

City of
Whitefish

ENGINEERING STANDARDS



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City of Whitefish
Public Works Department
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1.1 CONSTRUCTION WITHIN CITY RIGHT-OF-WAY

1.1.1 Standards

- A. The latest published edition of the Montana Public Works Standard Specifications is adopted in their entirety, except as amended by the latest edition of the City of Whitefish Engineering Standards.
- B. With respect to the design and/or construction of public facilities, any conflict(s) or difference(s) between the Montana Public Works Standard Specifications, and the City of Whitefish Engineering Standards will be resolved in favor of the City of Whitefish Engineering Standards. This document is available at the City's website (<http://www.cityofwhitefish.org/>).
- C. These City of Whitefish Engineering Standards establish the minimum requirements for construction and/or upgrading of facilities both in the public right-of-way and for private development; transportation and transportation-related facilities; storm drainage facilities; sanitary sewer and water improvements; and park, recreation, and open space facilities.
 - I. The standards in this document apply whenever any public or private work is performed within the public right-of-way or public easement of the City of Whitefish, including work performed by private parties at their own expense under authority granted by ordinance of the City Council or permit process of the Public Works Department.
 - II. Compliance with these standards does not relieve the designer, property owner, or contractor of the responsibility to apply conservative and sound professional judgment to protect the health, safety, and welfare of the public.
- D. These are minimum standards and are intended to assist, but not to substitute for, competent work by design professionals.
 - I. Special considerations or environmental constraints may require more intense or rigorous design parameters than would be otherwise required.
 - II. City staff will use professional judgment in requiring more than these minimum standards in circumstances where the standards contained in this document do not satisfy the needs of special conditions or environmental constraints.
- E. It is not the intent of the City to unreasonably limit any innovative or creative effort resulting in a superior design based upon the performance criteria of safety, economical maintenance, and pleasant appearance. Proposed departures from these standards by the developer will be evaluated by City staff on the basis the proposal will produce acceptable results for the user, the environment, and the

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public.

- F. In accordance with the City's "Disturbing the Peace" ordinance, no construction activity is allowed within the City from 10:00 p.m. to 7:00 a.m. (Whitefish City Code Section 5.2.5).
- G. Any enforcement action for violation of these Standards, except costs assessed under provision of these Standards, will follow the procedure outlined in Section 1.4.1 of the Whitefish City Code as it currently exists or is, hereafter, amended.

1.1.2 Applicable Laws and Indemnification of the City

- A. The Contractor will give all notices and comply with all federal, state and local laws, ordinances and regulations affecting the conduct of the work, and must indemnify and hold harmless the City against any claim or liability arising from, or based on, the violation of any such law, ordinance, regulation, etc., whether by themselves or their employees.

1.1.3 Interruption of Service

- A. Affected City Departments, property owners and/or residents must be notified of any construction interrupting the normal operation of City sewer, water, storm or transportation facilities requires notification of affected City departments and property owners and/or residents.
- B. The Contractor must notify the Whitefish City Police and Fire Departments at least forty- eight (48) hours prior to any street closures.
- C. All street closures or interruptions of utility services require the Contractor to provide a news release specifying the location of construction and the duration of the closure. The Contractor must present the news release to the news media at least two (2) working days prior to the beginning of any construction activity.
- D. The Contractor must also notify utility users affected by the interruption of the type and duration of the interruption at least forty-eight (48) hours prior to beginning construction.
- E. The Contractor must notify the Public Works, Police and Fire Departments immediately In the event of an emergency interruption. The Contractor must immediately dispatch members of their staff to notify affected individuals by telephone or personal contact.

1.1.4 Traffic and Pedestrian Control

- A. A Traffic and Pedestrian Control Plan must be submitted and approved by the Public Works Department at least forty-eight (48) hours prior to commencing of an excavation.
 - I. The Contractor must also notify the City Police and Fire Departments at least forty-eight (48) hours prior to any street or alley closure.
 - II. A news release to the news media is also required at least two (2) business

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- days prior to the beginning of any construction activity that requires road or lane closures.
- B. All traffic control devices used must meet the most current Manual on Uniform Traffic Control Devices (MUTCD), Montana Public Works Standard Specifications, and the City of Whitefish Engineering Standards.
 - C. The location and description of all Traffic and Pedestrian Control Devices must be shown on the plan.
 - I. The plan must be approved prior to beginning construction. If the required devices are not in place, the Contractor will not be allowed to begin work on the project.
 - II. All devices must be kept in place and maintained in good visible condition throughout the project. The Public Works Department reserves the right to reject any device observed to be in substandard condition.
 - III. All signs, except "Stop" signs, must comply with the MUTCD for size, type, placement, material, and reflectivity.
 - IV. "Stop" signs must be 30".
 - V. Emergency access to, and through the work area must always be maintained.
 - D. All barricades and obstructions shall be protected at night by suitable signal lights which will be kept illuminated from sunset to sunrise.
 - I. Barricades must be of substantial construction and shall be constructed to increase their visibility at night.
 - II. Suitable warning signs must be placed and illuminated at night to show in advance where construction, barricades, or detours exist.
 - E. If flagging is required, it must be accomplished by competent and properly equipped flag persons. Flagging must be accomplished as described in the Montana Department of Transportation Flagger's Handbook and the MUTCD.
 - F. All traffic control devices must be in place prior to start of the excavation and left intact until the street is reopened to the general public.
 - G. The Contractor will remove all traffic and pedestrian control devices within 24 hours of the end of construction.
 - H. If the Contractor fails to maintain the Traffic and Pedestrian Control Devices in accordance with the approved plan, the City will correct the deficiency and all labor, equipment, material, and administrative costs will be billed to and paid by the Contractor.

1.1.5 Liability Insurance

- A. Liability Insurance for work within existing public right-of-way and/or easement.
 - I. The Contractor must procure and maintain during the construction period, at the Contractor's expense, Contractor's Liability Insurance in accordance with

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the Supplementary Conditions to the General Conditions of the Montana Public Works Standard Specifications.

- II. Contractor must provide the City with a Certificate of Insurance.

1.1.6 Bonding

- A. All construction work within the public right-of-way or easement (sidewalk and curb construction, storm drainage and sanitary sewer service line installation, repair, etc.) will require the Property Owner/Contractor to provide the City with a Performance Bond.
- B. The bond must be equal to the constructed value of the project and will remain in force for one year.
- C. Contractors furnishing the City with an annual bond of \$5,000 or more, depending on the project, will not be required to furnish additional bonding if the \$5,000 bond meets the requirements of these standards.
- D. Bonds may be in the form of a Surety Bond, a Certificate of Deposit (CD), a Certified Check, or an irrevocable Letter of Credit issued by a bank licensed to do business in the state of Montana.

1.1.7 Excavation and Disposal of Materials from Existing Public Right-of-Way and Easement

- A. Standards:
 - I. The Contractor is responsible for maintaining and repairing all defects or failures in the excavation area, including but not limited to ditch settlement and asphalt failure for a period of two (2) years. In the event the Contractor fails to make such repairs, the City will have the repairs performed and charge the Contractor the cost thereby incurred.
 - II. All steel tracked equipment operating within a public street right-of-way must be fitted with triple grouser street pads.
 - III. The Contractor will be responsible for damages to City infrastructure within the public street right-of-way and at its own expense, make any necessary infrastructure repairs.
- B. Call Before You Dig:
 - I. A Montana 811 Call Before You Dig utility locate request must be made prior to beginning any excavation within the City of Whitefish.
 - II. Two working days advance notification is required and will be enforced. Contact Montana811.org to get your locate ticket.
 - III. The contractor will mark the proposed excavation site with white paint and/or white marking flags in accordance with APWA/UULC standards.
- C. Encroachment Permit:
 - I. Temporary Construction Encroachment Permits for construction and/or demolition, containers and /or dumpsters are permitted on City property.

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Construction or demolition containers/dumpsters are not allowed to be placed on City streets at any time between November 1st and March 15th.

- II. The Permit will not be issued until all insurance and bonding requirements have been met.
 - III. Permanent Encroachment Permits are required for privately owned or maintained structures or items of personal property on, across, or over City owned property as defined in Title 7, Chapter 2 of the Whitefish City Code, and will need a permit approved by the City Manager.
- D. Emergencies:
- I. In an emergency which requires repairs to be made immediately, the Contractor may excavate and complete the repairs without first having obtained a Permit.
 - II. Prior to beginning work at the site during normal working hours, the Contractor must obtain a right-of-way permit at the Public Works office at City Hall or call 863-2456 or 863-2457.
 - III. The Contractor must notify police dispatch at 863-2420 prior to beginning work after hours.
 - IV. In either case, the Contractor must describe the circumstances and provide the location of the emergency repairs.
 - V. The Contractor must obtain the Permit no later than the next scheduled City workday.
- E. Potential Hazards Require Permits:
- I. A permit is also required for other uses of the public right-of-way where there is a possibility of creating a hazard.
 - II. Examples of hazards are:
 - a. Scaffolding
 - b. Storage of materials or equipment
 - c. Crane and equipment operations
 - d. Demolition
 - e. Sandblasting and painting operations
 - f. Temporary construction or demolition dumpster placement
 - g. Any other use deemed a hazard by the Public Works Department
 - III. All construction hazards that are placed in the City right-of-way require a right-of-way permit.
- F. Excavation of Material within the Existing Public Right-of-Way:
- I. The Contractor must remove and dispose of material unsuitable for trench backfill, sub-base, or base course excavated from the developed public right-

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of- way or easement.

- II. The disposal site must meet regulatory provisions for disposal of the unsuitable excavated material.
 - III. Unsuitable excavated material will not be stockpiled on-site.
 - IV. Excavated material will be confined to the work zone as established during the preconstruction conference or as shown in the contract documents.
 - V. With prior approval of the Public Works Department and project Design Engineer, on-site excavated soil may be used to backfill utility trenches.
 - a. For further details see Standard Detail 24 - Note 10.
- G. Cleanup:
- I. The Contractor must clean the construction site of all debris, construction materials, etc., immediately upon completion of the project.
 - II. If the Contractor fails to clean the construction site, the City will complete the cleanup or hire a private contractor to complete the cleanup and the cost, including administrative costs, will be borne by the Contractor.
 - III. Site cleanup is required at the end of any working day (this includes daily street sweeping, as needed).

1.1.8 Tree Protection and Planting Requirements

For further information see Appendix

P and Whitefish City Code Sections 7-5 and 12-4.

- A. Work on Public Trees:
- I. Authority: The Director of Parks and Recreation or designated representative shall have the authority and jurisdiction of regulating the planting, maintenance and removal of public trees on streets and other publicly owned property and to affix reasonable conditions to the granting of a permit to ensure safety and to preserve the aesthetics of such public places.
 - II. Permit Required for Work on Public Trees: No person shall plant, spray, perform major pruning, remove or otherwise disturb any public tree without written permission issued by the Director of Parks and Recreation or his designated representative. The person receiving the permission shall abide by the arboricultural specifications and standards identified in the permit. Public liability insurance may be required at the discretion of the Director of Parks and Recreation and will be decided on a case-by-case basis.
- B. Removal of Public Trees:
- I. No trees shall be removed from public places unless they are dead, diseased, constitute a hazard to life or property, are a public nuisance, or because a revision of planting plans necessitates.
 - II. No person or property owner is to remove a public tree from the boulevard

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for the purpose of construction, or for any other reason, without first obtaining written permission from the Director of Parks and Recreation.

- C. Protection of Public Trees during Construction:
 - I. All trees on any street or other publicly owned property near any excavation or construction of any building, structure or street work, shall be guarded with a substantial fence, frame, or box. All building material, dirt or other debris shall be kept outside the barrier.
 - II. It is unlawful for any person to excavate any ditches, tunnels, trenches, or lay drive within a radius of ten feet (10') of any public tree without first obtaining written permission from the Director of Parks and Recreation. Maintenance or repair work on existing underground utilities will be permitted. Excavation for new utilities and structures within a radius of ten feet (10') of any public tree will not be permitted unless it is determined by the Director of Parks and Recreation that it will not adversely affect the tree.
- D. Permitted Tree Planting in Boulevards:
 - I. A list of acceptable trees for planting in the planting strip and the public sites of the City of Whitefish is available from the Parks and Recreation Department and can be found in Appendix P.

1.1.9 Monumentation

- A. When a street is to be reconstructed, prior to any excavation, a thorough search must be made for existing intersection monuments. If found, such monuments and any other survey monuments likely to be disturbed or destroyed must be preserved by or under direction of a Professional Land Surveyor in accordance with MCA 70-22-115.
- B. All monuments set must meet the requirements of ARM 24.183.1101. Monuments set in pavement or concrete driving surfaces shall be placed inside of a cast iron monument box.
- C. Monuments must be placed as shown in Standard Drawing SD- 3
 - I. The monument must be capped with a brass or aluminum cap stamped with the name and license number of the responsible land surveyor.
 - II. The cap must be recessed at least 1/8" below the final asphalt surface.
 - III. Monument boxes w/lids of the same type as City water valves (six inches inner diameter) may be used.

1.1.10 Pollution Controls – Flathead County Air Pollution Control Program

- A. The Contractor will be responsible to maintain the construction site and all haul routes in accordance with the current requirements of the Flathead County Air Pollution Control Program (Chapter 7 Whitefish Air Pollution Control District).
- B. If the Contractor fails to meet these requirements, City forces may perform the work or have the work done and the Contractor will reimburse the City for labor,

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equipment, materials, and administrative costs.

- C. In some cases, a stop work order will be enforced until clean-up of City Streets has occurred.

1.1.11 Pavement Restoration

- A. The Contractor signing the Public Right-of-Way Permit will be responsible for pavement replacement.
- B. Pavement must be cut with a saw or pneumatic asphalt breaker prior to excavating.
 - I. The trench will be cut along a neat vertical line a minimum of 12" from each edge of the trench opening.
 - II. For example: If the excavator bucket width is 2', then the width of the asphalt cut must be a minimum of 4', with the excavation centered between the two cuts.
- C. If any adjacent longitudinal or transverse joints or cracks are less than 3' from the cut lines, the pavement will be removed and replaced to that joint or crack.
- D. Additional asphalt cuts will be required if the cut edges or adjoining sections of asphalt are disturbed during excavation.
- E. All permanent paving must be completed within seven (7) working days after cutting the pavement.
- F. Trench edges must be cleaned and a tack coat (SS-1, SS-1h or approval equal) applied before placing asphalt.
- G. Do not place asphalt hot-mix when the air temperature is less than 40 degrees Fahrenheit and rising. Do not place asphalt upon a surface which is frozen or has a temperature less than 32 degrees. Paving is not allowed during rainfall or if standing water is present.
- H. Pavement replacement:
 - I. A minimum of four (4) inches of Hot-Mix asphalt (PG 64-34) placed in two (2) properly compacted lifts is required.
 - II. In no case will the new replacement be less than the existing section.
 - III. Compaction testing is required by the City at the Contractor's expense.
- I. Temporary paving with a "winter" mix asphalt such as UPM or QPR is allowed only when Hot-Mix asphalt is not available; a three (3) inch minimum thickness is required.
 - I. The road cut may also be temporarily repaired with a minimum of four (4) inches of Portland cement concrete.
 - II. The temporary repair must be maintained by the Contractor for safe winter usage.
 - III. The permanent restoration must be made as soon as the ground is thawed in

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the spring, or as directed by the Public Works Department.

- J. Crack sealing of all asphalt joints may be required.
- K. All excavations within 36" of the edge of the asphalt require removal and replacement from the edge of asphalt to the excavation edge.
 - I. Asphalt patch areas within the wheel path of the vehicular travel lane must be increased in size to the center of the lane or adjacent lane.
 - II. In no circumstance will the edge of a patch area be allowed to fall within the wheel path.
- L. Any damage to the existing asphalt surface caused by the Contractor's operations must be repaired at the expense of the Contractor, including but not limited to gouges, scrapes, outrigger marks, backhoe bucket marks, etc.
 - I. A slurry seal type covering is considered the minimum repair.
 - II. The Contractor will be responsible for maintaining the area in a smooth and drivable condition until the permanent pavement is placed.
- M. If the Contractor fails to restore the pavement within seven (7) working days of an asphalt cut or fails to maintain the trench or area as required, the City (or a paving contractor hired by the City) will complete the restoration or maintenance, and all labor, equipment, material and administrative costs will be borne by the Contractor.
- N. Contractors cutting into City streets with geotextile fabric will be required to over-excavate the trench to provide a minimum 2'-0" overlap with existing fabric.
 - I. Detailed requirements for the cutting and overlapping of existing geotextile fabric are included in the PVC Trench Bedding and Backfill drawing SD-21.

