outlined below and approved by the U.S. Postal Service.

2. Location

- a. Bottom or base of box shall be 36" to 42" above the road surface.
- b. Front of mailbox 18 inches behind vertical curb face or outside edge of shoulder.

- c. New developments. Clustered mailboxes will, in all likelihood, be required. Contact the U.S. Postal Service for details.
- 3. Mailboxes shall be set on posts strong enough to give firm support but not to exceed 4 x 4 inch wood or one 1-1/2-inch-diameter pipe, or material and design with comparable breakaway characteristics. Deviations may be allowed only with the written approval of the City.

F. Guard Rails

For purposes of design and location, all guard rails along roadways shall conform to the criteria of the most current edition of the WSDOT Design Manual and current amendments thereto.

Retaining Walls

- 1. Rock walls may be used for erosion protection of cut or fill embankments up to a maximum height of 6 feet in stable soil conditions which will result in no significant foundation settlement or outward thrust upon the walls. For heights over 6 feet or when soil is unstable, structural wall of acceptable design stamped by a structural engineer currently licensed in the State of Washington shall be used. Design and construction of rock walls shall be per the Association of Rockery Contractors (ARC) Specifications and/or applicable geotechnical recommendations. Rock walls over 6 feet high shall be subject to inspection by a geotechnical engineer as outlined in the following paragraph.

Any rock wall over 48 inches high in a fill section shall require an engineered design by a geotechnical engineer. The geotechnical engineer shall continuously inspect the installation of the wall as it progresses and shall submit inspection reports, including compaction test results and photographs taken during the construction, documenting the techniques used and the degree of conformance to the geotechnical engineer's design.

In the absence of such a rock wall design, walls having heights over 6 feet or walls to be constructed in conditions when soil is unstable require a structural wall having a design approved by the City of South Bend. The design of structural walls shall be by a professional engineer currently licensed in the State of Washington qualified in retaining wall design.

2. The rock material shall be as nearly rectangular as possible. No stone shall be used which does not extend through the wall. The rock material shall be hard, sound, durable and free from weathered portions, seams, cracks and other defects. The rock density shall be a minimum of 160 pounds per cubic foot.
3. The rock wall shall be started by excavating a trench having a depth below subgrade of one half the base course or one foot (whichever is greater).
4. Rock selection and placement shall be such that there will be minimum voids and, in the exposed face, no open voids over 6 inches across in any direction. The final course shall have a continuous appearance and shall be placed to minimize erosion of the backfill material. The larger rocks shall be placed at the base of the rockery so that the wall will be stable and have a stable appearance. The rocks shall be placed in a manner such that the longitudinal axis of the rock shall be at right angles or perpendicular to the rockery face. The rocks shall have all inclining faces sloping to the back of the rockery. Each course of rock shall be seated as tightly and evenly as possible on the course beneath. After setting each course of rock, all voids between the rocks shall be chinked on the back with quarry rock to eliminate any void sufficient to pass a 2-inch square probe.
5. The wall backfill shall consist of quarry spalls with a maximum size of 6 inches and a minimum size of 4 inches or as specified by a licensed engineer. This material shall be placed to a 12-inch minimum thickness between the entire wall and the cut or fill material. The backfill material shall be placed in lifts to an elevation approximately 6 inches below the top of each course of rocks as they are placed, until the uppermost course is placed. Any backfill material on the bearing surface of one rock course shall be removed before setting the next course.
6. Perforated drainage pipe and filter fabric shall be installed as required by the City.
7. Walls greater than 30 inches in height shall have a fence or guardrail (as approved by the City) installed above the wall unless otherwise approved by the City Supervisor.

A Public Works permit is required for all rock walls within the public right-of-way and for all those exceeding 4 feet in height on private property.

8. Alternate types of retaining walls, including reinforced geosynthetic, gabion walls, H-pile, and rock buttress, shall be constructed in accordance with the standard details and under the direct supervision of a geotechnical engineer.

G. Metal Hand Railings

This section applies to providing and building metal hand railings that meet the requirements of the Plans, these Specifications and the City Engineer.

1. Materials shall meet the requirements of the following:

Ornamental Handrail

Ornamental handrail shall be constructed in accordance with these Specifications. Horizontal rails and vertical support posts shall be 1-1/2 inches by 1-1/2 inches by 1/8-inch tubular steel conforming to ASTM A120. Balusters shall be 1/2-inch by 1/2-inch and the horizontal bottom rail 1-1/2 inches by 1/2-inch by 1/8-inch channel steel (ASTM A120). Vertical support posts shall be a maximum 8 feet on center and balusters a maximum 4-inches clear space. The center of the bottom rail shall be a maximum 4 inches above finished grade. Finished height of the railing shall be 42 inches above the pedestrian walking surface. Provide slip joints at stairway expansion joints and at 24-feet on center maximum.

Pedestrian Handrail (Galvanized Steel and Aluminum)

Galvanized Steel and Aluminum pedestrian handrail shall be constructed in accordance with these Specifications. Horizontal rails and vertical support posts shall be 1-1/2-inch-diameter Schedule 40 Standard pipe and balusters shall be 3/4-inch-diameter Schedule 40 Standard Pipe. Vertical support posts shall be on 8-foot centers and balusters on 4-inches clear space. Finished height of the railing shall be 42 inches above the pedestrian walking surface. Provide slip joints at stairway expansion joints and at 24-feet on center maximum.

2. Fabrication

Before fabricating the railing, the contractor shall submit five copies of the shop plans for City Engineer approval. The Contractor may substitute other rail connection details for those shown in the plans if details of these changes show in the shop plans and if the engineer approves. In approving shop plans, the

City Engineer indicates only that they are adequate and complete enough to finish design. Approval does not indicate a check on dimensions.

Welding shall conform to the requirements of the “Structural Welding Code” AWS D1.1 for steel, and to the requirements of the “Specifications for Aluminum Structures” of the Aluminum Association, for aluminum alloys. All exposed welds shall be ground flush with adjacent surfaces.

Railing panels shall be straight and true to dimensions. Adjacent railing panels shall align with each other with a variation not to exceed 1/16-inch. Joints shall be match-marked.

For structures on curves, either horizontal or vertical, the railing shall conform closely to the curvature of the structure by means of series of short chords. The lengths of the chords shall be the distance center to center of rail posts.

Steel railing units shall be galvanized after fabrication. Zinc used for galvanizing shall be grade Prime Western conforming to ASTM B6 with a minimum 2 ounces per square foot.

Completed aluminum railing units shall be anodized after fabrication conforming to the requirements of the Aluminum Class 1 Anodic Coating, AA-C22-A41.

Ornamental railing shall be painted with a rust proof metal primer and one coat of black ornamental iron metal paint.

3. Installation

The railing shall be erected in accordance with the plans on anchor bolts, or in holes formed by inserts provided in the concrete railing base to receive the railing posts. Sheet metal inserts shall be removed before the erection of the railing.

No railing shall be erected on the structure until the sidewalk to which it is to be attached is completed and all falsework supporting the system is released.

The railing shall be carefully erected, true to line and grade. Posts and balusters shall be vertical with the direction from the vertical for the full height of the panel not exceeding 1/8-inch.

Slip joints shall be designed and shown on plans for City Engineer approval. Railing installed without slip joints will be rejected and the contractor shall install new railing at his own expense.

H. Street Trees and Landscaping Items

Street trees and/or landscaping, landscape medians or strips, shall be furnished and installed as may be specifically required by the City's Planning Department. They shall be provided at the City's sole discretion and direction. Exact size, spacing, type, location, and quantity to be as specified by the City Planning Department.

4.23 Parking Lots

A building permit is required prior to surfacing any unsurfaced designated parking area.

Pedestrian walkways may be required within commercial parking lots as determined by the City.

Internal vehicle and pedestrian circulation for parking lots shall be approved by the City Engineer. Parking lot circulation shall allow for access so pedestrians and wheelchairs can easily gain access from public sidewalks and bus stops to building entrances through the use of pedestrian paths which are physically separated from vehicle traffic and maneuvering areas. In shopping center parking lots containing more than 100 spaces, such pedestrian/wheelchair paths shall be a minimum of 5-foot wide and constructed in a manner that they cannot be used as a holding area for shopping carts.

The driving aisle within the parking lot shall be 20 feet.

Parking areas shall be positioned as close to sight entrance as possible as to reduce the need for long access driveways.

Access driveways for parking areas shall be located so as to cause the least possible conflict with vehicular and pedestrian traffic on public rights-of-way.

The City may require joint use of driveways by more than one property.

Storm water detention shall be provided and shall follow the criteria as set forth in Chapter 5 of these standards.

Five sets of plans and specifications shall be required to be submitted for review and approval by the City with respect to storm drainage discharge and on site retention or detention, matching street and/or sidewalk grades, access locations,

parking layout, and to check for future street improvement conformity and City zoning regulations.

Parking lot surfacing materials shall satisfy the requirement for a permanent all-weather surface, unless the parking lot is to be constructed using the SLID method referenced in Section 4.26 and approved by the City Engineer. Asphalt concrete pavement and cement concrete pavement satisfy this requirement and are approved materials. Gravel surfaces are not acceptable or approved surface material types.

4.24 Utilities

Within the right-of-way on new roads, or in roadways that share existing topography, utilities, or storm drains that are not in conflict, utilities shall be located as shown in the Standard Details listed herein. Where existing utilities are in place, new utilities shall conform to these Standards as nearly as practical and yet be compatible with the existing installations.

Exceptions may be approved by the City when necessary to meet special or localized requirements.

A. Waterlines

Waterlines shall be located as follows:

1. Shoulder-and-Ditch Section (on existing “standard” street sections):

If practical: Outside of ditch line.

Otherwise: In shoulder 3 feet minimum from edge of travel lane.

2. Curb and Gutter Section:

Preferable: 10 feet from right-of-way centerline. Mains and service connections to all lots should be completed prior to placing of surface materials.

Otherwise: 1.5 feet minimum from back of curb, or at distance which will clear root masses of street trees if these are present or planned for.

3. Designated side of centerline:

WATER: North and East.

4. Depth: Per City Standards.

B. Sanitary Sewers

Sanitary sewers shall be located 5 feet south and west of centerline; depth 8 feet minimum from finished grade, unless otherwise approved by the City Engineer.

Sanitary and water lines shall be horizontally and vertically separated per Washington State Department of Ecology minimum requirements unless otherwise approved by the City Engineer.

Gravity systems, whether sanitary or storm drainage, shall have precedence over other systems in planning and installation.

C. Other Utilities

Other utilities (power, telephone, and cable TV) shall be located as follows:

Preferable: Underground, either side of road, at plan location and depth compatible with other utilities and storm drains.

Otherwise: On poles (as applicable and if approved by City Planning Department) set back of ditchline or sidewalk, at locations compatible with driveways, intersections, and other essential road features. To extent practical, utilities should share facilities so that a minimum of poles are needed, and preferably on only one side of road.

Notwithstanding other provisions, underground systems shall be located behind sidewalks or, as a minimum, at least 5 feet away from road centerline and where they will not otherwise disturb existing survey monumentation.

D. Utility Crossings in Existing Streets

For smaller diameter pipes and wires the crossing shall be made without surface cut of the traveled portion where the street is of oil mat or better. The crossing shall be made by pushing or boring a pipe under the road. Where rock is known or expected in the area of the crossing, the attempt need not be first, but prior approval of the City Supervisor is required.

4.25 Sustainable Low-Impact Development Alternative (SLID)

For uses such as alleys, driveways, utility access, loading areas, trails, sidewalks, road shoulders and parking areas including street parking lanes; low-impact alternatives such as permeable paving systems are encouraged by the City. These

systems allow water to permeate below their surfaces, both filtering/reducing impurities and decreasing the strain on the City’s future stormwater treatment facilities.

Permeable paving systems have an expected service life of approximately 20 years and require considerably less maintenance than concrete and asphalt pavements conventionally used for the same applications.

A. Infiltration Rate

The expected long-term infiltration rate for permeable paving systems may be as low as 0.5 inch/hour. Application of these systems requires an infiltration test and approval by the City Engineer. The USDA Soil Textural Classification (also known as Rawls survey) shall be implemented every 200 feet of road or every 5,000 square feet.

B. Subgrade

The subgrade for permeable paving systems should be cleared, drained, graded, and dragged as is required for conventional paving systems. After grading the subgrade, it should not be compacted or driven over with construction equipment.

C. Base Course

A base course shall be prepared of sandy gravel commonly used for roadbed construction. The sandy gravel shall come from local sources and may be composed of either “pit run” or “crusher run” materials, provided crusher run materials be augmented with sharp sand (25 percent-35 percent by volume) ensuring long term porosity. Materials used shall pass the following sieve analysis:

<u>Sieve Size</u>	<u>Percent Passing*</u>
3/4" square sieve	100
3/8" square sieve	85
U.S. No. 4 sieve	60
U.S. No. 40 sieve	30
U.S. No. 200 sieve	3 Max.

*All percentages are by weight.

Approved base course material for permeable paving systems shall be placed over subgrade to grades shown on approved plan. Minimum depth of base course is 6-inch unless otherwise approved by the City Engineer. Lifts shall not exceed 6-inch; each compacted separately to 95 percent modified proctor, leaving 1-inch for insertion of top course.

D. Top Course

The Gravelpave2 flexible plastic grid system is the City-approved top course for permeable paving systems. Other permeable paving systems may be used per approval by the City Engineer. The Gravelpave2 grid should be installed according to directions at a depth of 1-inch immediately after base preparation so as to reduce introduction of sediment and displacement of base material. When completely installed, the top of the rings of the permeable paving system shall be flush with the surfaces of adjacent hard-surfaced pavements.

E. Fill

Gravel fill shall meet strict City Standards composed of clean, washed, fine, decorative gravel bits not bigger than 10mm and generally uniform in size. The gravel bits shall be sharp and angular stones (as opposed to rounded stones) and shall be of granite hardness. The fill shall be installed into the voids in the permeable paving system directly from a dump truck or tractor to a minimum depth of 6-inch. After the rings have been filled, the depositing vehicle shall drive over the filled rings. The gravel shall then be spread and compacted to ¼-inch above the top of the rings. Edging constraints shall be placed along the edges of the grid and other areas that may experience particular stress with vehicle loads.

SECTION 5
STORM DRAINAGE STANDARDS

SECTION 5

5. STORM DRAINAGE STANDARDS

5.01 General

The standards established by this chapter are intended to represent the minimum standards for the design and construction of storm drainage facilities. Greater or lesser requirements may be mandated by the City due to localized conditions.

5.02 Design Standards

The design of storm drainage and detention system shall depend on their type and local site conditions. The design elements of storm drainage systems shall conform to City Standards as set forth herein and follow current design practice as set forth herein. The following design considerations shall apply:

- A. The use of commercial parking lots for detention of stormwater will be reviewed by the City Supervisor and approved or denied based on the design and other available alternatives. The detention area shall be situated away from areas of pedestrian movement unless means for rapid closing of the areas is incorporated in the design. The maximum depth of water in parking lot storage shall be limited to 6 inches. Curbs cannot be used for retaining storage.
- B. Maximum catch basin spacing shall be 200 feet on road grades up to 3 percent, 300 feet when the road grade is 3 percent or greater and 500 feet maximum on main storm drains between access structures, whether catch basins or manholes. No surface water (unless otherwise approved in writing by the City Public Works Department) shall cross any roadway. In addition, catch basins shall be placed whenever the length of surface drainage exceeds 300 feet on road grade, extending either direction from crest or sag on vertical curves. Vaned grates shall be employed on street grades exceeding 6 percent slope.

The General Notes on the following page shall be included on any plans dealing with storm systems.

- C. Plans for storm drainage shall indicate where the stormwater will be discharged. If the proposed development will increase the amount of storm runoff, it must be shown that the pipes and channels downstream from the discharge point (a minimum of 1/4 mile) can carry the increased runoff without damage to the adjoining properties. Wherever possible, provisions should be made for detainage and/or retainage of stormwater in order to decrease the amount of storm runoff and, more importantly, to decrease the peak runoff volume.

- D. Where storm drains run outside an existing public right-of-way, permanent easements will be required for public or private maintenance as may be required and warranted. Such easement shall be a minimum of 10 feet in width. Where the City is to maintain the storm drain, a permanent easement will be required having a minimum width of 15 feet. A construction (temporary) easement of suitable width shall also be provided.
- E. Storm Drain Detention Systems shall be designed and constructed in strict compliance with these standards and the current storm water manual adopted by the City of South Bend.
- F. The General Notes, numbered 1 thru 10, as shown and further referenced herein shall be included or referenced on any plans submitted to the City for construction approval dealing with storm system design.

GENERAL NOTES (STORM DRAIN CONSTRUCTION)

- 1. All workmanship and materials shall be in accordance with City of South Bend Standards and the most current edition of the WSDOT Standard Specifications.
- 2. Temporary erosion/water pollution measures shall be required in accordance with Section 1-07.15 of the WSDOT Standard Specifications.
- 3. Comply with all other permits and other requirements by the City of South Bend or other governing authority or agency as may be applicable.
- 4. A preconstruction meeting shall be held with the City Public Works Department prior to the start of construction.
- 5. All storm mains and retention/detention areas shall be staked for grade and alignment by engineering or surveying firm capable of performing such work, and currently licensed in the State of Washington to do so.
- 6. Storm drain pipe shall meet the following requirements:
 - a) Plain concrete pipe conforming to the requirements of AASHTO M 86, Class 2.
 - b) Reinforced concrete pipe conforming to the requirements of AASHTO M 170.

- c) PVC pipe shall conform to ASTM D 3034-73 SDR 35 for 4" thru 15" diameter PVC pipe, and shall conform to ASTM F 679 for 18" thru 27" diameter PVC pipe, with joints and gaskets conforming to ASTM D 3212 and ASTM F 477.
 - d) Ductile iron pipe conforming to the requirements of ANSI A21.51, and AWWA C 151, thickness class as shown on the plans.
 - e) Polyethylene smooth wall pipe per Advanced Drainage Systems (ADS) N-12 constructed per WSDOT Standard Specifications 7-04. Inspection to ensure compaction around this pipe will be more rigorous than when other types of approved storm drain pipe are used.
- 7. Special structures, oil/water separators and outlet controls shall be installed per plans and manufacturers recommendations.
 - 8. Provide traffic control plan(s) as required in accordance with MUTCD.
 - 9. Call underground locate line 1-800-424-5555 (or 811) a minimum 48 hours prior to any excavations.
 - 10. Where connections require "field verifications", connection points will be exposed by contractor and fittings verified 48 hours prior to distributing shut-down notices.

5.03 Conveyance

Pipe: Storm drain pipe within a public right-of-way or easement shall be sized to carry the maximum anticipated runoff from the possible contributing tributary area.

The minimum main size shall be 12 inches diameter. Lateral lines if approved by the City Engineer may be 8 inches diameter. Runoff shall be computed and, if the flow requires it, a larger pipe shall be used. Nothing shall preclude the City from requiring the installation of a larger sized main if the City determines a larger size is needed to serve adjacent areas or for future service.

Storm drain gradients shall be such as to assure minimum flow velocity of 3 feet per second when flowing full.

All pipe for storm mains shall be “pre-approved” by the City’s Public Works Department based on localized conditions and comply with one of the following types:

- Polyvinyl Chloride: PVC pipe shall conform to ASTM D 3034, SDR 35 or ASTM F 789 with joints and rubber gaskets conforming to ASTM D3212 and ASTM F477.
- Plain Concrete: Plain concrete pipe per WSDOT Standard Specifications as set forth in Section 7-04.
- Reinforced Concrete: Reinforced concrete pipe per WSDOT Standard Specifications as set forth in Section 7-04.
- Ductile Iron: Ductile iron pipe shall conform to AWWA C151 Class 50 and have a cement mortar lining conforming to AWWA C 104. All pipes shall be joined using non-restrained joints which shall be rubber gaskets, push on type or mechanical joint, conforming to AWWA C 111.
- Polyethylene: PE smooth wall pipe per Advanced Drainage Systems (ADS) N-12, or City approved equal, constructed per WSDOT Standard Specifications 7-04.

5.04 Connections

Connections of storm drain pipe leading from an existing street inlet location may be made into an existing main storm drain without a structure, subject to case-by-case approval by the City Engineer or Public Works Utility Superintendent and subject to the following requirements:

1. The inletting structure shall be a catch basin and not a simple inlet lacking a catch or drop section.
2. Outside diameter of inlet pipe shall not exceed one-half the inside diameter of the main storm drain.
3. Length of inlet connection shall not exceed 30 feet.
4. Standard shop-fabricated tees, wyes, and saddles shall be used.

Channels: The City encourages the use of open vegetated channels to convey stormwater runoff when feasible as long as they do not pose a health or safety threat to the general public. Any open channels proposed to be located within public right-of-way shall require special approval from the City Public Works Department.

5.05 Staking

All surveying and staking shall be performed by an engineering or surveying firm capable of performing such work. The engineer or surveyor directing and/or performing such work shall be currently licensed by the State of Washington to perform said tasks.

A preconstruction meeting shall be held with the City prior to commencing staking. All construction staking shall be inspected by the City prior to construction.

The minimum staking of storm sewer systems shall be as follows:

1. Stake centerline alignment every 25 feet with cuts and/or fills to bottom of trench.
2. Stake location of all catch basins/manholes and other fixtures for grade and alignment.
3. Stake location, size and depth of retention/detention facility.
4. Stake finished grade of catch basin/manhole rim elevation and invert elevations of all pipes in catch basins, manholes, and those that daylight.

5.06 Trench Excavation

- A. Clearing and grubbing where required shall be performed within the easement or public right-of-way as permitted by the City and/or governing agencies. Debris resulting from the clearing and grubbing shall be disposed of by the Owner or Contractor in accordance with the terms of all applicable permits.
- B. Trenches shall be excavated to the line and depth designated by the City to provide a minimum of 24 inches of cover over the pipe. Except for unusual circumstances where approved by the City, the trench sides shall be excavated vertically and the trench width shall be excavated only to such widths as are necessary for adequate working space as allowed by the governing agency and in compliance with all safety requirements of the prevailing agencies. See Detail. The trench shall be kept free from water until joining is complete. Surface water shall be diverted so as not to enter the trench. The Contractor shall maintain sufficient pumping equipment on the job to insure that these provisions are carried out.

- C. The Contractor shall perform all excavation of every description and whatever substance encountered and boulders, rocks, roots and other obstructions shall be entirely removed or cut out to the width of the trench and to a depth 6 inches below storm line grade. Where materials are removed from below the pipeline grade, the trench shall be backfilled to grade with material satisfactory to the City and thoroughly compacted.
- D. Trenching and shoring operations shall not proceed more than 100 feet in advance of pipe laying without specific written approval of the City, and shall be in conformance with Washington Industrial Safety and Health Administration (WISHA) and Office of Safety and Health Administration (OSHA) Safety Standard.
- E. The bedding course shall be finished to grade with hand tools in such a manner that the pipe will have bearing along the entire length of the barrel. The bell holes shall be excavated with hand tools to sufficient size to facilitate the construction of pipe joints.

5.07 Bedding

Gravel backfill for pipe bedding shall be installed in conformance with Section 2-09 of the WSDOT Standard Specifications. See Detail.

Bedding for Rigid Pipe (Concrete or Ductile Iron Pipe):

Gravel backfill for rigid pipe bedding shall consist of crushed, processed, or naturally occurring granular material. It shall be essentially free from various types of wood waste or other extraneous or objectionable materials. It shall have such characteristics of size and shape that it will compact readily and shall meet the following specifications for grading and quality:

<u>Sieve Size</u>	<u>Percent Passing*</u>
3/4" Square	100
3/8" Square	95-100
U.S. No. 8	0-10
U.S. No. 200	0-3
Sand Equivalent	35 MIN.

*All percentages are by weight.

Bedding for Flexible Pipe (P.V.C. pipe):

Gravel backfill for flexible pipe (P.V.C. pipe) bedding shall consist of crushed, processed, or naturally occurring granular material. It shall be essentially free from various types of wood waste or other extraneous or objectionable materials. It shall have such characteristics of size and shape that it will compact readily and shall meet the following specifications for grading and quality:

<u>Sieve Size</u>	<u>Percent Passing*</u>
3/4" Square	100
3/8" Square	95-100
U.S. No. 8	0-10
U.S. No. 200	0-3
Sand Equivalent	35 MIN.

*All percentages are by weight.

Native Material shall not be used for bedding, unless approved by the City Engineer.

Bedding for Flexible Pipe (H.D.P.E. pipe):

Bedding material for flexible pipe shall be a clean gravel mixture free from organic matter and conforming to the following gradation:

<u>Sieve Size</u>	<u>Percent Passing*</u>
3/4" Square	100
3/8" Square	70-100
U.S. No. 4	55-100
U.S. No. 10	35-95
U.S. No. 20	20-80
U.S. No. 40	10-55
U.S. No. 100	0-10
U.S. No. 200	0-3

*All percentages are by weight.

5.08 Backfilling

Backfilling and surface restoration shall closely follow installation of pipe so that not more than 100 feet is left exposed during construction hours without approval of the City. Selected material shall be placed and compacted around and under the storm drain by hand tools. Special precautions should be provided to protect

the pipe to a point 12 inches above the crown of the pipe. The remaining backfill shall be compacted to 95 percent of the maximum density in traveled areas, 90 percent outside driveway, roadways, road prism, shoulders, parking or other travelled areas. Where governmental agencies other than the City have jurisdiction over roadways, the backfill and compaction shall be done to the satisfaction of the agency having jurisdiction. If suitable backfill material, as determined by the City, is not available from trenching operations, the City may order the placing of gravel base conforming with Section 9-03.10 of the WSDOT Standard Specifications for backfilling the trench.

5.09 Street Patching and Restoration

See Chapter 4 for requirements regarding street patching and trench restoration.

SECTION 6

SANITARY SEWER STANDARDS

SECTION 6

6. SANITARY SEWER STANDARDS

6.01 General

The standards established by this chapter are intended to represent the *minimum* standards for the design and construction of sanitary sewer facilities. Greater or lesser requirements may be mandated by the City due to localized conditions. Where gravity service can be reasonably provided, it shall be so provided. Where gravity service cannot be reasonably provided, low pressure sewer systems may be approved by the City due to special circumstances, as approved by the City Council. Such systems shall be designed and constructed to City Standards as approved by the City Engineer. The following design and construction considerations shall apply:

6.02 Design Standards

The design of sanitary sewer systems shall be dependent on local site conditions. The design elements of sanitary sewer systems shall conform to minimum City Standards set forth herein and follow design guidelines as further set forth in the Department of Ecology’s “Criteria for Sewage Design” manual.

- A. Detailed plans shall be submitted for the City’s review, which provide the location, size, type and direction of flow of the proposed sewers and the connection with existing sewers. These plans shall be separate from water plans.
- B. Project plans should have a horizontal scale of not more than 50 feet to the inch and a vertical scale of not more than 5 feet to the inch. Plan views shall be drawn to a corresponding horizontal scale. Plans and profiles shall show:
 - 1. Locations of streets, right-of-ways, existing utilities, and sewers.
 - 2. Ground surface, pipe type, class and size, manhole stationing, invert and surface elevation at each manhole, and grade of sewer between adjacent manholes. All manholes shall be numbered on the plans and correspondingly numbered on the profile. Where there is any question of the sewer being sufficiently deep to serve any residence, the elevation and location of the basement floor, if basements are served, shall be plotted on the profile of the sewer which is to serve the house in question. The Developer shall state that all sewers are sufficiently deep to serve adjacent basements, except where otherwise noted on the plans. Minimum floor

elevations of structures shall be noted for each lot being provided sewer service.

3. All known existing structures, both above and below ground, which might interfere with the proposed construction, particularly water mains, storm drains, overhead and underground power lines, telephones lines, and television cables.
 4. All utility easements.
 5. Details in scale drawings which clearly show special sewer joints and cross-sections, and sewer appurtenances such as manholes and related items.
- C. Construction of new sewer systems or extensions of existing systems will be allowed only if the existing receiving system is capable of supporting the added hydraulic load.
- D. Collection and interceptor sewers shall be designed for the ultimate development of the tributary areas.
- E. Sewer systems shall be designed and constructed to achieve total containment of sanitary wastes and maximum exclusion of infiltration and inflow.
- F. Computations and other data used for design of the sewer system shall be submitted to the City for approval.
- G. The sewage facilities shall be constructed in conformance with the WSDOT Standard Specifications and as modified by any special City requirements and standards.
- H. Material and installation specifications shall contain appropriate requirements that have been established by the industry in its technical publications, such as ASTM, AWWA, WPCF, and APWA Standards. Requirements shall be set forth in the specifications for the pipe and methods of bedding and backfilling so as not to damage the pipe or its joints, impede cleaning operations and future tapping, nor create excessive side fill pressure or ovalation of the pipe, nor seriously impair flow capacity.
- I. All sewers shall be designed to prevent damage from superimposed loads. Proper allowance for loads on the sewer because of the width and depth of trench should be made. When standard-strength sewer pipe is not sufficient, extra-strength pipe shall be used.

J. Prior to acceptance and approval of construction, the following tests shall apply to each type of construction.

1. Gravity Sewer

- (1) Prior to acceptance of the project, the gravity sewer pipe shall be subject to a low pressure air test per WSDOT/APWA Standards. The Contractor shall furnish all equipment and personnel for conducting the test under the observation of the City Engineer. The testing equipment shall be subject to the approval of the City. The Contractor shall provide a minimum of two complete sets of test gear to test two sections of pipe manhole to manhole at the same time. The Contractor shall perform an air pre-test prior to notifying the City to schedule the actual test. The acceptance air test shall be made after trench is back filled and compacted and the roadway section is completed to sub grade.

All wyes, tees, and end of side sewer stubs shall be plugged with flexible joint caps, or acceptable alternates, securely fastened to withstand the internal test pressures. Such plugs or caps shall be readily removable and their removal shall provide a socket suitable for making a flexible jointed lateral connection or extension.

- (2) Testing of the sewer main shall include a television inspection by the Contractor. The camera shall be equipped with a rotating head to allow televising of the side sewers as mainline inspection is occurring. The camera unit shall be equipped with a measuring device that is in plain view ahead of the camera. The device shall be 1-inch in diameter and on a flexible shaft. Television inspection shall be done after the WSDOT low pressure air test #7-17.3(2) F has passed, the pipe line cleaned and before the roadway is paved. Immediately prior to a television inspection enough water shall be run down the line so it comes out the lower manhole, unless televising is done right after the cleaning has taken place. A copy of the video tape and written report shall be submitted to the City. Acceptance of the line will be made after the tape has been reviewed and approved by the inspector. Any tap to an existing system needs to be televised as well. Televising shall start at the closest manhole to the tap and extend 15 feet beyond the tap.

- K. A mandrel test in accordance with Section 7-17.3 (2)G of the WSDOT/APWA Standard Specifications shall be required on all sewers except laterals as defined in these standards as directed by the City.
- L. At all times during the televised inspection process, the City's Public Works Superintendent or a designated representative shall be present. The City's Public Works Department shall be notified forty-eight (48) hours prior to any televised inspection.
- M. After all other work is completed and before final acceptance, the entire roadway, including the roadbed, planting, sidewalk areas, shoulders, driveways, alley and side street approaches, slopes, ditches, utility trenches, and construction areas shall be neatly finished to the lines, grades and cross sections for a new roadway consistent with the original section.
- N. The Developer shall be required, upon completion of the work and prior to acceptance by the City, to furnish the City with a written guarantee covering all material and workmanship for a period of 2 years after the date of final acceptance and the Developer shall make all necessary repairs during that period at his own expense, if such repairs are necessitated as the result of furnishing poor materials and/or workmanship. The Developer shall obtain warranties from the Contractors, subcontractors and suppliers of material or equipment where such warranties are required, and shall deliver copies to the City upon completion of the work.

6.03 General Requirements

- 1. Prior to construction, the sewer plans shall be reviewed and approved by the Department of Ecology (if specifically requested by the City) and an affidavit stating such are on file at the City's Public Works Department.
- 2. Prior to construction, the Contractor shall notify the City for a preconstruction meeting.
- 3. Work shall be performed only by licensed and bonded Contractors with a demonstrated experienced in laying public sewer mains of the type being proposed for construction.
- 4. Prior to any work being performed, the Contractor shall contact the City Supervisor or City Engineer to set forth his proposed schedule.
- 5. Contractor shall obtain approval of materials to be used from the City's Public Works Department prior to ordering of materials.

6. Sewer main shall be laid only in dedicated streets or in easements which have been exclusively granted to the City. A street is normally not officially recognized until the plat which created it has been filed (recorded) with the County Auditor.
7. The sewer main shall run parallel to and 5 feet southerly or westerly of street centerline where possible. The sewer main shall maintain a minimum 10 foot horizontal separation from proposed or existing water mains.
8. The maximum distance between manholes shall be 400 feet unless specifically approved otherwise by the City Public Works Department.
9. PVC pipe shall be a minimum Class S.D.R. 35 and be manufactured in accordance with ASTM D3034. Ductile iron pipe shall be Class 52 conforming to AWWA C151 and C104.
10. The allowable cover (finished grade) for the various types of pipe are:

PVC Pipe:	3' to 25'
D.I. Pipe (CL 52):	<3' (if allowed)
	25' and above
	Slopes of 18 percent or greater

All pipe shall have a minimum of 36 inches of cover (18" in the case of a side sewer on private property). The City reserves the right to require a minimum of 3 feet of cover unless topography, existing facilities or other future improvements prohibit this minimum cover for installation.

11. The minimum slope for 8" gravity mains shall be 0.5 percent (except the minimum slope for dead end runs shall be 1.0 percent for 8" gravity mains) and the minimum slope for 6" side sewer laterals shall be 2.0 percent.
12. All side sewer laterals shall be of the same material as the main line.
13. Each side sewer lateral shall be equipped with a 6" x 6" tee or wye (see detail), with an approved water-tight cap (adequately secured to facilitate pressure testing), located adjacent to, but within, the public right-of-way, to be utilized as a clean-out.
14. Each side sewer lateral shall have an approved water-tight cap at the termination of the stub; it shall be adequately "blocked" to satisfactorily resist the air pressure testing.

15. Each side sewer lateral shall have a 12 foot long 2" x 4" wood "marker" at the termination of the stub. The "marker" shall extend from the bottom of the trench to above finished grade. Above the ground surface, it shall be painted "white" with "S/S" and the depth, in feet, stenciled in black letters 2" high.
16. Front lot corners shall be staked prior to construction for side sewer tee location.
17. All side sewers shall be extended to the lowest property corner and located a minimum of 10 feet from the side lot line and extend a minimum of 10 feet past the street right-of-way line (or property line).
18. Side sewer connections if allowed directly into manholes shall be constructed to match the sewer main crown (outlet) and the manhole channeled accordingly.
19. All lots shall be serviced with its own individual side sewer.
20. Terminating manholes, where sewer extension may occur, shall be provided with knock-outs and channeled accordingly.
21. Manholes shall be provided with a 0.10 foot drop across the channel.
22. Locking lids shall be provided for all manholes and all manhole lids shall have the word "sewer" cast integrally onto its surface.
23. Concrete collars shall be placed around all frames per the Standard Detail for manholes as noted herein.
24. Pipe connections to manholes shall be as follows:
 - PVC Pipe: Cast or grout a watertight manhole coupling (see detail) into manhole wall.
 - Pipe: Bell and spigot joint or flexible coupling; either shall be 12" maximum distance from manhole wall.
 - PVC and D.I. pipe, optional: Core the manhole and connect sewer pipe with a water-tight flexible rubber boot in manhole wall, Kor-N-Seal boot, or equal.
25. Provide the City's Engineer and Public Works Superintendent a copy of the cut sheets prior to construction.

- 26. Pipe trenches shall not be backfilled until pipe and bedding installation has been inspected and approved by the City’s inspector.
- 27. Manhole rim and invert elevations shall be field verified after construction by the Developer’s engineer(s) and the “as constructed” drawings individually stamped by a Washington State licensed professional engineer which shall attest to the fact that the information is correct.

6.04 Materials and Testing

A. Sewer Mains, Laterals, and Force Mains

Sewer mains to be installed shall be of material noted below:

Gravity Sewer and Laterals:

PVC Pipe:	3'-25' Cover
DI Pipe (Class 52):	<3' Cover (if allowed) 25' and Over Slopes of 18 percent or greater

Force Main: DI Pipe Class 52, PVC, or HDPE

PVC pipe shall be a minimum Class S.D.R. 35 and be manufactured in accordance with ASTM D3034. The pipe and fittings shall be furnished with bells and spigots which are integral with the pipe wall. Pipe joints shall use flexible elastomeric gaskets conforming to ASTM D3212. Nominal laying lengths shall be 20 feet and 13 feet.

The ductile iron pipe shall conform to ANSI/AWWA C151/A21.51-91 Standards, and current amendments thereto, except the ductile iron pipe shall be thickness Class 52 for gravity sewers and Class 52 for force mains. Grade of iron shall be a minimum of 60-42-10. The pipe shall be cement lined to a minimum thickness of 1/16", and the exterior shall be coated with an asphaltic coating. Each length shall be plainly marked with the manufacturer’s identification, year case, thickness, class of pipe and weight.

Type of joint shall be mechanical joint or push-on type, employing a single gasket, such as “Tyton”, except where otherwise calling for flanged ends. Bolts furnished for mechanical joint pipe and fittings shall be high strength ductile iron, with a minimum tensile strength of 50,000 psi.

Restrained joint pipe, where shown on the Plans shall be push-on joint pipe with “Field Lok” gaskets as furnished by U.S. Pipe or equal for 12-inch diameter and smaller pipe and “TR FLEX” as furnished by U.S.

Pipe or equal for 16-inch and 24-inch diameter pipes. The restrained joint pipe shall meet all other requirements of the non-restrained pipe.

All pipe shall be jointed by the manufacturer's standard coupling, be all of one manufacturer, be carefully installed in complete compliance with the manufacturer's recommendations.

All fittings shall be short-bodied, ductile iron complying with applicable ANSI/AWWA C110 or C153 Standards for 350 psi pressure rating for mechanical joint fittings and 250 psi pressure rating for flanged fittings. All fittings shall be cement lined and either mechanical joint or flanged, as indicated on the Plans.

Fittings in areas shown on the Plans for restrained joints shall be mechanical joint fittings with a mechanical joint restraint device. The mechanical joint restraint device shall have a working pressure of at least 250 psi with a minimum safety factor of 2:1 and shall be EBAA Iron, Inc., MEGALUG, or ROMAC "Grip Ring," as approved by the City Public Works Superintendent.

All couplings shall be ductile iron mechanical joint sleeves.

The sewer pipe, unless otherwise approved by the City and/or Engineer, shall be laid upgrade from point of connection on the existing sewer or from a designated starting point. The sewer pipe shall be installed with the bell end forward or upgrade. When pipe laying is not in progress, the forward end of the pipe shall be kept tightly closed with an approved temporary plug. Wherever movable shoring (steel box) is used in the ditch, pipe shall be restrained by use of a winch mounted in the downstream manhole and a line of sufficient strength threaded through the pipe and set tight before each move. Any indication that joints are not being held shall be sufficient reason for the City to require restraints, whether or not movable shoring is being used.

All pipe shall be laid in straight lines and at uniform rate of grade between manholes. Variance from established line and grade shall not be greater than 1/2-inch, provided that such variation does not result in a level of reverse sloping invert; provided, also, that variation in the invert elevation between adjoining ends of pipe, due to non-concentricity of joining surface and pipe interior surfaces, does not exceed 1/64-inch per inch of pipe diameter, or 1/2-inch maximum. Any corrections required in line and grade shall be reviewed with the City Public Works Superintendent and/or City Engineer and shall be made at the expense of the Developer and/or Contractor.

All extensions, additions and revisions to the sewer system, unless otherwise indicated, shall be made with sewer pipe jointed by means of a flexible gasket which shall be fabricated and installed in accordance with the manufacturer's specifications.

All joints shall be made up in strict compliance with the manufacturer's recommendations and all sewer pipe manufacture and handling shall meet or exceed the ASTM and APWA recommended specifications, current revisions.

Pipe handling after the gasket has been affixed shall be carefully controlled to avoid disturbing the gasket and knocking it out of position, or loading it with dirt or other foreign material. Any gaskets so disturbed shall be removed, cleaned, relubricated if required, and replaced before the rejoining is attempted.

Care shall be taken to properly align the pipe before joints are entirely forced home. During insertion of the tongue or spigot, the pipe shall be partially supported by hand, sling or crane to minimize unequal lateral pressure on the gasket and to maintain concentricity until the gasket is properly positioned. Since most flexible gasketed joints tend to creep apart when the end pipe is deflected and straightened, such movement shall be held to a minimum once the joint is home.

Sufficient pressure shall be applied in making the joint to assure that it is home, as described in the installation instructions provided by the pipe manufacturer. Sufficient restraint shall be applied to the line to assure that joints once home are held so, until fill material under and alongside the pipe has been sufficiently compacted. At the end of the work day, the last pipe laid shall be blocked in an effective way to prevent creep during "down time."

For the joining of dissimilar pipes suitable adapter couplings shall be used which have been approved by the City Public Works Superintendent and/or the Engineer.

All gravity sewer pipe shall be bedded with pea gravel. The PVC pipe shall be bedded from a depth of 4 inches below the pipe to 12 inches above the pipe and ductile iron gravity sewer pipe shall be bedded from a depth of 4 inches below the pipe to the springline of the pipe. The bedding material shall extend across the full width of the trench and shall be compacted under the haunches of the pipe.

Special concrete bedding shall consist of a pipe cradle constructed of Portland cement concrete containing not less than four sacks of cement per cubic yard. Sand, gravel and water proportions are subject to approval by

the Engineer. Maximum aggregate size shall be 1-1/2-inch. Maximum slump shall be 4-inch. The bottom of the trench shall be fully compacted before the placement of pipe cradle. The Contractor shall protect pipe against flotation and disturbing the horizontal alignment of the pipe during the pouring of the concrete. WSDOT Standard Specifications for “Class A” concrete bedding will be acceptable.

Clay or Bentonite dams shall be installed across the trench and to the full depth of the granular material in all areas of steep slopes, stream crossings and wetland to prevent migration of water along the pipeline.

All backfill shall be placed and compacted in accordance with City, County, or State requirements as may be applicable and copies of the compaction results shall be provided to the City Engineer.

B. Manholes

Manholes shall be of the offset type and shall be precast concrete sections with either a cast in place base, or a precast base made from a 3,000 psi structural concrete. Joints between precast wall sections shall be confined O-ring or as otherwise specified. Pre-channeled manholes are not acceptable.

For connections to existing systems, a concrete coring machine, suitable for this type of work, shall be utilized in making the connection. The existing manhole shall be rechanneled as required. The new pipe connection shall be plugged (water tight) until the new pipe system has been installed and approved. The Contractor shall be responsible for any existing defects in the existing manhole unless these defects are witnessed by a representative of the City prior to any work being performed to make the connection. The Contractor shall be required to remove any and all deleterious material in the existing manhole and downstream reaches as a result of his/her work.

1. Manhole Sections

Manhole sections shall be placed and aligned so as to provide vertical sides and vertical alignment of the ladder steps. The completed manhole shall be rigid, true to dimension, and be water tight. Rough, uneven surfaces will not be permitted.

The mortar used between the joints in the precast sections and for laying manhole adjusting bricks shall be composed of one part cement to two parts of plaster sand. All joints shall be thoroughly wetted and completely filled with mortar, smoothed both inside and outside to insure water tightness.

Masonry units (manhole adjusting brick) shall conform to the ASTM C-32, Grade MA. The outside and inside of manhole adjusting bricks and the joints of precast concrete sections shall be plastered and troweled smooth with 1/2-inch (minimum) of mortar in order to attain a watertight surface.

2. Manhole Steps

Manhole steps shall be polypropylene, Lane International Corp. No. P13938, or equal. Ladders (maximum 3 foot length) shall be polypropylene Lane International Corp., or equal, and shall be compatible with steps.

3. Grade Adjustment

Where work is located in public right-of-way, not less than 18" or more than 26" shall be provided between the top of the cone or slab and the top of the manhole frame.

4. Channels

Channels shall be made to conform accurately to the sewer grade and shall be brought together smoothly with well-rounded junctions, satisfactory to the City Public Works Superintendent and/or the City Engineer. The channels shall be field poured after the inlet and outlet pipes have been laid and firmly grouted into place at the proper elevation. Allowances shall be made for a 0.1 foot drop in elevation across the manhole in the direction of flow. Channel sides shall be carried up vertically from the invert to three-quarters of the diameter of the various pipes. The concrete shelf shall be warped evenly and sloped 3/8" per foot to drain. Rough, uneven surfaces will not be permitted. Channels shall be constructed to allow the installation and use of a mechanical plug or flow meter of the appropriate size.

5. Drop Manholes

Drop manholes shall, in all respects, be constructed as a standard manhole with the exception of the drop connection.

6. Lift Holes and Steel Loops

All lift holes shall be completely filled with expanding mortar, smoothed both inside and outside, to insure water tightness. All steel loops shall be removed, flush with the manhole wall. The

stubs shall be covered with mortar and smoothed. Rough, uneven surfaces will not be permitted.

7. Frames and Covers

Frames and covers shall be ductile iron. Castings shall be free of porosity, shrink cavities, cold shuts or cracks, or any surface defects which would impair serviceability. Repair of defects by welding, or by the use of “smooth-on” or similar material, will not be permitted. Frames and covers shall be machine finished or ground on seating surfaces so as to assure non-rocking fit in any position and interchangeability of covers. Frames and covers shall be provided with three bolt locking lids. Rings and covers shall be positioned so one of the three locking bolts is located over the manhole steps and shall be adjusted to conform to the final finished surface grade of the street or easement to the satisfaction of the City or agent for the City. Manhole frames and covers shall be as manufactured by “Sather” Manufacturing Company, Model No. 6024-R, or City approved equal.

C. Side Sewer Lateral

A side sewer lateral is considered to be that portion of a sewer line that will be constructed between a main sewer line and a property line or easement limit line.

All applicable specifications given herein for sewer construction shall be held to apply to side sewer laterals.

Side sewers shall be for a single connection only and be a minimum 6-inch diameter pipe. Side sewers shall be connected to the tee, provided in the sewer main where such is available, utilizing approved fittings or adapters. The side sewer shall rise at a maximum of 45° and a minimum of 2 percent, from the sewer main.

Where there are no basements, the minimum side sewer depth shall be 6 feet below existing curb line and 5 feet below ground at the property line where possible, except where existing improvements, proposed improvements or topography may dictate additional depth. The elevations of the side sewer connections shall be of sufficient depth to serve all existing and potential future basements.

The Contractor shall provide for each 6-inch side sewer service a 12 foot long 2" x 4" wooden post which extends from the invert of the end of the 6-inch pipe to above the existing ground. The exposed area of this post shall be painted white and shall have selected thereon in 2-inch letters

(black paint) “S/S” and shall also indicate the depth of the sewer service stub from finished grade.

Where no tee or wye is provided or available, connection shall be made by machine-made tap and saddle, only with specific written authorization of the City. The City shall review the exact location and material, list in its evaluation.

The maximum bend permissible at any one fitting shall not exceed 45°. The maximum bend of any combination of two adjacent fittings shall not exceed 45° (one-eighth bend) unless straight pipe of not less than 3 feet in length is installed between such adjacent fittings, or unless one of the fittings is a wye branch with a cleanout provided on the straight leg.

D. Private Side Sewers

Private side sewers are the extension of side sewer laterals located outside of the public rights-of-way or easements granted to the City of South Bend.

1. Side sewer pipe located on private property shall be 4-inch (larger if specifically approved by the City), ductile iron or PVC ASTM D-3034, and shall be installed at 2 percent minimum grade (1/4 inch fall per foot). Construction on private property may be performed by Owner, but requires a permit.
2. Pipe shall be bedded with pea gravel or clean free draining sand.
3. 6- inch sewer pipe is required in the street right-of-way and shall have a 2 percent minimum grade. Construction in street rights-of-way shall be performed by a licensed side sewer contractor and requires a permit.
4. Side sewer shall be inspected by the City’s Representative/Inspector prior to backfilling. Side sewer shall be plugged and tested in the presence of the City’s inspector by filling with water. Leakage rate shall not exceed 0.31 gal./hr. for 4-inch pipe and 0.47 gal./hr. for 6-inch pipe, per 100 feet of pipe.
5. On private property, minimum cover shall be 18-inches over top of pipe from the point which is 30-inches out from house and continuing to the connection with the City’s sewer system.
6. Parallel water and sewer lines shall be 10 feet apart horizontally wherever possible and have a vertical separation of 18-inches if a vertical crossing is necessary.

7. No more than 100 feet is allowed between cleanouts. Cleanouts are required for bends equal to or greater than 45°. Cleanout shall be a watertight plugged gasketed tee or wye lateral.
8. All pipe joints shall be rubber gasket type.
9. Provide “grease trap” of a size and type approved by the City at all such locations as may be deemed necessary by the City.

E. Testing Gravity Sewers for Acceptance

The Contractor and/or Developer shall furnish all facilities and personnel for conducting tests under the observation of the City Engineer or City Public Works Superintendent. Methods other than Part “B” shall be subject to the approval of the City Supervisor and/or City Engineer.

1. Preparation for Testing for Leakage

The Contractor and/or Developer shall be required, prior to testing, to clean and flush all gravity sewer lines. The completed gravity sewer, including side sewer stubs, after completion of backfill and cleaning shall be televised inspected. This will be permitted prior to paving. The sewer shall then be tested by the low pressure air test method and/or an infiltration test. Except, however, that in certain conditions an exfiltration test may be required by the City Public Works Superintendent and/or City Engineer.

The first section of pipe not less than 300 feet in length installed by each crew shall be tested, in order to qualify the crew and/or the material. A successful installation of this first section shall be a prerequisite to further pipe installation by the crew. At the Contractor’s option, crew and/or material qualification testing may be performed at any time during the construction process after at least 2 feet of backfill has been placed over the pipe.

The cleaning shall be carried out in such a manner to not infiltrate existing facilities. Precautions shall be taken to prevent any damage caused by cleaning and testing. Any damage resulting shall be repaired by the Contractor and/or Developer at his own expense. The manner and time of testing shall be subject to approval of the City Public Works Superintendent and/or the City Engineer.

2. Low Pressure Air Test

The sewer pipe shall be tested for leaks through the use of air (unless method “C” and “D” are approved) in the following manner:

Air shall be slowly supplied to the plugged pipe installation until the internal air pressure reaches 4.0 pounds per square inch greater than the average back pressure of any ground water that may submerge the pipe. At least two minutes shall be allowed for temperature stabilization before proceeding further.

The rate of air loss shall then be determined by measuring the time interval required for the internal pressure to decrease from 3.5 to 2.5 pounds per square inch greater than the pipe section’s average adjacent groundwater back pressure.

The pipeline shall be considered acceptable, when tested at an average pressure of 3.0 pounds per square inch greater than the pipe section’s adjacent groundwater back pressure if the total rate of air loss from any section tested in its entirety between manholes, cleanouts or pipe ends does not exceed the following table:

Length of 6-Inch Pipe (ft)

	0	50	100	150	200	250	300	350	400
0	0	0:40	1:20	1:58	2:38	3:18	3:58	4:38	5:16
50	1:10	1:50	2:30	3:10	3:48	4:28	5:08	5:48	5:56
100	2:20	3:00	3:40	4:20	5:00	5:38	6:14	6:12	6:08
150	3:32	4:10	4:50	5:30	6:10	6:30	6:26	6:22	6:18
200	4:42	5:22	6:00	6:40	6:44	6:38	6:34	6:30	6:26
250	5:52	6:32	6:48	6:58	6:50	6:44	6:40	6:36	6:32
300	7:02	7:20	7:10	7:02	6:56	6:50	6:44	6:40	6:36
350	7:34	7:22	7:14	7:06	7:00	6:54	6:50	6:44	6:42
400	7:34	7:24	7:16	7:08	7:02	6:58	6:52	6:48	6:44

Test time in minutes and seconds

Test times will be provided by the City Engineer upon request for combinations other than 8-inch mains and 6-inch laterals.

If the pipe installation fails to meet these requirements, the Developer and/or Contractor shall determine at his own expense the source or sources of leakage, and he shall repair (if the extent and type of repairs proposed by the Developer and/or Contractor appear reasonable to the City Public Works Superintendent and/or

City Engineer) or replace all defective materials or workmanship. The completed pipe installation shall meet the requirements of this low pressure air test or the alternative water exfiltration test before being considered for acceptance.

Plugs used to close the sewer pipe for the air test shall be securely braced to prevent the unintentional release of a plug which can become a high velocity projectile. Gauges, air piping manifolds and valves shall be located at the top of the ground. No one shall be permitted to enter a manhole where a plugged pipe is under pressure. Air testing apparatus shall be equipped with a pressure release device such as a rupture disk or a pressure relief valve designed to relieve pressure on the pipe under test at 6 psi.

3. Exfiltration Test (if approved by City)

All pipe shall be cleaned before the exfiltration test. Prior to making exfiltration leakage tests, the Developer and/or Contractor may fill the pipe with clear water to permit normal absorption into the pipe walls; provided however, that after so filling the pipe he shall complete the leakage test within 24 hours after filling. When under test, the leakage allowable shall comply with the provisions that follow:

Leakage shall be no more than 0.15 gallons per hour per inch of diameter per 100 feet of sewer pipe, with a minimum test pressure of 6 feet of water column above the crown at the upper end of the pipe or above the active groundwater table, whichever is higher as determined by the City. The length of pipe tested shall be limited so that the pressure on the invert of the lower end of the section tested shall not exceed 16 feet of water column. For each increase in pressure of 2 feet above a basic 6 feet measured above the crown at the lower end of the test station, the allowable leakage shall be increased by 10 percent.

The Developer and/or Contractor shall furnish all equipment, materials, and labor necessary for making test. The equipment shall be to the approval of the City Public Works Superintendent and/or City Engineer. The manner and time of testing shall be subject to approval of the City Public Works Superintendent and/or City Engineer. It shall be the Developer's and/or Contractor's responsibility to determine the level of the water table at each manhole. If leakage exceeds the allowable amount, corrective measures shall be taken and the line then be retested to the satisfaction of the City's designated inspector.

4. Infiltration Test (if approved by City)

Infiltration testing shall take place during jetting of backfill, except when the natural groundwater table is above the crown of the higher end of the test section. The maximum allowable limit for infiltration shall be 0.15 gallons per hour per inch of internal diameter per 100 feet of length with no allowance for external hydrostatic head.

5. Deflection Test

Deflection tests shall be performed on all PVC gravity sewer mains by pulling a mandrel through the pipe and the deflection test limit shall be 5.0 percent of the base inside diameter or for example 7.28 inches for 8-inch diameter pipe. The sewer lines shall be thoroughly cleaned prior to the deflection test.

F. Testing Force Main

1. Test Specifications

All force mains shall be tested prior to acceptance of work. All pumps, gauges, plugs, saddles, corporation stops, miscellaneous hose and piping, and measuring equipment necessary for performing the test shall be furnished, installed and operated by the Contractor. Feed for the pump shall be from a barrel or other container within the actual amount of “makeup” water, so that it can be measured periodically during the test period.

The pipeline shall be backfilled sufficiently to prevent movement of the pipe under pressure. All thrust blocks shall be in place and time allowed for the concrete to cure before testing. Where permanent blocking is not required, the Contractor shall furnish and install temporary blocking.

The pipeline shall be subjected to a pressure and leakage test of a minimum of 150 pounds per square inch for a period of not less than 1 hour. The test pressure shall be applied at the low end of the section tested.

The quantity of water lost from the main shall not exceed the number of gallons per hour determined by the formula:

$$L = \frac{ND(P)^{0.5}}{7,400}$$

in which

L = Allowable leakage, gallons/hour

N = Number of joints in the length of pipeline tested

D = Nominal diameter of the pipe in inches

P = Average test pressure during the leakage test, psi

Defective materials or workmanship, discovered as a result of the tests, shall be replaced by the Contractor at the Contractor's expense. Whenever it is necessary to replace defective material or correct the workmanship, the tests shall be re-run at the Contractor's expense until a satisfactory test is obtained.

2. Preliminary Tests

Developer and/or Contractor shall conduct preliminary tests and assure himself/herself that the section to be tested is in an acceptable condition before requesting the City Public Works Superintendent and/or City Engineer to witness the test.

3. Thrust Blocks and Anchor Blocks

All fittings shall be blocked with concrete in order to prevent movement and separation of pipe joints. Timber will not be permitted as permanent blocking. Sufficient time shall be allowed for concrete to set before commencement of pressure tests. The type and size of blocks and anchors shall be as detailed herein. A visqueen barrier shall be provided to protect glands, bolts, and other miscellaneous materials required for this type of connection from the concrete.

6.05 Video Recording

Upon completion, the Developer shall require that the sewer lines be internally televised and recorded. A DVD or CD together with a written log of the television inspection shall be submitted to the City for their review and approval, and if accepted, be retained in their files. This work can be performed prior to paving. The City's inspector shall be notified of the date of TV inspection to insure his availability during this time.

6.06 State Highway Crossings

All state highway and stream crossings shall be encased with a steel casing or ductile iron or PVC sleeve, as approved by the City and prevailing regulatory agencies. The steel casing or sleeve shall be of sufficient diameter, size and strength to enclose the sewer pipe and to withstand maximum highway loading. Sizing and wall thickness of casing is subject to approval by the City Engineer. Sand backfill or grout fill between the casing and the sewer pipe shall be required. In order to prevent the sand from being washed from the casing the ends of the casing shall be bricked and cemented after installation, backfill and testing of the pipe are completed.

6.07 Staking

All surveying and staking shall be performed by an engineering or surveying firm capable of performing such work. The engineer or surveyor directing or performing such work shall be currently licensed by the State of Washington to perform said tasks.

A preconstruction meeting shall be held with the City prior to commencing staking. All construction staking shall be inspected by the City prior to construction.

The minimum staking of sanitary sewer systems shall be as follows:

- A. Stake centerline alignment at a minimum of 50 foot intervals unless otherwise approved by the City.
- B. Stake location of all manholes and side sewer laterals for grade and alignment.
- C. Provide a copy of “cut sheets” to City’s inspector.
- D. Stake finished manhole rim elevation and invert elevations of all pipes in manholes.

6.08 Trench Excavation

- A. Clearing and grubbing where required shall be performed within the easement or public right-of-way as permitted by the City and/or governing agencies. Debris resulting from the clearing and grubbing shall be disposed of by the owner or contractor in accordance with the terms of all applicable permits.

- B. Trenches shall be excavated to the line and depth designated by the City to provide a City approved minimum of cover over the pipe. See Details as applicable. Except for unusual circumstances where approved by the City, the trench sides shall be excavated vertically and the trench width shall be excavated only to such widths as are necessary for adequate working space as allowed by the governing agency and in compliance with all safety requirements of the prevailing agencies. See Detail. The trench shall be kept free from water until joining is complete. Surface water shall be diverted so as not to enter the trench. The owner shall maintain sufficient pumping equipment on the job to insure that these provisions are carried out.
- C. The Contractor shall perform all excavation of every description and whatever substance encountered and boulders, rocks, roots and other obstructions shall be entirely removed or cut out to the width of the trench and to a depth 6 inches below sewer line grade. Where materials are removed from below pipe grade, the trench shall be backfilled to grade with material satisfactory to the City and thoroughly compacted.
- D. Trenching and shoring operations shall not proceed more than 100 feet in advance of pipe laying without approval of the City, and shall be in conformance with Washington Industrial Safety and Health Administration (WISHA) and Office of Safety and Health Administration (OSHA) Safety Standard.
- E. The bedding course shall be constructed to grade with hand tools in such a manner that the pipe will have bearing along the entire length of the barrel. The bell holes shall be excavated with hand tools to sufficient size to make up the joint.

6.09 Bedding

Gravel backfill for pipe bedding shall be installed in conformance with Section 2-09 of the WSDOT Standard Specifications. See Detail.

Bedding for Rigid Pipe (Ductile Iron Pipe):

Gravel backfill for rigid pipe bedding shall consist of crushed, processed, or naturally occurring granular material. It shall be essentially free from various types of wood waste or other extraneous or objectionable materials. It shall have such characteristics of size and shape that it will compact readily and shall meet the following specifications for grading and quality:

<u>Sieve Size</u>	<u>Percent Passing*</u>
3/4" Square	100
3/8" Square	95-100
U.S. No. 8	0-10
U.S. No. 200	0-3
Sand Equivalent	35 MIN.

*All percentages are by weight.

Bedding for Flexible Pipe (PVC pipe):

Gravel backfill for flexible pipe (PVC pipe) bedding shall consist of crushed, processed, or naturally occurring granular material. It shall be essentially free from various types of wood waste or other extraneous or objectionable materials. It shall have such characteristics of size and shape that it will compact readily and shall meet the following specifications for grading and quality:

<u>Sieve Size</u>	<u>Percent Passing*</u>
3/4" Square	100
3/8" Square	95-100
U.S. No. 8	0-10
U.S. No. 200	0-3
Sand Equivalent	35 MIN.

*All percentages are by weight.

Native Material shall not be used for bedding, unless approved by the City Engineer.

6.10 Backfilling

Backfilling and surface restoration shall closely follow installation of pipe so that not more than 100 feet is left exposed during construction hours without approval of the City. Selected backfill material shall be placed and compacted around and under the sewer pipe by hand tools. Special precautions shall be provided to protect the pipe to a point 12 inches above the crown of the pipe. The remaining backfill shall be compacted to 95 percent of the maximum density in traveled areas and road "prisms", 90 percent outside driveway, roadways, road prism, shoulders, parking or other traveled areas. Where governmental agencies other than the City have jurisdiction over roadways, the backfill and compaction shall be done to the satisfaction of the agency having jurisdiction. If suitable backfill material, as determined by the City, is not available from trenching operations, the

City may order the placing of gravel base conforming with Section 9-03.10 of the WSDOT Standard Specifications for backfilling the trench.

6.11 Street Patching and Restoration

See Chapter 4 for requirements regarding street patching and trench restoration.

6.12 Erosion Control

The detrimental effects of erosion and sedimentation shall be minimized by conforming with SBMC 15.78.050 and the following general principles:

1. Soil shall be exposed for the shortest possible time.
2. Reducing the velocity and controlling the flow of runoff.
3. Detaining runoff on the site to trap sediment.
4. Releasing runoff safely to downstream areas.

In applying these principles, the Developer and/or Contractor shall provide for erosion control by conducting work in workable units; minimizing the disturbance to cover crop materials; providing mulch and/or temporary cover crops, sedimentation basins, and/or diversions in critical areas during construction; controlling and conveying runoff; and establishing permanent vegetation and installing erosion control structures as soon as possible.

1. Trench Mulching

Where there is danger of backfill material being washed away due to steepness of the slope along the direction of the trench, backfill material shall be compacted and held in place by covering the disturbed area with straw and held with a covering of jute matting or wire mesh anchored in place.

2. Cover-Crop Seeding

A cover crop shall be sown in all areas excavated or disturbed during construction that were not paved, landscaped and/or seeded prior to construction. Areas landscaped and/or seeded prior to construction shall be restored to their original or superior condition.

Cover-crop seeding shall follow backfilling operations.

The Developer and/or Contractor shall be responsible for protecting all areas from erosion until the cover crop affords such protection. The cover

crop shall be re-seeded, if required, and additional measures taken to provide protection from erosion until the cover crop is capable of providing protection.

During winter months, the Contractor may postpone seeding, if conditions are such that the seed will not germinate and grow. The Developer and/or Contractor will not, however, be relieved of the responsibility of protecting all areas until the cover crop has been sown and affords protection from erosion.

The cover crop shall be sown at a rate of 10 to 15 pounds of seed per acre using a hand or power operated mechanical seeder capable of providing a uniform distribution of seed.

6.13 Adjustment of New and Existing Utility Structures to Grade

This work consists of constructing and/or adjusting all new and existing utility structures encountered on the project to finished grade.

1. Asphalt Concrete Paving Projects

On asphalt concrete paving projects, the manholes shall not be adjusted until the pavement is completed, at which time the center of each manhole lid shall be relocated from references previously established by the Developer and/or Contractor. The pavement shall be cut as further described and base material removed to permit removal of the cover. The manhole shall then be brought to proper grade.

Prior to commencing adjustment, a plywood and visqueen cover as approved by the City Public Works Department shall be placed over the manhole base and channel to protect them from debris.

The asphalt concrete pavement shall be cut and removed to a neat circle, the diameter of which shall not exceed 48" or 14" from the outside diameter of the ductile iron frame, whichever is smaller. The ductile iron frame shall be brought up to desired grade, which shall conform to surrounding road surface.

Adjustment to desired grade shall be made with the use of concrete or bricks. No cast or ductile iron adjustment rings will be allowed. An approved class or mortar (one part cement to two parts of plaster sand) shall be placed between manhole sections; adjustment rings or bricks and ductile iron frame to completely fill all voids and to provide a watertight seal. No rough or uneven surfaces will be permitted inside or out. Adjustment rings or brick shall be placed and aligned so as to provide vertical sides and vertical alignment of manhole steps and ladder.

Check manhole specifications for minimum and maximum manhole adjustment and step requirements. Special care shall be exercised in all operations in order not to damage the manhole, frames and lids or other existing facilities.

As soon as the street is paved past each manhole, the asphalt concrete mat shall be scored around the location of the manhole, catch basin, meter boxes or valve box. After rolling has been completed and the mat has cooled, it shall be cut along the scored lines. The manholes, catch basins, meter boxes and valve boxes shall then be raised to finished pavement grade and the annular spaces filled with cement concrete to within 1-1/2 inches of the finished grade. The remaining 1-1/2 inches shall be filled with asphalt concrete Class B to give a smooth finished appearance.

After pavement is in place, all joints shall be sealed with hot asphalt cement (AR 4000W). A sand blanket shall be applied to the surface of the AR 4000W hot asphalt cement binder to help alleviate "tracking".

Asphalt concrete patching shall not be carried out during wet ground conditions or when the ambient air temperature is below 50°F. Asphalt concrete mix shall be at required temperature when placed. Before making the asphalt concrete repair, the edges of the existing asphalt concrete pavement and the outer edge of the casting shall be tack coated with hot asphalt cement. The remaining 2" shall then be filled with Class B asphalt concrete and compacted with hand tampers and a patching roller.

The completed patch shall match the existing paved surface for texture, density and uniformity of grade. The joint between the patch and the existing pavement shall then be carefully painted with hot asphalt cement or asphalt emulsion and shall be immediately covered with dry paving sand before asphalt cement solidifies. All debris such as asphalt pavement, cement bags, etc., shall be removed and disposed of by Developer and/or Contractor.

Prior to acceptance of a project, manholes shall be cleaned of all debris and foreign material. All manhole steps and ladders shall be cleaned free of grout. Any damage occurring to the existing facilities due to the Developer's and/or Contractor's operations shall be repaired at his/her own expense.

2. Adjustment of Manholes in Easements

Manholes in easement areas shall be adjusted to insure drainage away from the manhole frame and cover. The manhole frame and cover shall be set approximately 0.1 foot above finished grade. Concrete collars shall be set about the structure, as shown herein, in all non-paved areas.

3. Adjustment of Valve Box Castings

Adjustment of valve box castings (force main valving) shall be made in the same manner as for manholes.

6.14 Finishing And Cleanup

Before acceptance of sewer system construction, all pipes, manholes, catch basins, and other appurtenances shall be cleaned of all debris and foreign material. After all other work on this project is completed and before final acceptance, the entire roadway, including the roadbed, planting, sidewalk areas, shoulders, driveways, alley and side street approaches, slopes, ditches, utility trenches, and construction areas shall be neatly finished to the lines, grades and cross sections of a new roadway consistent with the original section, and as hereinafter specified.

On sewer construction where all or portions of the construction is in undeveloped areas, the entire area which has been disturbed by the construction shall be shaped so that upon completion the area will present a uniform appearance, blending into the contour of the adjacent properties. All other requirements outlined previously shall be met.

Slopes, sidewalk areas, planting areas and roadway shall be smoothed and finished to the required cross section and grade by means of a grading machine insofar as it is possible to do so without damaging existing improvements, trees and shrubs. Machine dressing shall be supplemented by hand work to meet requirements outlined herein, to the satisfaction of the City and/or the Engineer.

Upon completion of the cleaning and dressing, the project shall appear uniform in all respects. All graded areas shall be true to line and grade. Where the existing surface is below sidewalk and curb, the area shall be filled and dressed out to the walk. Wherever fill material is required in the planting area, the finished grade shall be elevated to allow for final settlement, but nevertheless, the raised surface shall present a uniform appearance.

All rocks in excess of 1 inch diameter shall be removed from the entire construction area and shall be disposed of the same as required for other waste material. In no instance shall the rock be thrown onto private property. Overhang

on slopes shall be removed and slopes dressed neatly so as to present a uniform, natural, well-sloped surface.

All excavated material at the outer lateral limits of the project shall be removed entirely. Trash of all kinds resulting from clearing and grubbing or grading operations shall be removed and not placed in areas adjacent to the project. Where machine operations have broken down brush and trees beyond the lateral limits of the project, the Developer and/or Contractor shall remove and dispose of same and restore said disturbed areas at his own expense.

Drainage facilities such as inlets, catch basins, culverts, and open ditches shall be cleaned of all debris which is the result of the Developer and/or Contractor's operations.

All pavements and oil mat surfaces, whether new or old, shall be thoroughly cleaned. Existing improvements such as Portland cement concrete curbs, curb and gutters, walls, sidewalks, and other facilities which have been sprayed by the asphalt cement shall be cleaned to the satisfaction of the City Public Works Superintendent and/or City Engineer.

Castings for manholes, valves, lamp holes, vaults and other similar installations which have been covered with the asphalt material shall be cleaned to the satisfaction of the City.

6.15 Final Acceptance

Prior to final inspection, all pipelines shall be flushed and cleaned and all debris removed. A pipeline "cleaning ball" of the proper diameter for each size of pipe shall be flushed through all pipelines prior to final inspection.

Before sewer lines are accepted, all lines shall be inspected for line and grade by checking each section between manholes for alignment. A full circle of light shall be seen by looking through the pipe at a light held in the manhole at the opposite end of the section of sewer line being inspected. Any corrections required in line and grade shall be made at the expense of the Developer and/or Contractor.

6.16 General Guarantee and Warranty

The Developer shall be required, upon completion of the work, and acceptance by the City, to furnish the City a written guarantee covering all material and workmanship for a period of two years after the date of final acceptance and he shall make all necessary repairs during that period at his own expense, if such repairs are necessitated as the result of furnishing, poor materials and/or workmanship. The Developer shall obtain warranties from the Contractors, subcontractors and suppliers of material or equipment where such warranties are required, and shall deliver copies to the City upon completion of the work.

Easement documents, if applicable, shall be filed and recorded with the Pacific County Auditor's office and the documents reviewed by the City's Engineer and/or Attorney prior to project acceptance.

6.17 Sanitary Sewer Lift Stations

A. Objective

This Section is intended to present information and provide an outline of the minimum general standards to be accomplished in planning a sewage lift station installation within the City's service area.

The Developer shall submit to the City for review and approval, complete sewage lift station plans and design which provide for the lift station, electrical service/controls and telemetry system, auxiliary generator, and transfer switch together with all accessories for a complete, automatically operating installation.

Design material and drawings shall provide all civil, mechanical and electrical details and align with all applicable codes and regulations, and good engineering practice.

The principle components of a sewage lift station installation will be addressed in the remainder of this section.

B. Lift Station

1. Type

The sewage lift station shall be a submersible station of a type approved by the City or a buried, dry-pit-type, with an above-ground entrance hatch having a steel cover, lockable to City Standards, with anode protection. Construction shall be in compliance with O.S.H.A., U.L., A.S.T.M., N.E.C. and other applicable codes and regulations.

All sewage lift stations shall have, as a minimum, two sewage pumps. The pumps shall have sufficient capacity and capability to efficiently handle the peak design flow with one pump and to insure a minimum velocity of 3 feet per second in the force main. Design calculations and pump curves shall be provided with the submittal information, and stamped and signed by a currently licensed engineer in the State of Washington.

SANITARY SEWER STANDARDS

Each sewage pump shall be drilled, tapped and valved with 2-inch drainage fittings on the pump suction between the shut-off valve and the pump, and then piped to the sump.

The pump and motor shafts shall be the maximum diameter available for these units.

Pump motors shall be 3-phase, 60-cycle, and operate at the voltage as supplied by the utility company.

Three phase pump motors shall be N.E.M.A. standard starting or better as noted:

<u>Code</u>	<u>Starting KVA/HP</u>	<u>Typical Size Range</u>
A	0-3.15	---
A	3.15-3.55	---
A	3.55-4.0	---
A	4.0-4.5	---

<u>Code</u>	<u>Starting KVA/HP</u>	<u>Typical Size Range</u>
A	4.5-5.0	---
A	5.0-5.6	15 HP and Up
A	5.6-6.3	10 HP
A	6.3-7.1	7.5 and 5 HP
A	7.1-8.0	3 HP
A	8.0-9.0	2 and 1-1/2 HP
A	9.0-10.0	1 HP
A	10.0-11.2	Less Than 1 HP

The sewage lift station supplier shall check the station during installation to determine if the installation is correct. Written confirmation of each visit and recommendations shall be provided to the City Public Works Department.

The sewage lift station supplier shall provide four hours of check-out training for City personnel at the station site during start-up.

The sewage lift station supplier shall provide four complete copies of maintenance and operation material to the City Public Works Department.

The Developer shall demonstrate that no surge problems exist with the station, and if found to exist, that they shall be corrected at no expense to the City.

Provide mouse proofing where applicable to ground-mounted structures.

All keys, miscellaneous items, and spare parts shall be given to the City prior to approval.

The Developer shall provide an area yard light for the lift station site.

2. Capacity

The Developer shall perform a study and make the determination to assure that the lift station installation is sized to serve the overall sewage flows generated within the potential service area. The flow study shall include the Developer's plat boundary area as well as adjacent and future service areas. The service areas shall be the areas within that which could be served by the installation of the lift station(s).

The station's design flow capacity shall be based on an average daily per capita flow with related peaking factors and inflow/infiltration allowances.

Documentation of present and future service area flow rates for lift station size and capacity determination shall be provided to the City.

The effects of the minimum flow conditions shall be estimated to be sure that retention of the sewage in the wet well will not create a nuisance and that pumping equipment will not operate too infrequently.

Lift station capacity shall meet the maximum rate of flow expected. The capacity of the receiving sewer shall also match the flow expected. At least two pump units shall be provided at each lift station installation, each capable of handling the expected maximum flow.

3. Location

The Developer shall furnish a site layout for the lift station installation.

The sewage lift station shall be located as far as practicable from present or proposed built-up residential areas, and an asphalt concrete access road shall be provided. Noise control, odor

control, and station architectural design shall be taken into consideration. Sites for sewage lift stations shall be of sufficient size for future expansion or addition, if applicable.

The limits of the cut and fill areas for the lift station site and access shall be within the easement area and the slope of all embankments shall not exceed 2:1. The method of fill construction, i.e., compaction, etc., shall be noted on the plans. The easement shall be submitted to the City for review prior to construction of the lift station. Lift station sites not located within the plat boundary shall be deeded to the City of South Bend.

The water service to the lift station site shall be 1-inch with a 1-inch buried washdown hydrant, together with backflow preventer of the reduced pressure type, both installed near the wet well, including meter box, meter and hose bib and 1-inch heavy-duty rubber hose, 50-foot long with a spray nozzle.

A 7'-0" high galvanized chain link fence with vertical wooden redwood or plastic slats in-laid for screening, and a combination 12-foot wide gate all with 3 rows of barbed wire enclosing the lift station and generator site shall be provided.

4. Wet Well

The wet well shall be of pre-cast concrete construction with flat slab cover and 30-inch hatch or manhole cover for access. The flat slab concrete cover shall be provided with a 4-inch vent which is "hooked and screened."

The wet well shall provide for the volute of the pumps to be fully submerged and a minimum of 3 minutes between pump cycles at pump capacity. The high water alarm shall be set a minimum of 7 inches below the invert of the lowest gravity sewer inlet pipe, or at an elevation as may be set by the City.

The wet well and the steel lift station shall be located on a common reinforced concrete slab. Protection against buoyancy shall be provided, together with the calculations to verify the same. The wet well chamber shall be provided with polypropylene safety steps as specified for typical precast manhole in accordance with the City's Standard Details.

The suction lines from the wet well to the pumps shall be a minimum of 6-inch inside diameter ductile iron, Class 53.

The force main shall be a minimum 6-inch diameter ductile iron Class 53, and provided with a continual positive slope. There shall be no intermediate high point between the pump station and the force main discharge point (depth shall be a minimum of 4'-0"). All pipes (gravity and pressure) entering and leaving the wet pit or dry pit shall have flexible couplings within 18-inches of the structure.

An outside drop manhole connection for the force main discharge into existing manholes shall be utilized with ductile iron fittings and the existing manhole re-channeled accordingly.

An emergency pump connection shall be located near the wet well.

C. Electrical Service/controls and Telemetry System

1. General

Codes and regulations exist at the federal, state, and local level dictating minimum acceptable requirements for electrical systems. The following partial list of codes and regulations shall be used as a basis for design and review.

- National Electric Code (NEC)
- Occupational Safety & Health Act (OSHA)
- State and Local Building Codes
- National Electrical Safety Code (NESC)

Various manufacturers and technical societies publish standards and recommendations. The following partial list of standards and recommendations shall be used as a basis for design and review whenever the project specifications have not made them mandatory.

- National Electrical Manufactures Association (NEMA)
- Underwriters' Laboratory (UL)
- Insulated Power Conductor Engineering Association (IPCEA)
- American National Standards Institute (ANSI)

- Institute of Electrical & Electronic Engineers (IEEE)

2. Electrical Service

The local electric utility will be the primary source of electrical power. The Developer shall ascertain proper coordination between the nominal secondary delivery voltage supplied by the local power company and the connection to the lift station equipment. The electrical service shall be 4-wire, 3-phase, 60 hertz, with a solid neutral terminal at the disconnect, or as may otherwise be required by the local P.U.D.; this shall be confirmed with the local power company and confirmed by the suppliers.

The pump motors, generator and transfer switch shall match the utility supplied voltage.

All wire shall be copper.

All conduit shall be galvanized, rigid.

All installation shall be approved by the local P.U.D. and shall be in conformance with the N.E.C. (current issue) U.L. 98, O.S.H.A. and County and State electrical codes. The City shall be furnished with a certificate of final inspection by the inspecting agency.

All underground conduits shall be marked with polyethylene tape placed 6-inches below finished grade and directly above the conduit.

All conduit shall have a minimum of 24 inches of cover.

Heating strips shall be provided for outside electrical enclosures.

A service entrance shall be provided with a pedestal on which shall be mounted, as a minimum, the following equipment:

- a) Meter and meter can (as required by the local utilities).
- b) Meter C.T. (as required by the local utilities).
- c) Main disconnect circuit breaker in a N.E.M.A., 3-R, enclosure, with padlock to City Standards.
- d) A generator transfer switch, sized for the full connected load, in a N.E.M.A. 3-R enclosure, with padlock to City Standards.

- e) 277/480 Volt circuit, a 5 KVA minimum, 480 to 240/120-volt, single-phase transformer for outside installation with padlock to City Standards.
- f) A 240/120-volt panel (12-circuit) in a N.E.M.A. 3-R enclosure with padlock to City Standards.
- g) A 120-volt duplex in N.E.M.A. 3-R enclosure with padlock to City Standards.
- h) Ground rod and connector wire in conduit to N.E.C. Standards.
- i) For mounting electrical equipment, provide two, 6'-0" high (above ground) 4" H.W. steel galvanized pipe support posts with H.W. galvanized "*super strut*" for supporting equipment; for minimum required the length of the pedestal secure to the posts. Post shall be encased in ground 3'-0" with 12-inch diameter concrete encasement. Enclose assembly in 8-inch thick poured-in-place concrete pad (finished surface 3 inches above ground), reinforced with #5 bars at 8 inches wide. Chamfer all concrete edges 3/4-inch.
- j) When applicable, as determined by the City, include a galvanized roof structure over electrical enclosures.
- k) Provide a 2-inch future conduit from a point 6 inches above the concrete slab as noted above, thence, underground to a point 24 inches from slab. Cap both ends.

Provide electrical single-line diagram showing all components and control between pedestal, lift station and generator with wire and conduit sizes.

The City shall be provided with a complete reproducible set of as-constructed Plans and Details showing final location of all equipment, conduit and wire.

3. Controls

Control and instrument system plans shall thoroughly and completely depict system design. The plans, in conjunction with the specifications, shall define the type of control system, the type of components in the system, set points and the interface between

the instrumentation and control system and the lift station system. To accomplish this, the control and instrument plan(s) shall include, as a minimum, the following:

- a) Control and instrumentation system legend and general notes.
- b) Control, instrumentation and distribution diagram.
- c) Plans showing location of all control, instrument, and distribution system equipment and components, both electrical and pneumatic.
- d) All equipment and installation details.

The power, control and instrumentation systems shall be designed with both operational reliability and maintainability. Use standard products wherever possible.

All components within the lift station system, including both internally and face-mounted instruments and devices shall be clearly identified with phenolic nameplates of black background with white letters.

All wiring between cabinet, equipment and components shall be marked and multiple color-coded where applicable.

All wiring shall be copper.

All pump motors shall have an independent circuit breaker located within the lift station and the lift station shall have a main circuit breaker located outside the lift station.

The lift station shall be furnished with a wet well gauge in the control panel. The control panel shall be furnished with an A-O-H switch for each pump motor and voltage monitor relays to protect the pump motors from single-phasing, phase reversal and low voltage.

The pump controls shall be air bubbler type with two compressors alternating on timer control, and shall provide for both pumps to operate at high water conditions. The control elevations shall be indicated on the plans, i.e., on-off, first pump on, second pump on, and high water alarm.

The single-phase transformer for the lift station shall be 5 KVA, or as required for proper operation of the single phase side system.

The lift station electrical circuit shall be modified for generator starting and telemetry as required.

Provide check valve limit switches and relays to confirm pump run to telemetry on each pump.

A complete set of spare fuses shall be provided for all fused equipment.

4. Telemetry

The lift station installation shall be installed with a complete telemetry system. This shall include all remote equipment, at the lift station, and all central based equipment.

Any telemetry shall be installed compatible with any current system and shall send all signals to the City office. The alarm priority shall be: 1) telemetry line failure; 2) normal power failure; 3) water in dry pit; 4) high/low water wet well; and 5) pump failure; 6) generator run. All contacts shall close on alarm. The panel shall be installed within the lift station. A water level sensor shall be provided in the dry pit.

The City will coordinate with the telemetry supplier and further mandate those alarms which the City desires to transmit.

All telemetry equipment shall be installed in a single NEMA 3R metal enclosure with an inner and outer door and shall be padlocked to City Standards. This equipment shall be installed on the electrical service mounting rack.

For ease of serving and maintaining the equipment, all wiring shall be multi-colored and numbered, using solderless pressure connectors.

All major components, including relays, timers, tone transmitters, and receivers, and power supplies shall be identified using phenolic or vilam engraved labels.

A line (surge) protector unit shall be provided for the telemetry equipment. The unit shall protect the equipment from transient and electrical surges on the telephone line. Protection shall include

line fuses and clamps for voltages over 25 volts, gas tubes shall be provided as an integral part of the lighting protection unit.

The telemetering between the central based system and the lift station site shall be performed over a voice grade circuit leased to the City from the local telephone company. The telemetry supplier shall coordinate with the City to ensure proper circuits are furnished.

D. Auxiliary Power System

1. General

Emergency power generation equipment shall be provided at the lift station site which will operate the lift station in the event of a commercial power outage.

It is essential that the emergency system be designed with capacity and rating to carry safely the entire connected lift station load.

The auxiliary power unit shall be complete in every respect and shall include, but not be limited to, the following:

- a) Generator, control panel and circuit breaker.
- b) Engine, radiator and exhaust system.
- c) Fuel tank.
- d) Generator set enclosure.
- e) Automatic transfer switch.
- f) Battery and rack.
- g) Battery charger.
- h) Conduit, wire and piping.

The auxiliary power unit shall be new, factory assembled, tested and as manufactured by Cummins/Onan, or owner approved equal. The generator set shall be manufactured and installed to all current electrical and other codes and regulations, as required by national, state, county and local agencies having jurisdiction.

Generator shall be capable of automatic starting and maintaining a full load from a cold start.

Generator shall have locking panels to engine and butterfly compartment. Fuel tank and radiator cap shall be lockable with common key.

Provide mouse proofing where applicable to ground-mounted structures.

2. Power System

Generator, engine and accessories enclosed in metal enclosure with removable panels and sides. Enclosures shall be lockable to City Standards.

Generator shall be designed so that the danger of accidents to the operator will be minimized.

Suitable guards shall be provided on all electrical parts to minimize the personal shock hazard.

Generator shall be broken-in sufficiently to permit application of full load immediately upon installation.

Generator supplier shall provide all tools for the generator set as recommended and required by the manufacturer.

Generator installation shall be checked three (3) times by the supplier during construction to determine that the installation is correct. Written confirmation of each visit and recommendations shall be provided to the City.

Generator supplier shall provide two (2) eight (8) hour days of supervision during start-up.

Generator supplier shall provide training for City personnel. This training shall be four (4) hours in length, and shall be conducted at the lift station site.

Generator manufacturer shall provide four (4) copies of maintenance and operations manual. These manuals shall be complete and shall include all information necessary to allow City personnel to maintain the generator.

Generator mounting pad shall be reinforced concrete to carry the weight of the unit and shall extend a minimum of 3 inches beyond generator housing. Chamfer all edges 3/4-inch.

Propane tank support pad shall be as above.

Provide a roof structure and/or fiberglass enclosure over generator per City direction. If the City desires a roof structure, the structure shall be designed by the Developer's engineer and subject to the City's approval. It shall be designed to protect the generator and City personnel from inclement weather, to be utilized as a noise barrier, and be aesthetically pleasing to the surrounding area.

a) Engine

(Shall be provided with/have):

Engine shall be diesel fueled. No gasoline or propane engines are permitted. Fuel tank shall be above-ground. Capacity shall be 24 hours when full + 25 percent reserve.

Fuel system shall be provided with an electrical shut-off valve with flexible connection to the generator. The generator set shall be manufacturer in compliance with the following codes, regulations and standards; N.E.M.A., I.E.E., A.N.S.I., N.E.C. and O.S.H.A.

Generator recovery after acceptance of 100% rated load in one step shall be 1 second.

Cooling shall be by radiator, provided with anti-freeze protected to -45°F and with corrosion protection. Provide block heater. Radiator cover shall have padlock hasp and padlock to City Standards.

Lubrication shall be full circulation pressure type, with replaceable filter with bypass.

Engine governor shall be gear-type mechanical.

Engine air filter shall be replaceable type.

Generator unit shall be furnished with vibration mounts.

Electrical fuel shut-off and flex-connections to engine.

Engine oil drain extension.

Stainless steel flexible exhaust connector and hospital (critical) rated muffler with condensation and rain collector including insulation.

Skid base with vibration isolators between base and concrete pad; secure to concrete per manufacturer's specifications.

High amperage industrial rated batteries and cables.

Battery charger capable of recharging battery in 4 hours from complete discharge.

Engine shall be 1,800 rpm, 4-cycle.

b) Generator

(Shall be provided with/have):

Designed and manufactured in accordance with N.E.M.A., I.E.E., and A.N.S.I. standards for temperature rise and all applicable electrical codes.

Revolving field, dynamically balanced, static excited, static regulated, 12-lead.

Upon application of rated continuous load, in one step, voltage dip shall be less than 25 percent or less with recovery to normal voltage in less than one second, measured with a light beam oscillograph.

Voltage regulation, solid state, within + 1 percent.

40°C temperature rise above 90°C ambient operation.

Frequency regulation within 3-hertz.

Radio suppression.

Self-ventilated, drip-proof construction.

Brushless, fast response, amortized winding, Class "B" and "F" fungus resistant. Coils and stator mechanically and epoxy braided.

Winding heaters shall be provided (120-volt).

Shock mounted.

Pump lockout circuit when generator is running (locked-out pump to be second call pump).

Low coolant level alarm shall shut down unit if coolant level is low.

Generator shall be 3-phase, 60-cycle and shall match the supply voltage of the utility distribution system.

c) Control Panel

(Shall be provided with/have):

Three position selector switch (off, test, automatic), which shall include a red flashing indicator light which lights in the off position.

Manual start-stop switch for testing without interrupting normal source.

Contact for an alarm and report system (6 contacts) N.O./N.C.

Cranking reset button.

Over-cranking protection shall open cranking circuit after 30-90 seconds of cranking (adjustable).

Cranking cyler with four attempts of 15 seconds each and 10 second rest periods between attempts.

Line circuit breaker rated at full generator capacity.

AC volt meter with switch for each phase.

AC ammeter with switch for each phase.

Current transformers.

Frequency meter.

Running time meter (99,999.9 hours capacity)

Panel light.

Oil pressure gauge.

Water temperature gauge.

Voltage adjusting reostat.

Alarm indication panel with shut-off control; 1) over-speed; 2) over-crank; 3) high temperature; 4) low oil pressure; 5) low coolant level.

All contacts shall close on alarm.

All alarm sensors and instruments shall be protected by individual push-type reset circuit breakers.

Generator load meter (to measure true load on generator) in kW.

Panel to be N.E.M.A. 12 construction.

3. Transfer Switch

The transfer switch shall be sized, in amps, to equal plus 25 percent, the full connected load of the lift station generator and auxiliary equipment. The transfer switch shall be enclosed in a N.E.M.A. 3-R cabinet with padlock to City Standards and mounted on the entrance pedestal.

Shall be U.L., 1008 and C.S.A. approved.

Shall protect all types of loads, inductive and resistive.

Shall be rated, 3-phase, 60-cycle, 3-pole, 4-wire with neutral lug and match the commercially supplied system voltage.

Shall be rated for all classes of loads without de-rating, either open or closed.

Shall automatically transfer load upon failure of normal power and return upon restoration of normal power.

Shall be electrically operated, mechanically-held using circuit breakers.

Shall be provided with time delay in the neutral position.

The automatic transfer panel shall have solid state, close-differential, field-adjustable, voltage-sensing relays, nominally set at 70 percent drop-out and 90 percent pick-up, both modes: emergency to normal and normal to emergency.

Interrupting and withstand capacity, measured symmetrical of breakers shall be as follows:

40, 70, 100 amp =	14,000
150, 260 amp =	30,000
400, 600 amp =	65,000
800, 1000 amp =	65,000

The automatic transfer switch shall obtain current from the source to which the load is being transferred.

Panel shall be front opening.

All equipment listed shall be mounted directly in the automatic transfer panel lockable cabinet.

All equipment shall be accessible from the front of the cabinet for ease of maintenance or removal.

All pilot devices and/or relays shall be industrial type rated 10-amperes with self-cleaning contacts.

Components of the operation mechanism shall be insulated or electrically dead.

The transfer mechanism shall be energized only momentarily during transfer.

Components of linkages and handles of operating mechanism shall be ruggedly constructed and not subject to deterioration.

Time Delay - transfer from normal power source to standby generator set, shall be delayed in order to override momentary power fluctuations or outages. Adjustable, 0 to 50 seconds.

Time Delay - emergency to normal transfer shall be delayed after normal power resumes to permit stabilization of the normal power source prior to transfer. Adjustable, 30 seconds to 30 minutes.

Time Delay for Engine Cool-Off - a time delay shall allow the engine to run, unloaded for a period of not less than two minutes after power has been transferred back to the normal source. The time delay shall be adjustable from a minimum period of 60 seconds to 15 minutes.

Protection for under-voltage, over-voltage, phase reversal, single-phasing, unbalanced operating voltage; both modes - emergency to normal and normal to emergency.

Auxiliary Contacts - a minimum of six (6) pairs of auxiliary contacts shall be provided in the transfer switch panel, complete with switches to prevent chosen circuits from operating during periods of normal power outage. The contacts shall be cartridge type convertible from normally closed to normally open.

Time delay at the neutral position - when transferring from normal power to generator power and from generator power to normal power. Time delay shall be adjustable from 0.2 to 50 seconds.

SECTION 7

WATER SYSTEM STANDARDS

SECTION 7

7. WATER SYSTEM STANDARDS

7.01 General

The standards established by this chapter are intended to represent the *minimum* standards for the design and construction of water system facilities. Greater or lesser requirements may be mandated by the City due to localized conditions. The following design and construction considerations shall apply:

7.02 Design Standards

The design of water system improvements shall depend on their type and local site conditions. The design elements of water system improvements shall conform to City Standards as set forth herein and follow current design practice as set forth by the Department of Health and/or current AWWA Standards.

- A. Detailed plans shall be submitted for the City’s review which provide the locations, size, and type of the proposed water system and points of connection. These Plans shall be separate from Sewer Plans.
- B. Project plans shall have a horizontal scale of not more than 50 feet to the inch. Plans shall show:
 - 1. Locations of streets, right-of-ways, existing utilities and water system facilities.
 - 2. Ground surface, pipe type and size, and water valves and hydrants stationing.
 - 3. All known existing structures, both above and below ground, which might interfere with the proposed construction, particularly sewer lines, gas mains, storm drains, overhead and underground power lines, and telephone lines and television cables.
 - 4. All utility easements.
- C. Computations and other data used for design of the water system shall be submitted to the City for approval.
- D. The water system facilities shall be constructed in conformance with the most current edition of the WSDOT Standard Specification and current amendments thereto, State of Washington, revised as to form to make reference to Local Governments and as modified by the City’s requirements and standards.

- E. Material and installation specifications shall contain appropriate requirements that have been established by the industry in its technical publications, such as ASTM, AWWA, WPCF, and APWA Standards. Requirements shall be set forth in the specifications for the pipe and methods of bedding and backfilling so as not to damage the pipe or its joints.
- F. Except as otherwise noted herein, all work shall be accomplished as recommended in applicable American Water Works Association (AWWA) Standards, and according to the recommendations of the manufacturer of the material or equipment concerned.
- G. The location of the water mains, valves, hydrants, and principal fittings including modifications shall be staked by the Developer. No deviation shall be made from the required line or grade. The Contractor shall verify and protect all underground and surface utilities encountered during the progress of this work.
- H. Prior to final inspection, all pipelines shall be tested and disinfected.
- I. Before acceptance of the water system by the City, all pipes, assemblies, and other appurtenances shall be cleaned of all debris and foreign material. After all other work is completed and before final acceptance, the entire roadway, including the roadbed, planting, sidewalk areas, shoulders, driveways, alley and side street approaches, slopes, ditches, utility trenches, and construction areas shall be neatly finished to the lines, grades and cross sections for a new roadway consistent with the original section.
- J. The Developer shall be required, upon completion of the work and prior to acceptance by the City, to furnish the City with a written guarantee covering all material and workmanship for a period of two years after the date of final acceptance and he shall make all necessary repairs during that period at his own expense, if such repairs are necessitated as the result of furnishing poor materials and/or workmanship. The Developer shall obtain warranties from the contractors, subcontractors and suppliers of material or equipment where such warranties are required and shall deliver copies to the City upon completion of the work.

7.03 General Notes – on all plans submitted to the city

- A. Prior to construction, the Contractor shall notify the City for a preconstruction meeting.

- B. Work shall be performed only by contractors experienced in laying public water mains.
- C. Prior to any work being performed, the Contractor shall contact the City Supervisor to set forth his proposed work schedule.
- D. Contractor shall obtain approval of materials to be used from the City Supervisor prior to ordering of materials.
- E. Water mains shall be laid only in dedicated streets or in easements which have been granted to the City. A street is normally not considered dedicated until the plat which created it has been officially filed with the County Auditor.
- F. All water main distribution pipeline construction shall have a minimum of a 36" cover from finished grade. Mains shall generally be located parallel to and ten feet northerly or easterly of street centerline.
- G. Average spacing between fire hydrants will generally be determined by the fire-flow requirements of the development being served. Where new water mains are extended along streets where hydrants are not needed for protection of structures or similar fire problems, fire hydrants will generally be provided every 600 feet in residential areas and every 300 feet in commercial areas. Spacing and location of fire hydrants shall be determined by the City Fire Marshal.
- H. Fire hydrants on dead end streets and roads shall be located within approximately 300 feet from the frontage center of the farthest lot. Distances required herein shall be measured linearly along street or road.
- I. Pipes connecting hydrants to mains shall be at least 6 inches in diameter and not longer than 50 feet.
- J. Dead end lines are not permitted except where the Developer can demonstrate to the City's satisfaction that it would be impractical to extend the line at a future date. Water mains on platted cul-de-sacs shall extend to the plat line beyond the cul-de-sac to neighboring property for a convenient future connection, and a 2 inch blow off assembly shall be provided.
- K. All materials shall be new and undamaged.

L. Water main shall be ductile iron pipe class as shown below:

<u>Pipe Diameter</u>	<u>Class</u>
6" through 14"	Class 52
6" Hydrant Spools	Class 53
16" and larger	Class 52

- M. All fittings shall be cement-lined ductile iron.
- N. All water mains and services shall have tracer wire installed on them and the wire shall be brought to the surface through valve and meter boxes.
- O. Provide bends in field to suit construction and in accordance with pipe manufacturer's recommendations so as not to exceed allowable deflection at pipe joints.
- P. Provide concrete blocking at all fittings and bends in accordance with the City standards and conditions.
- Q. Provide anchor blocking at all up-thrust vertical bends in accordance with City Standards.
- R. All valve marker posts shall be painted yellow and marked with the distance to valve being referenced.
- S. Water services shall be "Poly" pipe (no joints beneath pavement areas), as manufactured by Driscopipe (CL 200), or City approved equal. Service lines shall be restricted to a maximum length of 150'.
- T. Minimum size service lines (single service) between the water main and the water meter shall be 3/4 inch diameter. Minimum size service lines (double service) between the water main and double water meters (located at common property corner) shall be one and one-half inch 1 1/2" diameter. All service lines shall be the minimum size specified. Larger diameters may be required by the current Plumbing Code to facilitate a large number of fixture units.
- U. Meter services and meter boxes shall be set to final grade and all adjustments shall be made prior to final pressure testing of the system, centerline of service inlets shall be located to match bottom elevation of meter box in such a manner that meter inlet and outlet will be the same elevation as bottom of meter box. Service inlet shall be centered at inlet end of box and faced toward outlet end of box parallel with long sides.
- V. All water services shall end within road right-of-way or easements.

- W. All fittings shall be brass.
- X. All meters shall be installed by the City, unless otherwise approved, and the Developer shall pay the current meter installation charge.
- Y. All new buildings and residences shall include in their water service a suitable pressure reducing valve to protect the plumbing from excessive pressures when static pressure exceeds 80 psi at the lot/property line (meter location).
- Z. All new construction shall comply with the City's Cross-Connection Control Program, SBMC Chapter 13.35 and current amendments thereto. A copy of such is available for review at the City office.
- AA. Cut in connections shall not be made on Fridays, holidays or weekends. All tapping sleeves and tapping valves shall be pressure tested prior to making connection to existing mains.
- BB. Contractor shall notify City's Public Works Superintendent and obtain approval from him/her prior to any water shut-off or turn-on, affecting the water system, a minimum of 48 hours in advance.
- CC. Road restoration shall be per City, County or State design and construction standards, as may be applicable. Developer and Contractor shall become familiar with all State, County and City conditions of required permits, and shall adhere to all conditions and requirements.

7.04 Materials and Testing

- A. Water Mains and Fittings
 - 1. All water mains to be installed, unless otherwise approved (or required) in writing by the City Engineer, shall be PVC C900. The minimum size for all water lines shall be 8 inches.
 - 2. PVC pipe shall conform to AWWA C-900, Class 150, capable of connecting to ductile iron fittings. All fittings shall be ductile iron.
 - 3. Type of joint shall be mechanical joint or push-on type, employing a single gasket, such as "Tyton", except where otherwise calling for flanged ends. Bolts furnished for mechanical joint pipe and fittings shall be high strength ductile iron, with a minimum tensile strength of 50,000 psi.

4. Restrained joint pipe, where shown on the Plans shall be push-on joint pipe with “Field Lok” gaskets as furnished by U.S. Pipe or equal for 12” diameter and smaller pipe and “TR FLEX” as furnished by U.S. Pipe or equal for 16” and 24” diameter pipes. The restrained joint pipe shall meet all other requirements of the non-restrained pipe. Restraint joint pipe shall be installed at “dead end” installations.
5. All pipe shall be jointed by the manufacturer’s standard coupling, be all of one manufacturer, and be carefully installed in complete compliance with the manufacturer’s recommendations.
6. Joints shall be “made up” in accordance with the manufacturer’s recommendations. Standard joint materials, including rubber ring gaskets, shall be furnished with the pipe. Material shall be suitable for the specified pipe size and pressures.
7. All fittings shall be short-bodied, ductile iron complying with applicable ANSI/AWWA C110 or C153 Standards for 350 psi pressure rating for mechanical joint fittings and 250 psi pressure rating for flanged fittings. All fittings shall be cement lined and either mechanical joint or flanged, as indicated on the Plans.
8. Fittings in areas shown on the Plans for restrained joints shall be mechanical joint fittings with a mechanical joint restraint device. The mechanical joint restraint device shall have a working pressure of at least 250 psi with a minimum safety factor of 2:1 and shall be EBAA Iron, Inc., MEGALUG, Romac “Grip Ring” or City approved equal.
9. All couplings shall be ductile iron mechanical joint sleeves, or long pattern solid sleeves.
10. The pipe and fittings shall be inspected for defects before installation. All lumps, blisters, and excess coating shall be removed from the bell and spigot end of each pipe, and the outside of the spigot and the inside of the bell shall be wire-brushed and wiped clean and dry, and free from oil and grease before the pipe is laid.
11. Every precaution shall be taken to prevent foreign material from entering the pipe while it is being placed in the line. After placing a length of pipe in the trench, the spigot end shall be centered in the bell and pipe forced home and brought to correct line and grade. The pipe shall be secured in place with select backfill tamped under it. Precaution shall be taken to prevent dirt from

entering the joint space. At times when pipe laying is not in progress, the open ends of pipe shall be closed by a water-tight plug. If water is in the trench when work resumes, the seal shall remain in place until the trench is pumped completely dry. No pipe shall be laid in water or when trench conditions are unsuitable.

12. The cutting of pipe for inserting fittings or closure pieces shall be done in a neat and workmanlike manner, without damage to the pipe or cement lining, and so as to leave a smooth end at right angles to the axis of the pipe. Pipe shall be laid with bell ends facing in the direction of the laying, unless directed otherwise by the City. Wherever it is necessary to deflect pipe from a straight line, the amount of deflection allowed shall not exceed pipe manufacturer's recommendations.
13. For connection of mechanical joints, the socket, plain end of each pipe and gasket shall be cleaned of dirt before jointing, and shall be jointed according to manufacturer's directions. Bolts shall be tightened alternately at top, bottom and sides, so pressure on gasket is even.
14. For connection of "Tyton" joints, the jointing shall be done according to manufacturer's recommendations, with special care used in cleaning gasket seat to prevent any dirt or sand from getting between the gasket and pipe. Lubricant to be used on the gasket shall be non-toxic and free from contamination. When a pipe length is cut, the outer edge of the cut shall be beveled with a file to prevent injury to the gasket during jointing.
15. Valves, fittings, plugs and caps shall be set and jointed to pipe in the manner as required. All dead ends on new mains shall be closed with dead end M.J. caps.
16. Fittings shall be "blocked" with poured-in-place concrete, with a firm minimum bearing against an undisturbed earth wall. Timber blocking will not be permitted. Thrust blocks shall be poured as soon as possible after setting the fittings in place to allow the concrete to "set" before applying the pressure test. The concrete thrust blocks shall be in place before beginning the pressure test. Anchor blocks shall be allowed to set sufficiently to develop the necessary bond strength between the reinforcing rods and the concrete anchor before beginning the pressure test.

17. All of the new piping, valves and blocking shall have been installed, disinfected and tested up to the point of cutting into existing lines before the crossover is made. The crossover to the existing system shall be in full readiness, including the cut and sized specials. Forty-eight (48) hour notice shall be given the City in advance of the planned “cut-ins”. All sleeves shall be ductile iron.

B. Valves

All valves 12” and smaller shall be resilient seat gate valves. All valves 14” and larger shall be butterfly valves.

1. Resilient-Seated Gate Valves

All gate valves shall conform to ANSI/AWWA C509-87 Standards for resilient-seated disc gate valves. The valves shall be iron-bodied, iron disk completely encapsulated with polyurethane rubber and bronze, non-rising stem with “O” ring seals. The polyurethane sealing rubber shall be permanently bonded to the disk to meet ASTM tests for rubber to metal bond ASTM D429. The valves shall open counter-clockwise and be furnished with 2-inch square operating nuts except valves in vaults shall be furnished with handwheels. All surfaces, interior and exterior shall be fusion bonded epoxy coated, acceptable for potable water.

For applications with working pressure above 175 psi, a ductile iron valve rated as 250 psi or higher shall be used.

The valves shall be set with stems vertical. The axis of the valve box shall be common with the axis projected off the valve stem. The tops of the adjustable valve boxes shall be set to the existing or established grade, whichever is applicable.

Valves shall be Clow, M&H, or U.S. Pipe.

2. Butterfly Valves

Butterfly valves shall be of the tight closing rubber seat type with rubber seat either bonded to the body or mechanically retained in the body with no fasteners or retaining hardware in the flowstream. The valves may have rubber seats mechanically affixed to the valve vane. Where threaded fasteners are used, the fasteners shall be retained with a locking wire or equivalent provision to prevent loosening. Rubber seats attached to the valve vane shall be equipped with stainless steel seat ring integral with the body, and

the body internal surfaces shall be epoxy coated to prevent tuberculations buildup which might damage the disc-mounted rubber seat.

No metal-to-metal sealing surfaces shall be permitted. The valves shall be bubble-tight at rated pressures with flow in either direction, and shall be satisfactory for applications involving valve operations after long periods of inactivity. Valve discs shall rotate ninety (90) degrees from the full open position to the tight shut position. The valves shall meet the full requirements of AWWA C504, Class 150B. The valve shall be Henry Pratt Company “*Groundhog*”, Dresser “450” or Mueller “*Lineseal III*”.

3. Tapping Sleeves & Tapping Valves

The tapping sleeves shall be rated for a working pressure of 200 psi minimum and furnished complete with joint accessories. Tapping sleeves shall be constructed in two sections for ease of installation and shall be assembled around the main without interrupting service.

Mechanical joint style sleeves shall be ductile iron and is required for size-on-size connection to cast iron pipe. Mechanical joint sleeves shall be cast by Clow, Dresser, Mueller, Tyler, U.S. Pipe, or approved equal.

Fabricated steel style sleeves shall be fusion bonded coated, acceptable for potable water, and is acceptable for A.C. pipe taps only. Fabricated steel sleeves shall be manufactured by JCM, Romac, or approved equal.

Tapping valves shall be provided with a standard mechanical joint outlet for use with ductile iron pipe and shall have oversized seat rings to permit entry of the tapping machine cutters. In all other respects, the tapping valves shall conform to the resilient seat gate valves herein specified with regards to operation and materials.

The installation of the tapping sleeves and valves shall be performed by a contractor with demonstrated qualifications.

4. Pressure Reducing and Relief Valves

There are two uniform plumbing codes: one is prepared by the International Association of Plumbing and Mechanical Officials, another is prepared by the International Conference of Building Officials. Both codes require installation of pressure reducing

valves in the water service pipe when street main pressure exceed 80 psi, as follows:

- a. When street main pressure exceeds 80 psi, an approved pressure reducing valve with an approved pressure relief device shall be installed in the water service pipe near its entrance to the building to reduce the pressure to 80 psi or lower, except where the water service pipe supplies water directly to a water-pressure boost system, an elevated water gravity tank, or to pumps provided in connection with a hydropneumatic or elevated gravity water-supply tank system. Pressure at any fixture shall be limited to no more than 80 psi under no-flow conditions.

- b. Where local water pressure is in excess of eighty (80) pounds per square inch (551 kPa), an approved type pressure regulator preceded by an adequate strainer shall be installed and the pressure reduced to eighty (80) pounds per square inch (551 kPa) or less. For potable water services up to and including one and one-half (1-1/2) inch (38.1 mm) regulators, provision shall be made to prevent pressure on the building side from exceeding main supply pressure. Approved regulators with integral bypasses are acceptable. Each such regulator and strainer shall be accessibly located and shall have the strainer accessible for cleaning without removing the regulatory or strainer body or disconnecting the supply piping. All pipe size determinations shall be based on eighty (80) percent of the reduced pressure.

Both uniform plumbing codes also require installation of pressure and temperature relief valves for hot water tanks as follows:

- a. **Pressure-Relief Valves:** Pressure-relief valves shall meet the ANSI Standards and the ASME Standards when required by the building office. The valves shall have a pressure relief rating adequate to meet the pressure conditions of the equipment served. They shall be installed either directly in a top tank tapping or in the hot or cold outlet line close to the tank. There shall be no shutoff valves between the pressure relief valve and the tank. The pressure relief valve must be set to open at not less than 25 psi above the street main pressure or not less than 25 psi above the setting of any house water press-regulating valve.

The setting shall not exceed the tank rated working pressure.

- b. **Temperature-Relief Valves:** Temperature-relief valves shall be adequate relief rating, express in Btu/hr, for the equipment served. They shall be installed so that the temperature-sensing element is immersed in the hottest water within the top 6 inches of the tank. The valve shall be set to open when the stored water temperature is 210 degrees Fahrenheit (or less). These valves must conform to an approved standard and shall be sized so that when the valve opens, the water temperature cannot exceed 210 degrees Fahrenheit with the water heating element operating at maximum input.

All storage-type water heaters and hot water boilers deriving heat from fuels or types of energy other than gas, shall be provided with, in addition to the primary temperature controls, an over-temperature safety protection device constructed, list and installed in accordance with nationally recognized applicable standards for such devices.

The City will require that its customers install such pressure-reducing valves in the water service pipe when the street main static pressure exceeds 80 psi. The City will make static pressure information available upon request.

5. All Valves

All valves with operating nuts located more than 42" below finished grade shall be equipped with extension stems to bring the operating nut to within 18" of the finished grade.

At the top of the extension stem, there shall be a 2-inch standard operating nut, complete with a centering flange that closely fits the 5-inch pipe encasement of the extension stem. The valve box shall be set in a telescoping fashion around the 5-inch pipe cut to the correct length to allow future adjustment up or down.

Each valve shall be provided with an adjustable two-piece cast iron valve box of 5 inches minimum inside diameter. Valve boxes shall have a top section with an 15-inch minimum length. The valve boxes and covers shall be Rich No. 940, or equal.

6. Valve Markers

For each valve outside of asphalt, provide a valve marker post.

The concrete marker posts shall have a 3-inch minimum square section and a minimum length of 36 inches, with beveled edges, and contain at least one (1) 3/8 inch diameter bar of reinforcing steel. Markers shall be placed at the edge of the right-of-way opposite the valve, and set so as to leave 12 inches of the post exposed above grade. The exposed portion of the marker posts shall be painted with two (2) coats of blue enamel paint. Distance to referenced valve shall be to the nearest 0.5 foot, and shall be clearly stenciled in black numerals 2 inches in height.

C. Fire Hydrants

All fire hydrants shall be approved by the National Board of Fire Underwriters and conform to AWWA Specification C502, break-away type, in which the valve will remain closed if the barrel is broken. The hydrant barrel shall have a diameter of not less than seven inches (7"), and the valve diameter shall be not less than five-and-one-quarter inches (5-1/4"). Each hydrant shall be equipped with two (2) two-and-one-half-inch (2-1/2") hose ports (National Standard Thread), and one (1) four-and-one-half-inch (4-1/2") pumper connection (National Standard Thread), with permanent four inch (4") Storz hydrant adaptor and Storz blind cap. Each hydrant shall be equipped with a suitable positive acting drain valve and one-and-one-quarter-inch (1-1/4") pentagonal operating nut (counter-clockwise opening). The fire hydrants shall be "M & H" Style 129S.

The holding spools between the gate valve and fire hydrant shall be made from 6-inch Class 53 ductile iron pipe, 0.34-inch wall thickness. The hydrant and gate valve shall be anchored in place using holding spools and mechanical joint restraint device. Holding spools with length in excess of 17 feet shall be supplied with an M.J. sleeve and mechanical joint restraint device.

The fire hydrants shall be painted with two (2) coats of Rustoleum Safety Yellow Base No. 288-14., Color Code AX-6732, T-4432, or per local Fire Marshall, contractor to verify. Distance to the hydrant valve shall be clearly stenciled in black numerals 2 inches in height on the fire hydrant below the pumper port. Each hydrant shall be installed with blue lane reflectors in line with the hydrant off-set from the center of the roadway towards the hydrant.

Between the time that the fire hydrant is installed and the completed facility is placed in operation, the fire hydrant shall at all times be wrapped in burlap, or covered in some other suitable manner to clearly indicate that the fire hydrant is not in service.

D. Blow-Offs and Air Relief Assemblies

Two (2) inch diameter (minimum size) blowoff assemblies shall be installed at the terminus of all permanent and/or temporary dead end water mains. Blowoffs utilized by the Contractor for flushing the water main shall be sufficient size to obtain 2.5 feet per second velocity in the main. Temporary blow-offs shall be removed and replaced with a suitably sized watertight brass plug.

Two (2) inch diameter (minimum size) air and vacuum release valves shall be installed at principal high points in the system, if specifically required by the City Public Works Supervisor.

The installation of these items shall include connection piping, gate valve, valve box, and all accessories. Valve markers shall be optional with City.

E. Water Sampling Station

Water sampling station(s) shall be provided only if specifically required/requested by the City Public Works Supervisor.

F. Water Pipe Testing and Disinfecting

All pipelines shall be tested and disinfected prior to acceptance of work. A water hydrant meter shall be required and procured from the City for all water utilized for flushing pipelines. All pumps, gauges, plugs, saddles, corporation stops, miscellaneous hose and piping, and measuring equipment necessary for performing the test shall be furnished, installed and operated by the Contractor. Feed for the pump shall be from a barrel or other container within the actual amount of “makeup” water, so that it can be measured periodically during the test period.

The pipeline shall be backfilled sufficiently to prevent movement of the pipe under pressure. All thrust blocks shall be in place and time allowed for the concrete to cure before testing. Where permanent blocking is not required, the Contractor shall furnish and install temporary blocking.

As soon as pipe is secured against movement under pressure, it may be filled with water. Satisfactory performance of air valves shall be checked while the line is filling.

Contractor shall preflush all water mains after water has remained in the main for 24 hours and before pressure testing the main.

After the pipe is filled and all air expelled, it shall be pumped to a test pressure of 250 psi, and this pressure shall be maintained for a period of not less than thirty (30) minutes to insure the integrity of the thrust and anchor blocks. All tests shall be made with the hydrant auxiliary gate valves open and pressure against the hydrant valve. Hydrostatic tests shall be performed on every complete section of water main between two valves, and each valve shall withstand the same test pressure as the pipe with no pressure active in the section of pipe beyond the closed valve.

In addition to the hydrostatic pressure test, a leakage test shall be conducted on the pipeline. The leakage test shall be conducted at 150 psi for a period of not less than one (1) hour. The quantity of water lost from the main shall not exceed the number of gallons per hour determined by the formula:

$$L = \frac{ND(P)^{0.5}}{7,400}$$

in which

L = Allowable leakage, gallons/hour
N = Number of joints in the length of pipeline tested
D = Nominal diameter of the pipe in inches
P = Average test pressure during the leakage test, psi

Defective materials or workmanship, discovered as a result of the tests, shall be replaced by the Contractor at the Contractor's expense. Whenever it is necessary to replace defective material or correct the workmanship, the tests shall be re-run at the Contractor's expense until a satisfactory test is obtained.

As sections of pipe are constructed and before pipelines are placed in service, they shall be sterilized in conformance with the requirements of the State of Washington Department of Health Services.

The Contractor shall be responsible for flushing all water mains prior to water samples being acquired. The water mains shall be flushed at a rate to provide a minimum 2.5 feet per second velocity in the main.

In all disinfection processes, the Contractor shall take particular care in flushing and wasting the chlorinated water from the mains to assure that the flushed and chlorinated water does no physical or environmental damage to property, streams, storm sewers or any waterways. The

Contractor shall chemically or otherwise treat the chlorinated water to prevent damage to the affected environment, particularly aquatic and fish life of receiving streams.

Chlorine shall be applied in one of the following manners, listed in order of preference, to secure a concentration in the pipe of at least 50 ppm.

1. Injection of chlorine-water mixture from chlorinating apparatus through corporation cock at beginning of section after pipe has been filled, and with water exhausting at end of section at a rate controlled to produce the desired chlorine concentration;
2. Injection similarly of a hypochlorite solution;
3. Placement of dry chlorinated lime throughout pipeline, as constructed, in proper quantities to produce the desired dosage. Filling of pipeline with this method should be at a very slow rate. Pipeline should be filled within two (2) days of placing sterilizing agent.

After the desired chlorine concentration has been obtained throughout the section of line, the water in the line shall be left standing for a period of twenty-four (24) hours. Following this, the line shall be thoroughly flushed and a water sample collected. The line shall not be placed in service until a satisfactory bacteriological report has been received.

City forces only will be allowed to operate existing and new tie-in valves. The Contractor's forces are expressly forbidden to operate any valve on any section of line which has been accepted by the City.

7.05 Staking

All surveying and staking shall be performed by an engineering or surveying firm capable of performing such work. The engineer or surveyor directing and/or performing such work shall be currently licensed by the State of Washington to perform said tasks.

A preconstruction meeting shall be held with the City prior to commencing staking. All construction staking shall be inspected by the City prior to construction.

The minimum staking of water systems shall be as follows:

- A. Provide staking sufficient to satisfy the City's Public Works Supervisor. In new plat development roadway centerline staking must be readily identifiable.

- B. Stake locations of all proposed fire hydrant, blow-off, air-vac, valves, meters, etc.

7.06 Trench Excavation

- A. Clearing and grubbing where required shall be performed within the easement or public right-of-way as permitted by the City and/or governing agencies. Debris resulting from the clearing and grubbing shall be disposed of by the owner or contractor in accordance with the terms of all applicable permits.
- B. Trenches shall be excavated to the line and depth designated by the City to provide a minimum of 36 inches of cover over the pipe. Except for unusual circumstances where approved by the City, the trench sides shall be excavated vertically and the trench width shall be excavated only to such widths as are necessary for adequate working space as allowed by the governing agency and in compliance with all safety requirements of the prevailing agencies. See Detail. The trench shall be kept free from water until joining is complete. Surface water shall be diverted so as not to enter the trench. The owner shall maintain sufficient pumping equipment on the job to insure that these provisions are carried out.
- C. The contractor shall perform all excavation of every description and whatever substance encountered and boulders, rocks, roots and other obstructions shall be entirely removed or cut out to the width of the trench and to a depth 6 inches below the pipeline grade. Where materials are removed from below the pipeline grade, the trench shall be backfilled to grade with material satisfactory to the City and thoroughly compacted.
- D. Trenching and shoring operations shall not proceed more than 100 feet in advance of pipe laying without approval of the City, and shall be in conformance with Washington Industrial Safety and Health Administration (WISHA) and Office of Safety and Health Administration (OSHA) Safety Standard.
- E. The bedding course shall be finished to grade with hand tools in such a manner that the pipe will have bearing along the entire length of the barrel. The bell holes shall be excavated with hand tools to sufficient size to make up the joint.