1.1.12 Stop Work Order

- A. A written Stop Work Order may be issued by the City Engineer or designee if the work in progress does not meet the Engineering Standards for the City of Whitefish, Montana, or for any other valid reason.
- B. Work may resume only after the Stop Work Order has been rescinded by the City Engineer or designee.

1.1.13 Service Connections and Utilities

- A. All development within City limits must be served by the City water and sewer systems.
- B. Developers are required to extend the existing water and sewer systems across the full frontage of the property being developed or otherwise extend the system to make it available for future extension and development, unless otherwise approved by the Public Works Director.
- C. Upon approval and final acceptance of construction, the Developer must convey or deed the system as constructed to the City.

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- D. Joint participation by the City apply where oversizing is deemed necessary by the Public Works Director/City Engineer.
- E. Requirements for annexation into the City of Whitefish for municipal services:
 - I. If a property is located outside the City Limits but is within 500-feet of a sewer main, state law requires development/new construction to connect to municipal services. If a property is located outside the City limits, and the property owner wishes to continue City services or anticipates initiation of City services in the future, the property owner is required to consent to annexation prior to development/new construction. Properties required to annex into the City shall complete and return a Petition for annexation to the City of Whitefish, a development agreement, if applicable, and an application for zoning map amendment to the City Clerk's Office. Such consent to annexation shall be completed prior to any development/new construction on the property. If the property requesting annexation has a County zone, a rezone of the property to a Whitefish zone will be initiated by the City.
 - II. Whitefish Planning and Building Department will schedule the appointment for rezone.
- F. Utility Easement Location:
 - I. No underground utilities will be placed in the boulevard between the back of curb and sidewalk, underground utilities (other than sewer, water, storm sewer, and street lighting) will be in a 10-foot utility easement.
 - II. Along the front lot line and side street lot line of each residential lot there will be reserved ten foot (10') wide utility easement along, contiguous and adjacent to the lot line to provide an area between the sidewalk and easement line for the placement of privately owned underground utilities, including power, phone, gas, cable, etc.
 - III. No private utilities will be in water or sewer trenches.
 - IV. The utility easement location may allow for variation on steep terrain with prior approval by the Public Works Director.
 - V. All underground electrical, gas, phone, and TV cable lines must maintain a minimum of five (5) feet of (horizontally) from water or sewer utility trenches.
 - VI. Utility lines must be designed by a licensed professional engineer or by the utility firms in cooperation with the subdivider.
 - VII. All applicable laws, rules and regulations of appropriate regulatory authority having jurisdiction over such facilities must be observed.
 - VIII. Public Works Department will review and approve the location of all proposed utilities and must be shown on the construction plans.
- G. Sewer Service Connection Procedures:
 - I. The Customer or their Contractor must provide all equipment, labor, and

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materials to tap the main, install the service line from the main to the point of service, and restore the pavement or other surface in the public right-of-way to the pre-construction condition when it is necessary to tap an existing sewer main for a service connection.

- H. Water Service Connection Procedures:
 - I. The Customer or their Contractor must provide all equipment and labor to excavate and expose the main when it is necessary to tap an existing water main for a service connection.
 - II. The City will provide the tap only for domestic service.
 - III. The Customer will pay the actual cost of the tap and materials for fire, irrigation, and any other connection.
 - IV. See Section 3.2.20 for main line and service line tapping procedures. The Customer or their Contractor must provide all equipment, labor, and materials to install the service line from the water main to the point of service and restore the pavement or other surface in the public right-of-way to its pre-construction condition.

1.1.14 Construction Control

- A. Work performed for the construction or improvement of City streets and utilities whether by or for a private Developer or by a City contractor, shall be done to the satisfaction of the City and in accordance with approved plans.
 - I. No work must be started (including excavation) until such plans are approved, required bonds posted, and proof of insurance obtained.
 - II. Any revision to such plans must be approved by the Public Works Director before being implemented.
 - III. Failure to receive the City's approval prior to construction can result in removal or modification of construction at the expense of the Contractor or Developer to bring it into conformance with approved plans.
- B. The City reserves the right to reject any installation not inspected and approved by the Public Works Director or designee.
- C. The City will allow the extension to be connected to the City system upon satisfactory completion of all required tests and acceptance of the main extension.
- D. No water main extension will be energized except for test purposes or sewer mains connected to the existing system until the new extension has been accepted by the Public Works Director or designee, all fees and charges have been paid and all recorded easements for utilities located outside of the Public right-of-way have been delivered to the City.
 - I. The City may not operate the water or sewer system prior to receiving a certification letter from the design engineer stating that the system was completed in accordance with the approved plans and specifications.

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- E. The applicant must provide the Public Works Department with record drawings in accordance with *Section 2.3 As-Built Record Drawings* within 90 days of completion of a main extension.
- F. No main extension will be accepted until satisfactory record drawings are provided. The two (2) year guarantee/maintenance period will not commence until this provision met.
- G. Combustible materials must neither be stored on-site nor used as building material until the water system and roadways are installed, tested and approved by the Public Works Department.

1.2 PROJECT REQUIREMENTS

1.2.1 Site Review Meetings

- A. Site review meetings are designed to assist applicants preparing their development applications for submittal to the City, to identify potential problems and to expedite development applications. These meetings are informal and provide one-stop meeting with City departments responsible for development review. Staff will describe the type of land use permit application(s) necessary, the review process and applicable development regulations. Issues and concerns may also be identified; however, it is not meant to be a detailed review of proposed plans or ideas. Plans presented at the Site Plan Review meeting are nonbinding and do not vest a project nor is the information provided an implied or conditional approval of the project.
- B. Site Plan Review is required for all new subdivisions, conditional use permit requests, new commercial uses or projects, multifamily proposals with three (3) or more units and any other proposals that may benefit from being reviewed by City staff.
- C. Submit the completed application and appropriate attachments in print and electronic format, to the Public Works Office Manager no later than 4:30 p.m. the Thursday prior to the Site Plan Review meeting. Incomplete applications will not be scheduled for review.
- D. The regularly scheduled meeting of the Site Plan Review Committee is weekly on Thursdays at 1:30 p.m. at City Hall at 418 E. 2nd Street.
- E. The applicant will be notified of the meeting via email. The applicant and/or representative are encouraged to attend.
- F. After the Site Review Meeting, the Public Works Office Manager will forward minutes to the applicant via email.

1.2.2 Permits

- A. Public Right-of-Way Permit:
 - I. A Right-of-Way Permit is required for any ground disturbance work within the right-of-way. The excavating contractor must have a completed, signed, and

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approved copy of a City of Whitefish Excavation/Right-of-Way Permit in its possession **prior to excavating** in any City right-of-way and is available at the City's website (<http://www.cityofwhitefish.org/>).

- II. The Permit may contain such restrictions as determined by the Public Works Department, including a deadline for restoration of public facilities.
- III. The work authorized by the Permit includes, but is not limited to:
 - a. Street construction and repair
 - b. Water
 - c. Sewer
 - d. Storm system construction and repair
 - e. Utility connections and repair
 - f. Landscaping
 - g. Sidewalk
 - h. Curbing
 - i. Driveway construction and repair
- B. Water/Sewer Service Line Permit:
 - I. A Service Line Permit is required to be completed by a Montana State Licensed Plumber for installation or alteration of a water or sewer service line. The permit application is available at the City's website (<http://www.cityofwhitefish.org/>).
- C. Storm Water Pollution Prevention Plan (SWPPP):
 - I. Construction activity that results in the "disturbance" of equal to or greater than one acre of total land area must obtain a Storm Water Discharge Permit.
 - II. The Storm Water Pollution Prevention Plan (SWPPP) must be approved by the Montana Department of Environmental Quality prior to the pre-construction meeting. For more information visit <https://deq.mt.gov>.
- D. Other permits as required by other agencies.

1.2.3 City Fees

- A. Water and Sewer Service Connection Fee (Impact Fees):
 - I. All impact fees must be paid in accordance with Title 2, Chapter 13 of the Whitefish City Code. Impact fees are assessed at the time of the complete building permit application and must be paid at the time a Building Permit is issued for a new structure, a change in use of an existing building or dwelling unit, including any alteration, expansion, replacement, or new accessory building.
 - II. These fees must be paid even if a service line has previously been stubbed to the property line or any other point.
- B. Public Works Department Engineering Review Fee:

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- I. An engineering review fee must be received by the Public Works Department before the plan review process can begin for a development project. The review fee is due in full at the time the plans are submitted to the Public Works Department. The review fee calculation form is provided in Appendix G.
- C. Erosion and Sediment Control Plan (ESCP) Fee:
 - I. The ESCP and fee for single family/duplex should be submitted to the Whitefish Planning and Building Department along with the building permit application. All other ESCP's should be submitted as part of engineering drawings to the Public Works Department.
 - II. Fees may be increased beyond what is set forth herein by action of the City Council.

1.2.4 Water Quality Protection Ordinance

- A. In accordance with Water Quality Protection regulations, or any successor ordinance, prior to receiving a building permit, property owners must submit a Water Quality Protection Checklist to the Whitefish Planning and Building Department.
- B. The checklist addresses the presence of streams, lakes, critical stormwater conveyance, wetlands, steep slopes or areas with potentially high groundwater on the property.
- C. The Water Quality Protection Checklist is available at the City's website: http://www.cityofwhitefish.org/WQ%20Checklist_081717.pdf.

1.2.5 Municipal Facilities Exclusion Certificate (MFE)

- A. Municipal Facilities Exclusion Certification may be required by the Montana Department of Environmental Quality as part of their review process.
- B. An MFE may be submitted to the City for certification of the availability of municipal services in cases where utilities are available to lots or subdivision's utility plans have been approved by the City. The MFE form is provided in Appendix L.
- C. If water or sewer services have not yet been stubbed out to individual lots from the main lines, the following note must be included on the final plat:
 - I. "Water and sewer services have not been stubbed out to individual lots from the main lines and are the responsibility of the lot owner at the time service is required."
 - II. This statement is not required if the application is part of an engineered plan review.
- D. A site plan must be provided showing details of existing and proposed water and sewer services as part of the MFE application.
 - I. Recorded easements must be provided for services that cross other lots.

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- E. The recorded easements must be submitted along with final construction plans if the MFE certification relates to a civil engineering plan set.

1.2.6 Latecomer's Agreement

- A. The City has a latecomer's reimbursement policy for City owned water and/or sewer infrastructure improvements.
- B. Any person who constructs more than 200' of water and/or sanitary sewer infrastructure improvements at the direction of the City, in excess of that which is required to meet minimum standards or extends beyond the minimum requirement for improvement and to the benefit of properties abutting the new main, may, with the approval of the City, enter into a contract with the City which allows the Developer to be reimbursed for that portion of the construction cost that benefits the adjoining properties and/or is in excess of the minimum standard.
- C. This contract is commonly termed a "Latecomers Agreement". The City's Latecomers Agreement form is included in Appendix F. No deviations from this form will be allowed.
- D. Cost apportionment for a Latecomers Agreement must be submitted for review and approval prior to plan approval to be considered.
- E. The Developer is responsible for initiating, executing, and, after City approval, filing with the Flathead County Clerk and Recorder for all affected parcels, the Latecomers Agreement and providing the City with a copy of the recorded agreement.
- F. The Agreement must include a list of those properties which will benefit from the extension, a map outlining and designating properties, legal descriptions, as required by the City, and backup data supporting the costs submitted.
- G. The City will exercise its best good faith efforts to collect the latecomers fee from persons wanting to connect to the utility extension or street improvement and subsequently see that the Developer receives payment.
- H. The Latecomers Agreement application must be submitted within 90 days of acceptance of the project by the Public Works Department.
- I. Acceptance of the project may occur once the design Engineer has certified to the City that the facilities are complete and installed in substantial compliance with the approved plans and specifications.

1.3 CONSTRUCTION INSPECTION, TESTING AND QUALITY CONTROL

1.3.1 Construction Inspection

- A. A Professional Engineer, or their designated representative, must provide construction inspection and testing as required.
- B. Inspection and testing must be in accordance with the current edition of the Montana Public Works Standard Specifications and the City of Whitefish

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Engineering Standards.

- C. The City reserves the right to conduct independent quality control testing at the City's expense during any phase of the construction.
- D. The Contractor will bear the expense of all failed tests and the expense of bringing the material into conformance with the required specifications.
- E. The following quality control procedures will apply to all utility and roadway construction projects:
 - I. All water main valves and fittings, fire hydrants, sewer manholes, wet wells and sewer/water main crossings must be inspected and approved by the Professional Engineer or their representative prior to backfilling.
 - II. A Professional Engineer or their designated representative, must be present for all tests required in Section 02660, Section 02720, and Section 02730 of the Montana Public Works Standard Specifications. A written record of all tests results must be submitted to the Public Works Department.
 - III. A Professional Engineer or their designated representative must provide the Public Works Department with electronic files of daily inspection reports, including Proctors and compaction test results for all projects or complete the weekly construction and inspection report form included in Appendix J.
 - IV. All underground stormwater detention and treatment facilities must be inspected and approved by the Professional Engineer or their designated representative prior to backfilling.
 - V. City streetlight electrical installation must be inspected by a licensed electrician.

1.3.2 Construction Testing

- A. Minimum Compaction Testing Procedures:
 - I. The following minimum compaction testing procedures shall apply to all utility and roadway construction projects.
 - II. Random longitudinal test locations are required.
 - III. The Professional Engineer or their designated representative may require additional tests.
 - IV. For projects containing less than 300 linear feet of improvements, a minimum of one compaction test for each improvement is required for the improvements listed below:
 - a. Utility Trenches and Underground Structures:
 - 1. Density tests must be taken at every lift.
 - 2. The minimum density must be 95% Standard Proctor, \pm 3% optimum moisture.
 - 3. Each test location must be separated horizontally from a prior

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test location.

- b. Horizontal Frequency:
 - 1. Utility Mains – One set of tests per 300 feet.
 - 2. Service Lines – One set of tests per three (3) services per utility type.
 - 3. Open Pit – Minimum of one test (Open Pit – at each manhole, water valve, storm inlet, curb inlet, vault, etc.).
- c. Street sub grade:
 - 1. All sub-base: 95% Standard Proctor, \pm 3% optimum moisture. One random density test, every 300 linear feet of street.
 - 2. All crushed gravel base: 95% Standard Proctor, \pm 3% optimum moisture. One random density test, every 300 linear feet of street.

1.4 PROJECT ACCEPTANCE

1.4.1 Final Acceptance

- A. Final acceptance of the public utilities will occur upon completion and acceptance of all required infrastructure development. Final acceptance will be considered upon the completion of the following items:
 - I. A comprehensive walk-through with City staff, the Engineer and the Developer.
 - II. Completion of the final punch-list items.
 - III. Inspection and repair of the previously accepted facilities found to be out of compliance with the interim acceptance conditions. The City reserves the right to require re-inspection and repair of the conditionally accepted utilities if damage from final construction is suspected.
 - IV. Final certification from the Engineer that the entire development has been completed in accordance with the approved plans and specifications.
 - V. Submission of final record drawings in an electronic format suitable for City archival.
 - VI. Submission of the complete set of daily construction progress and inspection reports and photographs.
 - VII. Copies of the required tests will be provided to the engineering division as well as the affected utility. The tests include the log or tape of the TV sewer main inspection, bacteriological tests, pressure tests, hydrant flow tests, compaction tests, and other testing as required.
 - VIII. A two-year maintenance bond will be provided for public infrastructure as described in *Section 1.5*.
- B. Final acceptance of a completed utility system component can be granted prior to

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completion of the infrastructure development as a whole, if the City of Whitefish is provided with a Subdivision Improvement Agreement and letter of credit from a local financial institution showing that the remaining infrastructure components will be completed within a specific time frame and that the completed infrastructure operates independently of the guaranteed portion.

1.5 TWO-YEAR MAINTENANCE BOND

1.5.1 Requirements

- A. As a condition of receiving final acceptance of infrastructure improvements, the Property Owner, Developer, or Contractor must provide the City with a Maintenance Bond of ten per cent (10%) of the total value of the public infrastructure constructed within the subdivision, development, or phased development.
- B. The Contractor will guarantee all materials and equipment furnished, and construction work performed for maintenance and repair work on existing public infrastructure for a period of two (2) years from the date of written acceptance of the work by the City.
- C. The Maintenance Bond will remain in full force for a two-year period after acceptance of the entire City infrastructure by the City for maintenance.
- D. The City expressly reserves the right to draft the Maintenance Bond for repairs not completed by the Property Owner, Developer, or Contractor within thirty (30) calendar days of being advised repairs are required. If the expiration date of the Maintenance Bond falls after November 16, the expiration date of the Maintenance bond will be June 30 of the following year.
- E. The Project Engineer or their designated representative shall conduct a two-year inspection, to be attended by a representative from the Public Works Department.
 - I. The inspection will take place not less than ninety (90) days prior to the expiration date of the Maintenance Bond.
 - II. The Maintenance Bond will be released when all deficiencies have been corrected to the satisfaction of the Public Works Director.
- F. The Public Works Director, the Project Engineer, or their designated representative, will notify the Principal as listed in the Maintenance Bond.

1.5.2 Warranty Work

- A. The City Engineer, the Project Engineer, or the designated representative will notify the Principal as listed in the Maintenance Bond of any work found to be not in accordance with the approved construction documents.
- B. The Principal must restore the work to meet the requirements of the approved construction documents prior to the release of the Maintenance Bond.
- C. The City expressly reserves the right to draft the Maintenance Bond for repairs not completed by the Owner, Developer, or Contractor within thirty (30) calendar

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days of being advised that repairs are required.

1.5.3 Subdivision Improvement Agreement

- A. The Whitefish Subdivision Regulations provide for a Subdivision Improvement Agreement (SIA), whereby a subdivision final plat may be issued prior to the completion of required infrastructure improvements. In such cases Developers sign a Subdivision Improvement Agreement with the City.
- B. A qualified professional must list all remaining improvements, the associated costs, and provide a schedule for completion. The Developer also provides a letter of credit from a local financial institution equal to 125% of the total cost of improvements, to guarantee all improvements are completed and on time.
- C. It is the Developer's sole responsibility to remain aware of, and meet, the completion deadline in the Subdivision Improvement Agreement.
 - I. The City will send one letter, 45 days before the improvement completion date, warning the developer of the need to complete all improvements or extend the letter of credit.
- D. Depending on the facts and circumstances, the City may not extend the completion date in all cases.
- E. An extension request to the Planning and Building Department must be submitted in writing sixty (60) days prior to its expiration. This request will be scheduled for review by the Whitefish City Council along with a recommendation.
- F. If the situation is not satisfactorily addressed by 14 days before the letter of credit expires, the City will make a written demand upon the financial institution providing the letter of credit, for release of funds to the City equal to 125% of any remaining improvements.
 - I. The City will then have the improvements completed, using the Developer's funds.

1.6 COLD WEATHER CONSTRUCTION REQUIREMENTS

1.6.1 Inspection Requirements

- A. As detailed by the adopted City of Whitefish Resolution No. 06-05 the following requirements will apply to cold weather construction of new water mains, sewer mains, storm sewer mains, roads, appurtenances, and earthwork in the existing or proposed public right of way and **will be in effect when the air temperature is lower than 32 degrees or when frozen soils conditions exist.**
- B. The Owner must sign a copy of the Cold Weather Construction Agreement for the project to proceed. A copy of the Cold Weather Construction Agreement is included in Appendix E.
- C. Full time inspection is required under the supervision of a Montana licensed civil engineer.
- D. The Field Inspector shall document on-site activities using the DAILY INSPECTION

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LOG FOR COLD WEATHER CONSTRUCTION included in Appendix E.

- I. An inspection log must be completed for each day of active construction, signed by both the Field Inspector and the Project Engineer, and submitted to the Public Works Director with all pertinent attachments no later than 9 a.m. the following business day.
- E. The Project Engineer must provide the Public Works Department with current proctor test results for all backfill material prior to use of that material.
- F. The Field Inspector must perform or oversee soil compaction testing for all backfill material to verify optimal moisture content and compliance with approved specifications.
 - I. Compaction tests must be taken at intervals of not more than 100 feet and at various depths, with 50% of the tests in the lower half of the trench or road section.

1.6.2 Warranty Requirements

- A. The Owner must enter into a two-year warranty agreement with the City for all water mains, sewer mains, storm sewer mains, roads, appurtenances, or earthwork constructed in the public right of way or proposed right of way during cold weather conditions prior to connecting any new mains to existing City facilities.
- B. The warranty will be enforced with a letter of credit issued by a local bank in the City's name.
- C. The letter of credit must provide an amount equal to 50% of the City approved engineer's estimate for the cost of improvements.

1.6.3 Construction Requirements

- A. A competent Project Supervisor, employed by the General Contractor, must be on the job site continuously during periods of active construction.
- B. Frozen soil, aggregate, or other material must not be placed in backfill areas and all frozen soil, aggregate, snow, ice, or other material must be removed before proper material is placed in fill area.
- C. The length of open trenches is limited to not more than 50 feet during active construction.
- D. Each trench must be backfilled to match the surrounding grade when construction activity in that trench ceases for any period greater than one (1) hour.
- E. Soil compaction must be in accordance with the optimal moisture results of pertinent Proctor testing and must conform to the approved plans and specifications.
- F. Pipe installers must abide by the manufacturers' cold weather guidelines, as well as the Uni-Bell Handbook of PVC Pipe, or an equivalent standard regarding the handling and installation of pipe, gaskets, fittings, etc.

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- G. The Public Works Department reserves judgment and authority to schedule or limit work near existing City utilities at their discretion.
- H. A lack of compliance with these requirements may be cause for the Public Works Department to issue a Stop Work Order or require work to be redone as a condition of final acceptance.

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2.1 PLANS

2.1.1 Engineering Plan Submittals

- A. Submit two sets of complete plans and specification for all proposed water distribution systems, sanitary sewer facility, storm drainage facilities, street, commercial development and subdivision, including any necessary designation and easement to the Public Works Office Manager.
 - I. Improvement plans must be prepared by a Professional Engineer licensed within the state of Montana and bear the seal of the Engineer responsible for the design.
 - II. Engineering Plan approval is valid for three (3) years.
 - III. No construction may commence until the Public Works Department has approved the plans, all fees have been paid and a pre-construction meeting had been held.
 - IV. Water and sanitary system designs may be submitted for concurrent review to MDEQ.
 - V. The Public Works Office Manager will route one set of plans to the Whitefish Fire Marshal and one set of plans to the Public Works Department.
- B. Complete Plan Submittal:
 - I. Plan and profile drawings are required for all proposed transportation-related improvements, storm drainage facilities and sewer and water improvements. Plan sets are also required for street lighting, erosion control, signage and landscaping.
 - II. An overall plan showing storm drainage, water and sewer plan must be shown on a single sheet when the plan and profile sheets for each utility exceed three (3) sheets or all plan sheets are not in a common north-south orientation.
- C. Upon final approval, a master copy of the cover sheet must be provided to the Public Works Department for Director of Public Works and Fire Marshall signature. See Appendix D for further specific minimum requirements. All plan sets on the job must be the final signed approved set.
- D. Changes or Revisions to the Approved Plan.
 - I. The assigned City Inspector may verify and approve minor changes. Such changes must be noted on the field drawings.
 - II. Significant changes must be reviewed and approved by the Public Works Director or his designee. Such changes must be submitted to the Public Works Office Manager in both paper and electronic format and will include

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a signature block. Revision approval is required prior to construction.

2.1.2 Design and Development Requirements

- A. Design Requirements:
 - I. All water, sanitary sewer, storm sewer, and street systems necessary to provide service to and within a development will be constructed at the Developer's expense.
- B. Development Requirements:
 - I. All subdivisions and developments will be in compliance with The Subdivision Regulations of the City of Whitefish, except as appended or amended herein.
- C. Development projects with multiple phases are required to provide a utility master plan for the entire project with the first phase submittal.
- D. It will be the responsibility of the Developer to extend all public facilities to the far property line of the development for future extensions. All utilities will be within a public right-of-way or recorded easement for future Developers free and unobstructed access.
- E. A Latecomers Agreement may be approved by the City enabling the Developer to recover a pro-rated share of utility installation costs from latecomers.
 - I. The agreement will apply only to service connections on the extended main and will not apply to future extensions of the main. See Section 1.2.6 of this document for additional information on Latecomers Agreement.
- F. It is the Developer's responsibility to obtain and provide the City with all easements and rights of way necessary to extend roadways and utilities to the development and provide for future extensions.

2.1.3 Design Criteria

- A. General Items:
 - I. Coordinate System: Montana State Plane Coordinate System, Federal Information Processing Standard (FIPS) Zone 2500, NAD 83 (2011)-International Feet.
 - II. Horizontal: North American Horizontal Datum 1983 (NAD 83).
 - III. Vertical: North American Vertical Datum 1988 (NAVD 88).
- B. Contours:
 - I. Urban Areas:
 - a. 5-foot major contour interval (max)
 - b. 1-foot minor contour interval (max)
 - c. The City reserves the right to request smaller or larger contour intervals for clarity if necessary.
 - II. Unimproved areas:

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- a. 10-foot major contour interval (max)
 - b. 2-foot minor contour interval (max)
 - c. The City reserves the right to request smaller or larger contour intervals for clarity if necessary.
- III. Existing contours shall use a dashed-line style.
 - IV. Proposed contours shall use a continuous-line style.
 - V. Major contour lines shall be thicker than minor contour lines.
- C. Alignment Data:
- I. Coordinate data must be provided for:
 - a. Beginning of alignment
 - b. Alignment changes in direction
 - c. End of alignment.
 - II. Provide the following curve data:
 - a. Length of curve
 - b. Curve radius
 - c. Chord length
 - d. Chord bearing.
 - III. Provide bearings and distances between points on alignments.
- D. Title Sheet(s) (Must not exceed 3 Sheets):
- I. Project Title
 - II. Vicinity Map:
 - a. Project limits
 - b. Adjacent street names
 - c. North arrow
 - d. Scale bar.
 - III. Firm or Engineer Information:
 - a. Name
 - b. Address
 - c. Telephone Number.
 - IV. MT Professional Engineer Stamp.
 - V. Point and Line Style Legend.
 - VI. Public Land Survey System Information:
 - a. Township
 - b. Range

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- c. Section(s) – If contained within a single section, provide the 1/2, 1/4, or 1/4 1/4 information as applicable (e.g. SW 1/4 NE 1/4).
- VII. Table of Contents.
- E. Plan Sheets:
 - I. Project Title.
 - II. Sheet Title.
 - III. Sheet Number.
 - IV. MT Professional Engineer Stamp.
 - V. Show property lines and easements (if existing, provide easement recording number).
 - VI. North Arrow (True North).
 - VII. Scale Bar (set to standard engineering scales).
- F. Plan and Profile Sheets:
 - I. Plan and profile sheets must be provided for all proposed water main, sanitary sewer main, storm main, and streets and include all items in *Section 2.1.3E* above.
 - II. In profile, show:
 - a. Vertical scale
 - b. Proposed ground (continuous line style)
 - c. Existing ground (dashed line-style)
 - d. Crossings of other utilities and separations from them
 - e. Parallel utilities must be shown in greyed line-style
 - f. Pipe:
 - 1. Length
 - 2. Slope (if gravity)
 - 3. Material type
 - g. Bury depth
 - h. Groundwater depths (if identified), include date of recording
 - i. Structures and appurtenances:
 - 1. For Water: valves, fittings, services, fire hydrants, encasement, etc. Label size and type and provide station and offset or coordinates
 - 2. For Sanitary Gravity Sewer: manholes, services, and other structures. Label in and out invert elevations, rim elevations, and provide station and offset or coordinates

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3. For Storm Sewer: manholes, catch basins, and other structures. Label invert, rim, and grate elevations and provide station and offset or coordinates. Include Hydraulic Grade Lines (HGL)
 - j. Streets, roads, and pathways:
 1. Grades
 2. Vertical curve data: VPI station and elevation, length, radius, and k- value
 - k. Stormwater conveyance system
 1. Show all pipes, culverts, ditches, and connections
 2. Include all sizes, material types, lengths, slopes, and invert elevations.
- G. Detail Sheets:
- I. Provide applicable City Standard Details (highlight any additions, deletions, or modifications to City Standard Details).
 - II. Include the following:
 - a. Project Title
 - b. Sheet Title
 - c. Sheet Number
 - d. Scale
 - e. MT Professional Engineer Stamp.
- H. Road and Drainage Plans:
- I. Include all items in *Section 2.1.3E*.
 - II. Existing and proposed contours.
 - III. Crest and sump point elevations.
 - IV. Flow arrows.
 - V. Drainage easements (if existing provide recording number).
 - VI. Where swales, ditches, or channels interfere with driveway location – driveway locations will be fixed and shown on the plans.
 - VII. Existing and proposed lot grading plans.
- I. Drainage Facilities and Swales:
- I. Include all items in *Section 2.1.3E*.
 - II. Provide a cross-section of each pond or swale, including the following:
 - a. Bottom elevation
 - b. Structure elevations

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- c. Maximum water surface elevation
 - d. Inlet and outlet elevations
 - e. Berm elevations and slopes.
 - III. Landscaping and vegetation requirements.
 - IV. Compaction requirements.
 - V. Keyway locations and dimensions.
 - VI. Coordinates and elevations of pond corners, swale/ditch angle points, inlet/outlet pipes, and all drainage structures.
 - VII. Material gradation, thickness, and dimensions of riprap pads.
- J. Basin Maps:
- I. Required as part of the Drainage Submittal.
 - II. Provide pre-development and post-development.
 - III. Minimum elements:
 - a. Vicinity map, project boundaries, PLSS information
 - b. Basin limits:
 - 1. Include on-site, off-site, and bypass areas contributing runoff to or from the project
 - 2. Engineer shall field-verify basin limits, including off-site areas, and describe how the limits were determined
 - 3. Shall be clearly labeled and correlate with calculations
 - c. Time of concentration routes with each segment clearly labeled and correlated with calculations
 - d. Contours shall extend beyond the project or drainage basin as necessary to confirm basin limits (refer to *Section 2.1.3B*)
 - e. Any drainage way, including natural drainage ways, constructed drainage features, wetlands, creeks, streams, seasonal drainage ways, closed depressions, ditches, culverts, storm drain systems, and drywells
 - f. Floodplain limits as defined by FEMA or other studies
 - g. Geologically hazardous areas
 - h. Proposed drainage features
 - i. North arrows and scale
 - j. Existing and proposed easements, parcel land, open space, and parkland (if existing, provide recording number)
 - k. Adjacent streets

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2.2 DATUM POLICY, COORDINATE SYSTEM AND CONTROL POINTS

2.2.1 Standards

- A. Permanent benchmarks and datum must be clearly shown on the preliminary and final plans and include location, description, and elevation.
- B. Horizontal Datum: North American Datum 1983 NAD 83 (2011) must be used for horizontal control or referenced to this datum.
- C. Vertical Datum: The North American Vertical Datum 1988 (NAVD 88) must be used for the vertical control.
- D. Coordinate Systems and Units: The Montana State Plane Coordinate System NAD83(2011), Federal Information Processing Standard (FIPS) Zone 2500, International Feet must be used.
- E. Control Points:
 - I. A control point table and drawing layer within as-built CAD data must be provided so that the drawing can be georeferenced in the City's database.
 - II. At least **three** control points must be provided in the overall design drawing with a table describing their coordinates in Montana State Plane, FIPS 2500, NAD 83 (2011) with +/- 20 inches of horizontal accuracy.
 - a. These three points may be existing control or new control.
 - b. As long as a drawing has a 1:1 relationship with these three points, the remainder of the drawing can be in a project or local coordinate system.
 - c. The City will use these three points for location and rotation of the project coordinates at a later date.
- F. An electronic copy of established GIS Control Points is shown in Appendix H. A digital copy of this information is available from the Public Works Department.