7.07 Backfilling

Backfilling and surface restoration shall closely follow installation of pipe so that not more than 100 feet is left exposed during construction hours without approval of the City. Selected material shall be placed and compacted around and under the storm drain by hand tools. Special precautions should be provided to protect the pipe to a point 12 inches above the crown of the pipe. The remaining backfill shall be compacted to 95 percent of the maximum density in traveled areas and road prisms, 90 percent outside driveway, roadways, road prism, shoulders, parking or other traveled areas. Where governmental agencies other than the City have jurisdiction over roadways, the backfill and compaction shall be done to the satisfaction of the agency having jurisdiction. If suitable backfill material, as determined by the City, is not available from trenching operations, the City may order the placing of gravel base conforming with Section 9-03.10 of the WSDOT Standard Specifications for backfilling the trench.

7.08 Street Patching and Restoration

See Chapter 4.16 and 4.17 for requirements regarding street patching and trench restoration.

7.09 Erosion Control

The detrimental effects of erosion and sedimentation shall be minimized by conforming with SBMC 15.78.050 and the following general principles:

1. Soil shall be exposed for the shortest possible time.
2. Reducing the velocity and controlling the flow of runoff.
3. Detaining runoff on the site to trap sediment.
4. Releasing runoff safely to downstream areas.

In applying these principles, the Developer and/or Contractor shall provide for erosion control by conducting work in workable units; minimizing the disturbance to cover crop materials; providing mulch and/or temporary cover crops, sedimentation basins, and/or diversions in critical areas during construction; controlling and conveying runoff; and establishing permanent vegetation and installing erosion control structures as soon as possible.

A. Trench Mulching

Where there is danger of backfill material being washed away due to steepness of the slope along the direction of the trench, backfill material shall be compacted and held in place by covering the disturbed area with straw and held with a covering of jute matting or wire mesh anchored in place.

B. Cover-Crop Seeding

A cover crop shall be sown in all areas excavated or disturbed during construction that were not paved, landscaped and/or seeded prior to construction. Areas landscaped and/or seeded prior to construction shall be restored to their original or superior condition.

Cover-crop seeding shall follow backfilling operations.

The Developer and/or Contractor shall be responsible for protecting all areas from erosion until the cover crop affords such protection. The cover crop shall be re-seeded if required and additional measures taken to provide protection from erosion until the cover crop is capable of providing protection.

During winter months, the Contractor may postpone seeding, if conditions are such that the seed will not germinate and grow. The Developer and/or Contractor will not, however, be relieved of the responsibility of protecting all areas until the cover crop has been sown and affords protection from erosion.

The cover crop shall be sown at a rate of 10 to 15 pounds of seed per acre using a hand or power operated mechanical seeder capable of providing a uniform distribution of seed.

7.10 Finishing and Cleanup

After all other work on this project is completed and before final acceptance, the entire roadway, including the roadbed, planting, sidewalk areas, shoulders, driveways, alley and side street approaches, slopes, ditches, utility trenches, and construction areas shall be neatly finished to the lines, grades and cross sections of a new roadway consistent with the original section, and as hereinafter specified.

On water system construction where all or portions of the construction is in undeveloped areas, the entire area which has been disturbed by the construction shall be shaped so that upon completion the area will present a uniform

appearance, blending into the contour of the adjacent properties. All other requirements outlined previously shall be met.

Slopes, sidewalk areas, planting areas and roadway shall be smoothed and finished to the required cross section and grade by means of a grading machine insofar as it is possible to do so without damaging existing improvements, trees and shrubs. Machine dressing shall be supplemented by hand work to meet requirements outlined herein, to the satisfaction of the City Public Works Superintendent and/or the City Supervisor.

Upon completion of the cleaning and dressing, the project shall appear uniform in all respects. All graded areas shall be true to line and grade. Where the existing surface is below sidewalk and curb, the area shall be filled and dressed out to the walk. Wherever fill material is required in the planting area, the finished grade shall be elevated to allow for final settlement, but nevertheless, the raised surface shall present a uniform appearance.

All rocks in excess of 1 inch diameter shall be removed from the entire construction area and shall be disposed of the same as required for other waste material. In no instance shall the rock be thrown onto private property. Overhang on slopes shall be removed and slopes dressed neatly so as to present a uniform, natural, well-sloped surface.

All excavated material at the outer lateral limits of the project shall be removed entirely. Trash of all kinds resulting from clearing and grubbing or grading operations shall be removed and not placed in areas adjacent to the project. Where machine operations have broken down brush and trees beyond the lateral limits of the project, the Developer and/or Contractor shall remove and dispose of same and restore said disturbed areas at his own expense.

Drainage facilities such as inlets, catch basins, culverts, and open ditches shall be cleaned of all debris which is the result of the Developer and/or Contractor's operations.

All pavements and oil mat surfaces, whether new or old, shall be thoroughly cleaned. Existing improvements such as Portland cement concrete curbs, curb and gutters, walls, sidewalks, and other facilities which have been sprayed by the asphalt cement shall be cleaned to the satisfaction of the City Public Works Superintendent and/or City Supervisor.

Castings for monuments, water valves, vaults and other similar installations which have been covered with the asphalt material shall be cleaned to the satisfaction of the City's resident inspector and/or the Public Works Department.

7.11 General Guarantee and Warranty

The Developer shall be required, upon completion of the work and prior to acceptance by the City, to furnish the City a written guarantee covering all material and workmanship for a period of 2 years after the date of final acceptance and he shall make all necessary repairs during that period at his own expense, if such repairs are necessitated as the result of furnishing poor materials and/or workmanship. The Developer shall obtain warranties from the Contractors, subcontractors and suppliers of material or equipment where such warranties are required, and shall deliver copies to the City upon completion of the work.

Easement documents, if applicable, shall be filed and recorded with the Pacific County Auditor's office and the documents reviewed by the City prior to project acceptance. Recorded copies shall be furnished to the City.

APPENDIX A

MISCELLANEOUS DETAILS

LIST OF MISCELLANEOUS DETAILS

ROADWAY DETAILS	DRAWING NO.
Major Collector Street Section.....	ST-3
Major Collector Street Intersection.....	ST-3I
Minor Collector Street Section	ST-4
Minor Collector Street Intersection	ST-4I
Local Access Street Section.....	ST-5
Private Access Street Section.....	ST-6
Cul-de-Sacs and Turnarounds.....	ST-CDS
Monument with Case and Cover.....	MON-1
Paved Surface Monument	MON-2
Unpaved Surface Monument	MON-3
Commercial and Single Residence Driveways	DW-1
Cement Concrete Sidewalk.....	SW-1
ADA Sidewalk Ramp Type A	RAMP-A
ADA Sidewalk Ramp Type B.....	RAMP-B
ADA Sidewalk Ramp Type C.....	RAMP-C
Cement Concrete Vertical Curb and Gutter	CG-1
Roadside Drainage	RDR
Pavement Centerline Markings.....	CHAN-1
Pavement Arrow Markings	CHAN-2
Pavement Crosswalk Markings.....	CHAN-3
Street Sign Lettering	SIGN-1
Street Name Signs.....	SIGN-2
Vehicular Control Signs.....	SIGN-3
Mailbox Location.....	ML-1
Utility Locations	UTIL

STORM DRAINAGE DETAILS	DRAWING NO.
Rigid Storm Drain Pipe Trench Section	STOM-1
Flexible Storm Drain Pipe Trench Section	STOM-2
New Ditch Construction	STOM-3
Riprap and Energy Dissipation for Ditch.....	STOM-4
Catch Basin Type 1	CB-1
Catch Basin Type 2.....	CB-2
Catch Basin Type 2 with Flow Restrictor.....	CB-2A
Catch Basin Frame and Grate	CB-3
Catch Basin Inlet Protection	CB-4
Manhole or Catch Basin Type 2 Grade Adjustment Detail	CB-5

Silt Fence EC-1

SANITARY SEWER DETAILS

DRAWING NO.

Typical Precast Manhole..... TPMH
Typical Manhole Plan TMHP
Typical Shallow Precast Manhole TSPMH
Typical Saddle Manhole TSMH
Outside Drop Manhole..... ODMH
Inside Drop Manhole IDMH
Manhole Frame and Cover..... MHFC
Polypropylene Ladder and Manhole Steps PLMHS
Force Main Discharge Manhole..... FMDMH
Sanitary Sewer Trench Section for P.V.C. Pipe SSTSPVCP
Sanitary Sewer Trench Section for D.I. Pipe SSTSDIP
Pressure Line and Force Main Typical Trench Section..... PLFMSTS
Typical Side Sewer Detail (within New Development) TSSD
New Side Sewer Service (within Existing Street Right-of-Way)..... SSD
Private Side Sewer Installation PSSI
Roof Structure for Electrical Enclosure RSEE
Lift Station Electrical Schematic 3 Phase, 277Y/480V Power..... LSES
Air & Vacuum Release Assembly AVRA
Manhole Frame Collar MHCLAR
Service Line Isolation Valve Assembly..... SSIV

WATER DETAILS

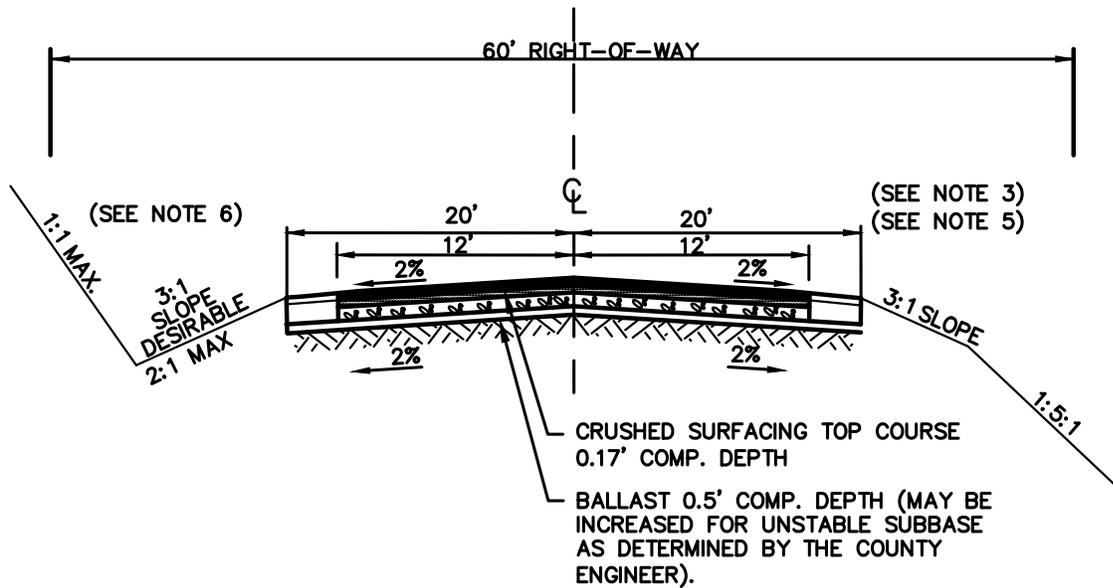
DRAWING NO.

Water Main Trench Section WATR-1
1" & Smaller Water Service WS-1
3/4" Double Water Service WS-1D
2" Water Service WS-2
3/4" to 2" Reduced Pressure Backflow Assembly..... 2RPBA
Fire Hydrant Installation FIRE-1
Fire Hydrant Relocation..... FIRE-2
Valve Box VALV-1
Valve Box Adjustment..... VALV-1A
Water Valve Stem Extension VALV-1B
Combination Air-Vac Release Valve..... VALV-2
End of Main Line Blowoff..... VALV-3A
Side Tap Blowoff VALV-3B
Cut-In Connection..... CIC
Compound Meter Installation CMI

MISCELLANEOUS DETAILS

Sampling Station..... SS
Thrust BlockingTBLOCK
Thrust Loads TLOAD
Thrust Restraint for Ductile Iron Pipe TRDIP
Typical Utility Crossing.....TUC
Wet Tap ConnectionWTC

ROADWAY DETAILS



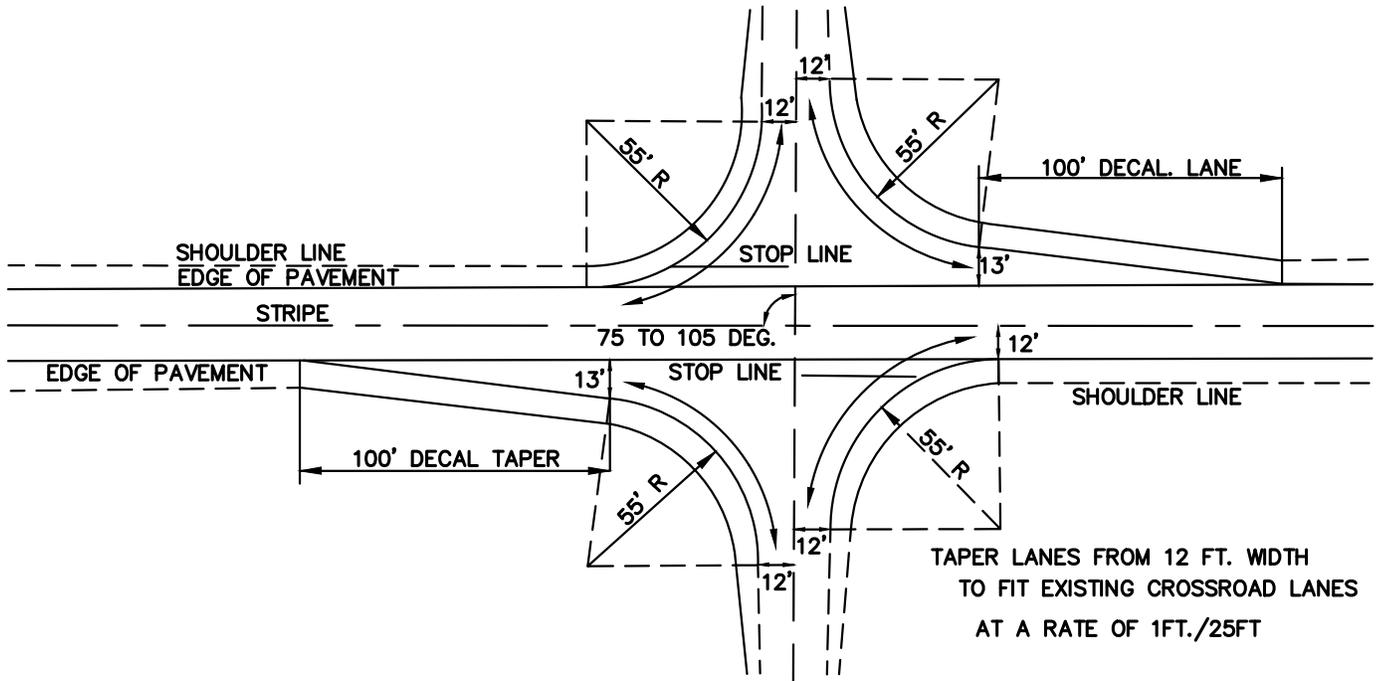
	FLAT	ROLLING	MOUNTAINOUS
CURVATURE (MAX. DEG.)	6.75	6.75	11.25
GRADIENT (MAX %)	6	7	10
MINIMUM RADIUS (FT.)	850	850	510
DESIGN SPEED (M.P.H.)	50	50	40
STOPPING DISTANCE (FT.)	375	375	275

NEW BRIDGES	
CLEAR WIDTH (FT)	28
VERTICAL CLEARANCE (FT)	16.5
DESIGN LOAD	AASHTO HS20-44

NOTES:

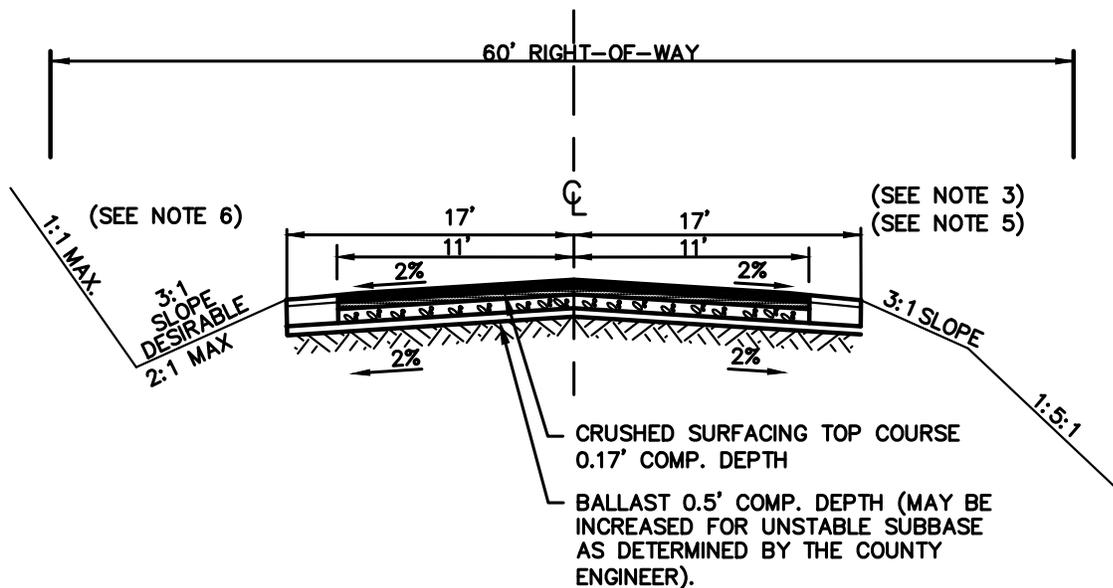
- MAY BE STEEPER FOR SHORTER DISTANCES.
- ALL BRIDGE CURBS TO MEET STATE STANDARDS. SIDEWALK TO BE DETERMINED ON INDIVIDUAL BASIS.
- FOR GUARDRAIL INSTALLATION, WIDTH OF SHOULDER TO BE AN ADDITIONAL 2 FEET.
- CLEARING, GRADING & GRUBBING: TO EXTENT NECESSARY FOR CONSTRUCTION AND PROPER SIGHT DISTANCE AS DETERMINED BY THE COUNTY ENGINEER.
- SURFACING TYPE: ASPHALT CONCRETE CLASS B. (DEPTH OF ASPHALT AND DEPTH OF ROCK TO BE DETERMINED BY DESIGN AND CONDITIONS.
- PARTICULAR SOIL TYPES MAY REQUIRE MORE OR LESS SLOPE.

CITY OF SOUTH BEND			
MAJOR COLLECTOR STREET SECTION			
APPROVED:		DWG. NO.	
PUBLIC WORKS DEPT.		DATE	
DATE:	DRWN:	CHKD:	SCALE:
04/2020	T.R.G.	D.J.M.	NO SCALE
		ST-3	



STANDARD DESIGN
A.D.T. ABOVE 2,000

CITY OF SOUTH BEND			
MAJOR COLLECTOR STREET INTERSECTION			
APPROVED:			DWG. NO.
PUBLIC WORKS DEPT.			ST-31
DATE:		DRWN:	CHKD:
04/2020	T.R.G.	D.J.M.	SCALE:
			NO SCALE



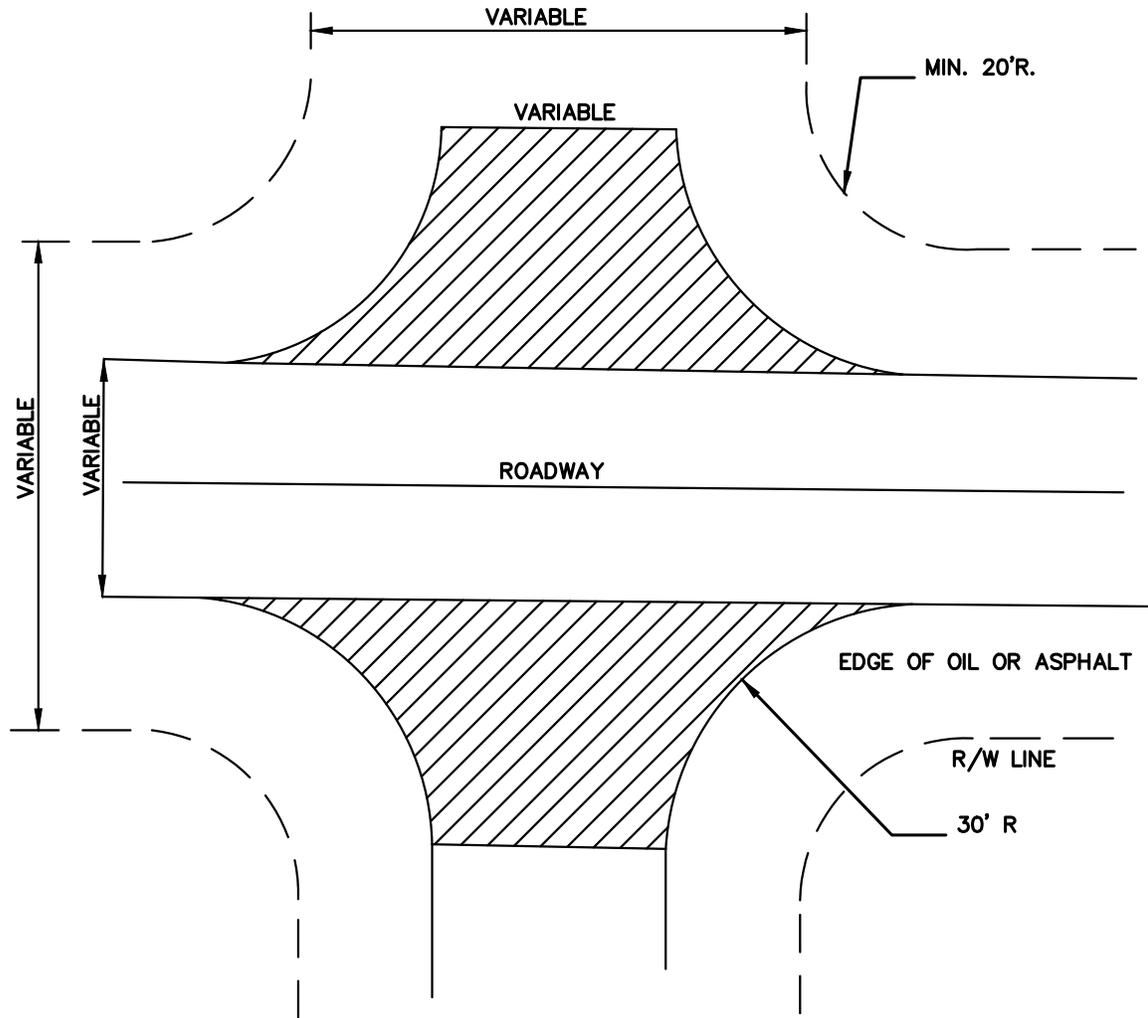
	FLAT	ROLLING	MOUNTAINOUS
CURVATURE (MAX. DEG.)	7.5	12.5	23.0
GRADIENT (MAX %)	6	8	10
MINIMUM RADIUS (FT.)	760	460	250
DESIGN SPEED (M.P.H.)	50	40	30
STOPPING DISTANCE (FT.)	375	275	200

NEW BRIDGES	
CLEAR WIDTH (FT.)	28
VERTICAL CLEARANCE (FT.)	16.5
DESIGN LOAD	AASHTO HS20-44

NOTES:

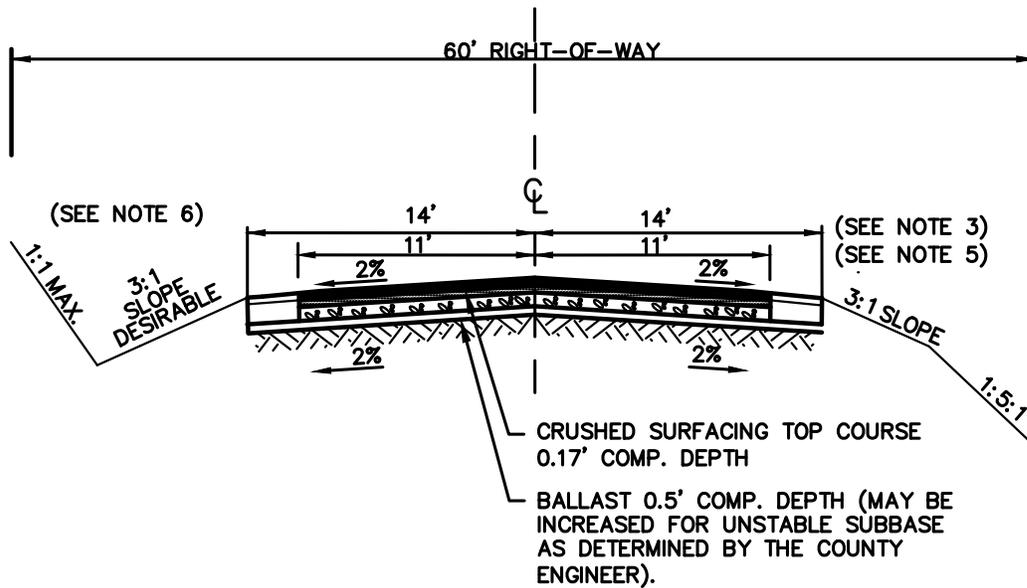
- MAY BE STEEPER FOR SHORTER DISTANCES.
- ALL BRIDGE CURBS TO MEET STATE STANDARDS. SIDEWALK TO BE DETERMINED ON INDIVIDUAL BASIS.
- FOR GUARDRAIL INSTALLATION, WIDTH OF SHOULDER TO BE AN ADDITIONAL 2 FEET.
- CLEARING, GRADING & GRUBBING: TO EXTENT NECESSARY FOR CONSTRUCTION AND PROPER SIGHT DISTANCE AS DETERMINED BY THE COUNTY ENGINEER.
- SURFACING TYPE: ASPHALT CONCRETE CLASS B. (DEPTH OF ASPHALT AND DEPTH OF ROCK TO BE DETERMINED BY DESIGN AND CONDITIONS.
- PARTICULAR SOIL TYPES MAY REQUIRE A LESSER OR GREATER SLOPE.

CITY OF SOUTH BEND			
MINOR COLLECTOR STREET SECTION			
APPROVED:			DWG. NO.
PUBLIC WORKS DEPT.			ST-4
DATE:	DRWN:	CHKD:	SCALE:
04/2020	T.R.G.	D.J.M.	NO SCALE



STANDARD DESIGN
A.D.T. BELOW 2,000

CITY OF SOUTH BEND			
MINOR COLLECTOR STREET INTERSECTION			
APPROVED:			DWG. NO.
PUBLIC WORKS DEPT.			ST-41
DATE:		DRWN:	CHKD:
04/2020	T.R.G.	D.J.M.	SCALE:
			NO SCALE



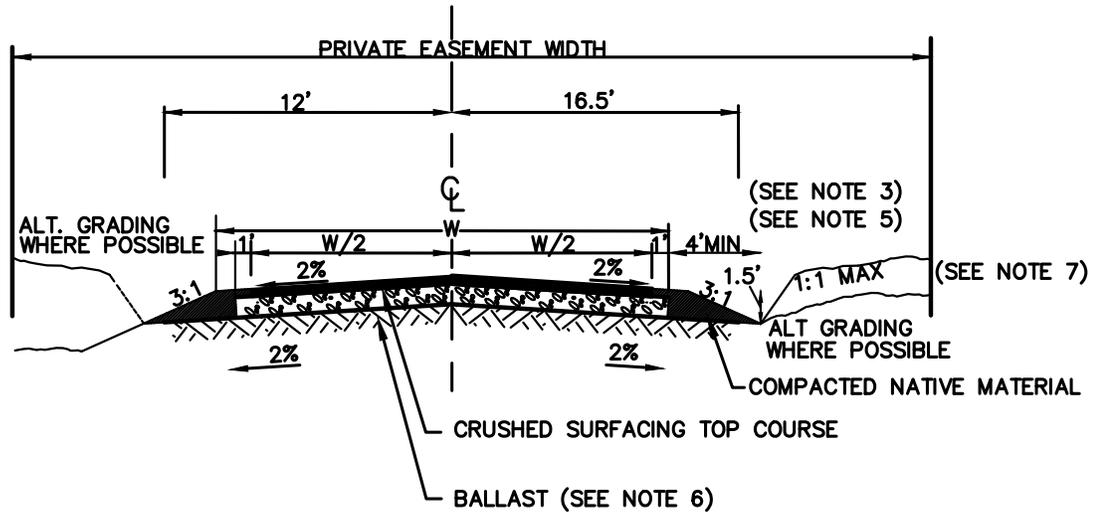
	FLAT	ROLLING	MOUNTAINOUS
CURVATURE (MAX. DEG.)	8.25	13.25	25.00
GRADIENT (MAX %)	7	9	12
MINIMUM RADIUS (FT.)	695	430	230
DESIGN SPEED (M.P.H.)	50	40	30
STOPPING DISTANCE (FT.)	375	275	200

NEW BRIDGES	
CLEAR WIDTH (FT.)	28
VERTICAL CLEARANCE (FT.)	16.5
DESIGN LOAD	AASHTO HS20-44

NOTE

- MAY BE STEEPER FOR SHORTER DISTANCES.
- ALL BRIDGE CURBS TO MEET STATE STANDARDS. SIDEWALK TO BE DETERMINED ON INDIVIDUAL BASIS.
- FOR GUARDRAIL INSTALLATION, WIDTH OF SHOULDER TO BE AN ADDITIONAL 2 FEET.
- CLEARING, GRADING & GRUBBING: TO EXTENT NECESSARY FOR CONSTRUCTION AND PROPER SIGHT DISTANCE AS DETERMINED BY THE COUNTY ENGINEER.
- SURFACING TYPE: ASPHALT CONCRETE CLASS B. (DEPTH OF ASPHALT AND DEPTH OF ROCK TO BE DETERMINED BY DESIGN AND CONDITIONS.
- SOIL TYPES MAY REQUIRE MORE OR LESS SLOPE.

CITY OF SOUTH BEND			
LOCAL ACCESS STREET SECTION			
APPROVED:		DWG. NO.	
PUBLIC WORKS DEPT.		DATE	
DATE:	DRWN:	CHKD:	SCALE:
04/2020	T.R.G.	D.J.M.	NO SCALE



PROPERTY USE	DWELLING UNITS
SINGLE FAMILY	2-4
DUPLEX	5-16
MULTI-FAMILY	1-8

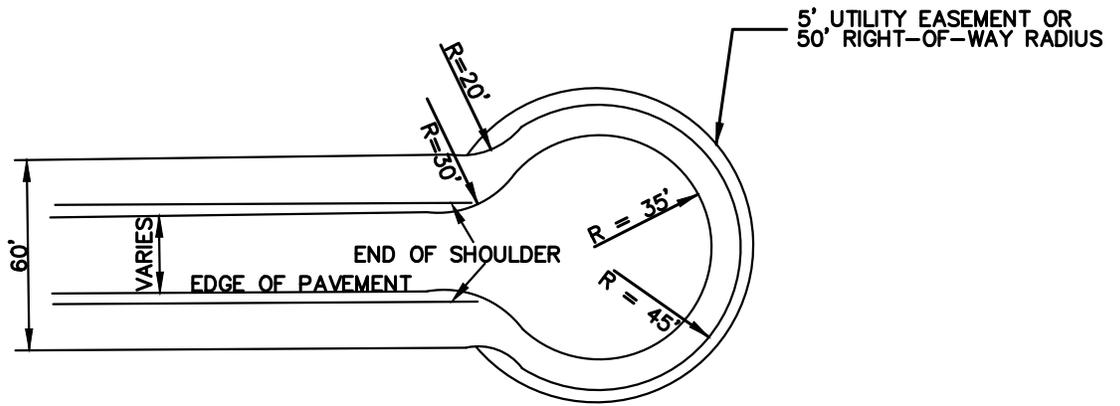
WIDTH (W)	TOP COURSE	BALLAST
12'	COUNTY ENGINEER'S EVALUATION	
12'	0.17'	0.50'
20'	0.17'	0.50'

NOTES

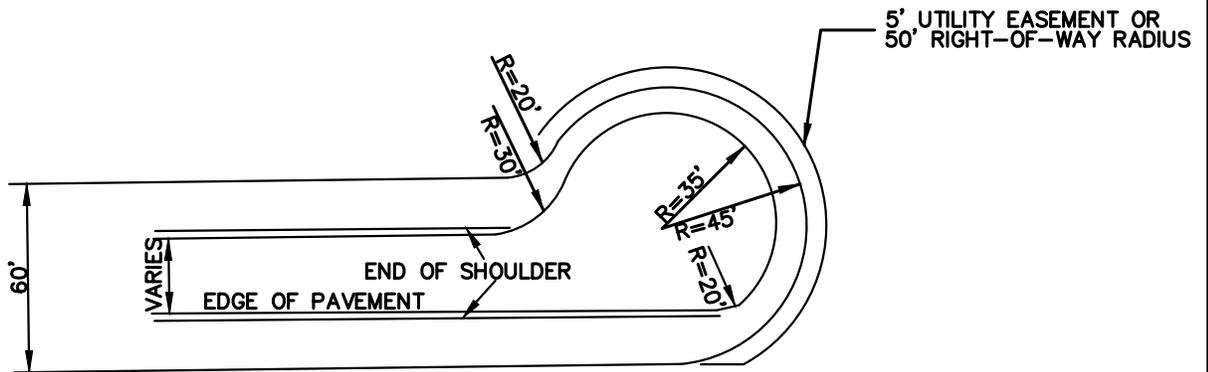
1. RIGHT-OF-WAY AS REQUIRED TO CONSTRUCT & MAINTAIN ROADWAY FACILITY, PLUS PROVISIONS FOR ANY UTILITIES. (UNLESS UTILITIES PROVIDED FOR BY SEPARATE EASEMENT OUTSIDE ROADWAY EASEMENT). TO SERVE MAXIMUM DENSITY PERMITTED BY ZONING OR COMPREHENSIVE PLAN BUT NOT LESS THAN FORTY (40) FEET)
2. CLEARING, GRADING & GRUBBING: TO EXTENT NECESSARY FOR CONSTRUCTION AND PROPER SIGHT DISTANCE.
3. CROSS SLOPE: MAY BE SLOPED AT 2% TO CUT DITCH WHERE 12' WIDE ROADWAY PERMITTED.
4. WHEN W = 12' PROVIDE VEHICLE PASSING TURNOUTS AT 200' INTERVALS.
5. DITCHING: AS REQUIRED TO PROVIDE TURNOUTS AT 200' INTERVALS.
6. BALLAST THICKNESS MAY BE INCREASED FOR UNSTABLE SUB-BASE AS DETERMINED BY THE COUNTY ENGINEER
7. SOIL TYPE MAY REQUIRE MORE OR LESS SLOPE.
8. PRIVATE ROADS WILL NOT BE MAINTAINED BY PACIFIC COUNTY.

	FLAT	ROLLING	MOUNTAINOUS
CURVATURE (MAX. DEG.)	12.5	19	29
GRADIENT (MAX%)	7	10	12
STOPPING DISTANCE (FT.)	375	275	200

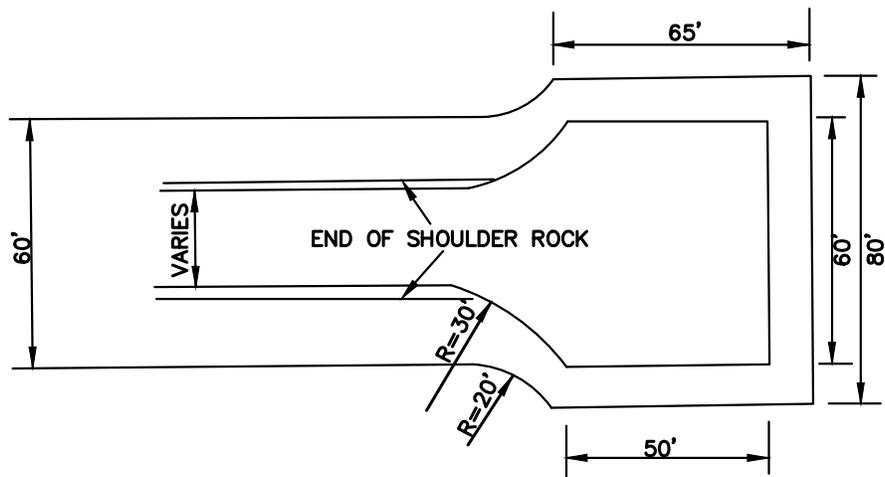
CITY OF SOUTH BEND			
PRIVATE ACCESS STREET SECTION			
APPROVED:			DWG. NO.
PUBLIC WORKS DEPT.			ST-6
DATE:	DRWN:	CHKD:	SCALE:
04/2020	T.R.G.	D.J.M.	NO SCALE



STANDARD CUL-DE-SAC

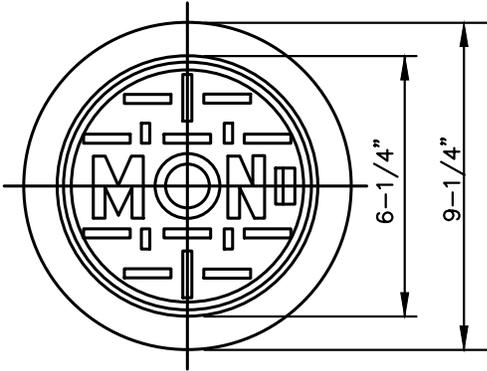


ALTERNATE CUL-DE-SAC



STANDARD TURNAROUND

CITY OF SOUTH BEND			
CUL-DE-SACS AND TURNAROUNDS			
APPROVED:			DWG. NO.
PUBLIC WORKS DEPT.			ST-CDS
DATE:	DRWN:	CHKD:	SCALE:
04/2020	T.R.G.	D.J.M.	NO SCALE

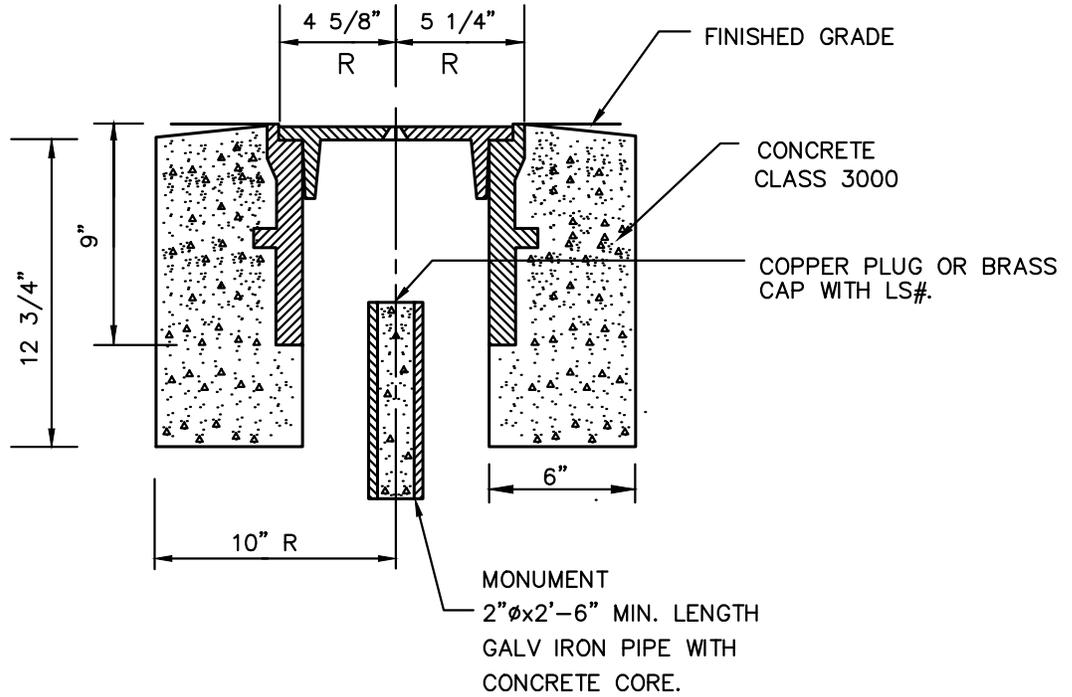


MONUMENT COVER

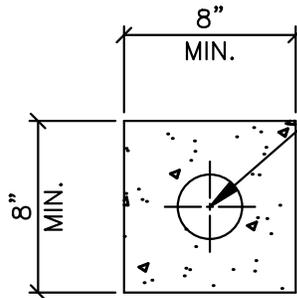
GENERAL NOTES:

1. CASTINGS SHALL BE GRAY IRON ASTM A 48, AASHTO M105, CLASS 30
2. MACHINE BEARING FACES OF COVER AND CASE TO INSURE POSITIVE FIT.
3. APPROXIMATE WEIGHTS, STANDARDS TO INSURE POSITIVE FIT.
4. CONCRETE SHALL BE CLASS 400

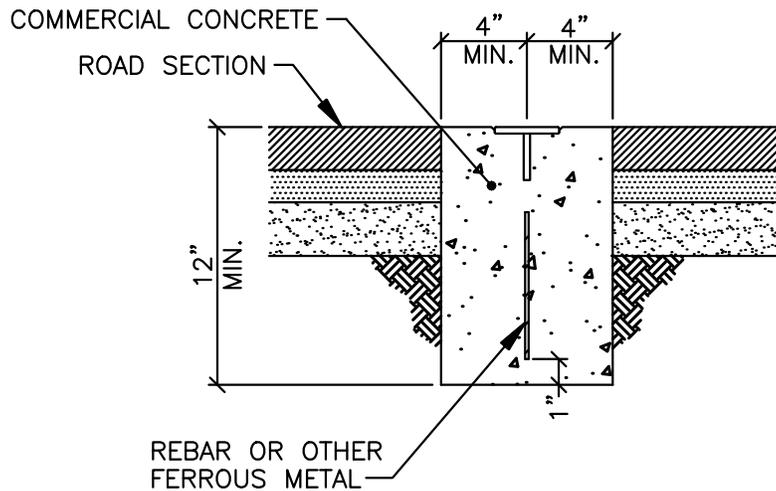
CASE	60 lbs
COVER	19 lbs
TOTAL	79 lbs
5. MONUMENT POSITION SHALL BE SET BY A PROFESSIONAL LAND SURVEYOR LICENSED BY THE STATE OF WASHINGTON WHOSE CERTIFICATE NUMBER SHALL BE STAMPED ON THE CAP.
6. FOR ADDITIONAL REQUIREMENTS, SEE SECTION 5.2 OF THE PUBLIC WORKS STANDARDS.



CITY OF SOUTH BEND			
MONUMENT WITH CASE AND COVER			
APPROVED:			DWG. NO.
PUBLIC WORKS DEPT.			MON-1
DATE:	DRWN:	CHKD:	SCALE:
04/2020	T.R.G.	D.J.M.	NO SCALE



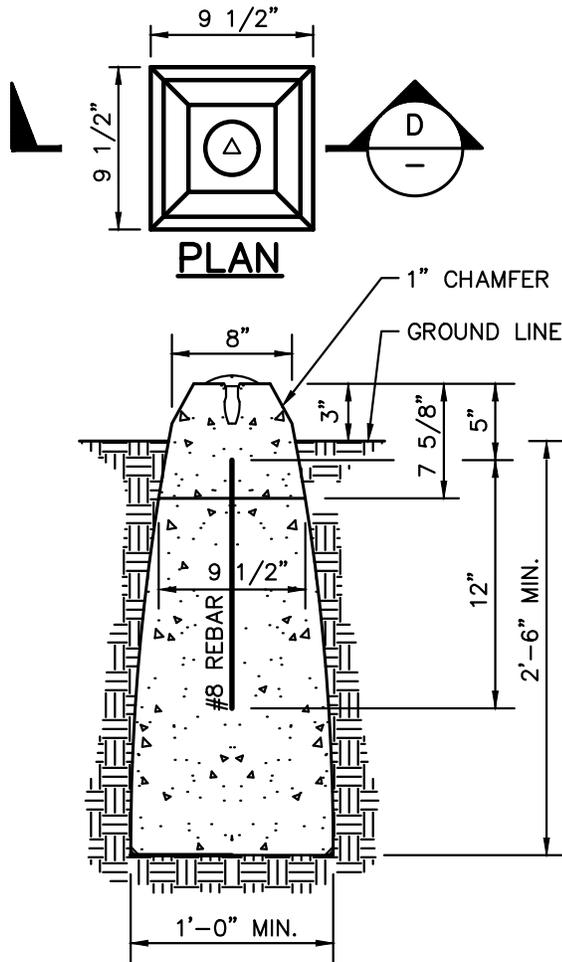
POINT SHALL BE DRILLED TO A DEPTH OF 3/16" MIN. (TOP OF CAP SHALL BE FLUSH W/ CONCRETE AND ASPHALT SURFACE)



GENERAL NOTES:

1. THIS MONUMENT TO BE USED PRIMARILY ON BITUMINOUS OR ASPHALT CONCRETE PAVEMENT FOR USE PRIMARILY IN SUBDIVISIONS AND MINOR ARTERIALS.
2. CONCRETE BASE DIMENSIONS SHOWN ARE MIN.. CONCRETE BASE NEED NOT BE FORMED.
3. CAP SHALL BE BRASS, ALUMINUM OR OTHER NON-FERROUS METAL, MIN. 2" DIA.
4. CONCRETE TO BE PLACED ON A FIRM AND UNYIELDING FOUNDATION.
5. MONUMENT POSITION SHALL BE SET BY A PROFESSIONAL LAND SURVEYOR LICENSED BY THE STATE OF WASHINGTON WHOSE CERTIFICATE NUMBER SHALL BE STAMPED ON CAP.
6. SUFFICIENT FERROUS METAL SHALL BE PLACED IN CONCRETE TO ALLOW DETECTION BY A METAL DETECTOR.
7. FOR ADDITIONAL REQUIREMENTS, SEE SECTION 5.2 OF THE PUBLIC WORKS STANDARDS.

CITY OF SOUTH BEND			
PAVED SURFACE MONUMENT			
APPROVED:			DWG. NO.
PUBLIC WORKS DEPT.			MON-2
DATE:		CHKD:	SCALE:
04/2020	DRWN:	D.J.M.	NO SCALE
	T.R.G.		



**GENERAL INSTALLATION
SECTION D**

GENERAL NOTES:

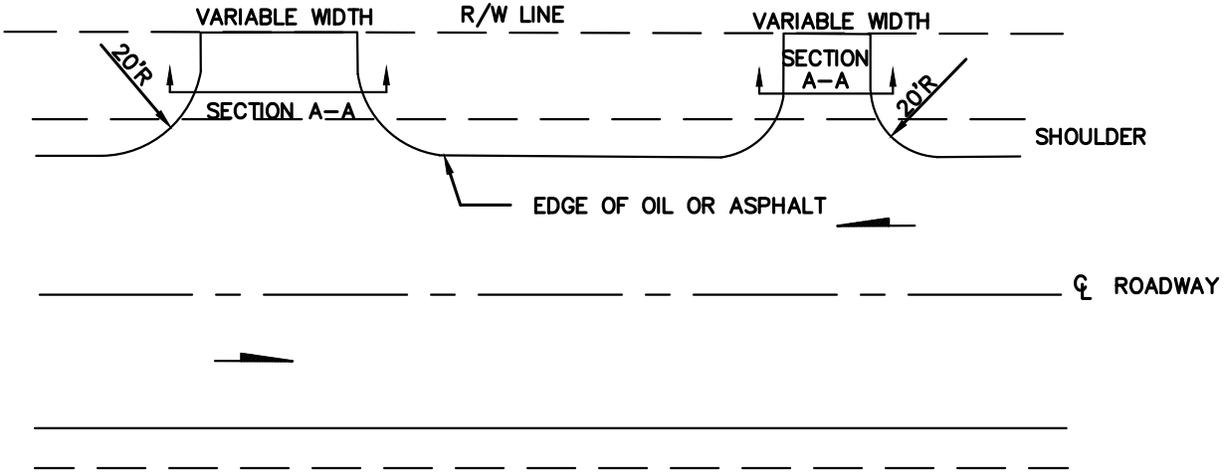
1. THE CAP SHALL BE OF A NON-FERROUS MATERIAL AND SHALL BE RIBBED TYPE TO PREVENT DISLODGING.
2. CONCRETE SHALL BE CLASS 4000.
3. THE HOLE SHALL BE 2.5' MIN. IN DEPTH OR 0.5' BELOW THE DEEPEST RECORDED FROST LINE. ALL LOOSE MATERIAL SHALL BE REMOVED FROM THE BOTTOM OF THE HOLE SO THAT THE CONCRETE IS ON FIRM, UNDISTURBED EARTH.
4. THE TOP OF THE CONCRETE SHALL BE TROWLED SMOOTH AND THE BRASS DISC SET IN THE CENTER WITH ITS TOP EDGE FLUSH AND LEVEL.
5. LS# SHALL BE STAMPED ON CAP.
6. FOR ADDITIONAL REQUIREMENTS, SEE SECTION 5.2 OF THE PUBLIC WORKS STANDARDS.

CITY OF SOUTH BEND			
UNPAVED SURFACE MONUMENT			
APPROVED:			DWG. NO.
PUBLIC WORKS DEPT.			MON-3
DATE:	DRWN:	CHKD:	SCALE:
04/2020	T.R.G.	D.J.M.	NO SCALE

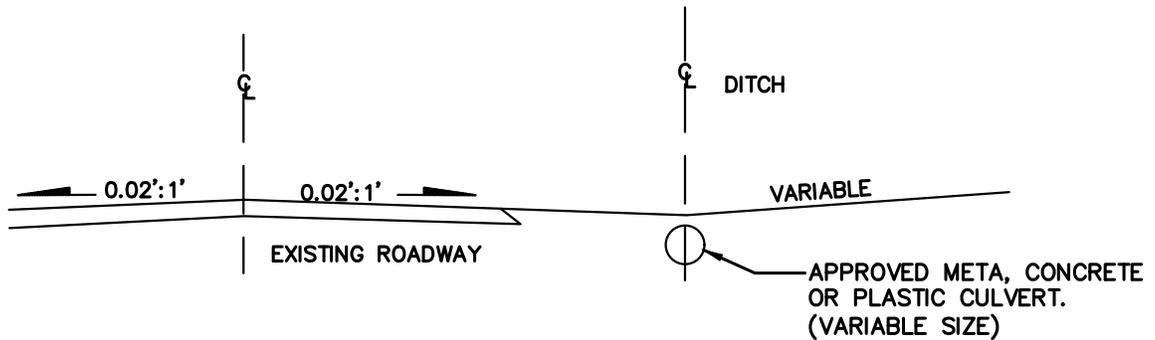
m:\south bend\20235.00_standard construction details and engineering standards\south bend\Details\Roadway Details\ST-COM&SINGLE-RES-DRIVEWAY-DESIGNS.dwg, 6/16/2020 7:16 AM, TULLY GENIS

COMMERCIAL

SINGLE RESIDENCE



	PIPE LENGTH (SEE NOTE)	PIPE DIAMETER
SINGLE	20' MIN.	12" MIN.
COMMERCIAL	40' MIN.	12" MIN.



DRIVEWAY CULVERT END TREATMENT

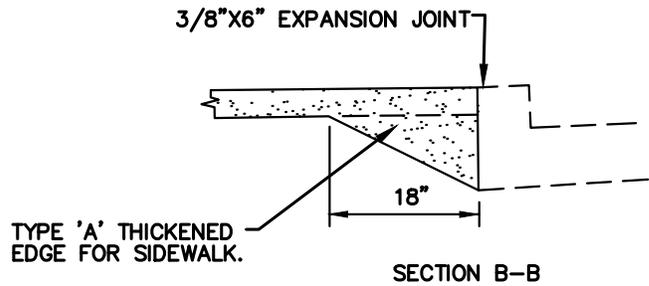
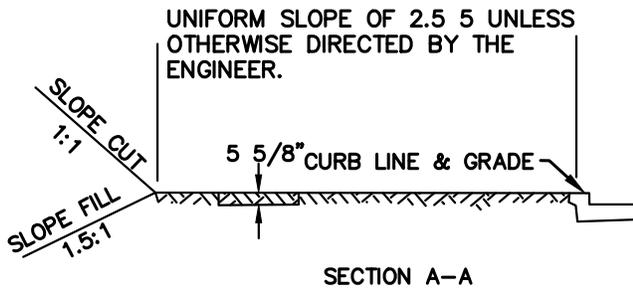
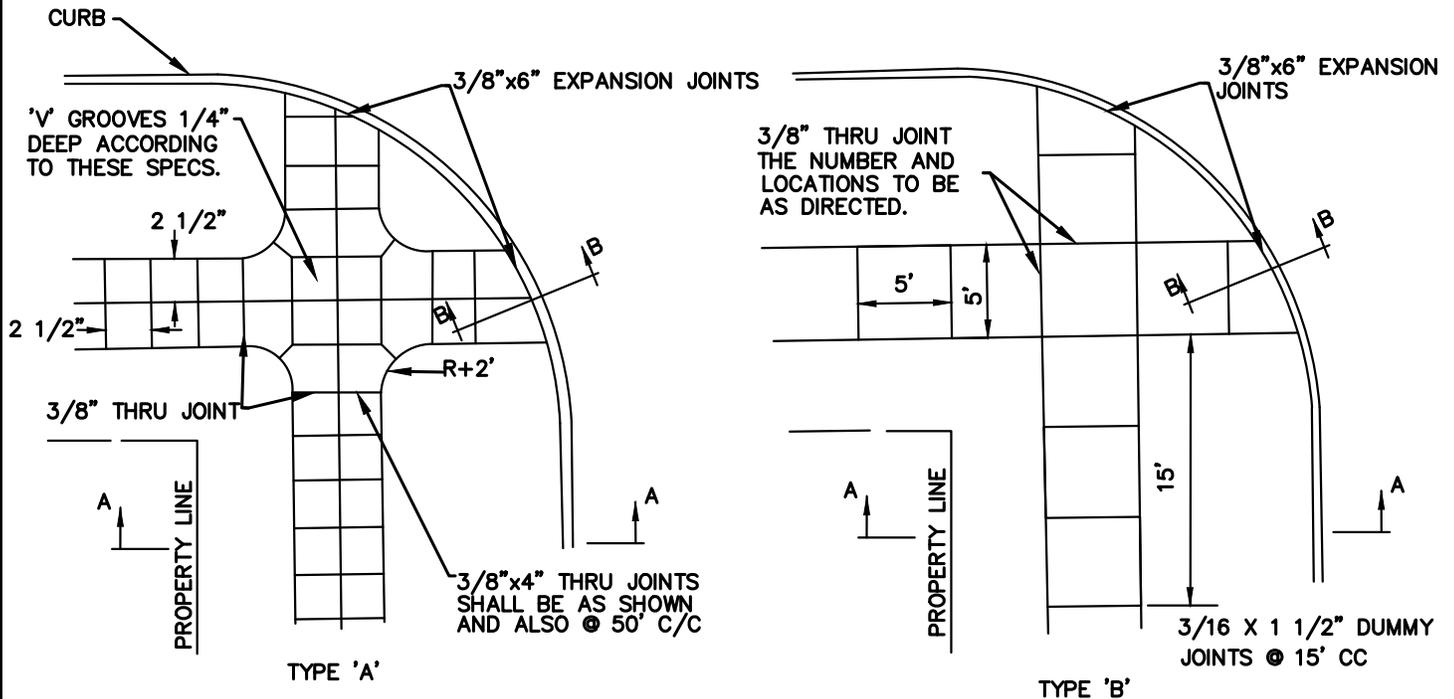


SECTION A-A

NOTE: FOR APPROACH AND CULVERT INSTALLATION ON EXISTING ROADWAYS, THE APPROACH RADIUS AND CULVERT LENGTH SHALL BE DETERMINED ON AN INDIVIDUAL BASIS BY FIELD INSPECTION, AND THE ABOVE DESIGN STANDARDS WILL NOT APPLY.

CITY OF SOUTH BEND			
COMMERCIAL AND SINGLE RESIDENCE DRIVEWAYS			
APPROVED:			DWG. NO.
PUBLIC WORKS DEPT.			DW-1
DATE:	DRWN:	CHKD:	SCALE:
04/2020	T.R.G.	D.J.M.	NO SCALE

m:\south bend\20235.00_standard construction details and engineering standards\south bend\Details\Roadway Details\SW-1 CEMENT CONCRETE SIDEWALK.dwg, 6/16/2020 7:16 AM, TULLY GENIS



GENERAL NOTES

JOINTS THRU & DUMMY JOINTS SHALL BE AS SHOWN ABOVE. THRU JOINTS SHALL ALSO BE PLACED IN THE SIDEWALK SECTION AT DRIVEWAY & ALLEY RETURNS AS SHOWN ON STANDARD PLANS. ALL JOINTS SHALL BE CLEAN & EDGED WITH AN EDGER HAVING A 1/4" RADIUS. JOINTS SHALL BE FLUSH WITH THE FINISHED SURFACE.

NOTE:
ALL UTILITY POLES, METER BOXES, ETC, IN SIDEWALK AREA, SHALL HAVE 3/16" JOINT MATERIAL (FULL DEPTH) PLACED AROUND THEM BEFORE PLACING CONCRETE.

FARMS

SHALL BE EITHER WOOD OR STILL AND SHALL MEET ALL REQUIREMENTS OF THESE SPECIFICATIONS.

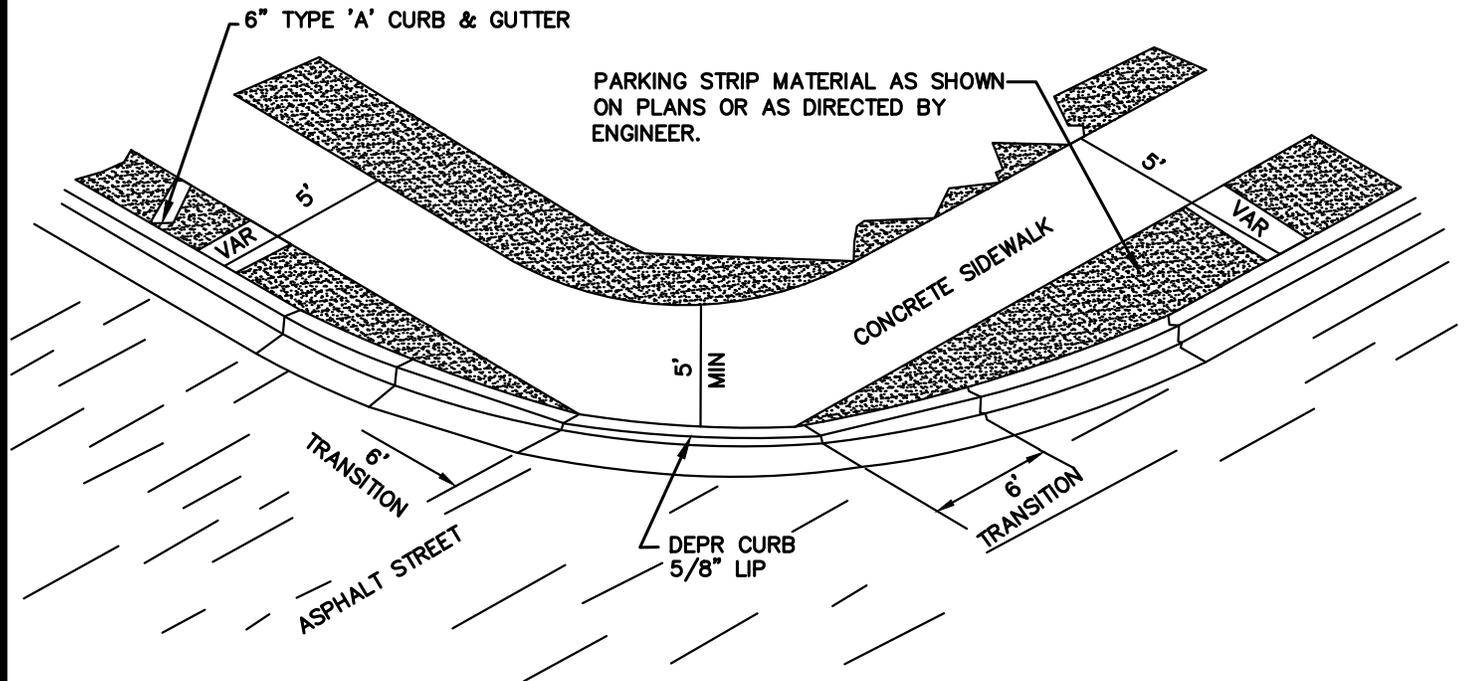
CONCRETE

SHALL BE CLASS 5(1 1/2) OR 5 (3/4)

PROCEDURES

FOR FURTHER REQUIREMENTS FOR FARMS, FORM SETTING, PLACING, FINISHING, & CURING SHALL BE AS OUTLINED IN THESE SPECIFICATIONS.