2.3 AS-BUILT RECORD DRAWINGS

2.3.1 Record Files

- A. During construction the Design Engineer/Contractor must maintain one set of prints of the improvement plans showing all the "as-built" changes. This set will be available on the job for spot inspection by the Public Works Department.
- B. Projects that will include stormwater, plans must be stamped by a Professional Engineer and require as-built drawings submitted to the City.
- C. Prior to the acceptance of the improvements, the Design Engineer must submit the original plans to the Department labeled "RECORD DRAWINGS" showing all changes made during construction and shall be signed by the engineer of record and the contractor.
- D. Corrections will be made to the original plan set.
 - I. Original data superseded must be crossed/hatched out.

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- II. New data must be border clouded and identified with the respective revision number within a triangle.
- III. Do NOT eradicate original figures, nor make corrections over them.
 - a. All lettering must be clear and legible.
 - b. Extensive changes, which cannot be made clearly on the original plan, should be made on a new sheet (supplemental sheet). Any supplemental sheet must be of the same quality as the original plans.
 - c. The new sheet must be signed by the Design Engineer and included with the "RECORD DRAWINGS."
 - d. The replacement sheets must remain in the plan set but must be crossed out with a note in the revisions which identifies that this sheet is superseded by the replacement sheet number.
- E. Paper submittals must conform to the following requirements:
 - I. Drawings must be 24" x 36" or 22" x 34" and will be printed on bond paper.
 - II. All plan and profile sheets will include all items in *Design Criteria Section 2.1.3*.

2.3.2 Electronic Files

- A. The Design Engineer must submit one hard copy of the As-Built Drawings. The Design Engineer must also submit electronic files containing the information depicted on the As-Built Drawings.
- B. Electronic files must conform to the following requirements:
 - I. CAD file format shall be in the following format: AutoCAD Compatible. (.DWG, .DXF).
 - II. A single PDF document of all drawing pages provided in paper copy.
 - III. Files must be submitted on portable media such as a CD-ROM, DVD, or memory stick; or submitted via internet file sharing or email. The media containing the files become the property of the City and will not be returned to the Design Engineer. Files may be compressed in a format compatible with Zip decompression software.
 - IV. The Design Engineer must submit all files used to produce the As-Built Drawings. Drawing files may utilize external references to reduce file size. However, all such reference files must be included in the submittal and must conform to City layering standards.
 - V. Layers showing the overall control point, street, storm drainage, water, sewer, lighting, landscaping, and sign plan must be shown on a single overall CAD drawing to allow integration with existing engineering drawings.
 - VI. Drawing layer structure must be as given in the Layering Convention Section below. The Design Engineer may use any combination of other layer names

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as desired for other elements depicted in the drawings. However, the relevant infrastructure system facilities must appear on the designated layers.

- a. Layering Convention:
 1. All digital data delivered in AutoCAD format must meet the layer convention found in Appendix I. As-built features not adhering to these conventions will result in the immediate rejection of As-built submittals.
 2. A listing of the Layering Convention is shown in Appendix I. An AutoCAD .DWG containing these layers is available from the Public Works Department.
- C. Upon project completion and before final acceptance, the Professional Engineer must submit record drawings (as described above) and certify in writing to the City the construction of the public utilities and streets meets the requirements of the approved construction documents.

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Chapter 3 WATER SYSTEM

3.1 GENERAL PROVISIONS

3.1.1 Design Standards

- A. Water system must be designed, constructed, and tested in accordance with the current editions of *MDEQ Circular 1*, the *Montana Public Works Standard Specifications*, and the *City of Whitefish Engineering Standards*.
- B. Water system Standard Details 26-37 must be included, where applicable, in water system construction drawings.
- C. The layout of extensions must provide for the future continuation and/or "looping" of the existing system as determined by the City and limit the extent of infrastructure required for each lot.

3.1.2 Design Report

- A. A design report prepared by a professional engineer licensed by the State of Montana which addresses fire and domestic flow requirements shall be submitted for all water main extensions.
- B. The design and design report shall meet the minimum requirements of MDEQ Circular 1.
- C. The report must include flow test results at the nearest hydrant which shows the static pressure at zero flow from the hydrant and the residual pressure with available flow from the hydrant.
 - I. For Residential developments with more than 30 single family dwelling units or requiring pressure booster pump(s), the report may be required to include hydraulic modeling results showing adequacy to meet fire and domestic flow requirements.
 - II. The normal operating pressure allowed for water system design is 60-100 psi.
- D. The design engineer must calculate and provide the average day demand, the max day demand, and the required fire flow. Demand calculations must be provided in units of gpd and ERUs.

3.1.3 Water Mains

- A. Size:
 - I. Minimum main diameter must be eight (8") inches unless a smaller diameter is approved by the Public Works Director.
 - II. Fire hydrant leads less than fifty feet in length may be six (6") inches in diameter.
 - III. Capacity must meet the maximum day plus fire flow and peak hour demand.
 - a. Base the amount of fire flow required for structures on the Uniform Fire

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Code Appendix III-A.

- b. The minimum fire flow for any structure is 1,000 gallons per minute, with a minimum of twenty pounds per square inch (20 psi) flow.
 - c. Non-structural utilization of an area must have the fire flow requirements determined by the Whitefish Fire Chief.
 - B. Location
 - I. Mains must be installed in public right-of-way wherever possible.
 - II. All water facilities must be designed and constructed such that they are readily accessible for maintenance and repair.
 - III. Where mains cannot be installed in the ROW, a 20-foot-wide easement must be provided with the pipe centerline five feet from one easement edge.
- 3.1.4 Valves
 - A. Size and Type:
 - I. Valves twelve (12) inches in diameter and under must be Gate Valves.
 - II. All valves over twelve (12) inches in diameter must be butterfly valves.
 - B. Location:
 - I. Isolation valves must be installed in the distribution system at enough intervals to facilitate system repair and maintenance, with a minimum one valve every 500 feet.
 - II. Valves must be installed on every branch line at intersections.
- 3.1.5 Fire Hydrants
 - A. Location:
 - I. The Whitefish Fire Chief must approve the placement of all fire hydrants.
 - II. Unless otherwise approved by the Whitefish Fire Chief, the hydrants shall be spaced no further apart than one standard City block.
 - III. Hydrant spacing shall not exceed:
 - a. 360 feet along streets in residential area
 - b. 300 feet in commercial areas
 - c. 150 to 200 feet in industrial areas.
 - IV. The Whitefish Fire Chief reserves the right to require additional fire hydrants if the demand of the structure(s) requires more flow than the minimum spacing provides.
- 3.1.6 Backflow Prevention Devices and Cross Connection
 - A. Requirements for New Customers:
 - I. All new and existing customers served by the City of Whitefish "Water" will be required to install a backflow prevention device, approved by the Public Works

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Director or City Engineer.

- II. Backflow prevention devices must be installed in accordance with the latest edition of the Cross-Connection Control Manual of the USC Foundation for Cross Connection Control and Hydraulic Research. Pacific Northwest Section – AWWA "Cross Connection Control Manual Accepted Procedure and Practice".
 - III. As required in the Uniform Plumbing Code, an approved Thermal Expansion Tank (along with relief valves) shall be installed whenever a backflow prevention device is present in the system line.
 - IV. It is the purpose and intent to protect the community's potable water system from the possibility of contamination or pollution by isolating within its customers private water distribution system or systems, such contamination or pollutants which backflow into the water distribution system. No pipes or fixtures connected to the water supply of the City of Whitefish system will be connected directly or indirectly to pipes or fixtures containing water from another source.
- B. Size and Type:
- I. The size and type of all backflow prevention devices will be determined by the Public Works Director/City Engineer or their designee based upon the size of service and the degree of hazard that exists or can be expected to exist on the premises served.
 - II. Testing of devices on commercial or multi-family and/or residential accounts will be the responsibility of the owner. Testing will occur annually in accordance with accepted industry practices and/or ordinances adopted by the Whitefish City Council.
- C. Secondary Backflow Prevention Devices:
- I. A secondary backflow device must be installed immediately following the inlet gate valve after the service line has entered the structure, or in accordance with the manufacturer's specifications, to facilitate removal for testing, repair, or replacement.
 - II. All installation, maintenance, testing, repair or replacement of backflow prevention devices installed in addition to the devices required by these rules and regulations, shall be the responsibility of, and at the expense of, the customer.
- D. Liability:
- I. Backflow prevention devices installed under these Standards are intended for the protection of the potable water supply and distribution system of the City and in no way relieve the customer from liability or requirements to install backflow prevention devices under the Uniform Plumbing code or other applicable Building Codes.

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3.1.7 Water Services

- A. Refer to the Rules and Regulations for the City of Whitefish Water, Sewer, and Garbage.
- B. Separate Service Lines:
 - I. Duplexes under the same ownership are required to have one (1) water meter, service line, meter pit or vault, and one curb stop.
 - II. Structures containing two or more residences under separate ownership, such as a townhouse, will have separate service lines from the main, service valves, curb stop, and meters for each residence. If requested, a building with multiple ownership units may have one service line, valve, curb stop, and meter for the building. A Homeowners Association must be formed, and paperwork provided to the Utility Billing Department.
 - III. In large developments such as unit developments, large commercial or industrial establishments, condominiums and mixed-use development, which are located on a single parcel of land under ownership by a single entity or under an HOA, a single metered water service line will be installed.
 - IV. Accessory apartments, accessory buildings, or accessory uses, as defined by the zoning regulations, separate services are not required if the following conditions are met:
 - a. The property remains under single ownership and is managed by a homeowners' association (HOA); and
 - b. The property cannot be further subdivided to separate the dwelling units.
- C. Abandonment of Service:
 - I. When a lot or parcel is developed to a permitted use, all duplicate, excess, and/or unused services and fire services, including stub-outs, must be abandoned at the main at no cost to the City.
 - II. Whenever a building served by water, sewer, and fire services cease to exist, all services must be abandoned at the main. The insurance carrier and the Fire Marshall must be notified prior to abandonment of services to an established fire suppression system designed to protect the structure.
 - III. Temporary removal from service may be controlled with an operative curb stop at the discretion of the Utility Services Supervisor and depending upon whether water service is anticipated to be renewed within one year.
 - a. The monthly base rate billing for water or sewer service will be discontinued for a building if the following conditions are met:
 - 1. The respective utility service line is abandoned in a manner acceptable to the Utility Service Supervisor; or
 - 2. All plumbing fixtures, including water valves, are permanently

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removed from the building in a manner approved by the Public Works Department. Such approval must be issued before the work is performed and the completed work inspected and approved by City personnel. The inspection fee (see Fee Schedule) must be paid and the City will approve the work before monthly billing is discontinued. The property owner continues to be responsible for maintenance of the water and/or sewer service lines that remain connected to the City utility.

- b. Evidence of subsequent water use is enough grounds to resume monthly billing.

3.1.8 Extension of Mains

- A. Customers or Developers who request water service in an area not presently served by a City-owned main must extend the existing main across the full frontage of the property being served or developed.
- B. Requests for extension by subdividers must conform to the subdivision rules and regulations and the water master plan where applicable.
- C. No new wells are permitted on any property if an approved water main is readily available within 200 feet of the property. A connection is considered as not readily available if:
 - I. The cost of connection, as determined by the City, is greater than three times the cost of the installation of the private water system, or
 - II. Connection to the public system is physically impractical, or
 - III. Necessary easements cannot be obtained.

3.1.9 Disinfecting and Flushing Water Mains

- A. Continuous Feed Method:
 - I. The continuous feed method is the preferred method for disinfecting all water mains.
 - II. Other methods used must comply with the Montana Public Works Standard Specifications and be approved by the Public Works Department.
- B. Clearing the Main of Heavily Chlorinated Water:
 - I. Heavily chlorinated water shall not remain in prolonged contact with pipe after the applicable retention period.
 - II. The heavily chlorinated water must be flushed from the main until chlorine concentration in the water leaving the main is no higher than generally prevailing in the system or is acceptable for domestic use.
- C. Dichlorination:
 - I. Heavily chlorinated water must be dechlorinated when discharged into waters

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of the State of Montana.

- II. Dechlorinating methods must be approved by the Public Works Department.

3.1.10 Hydrostatic and Leakage Testing of Water Mains

- A. Conduct the leak test concurrently with the pressure test for two (2) hours. Leakage is defined as the quantity of water supplied into the pipe, at the conclusion of the two (2) hour test, to bring the pressure back to the original test start pressure. If during the two (2) hour test duration the observed pressure drop exceeds 5 PSI, the test will be considered failed.

3.2 CONSTRUCTION STANDARDS

3.2.1 General

- A. Water system must be designed, constructed, and tested in accordance with the current editions of Circular 1 - *Montana Department of Environmental Quality - Standards for Water Works*, the *Montana Public Works Standard Specifications*, and the *City of Whitefish Engineering Standards*.

3.2.2 Minimum Cover

- A. The minimum cover for all water mains and water services from top of pipe to finish grade is six (6') feet unless otherwise approved by the Public Works Director/City Engineer.

3.2.3 Main Line Depth

- A. Sections of water main designed deeper than six (6) feet require approval of the Public Works Director.

3.2.4 Water Pipe

- A. Water main piping from six (6") to twelve (12") inches in diameter must be AWWA C-900 DR 18 (235 psi) PVC pipe (formerly listed as Class 150).
- B. All water main piping larger than twelve (12") inches in diameter must conform to AWWA C-900 Standards.

3.2.5 Valves

- A. Gate valves (12" in diameter and under) must be Mueller Resilient Wedge Gate Valves conforming to AWWA C-509 Standards, or an approved equal.
 - I. Tapping valves must be MJ x FL for connection to the tapping sleeve.
 - II. All other valves must be MJ x MJ.
- B. Butterfly valves (over 12" in diameter) must be Mueller Lineseal Butterfly Valves or approved equal conforming to AWWA C-504 Standards.

3.2.6 Valve Boxes

- A. Valve boxes must be Tyler 6860 Series "DD" or East Jordan 8560 Series - Screw Type, #6 Base to be marked "Water."

3.2.7 Fire Hydrants

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- A. Fire Hydrants must be Red Mueller Super Centurion 250 Fire Hydrants (5 - 1/4", 3-way) conforming to AWWA C-502 Standards.
- B. For additional details see Fire Hydrant Standard Drawing No. 23.
- C. Mueller Fire Hydrants must be used if blow-off hydrants are required for dead-end lines.

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3.2.8 Service Saddles

- A. Service saddles must be Power Seal 3412AS (3"-12"), Romac model 306 (2" - 12"), Romac Model 305 (10" - 32") or Smith Blair Model 372 (4" - 12").
- B. No single or double strap type is allowed on PVC pipe.

3.2.9 Corporation Stop and Curb Stop Valves

- A. Corporation Stops must be Mueller B-25008N (1"-2") or B-25009N for PE IPS (1" minimum).
- B. Curb stops must be Mueller 300 Ball Curb Valves with Insta-Tite or 110 compression fittings. SS liners are required for 110 compression fittings on PE pipe.

3.2.10 Service Fittings

- A. Service fittings must be Mueller Insta-Tite for IPS PE pipe or 110 Series compression fittings for copper tubing or IPS PE pipe.
- B. No fittings are allowed from the corporation stop to the curb stop. SS liners are required for compression fittings on PE pipe.

3.2.11 Curb Boxes

- A. Curb boxes must be Mueller H-10314 (1-inch stops) or H-10310 with stationary rods (1.5- and 2-inch stops) or McDonald Model No. 5604TW (1 inch).
- B. Extended lengths on all boxes must be 78 inches minimum. Stationary rods must be 63 inches standard.

3.2.12 Service Pipe

- A. Service pipe up to two inches (2") in diameter must be one of the following:
 - I. Type K Copper (ASTM Specifications B-88-62. "Reference AWWA Standard C800- 66, Appendix").
 - II. Polyethylene Pipe (IPS) SDR 7 - 1" minimum:
 - a. Must use beveling tool.
 - III. Polyethylene Tube (CTS) SDR 9 - 1 1/2" and 2":
 - a. Stainless steel inserts required on all compression type fittings for PE tube.
 - b. Tracer Wire to be installed on all PE Pipe, with DryConn connections. (See Standard Detail 26).
- B. Service pipe four inches (4") or larger in diameter must be Class 150 PVC Pipe conforming to AWWA C-900 Standards.