CITY OF SOUTH BEND			
CEMENT CONCRETE SIDEWALK			
APPROVED:		DWG. NO.	
PUBLIC WORKS DEPT.		DATE	
DATE:	DRWN:	CHKD:	SCALE:
04/2020	T.R.G.	D.J.M.	NO SCALE



CITY OF SOUTH BEND

ADA SIDEWALK RAMP
TYPE A

APPROVED:

DWG. NO.

PUBLIC WORKS DEPT.

DATE

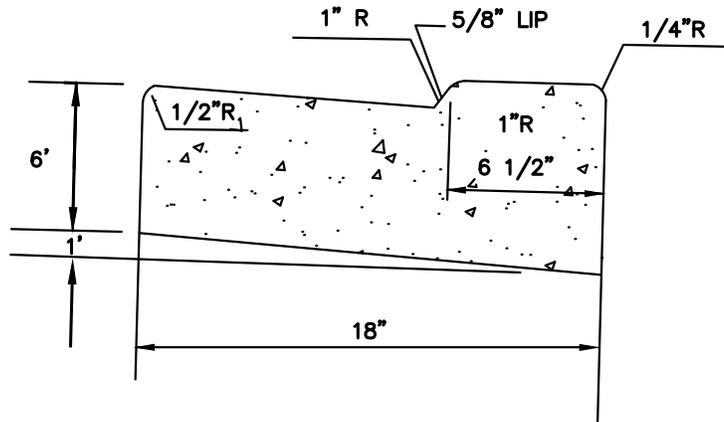
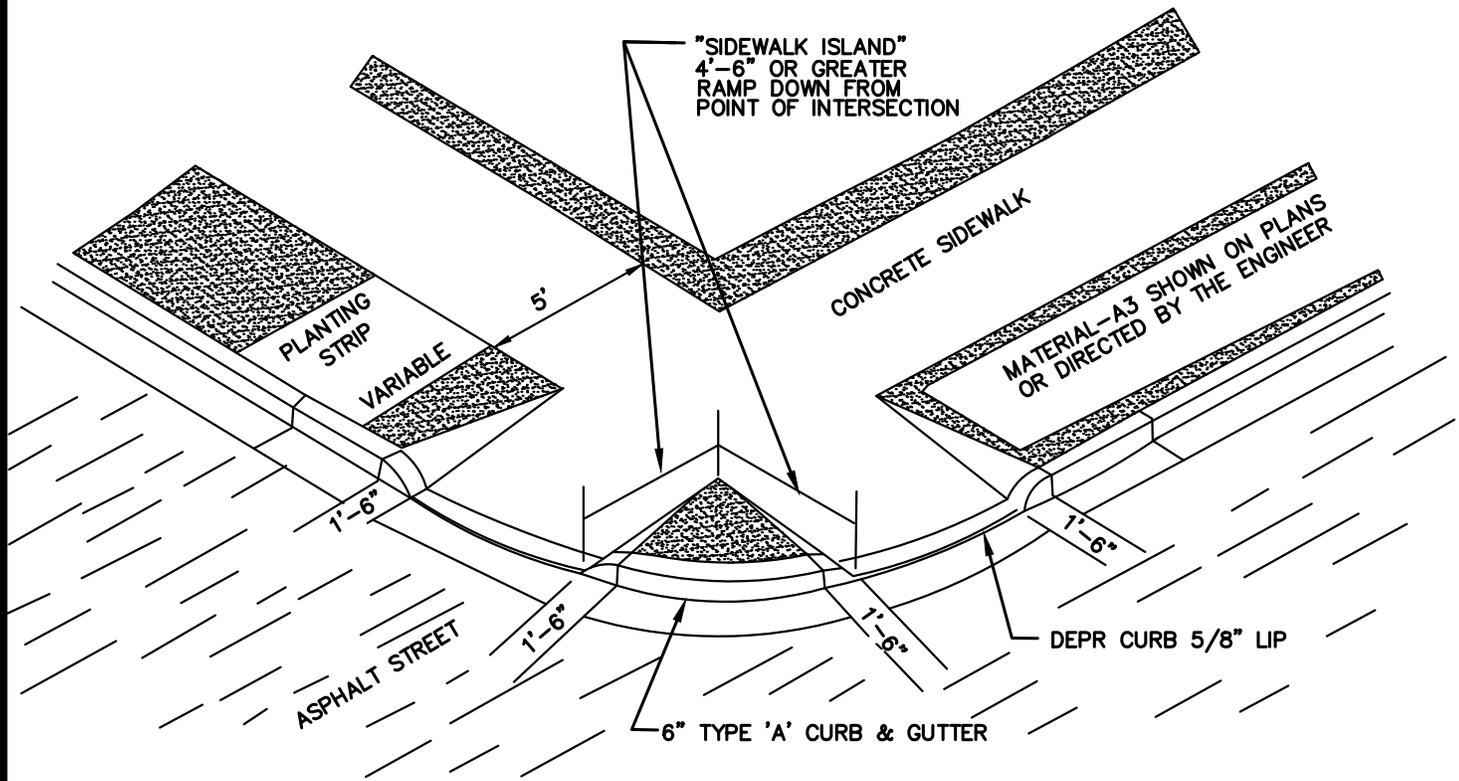
RAMP-A

DATE:
04/2020

DRWN:
T.R.G.

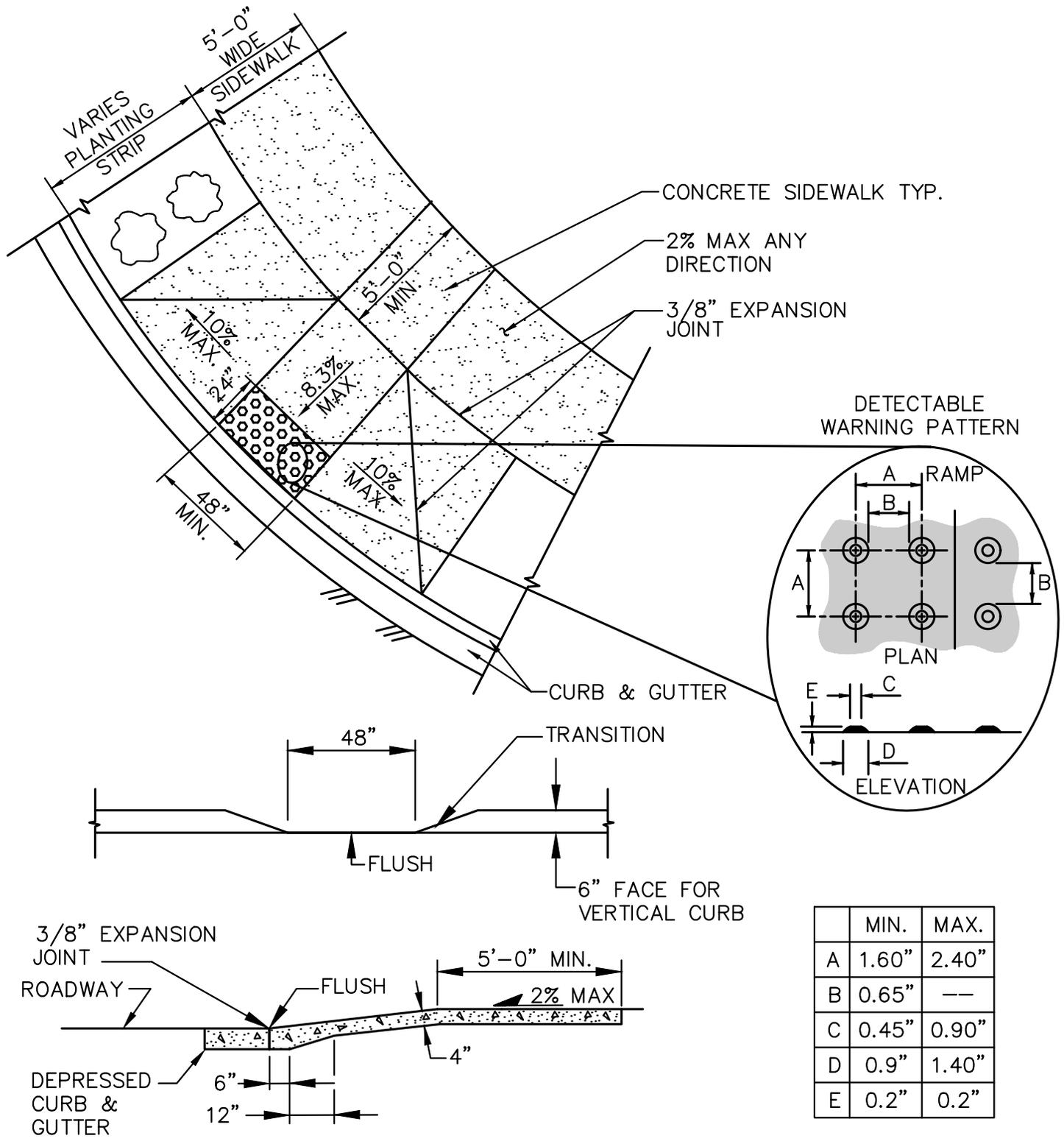
CHKD:
D.J.M.

SCALE:
NO SCALE



**TYPICAL SECTION
DEPRESSED CURB & GUTTER**

CITY OF SOUTH BEND			
ADA SIDEWALK RAMP TYPE B			
APPROVED:			DWG. NO.
PUBLIC WORKS DEPT.			RAMP-B
DATE:	DRWN:	CHKD:	SCALE:
04/2020	T.R.G.	D.J.M.	NO SCALE



GENERAL NOTES:

1. WHEELCHAIR RAMPS SHALL BE PROVIDED AT ALL INTERSECTIONS SEE SECTION 4.20.E. FOR ADDITIONAL REQUIREMENTS.
2. PRODUCT AND METHOD OF INSTALLATION SHALL BE APPROVED BY THE CITY AND MEET CURRENT WSDOT AND MUTCD.
3. PATTERN AREA SHALL BE YELLOW IN COLOR.

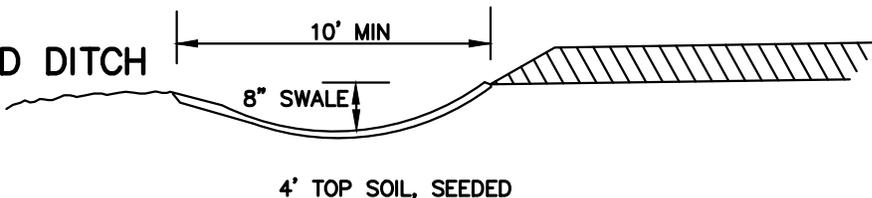
CITY OF SOUTH BEND			
ADA SIDEWALK RAMP TYPE C			
APPROVED:			DWG. NO.
PUBLIC WORKS DEPT.			RAMP-C
DATE:	DRWN:	CHKD:	SCALE:
04/2020	T.R.G.	D.J.M.	NO SCALE

NOTE: SOIL TYPES MAY REQUIRE MORE LESS SLOPE THAN SHOWN.

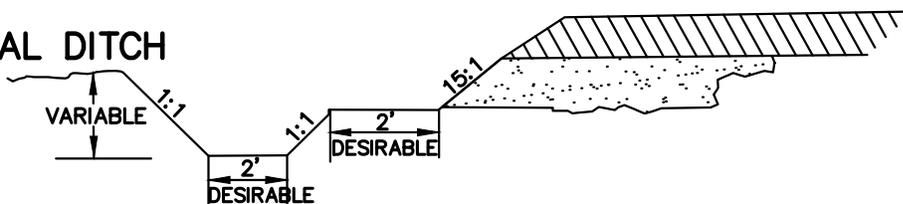
STANDARD



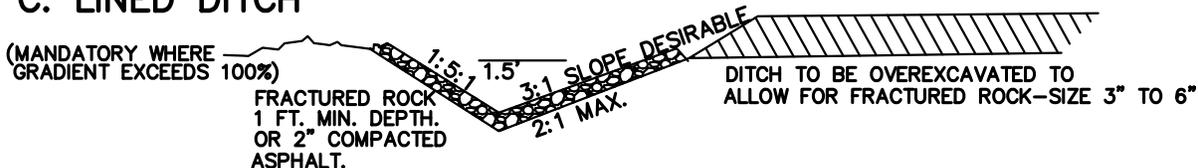
A. ROLLED DITCH



B. SPECIAL DITCH



C. LINED DITCH



D. CATCH BASIN: DESIGN SHALL BE OF THE TYPE SPECIFIED BY THE ENGINEER IN CONJUNCTION WITH DESIGN TYPES I, IA, II, III, IN THE MOST CURRENT EDITION OF THE STATE OF WASHINGTON STANDARD PLANS FOR ROAD AND BRIDGE CONSTRUCTION.

MAXIMUM LENGTH OF CULVERT WITHOUT CLEANOUT OPENING OR SPACING BETWEEN CATCH BASINS SHALL NOT EXCEED SUGGESTED CATCH BASIN SPACING AND PERCENT ROADWAY GRADE:

0.5%	- 1.5%	150'
1.5%	- 3.0%	200'
3.0%	- 8.0%	300'
8.0%	- 12.0%	200'
12.0%	- 20.0%	150'

■ CROSS-PIPES APPROVED FOR USE IN CONJUNCTION WITH THESE DESIGN STANDARDS.

1. APPROVED METAL
2. APPROVED PLASTIC
3. APPROVED CONCRETE

*E. ROADWAY CROSS PIPES: 18" DIAM. DESIRABLE MIN., ACTUAL SIZE TO BE DETERMINED BY ENGINEER. STEEL CROSS PIPES MUST BE TREATED WITH TREATMENT II.

CITY OF SOUTH BEND

ROADSIDE DRAINAGE

APPROVED:

DWG. NO.

PUBLIC WORKS DEPT.

DATE

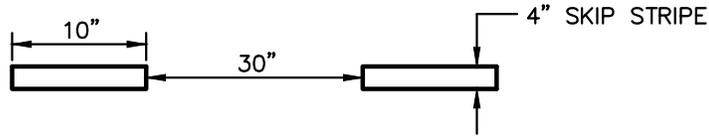
RDR

DATE:
04/2020

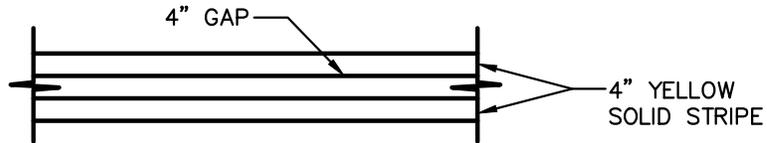
DRWN:
T.R.G.

CHKD:
D.J.M.

SCALE:
NO SCALE



SKIP CENTERLINE STRIPE

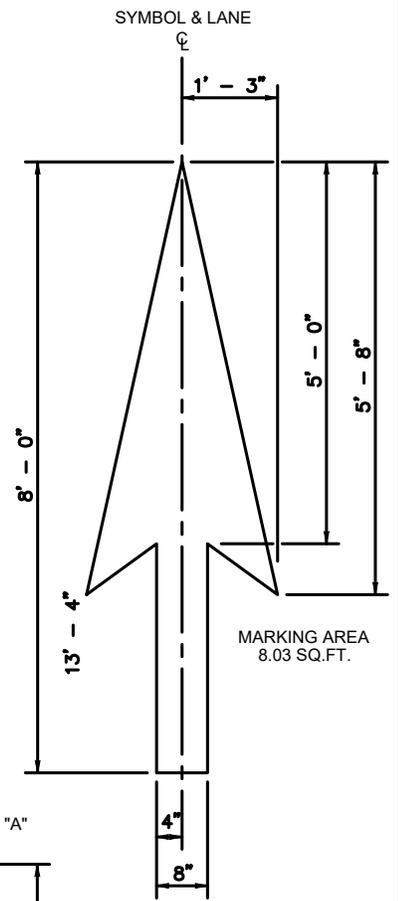
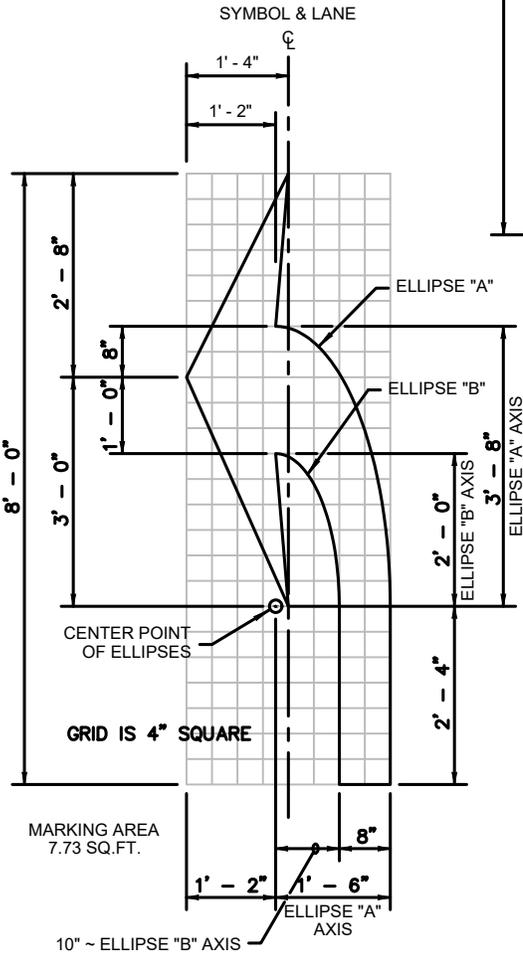
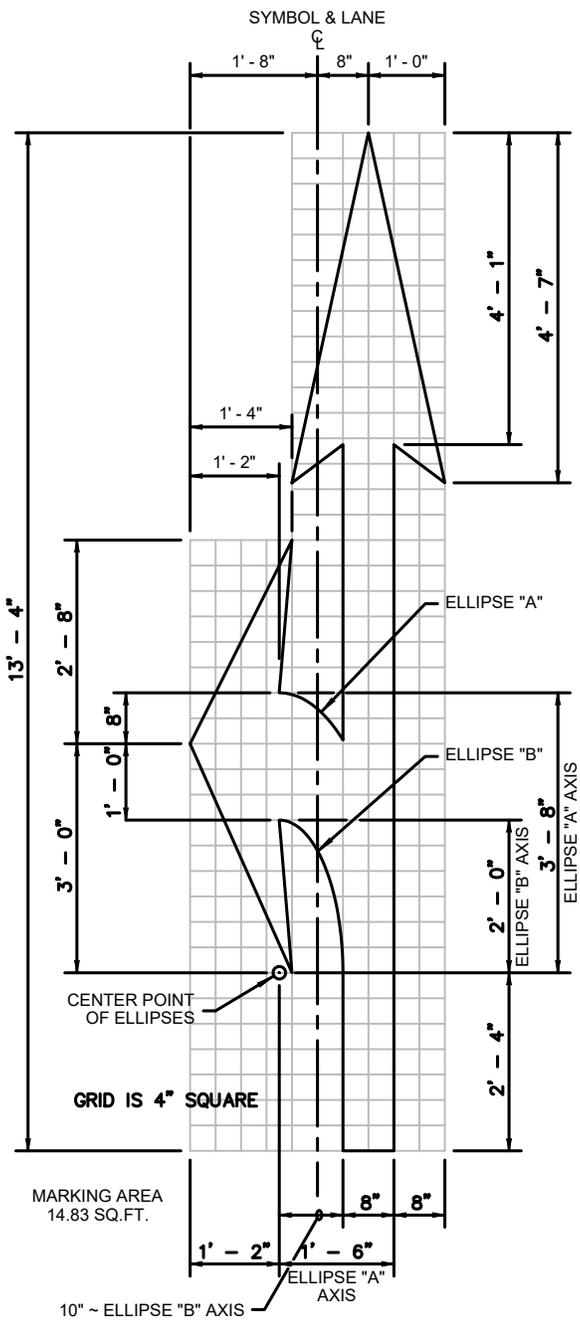


DOUBLE YELLOW CENTERLINE STRIPE

GENERAL NOTES:

1. FOR ADDITIONAL REQUIREMENTS, SEE SECTION 4.5 OF THE PUBLIC WORKS STANDARDS.
2. PAVEMENT MARKINGS SHALL BE INSTALLED WITH HOT APPLIED THERMOPLASTIC ON NEW ASPHALT, OVERLAYS AND ASPHALT IN GOOD CONDITION, AS DETERMINED BY THE CITY. WHERE AUTHORIZED, PREFORMED THERMOPLASTIC MATERIAL SHALL BE PREMARK WITH VIZIGRIP MADE BY FLINT TRADING INC. AND BE APPLIED USING PREMARK SEALER, OR CITY APPROVED EQUAL. ALL MATERIAL SHALL BE 125 MIL THICKNESS AND APPLIED USING APPROPRIATE INSTALLATION PROCEDURES ACCORDING TO THE MANUFACTURER.

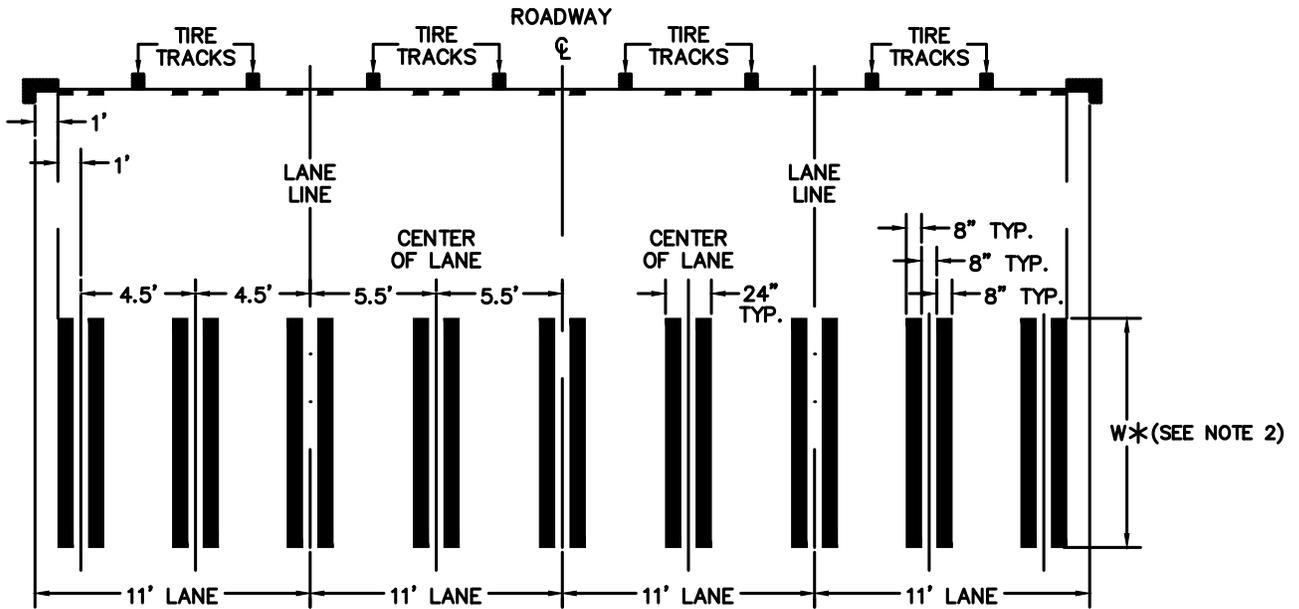
CITY OF SOUTH BEND			
PAVEMENT CENTERLINE MARKINGS			
APPROVED:			DWG. NO.
PUBLIC WORKS DEPT.			CHAN-1
DATE:		DRWN:	CHKD:
04/2020	T.R.G.	D.J.M.	SCALE:
			NO SCALE



GENERAL NOTES:

1. FOR ADDITIONAL REQUIREMENTS, SEE SECTION 4.5 OF THE PUBLIC WORKS STANDARDS.
2. PAVEMENT MARKINGS SHALL BE INSTALLED WITH HOT APPLIED THERMOPLASTIC ON NEW ASPHALT, OVERLAYS AND ASPHALT IN GOOD CONDITION, AS DETERMINED BY THE CITY. WHERE AUTHORIZED, PREFORMED THERMOPLASTIC MATERIAL SHALL BE PREMARK WITH VIZIGRIP MADE BY FLINT TRADING INC. AND BE APPLIED USING PREMARK SEALER, OR CITY APPROVED EQUAL. ALL MATERIAL SHALL BE 125 MIL THICKNESS AND APPLIED USING APPROPRIATE INSTALLATION PROCEDURES ACCORDING TO THE MANUFACTURER.

CITY OF SOUTH BEND			
PAVEMENT ARROW MARKINGS			
APPROVED:		DWG. NO.	
PUBLIC WORKS DEPT.		CHAN-2	
DATE:	DRWN:	CHKD:	SCALE:
04/2020	T.R.G.	D.J.M.	NO SCALE



GENERAL NOTES:

1. FOR ROADWAYS WITH MORE OR LESS LANES, THE SAME CONFIGURATION APPLIES TO KEEP THE BARS CENTERED ON THE LANE LINES, AND IN THE CENTER OF THE TRAVELED PORTION OF THE LANE TO MINIMIZE TIRE WEAR.
- * 2. THE WIDTH OF A CROSSWALK SHALL BE 8' WHEN CROSSING A RESIDENTIAL STREET, 10' ACROSS A STREET INTERSECTING AN ARTERIAL, AND 12' WHEN THE CROSSWALK IS CROSSING AN ARTERIAL.
3. PAVEMENT MARKINGS SHALL BE INSTALLED WITH HOT APPLIED THERMOPLASTIC ON NEW ASPHALT, OVERLAYS AND ASPHALT IN GOOD CONDITION, AS DETERMINED BY THE CITY. WHERE AUTHORIZED, PREFORMED THERMOPLASTIC MATERIAL SHALL BE PREMARK WITH VIZIGRIP MADE BY FLINT TRADING INC. AND BE APPLIED USING PREMARK SEALER, AS APPLICABLE, PER MANUFACTURER'S RECOMMENDATIONS, OR CITY APPROVED EQUAL. ALL MATERIAL SHALL BE 125 MIL THICKNESS AND APPLIED USING APPROPRIATE INSTALLATION PROCEDURES ACCORDING TO THE MANUFACTURER.

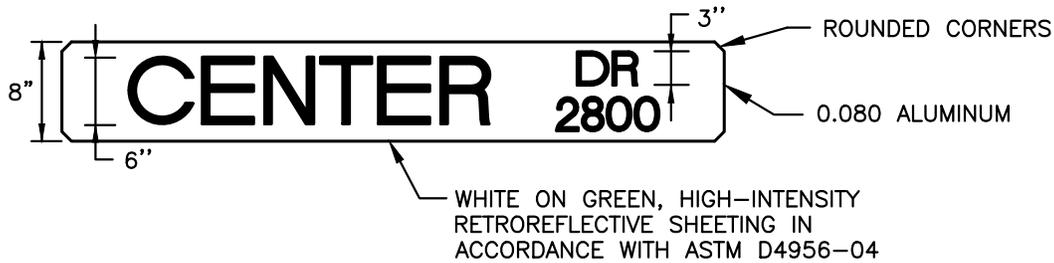
CITY OF SOUTH BEND			
PAVEMENT CROSSWALK MARKINGS			
APPROVED:		DWG. NO.	
PUBLIC WORKS DEPT.		CHAN-3	
DATE:		CHKD:	SCALE:
04/2020	DRWN:	D.J.M.	NO SCALE
	T.R.G.		

GENERAL NOTES:

1. ALL 4 INCH TALL LEGEND SHALL BE "C" SERIES TEXT. LEGEND NAME PLATES SHALL BE A MINIMUM LENGTH OF 24 INCHES AND A MAXIMUM LENGTH OF 42 INCHES. THE STANDARD HEIGHT SHALL BE 6 INCHES.
2. ALL 6 INCH TALL LEGEND SHALL BE "C" SERIES TEXT, UNLESS SPECIFIED OTHERWISE BY THE CITY ENGINEER. LEGEND NAME PLATES SHALL BE A MINIMUM LENGTH OF 24 INCHES AND A MAXIMUM LENGTH OF 48 INCHES. THE STANDARD HEIGHT SHALL BE 8 INCHES.
3. USE THE FOLLOWING STANDARD ABBREVIATIONS FOR STREET, AVENUE, BOULEVARD, ETC.

SUFFIX	ABBREVIATION	SUFFIX	ABBREVIATION
AVENUE	AVE	LOOP	LP
BOULEVARD	BLVD	PARKWAY	PKWY
CIRCLE	CIR	PLACE	PL
COURT	CT	ROAD	RD
DRIVE	DR	STREET	ST
LANE	LN	WAY	WAY

4. PERIODS, HYPHENS, COMMA, AND OTHER PUNCTUATION SHALL NOT BE USED.
5. ALL STREET NAME SIGNS SHALL BE DOUBLE SIDED, UNLESS SPECIFIED OTHERWISE BY THE CITY.
6. ALL CUL-DE-SACS AND DEAD END STREETS SHALL ONLY MOUNT THE NAME PLATE FOR THAT PARTICULAR CUL-DE-SAC OR DEAD END STREET.
7. STREET NAMES SHALL BE INSTALLED AT THE STOP SIGN LOCATION. THEY SHALL EITHER SHARE THE STOP/YIELD SIGN POST OR HAVE THE STREET NAME POST INSTALLED IN THE SAME LOCATION, UNLESS SPECIFIED OTHERWISE BY THE CITY.
8. FOR ADDITIONAL REQUIREMENTS, SEE SECTION 5.12 OF THE PUBLIC WORKS STANDARDS.



STANDARD 6 INCH LEGEND NAME PLATE

ARTERIALS
COMMERCIAL ACCESS STREETS
INDUSTRIAL ACCESS STREETS



STANDARD 4 INCH LEGEND NAME PLATE

URBAN RESIDENTIAL STREETS

CITY OF SOUTH BEND

STREET SIGN LETTERING

APPROVED:

DWG. NO.

PUBLIC WORKS DEPT.

DATE

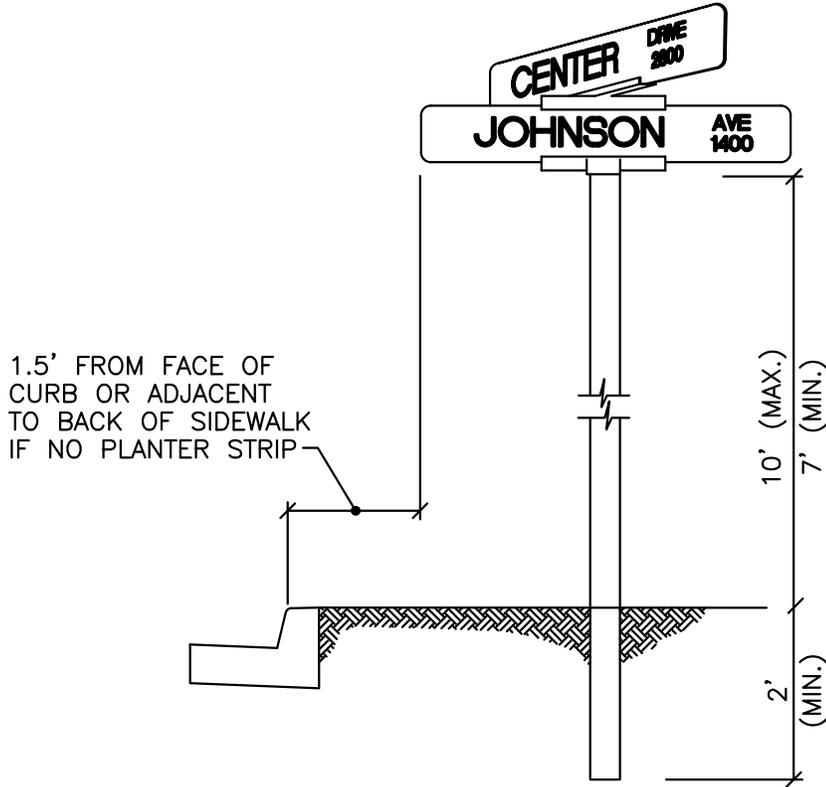
SIGN-1

DATE:
04/2020

DRWN:
T.R.G.

CHKD:
D.J.M.

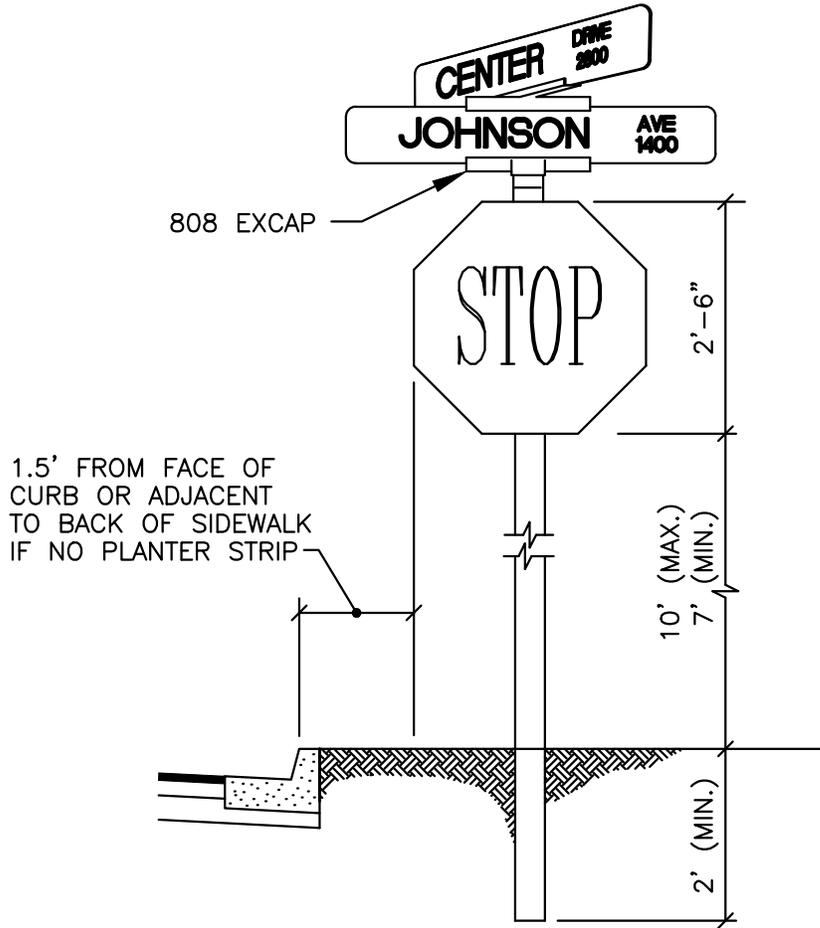
SCALE:
NO SCALE



GENERAL NOTES:

1. SIGN: SEE DWG. NO. 5.12-3
2. STREET SIGN MOUNTING: 808 EXCAP, 808 F PLATE OR CROSS PLATE.
3. POST: 4"x4" PRESSURE TREATED WOOD.
4. IF ADDITIONAL SIGN IS MOUNTED ON POLE, HEIGHT MUST BE GREATER TO ALLOW FOR 7' OF CLEARANCE FROM BOTTOM OF SIGN TO FINISHED GRADE.
5. FOR ADDITIONAL REQUIREMENTS, SEE SECTION 5.12 OF THE PUBLIC WORKS STANDARDS.

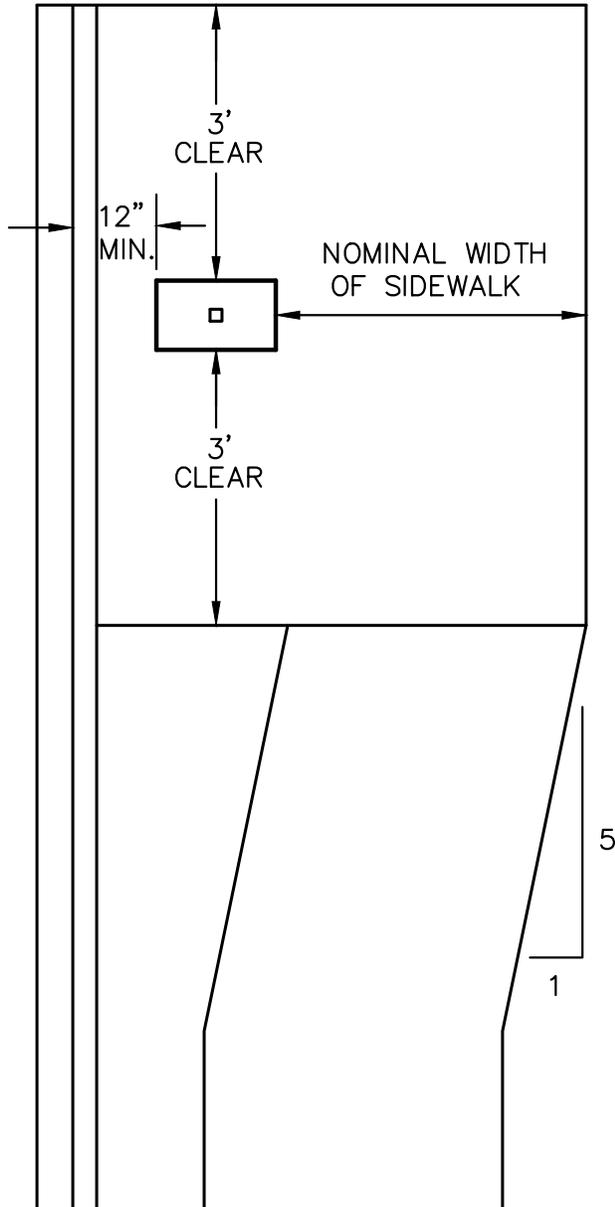
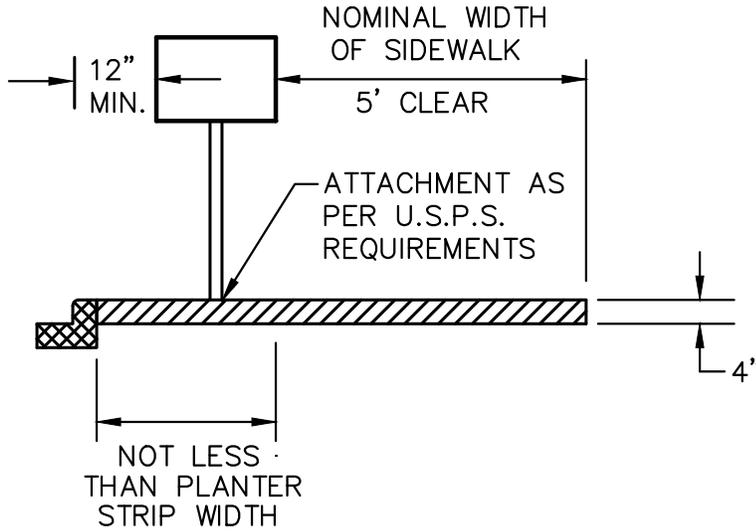
CITY OF SOUTH BEND			
STREET NAME SIGNS			
APPROVED:			DWG. NO.
_____			SIGN-2
PUBLIC WORKS DEPT.		DATE	
DATE:	DRWN:	CHKD:	SCALE:
04/2020	T.R.G.	D.J.M.	NO SCALE



GENERAL NOTES:

1. POST: 4"x4"x12' PRESSURE TREATED WOOD.
2. PANELS TO BE STANDARD ALUMINUM WITH REFLECTIVE LETTERS COLOR TO BE DETERMINED BY REGULATORY INFORMATION
3. ALL VEHICULAR CONTROL SIGNS SHALL MEET THE CITY REQUIREMENTS OF THE MANUAL FOR UNIFORM TRAFFIC CONTROL DEVICES (M.U.T.C.D.)
4. STOP SIGN MOUNTING: 2" LAG SCREWS WITH WASHERS.
5. FOR ADDITIONAL REQUIREMENTS, SEE SECTION 5.12 OF THE PUBLIC WORKS STANDARDS.

CITY OF SOUTH BEND			
VEHICULAR CONTROL SIGNS			
APPROVED:			DWG. NO.
_____			SIGN-3
PUBLIC WORKS DEPT.		DATE	
DATE:	DRWN:	CHKD:	SCALE:
04/2020	T.R.G.	D.J.M.	NO SCALE



GENERAL NOTE:

1. FOR ADDITIONAL REQUIREMENTS, SEE SECTION 5.3 OF THE PUBLIC WORKS STANDARDS.

CITY OF SOUTH BEND

MAILBOX LOCATION

APPROVED:

DWG. NO.

PUBLIC WORKS DEPT.

DATE

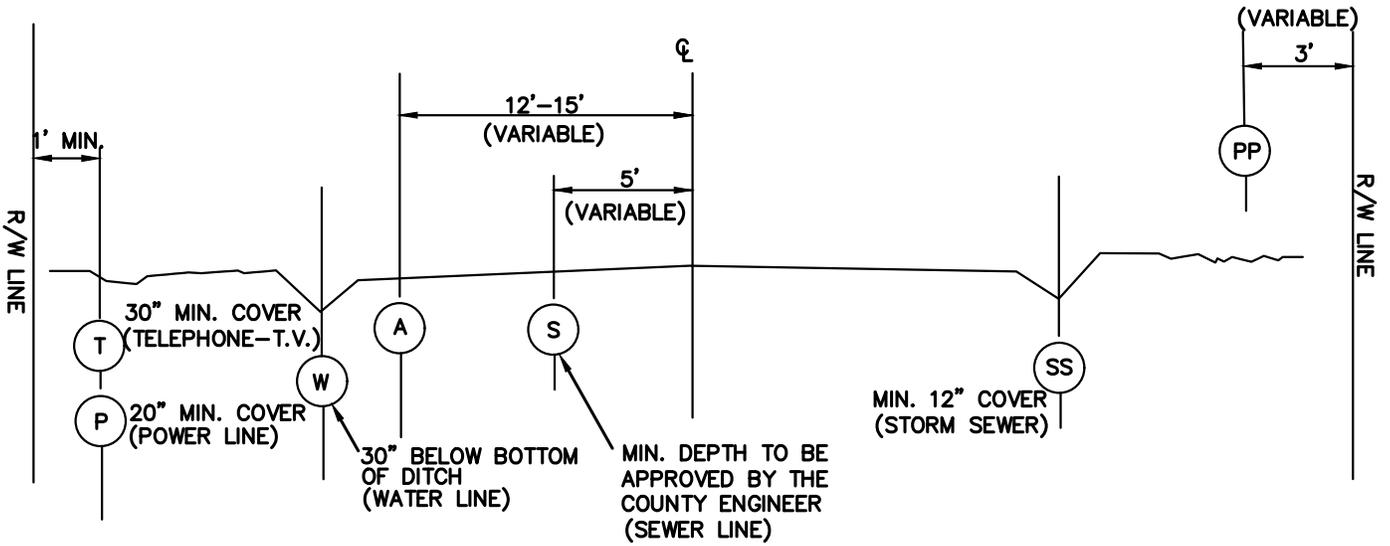
ML-1

DATE:
04/2020

DRWN:
T.R.G.

CHKD:
D.J.M.

SCALE:
NO SCALE



A = ALTERNATE LOCATION FOR POWER, TELEVISION OR TELEPHONE (COMMON TRENCH ACCEPTABLE).

P = POWER LINE (UNDERGROUND).

PP = POWER POLE LOCATION.

S = SANITARY SEWER LOCATION

SS = STORM SEWER LOCATION

T = TELEPHONE OR TELEVISION

W = WATER LINE LOCATION

NOTE: PLACEMENT OF UTILITIES AN EXISTING ROADWAYS WILL BE DETERMINED ON AN INDIVIDUAL BASIS BY THE COUNTY ENGINEER.

CITY OF SOUTH BEND			
UTILITY LOCATIONS			
APPROVED:			DWG. NO.
PUBLIC WORKS DEPT.		DATE	UTIL
DATE:	DRWN:	CHKD:	SCALE:
04/2020	T.R.G.	D.J.M.	NO SCALE

STORM DRAINAGE DETAILS

m:\south bend\20235.00_standard construction details and engineering standards\south bend\Details\Storm Drainage Details\STOW-1.DWG, 6/16/2020 7:17 AM, TULLY GENIS

FINISHED GRADE
OR SUBGRADE

BACKFILL MATERIAL
CONSISTING OF
CRUSHED ROCK,
SUITABLE EXCAVATED
MATERIAL OR GRAVEL
BORROW AS REQUIRED,
OR DIRECTED BY CITY

SPECIAL PRECAUTIONS
TO PROTECT PIPE TO
THIS LEVEL

HAND-PLACED,
COMPACTED SELECT
MATERIAL AS REQUIRED

RIGID STORM DRAIN
PIPE AS SPECIFIED
PER CITY STANDARDS

GRAVEL BACKFILL
FOR PIPE BEDDING

FOUNDATION GRAVEL
AS REQUIRED

UNDISTURBED EARTH

DEPTH VARIES
3' MINIMUM

1'-0"

1/2

*

SEE PIPE
BELOW O.D.

VARIES

CITY OF SOUTH BEND

RIGID STORM DRAIN PIPE
TRENCH SECTION

APPROVED:

DWG. NO.

PUBLIC WORKS DEPT.

DATE

STOM-1

DATE:
03/2020

DRWN:
B.M.P.

CHKD:
D.J.M.

SCALE:
NO SCALE

* 4-INCHES FOR PIPE 18-INCH DIA. AND
LESS 6-INCHES FOR PIPE GREATER
THAN 18-INCH DIA.

m:\south bend\20235.00_standard construction details and engineering standards\south bend\Details\Storm Drainage Details\STOM-6.DWG, 6/16/2020 7:17 AM, TULLY GENIS

FINISHED GRADE
OR SUB-GRADE

BACKFILL MATERIAL
CONSISTING OF
CRUSHED ROCK,
SUITABLE EXCAVATED
MATERIAL OR GRAVEL
BORROW AS REQUIRED,
OR DIRECTED BY CITY

SPECIAL PRECAUTIONS
TO PROTECT PIPE TO
THIS LEVEL

TOP OF PIPE
BEDDING

FLEXIBLE STORM DRAIN
PIPE AS SPECIFIED
PER CITY STANDARDS

GRAVEL BACKFILL
FOR PIPE BEDDING

FOUNDATION GRAVEL
AS REQUIRED

UNDISTURBED EARTH

DEPTH VARIES

1/2
* SEE PIPE
BELOW O.D.

VARIES

6"

1'-0"

CITY OF SOUTH BEND

FLEXIBLE STORM DRAIN PIPE
TRENCH SECTION

APPROVED:

DWG. NO.

PUBLIC WORKS DEPT.

DATE

STOM-2

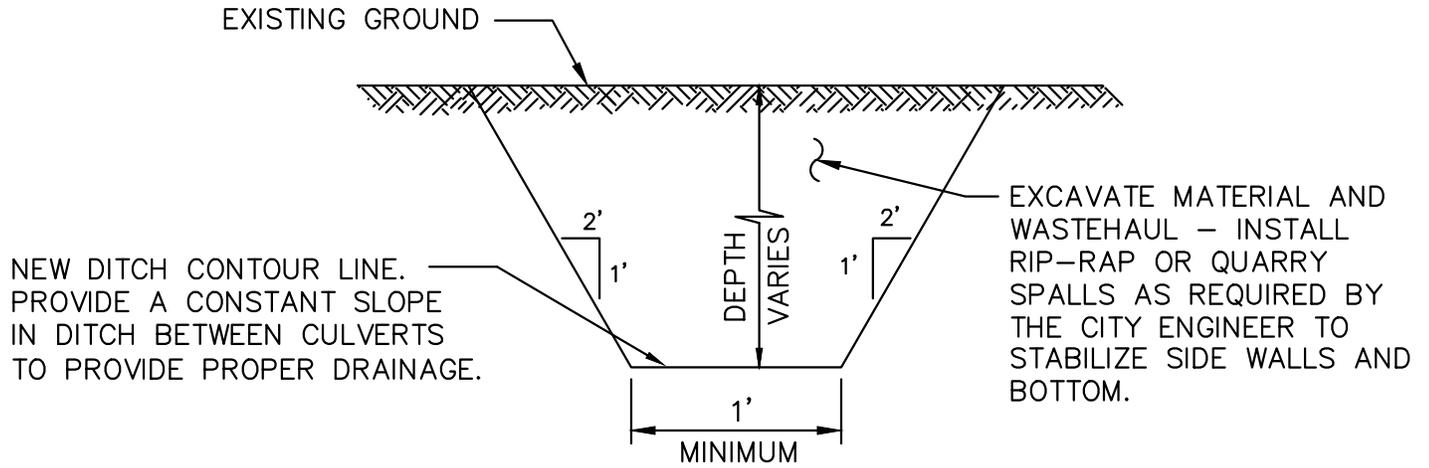
DATE:
03/2020

DRWN:
B.M.P.

CHKD:
D.J.M.

SCALE:
NO SCALE

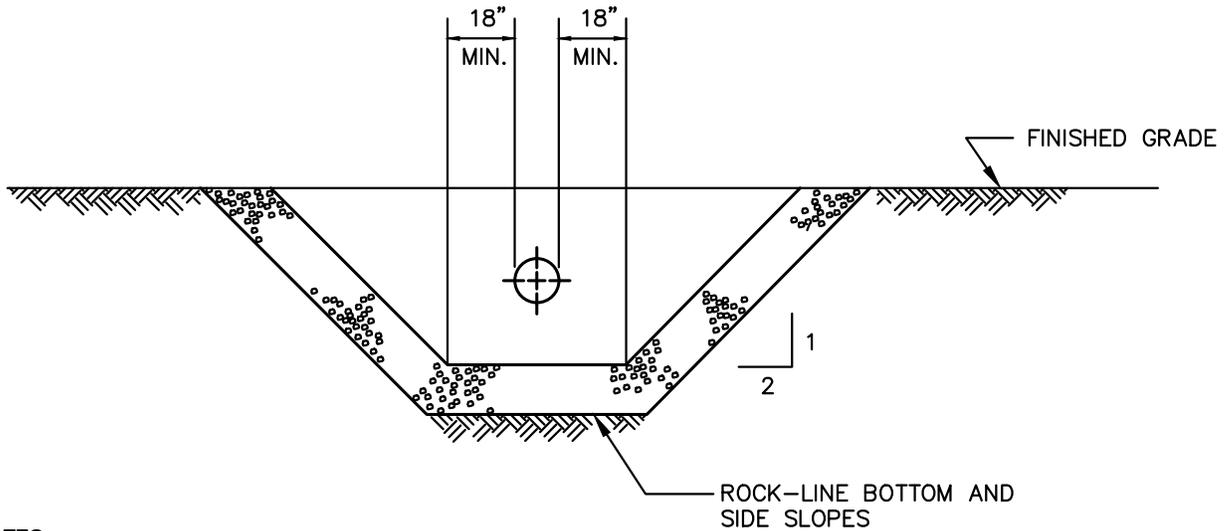
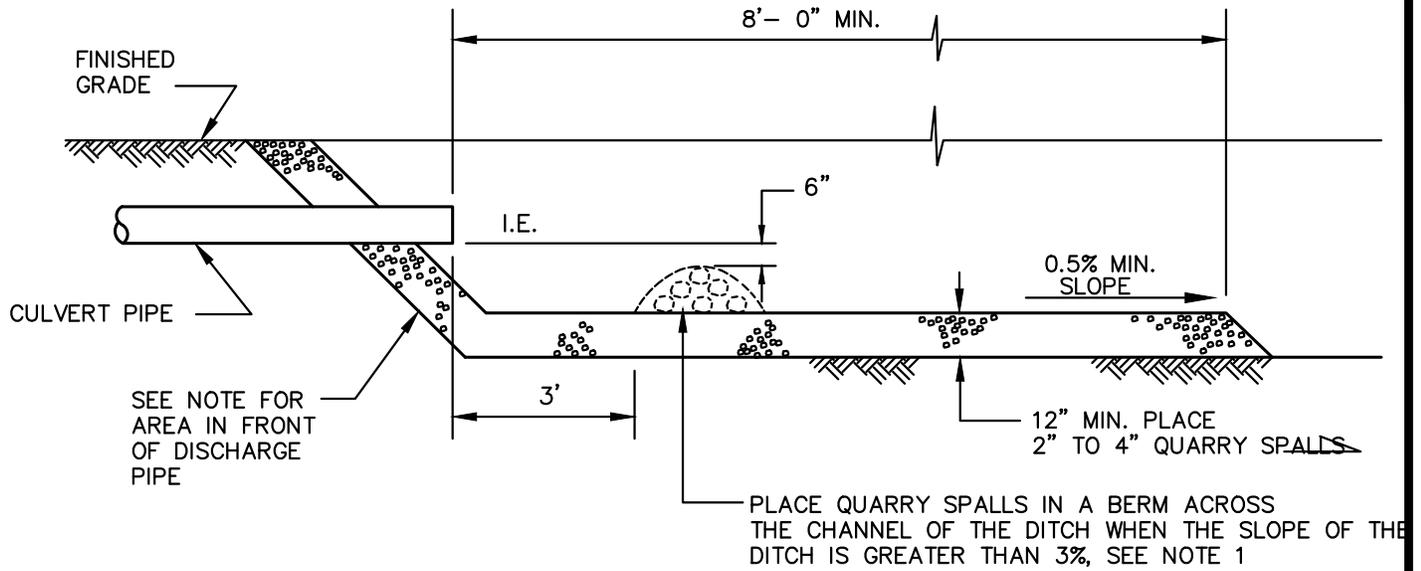
* 4-INCHES FOR PIPE 18-INCH DIA. AND
LESS 6-INCHES FOR PIPE GREATER
THAN 18-INCH DIA.



* DITCHES MAY REQUIRE ROCK RIP-RAP ARMOUR PLATING AT THE DIRECTION OF THE CITY

CITY OF SOUTH BEND			
NEW DITCH CONSTRUCTION			
APPROVED:			DWG. NO.
_____			STOM-3
PUBLIC WORKS DEPT.		DATE	
DATE:	DRWN:	CHKD:	SCALE:
03/2020	B.M.P.	D.J.M.	NO SCALE

m:\south bend\20235.00_standard construction details and engineering standards\south bend\Details\Storm Drainage Details\DITCH-2.DWG, 6/16/2020 7:18 AM, TULLY GENIS



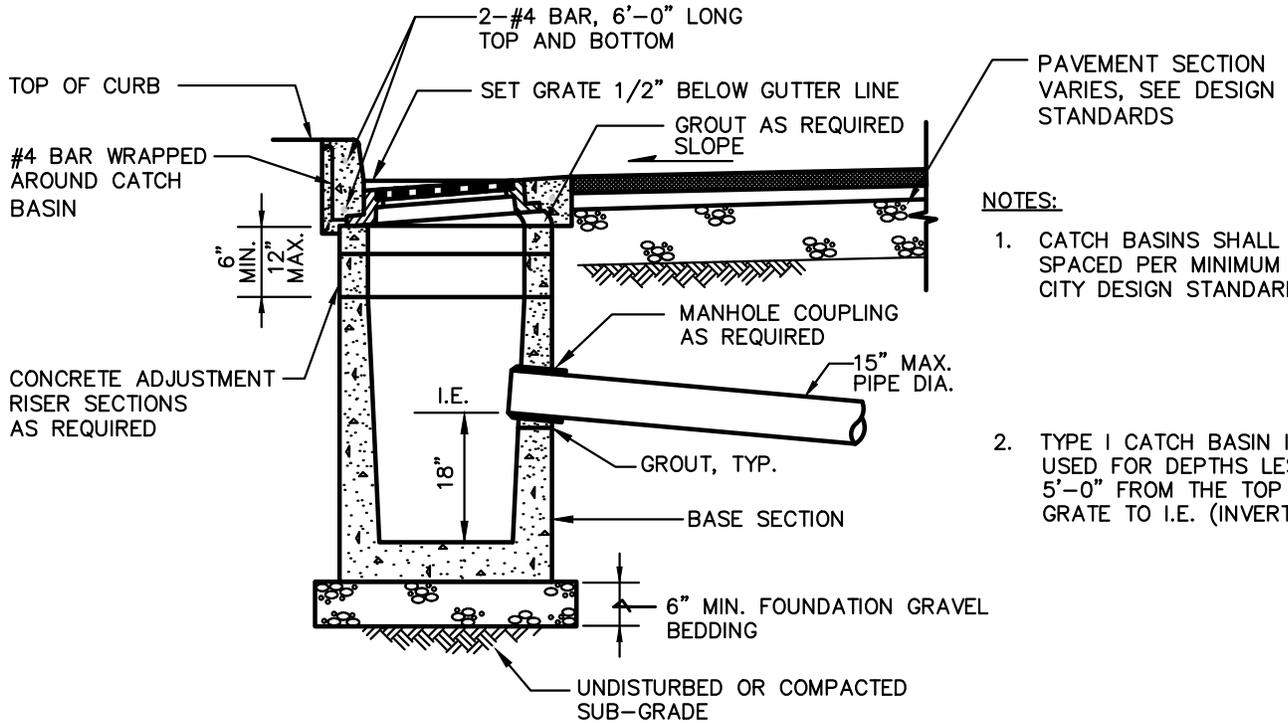
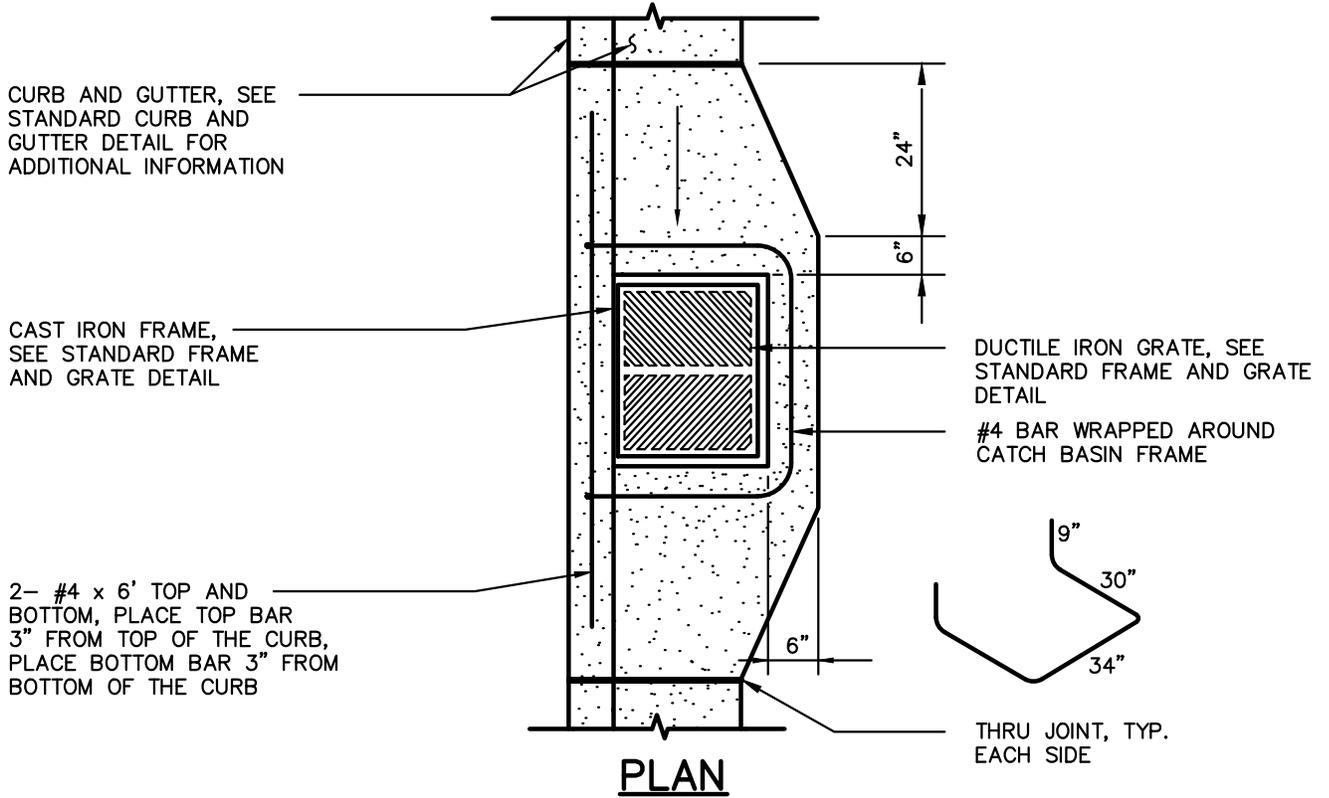
NOTES:

1. PLACE QUARRY SPALLS IN FRONT OF CULVERT DISCHARGE, ENGINEER SHALL SIZE QUARRY SPALL BERM

RIPRAP AND ENERGY DISSIPATION FOR DITCH

CITY OF SOUTH BEND			
RIPRAP AND ENERGY DISSIPATION FOR DITCH			
APPROVED:			DWG. NO.
PUBLIC WORKS DEPT.			STOM-4
DATE:	DRWN:	CHKD:	SCALE:
03/2020	B.M.P.	D.J.M.	NO SCALE

m:\south bend\20235.00_standard construction details and engineering standards\south bend\Details\Storm Drainage Details\CB-1.DWG, 6/16/2020 7:18 AM, TULLY GENIS



ELEVATION

CATCH BASIN TYPE I

CITY OF SOUTH BEND

CATCH BASIN TYPE 1

APPROVED:

DWG. NO.