3.2.13 Meter Pit and/or Meter Vaults

- A. Meter pits must be Mueller/McCullough Thermal Coil Meter Box with aluminum bottom insulation and cast-iron lid for 1" services.

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- B. Meter pits and/or vaults for services larger than 1" will be considered on a case-by-case basis depending on meter size and application and approved by the Utility Service Supervisor.
 - C. Meter pit risers must be no more than 6".
- 3.2.14 Tapping Sleeves
- A. Tapping sleeves must be Power Seal Stainless Steel Model 3490 AS (Stainless Steel), Romac SST III or an approved equal.
 - B. Tapping sleeves must be installed a minimum of 3 pipe diameters from the nearest joint on the existing pipe to be tapped.
 - C. Use of size-on-size tapping sleeves require pre-approval by the Public Works Department.
- 3.2.15 Ductile Iron Fittings
- A. Ductile iron fittings must be Class 350 SSB Fittings conforming to AWWA C-153 Standards.
 - B. Main couplings must be solid sleeve - MJ/SSB - Ductile iron (Long).
- 3.2.16 Mechanical Joint Restraints
- A. Megalugs, or similar joint restraining devices, must be used.
 - B. Thrust blocks shall be required at all Megalugs and similar mechanical joint restraining devices. (See Standard Details 28 and 37 for Megalug requirements for Fire Hydrants).
 - C. Mechanical thrust restraint must be EBAA Iron Sales series 2000 PV or approved equal.
- 3.2.17 Warning Tape
- A. Detectable warning tape must be a minimum of 5 mils thick, three inches (3") wide and conform to APWA colors.
- 3.2.18 Tracer Wire
- A. All mains and services must be installed with 12 gauge (minimum) insulated solid core tracer wire.
 - B. Tracer wire must be taped to the top of the water main.
 - C. Breaks, splices or taps must be DryConn.
 - D. In addition, tracer wire must be brought up and tied off at each curb stop and fire hydrant (See Standard Details 26-28).
- 3.2.19 Marker Posts
- A. Valve marker posts must be 4 inch x 4 inch reinforced concrete or Schedule 40 steel posts 5 feet long stamped with "W" and distance to valve.

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3.2.20 Main Line Tapping

- A. Contractor is to provide, install and test tapping sleeve and valve.
- B. City personnel are to be contacted to witness test. City personnel will perform tap and only City personnel will operate valves on City system.
- C. Public Works Department require 48 hours notification to schedule a tap. Tapping will not occur on Fridays or the day before a government holiday.

3.2.21 Service Line Tapping

- A. Contractor is to provide and install saddle and corporation stop.
- B. City personnel will perform tap and operate all valves.
- C. Public Works Department require 48 hours notification to schedule a tap. Tapping will not occur on Fridays or the day before a governmental holiday.

3.2.22 Extension of Mains

- A. Prior to the start of any construction on main extensions, an engineering report, necessary plans, and specifications for the extension, must be submitted to the Montana Department of Environmental Quality for review and approval pursuant to ARM 17.38.101, and the rules of the Department.

3.2.23 End of Water Mains

- A. A water main that may be extended in the future must include a valve, 10 feet main stub, and end cap.
- B. Megalugs must be installed on the valve, the end cap, and all pipe joints from valve to end cap (see Standard Detail 37).
- C. The end cap must also be thrust blocked.

CHAPTER 4 SANITARY SEWER

Chapter 4 SANITARY SEWER SYSTEMS

4.1 DESIGN STANDARDS

4.1.1 General Requirements

- A. Sanitary sewer systems must be designed, constructed, and tested in accordance with the current editions of the Montana Department of Environmental Quality Circulars, the Montana Public Works Standard Specifications and the City of Whitefish Engineering Standards.
- B. All sewer must be designed as a gravity sewer whenever physically feasible.
- C. Standard Details 38-53 must be included, where applicable, in sewer system construction drawings.

4.1.2 Design Report

- A. A design report prepared by a Professional Engineer licensed in the State of Montana which addressed sewer flows at full buildout of the development, shall be submitted to and approved by the Public Works Department.
- B. The design report must demonstrate all sanitary sewer extensions have adequate capacity to convey wastewater from the anticipated service area and meet the minimum flow velocities and/or flow depth requirements in Chapter 30 of MDEQ Circular-2.
- C. The report must also assess the impact on the Wastewater Treatment Plant.
- D. Sanitary sewers must be buried to a depth enough to prevent freezing and must have a minimum four (4) feet of cover.
 - I. Shallower depths may be allowed by the Public Works Department if suitable pipe insulating provisions have been made.
- E. Prior to the City's acceptance of the sewer system the Contractor must provide television inspection of the system.
 - I. The cost of television inspection is the responsibility of the Contractor.
 - II. The Contractor must furnish the City with a copy of the television inspection.
 - III. If any deficiencies are found during the inspection, the Contractor must correct them at the Contractor's expense.
 - IV. The cost of any sewer line cleaning or additional television inspection performed by the City must be paid for by the Contractor.

4.1.3 Sewage Quality Requirements

- A. No development may introduce any sewage into the City of Whitefish sewerage facility inconsistent with normal domestic sewage.
- B. The sewage must arrive at the Wastewater Treatment Plant in a non-septic condition.

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- C. No storm water may discharge to any sanitary sewer.
- D. High-strength waste dischargers (breweries, wineries, distilleries, processing plants, etc.) must test and pre-treat their discharge to ensure it complies with sewage quality requirements provided in the Uniform Plumbing Code 2018.
- E. Restaurants are required to install and maintain oil and grease separators compliant with Uniform Plumbing Code Section 1014.3.1 through Section 1014.3.7.

4.1.4 Gravity Mains

- A. The minimum velocity is two (2) feet per second, based on flowing full condition.
- B. The maximum velocity is ten (10) feet per second, unless otherwise approved by the City Public Works Department.
- C. Sewer mains must be sized for the ultimate development of the tributary area.
- D. Nothing shall preclude the City from requiring the installation of a larger sized main if the City determines a larger size is needed to meet the requirements for future service.
- E. Joint participation by the City may be applicable where oversizing is deemed appropriate by the City Engineer.

4.1.5 Force Mains

- A. The minimum velocity is three (3) feet per second.
- B. The maximum velocity is ten (10) feet per second, unless otherwise approved by the City Public Works Department.
- C. Pressure type cleanouts, of the same size as the force main, must be provided at approximate 600 foot intervals along a force main unless approved by the City Engineer.
- D. A removable cap for the force main cleanout must also be tapped for and fitted with a one (1) inch threaded plug.
- E. The force main must be equipped with a plug valve and valve box immediately upstream of each force main cleanout.

4.1.6 Manholes

- A. The maximum spacing between manholes is:
 - I. 400 feet for sewer main at slopes of 0.4% - 4%.
 - II. 300 feet for sewer main at slopes of 4% - 8%.
 - III. 200 feet at slopes greater than 8%.
- B. Manholes must not be located outside of road rights-of-way, when possible.

4.1.7 Location

- A. Sewer mains must be installed in public right-of-way wherever possible.

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- B. Dead end sewer mains with few (<4) services and no potential for future extension must be avoided.
- C. All sewer facilities must be designed and constructed so all facilities are readily accessible for maintenance and repair.
- D. Where mains cannot be installed in the ROW, a 20-foot wide easement must be provided with the pipe centerline five (5) feet from one easement edge.

4.1.8 Service Lines

- A. A minimum of 10 feet horizontal separation must be provided between sewer and water service lines.
- B. Structures containing two or more residences under separate ownership, such as townhouses, must have separate sewer service lines for each residence.
- C. Structures containing two or more residences, offices or businesses that are rental units under common ownership will have one service line for all occupants within a single structure.

4.1.9 Garage Floor Drains

- A. No direct connection of garage floor drains is allowed to the sanitary sewer service line.

4.1.10 Sewer Hookup Requirement

- A. Sewer hookup is required for new construction if the property is within 500 feet of a City sewer main in accordance with DEQ's ARM 17.36.328.

4.1.11 Sewage Lift Stations

- A. A written report must be submitted for any project proposing a new sewage lift station or will contribute to an existing sewage lift station.
 - I. Upon request from the Public Works Director/City Engineer, the Design Engineer must submit a list of three lift stations of the type proposed which have been in operation for at least five years
- B. All lift stations require an emergency power supply.
- C. All lift stations require an alarm system.
 - I. The alarm signals must be directed to an onsite alarm monitoring and telephone dialer system capable of connecting with the City's wireless mesh system. The Design Engineer must coordinate with the City's Coordinator to ensure this interconnection.
 - a. The alarm monitoring and telephone dialer system must be a 1400 Sensaphone or approved equal.
 - II. The alarm system must be capable of detecting:
 - a. Power interruption
 - b. Phase loss

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- c. Low water
 - d. Motor failure
 - e. Seal failure (motor moisture sensor)
 - f. High water
 - g. High motor temperature conditions
- D. Lift Station Controls:
- I. An hour meter is required on each pump.
 - II. Amperage meters are required on each leg of the electrical wiring.
 - III. Surge/lighting protection is required on all control panels.
 - IV. Cathodic protection is required for all lift stations having a metallic exterior.
 - a. The Engineer must submit an analysis of the amount of cathodic protection required.
- E. The report for a new sewage lift station must contain, but is not limited to the following:
- I. A description of the proposed wet well, pumping system, and force main.
 - II. The capacity of the recommended pumps and potential for future upgrades.
 - III. A map showing the potential lift station service area.
 - IV. The average and peak design flows for the proposed project and for the potential service area.
 - V. The hydraulic capacity of the force main and force velocities (min. 3 fps to resuspend solids).
 - VI. The reserve capacity of the lift station when the proposed project is online at full capacity (full build out).
 - VII. The pump run and cycle times for the average and peak design flows.
 - VIII. Strategies for improvements which may be necessary to accommodate future sewer extensions.
 - a. Increased storage, pumping, or auxiliary power capacity
 - IX. A statement of the pump selection process, including Engineer's calculations for:
 - a. Total dynamic head
 - b. Total discharge head
 - c. Net positive suction head
 - d. Other pertinent pump selection criteria.
 - X. The designed pump operating curve plotted on a manufacturer's pump performance chart with the designed operating point clearly identified.

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- F. The report for a project that will contribute to an existing sewage lift station shall contain, but is not limited to, the following:
 - I. A description of the existing wet well, pumping system, and force main.
 - II. The capacity of the existing pumps and potential for future upgrades.
 - III. A map showing the potential lift station service area.
 - IV. A list of the existing users and their average design flows.
 - V. The existing peak design flow and reserve capacity.
 - VI. The pump run and cycle times for the existing average and peak design flows.
 - VII. The hydraulic capacity of the force main.
 - VIII. The proposed average and peak design flows to the lift station.
 - IX. The reserve capacity of the lift station with the proposed project online at full capacity.
 - X. The pump run and cycle times for the proposed average and peak design flows.
 - XI. Recommendations for improvements, if necessary, to enable the lift station to serve the proposed project.
- G. The Public Works Director reserves the right to accept or reject the proposed lift station.

4.2 CONSTRUCTION STANDARDS

4.2.1 General

- A. Gravity Main Cleanouts:
 - I. Gravity main cleanouts are not permitted unless the Design Engineer show conditions exist as described in the MDEQ Circular 2, 34.1:
 - a. Allows cleanouts in special situations and at the end of mains less than 150 feet in length with no services installed and available for future extension.
- B. Testing:
 - I. Testing of the manholes, sewer lines, or force mains must be done in accordance with the Montana Department of Environmental Quality Circulars and the Montana Public Works Standard Specifications.

4.2.2 Adjustment Rings

- A. All adjustment rings must be composed of only concrete or high density polyethylene (HDPE).
- B. No rocks, asphalt, wood shims or any foreign material may be used to adjust rings.
- C. No more than two (2) adjustment rings may be used per manhole.
- D. Combinations of adjustment rings must have a total height of greater than two (2) inches and less than ten (10) inches.

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- E. All grate and adjustment ring combinations must be sealed with a rubberized chimney seal meeting the specifications of ASTM C-923 and must have of a minimum thickness of 3/16 inches.
- 4.2.3 Sewer Saddle
- A. Sewer saddles must be :
 - I. Romac CB-4.63 U.N (for any main type) or
 - II. PVC Saddle: O-ring/gasket seal w/stainless steel clamps (PVC main only)
 - III. Inserta Tee lateral connections
- 4.2.4 Gravity Sewer Main
- A. Gravity sewer main material must be PVC SDR 35.
 - B. The minimum diameter of any gravity sanitary sewer main is eight (8) inches.
- 4.2.5 Gravity Sewer Pipe
- A. Gravity sewer service pipe must be schedule 40 PVC.
 - B. The terminal end of sanitary sewer services at undeveloped lots must be marked in accordance with Standard Detail 38.
- 4.2.6 Manholes
- A. All sanitary sewer manholes must be constructed and installed as specified by the Montana Public Works Standard Specifications.
 - I. Eccentric manholes are required for all applications, unless given approval from the Public Works Director.
 - B. All sanitary sewer manholes sections must be sealed with an exterior rubberized joint seal meeting ASTM C-877, type II with a minimum width of nine (9) inches (see Standard Details 39, 40 and 41).
 - C. Manholes must not be located outside of road rights-of-way, when possible.
 - D. The sanitary sewer manhole ring and cover must be East Jordan Iron Works Model 3772Z1 or approved equal.
 - E. The cover must be marked Sewer.
 - F. Manholes located within the paved sections of roadways or driveways or in areas subject to flooding shall have approved infiltration pans installed.
 - G. Doghouse type manholes are not allowed when connecting to an existing sewer main unless approved by the Public Works Director.
 - H. If $\pm 1/8$ " tolerance is not met, then Whirlygig SD manhole risers must be used.
- 4.2.7 Warning Tape for Force Mains
- A. Detectable warning tape must be a minimum of five (5) mils thick, three (3) inches wide, and conform to APWA colors.
- 4.2.8 Toner Wire for Force Mains

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- A. All force mains must be laid with 12 gauge insulated solid core copper toner wire.
 - B. Toner wire must be insulated and taped to the top of the force main. .
 - C. Splices of toner wire must be made with heat shrink tape.
- 4.2.9 Force/Pressure Sewer Mains
- A. Pressure sewer mains (force mains) must consist of HDPE SDR 11, PE3608 or HDPE SDR 13.5, PE 4710 or approved equal with butt fusion joints.
 - B. Force main materials must follow Montana DEQ Circular 2, Chapter 33.
- 4.2.10 Force/Pressure Sewer Pipe
- A. Pressurized sewer service pipe must be HDPE SDR11 or approved equal.
- 4.2.11 Trench Plugs
- A. Trench plugs, as specified in Standard Detail 20, must be installed on all sewer mains.
 - B. Trench plug spacing must follow the specifications included in SD-20.
- 4.2.12 Oil/Water Separators
- A. Facilities generating wastewater with oil and grease content are required to pretreat these wastes before discharging to the City sanitary sewer system.
 - I. These facilities include, but may not be limited to:
 - a. Automotive repair facilities and paint shops
 - b. Dealerships
 - c. Gas stations
 - d. Equipment degreasing areas
 - II. Pretreatment requires an oil/water separator be installed and maintained on site.
 - B. Oil/water separators for commercial/industrial processes must be sized on a case-by-case analysis of wastewater characteristics.
 - I. Typically, a minimum capacity of 750 gallons is required for small gas stations, auto repairs, and light commercial sites.
 - II. 1500 gallon capacity for large-scale truck washing and steam cleaning facilities.
 - C. The ultimate discharge must be directed to the sanitary sewer system.
 - D. All units regardless of size must be fitted with a standard final-stage sample box and spill- absorbent pillows.
 - E. Oil/water separators must be commercially manufactured and sized for the intended discharge rates for the facility where it is to be installed.
 - F. On or before January 31 each year, maintenance records from the preceding year must be submitted to the Public Works Department for oil/water separators.