PUBLIC WORKS DEPT.

DATE

CB-1

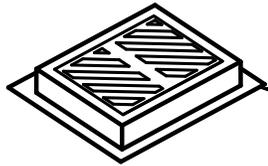
DATE:
04/2020

DRWN:
T.R.G.

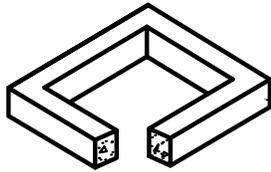
CHKD:
D.J.M.

SCALE:
NO SCALE

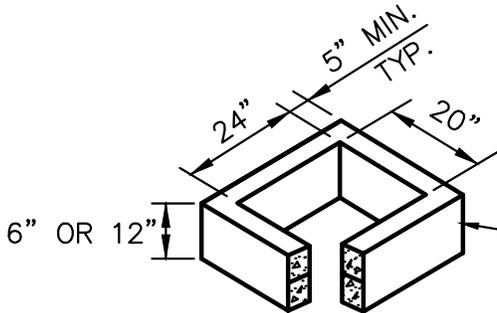
*



FRAME AND OPEN GRATE, VANED GRATE, OR SOLID COVER.



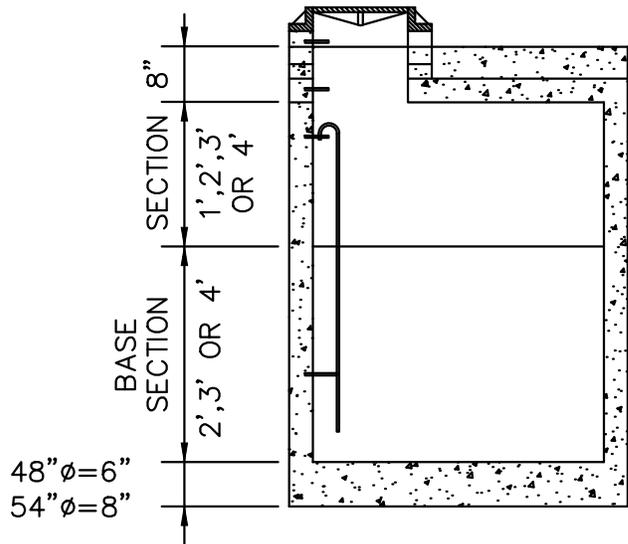
2"x4"x8" SOLID BRICK USED FOR FINAL ADJUSTMENT TO GRADE 6" HIGH MAX.



TOP SLAB WITH 24" ROUND ACCESS OR 20"x24" RECTANGULAR ACCESS, USE SEWER STANDARD. DETAIL 640 FOR STEPS AND LADDER.

NOTES:

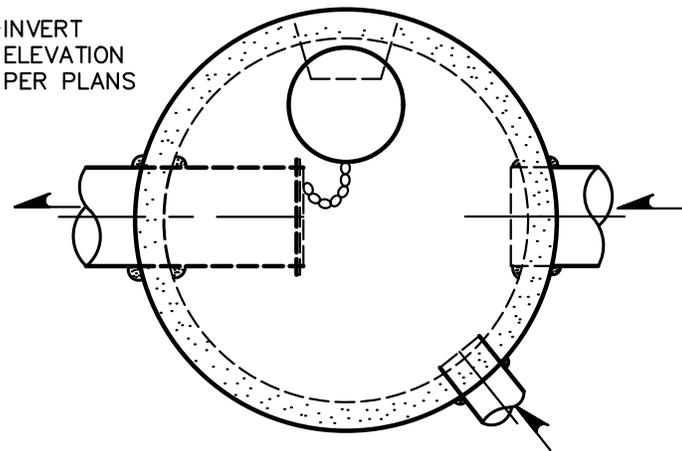
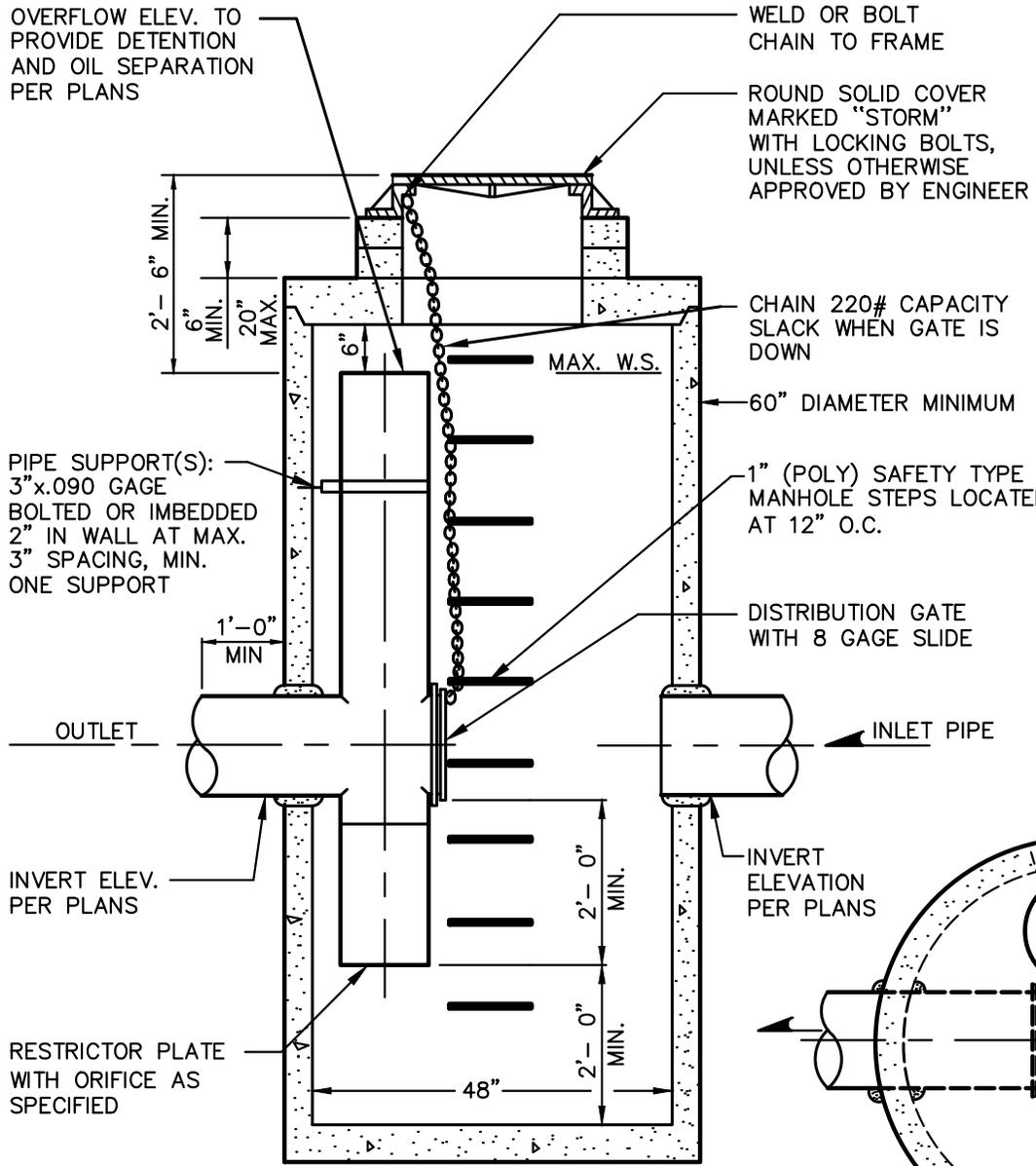
1. ALL TYPE 2 CB'S EQUIPPED WITH OPEN GRATES SHALL BE LOCKING TYPE.
2. ALL TYPE 2 CB'S NOT IN PAVED AREAS SHALL BE EQUIPPED WITH LOCKING LIDS.
3. CB'S SHALL BE SET SO THAT STEPS ARE DIRECTLY UNDER OPENING.
4. ALL TYPE II CB'S SHALL BE EQUIPPED WITH STEPS AND LADDER.
5. CONCRETE SHALL BE CLASS 4000.
6. MINIMUM DISTANCE FROM INVERT TO CB BOTTOM SHALL BE 2.0'.
7. CB SECTIONS AND LID WILL BE HS20 TRAFFIC LOAD CERTIFIED BY MFG.
8. HOLE SIZE - PIPE O.D. + 5" MAX
 MAX HOLE SIZE - 36" (28" CB)
 MAX HOLE SIZE - 42" (54" CB)



CATCH BASIN TYPE 2

CITY OF SOUTH BEND			
CATCH BASIN TYPE 2			
APPROVED:			DWG. NO.
PUBLIC WORKS DEPT.			CB-2
DATE:	DRWN:	CHKD:	SCALE:
04/2020	T.R.G.	D.J.M.	NO SCALE

m:\south bend\20235.00_standard construction details and engineering standards\south bend\Details\Storm Drainage Details\CB-2.DWG, 6/16/2020 7:18 AM, TULLY GENIS



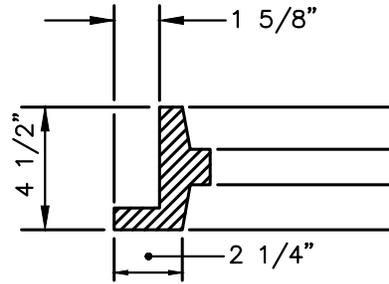
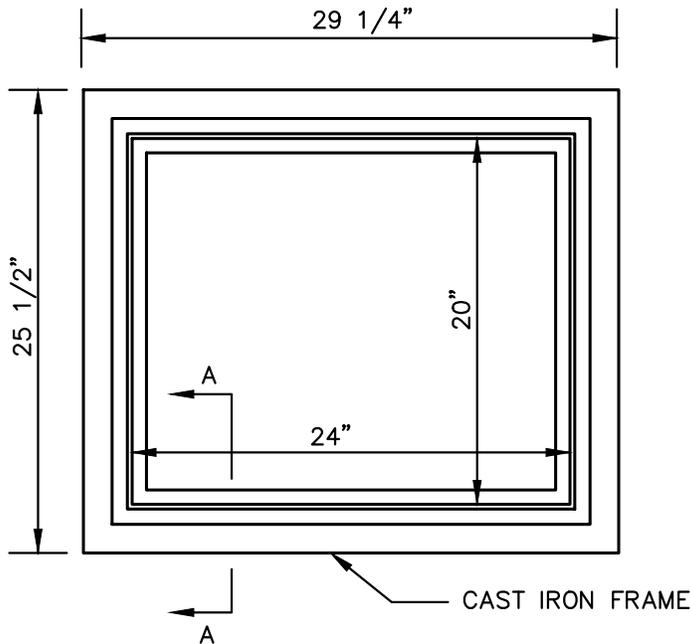
SECTION VIEW
FLOW RESTRICTOR
CATCH BASIN TYPE 2

PLAN VIEW

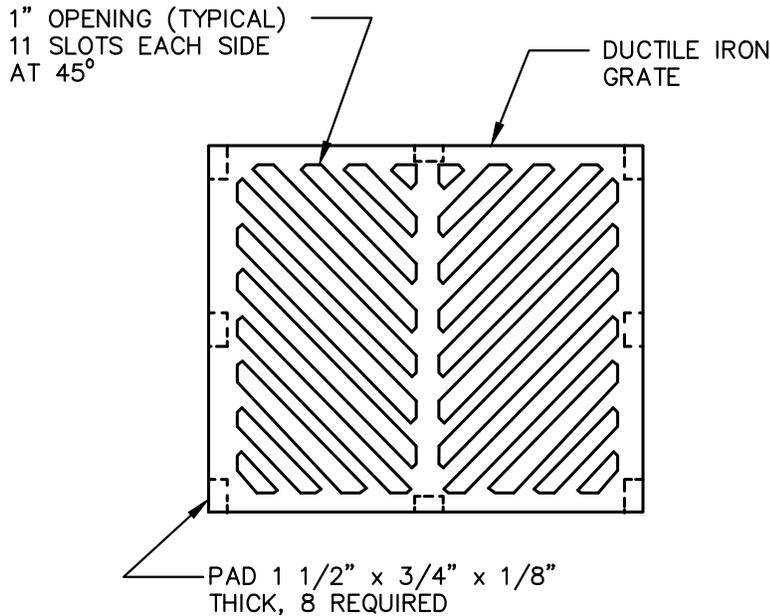
NOTES:

1. PIPE SIZES AND SLOPES: PER APPROVED PLANS
2. OUTLET CAPACITY: NOT LESS THAN COMBINED INLETS
3. METAL PARTS: CORROSION RESISTANT. GALVANIZED PIPE PARTS TO HAVE ASPHALT TREATMENT 1
4. FRAME AND LADDER OR STEPS OFFSET SO:
 - A. CLEANOUT GATE IS VISIBLE FROM TOP
 - B. CLIMB-DOWN SPACE IS CLEAR OF RISER AND CLEANOUT GATE
 - C. FRAME IS CLEAR OF CURB
5. IF METAL OUTLET PIPE CONNECTS TO CEMENT CONCRETE PIPE: OUTLET PIPE TO HAVE SMOOTH O.D. EQUAL TO CONCRETE PIPE I.D. LESS 1/4"

CITY OF SOUTH BEND			
CATCH BASIN TYPE 2 WITH FLOW RESTRICTOR			
APPROVED:		DWG. NO.	
PUBLIC WORKS DEPT.		CB-2A	
DATE:	DRWN:	CHKD:	SCALE:
04/2020	T.R.G.	D.J.M.	NO SCALE



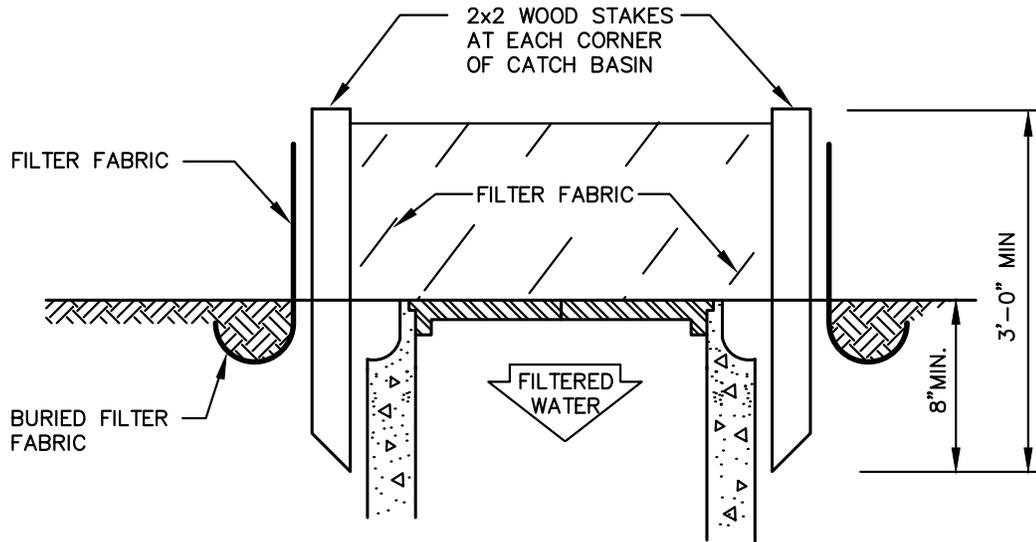
SECTION A-A



NOTES:

1. MATERIAL SHALL CONFORM TO THE "1994 STANDARD SPECIFICATIONS FOR ROAD, BRIDGE AND MUNICIPAL CONSTRUCTION" PREPARED BY THE WASHINGTON STATE DEPARTMENT OF TRANSPORTATION AND AMERICAN PUBLIC WORKS ASSOCIATION, WASHINGTON STATE CHAPTER.
2. WHEN ROAD PROFILE, EXCEEDS 6% "VANED" GRATES SHALL BE INSTALLED IN LIEU OF THE "HERRING BONE" GRATE, AT THE DISCRETION OF THE CITY.

CITY OF SOUTH BEND			
CATCH BASIN FRAME AND GRATE			
APPROVED:			DWG. NO.
_____			CB-3
PUBLIC WORKS DEPT.		DATE	
DATE:	DRWN:	CHKD:	SCALE:
03/2020	B.M.P.	D.J.M.	NO SCALE

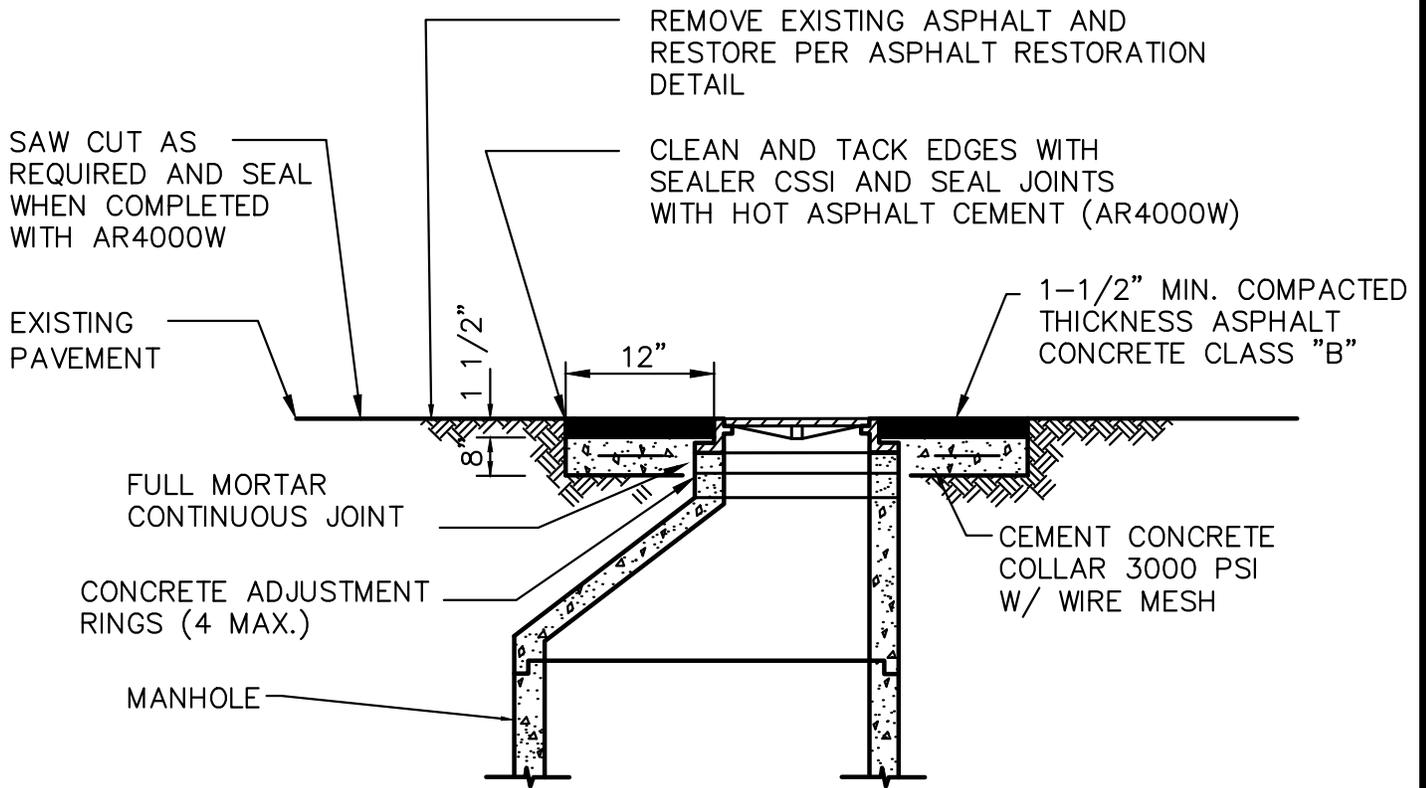


NOTE:

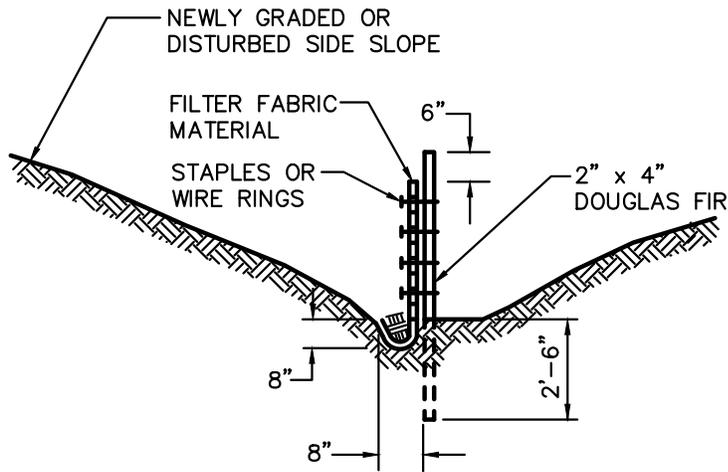
WOOD STAKES AROUND PERIMETER OF INLET SHALL BE SPACED A MAXIMUM OF 3 FEET APART.

CITY OF SOUTH BEND			
CATCH BASIN INLET PROTECTION			
APPROVED:			DWG. NO.
PUBLIC WORKS DEPT.			CB-4
DATE:	DRWN:	CHKD:	SCALE:
03/2020	B.M.P.	D.J.M.	NO SCALE

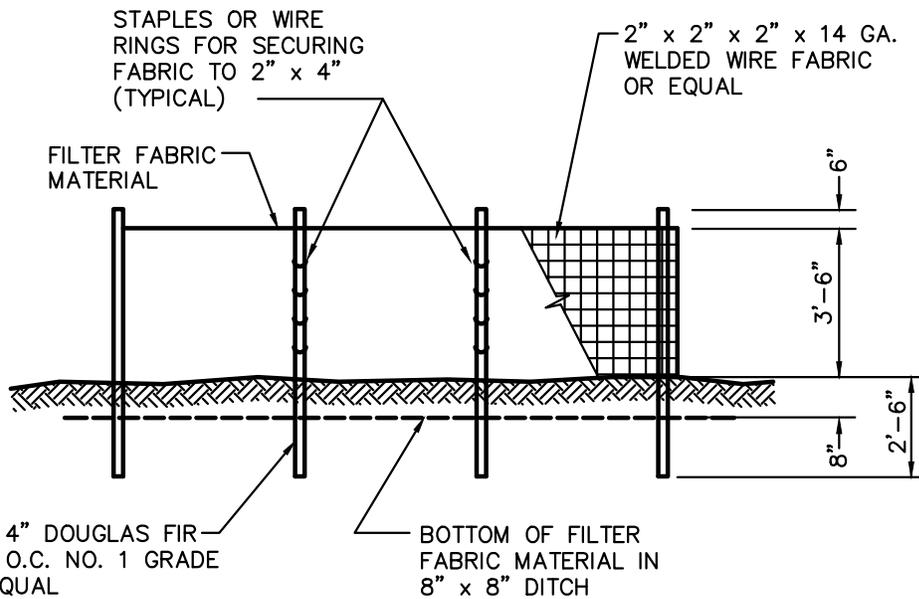
m:\south bend\20235.00_standard construction details and engineering standards\south bend\Details\Storm Drainage Details\STOW-2.DWG, 6/16/2020 7:18 AM, TULLY GENIS



CITY OF SOUTH BEND			
MANHOLE OR CATCH BASIN TYPE 2 GRADE ADJUSTMENT DETAIL			
APPROVED:			DWG. NO.
PUBLIC WORKS DEPT.			CB-5
DATE:		CHKD:	SCALE:
03/2020	DRWN: B.M.P.	D.J.M.	NO SCALE



CROSS SECTION



ELEVATION

NOTES:

1. WHERE POSSIBLE, MAINTAIN NATURAL VEGETATION FOR SILT CONTROL.
2. TEMPORARY SILTATION TO BE CONSTRUCTED BY PLACING FILTER FABRIC FENCES ACROSS SWALES UTILIZING FILTER SYSTEM PRIOR TO DISCHARGE.
3. ALL TEMPORARY SILTATION SHALL BE MAINTAINED IN A SATISFACTORY CONDITION UNTIL SUCH TIME THAT CLEARING AND/OR CONSTRUCTION IS COMPLETED AND SURFACE RESTORATION HAS BEEN COMPLETED.
4. RETURN SILTATION CONTROL AREAS TO ORIGINAL GROUND CONDITIONS, UNLESS SPECIFICALLY DIRECTED OTHERWISE BY THE CITY.

CITY OF SOUTH BEND

SILT FENCE

APPROVED:

DWG. NO.

PUBLIC WORKS DEPT.

DATE

EC-1

DATE:
03/2020

DRWN:
B.M.P.

CHKD:
D.J.M.

SCALE:
NO SCALE

SANITARY SEWER DETAILS

m:\south bend\20235.00_standard construction details and engineering standards\south bend\Details\Sanitary Sewer Details\TPMH.dwg, 6/16/2020 7:18 AM, TULLY GENIS

MANHOLE FRAME & COVER WITH "SEWERS"
 CAST ON COVER WITH 3" HIGH RAISED
 LETTERS (NON-SKID PATTERN) AS
 MANUFACTURED BY "SATHER MANUFACTURING
 CO., INC." NO. 6024-R. 3 HOLE LOCKING
 FRAME AND COVER. ONE (1) BOLT HOLE
 TO BE CENTERED OVER LADDER

FIRST STEP
 14" MIN.
 18" MAX.

GROUT BETWEEN RINGS

POLYPROPYLENE MANHOLE
 STEPS NO. P-13938 LOCATED
 AT 12" O.C.

GROUT LIFT HOLES
 INSIDE AND OUTSIDE

POLYPROPYLENE LADDER
 (3' MAXIMUM LENGTH)

SEE NOTE 1

CHANNEL
 3/4 PIPE DIA

SEE NOTE 4

FINISHED GRADE

4" X 24" PRECAST CONC.
 ADJUSTMENT RINGS
 2 RINGS REQUIRED
 4 RINGS MAXIMUM
 PLASTER INSIDE AND
 OUTSIDE FACE WITH 1/2"
 THICK GROUT

24" DIA.

48" TO 24" OFFSET CONE

48" OR 54" (INSIDE DIAMETER)
 PRECAST MANHOLE

RUBBER GASKET SEALING
 ELEMENT

SLOPE 3/8"/FT

FLOW

GROUT FILL

FOUNDATION GRAVEL
 8-INCH MINIMUM

UNDISTURBED EARTH

NOTES:

1. PIPE CONNECTIONS TO MANHOLES SHALL BE AS FOLLOWS:
 PVC AND D.I. PIPE. CORE THE MANHOLE AND
 CONNECT SEWER PIPE WITH A WATER TIGHT FLEXIBLE RUBBER
 BOOT IN MANHOLE WALL, KOR-N-SEAL BOOT
 OR EQUAL.
2. DROP OF GRADE THRU MANHOLE SHALL
 BE 0.10', UNLESS OTHERWISE REQUIRED/
 APPROVED BY CITY ENGINEER.
3. LARGER MANHOLES WILL BE REQUIRED AT
 THE DISCRETION OF THE CITY ENGINEER
 BASED ON PIPE SIZE, NUMBER AND
 ORIENTATION OF PIPE(S).
4. INSTALL CONCRETE COLLAR. SEE DETAIL.
5. PRE-CHANNELED MANHOLES ARE NOT
 ACCEPTABLE.

CITY OF SOUTH BEND

TYPICAL PRECAST MANHOLE

APPROVED:

DWG. NO.

PUBLIC WORKS DEPT.

DATE

TPMH

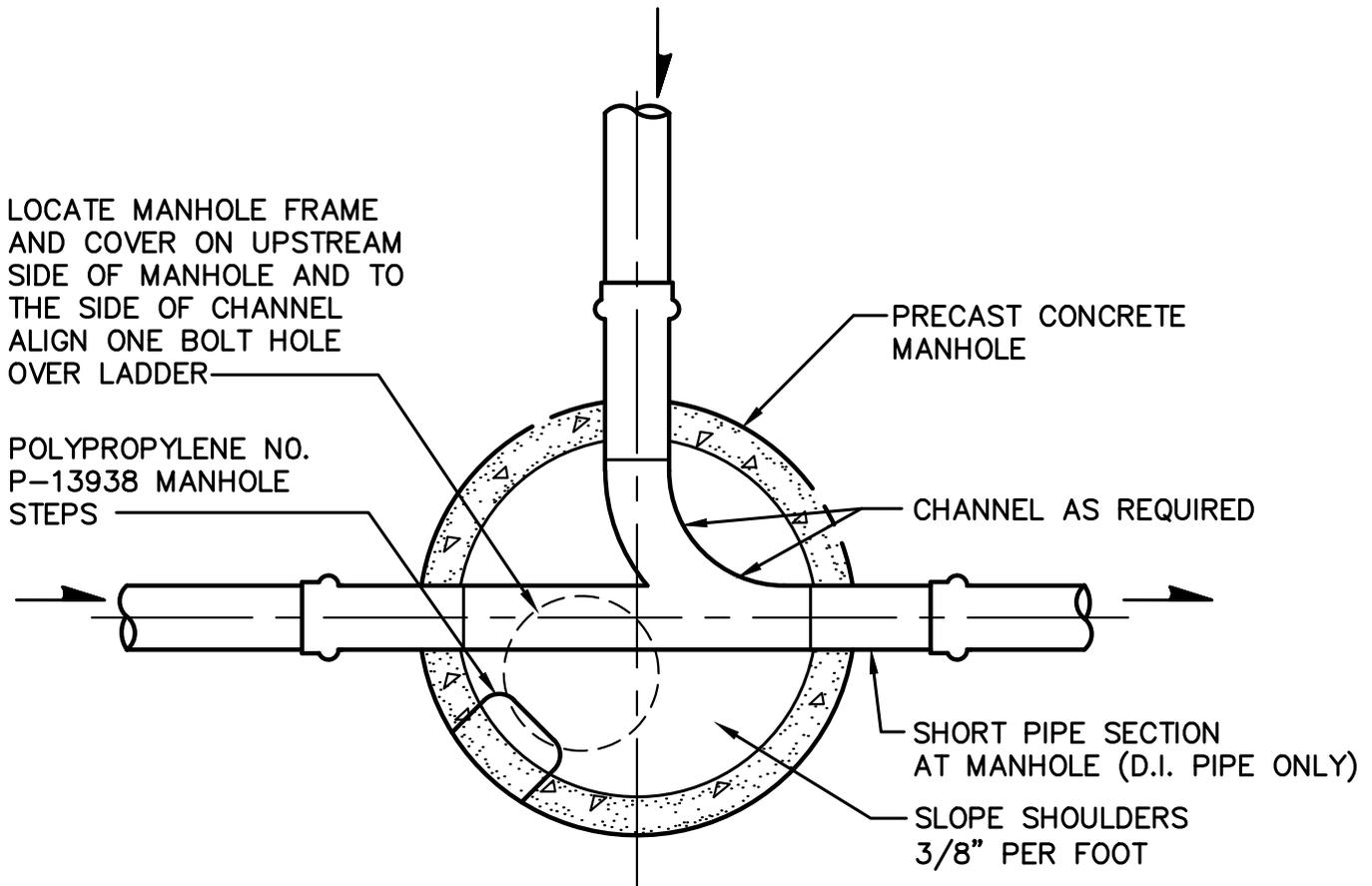
DATE:
 03/2020

DRWN:
 B.M.P.

CHKD:
 D.J.M.

SCALE:
 NO SCALE

m:\south bend\20235.00_standard construction details and engineering standards\south bend\Details\Sanitary Sewer Details\TMHP.DWG, 6/16/2020 7:18 AM, TULLY GENIS

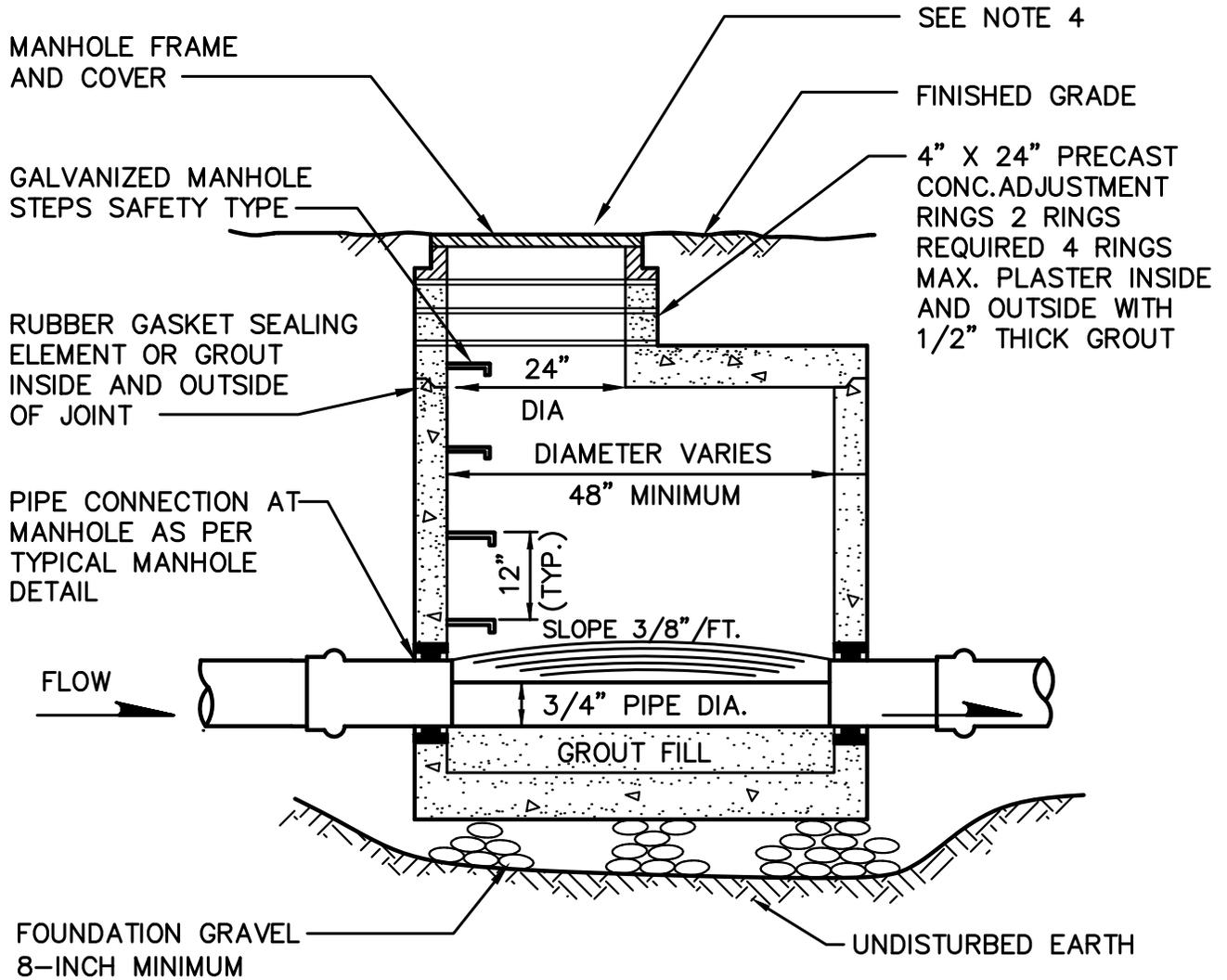


NOTE:

PIPE CONNECTIONS TO MANHOLES SHALL BE AS FOLLOWS:
 PVC AND D.I. PIPE. CORE THE MANHOLE AND CONNECT
 SEWER PIPE WITH A WATER TIGHT FLEXIBLE RUBBER BOOT IN
 MANHOLE WALL, KOR-N- SEAL BOOT OR EQUAL. ALL
 CONNECTIONS TO EXISTING MANHOLES SHALL BE MADE WITH
 A CONCRETE CORING MACHINE UNLESS OTHERWISE APPROVED
 BY THE CITY.

CITY OF SOUTH BEND			
TYPICAL MANHOLE PLAN			
APPROVED:			DWG. NO.
PUBLIC WORKS DEPT.		DATE	TMHP
DATE: 03/2020	DRWN: B.M.P.	CHKD: D.J.M.	SCALE: NO SCALE

m:\south bend\20235.00_standard construction details and engineering standards\south bend\Details\Sanitary Sewer Details\TSPMH.dwg, 6/16/2020 7:19 AM, TULLY GENIS



NOTES:

1. PIPE CONNECTIONS TO MANHOLES SHALL BE AS FOLLOWS:
PVC AND D.I. PIPE CORE THE MANHOLE AND CONNECT SEWER PIPE WITH A WATER TIGHT FLEXIBLE RUBBER BOOT IN MANHOLE WALL, KOR-N-SEAL BOOT OR EQUAL.
2. DROP OF GRADE THRU MANHOLE SHALL BE 0.10'.
3. PRE-CHANNELED MANHOLES ARE NOT ACCEPTABLE.
4. CONSTRUCT CONCRETE COLLARS PER DETAILS.

CITY OF SOUTH BEND			
TYPICAL SHALLOW PRECAST MANHOLE			
APPROVED:		DWG. NO.	
PUBLIC WORKS DEPT.		TSPMH	
DATE:		DATE	
03/2020	DRWN: B.M.P.	CHKD: D.J.M.	SCALE: NO SCALE

m:\south bend\20235.00_standard construction details and engineering standards\south bend\Details\Sanitary Sewer Details\TSMH.dwg, 6/16/2020 7:19 AM, TULLY GENIS

MANHOLE FRAME & COVER WITH "SEWERS"
 CAST ON COVER WITH 3" HIGH RAISED
 LETTERS (NON-SKID PATTERN) AS
 MANUFACTURED BY "SATHER MANUFACTURING
 CO., INC." NO. 6024-R. 3 HOLE LOCKING
 FRAME AND COVER. ONE (1) BOLT HOLE
 TO BE CENTERED OVER LADDER

FIRST STEP
 14" MIN.
 18" MAX.

GROUT BETWEEN RINGS

POLYPROPYLENE MANHOLE
 STEPS NO. P-13938 LOCATED
 AT 12" O.C.

GROUT LIFT HOLES
 INSIDE AND OUTSIDE

POLYPROPYLENE LADDER
 (3' MAXIMUM LENGTH)

CUT OUT EXISTING PIPE,
 MAKE SMOOTH INVERT &
 CHANNEL AFTER NEW LINE
 IS ACCEPTED.

CAST IN PLACE
 CHANNEL & SHELF,
 3000 PSI CONCRETE

8" MINIMUM

SEE NOTE 3

FINISHED GRADE

4" X 24" PRECAST CONC.
 ADJUSTMENT RINGS
 2 RINGS REQUIRED
 4 RINGS MAXIMUM
 PLASTER INSIDE AND
 OUTSIDE FACE WITH 1/2"
 THICK GROUT

48" TO 24" OFFSET CONE

PRECAST MANHOLE

RUBBER GASKET SEALING
 ELEMENT

SHORT PIPE SECTION AT
 MANHOLE

FLOW

FOUNDATION GRAVEL
 8-IN MINIMUM

UNDISTURBED EARTH

NOTES:

1. PIPE CONNECTIONS TO MANHOLES SHALL BE AS FOLLOWS:
 PVC C900 PIPE: CAST OR GROUT A MANHOLE COUPLING
 INTO WALL. D.I. PIPE: BELL AND SPIGOT JOINT OR FLEXIBLE
 COUPLING EITHER SHALL BE 12" MAXIMUM DISTANCE FROM MANHOLE
 WALL. PVC AND D.I. PIPE, OPTIONAL: CORE THE MANHOLE AND
 CONNECT SEWER PIPE WITH A WATER TIGHT FLEXIBLE RUBBER
 BOOT IN MANHOLE WALL, KOR-N-SEAL BOOT
 OR EQUAL.
2. DROP OF GRADE THRU MANHOLE SHALL
 BE 0.10', UNLESS OTHERWISE APPROVED
 BY CITY INSPECTOR.
3. INSTALL CONCRETE COLLAR.
 SEE DETAIL.

CITY OF SOUTH BEND

TYPICAL SADDLE MANHOLE

APPROVED:

DWG. NO.

PUBLIC WORKS DEPT.

DATE

TSMH

DATE:
 03/2020

DRWN:
 B.M.P.

CHKD:
 D.J.M.

SCALE:
 NO SCALE

m:\south bend\20235.00_standard construction details and engineering standards\south bend\Details\Sanitary Sewer Details\ODMH.DWG, 6/16/2020 7:19 AM, TULLY GENIS

DUCTILE IRON MJ
OR TYTON JOINT
SEWER PIPE

DUCTILE IRON TEE
GROUT IN PLACE

1/2 D.I. PLUG
AS DAM

316 GRADE STAINLESS
STEEL STRAPS & ANCHOR
BOLTS, FASTENED AROUND
EACH JOINT AND MIDWAY
BETWEEN EACH JOINT

90° D.I. BEND
MJ X PE

CROWN ELEVATIONS
SHALL BE EQUAL

FOUNDATION GRAVEL
8-INCH MINIMUM

UNDISTURBED
EARTH

10'± TO
UNDISTURBED EARTH

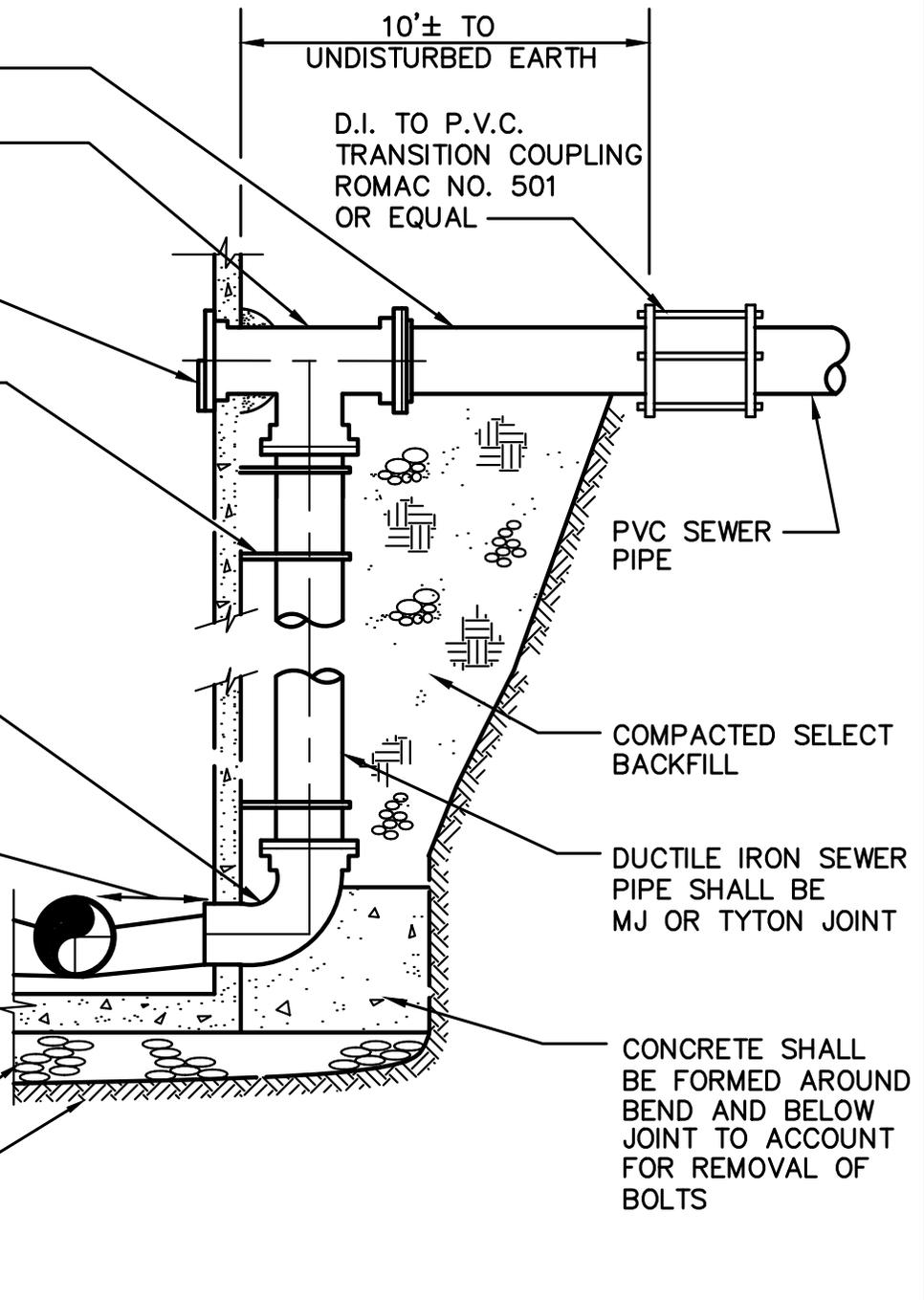
D.I. TO P.V.C.
TRANSITION COUPLING
ROMAC NO. 501
OR EQUAL

PVC SEWER
PIPE

COMPACTED SELECT
BACKFILL

DUCTILE IRON SEWER
PIPE SHALL BE
MJ OR TYTON JOINT

CONCRETE SHALL
BE FORMED AROUND
BEND AND BELOW
JOINT TO ACCOUNT
FOR REMOVAL OF
BOLTS



CITY OF SOUTH BEND

OUTSIDE DROP MANHOLE

APPROVED:

DWG. NO.

PUBLIC WORKS DEPT.

DATE

ODMH

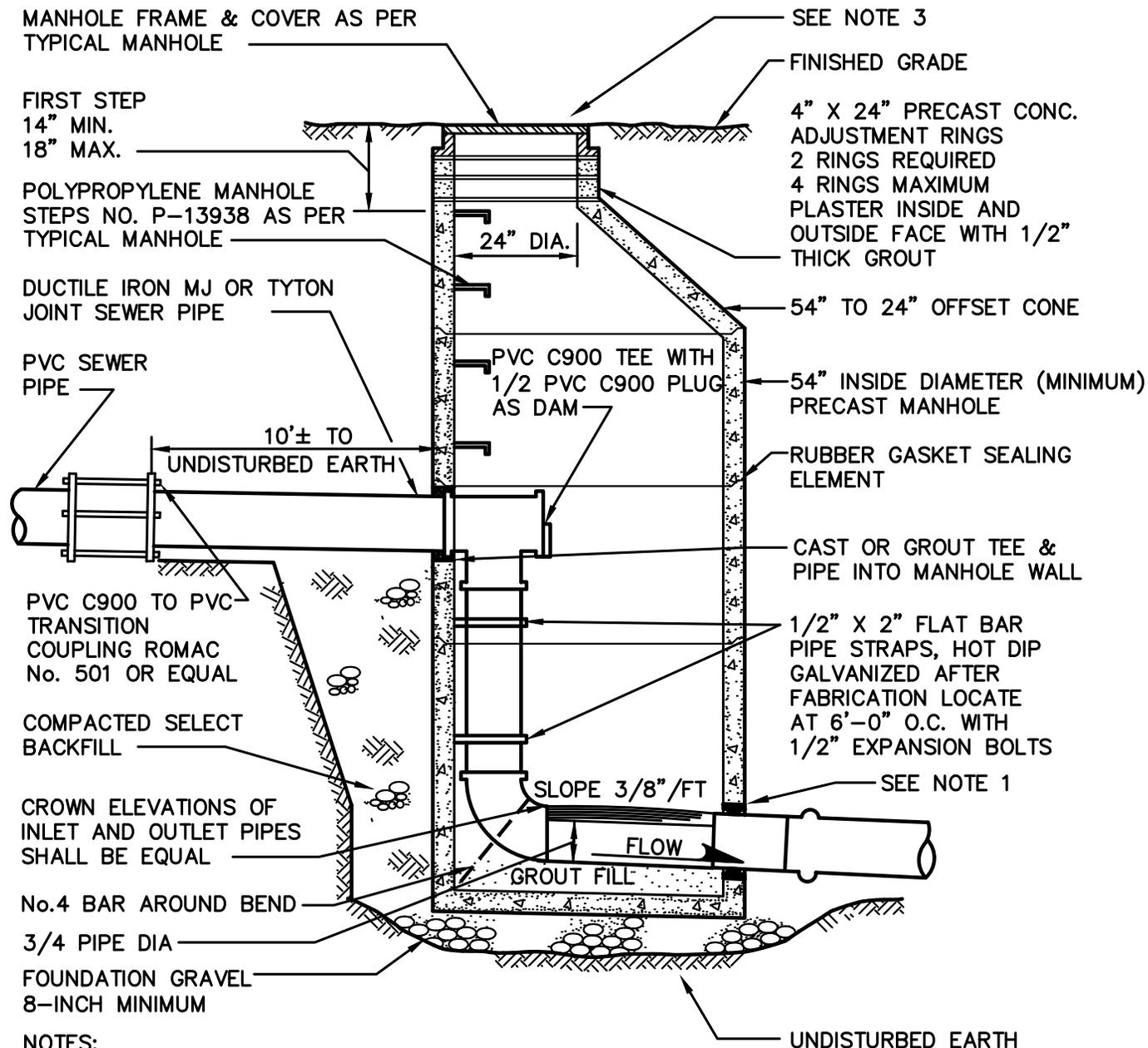
DATE:
03/2020

DRWN:
B.M.P.

CHKD:
D.J.M.

SCALE:
NO SCALE

m:\south bend\20235.00_standard construction details and engineering standards\south bend\Details\Sanitary Sewer Details\IDMH.dwg, 6/16/2020 7:19 AM, TULLY GENIS



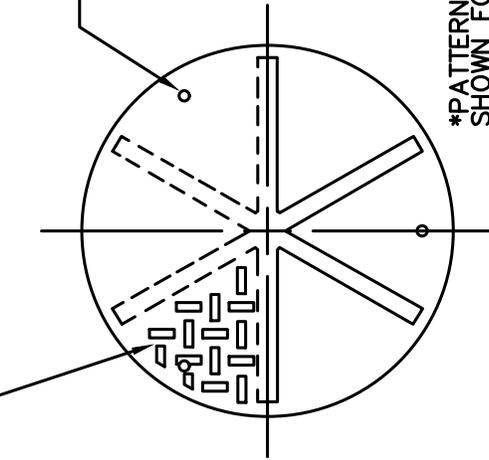
NOTES:

1. PIPE CONNECTIONS TO MANHOLES SHALL BE AS FOLLOWS:
PVC C900 AND D.I. PIPE. CORE THE MANHOLE AND CONNECT SEWER PIPE WITH A WATER TIGHT FLEXIBLE RUBBER BOOT IN MANHOLE WALL, KOR-N-SEAL BOOT OR EQUAL.
2. DROP OF GRADE THRU MANHOLE SHALL BE 0.10', UNLESS OTHERWISE APPROVED BY CITY INSPECTOR.
3. INSTALL CONCRETE COLLAR. SEE DETAIL
4. PRE-CHANNELED MANHOLE ARE NOT ACCEPTABLE

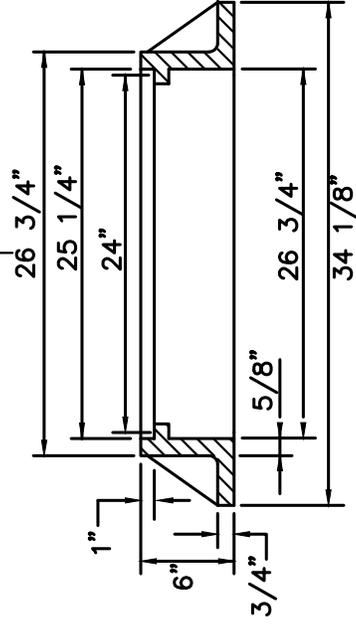
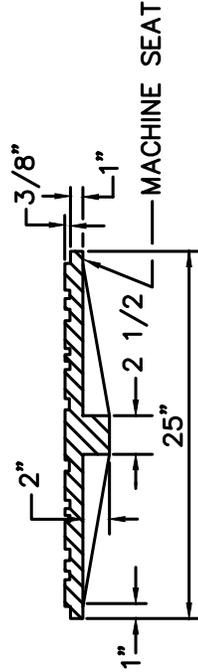
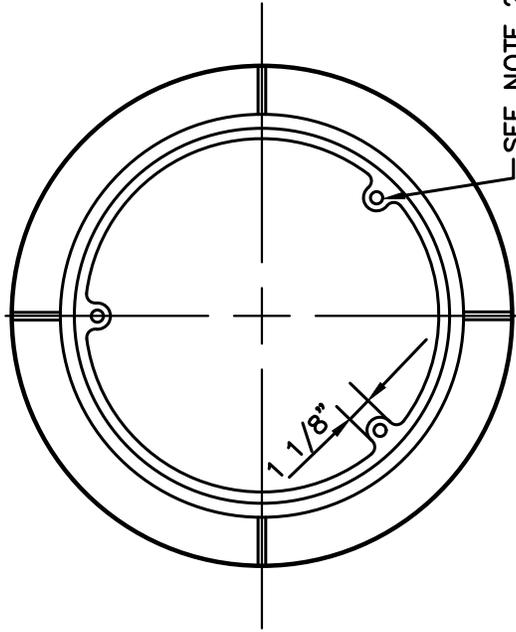
CITY OF SOUTH BEND			
INSIDE DROP MANHOLE			
APPROVED:			DWG. NO.
PUBLIC WORKS DEPT.		DATE	IDMH
DATE:	DRWN:	CHKD:	SCALE:
04/2020	T.R.G.	D.J.M.	NO SCALE

COVERS SHALL HAVE THE WORD "SEWER" IN RAISED LETTERS WHEN USED IN CONNECTION WITH SANITARY SEWER INSTALLATION, OR "WATER" WHEN IN CONNECTION WITH WATER DISTRIBUTION INSTALLATION.

NON-SKID PATTERN SHALL BE CAST INTEGRAL ON TOP OF COVER



*PATTERN NOT SHOWN FOR CLARITY

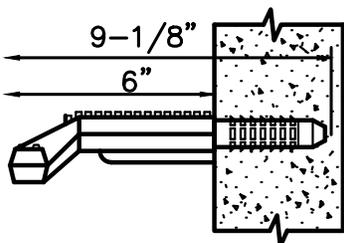
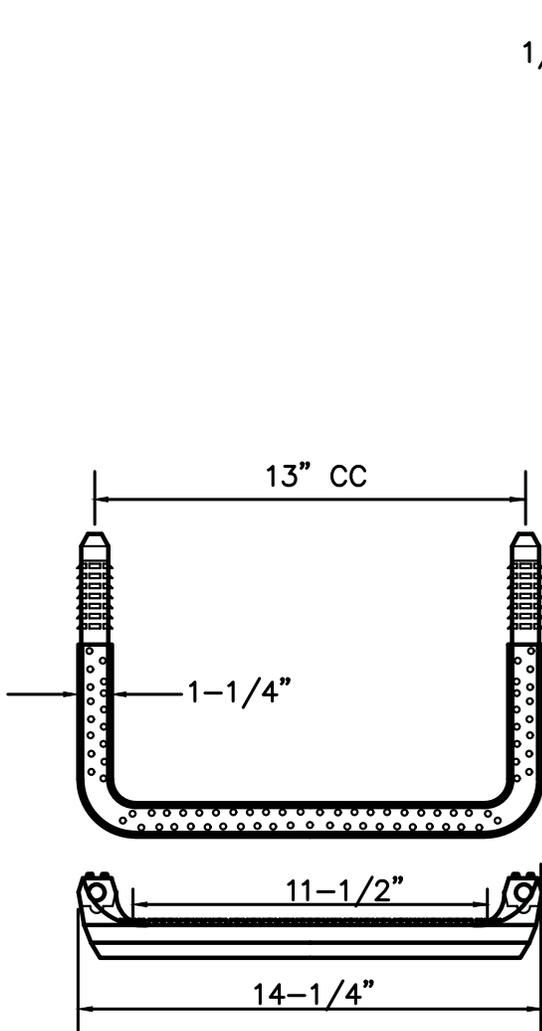


DUCTILE IRON LOCKING COVER
MINIMUM WEIGHT 180 LBS

NOTES:

1. MATERIALS ARE DUCTILE IRON ASTM A-40 CLASS 30
2. DRILL AND TAP THREE 5/8" HOLES THRU FRAME AT 120° AND 11 1/16" RADIUS
3. SATHER MANUFACTURING CO 6024-R OR OTHERWISE APPROVED R EQUAL
4. WATERTIGHT MANHOLE FRAME AND COVERS MAY BE REQUIRED BASED ON LOCAL CONDITIONS.
5. ALL MANHOLES LOCATED OUTSIDE PAVEMENT AREAS SHALL BE PROVIDED WITH LOCKING MANHOLE FRAME AND COVER.

CITY OF SOUTH BEND			
MANHOLE FRAME AND COVER			
APPROVED:			DWG. NO.
PUBLIC WORKS DEPT.		DATE	MHFC
DATE: 03/2020	DRWN: B.M.P.	CHKD: D.J.M.	SCALE: NO SCALE



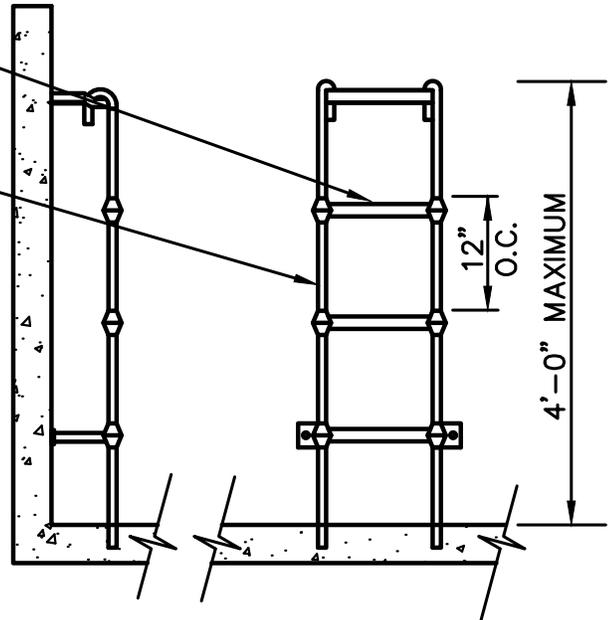
POLYPROPYLENE STEP, LANE NO. P-13938 OR EQUAL

POLYPROPYLENE MANHOLE STEPS

RUNG
1/2" GRADE 60



RAIL
9/16" ROUND BAR

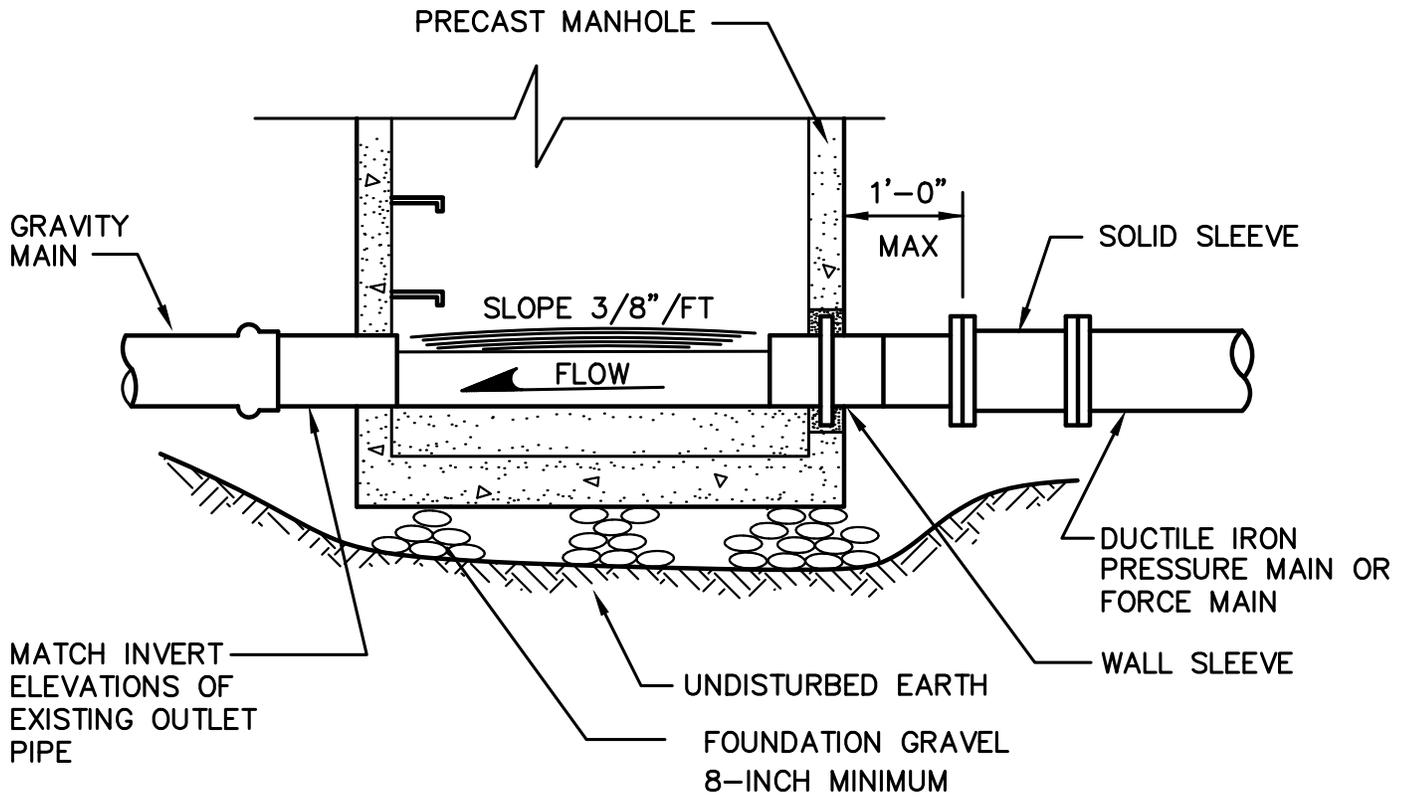


LADDER SHALL CONFORM TO POLYPROPYLENE ASTM D-4101
1/2" GRADE 60 REINFORCING BAR A-615 9/16" COLD DRAWN BAR C-1018.

POLYPROPYLENE LADDER

CITY OF SOUTH BEND			
POLYPROPYLENE LADDER AND MANHOLE STEPS			
APPROVED:			DWG. NO.
PUBLIC WORKS DEPT.		DATE	PLMHS
DATE: 03/2020	DRWN: B.M.P.	CHKD: D.J.M.	SCALE: NO SCALE

m:\south bend\20235.00_standard construction details and engineering standards\south bend\Details\Sanitary Sewer Details\FMDMH.DWG, 6/16/2020 7:19 AM, TULLY GENIS

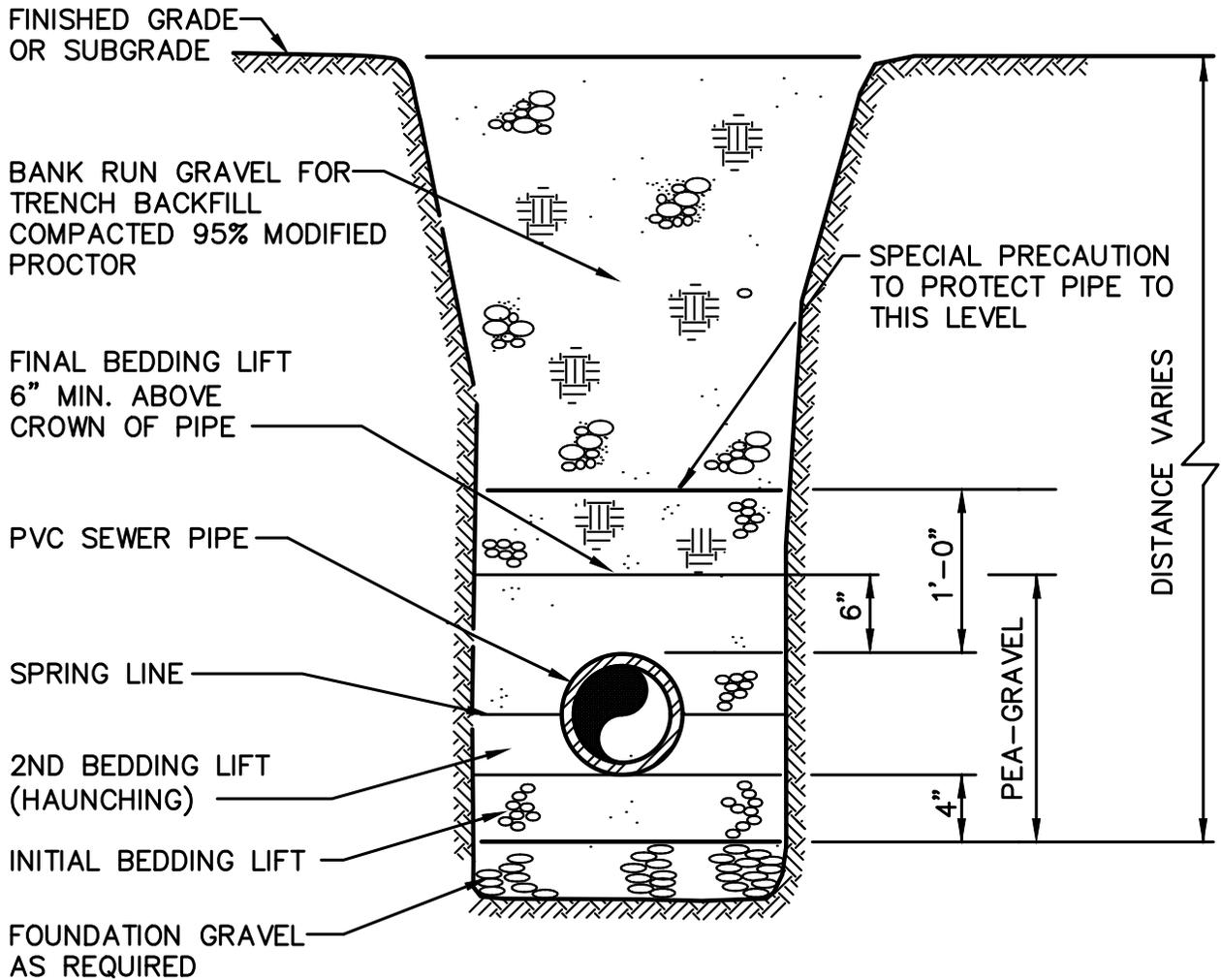


NOTES:

1. PIPE CONNECTIONS TO MANHOLES SHALL BE AS FOLLOWS:
PVC C900 AND D.I. PIPE. CORE THE MANHOLE AND CONNECT SEWER PIPE WITH A WATER TIGHT FLEXIBLE RUBBER BOOT IN MANHOLE WALL, KOR-N-SEAL BOOT OR EQUAL.
2. DROP OF GRADE THRU MANHOLE SHALL BE 0.10', UNLESS OTHERWISE APPROVED.

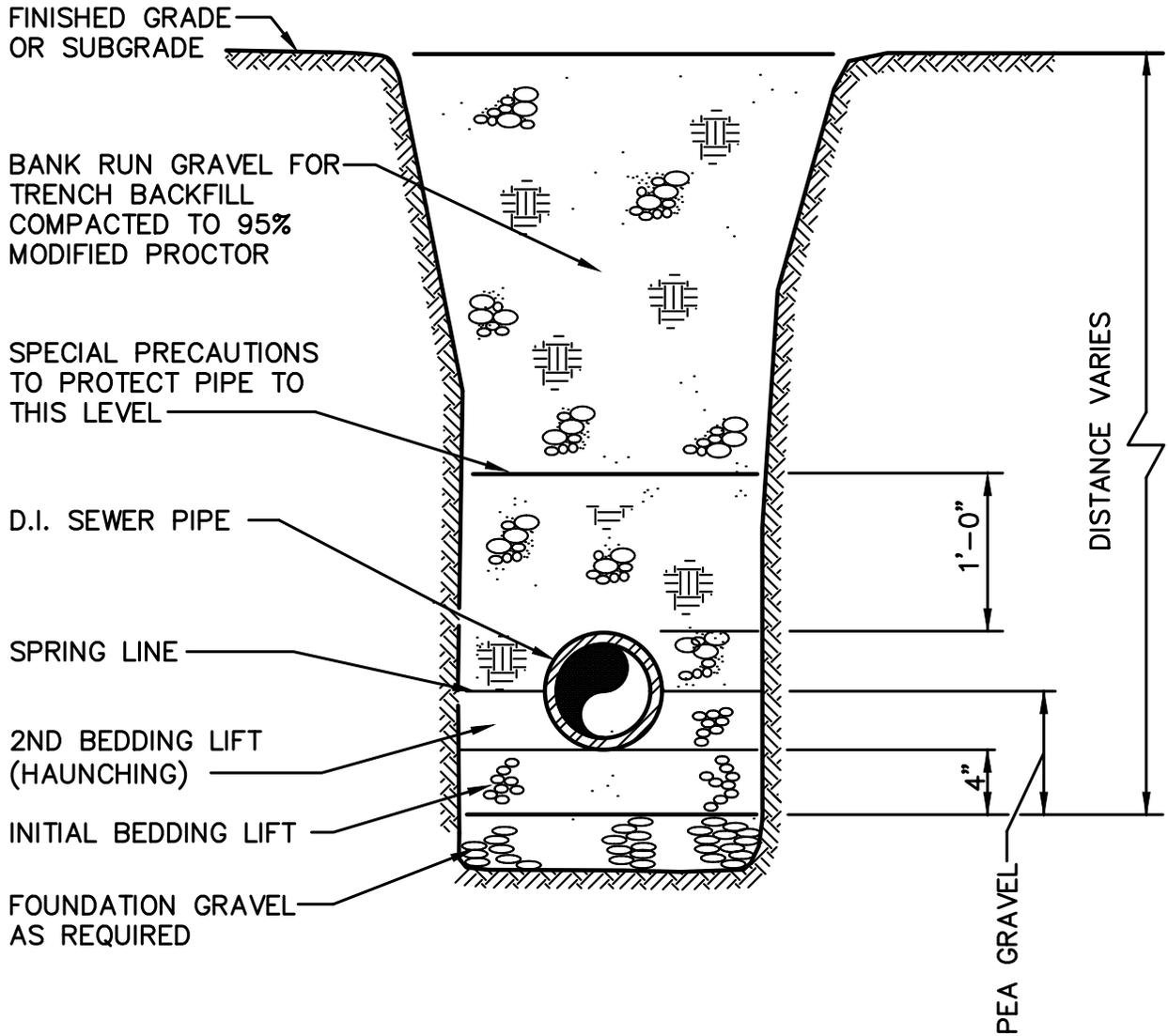
CITY OF SOUTH BEND			
FORCE MAIN DISCHARGE MANHOLE			
APPROVED:			DWG. NO.
PUBLIC WORKS DEPT.		DATE	FMDMH
DATE: 04/2020	DRWN: T.R.G.	CHKD: D.J.M.	SCALE: NO SCALE

m:\south bend\20235.00_standard construction details and engineering standards\south bend\Details\Sanitary Sewer Details\SSTSPVCP.DWG, 6/16/2020 7:19 AM, TULLY GENIS



NOTE:
 BACKFILL MATERIAL AND COMPACTION SHALL BE IN CONFORMANCE WITH CITY STANDARDS AND/OR THE STATE OR COUNTY PERMIT REQUIREMENTS (AS MAY BE APPLICABLE).

CITY OF SOUTH BEND			
SANITARY SEWER TRENCH SECTION FOR P.V.C. PIPE			
APPROVED:			DWG. NO.
PUBLIC WORKS DEPT.		DATE	SSTSPVCP
DATE:	DRWN:	CHKD:	SCALE:
03/2020	B.M.P.	D.J.M.	NO SCALE



NOTE:
 BACKFILL MATERIAL AND COMPACTION SHALL BE IN CONFORMANCE WITH CITY STANDARDS AND/OR THE STATE OR COUNTY PERMIT REQUIREMENTS (AS MAY BE APPLICABLE).

CITY OF SOUTH BEND			
SANITARY SEWER TRENCH SECTION FOR D.I. PIPE			
APPROVED:			DWG. NO.
PUBLIC WORKS DEPT.		DATE	SSTSDIP
DATE: 03/2020	DRWN: B.M.P.	CHKD: D.J.M.	SCALE: NO SCALE

m:\south bend\20235.00_standard construction details and engineering standards\south bend\Details\Sanitary Sewer Details\PLFMTTS.DWG, 6/16/2020 7:19 AM, TULLY GENIS

FINISHED GRADE
OR SUBGRADE

BANK RUN GRAVEL FOR TRENCH
BACKFILL COMPACTED 95%
MODIFIED PROCTOR

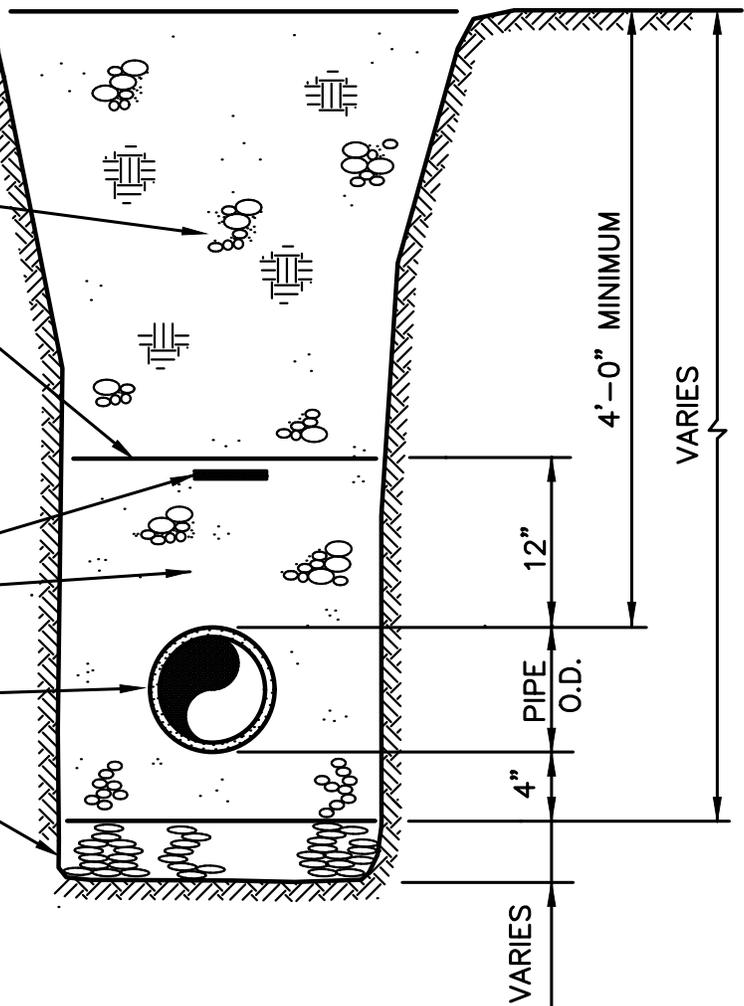
SPECIAL PRECAUTIONS TO
PROTECT PIPE TO THIS
LEVEL

3" MIN. WIDTH FLOURESCENT
ORANGE IDENTIFICATION TAPE
"NON-POTABLE WASTEWATER"
TO RUN CONTINUOUS WITH PIPE

PEA GRAVEL

DUCTILE IRON
SEWER PIPE

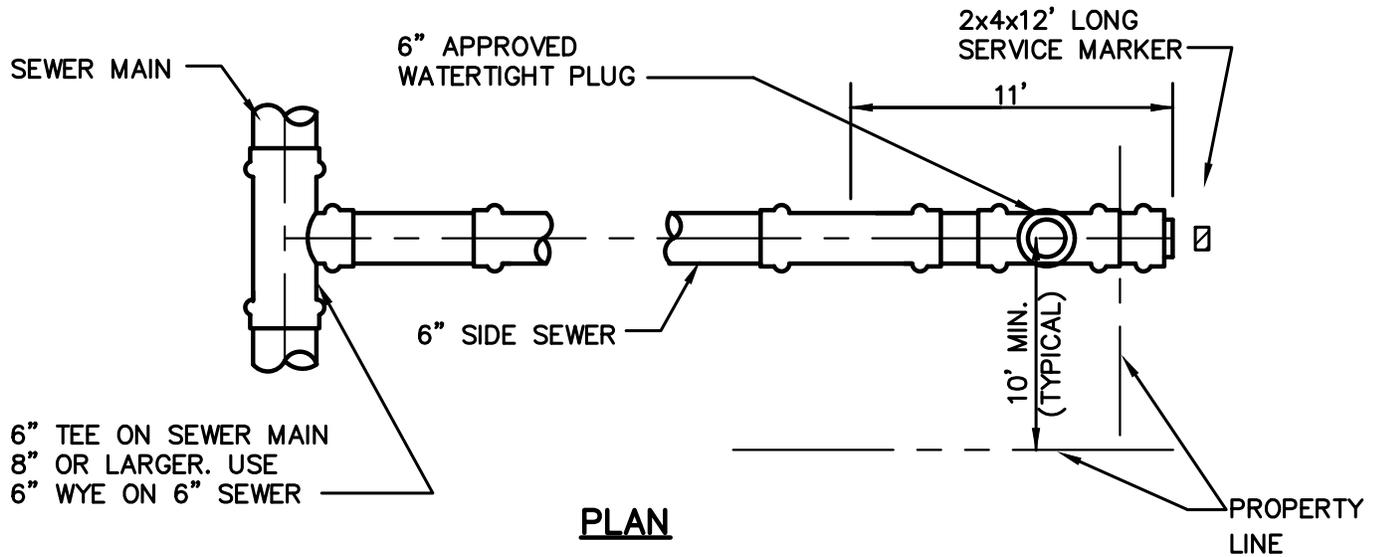
FOUNDATION GRAVEL
AS REQUIRED



NOTE:

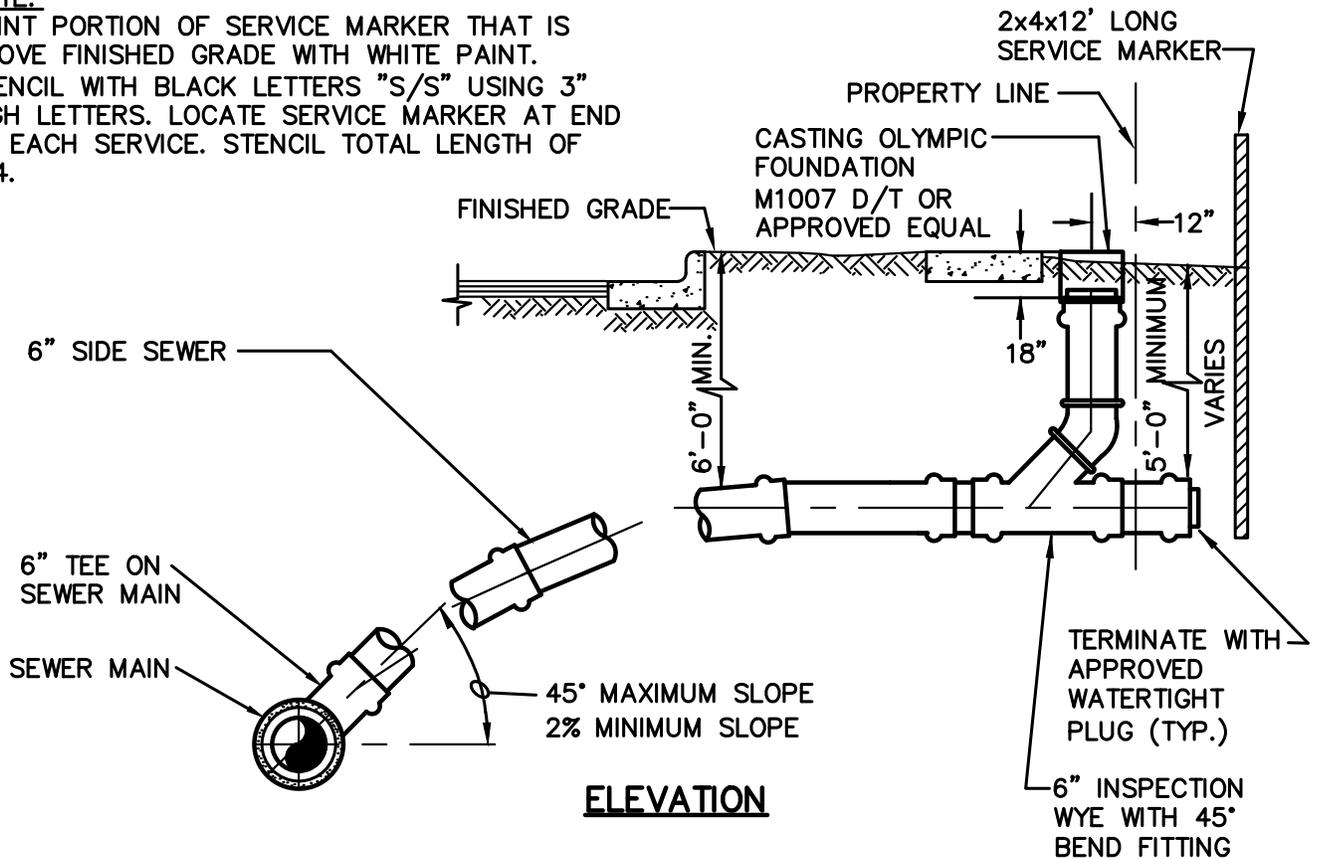
BACKFILL MATERIAL AND COMPACTION SHALL BE IN CONFORMANCE WITH CITY STANDARDS AND/OR THE STATE OR COUNTY PERMIT REQUIREMENTS (AS MAY BE APPLICABLE).

CITY OF SOUTH BEND			
PRESSURE LINE AND FORCE MAIN TYPICAL TRENCH SECTION			
APPROVED:			DWG. NO.
PUBLIC WORKS DEPT.		DATE	PLFMTTS
DATE: 03/2020	DRWN: B.M.P.	CHKD: D.J.M.	SCALE: NO SCALE



PLAN

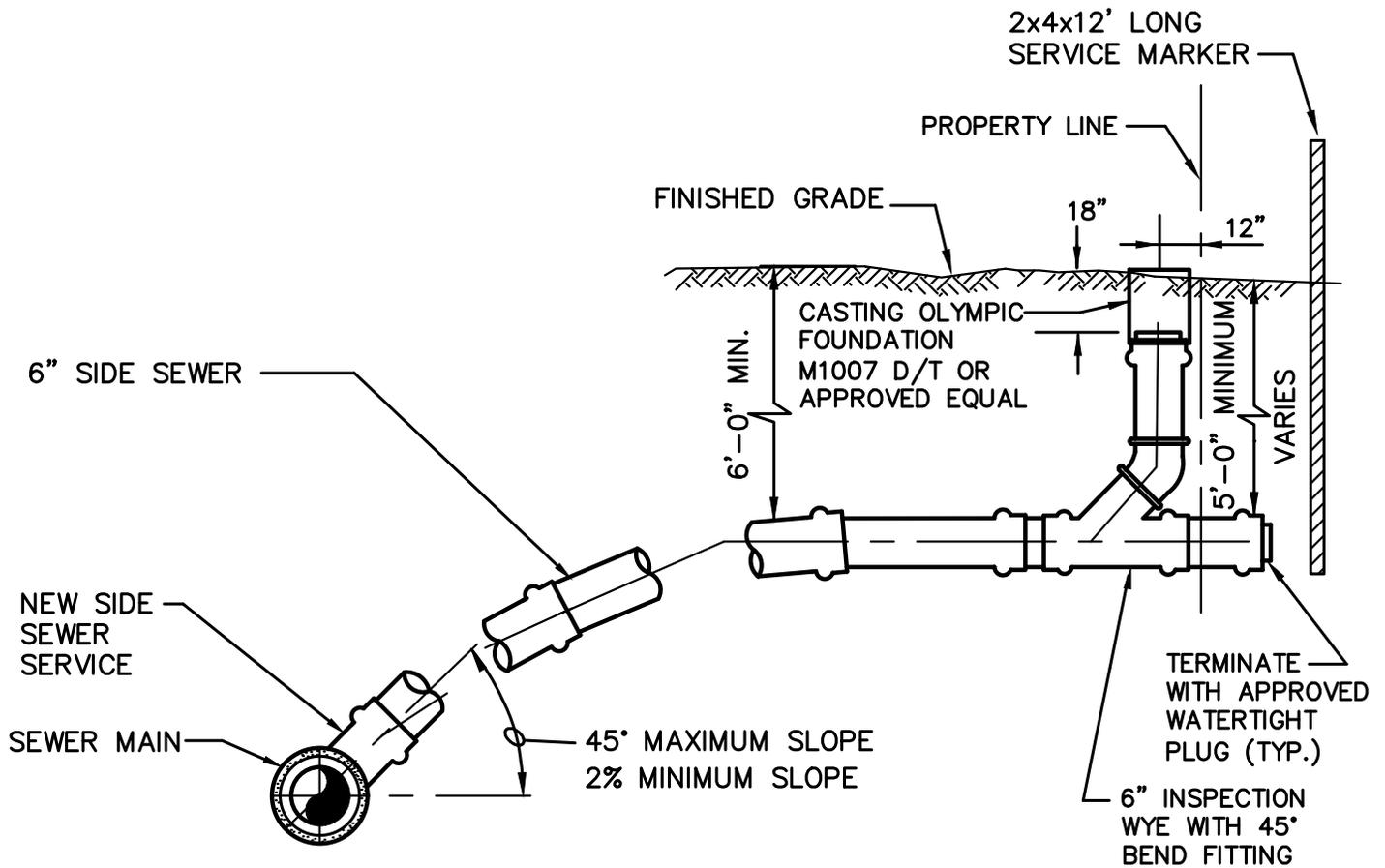
NOTE:
 PAINT PORTION OF SERVICE MARKER THAT IS ABOVE FINISHED GRADE WITH WHITE PAINT. STENCIL WITH BLACK LETTERS "S/S" USING 3" HIGH LETTERS. LOCATE SERVICE MARKER AT END OF EACH SERVICE. STENCIL TOTAL LENGTH OF 2x4.



ELEVATION

- NOTES:**
1. MAXIMUM DEFLECTION NOT TO EXCEED POPE MANUFACTURER RECOMMENDATIONS.
 2. SIDE SEWER LATERAL SHALL BE THE SAME MATERIAL AS THE MAIN LINE SEWER AND BEDDED THE SAME.
 3. PIPE TO BE BEDDED IN PEA GRAVEL.
 4. MARKED SEWER CASING OLYMPIC FOUNDRY M1007 D/T OR APPROVED EQUAL.

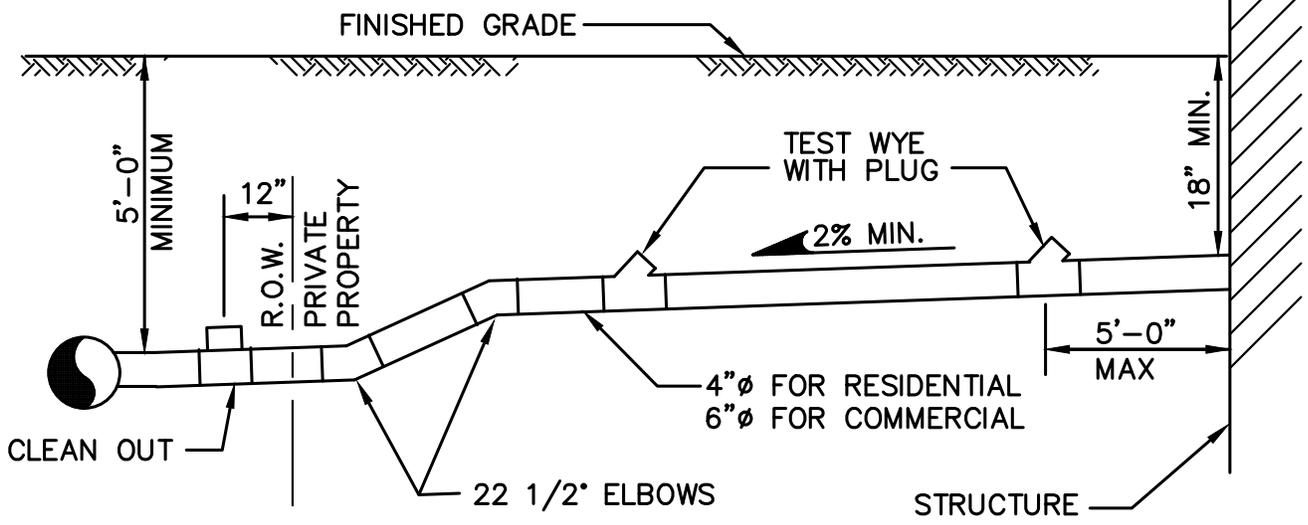
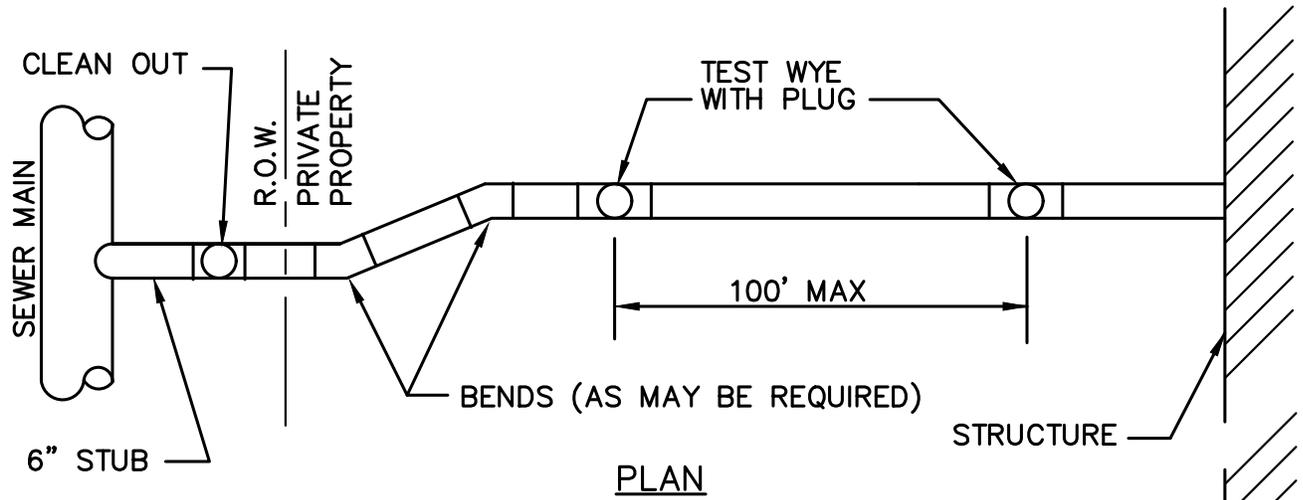
CITY OF SOUTH BEND			
TYPICAL SIDE SEWER DETAIL (WITHIN NEW DEVELOPMENT)			
APPROVED:		DWG. NO.	
PUBLIC WORKS DEPT.		TSSD	
DATE:	DRWN:	CHKD:	SCALE:
03/2020	B.M.P.	D.J.M.	NO SCALE



NOTES:

1. PAINT PORTION OF SERVICE MARKER THAT IS ABOVE FINISHED GRADE WITH WHITE PAINT. STENCIL WITH BLACK LETTERS "S/S" USING 3" HIGH LETTERS. LOCATE SERVICE MARKER AT END OF EACH SERVICE. STENCIL TOTAL LENGTH OF 2x4.
2. TAP EXISTING SEWER MAIN WITH INSTA T ROMAC W/ SS STRAPS SADDLE. INSTALL NEW SIDE SEWER TEE ON NEW MAIN LINES.
3. WHEN TAPPED SERVICE IS PERMITTED, CONTRACTOR SHALL PROVIDE SEWER MAIN COUPON TO CITY STAFF.
4. SEE "TYPICAL SIDE SEWER DETAIL" FOR CONSTRUCTION IN NEW DEVELOPMENTS.
5. PROVIDE PEA GRAVEL PIPE BEDDING SEE TRENCH SECTION DETAIL.
5. WATER TEST BEFORE CONNECTIONS TO SERVICE.

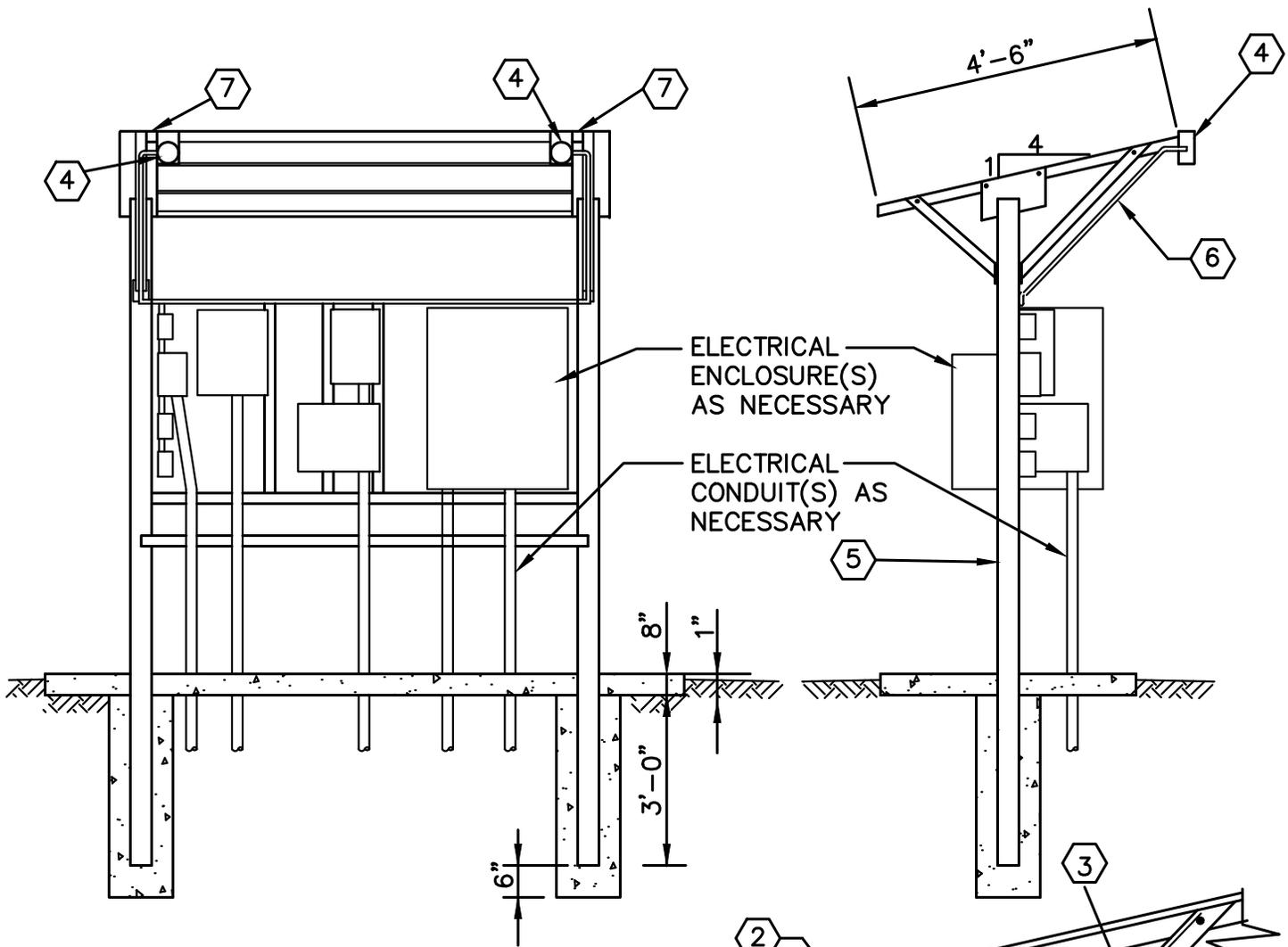
CITY OF SOUTH BEND			
NEW SIDE SEWER SERVICE (WITHIN EXISTING STREET RIGHT-OF-WAY)			
APPROVED:			DWG. NO.
PUBLIC WORKS DEPT.			SSD
DATE:		DATE	
03/2020	DRWN:	CHKD:	SCALE:
	B.M.P.	D.J.M.	NO SCALE



NOTES:

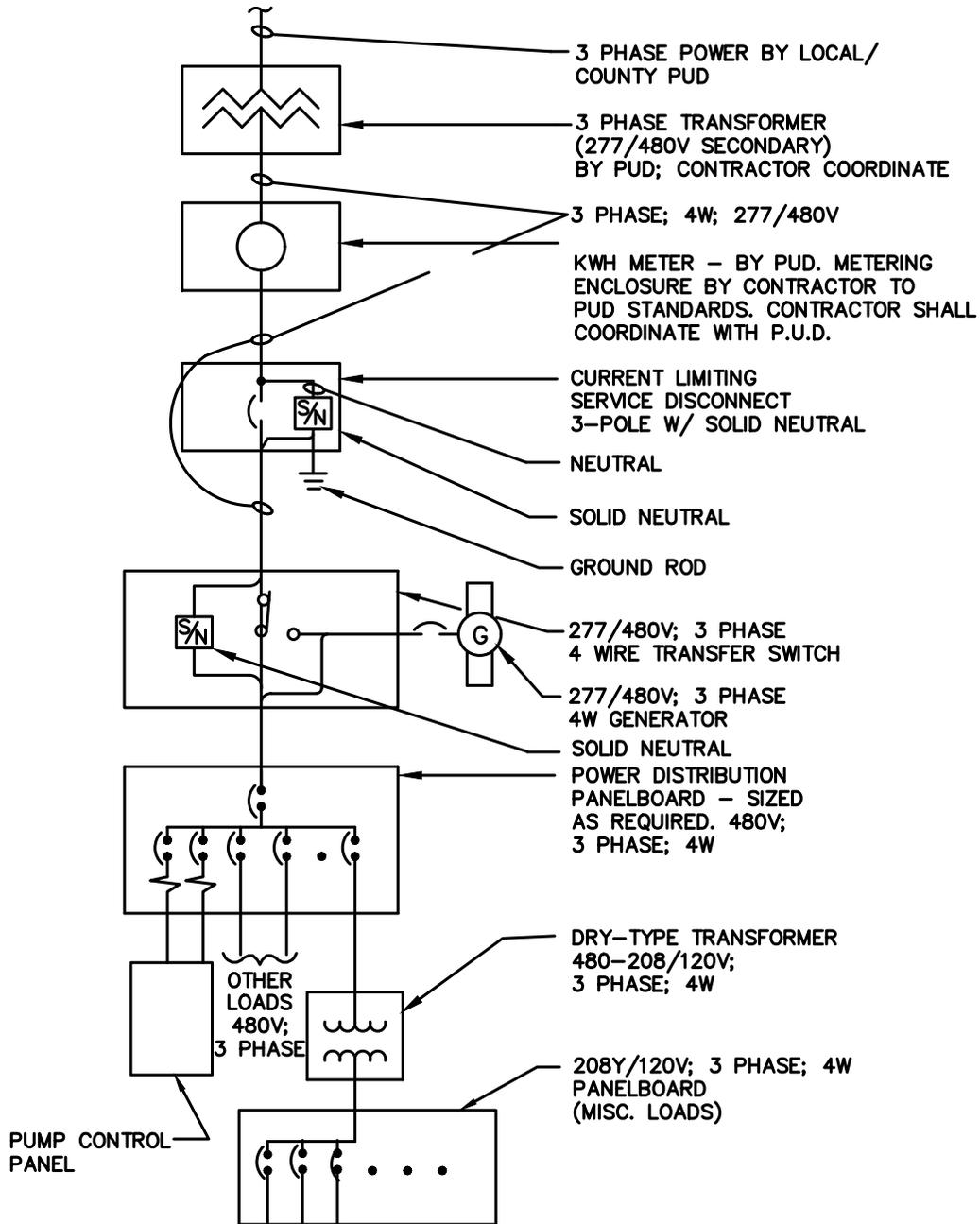
1. ELBOWS SHALL NOT BE GREATER THAN 45°
2. CLEAN OUT IS REQUIRED FOR EACH PIPE LENGTH GREATER THAN 100' AND FOR EACH 90° ACCUMULATED ELBOW/100'
3. RIGHT-OF-WAY RESTORATION SHALL MATCH OR EXCEED THE ORIGINAL CONDITION.
4. BACKFILL FOR PAVED AREA SHALL BE 5/8" MINUS CRUSHED SURFACING TOP COURSE, COMPACTED IN 12" LIFTS
5. ALL PLUMBING OUTLETS SHALL BE CONNECTED TO THE SEWER. NO DOWNSPOUTS OR STORM DRAINAGE MAY BE CONNECTED TO THE SEWER SYSTEM.
6. 18" MINIMUM COVERAGE OF PIPE
7. 6' MINIMUM COVERAGE AT PROPERTY LINE
8. LAY PIPE IN STRAIGHT LINE BETWEEN BENDS. MAKE ALL CHANGES IN GRADE OR LINE WITH AN ELBOW OR WYE. 90° CHANGE WITH AN ELBOW AND WYE.
9. 6" SEWER PIPE MINIMUM SIZE IN RIGHT-OF-WAY 2% MINIMUM GRADE, 45% MAXIMUM.
10. 4" SEWER PIPE MINIMUM SIZE ON PRIVATE RESIDENTIAL PROPERTY. 6" SEWER PIPE MIN. SIZE ON COMMERCIAL PROPERTIES. 2% MINIMUM GRADE, 45° MAXIMUM.
11. CONSTRUCTION IN RIGHT-OF-WAY SHALL BE PERFORMED BY A REGISTERED LICENSED CONTRACTOR.
12. ALL CONSTRUCTION REQUIRES A PERMIT AND PAYMENT OF FEE. COMPLETE LEGAL DESCRIPTION OF PROPERTY AND DIMENSIONS.
13. AS-BUILT DRAWING SHOWING LOCATION OF SIDE SEWER IN RELATION TO THE HOUSE IS REQUIRED AFTER INSTALLATION.

CITY OF SOUTH BEND			
PRIVATE SIDE SEWER INSTALLATION			
APPROVED:			DWG. NO.
PUBLIC WORKS DEPT.		DATE	PSSI
DATE: 03/2020	DRWN: B.M.P.	CHKD: D.J.M.	SCALE: NO SCALE



- ① GALVANIZED STEEL PLATE 8x14x1/4"
- ② 24 GAGE METAL ROOFING MATERIAL, PAINTED, OVERHANG ALL SIDES.
- ③ 2X2 GALV. STEEL ANGLE
- ④ LIGHT FIXTURE, 2 SETS, WEATHER PROOF CAST ALUMINUM BOX AND COVER
2 150 WATT FLOOD LIGHTS EACH (ADJUSTABLE)
- ⑤ 6" I.D. ELECTRICAL GALV. CONDUIT (SCHEDULE 40)
CLOSED TOP (WELDED)
- ⑥ ELECTRICAL CONDUIT, 3/4" GALV.
- ⑦ 2-1/2" SQUARE TUBE STEEL,
1/4" WALL WITH 4 ROOF SUPPORT
STRINGERS.

CITY OF SOUTH BEND			
ROOF STRUCTURE FOR ELECTRICAL ENCLOSURE			
APPROVED:			DWG. NO.
PUBLIC WORKS DEPT.			RSEE
DATE:	DRWN:	CHKD:	SCALE:
04/2020	T.R.G.	D.J.M.	NO SCALE



CITY OF SOUTH BEND			
LIFT STATION ELECTRICAL SCHEMATIC 3 PHASE, 277Y/480V POWER			
APPROVED:			DWG. NO.
PUBLIC WORKS DEPT.		DATE	LSES
DATE: 03/2020	DRWN: B.M.P.	CHKD: D.J.M.	SCALE: NO SCALE

MANHOLE FRAME & COVER WITH "SEWERS"
 CAST ON COVER WITH 3" HIGH RAISED
 LETTERS (NON-SKID PATTERN) AS
 MANUFACTURED BY "SATHER MANUFACTURING
 CO., INC." NO. 6024-R. 3 HOLE LOCKING
 FRAME AND COVER. ONE (1) BOLT HOLE
 TO BE CENTERED OVER LADDER

FIRST STEP
 14" MIN.
 18" MAX.

GROUT BETWEEN RINGS

POLYPROPYLENE MANHOLE
 STEPS NO. P-13938 LOCATED
 AT 12" O.C.

GROUT LIFT HOLES
 INSIDE AND OUTSIDE

TAG AIR AND VACUUM
 UNIT NON POTABLE
 TRANSMISSION LINE

2" GATE VALVE
 TH X TH

POLYPROPYLENE LADDER

6" BLIND FLANGE, TAP
 FOR 2" AIR & VACUUM
 UNIT

MJ TEE SIZE AS REQ'D
 WITH 6" FLANGE TEE

2" 90° BASE WITH 2"
 PIPE SUPPORT

FINISHED GRADE

4" X 24" PRECAST CONC.
 ADJUSTMENT RINGS
 2 RINGS REQUIRED
 4 RINGS MAXIMUM
 PLASTER INSIDE AND
 OUTSIDE FACE WITH 1/2"
 THICK GROUT

48" DIA. X 8" THICK
 CONCRETE SLAB

48" INSIDE DIAMETER
 PRECAST MANHOLE

RUBBER GASKET SEALING
 ELEMENT

"APCO, CRISPIN OR
 VALMATIC" HEAVY-DUTY
 COMBINATION AIR AND
 VACUUM VALVE
 W/STAINLESS STEEL
 INTERNALS & EPOXY
 COATING . SEATS SHALL
 BE SUPPLIED FOR THE
 FOLLOWING WORKING
 PRESSURES: 20 PSI,
 20-150 PSI W/FLUSHING
 ATTACHMENTS

4" DRAINAGE OUTLET
 PIPE TO DAYLIGHT OR
 STORM DRAIN MIN.
 1% SLOPE

FOUNDATION GRAVEL

UNDISTURBED EARTH

NOTES:

- PIPE CONNECTIONS TO MANHOLES SHALL BE AS FOLLOWS:
 PVC PIPE: CAST OR GROUT A MANHOLE COUPLING INTO WALL.
 D.I. PIPE: BELL AND SPIGOT JOINT OR FLEXIBLE COUPLING
 EITHER SHALL BE 12" MAXIMUM DISTANCE FROM MANHOLE WALL.
 PVC AND D.I. PIPE, OPTIONAL: CORE THE MANHOLE AND
 CONNECT SEWER PIPE WITH A WATER TIGHT FLEXIBLE RUBBER
 BOOT IN MANHOLE WALL, KOR-N-SEAL BOOT,
 HEAVY DUTY SAND COLLAR, OR EQUAL.
- DROP OF GRADE THRU MANHOLE SHALL
 BE 0.10', UNLESS OTHERWISE APPROVED.

CITY OF SOUTHBEND

AIR AND VACUUM RELEASE ASSEMBLY

APPROVED:

DWG. NO.

PUBLIC WORKS DEPT.

DATE

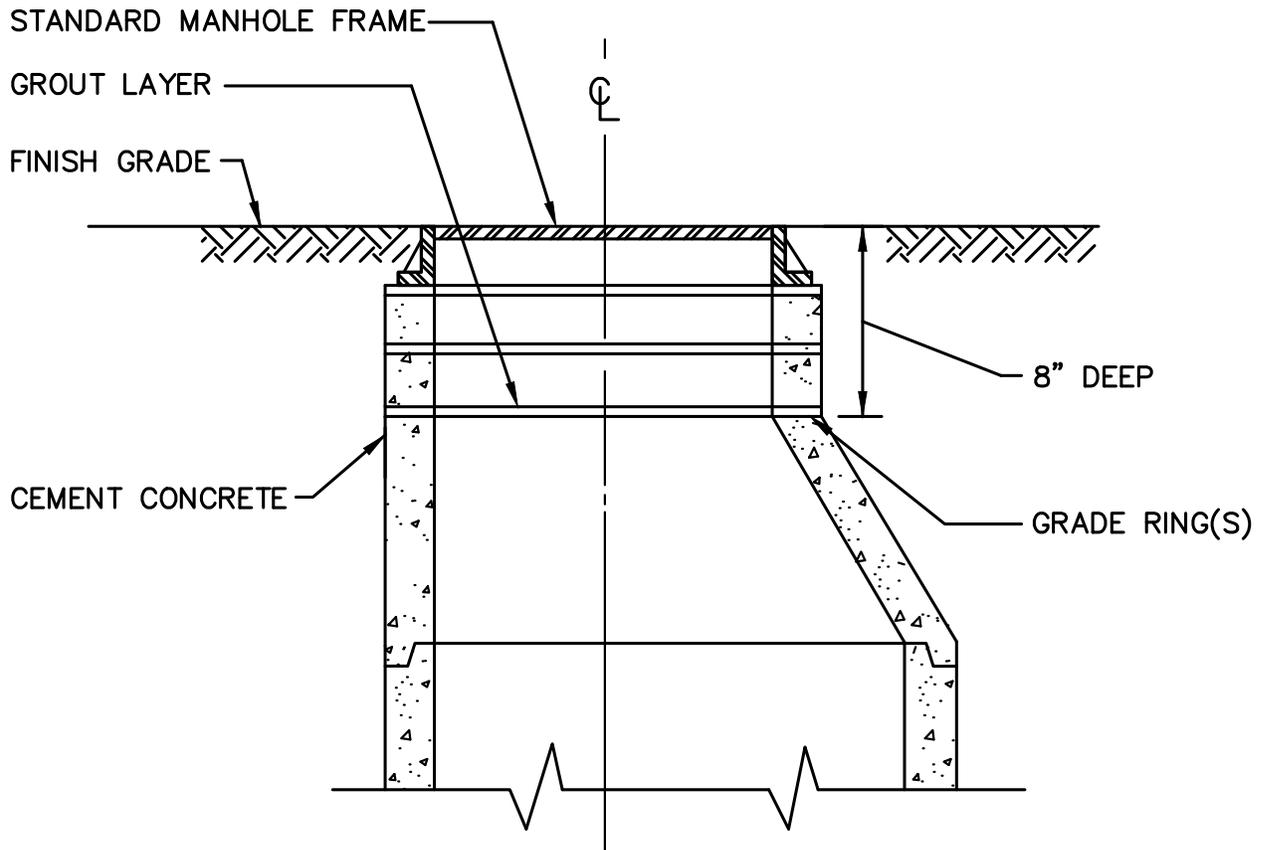
AVRA

DATE:
03/2020

DRWN:
B.M.P.

CHKD:
D.J.M.

SCALE:
NO SCALE

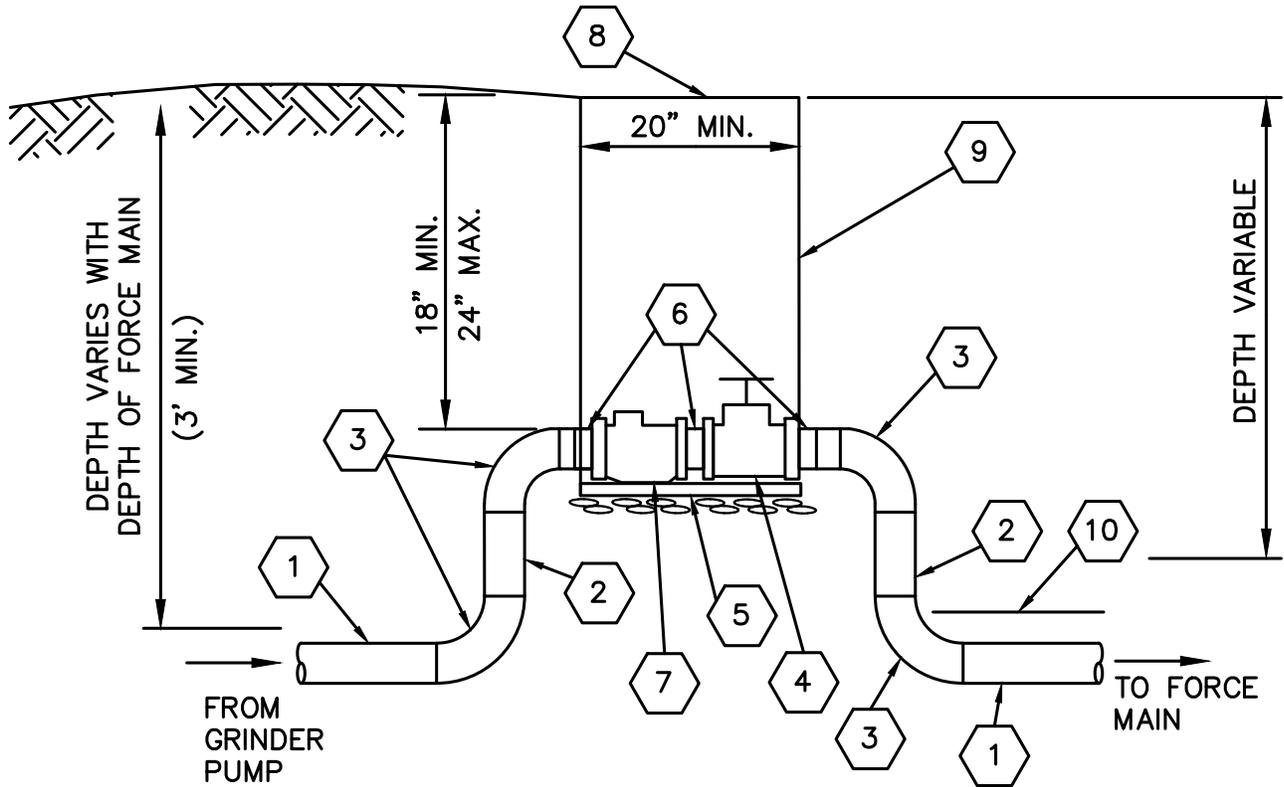


SECTION

NOTES:

1. CONSTRUCT CONCENTRIC CONCRETE COLLARS AROUND ALL MANHOLE FRAMES LOCATED OUTSIDE OF PAVEMENT AREAS.
2. HOLD DOWN 2" FOR MANHOLES IN ASPHALT SECTIONS.