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5.1 DESIGN STANDARDS

5.1.1 Regulatory Thresholds

- A. The regulatory threshold is the "trigger" for requiring compliance with the Basic Requirements of this section and is defined as 10,000 square feet or more of developed area.
- B. Development is the conversion of previously undeveloped or permeable surfaces to impervious surfaces and managed landscape areas. Development occurs on vacant land or through expansion of partially developed sites.
 - I. Development projects that meet or exceed the regulatory threshold must comply with ALL Basic Requirements (BR1-7).
 - II. The total developed area is used to determine if the threshold will be exceeded for development projects.
 - a. For example, an existing development has a 5,000-sf building and 3,000 sf parking lot and is adding 2,000 sf to their building and 1,000 sf to their parking lot. Therefore, the threshold would be exceeded ($5,000 + 3,000 + 2,000 + 1,000 = 11,000$ sf) and the development would be triggered to comply with BR1-7.
- C. Redevelopment is the replacement of impervious surfaces on a fully developed site. Redevelopment occurs when existing facilities are demolished and rebuilt or substantially improved through reconstruction.
 - I. For redevelopment, the regulatory threshold applies to the total amount of pollutant generating surfaces replaced or rebuilt. Redevelopment projects that meet the regulatory threshold must comply with BR-3 Water Quality Treatment.
 - a. For projects implemented in incremental phases, the threshold applies to the total amount of pollutant generating surfaces at the end of the current phase.
 - For example, an existing site proposes to replace a 13,500-sf parking lot in three equal phases. Therefore, the threshold would be triggered in the third phase and apply to the total pollutant generating surfaces on the site.
 - Phase 1 – 4,500 sf (no trigger)
 - Phase 2 – $4,500 + 4,500 = 9,000$ sf (no trigger)
 - Phase 3 – $9,000 + 4,500 = 13,500$ sf (Water Quality Treatment is required for all pollutant generating surfaces on the site)

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- b. Sites with 100% existing building coverage currently connected to a municipally owned storm sewer or discharge to water of the state must be evaluated on a case-by-case basis to continue to be connected without treatment. Additional requirements such as flow restrictors may also be required in such cases.
 - D. The City Engineer reserves the right to require compliance with any or all the Basic Requirements regardless of the size of the project or the amount of impervious area added or replaced.
 - E. Single Family Residence Threshold
Proposed single family residences that result in less than 15,000 square feet of the total impervious area and less than 30% of lot coverage are exempt from the stormwater requirements listed in this chapter. Lot coverage, in this case, includes building footprints, driveway, and deck areas.
 - F. Exemptions: Projects are exempt from the Basic Requirements under any of the following categories:
 - I. Actions by a public utility or any other governmental agency to remove or alleviate an emergency condition, restore utility service, or reopen a public thoroughfare to traffic.
 - II. Projects, when completed, will not have physically disturbed the land.
 - III. City right-of-way and City owned property maintenance and reconstruction projects.
 - IV. Chip seals and fog seals.
 - V. The Director of Public Works can make a determination if it is exempt due to its minor nature.
 - G. The storm drainage plans, and report shall be prepared by a registered professional engineer.
 - H. Stormwater facilities that are proposed within Water Quality Protection Buffer Areas must follow Section 11.3.29 of the Whitefish City Code. They must be located within the outer twenty five percent (25%) of buffers.
- 5.1.2 Basic Requirements (BR-1) Drainage Submittal
- A. Preliminary Drainage Plan and Report. The conceptual/preliminary drainage report and plan must be submitted with the preliminary plat.
 - I. The report must describe the preliminary plan for meeting the water quality treatment and flow control requirements. The report must describe offsite flow onto the property and drainage issues that exist within the downstream conveyance. The report should describe the general pre-development and post-development conditions for drainage areas and any potential impacts to adjoining parcels.
 - II. The preliminary drainage plan must extend beyond the property boundaries

the distance necessary to show how the development interacts hydraulically with the surrounding area. The plan must include existing and proposed contours. It must show all areas draining onto the proposed development and show enough of the abutting downstream properties to indicate the drainage course into which the proposed development is to drain. The direction of flow, acreage of areas contributing drainage to the development, the outline of the development, location of streams and drainage courses which are within the site boundaries must be indicated on the plan.

B. Final Drainage Report

- I. The report must be inclusive, clear, legible, and reproducible. An uninvolved third party shall be able to review the report and determine whether all applicable standards have been met.
- II. Narrative – The narrative of the report must include the following elements:
 - a. Project Description: Information about the size of the project, the number of lots proposed, the project location, and background information relevant to drainage design, including topography, surface soils, surface and vegetative conditions, etc.
 - b. Geotechnical Information: Summary of the geotechnical site characterization (GSC) for the project including recommended infiltration rates and on-site soil descriptions.
 - c. Pre-Development Basin Information: Summary of the pre-development drainage patterns for all basins contributing flow to, on, through, and from the site. Include all assumptions and justifications used to determine curve numbers and/or runoff coefficients used in the analysis. Identify and discuss all existing on- site and/or off-site drainage facilities, natural or constructed, including but not limited to Natural Drainage Ways, conveyance systems, and any other special features on or near the project.
 - d. Post-Development Basin Information: Summary of all assumptions used to determine the characteristics of the post-developed basins, such as the size of roofs and driveways, and the curve numbers and/or runoff coefficients used in the analysis. In addition, a table must be included summarizing the impervious and pervious areas for each sub-basin.
 - e. Wetland Analysis: A wetland analysis is required for all new development and redevelopment and must be compliant with section 11.3.29 of the City Code.
 - f. Down Gradient Analysis: Identify and discuss the probable impacts down-gradient of the project site.
 - g. Methodology: Discuss the hydraulic methods and storm events used in

- sizing the drainage facilities, including the Best Management Practices proposed for the project.
- h. Water Quality Treatment: Discuss treatment requirements based on the criteria in Section 5.1.4.
 - i. Results: Discuss results of the calculations and a description of the proposed stormwater facilities. Include a table comparing the pre-developed and post-developed conditions including rates and volumes. Provide a table summarizing the maximum water elevation of the facilities for the design storms, outflow structure information, the size of facilities "required" by the calculations, and the size of the facilities "provided" in the proposed design.
 - j. Operational Characteristics: Provide enough information about the operation of the stormwater system for understanding of how the proposed system will function under various conditions.
 - k. Perpetual Maintenance of Facilities: Include a discussion of the provisions set forth to operate and maintain the drainage facilities.
 - l. Off-Site Easements: Identify the anticipated location of any off-site easements either on the basin map or in a separate schematic. Off-site easements will be required for proposed stormwater conveyance or disposal facilities outside the project boundaries. These easements must be obtained and recorded prior to the acceptance of the final Drainage Submittal.
- III. Figures - The following figures are required as part of the final drainage report:
- a. Basin Map
 - b. Site photos
 - c. Soils map
 - d. Any graphs, charts, nomographs, maps, or figures used in the design
 - e. If a geological site characterization is required:
 - A geologic cross-section, drawn to scale
 - Stormwater facilities superimposed on the cross-section
 - All relevant geologic units clearly identified including the target disposal layer and limiting layers
- C. Calculations:
- I. Present in a logical format and provide enough information to allow reproduction of the results. Clearly identify assumptions, input and output data, and variables listed in computer printouts and hand calculations must be clearly identified. Basins and design storm events must be clearly identified on all calculations.

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- II. Incorporate all calculations used to determine the size of the facilities.
- III. As a minimum, provide the following, if applicable:
 - a. Hydrologic / hydraulic calculations
 - Pre- and post-development peak rate and volume
 - Routing
 - Design information for outflow structures
 - Orifice information
 - Pond volume rating table or calculations
 - b. Time of concentration calculations
 - c. Curve number (CN) or runoff coefficient (C)
 - d. Water quality treatment calculations
 - e. Inlet capacity and bypass calculations
 - f. Detention/retention storage capacities
 - g. Ditch and drainage way calculations
 - h. Culvert and pipe calculations
 - i. Non-flooded width calculations for curb and gutters
 - j. Energy dissipation calculations
- D. Down-Gradient Analysis
 - I. Inventory natural and constructed down-gradient drainage features a minimum of $\frac{1}{4}$ mile down gradient.
 - II. Identify and evaluate adverse down-gradient impacts. Adverse impacts include, but are not limited to:
 - a. A down gradient property receiving more standing or floodwater on their property than the pre-developed condition.
 - b. Erosion
 - c. Flooding
 - d. Slope failures
 - e. Changed runoff patterns
 - f. Reduced groundwater recharge
 - III. Analysis must include:
 - a. Visual inspection of the site and down-gradient area(s) by the engineer to the location where adverse impacts are anticipated to be negligible.
 - b. A site map clearly identifying the project boundaries, study area boundaries, down-gradient flow path, and any existing or potential areas identified as problematic.

- c. Pre- and post-development hydraulic (rate and volume) capacities for the 10- year and 100-year 24-hour storm events.
- d. A written summary including:
 - Existing or potential off-site drainage problems that may be aggravated by the project.
 - The condition and capacity of the conveyance route including:
 - All existing and proposed elements
 - Potential backwater conditions on open channels
 - Constrictions or low capacity zones
 - Surcharging of enclosed systems
 - Localized flooding
 - The presence of existing natural or constructed land features dependent upon pre-developed surface or subsurface drainage patterns.
 - Potential changes to groundwater characteristics that may negatively impact sub-level structures, foundations, or surface areas due to an increased amount, increased frequency, or duration of groundwater intrusion.
 - Existing or potential erosive conditions such as scour or unstable slopes on-site or down-gradient of the project.
 - Flood areas identified on FEMA maps.
- e. If there is existing or potential off-site drainage problems down-gradient of the project, demonstrate the proposed stormwater disposal system has been designed to meet the following conditions:
 - The stormwater runoff (volume and flowrate) leaves the site in the same manner as pre-developed condition.
 - Reduced or increased groundwater recharge has been considered with respect to potential adverse impacts on down-gradient features.
 - The proposed design does not aggravate or impact existing drainage problems or create a new drainage problem.
- f. If down-gradient surface release is at a rate or volume greater than the pre- developed condition, address and investigate potential adverse impacts on down-gradient property natural or constructed drainage channels due to an increase in stormwater rate, volume, velocity, and flow duration in detail.

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- E. Other Submittal Elements
 - I. Provide the following if applicable, required by other sections, or as otherwise required by the City Engineer:
 - a. A geotechnical site characterization (refer to 5.1.3)
 - b. An erosion and sediment control plan (refer to 5.1.7)
 - c. A draft copy of the Conditions, Covenants, and Restrictions (CC&Rs) for the homeowners' association in charge of operating and maintaining the drainage facilities (refer to 5.1.8B)
 - d. An operations and maintenance manual (refer to 5.1.8C)
 - e. A signed Maintenance Agreement (See Appendix N)
 - f. On-site and/or off-site easement documentation (refer to 5.1.9)
- 5.1.3 BR-2 Geotechnical Site Characterization
- A. Investigation and Assessment Requirements:
 - I. Provide a surface reconnaissance of the site and adjacent properties to assess potential impacts from the proposed stormwater system and to verify that the conditions are consistent with the mapped information. Typically, the evaluation should extend a quarter (1/4) of a mile down gradient. Where access to adjacent properties is unavailable, the project owner must rely upon the best-known information for the area, supplemented with information available from the City Engineer, including any existing geotechnical engineering reports or studies for sites in the vicinity.
 - II. Review available geologic, topographic, and soils, and identify any site conditions that could impact the use of storm drainage systems or the construction of sub-level structures. This review must include all available previous geotechnical engineering reports or studies for sites in the vicinity
 - III. Evaluate the potential impacts of groundwater on the proposed storm drainage facilities, roadways and proposed underground structures, when a seasonally high groundwater table is suspected.
 - B. Report must include:
 - I. A brief project description including size and number of lots proposed, project location (section, township and range), and background information relevant for drainage design.
 - II. A discussion of the study investigations.
 - III. A description of the soil units on the site and in the vicinity of the site.
 - IV. A description of the site including surface, soil, and groundwater conditions, etc.
 - V. Conclusions and recommendations.

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- C. Site Plan must include:
 - I. Project boundaries (including all existing and proposed property lines).
 - II. Labeled topographic contours, extending beyond the project and drainage basin.
 - III. Location of the soil units identified.
 - IV. Location of significant structures, properties or geologic features on site and in the project vicinity.
 - V. Location of existing natural or constructed drainage features on site and in the project vicinity.
 - VI. Location of proposed site infrastructure including roadways and drainage features such as ponds, drywells, etc.
- D. Test Method Documentation. Provide the following:
 - I. A map with the location of all subsurface field explorations and any in- place field tests.
 - II. A description of any difficulties encountered during excavation and testing.
 - III. A description of the equipment used to perform the field explorations or tests. When applicable, describe the type of fabric lining and gravel backfill used.
 - IV. Logs of subsurface explorations which identify the depth to groundwater, and the presence of any limiting layers and the target soil layer. Include test pit or excavation dimensions, with photographs, where applicable.
 - V. Test data in a format that includes time of day, flow meter readings, incremental flow rates, observed head levels, water depths and total flow volumes in the test pit or infiltrometer.
 - VI. A description of the condition of any existing facilities being tested, noting any silt build-up, water level, connections to other structures (including distance to inverts of any interconnecting pipes), measured depths and dimensions, etc.
 - VII. Results of field and laboratory testing conducted, including the grain size analysis represented both graphically and in tabular format.
 - VIII. A report on the actual and proposed design outflow rates for test pits.
 - IX. A geologic cross-section of the stormwater disposal area drawn to scale, with the proposed stormwater disposal facilities superimposed on the cross-section. All relevant geologic units must be clearly identified including the target disposal layer and limiting layers.
- E. Field and Laboratory Testing:
 - I. The subsurface exploration, testing, and associated engineering evaluations are necessary to identify permeable soils and to determine the thickness, extent, and variability of the soils. This information is necessary to properly design stormwater disposal facilities.

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- II. Field explorations and laboratory testing must be conducted under the direct supervision of a civil engineer, a geotechnical engineer, a hydrogeologist, or an engineering geologist.
- III. Test Methods:
 - a. Soil infiltration rates must be determined using one or more of the following methods for new development or redevelopment with greater than or equal to 10,000 square feet of impervious surface:
 - The ASTM D 3385-88 Double-ring Infiltrometer Test: This test method is used for field measurement of infiltration rate of soils.
 - The Pilot Infiltration Test Procedure: This test method uses field data to estimate the outflow rates of subsurface disposal facilities (refer to the Montana Stormwater Post Construction BMP Design Guidance Manual).
 - Additional or alternate test methods, upon approval from the City Engineer.
- IV. Minimum Requirements:
 - a. The following minimum requirements, when applicable, must be met for field explorations and laboratory testing when subsurface disposal is proposed:
 - Test borings and/or test pits must be located within the footprint of proposed stormwater disposal facilities; and
 - For each facility, a minimum of one subsurface exploration must be performed for up to 1,500 square feet of disposal area. Another subsurface exploration must be performed for each additional 3,000 square feet, or fraction thereof, of disposal area. For a linear roadside swale, a minimum of one subsurface exploration must be performed every 500 feet, staggered on both sides of the road, unless site conditions or test results indicate additional explorations are necessary. Subsurface explorations and sampling must be conducted according to applicable ASTM standards.
- V. Post-Construction Testing:
 - a. Newly constructed infiltration facilities will require a full-scale successful test prior to project engineer certification. Contact the City Engineer for additional information.
- F. Ground Water Monitoring:
 - I. Ground water monitoring is required for:
 - a. Projects proposing infiltration with greater than 10,000 square feet of

- impervious area; or
- b. Projects located within or draining to a drainage problem area as recognized by the City Engineer or within an area mapped by the City as having the potential for high ground water. See Appendix O.
- II. Groundwater must be monitored during seasonal high ground water conditions. Measurements must be recorded weekly. Monitoring season is March 15th through June 30th. Include monitoring results at least two weeks before and after groundwater peak. The methods used for measuring must meet current professional hydrogeological standards. The monitoring plan must include the number of piezometers needed and their location in relation to the site's topography and proposed stormwater facilities. The qualified professional must provide oversight and inspection with respect to the installation of piezometers and monitoring techniques. When field and research data indicate the seasonal high groundwater is at 6-feet or less a note must be placed on the final plat stating both basements and crawl spaces are not recommended. If wet season monitoring is not feasible a geotechnical soil log analysis may be substituted at the discretion of the Public Works Director. This analysis will need to include an indication of the groundwater level as recorded through soil logs. The analysis must be provided by a geotechnical engineer. The drainage design report must incorporate information provided in the groundwater report.

5.1.4 BR-3 Water Quality Treatment

- A. The recommendations of the latest edition of the Montana Storm Water Post-Construction BMP Design Guidance Manual (BMP Design Manual) are adopted in their entirety, except as amended herein. Any conflicts or differences between the BMP Design Manual and the City of Whitefish Engineering Standards will be resolved in favor of the Standards.
- B. The following known amendments are incorporated into the BMP Design Manual:
 - I. General:
 - a. Infiltrating facilities must provide a minimum vertical separation of 3 feet between the bottom of the facility and the seasonal high water table.
 - b. Infiltrating facilities must provide a minimum vertical separation of 5 feet between the bottom of the facility and the first limiting layer (bedrock, clay lens, etc.).
 - c. Facilities requiring pretreatment must provide a minimum pretreatment volume equal to 20% of the Runoff Treatment Volume (RTV).
 - d. Maintenance access must be provided.
 - e. Post-Construction BMPs must meet the requirements of 5.1.5H

II. Bioretention Areas:

- a. The maximum contributing area to a single bioretention area is 200,000 sf.
- b. For bioretention areas placed in subsoils having a hydrologic soil group designation of B, C, or D, an underdrain system is required.
- c. Underdrains must be included in the design when subsoil infiltration rates are less than 1 inch per hour.
- d. The ponding area must contain the entire volume associated with the Runoff Treatment Volume of 0.5 inches.
- e. The ponding depth must be designed to be 6 to 12 inches above the filter bed.
- f. Filter Treatment Criteria:
 - The filter bed must have a minimum depth of 30 inches.
 - The planting soil filter bed must be sized using a Darcy's Law equation with a filter drain time of 48 hours and a coefficient of permeability (k) of 0.5 feet per day.
 - The required filter bed area (A_f) is computed using the following formula:

$$\text{Equation 1} - A_f = \frac{V_{wq} \times d_f}{k \times (h_f + d_f) \times t_f}$$

Where:

A_f = surface area of filter bed (ft²)

V_{wq} = Runoff Treatment Volume (ft³)

d_f = filter bed depth (ft)

k = coefficient of permeability of filter media (ft/day)

h_f = average height of water above filter bed (ft)

t_f = design filter bed drain time (days)

g. Pretreatment Facilities:

- Micro-bioretention (250 – 2,500 sf):
 - A grass filter strip extending a minimum of 10 feet from the edge of the pavement and at a maximum slope of 5%.
- Small Scale Bioretention (2,500 to 20,000 sf):
 - A grass filter strip with a pea gravel diaphragm or other flow spreader.

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- Bioretention Basins (20,000 to 200,000 sf):
 - A pretreatment cell, like a forebay, is located at the piped inlets or curb cuts leading to the bioretention area and has a storage volume equivalent to at least 15% of the total RRV.
 - The design shall have a 2:1 length to width ratio.
 - The cell can be formed by a wooden or stone dam, or rock berm.
- h. Filter Media:
 - Planting soils media must consist of a sandy loam, loamy sand, or loam texture per USDA textural triangle with a clay content ranging from 0 to 5%. In addition, the planting soil must have a 3 to 5% organic content.
 - The recommended planting soil media mixture is:
 - 85 – 88 % sand. (washed medium sand is sufficient)
 - 8 - 12 % fines. (Includes both clay (max 5%) and silt)
 - 3 -5 % organic matter (leaf compost or peat moss)
 - Small scale bioretention and bioretention basin designs must use premixed certified media from a vendor meeting the following requirements for phosphorus content, cation exchange (CEC), and media filtration:
 - The recommend P-index value is between 10- 50
 - Soils with CECs exceeding 10 are preferred for pollutant removal; and,
 - The media should have an infiltration rate of 1 to 2 inches per hour
 - Micro-bioretention (250 to 2,500 sf) soil media can be mixed on site
 - The minimum filter media depth must be between 30 to 48 inches; and,
 - Place filter media in lifts of 12 to 18 inches
- III. Permeable pavement systems may be considered outside of public right of way. A long-term maintenance plan must be provided. The permeable pavement system design must follow the guideline in the BMP Design Manual. Use of permeable pavement requires approval of the Planning Director and

Public Works Director.

IV. Biofiltration Swale:

a. Slope:

- The channel slope must be at least 1% and no greater than 5%. Slopes of 2% to 4% provide the best performance.
- When slopes less than 2% are used, an underdrain is required.
 - A 6-inch-diameter perforated pipe must be installed in a trench lined with filter fabric and filled with 5/8-inch minus roundrocks.
 - The pipe must be placed at least 12 inches below the biofiltration channel bed, and the bed must incorporate topsoil that has a proportionately high sand content.

b. Geometry:

- The maximum bottom width is 10 feet and the minimum width is 3 feet. If the calculated bottom width exceeds 10 feet, parallel biofiltration channels must be used in conjunction with a device that splits the flow and directs an equal amount to each channel;
- The ideal cross-section is a trapezoid with side slopes no steeper than 3:1. However, a rectangular shape can be proposed if there are topographical constraints or other construction concerns.

c. Velocity:

- The maximum flow velocity through the swale under peak 100-year flow conditions must not exceed 3 feet/second.

d. Level Spreader:

- A flow spreader must be used at the inlet of a swale to dissipate energy and evenly spread runoff as sheet flow over the swale bottom. Flow spreaders are recommended at mid-length of the swale.

V. Wet Detention Basin:

a. Wet detention basins may be single cells when:

- Wet pool volume is less than or equal to 4,000 cubic feet; and,
- Length to width ratio is $\geq 4:1$.

VI. Proprietary Treatment Devices:

a. Proprietary treatment devices must be approved by:

- The Washington Department of Ecology through the TAPE process for pretreatment and have a general use level

designation.

- The New Jersey Department of Environmental Protection (NJDEP). The device must have NJCAT verification and NJDEP certification for a TSS removal rate of 80 percent. This is the Runoff Treatment Requirement listed in the Montana Stormwater Post Construction BMP Design Guidance Manual.

VII. Offsite Treatment Facilities:

- a. Onsite treatment options must be exhausted prior to evaluating offsite treatment.
- b. Approval for offsite treatment will not be granted when based solely on the difficulty or cost of implementation of onsite treatment methods.
- c. Offsite treatment will be considered by PW on a case-by-case basis when the following criteria can be firmly established:
 - Lack of available space
 - High groundwater
 - Groundwater contamination
 - Poorly infiltrating soils
 - Shallow bedrock
 - Prohibitive costs
 - A land use inconsistent with capture and reuse or infiltration of stormwater
- d. Offsite treatment proposals must include:
 - Fiscal plan for routine maintenance.
 - Fiscal plan for costs associated with replacement of the facility by the end of its design life.
 - A plan for perpetual ownership and maintenance responsibilities.

5.1.1.5 BR-4 Flow Control

A. Storm Event Calculations:

- I. The TR-55 Curve Number Method must be used to determine Peak Flow Rates, and Flow Control Volumes. The following is pertinent to and must be used for Whitefish:
 - a. 24-Hour Precipitation Depths for Whitefish (See Table 5-1).
- II. Alternative Methods:
 - a. Use when one of the following are met:

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- The calculated depth of runoff is less than a 0.5 inch;
 - The value of (P-0.2S) is a negative number;
 - The weighted CN is less than 40;
 - Routing a hydrograph through an existing control structure; or
 - Sizing a new flow control facility using hydrograph analysis.
- b. Rational Method:
- Use MDT Hydraulics Manual, Chapter 7.
 - Calculate time of concentration using the TR-55 Curve Number Method and not be less than 5 minutes (i.e., if calculated less than 5 minutes, use 5 minutes).
 - Use MDT IDF curves / tables to select intensities.
- c. Level Pool Routing Method:
- Use for routing a hydrograph through an existing control structure, or for sizing a new flow control facility using hydrograph analysis.
 - Follow the Handbook of Applied Hydrology (Chow, Ven Te, 1964)
- B. Precipitation:
- i. The design 24-hour precipitation depths and recurrence interval used by Whitefish are provided in the table below. The precipitation isopluvial map data comes from National Oceanic and Atmospheric Administration (NOAA) Atlas 2, Volume IX, 1973.

Table 5-1 - Whitefish Precipitation Depths

Recurrence Interval	2-year	10-year	25-year	50-year	100-year
24-Hour Precipitation Depth (inches)	1.4	2.0	2.4	2.8	3.0

- C. Design Storm Distribution:
- i. The NRCS Type I 24-hour storm distribution for the 10 and 100-year storm events must be used for sizing flow control facilities.
- D. Basin Areas:

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- I. The basin area must reflect the actual runoff characteristics as close as possible and be consistent with the assumptions used. The impervious and pervious areas must be estimated from best available plans, topography, or aerial photography, and verified by field reconnaissance.
- E. Outflow Control Structures:
 - I. Design outlet control structures using the criteria and methods set forth in Chapter 8 of the HEC-22 Manual.
 - II. Requirements:
 - a. Must be in a manhole or catch basin
 - b. Must have a restrictor device to control outflow
 - c. Must be incorporated into all detention facilities
 - d. Flow must enter the detention facility through a conveyance system separate from the outflow control structure
 - e. Provide an access road for inspection and maintenance
 - f. Lids must be locking, and the rim elevation must match finished grade
 - III. Types of Flow Control:
 - a. Multiple Orifice Restrictors:
 - Minimum orifice size must be 3 inches
 - Must be constructed on an baffle or on a tee section
 - b. Risers and Weir Restrictor:
 - Must provide for primary overflow of the developed 100- year peak flow discharging to the detention facility.
 - A combined orifice and riser overflow may be used if the condition above is met, assuming the orifices are plugged.
 - c. Skimmer (with baffle or without baffle):
 - Provide skimming up to the 10-year event high water level or greater.
 - Provide flow velocities through the submerged skimmer opening at 1.5 fps or lower under the 10-year event high water level.
 - IV. Flow Control Calculations:
 - a. Provide equations, references, coefficients, and assumptions used.

F. Infiltration Facilities:

I. Requirements:

a. Pretreatment

- Required for urban watersheds with more than 0.25 acres of impervious surface before entering the infiltration facility.
- Must be equal to 20% of Water Quality Volume. The pretreatment volume is in addition to the infiltration basin's Water Quality Volume sizing requirement.

b. Depth to Groundwater and Limiting Layer:

- The base of the infiltration facility must be ≥ 5 feet above the limiting layer (bedrock, clay lens, etc.).
- The bottom of the basin must be at least 3 feet above the seasonal high groundwater table.
 - The seasonal high-water table must be based on long-term piezometer records during at least one wet season March 15th through June 30th.

c. Setbacks:

- Facilities must be 50 feet upslope and ≥ 20 feet downslope from building foundation.
- Facilities must be 50 feet from top of slopes steeper than 15%, or as determined by a licensed geotechnical engineer.
- Facilities must be 200 feet from springs used for drinking water supply.
- Facilities must be 100 feet from septic drain fields.
- Facilities must be 100 feet from water supply wells.
- Facilities must be 20 feet from easements, external tracts, or property lines.
- Outside of the floodplain 100-year High Water Line.

d. Access:

- Provide dedicated maintenance access route to the infiltration facility from a public roadway.
- Dedicate Access route by maintenance easement or drainage

e. Longevity:

- Approval of an infiltration system obligates the owner to repair, replace or reconstruct the infiltration system if it fails to operate as designed. The maintenance and operation schedule

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for an infiltration system must include such a provision.

- II. Infiltration Criteria:
 - a. Short-term rate:
 - Use test methods described in Section 5.1.3E.III.
 - Must be greater than 0.5 inches per hour and less than 20 inches per hour.
 - b. Long-term rate:
 - Will be determined by dividing the short-term rate by 2.
 - When the long-term rate is greater than 2.5 inches per hour, a site- specific analysis must be performed by a licensed geotechnical engineer to determine pollutant removal to prevent groundwater contamination.
 - The maximum infiltration rates for various soils are outlined in Table 5-2.

Table 5-2 - Maximum Infiltration Rates for Soil Types

Soil Texture Class	Maximum Infiltration Rate (in/hr)
Coarse Sand, Cobbles	20
Medium Sand	8
Fine Sand, Loamy Sand	2.4
Sandy Loam	1

- c. Drawdown time:
 - Must drain dry within 72 hours after the design event using the long- term soil infiltration rate.
 - Infiltration basins need to be refreshed and infiltration rate restored when the actual drawdown time exceeds 72 hours.
- III. Planting requirements:
 - a. Plant basin with native vegetation containing a mixture of species of varying moisture tolerances. See section Appendix B – Stormwater Facility Planting Guidelines.
- IV. Post-construction verification:
 - a. Submit as-built grading plans of the infiltration basin after construction to the City to verify the design storage volume has been provided.
 - b. Perform post-construction testing of actual short-term infiltration rates to ensure the basin functions as designed or corrective action will

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need to be taken.

- V. Facility volume:
 - a. The size of the infiltration facility can be determined by routing methods.
 - b. Infiltration facilities must be sized to fully infiltrate the post-development NRCS Type I 10-year 24-hour design storm.
 - c. The design water surface for all facilities must be the post-developed 100-year 24-hour water surface elevation.
 - d. All overflows (structure or spillway) must pass the 100-year 24-hour developed peak flow rate.
 - e. Design the infiltration facility must be designed to drain completely the 10-year 24-hour event within 72 hours and the 100-year 24-hour event within 120 hours after the design storm event To prevent the onset of anaerobic condition and mosquito breeding.
- VI. Location:
 - a. These conditions must be investigated, and appropriate mitigating measures taken before designing infiltration facilities in these areas if the site has potential for contamination or unstable soil.
- VII. Underground infiltration facilities:
 - a. Materials must be designed to withstand HS-20 loading when installed.
 - b. Access
 - The maximum depth from finished grade to invert must be 10 feet.
 - To facilitate cleaning:
 - Place a minimum 3-foot access port at the inlet of the facility and as otherwise required for proper maintenance.
 - Access ports must have a minimum 2-foot sump.
 - Place flushing ports at the end of all pipe runs.
 - Access and flushing ports must have solid locking lids and be readily accessible by maintenance vehicles.
- G. Underground detention facilities:
 - I. Location must be:
 - a. Downstream of water quality treatment units.
 - b. A minimum of 5 feet from any structure or property boundary.
 - c. Not be under any permanent structures or buildings.

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- II. Sizing:
 - a. Pipe segments must be sufficient in number, diameter, and length to provide the required minimum storage volume for the 100-year event.
- III. Materials must:
 - a. Be metal, plastic, or concrete pipe or box.
 - b. Be designed to withstand HS-20 loading when installed.
 - c. Have watertight Joints and connections, not soil tight.
 - d. Have a minimum diameter of 12 inches for pipe or a minimum dimension of 12 inches for boxes.
 - e. Include end caps for structural stability at maximum hydrostatic loading conditions.
- IV. Flow control structure:
 - a. Discharge the facility outlet pipe(s) into a manhole structure.
 - b. If an orifice plate is required to control the release rates, the plate must be hinged to open into the detention pipes to facilitate back flushing of the outlet pipe.
 - c. A high flow bypass must be included to safely pass the 100-year storm event in the event of outlet structure blocked or mechanical failure. The bypass must be located so that downstream structures will not be impacted by emergency discharges.
- V. Buoyancy:
 - a. In soils where seasonal groundwater may induce flotation, buoyancy tendencies must be balanced either by ballasting with concrete backfill, providing concrete anchors, increasing the total weight, or providing subsurface drains to permanently lower the groundwater table.
 - b. Provide calculations to demonstrate stability.
- VI. Access:
 - a. The maximum depth from finished grade to invert is 10 feet.
 - b. To facilitate cleaning:
 - A minimum 3-foot access port must be at the inlet and outlet of the facility and as otherwise required for proper maintenance.
 - Access ports must have a minimum 2-foot sump.
 - Flushing ports must be at the beginning of all pipe runs.
 - Access and flushing ports must have solid locking lids and be readily accessible by maintenance vehicles.