CITY OF SOUTH BEND			
MANHOLE FRAME COLLAR			
APPROVED:			DWG. NO.
PUBLIC WORKS DEPT.			MHCLAR
DATE:		CHKD:	SCALE:
03/2020	DRWN: B.M.P.	D.J.M.	NO SCALE

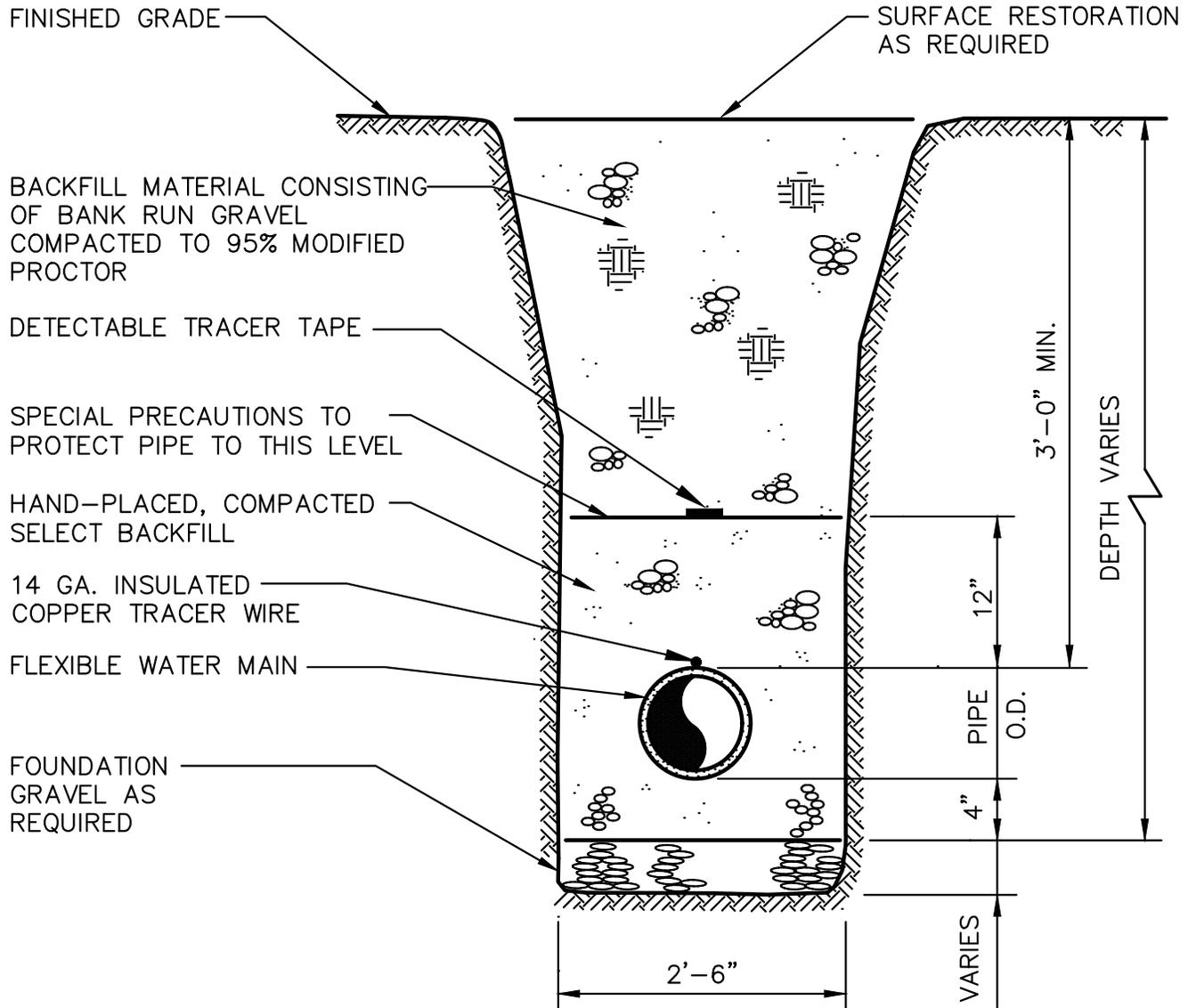


- 1 1-1/4" SCH 80 PVC. TRANSITION TO IPS HDPE DR 11 FOR CONNECTION TO SERVICE LINE OR FORCE MAIN.
- 2 1-1/4" SCH 80 PVC PIPE, LENGTH AS NEEDED
- 3 1-1/4" SCH 80 PVC 90° FITTING
- 4 1-1/4" CEPEX BALL VALVE, TRUE UNION
- 5 4" OF CSTC, COMPACTED TO 95%
- 6 1-1/4" SCH 80 PVC NIPPLE, THREADED, 3"± IN LENGTH
- 7 1-1/4" PVC CHECK VALVE, TRUE UNION
- 8 SOLID STEEL OR CAST IRON LID, H-20 RATED, WITH "SEWER" ON LID
- 9 METER BOX, MIN LENGTH OF 20". METER BOX SHALL BE H-20 RATED IF LOCATED IN PAVEMENT, ROADWAY, PARKING LOT, OR DRIVE WAY. ALL OTHER METER BOXES SHALL BE RATED FOR INCIDENTAL, NON-DELIBERATE TRAFFIC.
- 10 DETECTABLE TRACER TAPE

CITY OF SOUTH BEND			
SERVICE LINE ISOLATION VALVE ASSEMBLY			
APPROVED:			DWG. NO.
PUBLIC WORKS DEPT.		DATE	SSIV
DATE: 03/2020	DRWN: B.M.P.	CHKD: D.J.M.	SCALE: NO SCALE

WATER DETAILS

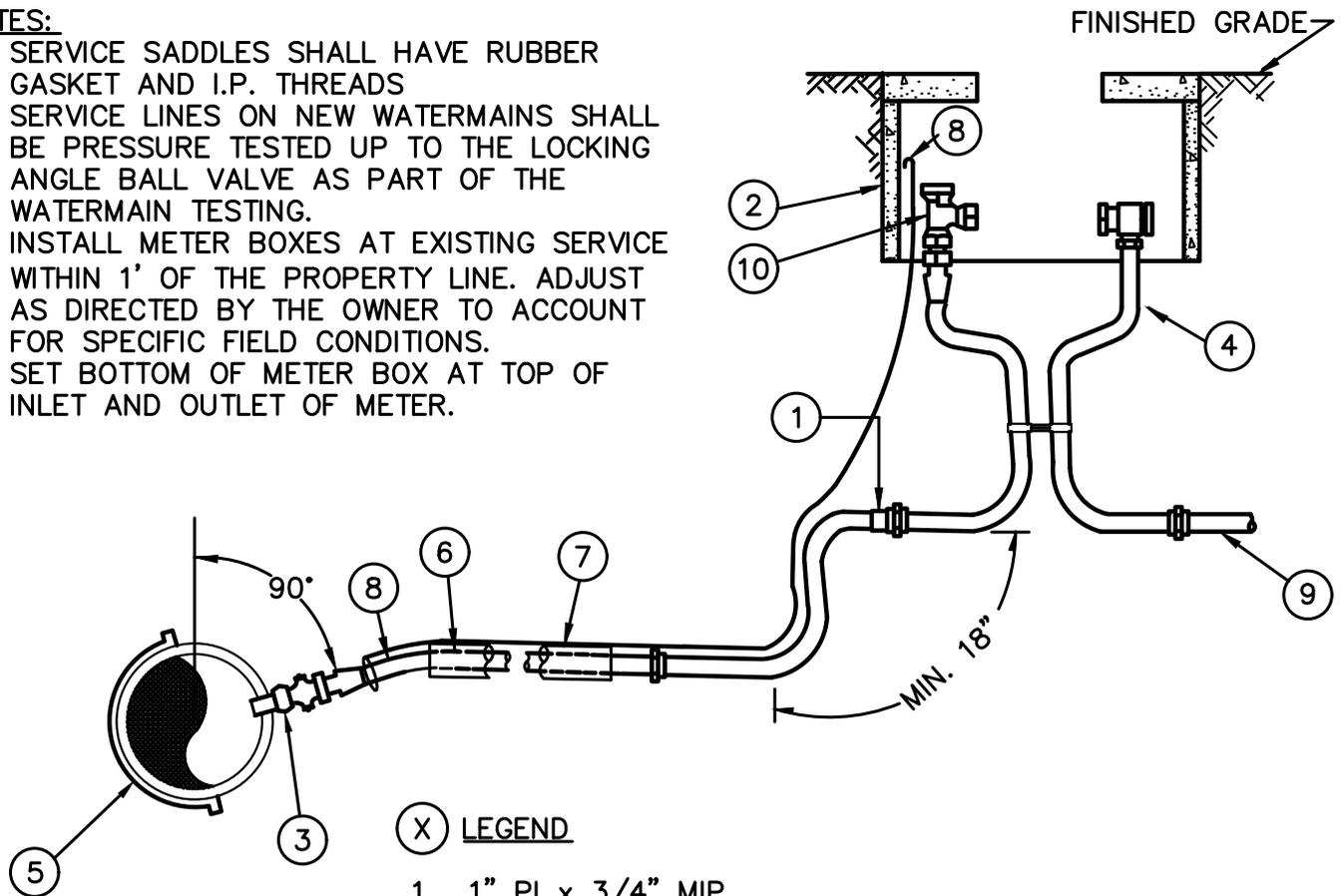
m:\south bend\20235.00_standard construction details and engineering standards\south bend\Details\Water Details\WATR-1.dwg, 6/16/2020 7:20 AM, TULLY GENIS



CITY OF SOUTH BEND			
WATER MAIN TRENCH SECTION			
APPROVED:			DWG. NO.
PUBLIC WORKS DEPT.		DATE	WATR-1
DATE:	DRWN:	CHKD:	SCALE:
05/2020	T.R.G.	D.J.M.	NO SCALE

NOTES:

1. SERVICE SADDLES SHALL HAVE RUBBER GASKET AND I.P. THREADS
2. SERVICE LINES ON NEW WATERMAINS SHALL BE PRESSURE TESTED UP TO THE LOCKING ANGLE BALL VALVE AS PART OF THE WATERMAIN TESTING.
3. INSTALL METER BOXES AT EXISTING SERVICE WITHIN 1' OF THE PROPERTY LINE. ADJUST AS DIRECTED BY THE OWNER TO ACCOUNT FOR SPECIFIC FIELD CONDITIONS.
4. SET BOTTOM OF METER BOX AT TOP OF INLET AND OUTLET OF METER.

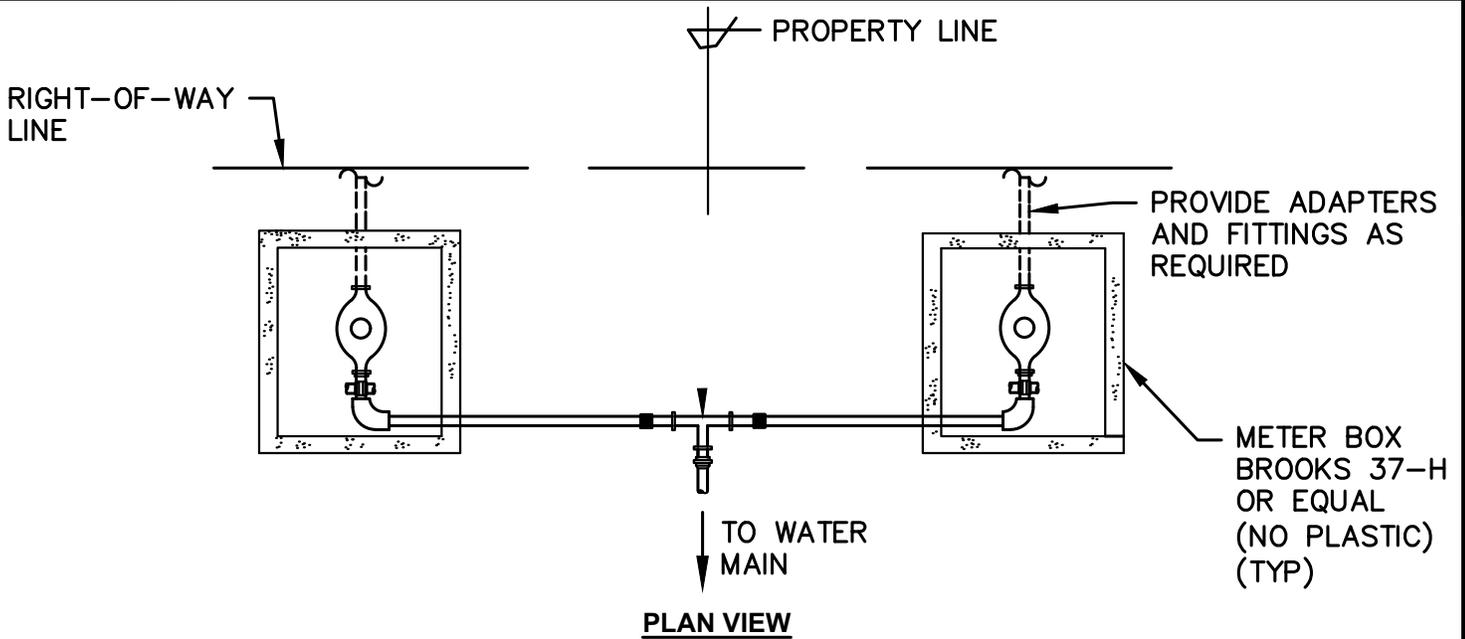


(X) **LEGEND**

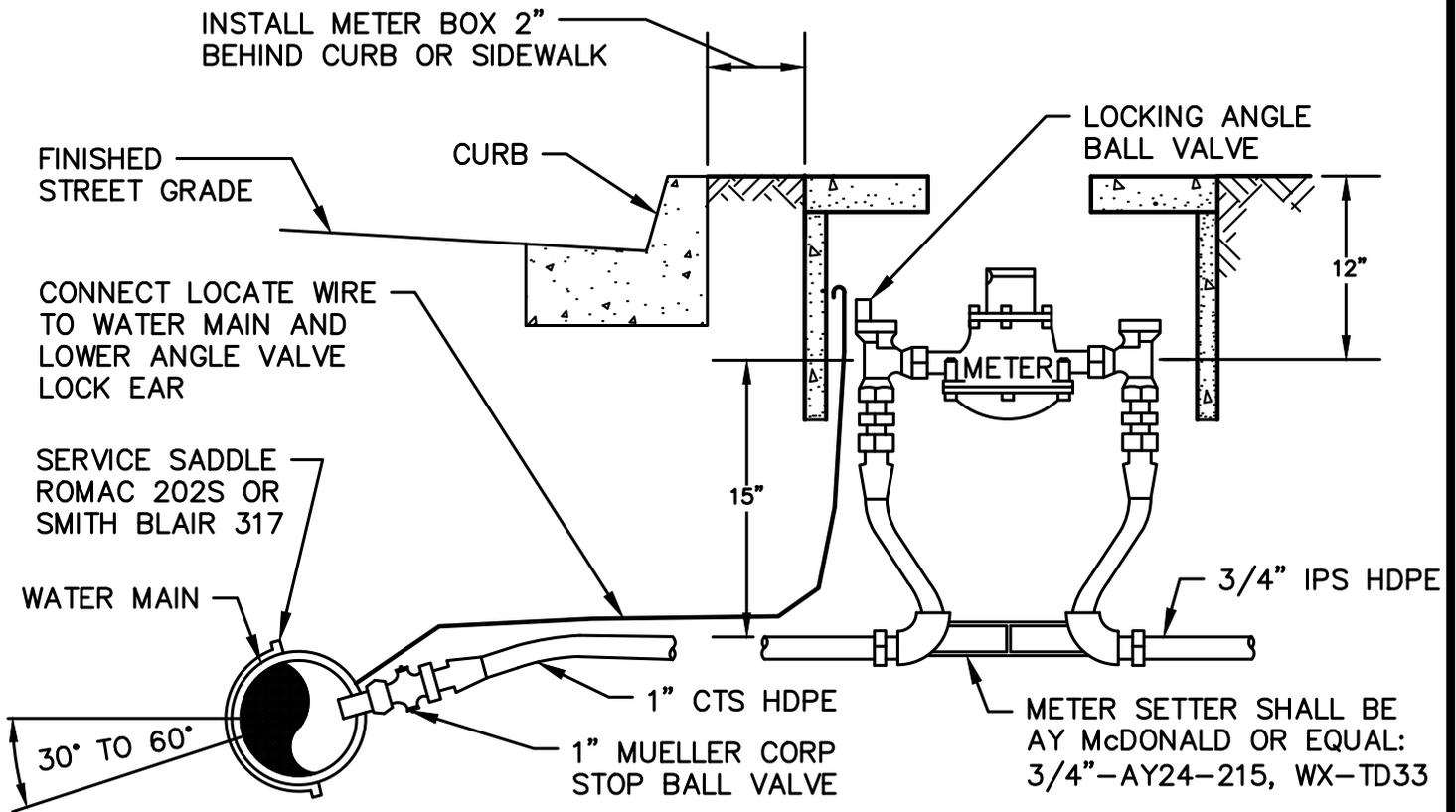
1. 1" PI x 3/4" MIP
2. CARSON INDUSTRIES 1419 METER BOX BODY WITH READER COVER
3. 1" MIP x PEP JOINT CORP STOP, MUELLER
4. COPPER SETTER FORD VBH72-12W WITH D86-33 OR AY MCDONALD 3/4-AY24-215
5. SERVICE SADDLE ROMAC 202S OR SMITH BLAIR 317
6. 3/4" (SINGLE SERVICE) HIGH MOLECULAR (200 PSI, SDR 7) "POLY" PIPE (LENGTH AS REQUIRED)
7. INSTALL SERVICE LINE IN 2" PVC GUARD PIPE (SCH-80) WHEN CROSSING ROADWAY (3' MINIMUM BEYOND AND BENEATH PAVEMENT SECTION)
8. 14 GAUGE WIRE FROM MAINLINE TAP TO METER BOX AND EXPOSE 6" MINIMUM IN BOX (RUN INSIDE 2" PVC GUARD CONDUIT WHERE APPLICABLE)
9. PROVIDE APPROVED WATERTIGHT PLUG UNTIL CONNECTION TO PRIVATE SYSTEM IS MADE.
10. LOCKING ANGLE BALL VALVE

CITY OF SOUTH BEND			
1" & SMALLER WATER SERVICE			
APPROVED:			DWG. NO.
PUBLIC WORKS DEPT.			WS-1
DATE:	DRWN:	CHKD:	SCALE:
06/2020	T.R.G.	D.J.M.	NO SCALE

m:\south bend\20235.00_standard construction details and engineering standards\south bend\Details\Water Details\WS-1D.dwg, 6/16/2020 7:20 AM, TULLY GENIS



PLAN VIEW



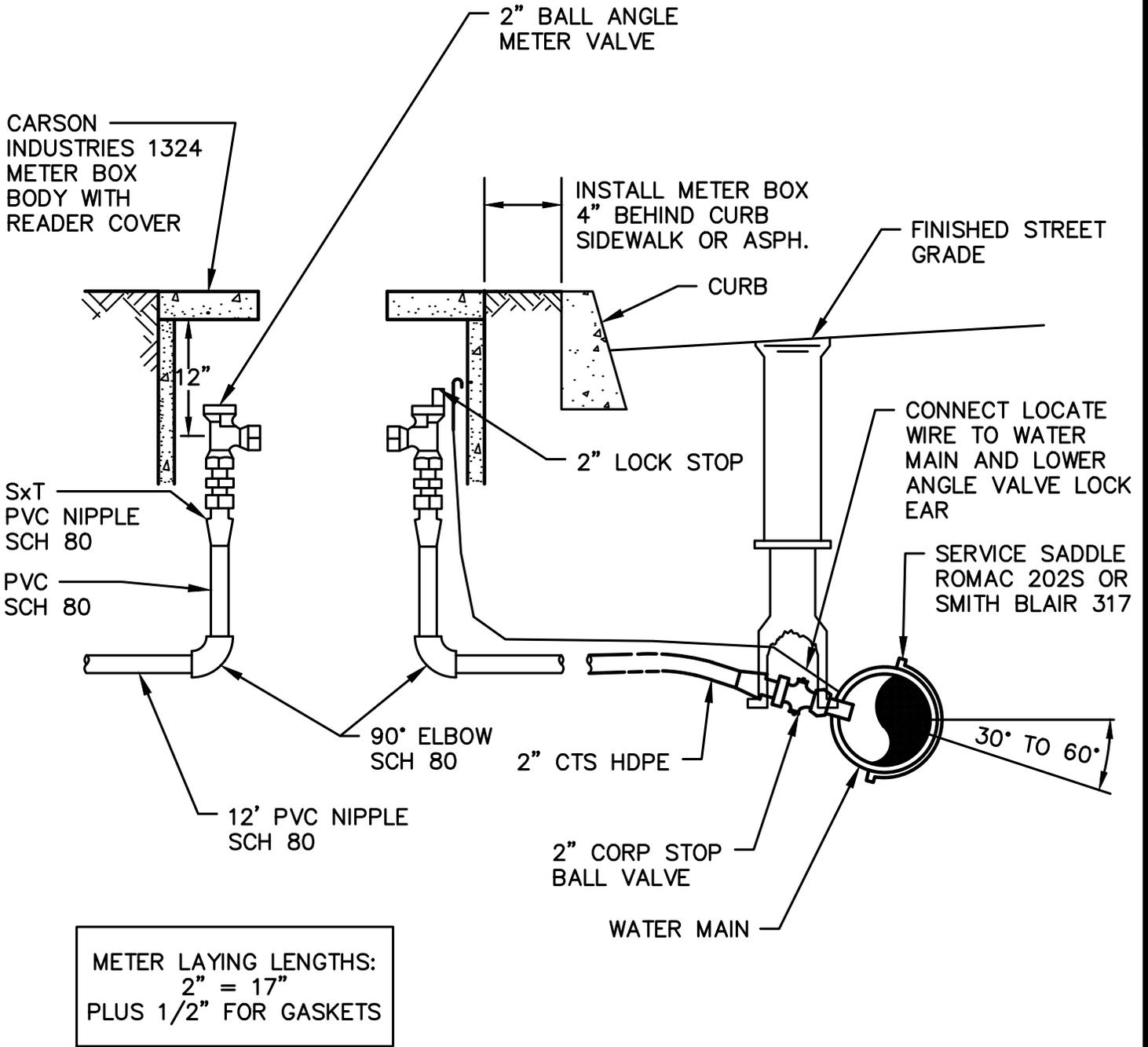
SECTION VIEW

NOTES:

1. SERVICE SADDLES SHALL HAVE RUBBER GASKET AND I.P. THREADS.
2. SERVICE LINES ON NEW WATER MAINS SHALL BE PRESSURE TESTED UP TO THE LOCKING ANGLE BALL VALVE AS PART OF THE WATER MAIN TESTING.
3. INSTALL METER BOXES AT EXISTING SERVICE WITHIN 1" OF PROPERTY LINE. ADJUST AS DIRECTED BY OWNER TO ACCOUNT FOR SPECIFIC FIELD CONDITIONS.

CITY OF SOUTH BEND			
3/4" DOUBLE WATER SERVICE			
APPROVED:			DWG. NO.
PUBLIC WORKS DEPT.			WS-1D
DATE:	DRWN:	CHKD:	SCALE:
05/2020	T.R.G.	D.J.M.	NO SCALE

M:\south bend\20235.00_standard construction details and engineering standards\south bend\Details\Water Details\WS-2.dwg, 6/16/2020 7:30 AM, TULLY GENIS



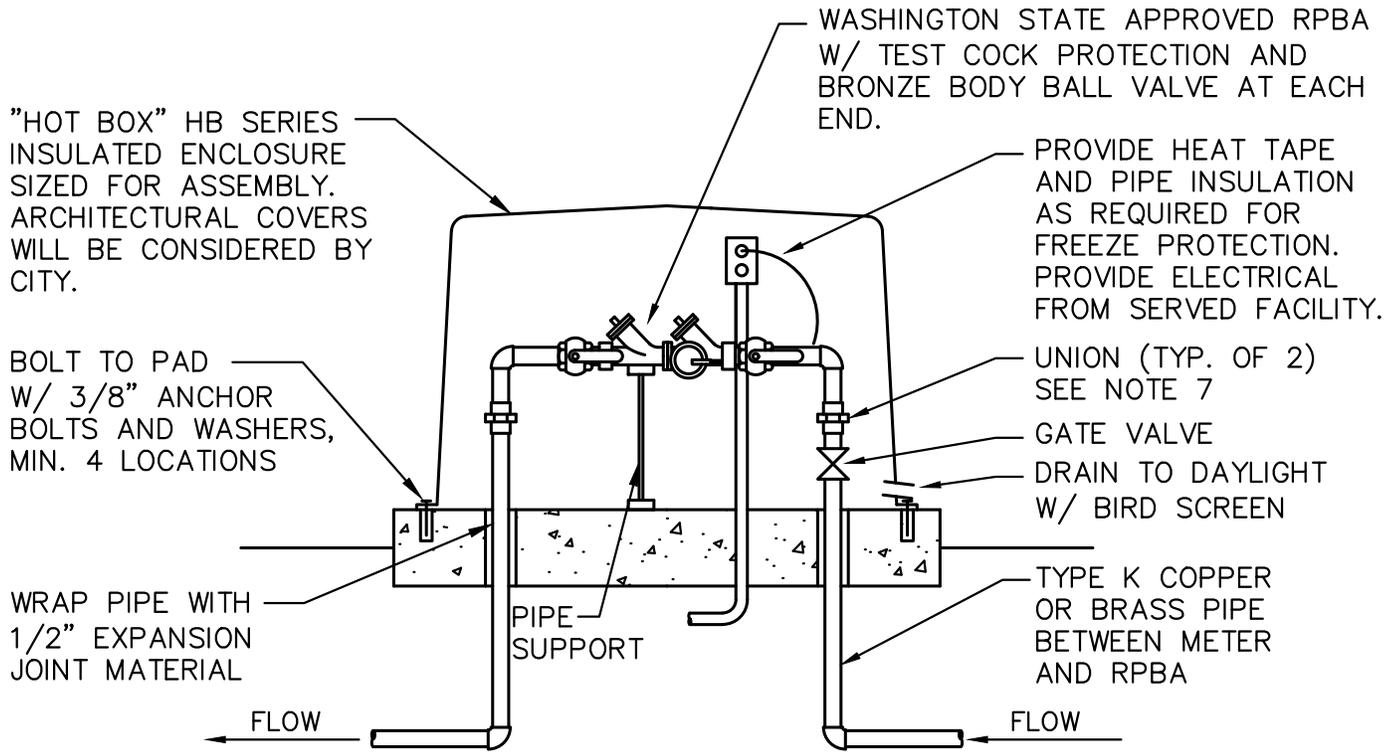
METER LAYING LENGTHS:
 2" = 17"
 PLUS 1/2" FOR GASKETS

NOTES:

1. SERVICE SADDLES SHALL HAVE RUBBER GASKET AND I.P. THREADS.
2. SERVICE LINES ON NEW WATER MAINS SHALL BE PRESSURE TESTED UP TO THE LOCKING ANGLE BALL VALVE AS PART OF THE WATER MAIN TESTING.

CITY OF SOUTH BEND			
2" WATER SERVICE			
APPROVED:			DWG. NO.
PUBLIC WORKS DEPT.			WS-2
DATE:	DRWN:	CHKD:	SCALE:
06/2020	T.R.G.	D.J.M.	NO SCALE

m:\south bend\20235.00_standard construction details and engineering standards\south bend\Details\Water Details\8.4-5 .75 to 2 rpba.dwg, 6/16/2020 7:20 AM, TULLY GENIS

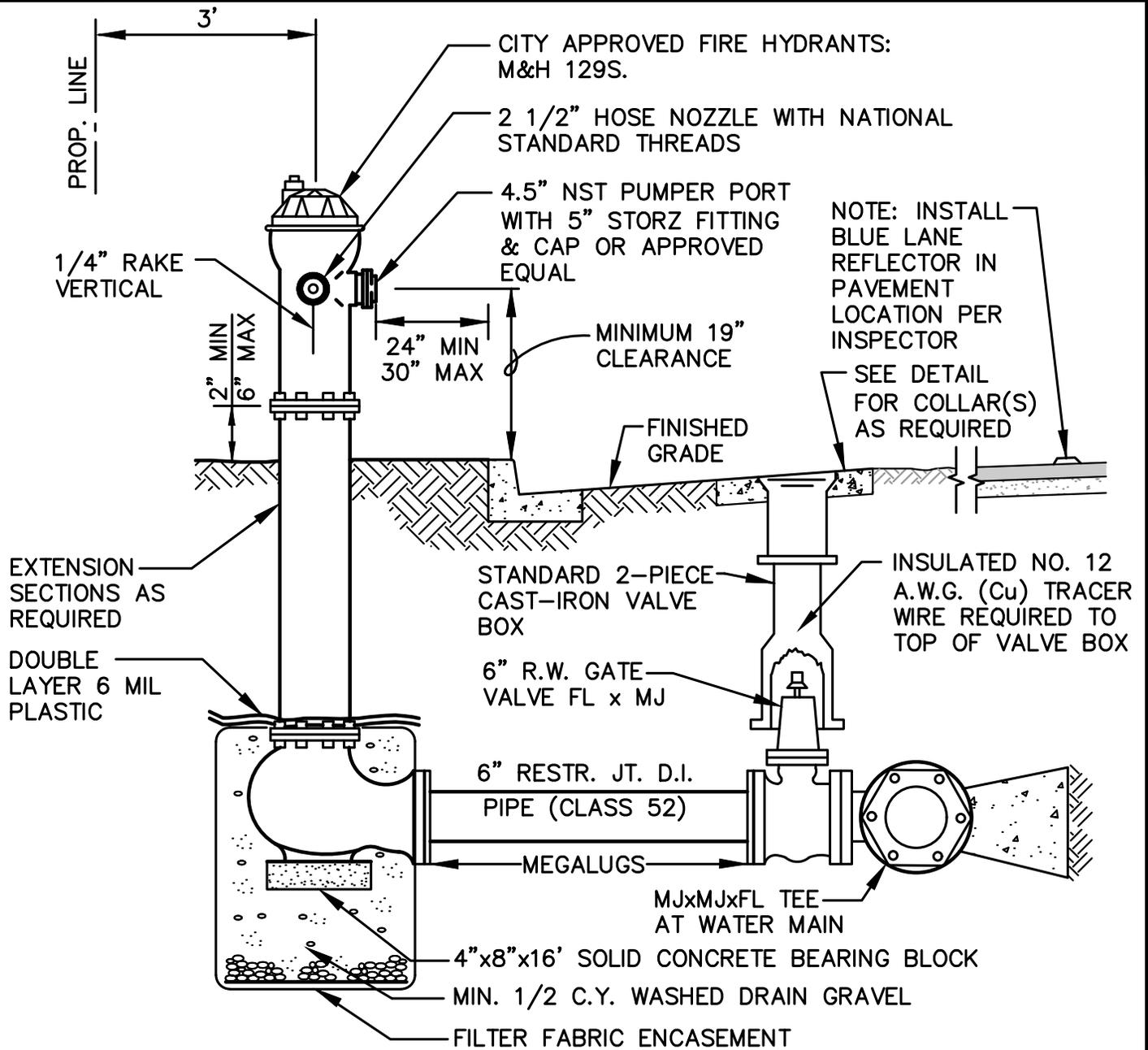


NOTES:

- 1) BACKFLOW ASSEMBLY SHALL BE SELECTED FROM WASHINGTON STATE DEPARTMENT OF HEALTH CURRENT APPROVED LIST.
- 2) CONCRETE TO BE 2500 PSI MIX WITH AIR ENTRAINMENT.
- 3) COMPLETE ALL WORK IN ACCORDANCE WITH STATE, CITY AND SUPPLIER STANDARDS.
- 4) SYSTEM SHALL NOT BE PUT INTO SERVICE UNTIL RPBA IS APPROVED BY THE CITY AND TESTED/CERTIFIED BY A WASHINGTON STATE LICENSED TESTER.
- 5) RPBA IS CONSIDERED PART OF THE PRIVATE SYSTEM AND SHALL BE MAINTAINED BY THE PROPERTY OWNER WITH ANNUAL CERTIFICATION REQUIRED.
- 6) PRESSURE TEST AND DISINFECT PER A.W.W.A. STANDARDS.
- 7) DIELECTRIC UNIONS SHALL BE USED TO SEPARATE DISSIMILAR MATERIALS.

CITY OF SOUTH BEND			
3/4" TO 2" REDUCED PRESSURE BACKFLOW ASSEMBLY			
APPROVED:			DWG. NO.
PUBLIC WORKS DEPT.			2RPBA
DATE:	DRWN:	CHKD:	SCALE:
04/2020	T.R.G.	D.J.M.	NO SCALE

m:\south bend\20235.00_standard construction details and engineering standards\south bend\Details\Water Details\FIRE HYDRANT INSTALLATION.dwg, 6/16/2020 7:20 AM, TULLY GENIS



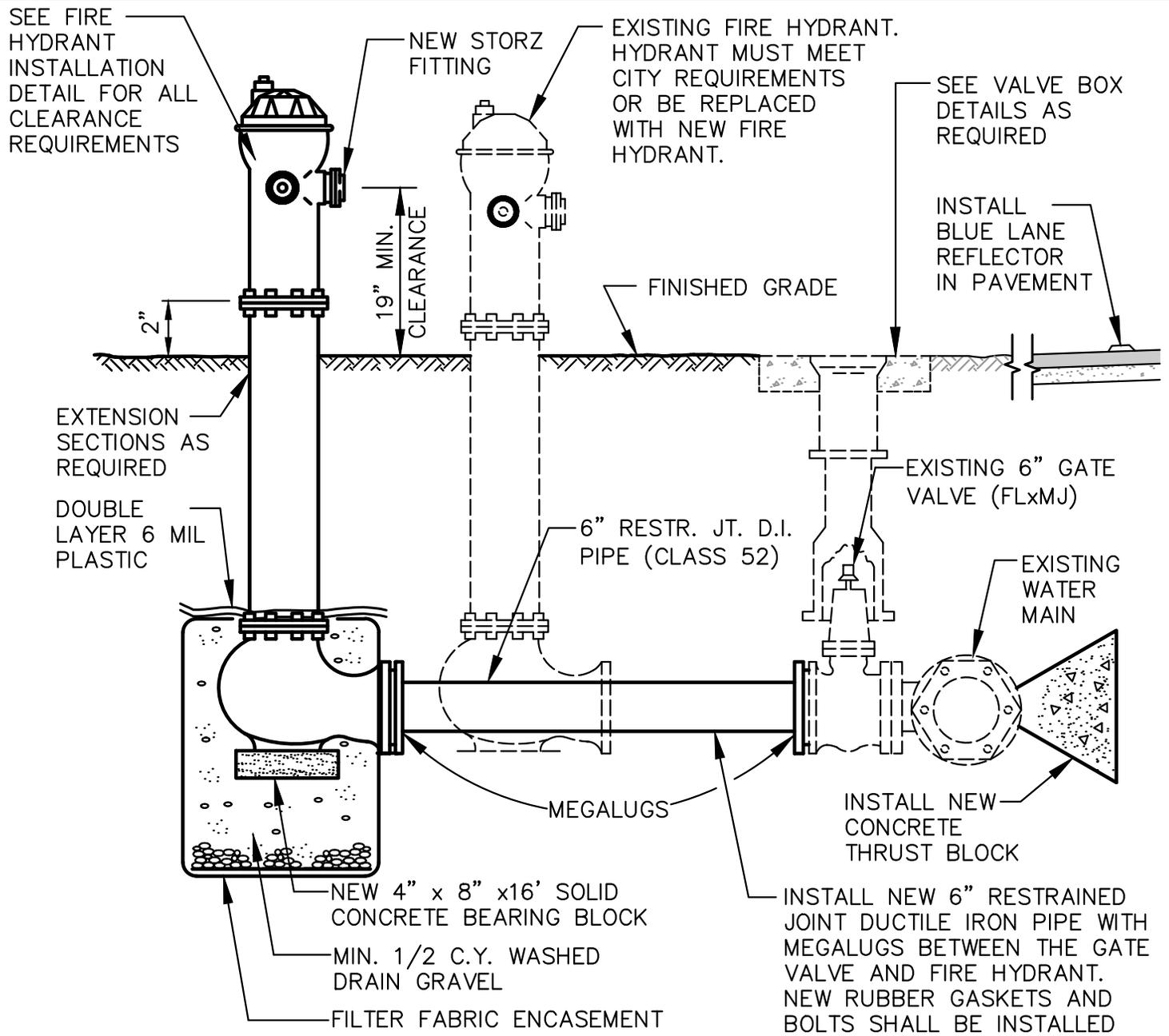
NOTES:

1. HYDRANTS SHALL NOT BE SET UNTIL CITY APPROVES LOCATION AND DEPTH AS SHOWN ON THE PLANS.
2. HYDRANT INSTALLATION MUST BE APPROVED BY CITY PRIOR TO BACKFILLING.
3. INSTALL 4 GUARD POSTS IN UNPROTECTED AREAS (4' RADIUS).
4. FIRE HYDRANT SHALL BE SHOP PAINTED PRIOR TO INSTALLATION W/ SAFETY YELLOW (RODDA NO. QD813) HIGH-GLOSS EQUIPMENT ENAMEL.
5. HYDRANT STANDARD BURY IS 4' UNLESS OTHERWISE NOTED ON PLANS.
6. IN LIEU OF CONCRETE THRUST BLOCK, ALLOWABLE JOINT RESTRAINT SYSTEM MAY BE USED FOR INSTALLATIONS OF NOT MORE THAN 18' (ONE PIPE LENGTH).
7. ALL JOINTS ON HYDRANT RUN SHALL BE

NOTES (CONTINUED):

8. RESTRAINED PER CITY STANDARDS.
9. PROVIDE MIN. 3 FT. CLEAR AND LEVEL AREA AROUND HYDRANT.
10. SEE SECTION 7.04 FOR ADDITIONAL REQUIREMENTS.

CITY OF SOUTH BEND			
FIRE HYDRANT INSTALLATION			
APPROVED:		DWG. NO.	
PUBLIC WORKS DEPT.		DATE	
DATE:	DRWN:	CHKD:	SCALE:
05/2020	T.R.G.	D.J.M.	NO SCALE

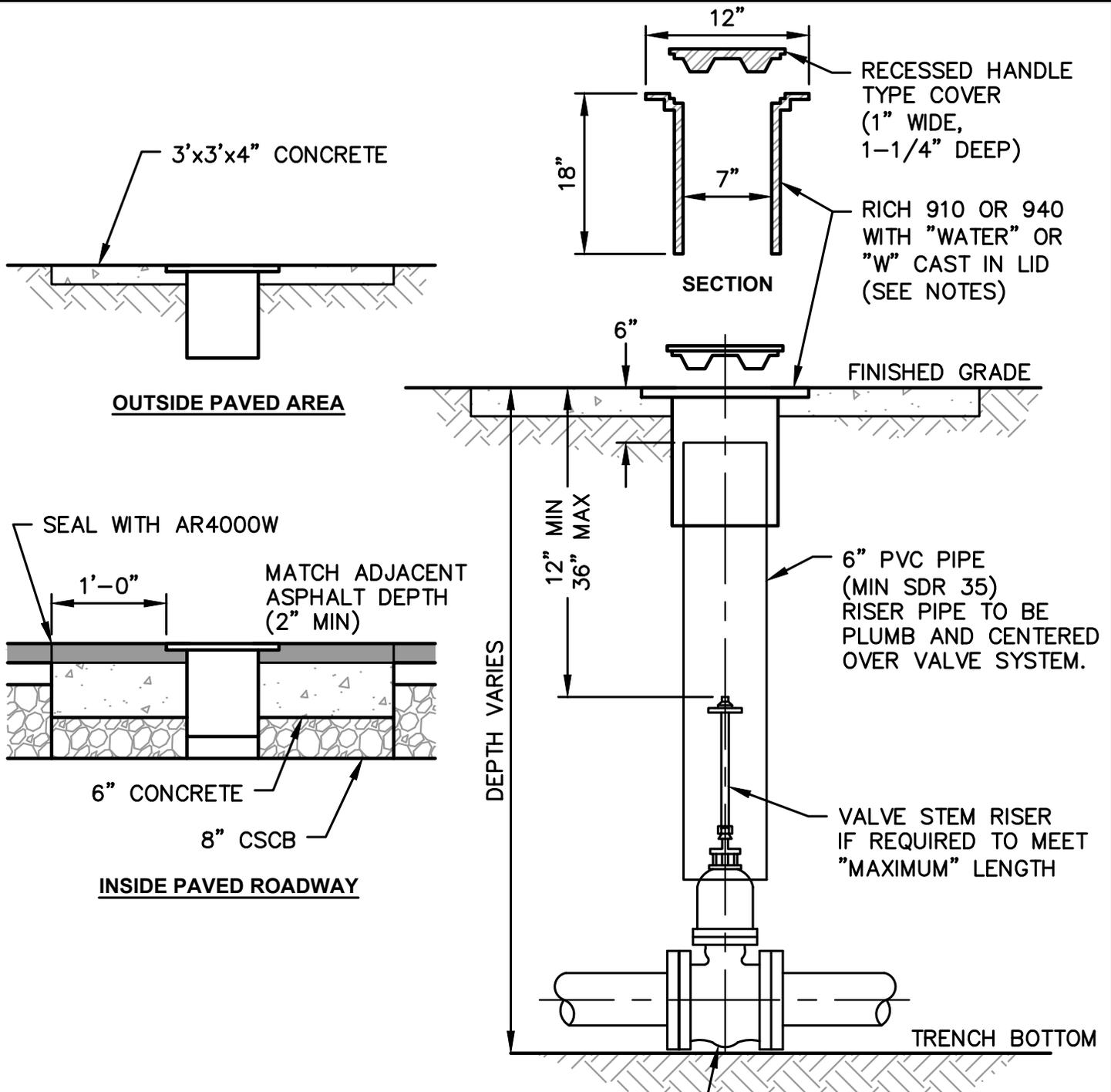


NOTES:

1. ALL RELOCATED FIRE HYDRANTS SHALL HAVE 4 1/2" PUMPER PORTS WITH 5" STORZ ADAPTOR (DEVELOPER PROVIDED).
2. PROVIDE 15' OF 12" (MIN.) STORM PIPE IN ANY ADJACENT DITCH SECTION. RIP-RAP ENDS AND FILL ABANDONED DITCH SECTION.
3. PROVIDE MIN. 3 FT CLEARANCE AND LEVEL AREA AROUND RELOCATED HYDRANT.
4. FIRE HYDRANT SHALL BE SHOP PAINTED PRIOR TO INSTALLATION W/ SAFETY YELLOW (RODDA NO. QD813) HIGH-GLOSS EQUIPMENT ENAMEL.
5. FOR ADDITIONAL REQUIREMENTS, SEE SECTION 7.04 OF THE PUBLIC WORKS STANDARDS.

CITY OF SOUTH BEND			
FIRE HYDRANT RELOCATION			
APPROVED:		DWG. NO.	
PUBLIC WORKS DEPT.		FIRE-2	
DATE:	DRWN:	CHKD:	SCALE:
05/2020	T.R.G.	D.J.M.	NO SCALE

m:\south bend\20235.00_standard construction details and engineering standards\south bend\Details\Water Details\VALV-1.dwg, 6/16/2020 7:21 AM, TULLY GENIS

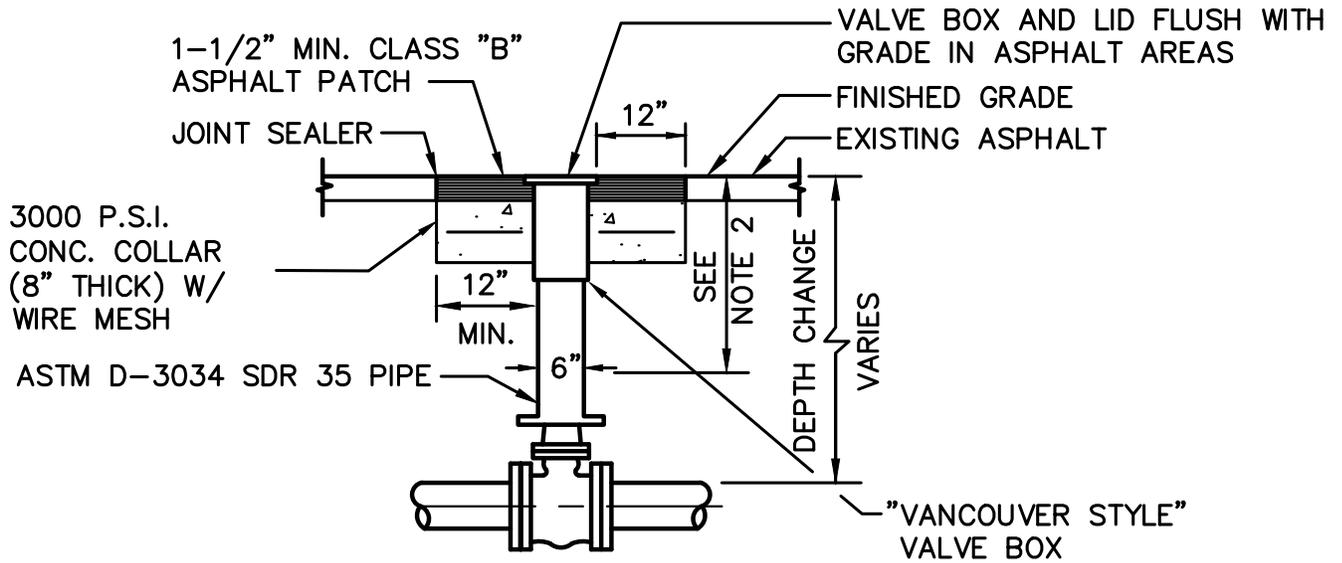


NOTES:

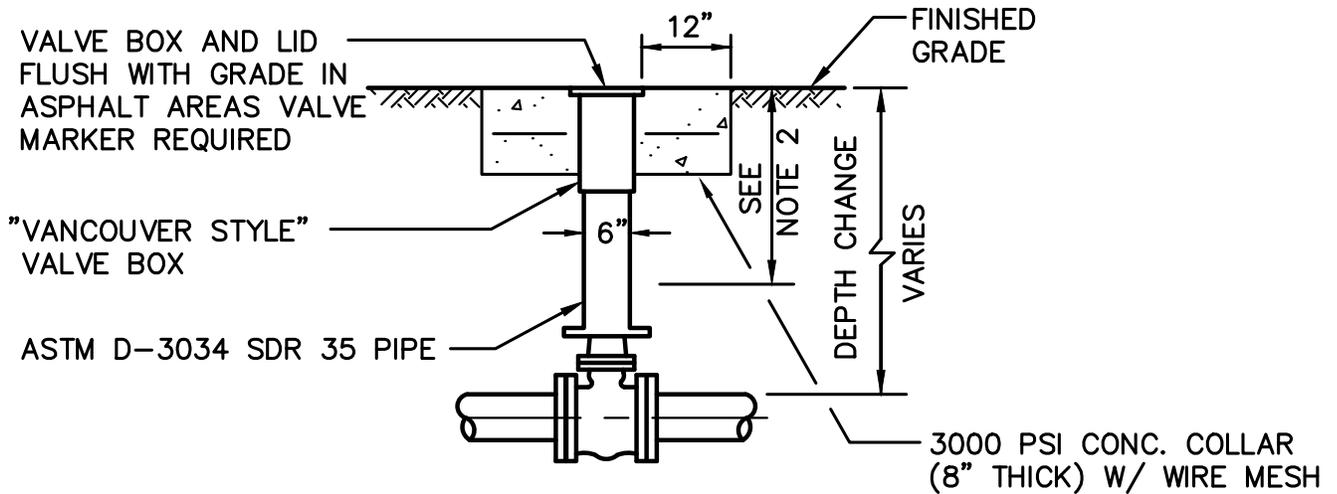
- 1. IN TRAFFIC LANES, RICH 940 VALVE BOX SHALL BE REQUIRED.

GATE VALVE SHOWN – SIMILAR INSTALLATION REQUIRED FOR BUTTERFLY VALVES.

CITY OF SOUTH BEND			
VALVE BOX			
APPROVED:			DWG. NO.
PUBLIC WORKS DEPT.			VALV-1
DATE:	DRWN:	CHKD:	SCALE:
05/2020	T.R.G.	D.J.M.	NO SCALE



VALVE BOX IN ASPHALT AREA



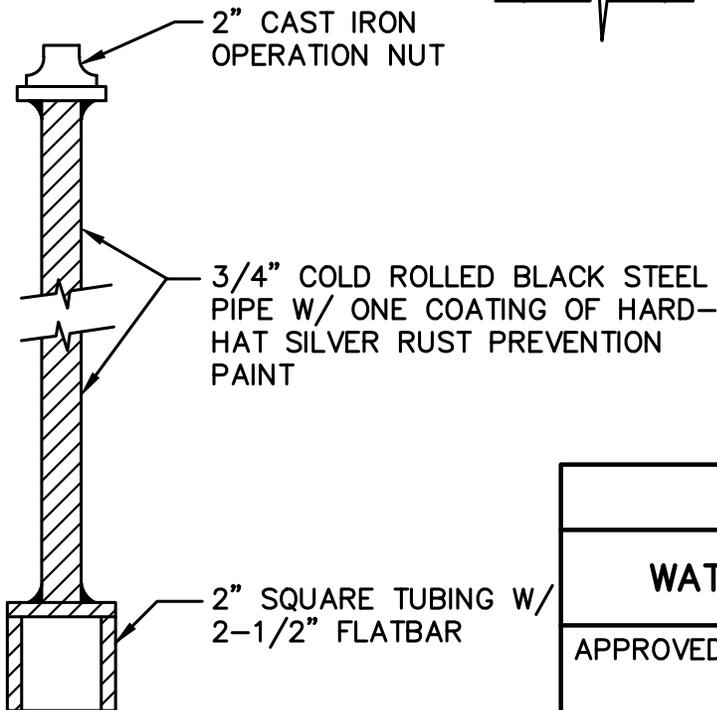
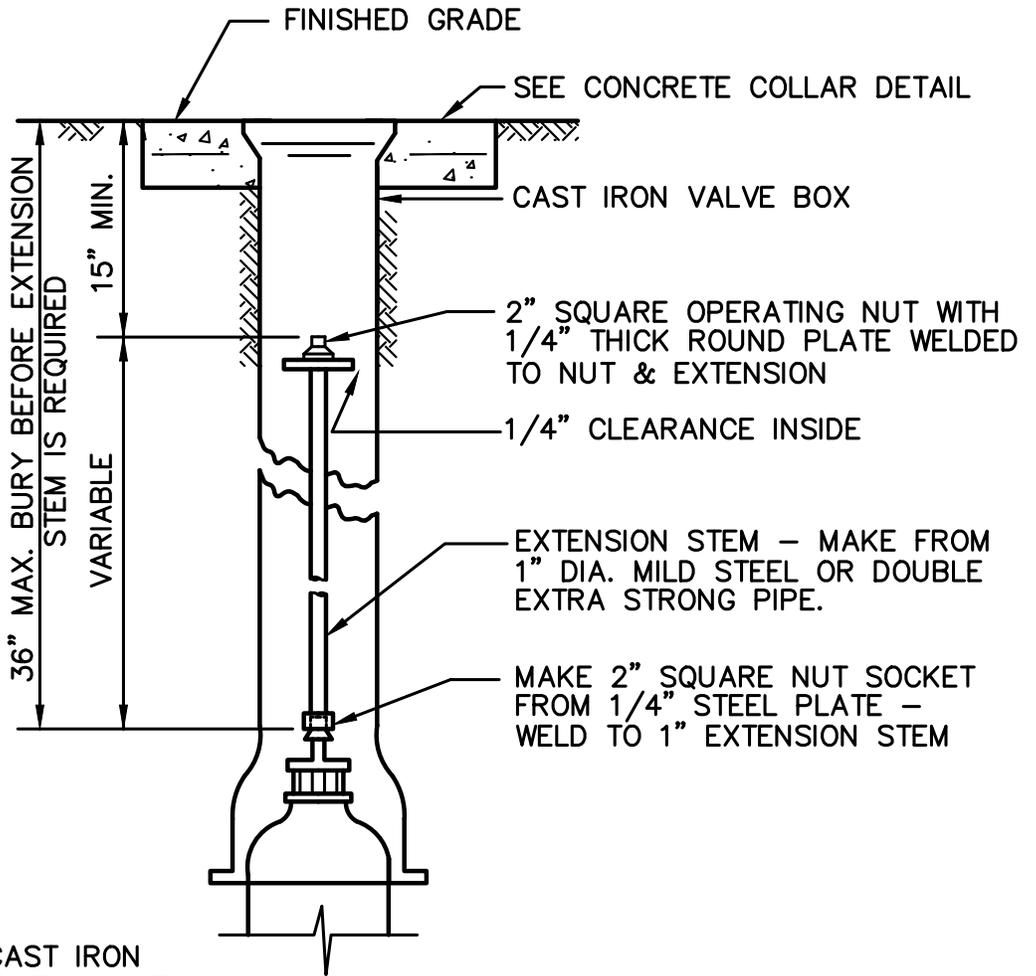
VALVE BOX IN UNIMPROVED AREA

NOTES:

1. EACH VALVE SHALL BE PROVIDED WITH AN ADJUSTABLE CAST IRON VALVE BOX OF 5 INCHES (5") INSIDE DIAMETER. VALVE BOXES SHALL HAVE A TOP SECTION WITH AN EIGHTEEN INCH (18") MIN. LENGTH. THE VALVE BOX SHALL BE "VANCOUVER STYLE" OR APPROVED EQUAL.

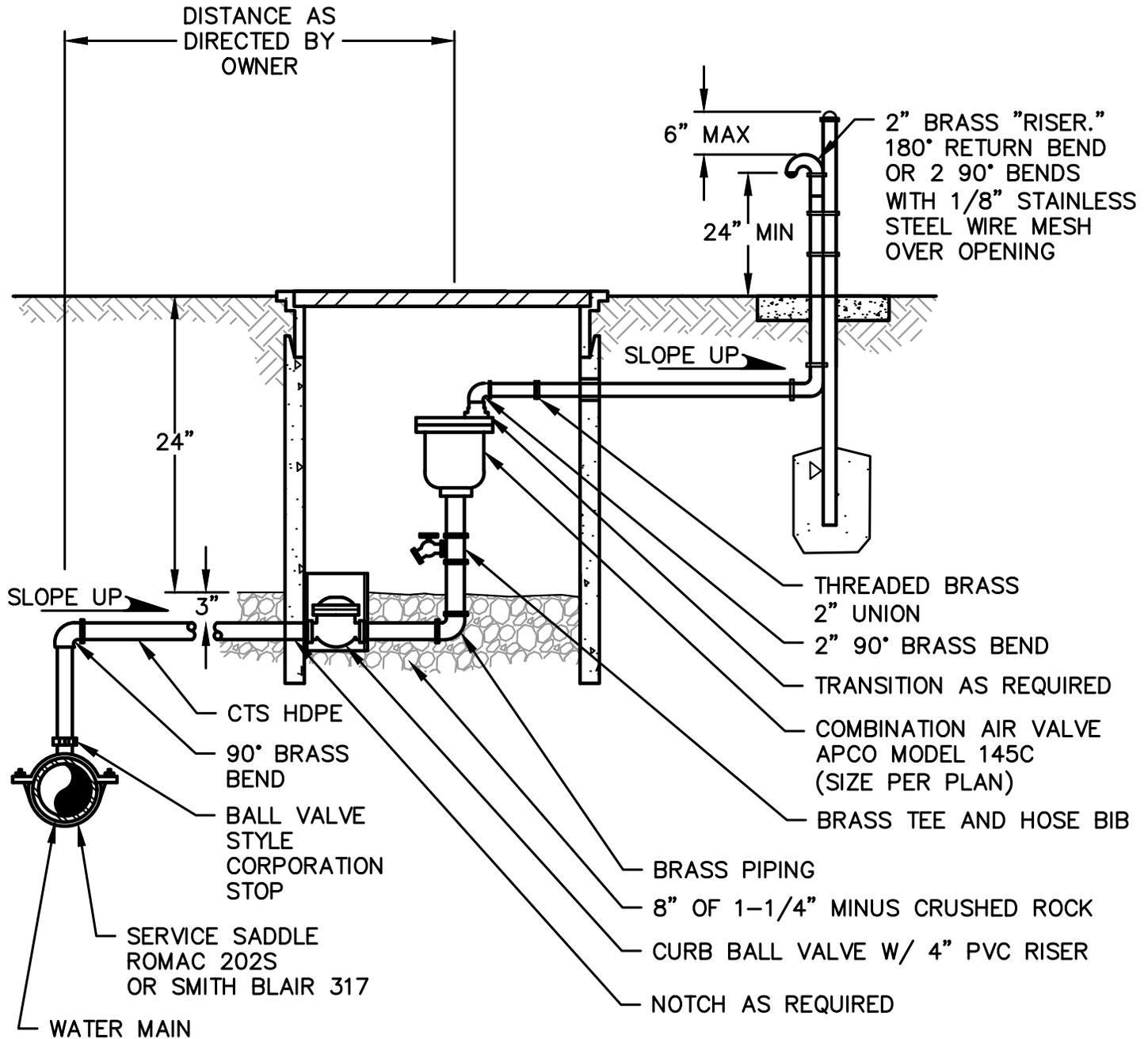
15" MINIMUM, 36" MAXIMUM FOR OPERATOR NUT. EXTENSION MAY BE REQUIRED.

CITY OF SOUTH BEND			
VALVE BOX ADJUSTMENT			
APPROVED:			DWG. NO.
PUBLIC WORKS DEPT.			VALV-1A
DATE:	DRWN:	CHKD:	SCALE:
03/2020	B.M.P.	D.J.M.	NO SCALE



CITY OF SOUTH BEND			
WATER VALVE STEM EXTENSION			
APPROVED:		DWG. NO.	
PUBLIC WORKS DEPT.		DATE	
DATE: 03/2020	DRWN: B.M.P.	CHKD: D.J.M.	SCALE: NO SCALE
		VALV-1B	

m:\south bend\20235.00_standard construction details and engineering standards\south bend\Details\Water Details\VALV-2.dwg, 6/16/2020 7:21 AM, TULLY GENIS

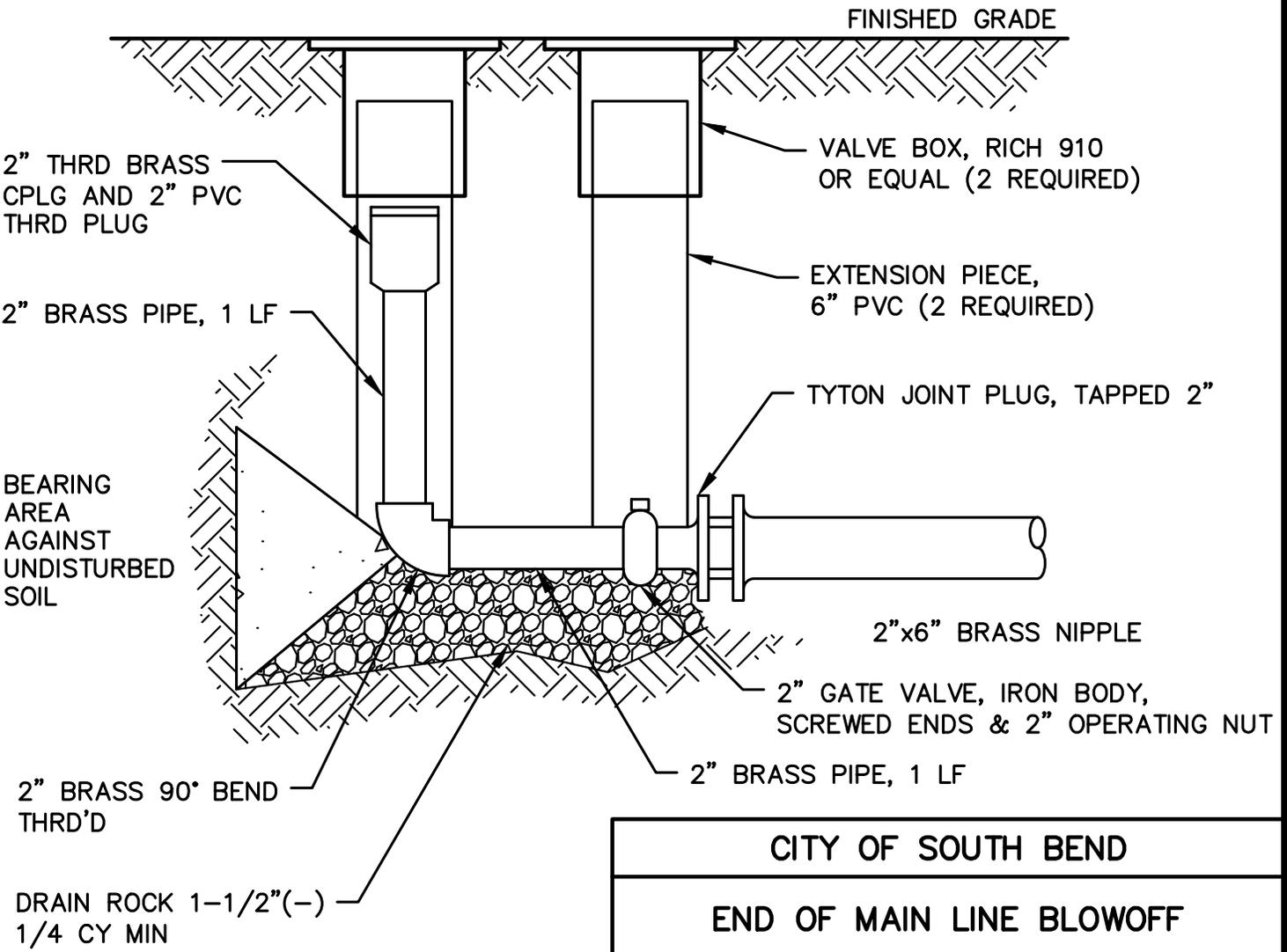
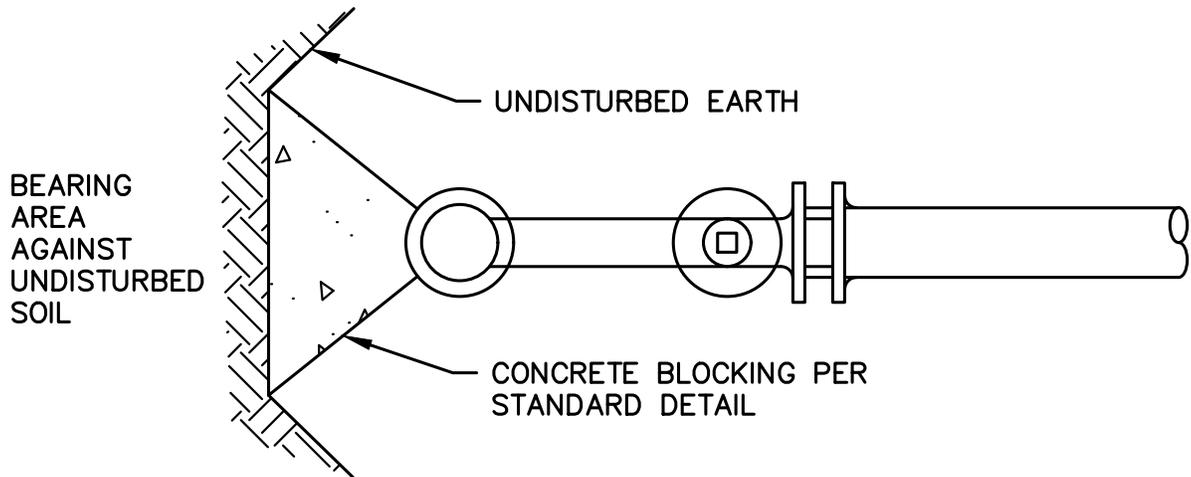


NOTES:

1. VALVE ASSEMBLY SHALL BE SET AT THE HIGH POINT OF THE LINE.
2. A MINIMUM OF ONE 4" ADJUSTMENT RING MUST BE PROVIDED IN TRAFFIC AREA SETTINGS. SADDLE TAP, PIPING, AND VALVE TO MATCH COMBINATION AIR VALVE INLET SIZE (SEE PLAN). ADJUSTMENT RINGS AND MANHOLE RING TO BE GROUTED, WATER TIGHT.
3. TERMINATE EXHAUST INSIDE VAULT WITH 90° BEND (DOWN) AND WIRE MESH IF VAULT IS DRAINED TO DAYLIGHT.

CITY OF SOUTH BEND			
COMBINATION AIR-VAC RELEASE VALVE			
APPROVED:			DWG. NO.
PUBLIC WORKS DEPT.			VALV-2
DATE:		CHKD:	SCALE:
05/2020	DRWN: T.R.G.	D.J.M.	NO SCALE

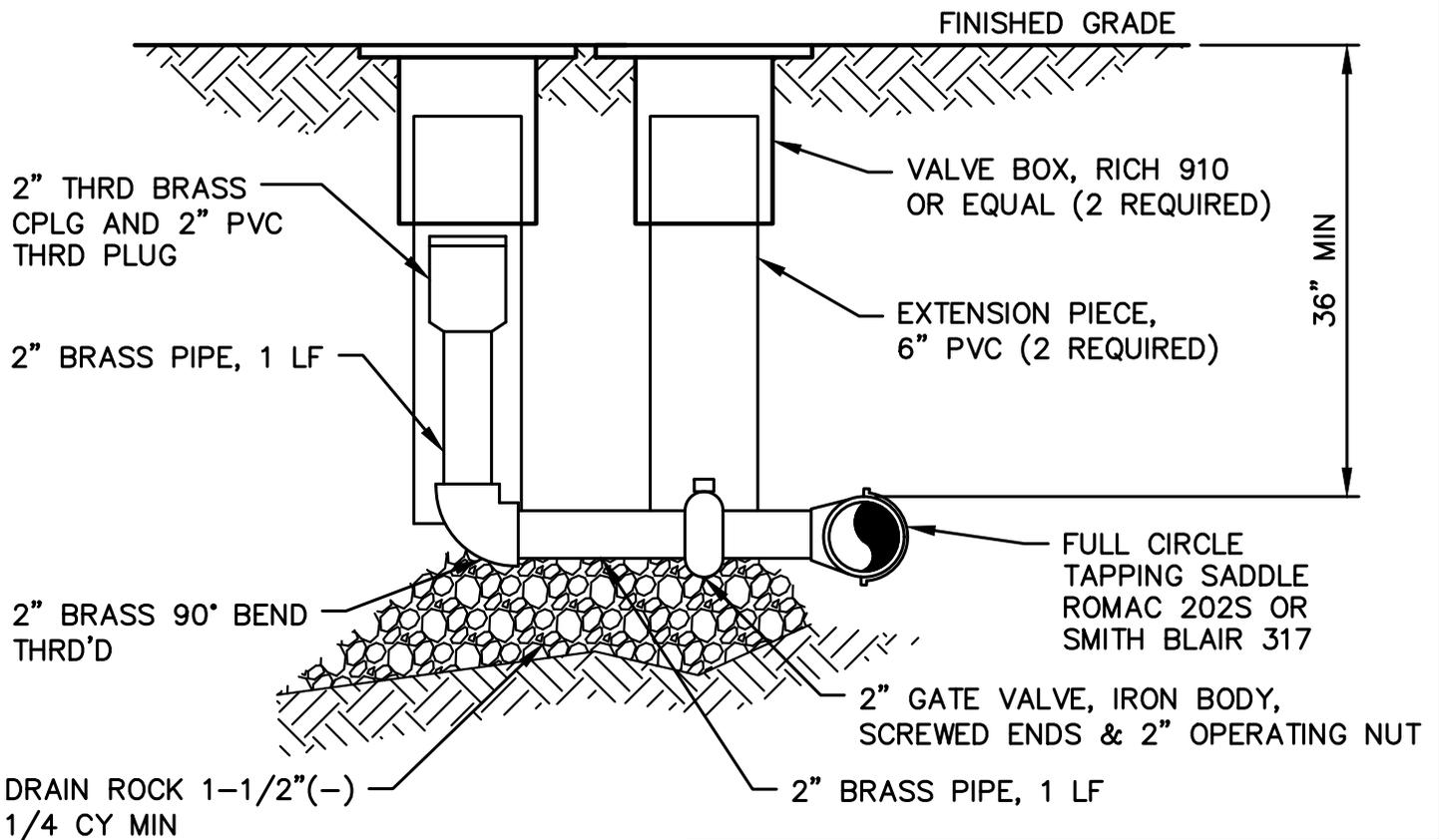
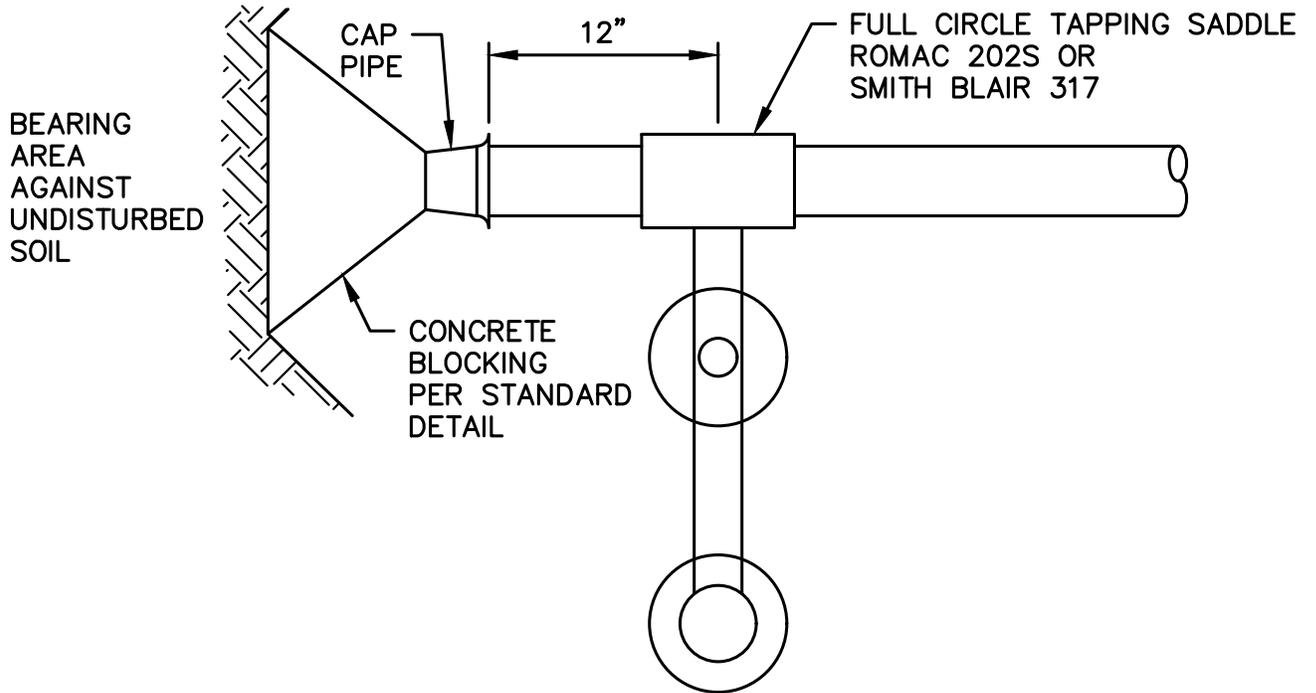
m:\south bend\20235.00_standard construction details and engineering standards\south bend\Details\Water Details\VALV-3A.dwg, 6/16/2020 7:21 AM, TULLY GENIS



NOTE:
 PROVIDE 2 REMOVABLE 2" BRASS BLOWOFF RISERS AS PART OF CONTRACT. RISERS INCLUDE 3' RISER W/ THRD END, THRD ELBOW, AND 6" LONG DISCHARGE END.

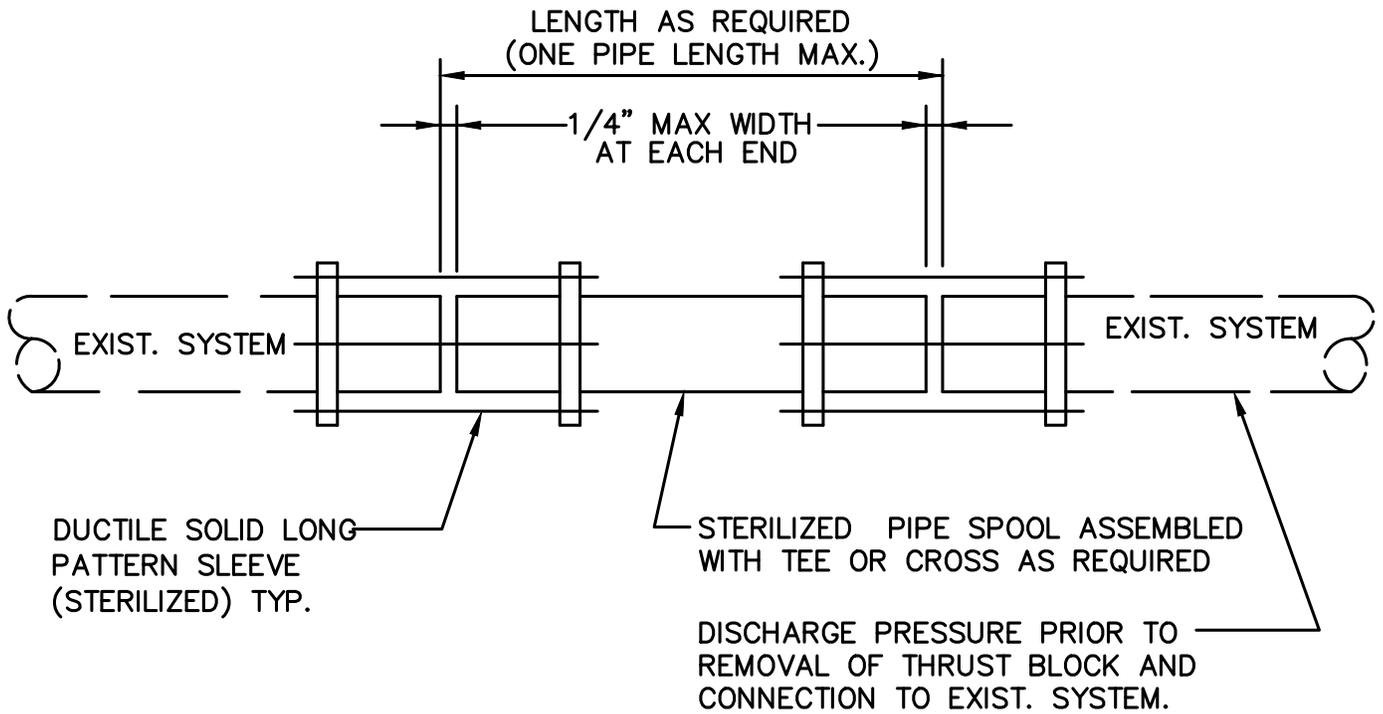
CITY OF SOUTH BEND			
END OF MAIN LINE BLOWOFF			
APPROVED:		DWG. NO.	
PUBLIC WORKS DEPT.		VALV-3A	
DATE:		DATE	
03/2020	DRWN: B.M.P.	CHKD: D.J.M.	SCALE: NO SCALE

m:\south bend\20235.00_standard construction details and engineering standards\south bend\Details\Water\Details\VALV-3B.dwg, 6/16/2020 7:21 AM, TULLY GENIS



NOTE:
 PROVIDE 2 REMOVABLE 2" BRASS BLOWOFF RISERS AS PART OF CONTRACT. RISERS INCLUDE 3' RISER W/ THRD END, THRD ELBOW, AND 6" LONG DISCHARGE END.

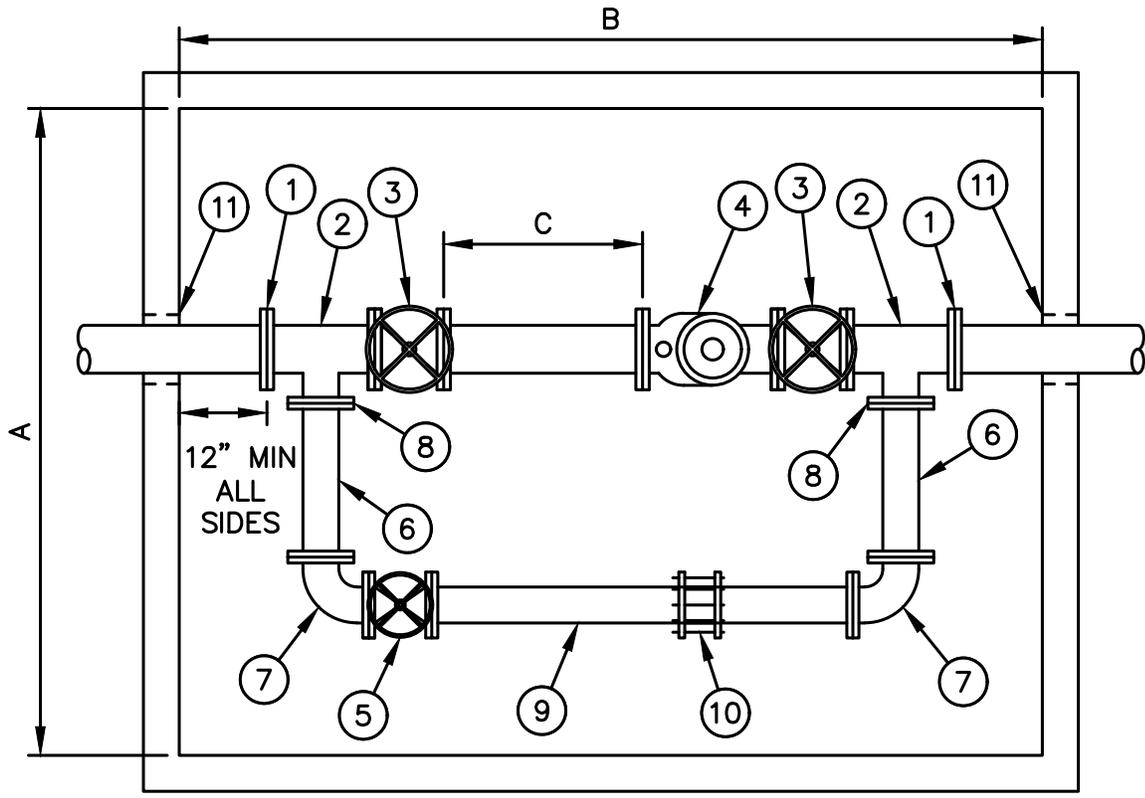
CITY OF SOUTH BEND			
SIDE TAP BLOWOFF			
APPROVED:			DWG. NO.
PUBLIC WORKS DEPT.			VALV-3B
DATE:	DRWN:	CHKD:	SCALE:
05/2020	T.R.G.	D.J.M.	NO SCALE



NOTE:

- ① NO DEFLECTION SHALL BE ALLOWED AT EITHER COUPLING.
- ② CUT-IN CONNECTIONS ON STEEL PIPE TO USE D.I. x O.D. STEEL TRANSITION COUPLINGS ROMAC OR EQUAL.
- ③ IN-LINE VALVE(S) IN EXISTING SYSTEM MAY BE REQUIRED AT THE SOLE DISCRETION OF THE CITY AT ALL NEW INTERTIE LOCATIONS. (NOTE: VALVE(S) ARE NOT SHOWN ABOVE FOR CLARITY)

CITY OF SOUTH BEND			
CUT IN CONNECTION			
APPROVED:			DWG. NO.
PUBLIC WORKS DEPT.		DATE	CIC
DATE: 03/2020	DRWN: B.M.P.	CHKD: D.J.M.	SCALE: NO SCALE



METER	MINIMUM DIMENSIONS			DOOR SIZE	VAULT DEPTH	TEE
	"A"	"B"	"C"			
3" COMPOUND	3'-6"	5'-6"	1'-3"	3'x3'	5'-0"	3"x1.5"
4" COMPOUND	3'-6"	8'-0"	1'-8"	3'x3'	5'-0"	4"x2"
6" COMPOUND	3'-6"	8'-0"	2'-6"	3'x3'	5'-0"	6"x4"
8" COMPOUND	4'-6"	10'-0"	3'-4"	4'x4'	5'-0"	8"x6"

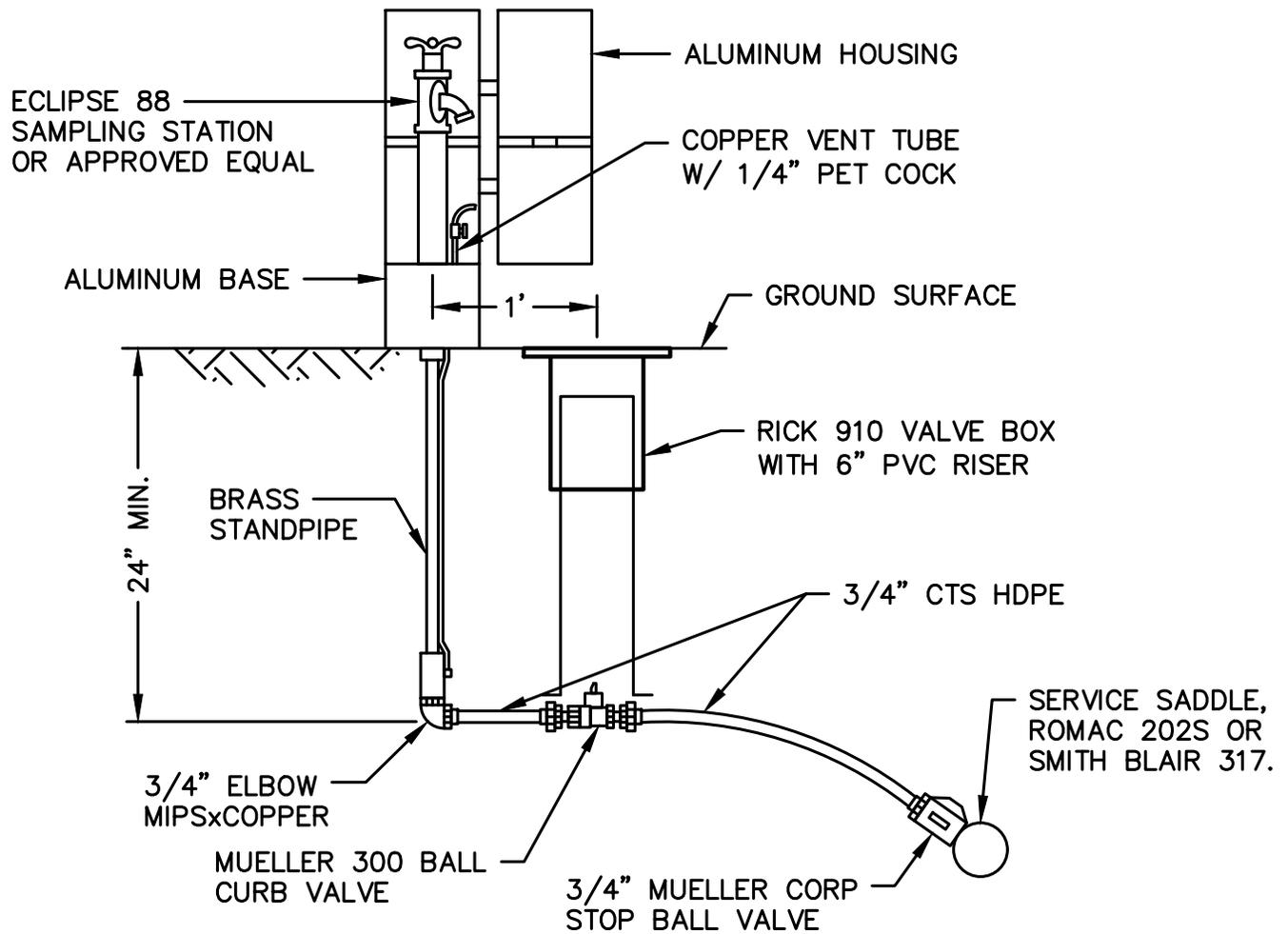
(X) COMPONENTS

- | | |
|--|---|
| <ul style="list-style-type: none"> 1. FLEXxFL COUPLING 2. ALL-FL TEE 3. FL RES. SEATED GATE VALVE W/ HAND WHEEL 4. COMPOUND METER 5. GATE VALVE W/ HAND WHEEL | <ul style="list-style-type: none"> 6. BRASS OR DUCTILE IRON NIPPLES 7. 90° ELBOWS (MATERIAL TO BE SAME AS PIPE) 8. COMPANION FL 9. BRASS OR DUCTILE IRON PIPE 10. MECHANICAL COUPLING 11. PIPE SLEEVE |
|--|---|

NOTES:

- 1. VAULT DIMENSIONS SHOWN ARE INSIDE (MIN).
- 2. BACKFLOW PREVENTION IS NOT INCLUDED AS PART OF THIS DETAIL.
- 3. METER AND SERVICE LINE SIZES WILL VARY ACCORDING TO NEED.
- 4. ALL VAULTS WILL BE SUPPORTED BY ADEQUATE FOOTING OR FLOOR.
- 5. PIPE AND FIXTURES TO BE SET ON VALVE STANDS INSTALLED ACCORDING TO MANUFACTURER'S SPECS.
- 6. REMOTE READER UNIT SHALL BE LOCATED IN A READILY ACCESSIBLE AREA OUTSIDE THE VAULT AS APPROVED BY THE CITY.
- 7. DRAINAGE MUST BE PROVIDED FOR THE VAULT.

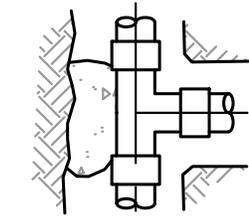
CITY OF SOUTH BEND			
COMPOUND METER INSTALLATION			
APPROVED:			DWG. NO.
PUBLIC WORKS DEPT.			CMI
DATE:	DRWN:	CHKD:	SCALE:
06/2020	T.R.G.	D.J.M.	NO SCALE



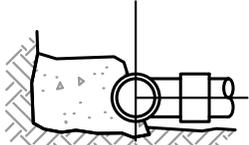
NOTES:

1. SAMPLING STATIONS SHALL BE 24" BURY, WITH A 3/4" FIP INLET, AND A (3/4" HOSE) NOZZLE.
2. ALL STATIONS SHALL BE ENCLOSED IN A LOCKABLE, NONREMOVABLE, ALUMINUM-CAST HOUSING.
3. WHEN OPENED, THE STATION SHALL REQUIRE NO KEY FOR OPERATION, AND THE WATER WILL FLOW IN AN ALL-BRASS WATERWAY.
4. ALL WORKING PARTS WILL ALSO BE OF BRASS AND BE REMOVABLE FROM ABOVE GROUND WITH NO DIGGING. EXTERIOR PIPING SHALL BE BRASS.
5. A COPPER VENT TUBE WILL ENABLE EACH STATION TO BE PUMPED FREE OF STANDING WATER TO PREVENT FREEZING AND TO MINIMIZE BACTERIA GROWTH.
6. ECLIPSE NO. 88 SAMPLING STATION SHALL BE MANUFACTURED BY: KUPFERLE FOUNDRY, ST. LOUIS, MO 63102

CITY OF SOUTH BEND			
SAMPLING STATION			
APPROVED:			DWG. NO.
PUBLIC WORKS DEPT.			SS
DATE:		DRWN:	CHKD:
03/2020	B.M.P.	D.J.M.	SCALE:
			NO SCALE

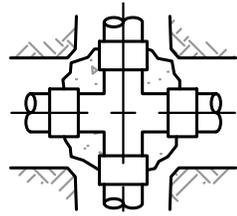


TOP VIEW

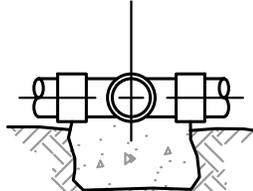


SIDE VIEW

TEE



TOP VIEW

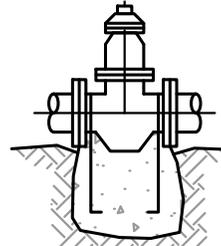


SIDE VIEW

CROSS

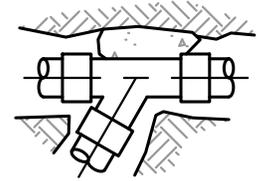


TOP VIEW

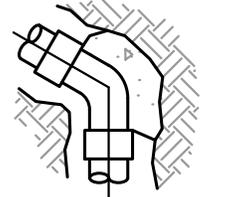


SIDE VIEW

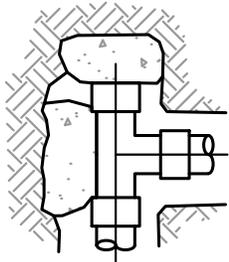
GATE VALVE



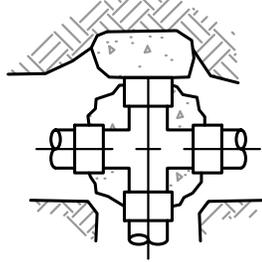
WYE



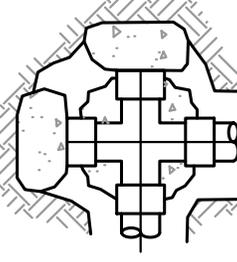
HORIZ. BEND



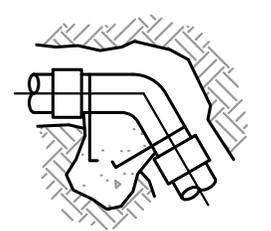
TEE WITH PLUG



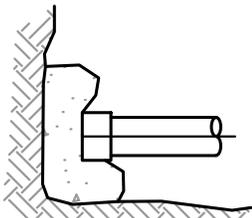
CROSS WITH PLUG



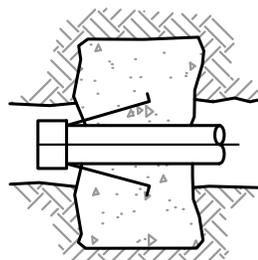
CROSS WITH PLUGS



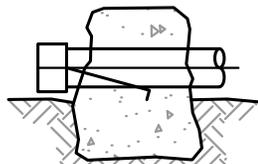
45°-90° VERTICAL BEND



PLUG OR CAP



TOP VIEW



SIDE VIEW

DEAD-MAN THRUST BLOCKING



LOCKING RETAINER GLAND

ALTERNATIVE STRADDLE BLOCK

NOTES:

1. CONCRETE THRUST BLOCKING TO BE POURED AGAINST UNDISTURBED EARTH.
2. PLASTIC BARRIER SHALL BE PLACED BETWEEN ALL THRUST BLOCKS AND PIPE AND/OR FITTINGS.
3. ANCHOR REBAR SHALL BE 5/8" MINIMUM DIAMETER.
4. CONCRETE DEAD-MAN THRUST BLOCKING MAY BE REQUIRED BY THE CITY, OR ALLOWED AT THE DISCRETION OF THE PUBLIC WORKS DIRECTOR.
5. ALL STANDARD BLOCKING AND THRUST CRITERIA, AS LISTED ON DETAIL TLOAD, SHALL APPLY.

CITY OF SOUTH BEND

THRUST BLOCKING

APPROVED:

DWG. NO.

PUBLIC WORKS DEPT.

DATE

TBLOCK

DATE:
06/2020

DRWN:
T.R.G.

CHKD:
D.J.M.

SCALE:
NO SCALE

THRUST LOADS					
PIPE DIAMETER	90° BEND	45° BEND	22.5° BEND	11.25° BEND	DEAD END OR TEE
4"	3,600	2,000	1,000	500	2,600
6"	8,000	4,400	2,300	1,200	5,700
8"	14,300	7,700	4,000	2,000	10,100
10"	22,300	12,100	6,200	3,100	15,800
12"	32,000	17,400	8,900	4,500	22,700
14"	43,600	23,600	12,100	6,100	30,800
16"	57,000	30,800	15,700	7,900	40,300

THRUST AT FITTINGS IN POUNDS AT 200 POUNDS PER SQUARE INCH OF WATER PRESSURE

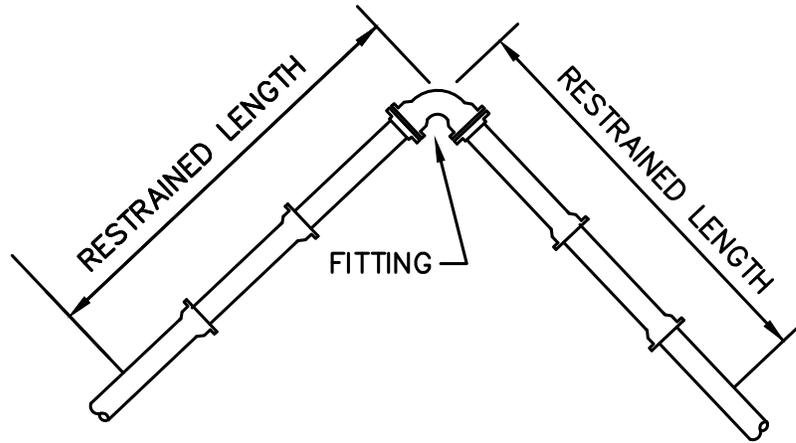
SAFE SOIL BEARING LOADS	
SOIL	POUNDS PER SQUARE FOOT
MUCK, PEAT	0
SOFT CLAY	1,000
SAND	2,000
SAND & GRAVEL	3,000
SAND & GRAVEL CEMENTED WITH CLAY	4,000
HARD SHALE	10,000

FOR HORIZONTAL THRUSTS WHEN THE DEPTH OF COVER OVER THE PIPE EXCEEDS 2 FEET

NOTES:

1. BLOCKING SHALL BE CEMENT CONCRETE CLASS "B" POURED IN PLACE AGAINST UNDISTURBED EARTH. FITTING SHALL BE ISOLATED FROM CONCRETE THRUST BLOCK WITH PLASTIC OR SIMILAR MATERIAL.
2. TO DETERMINE THE BEARING AREA OF THE THRUST BLOCK IN SQUARE FEET (SF):
EXAMPLE: FOR 12" DIAMETER AND 90° BEND IN SAND AND GRAVEL,
 $32,000 \text{ LB} / 3,000 \text{ PSF} = 10.7 \text{ SF BEARING AREA}$
3. AREAS MUST BE ADJUSTED FOR OTHER PIPE SIZES, PRESSURES, AND SOIL CONDITIONS.
4. BLOCKING SHALL BE ADEQUATE TO WITHSTAND FULL TEST PRESSURE AS WELL AS TO CONTINUOUSLY WITHSTAND OPERATING PRESSURE UNDER ALL CONDITIONS OF SERVICE.

CITY OF SOUTH BEND			
THRUST LOADS			
APPROVED:			DWG. NO.
PUBLIC WORKS DEPT.		DATE	TLOAD
DATE: 05/2020	DRWN: T.R.G.	CHKD: D.J.M.	SCALE: NO SCALE

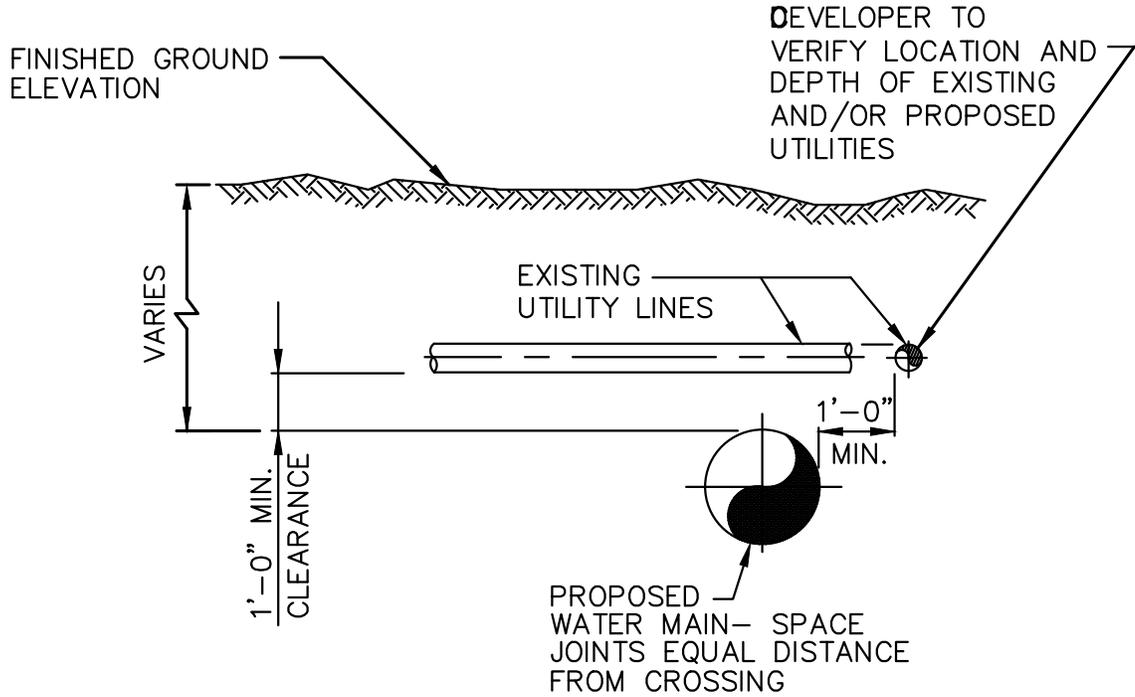


PIPE SIZE	90° BEND	45° BEND	22 1/2° BEND	11 1/4° BEND	TEE OR DEAD END CAP
	RESTRAINED LENGTH IN FEET				
4"	40	17	8	4	30
6"	55	23	11	6	39
8"	73	31	15	8	53
10"	88	37	18	9	67
12"	103	43	21	10	82
16"	133	55	27	13	110
18"	145	60	29	15	124

RESTRAINED LENGTHS SHOWN ARE MINIMUM AND FOR LINEAL FEET REQUIRED ON EACH SIDE OF FITTING INDICATED.

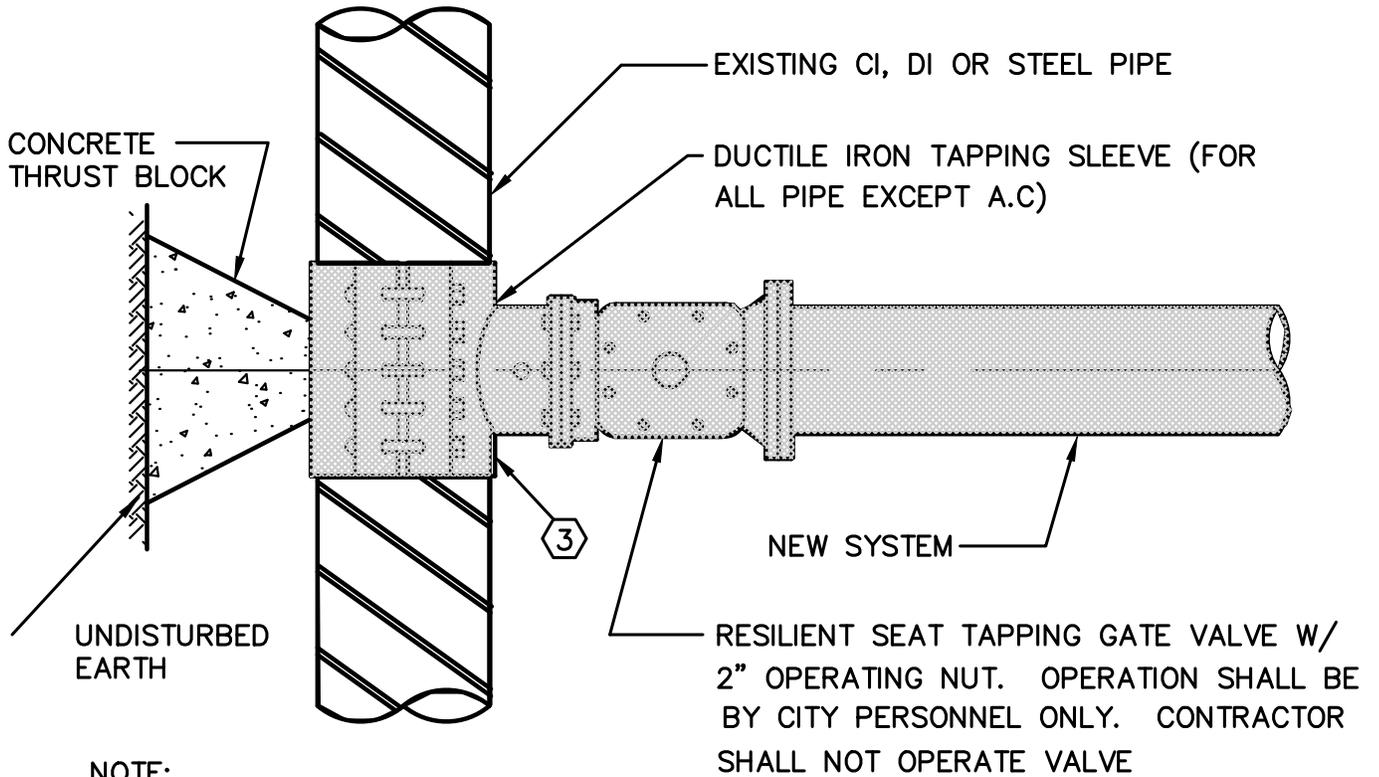
FOOTAGES ARE BASED ON 250 PSI PRESSURE AND 42 INCHES COVER. IF PRESSURE IS GREATER OR COVER IS LESS, THE RESTRAINED LENGTH SHALL BE INCREASED. DEVELOPER'S ENGINEER TO DESIGN SAME.

CITY OF SOUTH BEND			
THRUST RESTRAINT FOR DUCTILE IRON PIPE			
APPROVED:			DWG. NO.
PUBLIC WORKS DEPT.		DATE	TRDIP
DATE: 03/2020	DRWN: B.M.P.	CHKD: D.J.M.	SCALE: NO SCALE



NOTE: CONCRETE ENCASEMENT (BEDDING) SHALL BE UTILIZED, IF APPROVED BY THE CITY, AT LOCALIZED UTILITY CROSSING IF MINIMUM PIPE SEPARATION (ELEVATION) CANNOT BE MAINTAINED / ACHIEVED.

CITY OF SOUTH BEND			
TYPICAL UTILITY CROSSING			
APPROVED:			DWG. NO.
PUBLIC WORKS DEPT.		DATE	TUC
DATE: 03/2020	DRWN: B.M.P.	CHKD: D.J.M.	SCALE: NO SCALE



NOTE:

- ① VALVE BOX TO HAVE A LOCKING LID UNTIL ACCEPTED BY THE CITY
- ② O.D. STEEL PIPE SHALL USE S.S. SLEEVE (FUSION COATED)
- ③ STAINLESS STEEL SLEEVE SHOWN FOR ILLUSTRATIVE PURPOSES ONLY
- ④ DELIVER PIPE "COUPON" TO CITY

CITY OF SOUTH BEND			
WET TAP CONNECTION			
APPROVED:			DWG. NO.
PUBLIC WORKS DEPT.		DATE	WTC
DATE:	DRWN:	CHKD:	SCALE:
03/2020	B.M.P.	D.J.M.	NO SCALE

APPENDIX B

MISCELLANEOUS CITY DOCUMENTS

LIST OF MISCELLANEOUS CITY DOCUMENTS

NO. TITLE OF DOCUMENT

- B-01 Bill of Sale for Water
- B-02 Bill of Sale for Sanitary Sewer
- B-03 Performance Bond
- B-04 Assignment of Funds in Lieu of Performance Bond
- B-05 Maintenance Bond for Water
- B-06 Maintenance Bond for Sewer
- B-07 Assignment of Funds in Lieu of Maintenance Bond
- B-08 Agreement for Inspection and Maintenance of Privately Maintained
Storm Drainage Facilities
- B-09 Easement for Water Mains and Appurtenances
- B-10 Easement for Sanitary Sewers

**CITY OF SOUTH BEND
PERFORMANCE BOND**

Developer: _____

Project Name/Permit No.: _____

Surety: _____

Amount: _____

KNOW ALL MEN BY THESE PRESENTS: Whereas the City has approved construction plans dated _____ day of _____, 20_____ for the construction of _____ **[INSERT PROJECT NAME AND IMPROVEMENT DESCRIPTION]**, in accordance with the City’s regulations.

NOW, THEREFORE, we, the Developer and surety, are held and firmly bound to the State of Washington and to the City in the amount named above for the payment of which we do jointly and severally bind ourselves, our heirs, personal representatives, successors, and assigns by these presents.

THE CONDITIONS OF THIS OBLIGATION are such that if the Developer, or the Developer’s heirs, personal representatives, successors, and assigns shall well and truly keep all the provisions of the regulations of the City applicable to the work described in the City’s regulations, and pay all laborers, mechanics, subcontractors, and materialman, and all persons who shall supply such person or subcontractors with provisions and supplies for carrying on such work and shall indemnify and save harmless the City, its officers and agents, from any pecuniary loss resulting from the breach of said regulations, including the obligation of the Developer to replace or correct any defective work or materials discovered by the City within two years from the date of acceptance of the work, then this obligation shall become void; otherwise, it shall remain in full force and effect.

No change, extension of time, alteration or addition to the work to be performed by the Developer shall affect the obligation of the principal or surety on this bond, and the surety waives notice of any such change, extension, alteration, or addition thereunder.

This bond is furnished pursuant to the requirements of Chapter 39.08 of the Revised Code of Washington, and the regulations of the City, and in addition to the foregoing, is made for the benefit of the City, together with all laborers, mechanics, subcontractors, materialmen, and all persons who supply such person or subcontractors with supplies and equipment for the carrying on of the work covered by this agreement, whether or not such work is deemed to be “public work” under the laws of the State of Washington.

In witness whereof, the principal and surety have caused this bond to be signed and sealed by their duly authorized officers or representatives this ____ day of _____, 20____.

Principal

By _____

Surety

By _____

Accepted by the City of South Bend this _____ day of _____, 20____.

Mayor, City of South Bend

**CITY OF SOUTH BEND
ASSIGNMENT OF FUNDS IN LIEU OF PERFORMANCE BOND**

Project Name/Permit No.: _____

Developer: _____

In lieu of a performance bond at the direction of _____
for the proposed construction of _____
we are holding funds in the amount of _____
(\$ _____) in Account Number _____ for the sole purpose of
completing the referenced construction to standards acceptable to the City of South Bend,
Washington by _____.

We have been instructed by _____
that these funds are to be used for the sole purpose described above. In the event said principal
fails to complete said construction to standards acceptable to the City of South Bend, said funds
in Account Number _____ will be made available to said City of South Bend
for the sole and specific purpose of completing the above described construction. Failure of the
above noted financial institution to hold the minimum required amount until released by City of
South Bend will bind the financial institution for the amount owed, and for legal fees and costs
necessary to enforce collection of the assignment.

**CITY OF SOUTH BEND
MAINTENANCE BOND for WATER**

Developer: _____

Surety: _____

Development: _____

Amount: _____

Bond No.: _____

We, _____, as principal, and _____, a corporation organized under the laws of the State of _____, and duly authorized to transact business in the State of Washington, as surety, are held and firmly bound unto the City of South Bend, Pacific County, Washington, in the amount of \$_____, for the payment of which sum we bind ourselves, and each of our executors, administrators, successors, and assigns, jointly and severally.

Now, therefore, the conditions of these obligations are such that if the principal shall replace or correct any part of parts of principal's _____
_____ **[DESCRIBE PROJECT IMPROVEMENTS]** built by principal or principal's Contractor as required by Plans approved by the City on _____ day of _____, _____ discovered by the City of South Bend to be defective in material or inefficient or otherwise unsatisfactory in operations, through faulty construction, materials or workmanship, or through any fault of design or detail arising with Contractor or manufacturer within two years of the acceptance of the work and transfer of title, then the obligation of Principal and Surety under this Bond shall be void, but otherwise it shall remain in full force and effect.

Such parts shall be replaced with parts constructed in accordance with designs and of material satisfactory to the City. Any corrections required shall be completed within thirty (30) days of the date of notification of the need for such correction by the City. If the work is not performed in a timely manner or in cases of emergency, the City shall have the right, without recourse to legal action, to have said work performed, at the expense of the Developer.

Upon the failure of the principal to perform the terms of this Bond, the Surety shall either perform the terms of the Bond itself or shall, upon demand by the Mayor of the City, release up to the full bonded amount to the City. We further agree that up to the full bonded amount shall be released to City of South Bend upon written demand by the Mayor of the City. The amount demanded by the City will be a good faith estimate of the actual cost of repairs.

We further agree that if it is necessary for the City to take any legal action against any signatory to this agreement to assure compliance with its terms, the City shall be entitled to its reasonable costs and attorney's fees.

We further agree that nothing of any kind or nature that will not discharge the principal shall operate as a discharge or release of the Surety, regardless of law, rule of equity or usage relating to the liability of sureties to the contrary notwithstanding.

It shall be the responsibility of both the principal and the surety to inform the City of South Bend, in writing, of any change of mailing address. The City will mail only to the last known address of principal and surety.

SIGNED this _____ day of _____, _____.

Principal

Surety

Address

Address

City, State & Zip

City, State & Zip

Phone No. _____

Phone No. _____

Signature of Principal

Signature of Surety Official

Print Name and Title

Print Name and Title

Accepted by the City of South Bend this _____ day of _____, _____.

Mayor, City of South Bend

**CITY OF SOUTH BEND
MAINTENANCE BOND for SANITARY SEWER**

Developer: _____

Surety: _____

Development: _____

Amount: _____

Bond No.: _____

We, _____, as principal, and _____, a corporation organized under the laws of the State of _____, and duly authorized to transact business in the State of Washington, as surety, are held and firmly bound unto the City of South Bend, Pacific County, Washington, in the amount of \$ _____, for the payment of which sum we bind ourselves, and each of our executors, administrators, successors, and assigns, jointly and severally.

Now, therefore, the conditions of these obligations are such that if the principal shall replace or correct any part of parts of principal's _____ [DESCRIBE PROJECT IMPROVEMENTS] built by principal or principal's Contractor as required by Plans approved by the City on _____ day of _____, _____ discovered by the City of South Bend to be defective in material or inefficient or otherwise unsatisfactory in operations, through faulty construction, materials or workmanship, or through any fault of design or detail arising with Contractor or manufacturer within two years of the acceptance of the work and transfer of title, then the obligation of Principal and Surety under this Bond shall be void, but otherwise it shall remain in full force and effect.

Such parts shall be replaced with parts constructed in accordance with designs and of material satisfactory to the City. Any corrections required shall be completed within thirty (30) days of the date of notification of the need for such correction by the City. If the work is not performed in a timely manner or in cases of emergency, the City shall have the right, without recourse to legal action, to have said work performed, at the expense of the Developer.

Upon the failure of the principal to perform the terms of this Bond, the Surety shall either perform the terms of the Bond itself or shall, upon demand by the Mayor of the City, release up to the full bonded amount to the City. We further agree that up to the full bonded amount shall be released to City of South Bend upon written demand by the Mayor of the City. The amount demanded by the City will be a good faith estimate of the actual cost of repairs.

We further agree that if it is necessary for the City to take any legal action against any signatory to this agreement to assure compliance with its terms, the City shall be entitled to its reasonable costs and attorney's fees.

We further agree that nothing of any kind or nature that will not discharge the principal shall operate as a discharge or release of the Surety, regardless of law, rule of equity or usage relating to the liability of sureties to the contrary notwithstanding.

It shall be the responsibility of both the principal and the surety to inform the City of South Bend, in writing, of any change of mailing address. The City will mail only to the last known address of principal and surety.

SIGNED this _____ day of _____, _____.

Principal

Surety

Address

Address

City, State & Zip

City, State & Zip

Phone No. _____

Phone No. _____

Signature of Principal

Signature of Surety Official

Print Name and Title

Print Name and Title

Accepted by the City of South Bend this _____ day of _____, _____.

Mayor, City of South Bend

**CITY OF SOUTH BEND
ASSIGNMENT OF FUNDS IN LIEU OF MAINTENANCE BOND**

Project Name/Permit No.: _____

Developer: _____

In lieu of a maintenance bond, we hereby agree that the sum of \$ _____ will be held in savings account number _____ in _____ in the name of _____ to assure maintenance requirements hereunder.

Now, therefore, the conditions of these obligations are such, that the principal shall replace or correct any part or parts of all improvements, installed under Plans approved by the City of South Bend _____ day of _____, 20____ discovered by the City of South Bend to be defective in material or inefficient or otherwise unsatisfactory in operations, through faulty construction, materials or workmanship, or through any fault of design or detail arising with Contractor or manufacturer within two years of the acceptance of the completed work _____ (date) and transfer of title. Such parts shall be replaced with parts constructed in accordance with designs and of material satisfactory to the City.

We further agree that up to the full amount of the funds in the above referenced account shall be released to the City of South Bend upon written demand by the Mayor of the City. The amount demanded by the Mayor will be a good faith estimate of the actual cost of the repairs.

We further agree that if it is necessary for the City of South Bend take any legal action against any signatory to this agreement to assure compliance with its terms, the City shall be entitled to its reasonable costs and attorney's fees.

It shall be the responsibility of both the principal and the financial institution to inform the City of South Bend, in writing, of any change of mailing address. The City will mail only to the last known address of principal and financial institution.

Signed this _____ day of _____, 20__.

Principal

Name of Financial Institution

Address

Address

City, State, Zip

City, State, Zip

**CITY OF SOUTH BEND
AGREEMENT FOR INSPECTION AND MAINTENANCE OF PRIVATELY
MAINTAINED STORM DRAINAGE FACILITIES**

Declaration of Covenant

In consideration of approval of the development known as _____ **[INSERT PROJECT NAME]** relating to real property legally described as follows:

[INSERT LEGAL DESCRIPTION]

The undersigned, as owner(s), covenant and agree that:

1. The owner and subsequent owners of the above-described property shall maintain the approved storm drainage system shown on Exhibit A in compliance with the Operation and Maintenance Schedule, Exhibit B.
2. The owner shall, in accordance with the Operation and Maintenance Schedule, record and log maintenance performed. The Operation and Maintenance records shall be retained by the Owner for a minimum of three years and shall be available to the City for inspection at all reasonable times.
3. The owner shall provide access to the storm drainage system at reasonable times for regular inspection by the City or its authorized representative to ensure that the facility is maintained in proper working condition in accordance with the Operation and Maintenance Schedule.
4. If at any time, in accordance with the Operations and Maintenance Schedule, the City of South Bend reasonably determines that maintenance or repair work is required to be done to the existing, approved storm drainage facilities installed on the property described above the City shall give the current owner seven days notice that the City intends to perform such maintenance or repairs, or to have them performed by others.
5. If the owner has not completed or is not diligently pursuing the repair or maintenance of the system and it becomes necessary for the City of South Bend to perform the work, the current owners will assume responsibility for the cost of such maintenance or repair and will reimburse the City within thirty days of the receipt of the invoice. Overdue payments will require payment of interest at the current legal rate for liquidated judgments, and any costs or fees incurred by the City, should any legal action be required to collect such payments, will be borne by the parties responsible for said reimbursements.
6. If at any time the City of South Bend reasonably determines that the existing and approved storm drainage system on the property poses a hazard to life and limb, or endangers property, or adversely affects the safety and operations of a public way, due to failure, damage or non-

maintenance of the existing on-site storm system, and that the situation is so adverse as to preclude written notice to said owners, the City may take the measures necessary to eliminate the hazardous situation (which will mean repair or clean out of the existing system only to the same standards as originally installed and approved) provided the City has first made a reasonable effort to locate said owner before acting.

The current owners will assume responsibility for the cost of such maintenance or repair; and will reimburse the City within thirty days of receipt of the invoice. Overdue payments will require payment of interest at the current legal rate for liquidated judgments, and any costs or fees incurred by the City, should any be borne by the parties responsible for said reimbursements.

7. The owner shall keep the City of South Bend informed at all times as to the name, address and telephone number of the contact person responsible for the performance of maintenance or repair work to the storm drainage facilities.

These covenants are intended to protect the value and desirability of the real property described above, and to benefit all the citizens of the City of South Bend. They shall run with the land and be binding on all parties having or acquiring from the current owners or their successors, any right, title or interest therein, and to the benefit of all the citizens of the City of South Bend.

8. Lien: The City shall have a lien for costs expended by it for any repairs or maintenance properly chargeable to the owner hereunder, which lien shall be prior in right to the lien of secured parties under deeds of trust, mortgages or real estate contracts, regardless of the date of their recordation, and which shall be recordable and enforceable in the manner provided for materialmen's contractors' liens pursuant to RCW Ch. 60.04 or any successor statute thereto.
9. Attorneys' fees and costs: Should any party institute proceedings to enforce any right hereunder, including filing a lien under paragraph 8, reasonable costs and attorneys' fees thereby incurred shall be awarded to the prevailing party in such proceeding.

City of South Bend, Mayor

Owner

Signature

Signature

Date

Date

Address

City, State, Zip

Phone: _____

STATE OF WASHINGTON

ss. (INDIVIDUAL ACKNOWLEDGMENT)

City of South Bend

I, _____, Notary Public in and for the State of Washington, residing at _____, do hereby certify that on this ____ day of _____, 20____, personally appeared before me _____ to be known to be the individual described in and who executed the within instrument and acknowledged that _____ signed and sealed the same as _____ free and voluntary act and deed for the uses and purposes herein mentioned.

GIVEN UNDER MY HAND AND OFFICIAL SEAL

this ____ day of _____, 20 ____.

Notary Public in and for the State of
Washington, _____ residing _____ at
_____ in
said County. My commission expires
_____.

**CITY OF SOUTH BEND
EASEMENT FOR WATER MAINS AND APPURTENANCES**

THIS EASEMENT is made on the ____ day of _____, 20____
("Effective Date") by _____, a Washington corporation ("Grantor").

1. Grant and Location of Easement. Grantor hereby grants and conveys to the City of South Bend, a municipal corporation ("Grantee"), its successors and assigns, a non-exclusive utility easement ("Easement") with immediate right of entry and continued access over, under, and across the real property legally described on Exhibit "A" and depicted on Exhibit "B", attached hereto and incorporated herein.

2. Purpose of Easement. The purpose of this Easement is for the construction, improvement, maintenance, and repair of underground utilities, including but not limited to, underground water and other appurtenant structures.

3. Maintenance of Easement. Grantee shall maintain and repair the utility pipes, water mains, and its appurtenant structures so as not to damage the property burdened by this Easement, or any other property.

4. Interference. Grantor may use the surface above the Easement, PROVIDED that its use does not interfere with or cause damage to the utility pipes, water mains, and appurtenant structures, PROVIDED FURTHER that prior to constructing any building or planting any trees within the Easement Grantor shall obtain the written consent of Grantee, which consent shall not be unreasonably withheld. Grantor may construct a fence or other obstruction on Grantor's property, PROVIDED however that Grantor does not prohibit or impede Grantee's access to the Easement. Grantor may grant other non-exclusive easement rights in and to the Easement; PROVIDED, however, that no other utility pipe, line, or structure shall be located closer than five (5) feet parallel to the Grantee's utility pipe, water main, and/or appurtenances; and, PROVIDED FURTHER, that prior to installation of any utility pipe, line, or structure that crosses the Easement, Grantor shall obtain the written consent of Grantee, which consent shall not be unreasonably withheld. If, in exercising any right to use the surface above the Easement or grant other easements, the Easement is disturbed, Grantor shall return the Easement to its condition prior to its disruption, at Grantor's sole cost and expense.

5. Title. The Grantor warrants that the Grantor has good title to the above property.

6. Successor and Assigns. This agreement shall run with the property and be binding on the parties, their successors, and assigns.

A Washington Corporation

By: _____
Its: _____

STATE OF WASHINGTON)
) ss.
County of Pacific)

On this day personally appeared before me _____ to me
known to be the person who executed the within instrument as the _____
of _____, the corporation that executed the within and
foregoing instrument, and acknowledged the said instrument to be the free and voluntary act and
deed of said corporation, for the uses and purposes therein mentioned, and on oath stated that
he/she is authorized to execute the said instrument and that the seal affixed in the corporate seal
of said corporation.

GIVEN under my hand and official seal this _____ day of _____,
20_____.

(Type/Print Name)
Notary Public in and for the State of Washington, residing
at _____ My
appointment expires: _____.

Accepted by the City of South Bend this _____ day of _____, 20_____.

Mayor, City of South Bend

**CITY OF SOUTH BEND
EASEMENT FOR SANITARY SEWERS**

THIS EASEMENT is made on the ____ day of _____, 20____
("Effective Date") by _____, a Washington corporation ("Grantor").

1. Grant and Location of Easement. Grantor hereby grants and conveys to the City of South Bend, a municipal corporation ("Grantee"), its successors and assigns, a non-exclusive utility easement ("Easement") with immediate right of entry and continued access over, under, and across the real property legally described on Exhibit "A" and depicted on Exhibit "B", attached hereto and incorporated herein.

2. Purpose of Easement. The purpose of this Easement is for the construction, improvement, maintenance, and repair of underground utilities, including but not limited to, underground water and other appurtenant structures.

3. Maintenance of Easement. Grantee shall maintain and repair the utility pipes and sanitary sewer structures so as not to damage the property burdened by this Easement, or any other property.

4. Interference. Grantor may use the surface above the Easement, PROVIDED that its use does not interfere with or cause damage to the utility pipes and sanitary sewer structures, PROVIDED FURTHER that prior to constructing any building or planting any trees within the Easement Grantor shall obtain the written consent of Grantee, which consent shall not be unreasonably withheld. Grantor may construct a fence or other obstruction on Grantor's property, PROVIDED however that Grantor does not prohibit or impede Grantee's access to the Easement. Grantor may grant other non-exclusive easement rights in and to the Easement; PROVIDED, however, that no other utility pipe, line, or structure shall be located closer than five (5) feet parallel to the Grantee's utility pipe and sanitary sewers; and, PROVIDED FURTHER, that prior to installation of any utility pipe, line, or structure that crosses the Easement, Grantor shall obtain the written consent of Grantee, which consent shall not be unreasonably withheld. If, in exercising any right to use the surface above the Easement or grant other easements, the Easement is disturbed, Grantor shall return the Easement to its condition prior to its disruption, at Grantor's sole cost and expense.

5. Title. The Grantor warrants that the Grantor has good title to the above property.

6. Successor and Assigns. This agreement shall run with the property and be binding on the parties, their successors, and assigns.

A Washington Corporation

By: _____
Its: _____

STATE OF WASHINGTON)
) ss.
County of Pacific)

On this day personally appeared before me _____ to me
known to be the person who executed the within instrument as the _____
of _____, the corporation that executed the within and
foregoing instrument, and acknowledged the said instrument to be the free and voluntary act and
deed of said corporation, for the uses and purposes therein mentioned, and on oath stated that
he/she is authorized to execute the said instrument and that the seal affixed in the corporate seal
of said corporation.

GIVEN under my hand and official seal this _____ day of _____,
20_____.

(Type/Print Name)
Notary Public in and for the State of Washington, residing
at _____ My
appointment expires: _____.

Accepted by the City of South Bend this _____ day of _____, 20_____.

Mayor, City of South Bend