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H. Additional Requirements For All Facilities:

I. General:

- a. Locate pond bottoms a minimum of 6 inches below the outlet to provide sediment storage. Sediment storage volume must not be included in the design volume.
- b. Slope pond bottoms from 0.5% to 1%. Roadside swales are considered flat if the swale bottom slope is 1% or less. When calculating treatment volume, the designer can assume a flat bottom for swale/pond bottom slopes up to 1%.
- c. Locate drainage facilities within a drainage parcel or easement. Refer to Section 5.1.9 for specific information.

II. Setbacks:

- a. Any detention pond, swale or ditch (measured from the maximum design operating depth) must be at least 30 feet upgradient or 20 feet when located down-gradient from septic tanks or drain fields.
- b. Locate pond overflow structures a minimum of 10 feet from any structure or property line. The toe of the berm or top of bank must be a minimum of 5 feet from any structure or property line.
- c. There must be 50 feet from building foundation to maximum water surface elevation.
- d. There must be 20 feet from easement or property line to maximum water surface elevation.
- e. Facilities must be outside of the floodplain 100-year High Water Line.
- f. Detention and infiltration ponds must be 200 feet from schools, day cares, nursing homes, or similar facilities.

III. Drawdown time:

- a. Facilities must drain completely within 120 hours after a 100-year storm event.

IV. Side slopes:

- a. Interior side slopes must not be steeper than 3H:1V.
- b. Pond walls may be vertical retaining walls, provided that:
 - A fence is provided along the top of the wall for walls 2.5 feet or taller.
 - An 8-foot-wide access ramp to the pond bottom is provided, with slopes less than 4H:1V.
 - The design is by a professional engineer with structural expertise if the wall is 4 feet or more in height.

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- V. Emergency overflow spillway:
- a. Must be analyzed as a broad crested trapezoidal weir.
 - b. Must have the capacity to pass the 100-year developed peak flow.
 - c. The full width of the spillway must be armored with riprap and extend downstream to where emergency overflows enter the conveyance system.
 - The armoring may have 4 inches topsoil and grass cover.
 - d. Riprap must extend just beyond the point that bank and streambed erosion occur:
 - If the facility is located on an embankment, the overflow spillway must be armored to a minimum of 10 feet beyond the toe of the embankment.
 - The overflow path must be identified on the construction plans and easements shall be provided as necessary.
 - e. Engineers may choose to design the detention pond multi-stage outflow structure with an emergency bypass that can route the 100-year storm through the structure and out of the pond directly into the conveyance channel. If the emergency bypass and downstream conveyance is adequately sized to convey the 100-year storm event, an emergency overflow spillway is not required.
- VI. Embankments:
- a. The height of an embankment is measured from the top of the berm to the catch point of the native soil at the lowest elevation.
 - b. Embankments 4 feet or more in height shall be constructed as recommended by a geotechnical engineer. Depending upon the site, geotechnical recommendations may be necessary for lesser embankment heights.
 - c. Embankments must be constructed on native consolidated soil, free of loose surface soil materials, fill, roots, and other organic debris or as recommended by the geotechnical engineer.
 - d. Energy dissipation and erosion control must be provided to stabilize the berm and its overflow.
 - e. The embankment compaction must produce a dense, low permeability engineered fill that can tolerate post-construction settlements with minimal cracking. The embankment fill must be placed on a stable subgrade, placed in 6" lifts, and compacted to a minimum of 95% of the Modified Proctor Density (ASTM Procedure D1557).
 - f. Anti-seepage filter-drain diaphragms shall be considered on all outflow pipes and are required on outflow pipes when design water depths are

- 8 feet or greater.
 - g. In the event of a berm fracture or failure, the berm must allow the passage of water through the berm without additional erosion or failure of the berm structure.
 - h. Embankments must be constructed by excavating a key:
 - Key width must equal 50 percent of the berm base width.
 - Key depth must equal 50 percent of the berm height.
 - The berm top width must be a minimum of 4 feet.
- VII. Fencing:
- a. General:
 - Fencing is required on:
 - Facilities with the first overflow at 4 or more feet above the pond bottom.
 - Facilities with retaining walls 2.5 feet high or taller.
 - Facilities located at, or adjacent to, schools, nursing homes, day cares, or similar facilities.
 - Fencing is not required for a typical infiltration swale. However, the City Engineer reserves the authority to require a fence along any swale or pond should there be a concern for safety.
 - At the discretion of the City Engineer, if a pond is proposed as an amenity, (i.e., enhancements to the disposal facility are proposed, such as rocks, boulders, waterfalls, fountains, creative landscaping or plant materials), the design will be reviewed on a case-by-case basis, such that the fencing requirements may be reduced or waived.
 - The City Engineer reserves the authority to waive any and all fencing in commercial areas, as reviewed and accepted on a case-by-case basis.
 - b. Construction Fence Must:
 - Be at least 4 feet tall unless otherwise specified by the City Engineer.
 - Provide visual access.
 - Provide 12 feet wide locked gate(s) with 2 leaves.
- VIII. Planting:
- a. Exposed earth on the pond bottom and interior side slopes must be sodded, seeded, or vegetated in a timely manner, taking into account the current season.

- b. Use of dryland grass or other drought tolerant plant material is recommended.
 - c. All remaining areas of the tract or easement must be sodded, planted with dryland grass, or landscaped.
 - d. Refer to Appendix B – Stormwater Facility Planting Guidelines.
- IX. Landscaping:
- a. General:
 - Integrate Landscaping and common use areas with the open drainage features and into the overall stormwater plan.
 - Landscaping and other uses are secondary to the primary stormwater needs and functions.
 - Landscaping must not conflict with the collection, conveyance, treatment, storage, and/or disposal of stormwater.
 - Group supplemental landscaping into irregular islands and borders outside of the immediate stormwater facilities and not uniformly disperse throughout them.
 - The constructed stormwater features should be irregular and curved in shape to look natural. Avoid straight lines and regular shapes where possible.
 - Trees and shrubs must not be planted on pond liners due to potential leakage from root penetration.
 - Planting is restricted from berms that impound water, either permanently or temporarily during storms.
 - Trees and shrubs must not be planted within 10 feet of drainage appurtenances such as outlet control structures, manholes, catch basins, inlets and outlets, spillways, storm drain lines, and underground disposal structures such as drywells or drain-fields. The minimum spacing between the tree or shrub and the drainage structure is equal to the crown diameter of the mature plant.
 - Trees and shrubs must not be planted within the treatment, storage, and conveyance zones of swales, ponds, or open channels, unless treatment and storage calculations take into account the mature tree size and allow runoff to reach the drainage facilities.
 - Self-limiting plants must be used rather than spreading or self-seeding types.
 - Full-size forest trees and trees with aggressive root systems

must not be used except where space and circumstances allow. Deciduous trees with heavy shade and leaf-fall should also be avoided to allow the survival of the surrounding grass areas and prevent plugging of drainage facilities. Evergreens and smaller ornamental trees are better suited to urban conditions.

- Shrubs should be upright in form and groundcovers should have neat growth patterns to assist in their maintenance and that of the surrounding grass areas.
- The plant selection needs to consider the native soil conditions and altered moisture conditions created by the stormwater facilities. The plants need to be adaptable to the changes in site conditions. Self-sufficient and self-limiting plants do not require year-round irrigation and require minimal care are encouraged. Guidelines for plantings are listed in Appendix B – Stormwater Facility Planting Guidelines.

X. Special Requirements:

a. Floodplains:

- Floodplain requirements are administered by the City Planning Department. Contact the City Floodplain Administrator (863-2410) for more information and specific requirements.

b. Whitefish Lake Water Quality Protection Plan:

- All development of property within 75 feet of the lake must submit a water quality protection plan in accordance with the Water Quality Protection Regulations, Section 11.3.29 of the Whitefish City Code.
- The water quality protection plan must be developed by a qualified professional and must make recommendations regarding stormwater management, impervious surface, grading and filling, and vegetation protection and restoration so the estimated discharge of sediment, nutrients, and other pollutants to the lake during and after construction would be no greater than if the site had a seventy-five (75) foot buffer.

c. Whitefish Lake and Lakeshore Regulations:

- Whitefish Lake and Lakeshore Protection Regulations require permits for construction within thirty (30) horizontal feet of the perimeter of the lake (mean annual high water).
- Any construction activity which will affect the lakeshore protection zone must incorporate all necessary means to prevent pollution of the lake, including erosion, sediment, and storm runoff controls.
- The proposed activity must not cause, directly or indirectly,

increased sedimentation, an increase in suspended sediments, or an increased discharge of nutrients into the lake either during its construction or utilization.

- For details on the lake regulations and mean annual high-water elevation refer to Title *13 Lake and Lakeshore Protection Regulations* of the Whitefish City Code.

d. Wetlands:

- A wetland analysis is required for all new development and redevelopment. If wetlands are present an assessment must be performed by a wetland professional trained and familiar with the current US Army Corps of Engineers Regional Supplements for Wetland Delineations and the most recent Army Corps of Engineers guidance for Jurisdictional Determinations.
- The wetland analysis must comply with the Water Quality Protection, Section 11.3.29 of the Whitefish City Code.

e. Closed Depressions:

- Closed depressions are natural low areas that hold a fixed volume of surface water. Depending upon soil characteristics, a closed depression may or may not accumulate surface water during wet periods of the year. Some closed depressions may be classified as wetlands. If so, the engineer must comply with the wetland criteria specified in this section. Analysis of closed depressions must include the following at a minimum:
 - Identification of the location of the closed depression on the pre-developed basin map.
 - A routing analysis of the drainage basins contributing to the closed depression to estimate the peak flow rates and volumes entering the closed depression in the pre-developed condition.
 - An estimation of the storage capacity of the closed depression for the 100- year storm event.
 - If the closed depression will be filled in, a facility must be provided with capacity to store the 100-year 24-hour volume that was historically intercepted by the closed depression. This is in addition to the drainage facilities required for flow control and treatment due to the increase in stormwater runoff. The construction plans must include a grading plan of any closed depression areas to be filled in. The grading plan must show both existing

and finished grade contours. The plans must also specify compaction and fill material requirements.

- Closed depressions have the same flow control requirements as infiltration facilities.

- XI. Flow Control Exemption for Discharge to Whitefish River or Whitefish Lake
 - a. Neither the Whitefish River or Whitefish Lake is vulnerable to increased flooding or erosion risk from peak flows. Therefore, if a drainage system discharges directly to and is located within 500 feet of these water bodies, they are exempt from flow control requirements. The distance must be measured from the property's discharge point to the ordinary high water of the receiving water. Stormwater systems that discharge first to a regional stormwater facility and then to the river or lake do not fall under this exemption unless it can be proven that the additional peak flow will not subject the facility to flooding. In addition, it must be proven that the collection system has sufficient capacity, or will be appropriately modified, to accept the increased peak flow.

5.1.6 BR-5 Conveyance

- A. The 10-year 24-hour design storm must be used to size the enclosed storm sewer system and inlets. Use methods set forth in Chapter 7 of the HEC-22 Urban Drainage Design Manual:
<https://www.hfwa.dot.gov/engineering/hydraulics/pubs/10009/10009.pdf>.
- B. Evaluate the capacity of the downstream drainage course for a minimum distance of 1/4 mile from the point of discharge of the development or as determined by the Public Works Director.
- C. The downstream conveyance system must be adequately sized to handle offsite peak flows conveyed through the development plus the onsite developed peak flow discharged to the drainage course from the controlling 10-year storm.
 - I. The system must be shown on the drainage layout.
- D. The size of the controlled outlet must be calculated for the total drainage basin when the total runoffs from both off-site and on-site areas are combined.
- E. Arrows indicating drainage direction in all public and private property must be shown on the Construction Drawings for all hydraulic conveyance systems.
- F. Culverts must be designed in accordance with the Federal Highway Administration (FHWA), Hydraulic Design Series No. 5 (HDS-5) "Hydraulic Design of Highway Culverts".
 - I. Culverts must be designed to accommodate runoff from upstream drainage areas.
- G. Design open channels in accordance with the methods provided in Chapter 5 of the HEC-22 Urban Drainage Design Manual. Minimum freeboard requirements for

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- open channels must be 0.5 feet below the top of bank for the design flow rate.
- H. Channels in earth must have sides with a maximum slope of one-foot vertical rise for every two feet of horizontal distance.
 - I. Steeper slopes may be permitted only if bank protection is used to prevent erosion and sloughing of the sides into the bottom of the channel.
 - I. Constructed and natural channels and culverts must be designed with sufficient capacity to convey, at a minimum, the depth associated with the 100-year 24-hour design storm peak flow rate.
 - J. Assume developed conditions for on-site tributary areas and existing conditions for any off-site tributary areas.
 - K. Surface water exiting the subject property must be discharged at the natural location.
 - L. Adequate energy dissipaters must be used within the subject property to eliminate the potential for detriment to the existing downstream infrastructure.
 - M. Preservation of Natural Drainage Way (Critical Stormwater Conveyance):
 - I. Introduction:
 - a. New development must be designed to protect existing natural drainage features that convey or store water or allow it to infiltrate into the ground in its natural location. Preserving the natural drainage ways, referred to as Critical Stormwater conveyances in the Water Quality Protection Regulations, will help ensure stormwater runoff can continue to be conveyed and disposed of at its natural location.
 - II. Definitions:
 - a. The drainage ways that need to be preserved are indicated on map available from the Public Works Department. The maps are not definitive. Each natural drainage way must be designed to pass the 100-year 24-hour storm event. Because every site is unique, the City Engineer will make interpretations, as necessary, based on site visits and technical information as to the exact location on a project site. The City Engineer may also require the project owner to provide engineering information to assist in this determination.
 - b. The maps are making this one tool used to identify existing natural drainage ways; field verification will also be required to fully identify drainage ways and their significance with regard to a natural conveyance system.
 - c. Review all projects for the presence of natural drainage ways and make a determination as to their significance with regard to preservation of natural conveyance and potential use as part of a regional system.
 - III. Protection:

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- a. No cuts or fills are allowed in predominant natural drainage ways except for perpendicular driveway or road crossings with engineering plans showing appropriately sized culverts or bridges. Natural drainage ways must be preserved for stormwater conveyance in their existing location and state, and must also be considered for use as regional facilities.
- b. Less prominent drainage ways in non-residential developments and residential development containing lots 1 acre or smaller may be realigned within the development provided the drainage way will enter and exit the site at the pre-developed location and discharge will occur in the same manner as prior to development.
- c. Realignment of a less prominent drainage way must be defined as still following the "basic" flow path of the original drainage way. An acceptable example is if the drainage way is proposed to be realigned such that it follows a new road within the proposed development and is left in its existing state or utilized as part of the project's on-site stormwater system.
- d. Stormwater leaving the site in the same manner is defined as replicating the way the stormwater left the site in its existing condition. If the drainage way is preserved in its existing location and is left undisturbed, this goal should be met.
- e. If the City Engineer accepts the proposal to allow a less predominant drainage way to be routed through the site via a pipe or approved drainage material, the following additional criteria must be met:
 - Where the less prominent drainage way enters the site, the design ensures the entire drainage way is "captured" as it enters the site; i.e., the surrounding property must not be regraded to "neck-down" the drainage way so it fits into a drainage easement or tract or structure intended to capture and reroute the off-site stormwater runoff.
 - Where the less prominent drainage way exits the site, the design ensures the stormwater leaves the pipe, pond or structure a significant distance from the edge of the adjacent property so by the time the stormwater reaches the property boundary, its dispersal mimics that of the pre-developed condition.
 - The drainage way may be subject to the same limitations and criteria as a predominant drainage way if it is a necessary conveyance for flood control or is considered a connection to a planned regional facility or conveyance route.

- The size of the tract or easement containing the drainage way must be determined based on an analysis of the existing and proposed stormwater flows directed to these drainage systems and any access and maintenance requirements found in this manual.
- The drainage ways must be set aside as open space in a separate parcel in new development containing lots that are 1 acre or smaller must be required to set aside the drainage way as open space in a separate parcel. For new development containing lots that are greater than 1 acre, the drainage way may be set aside in either a parcel or an easement.

5.1.7 BR-6 Erosion and Sediment Control

A. Overall Description:

- I. The objective of the erosion and sediment control standards is to minimize erosion of disturbed areas during the construction of a project.
- II. Erosion and subsequent sediment transport can have a significant impact on the water quality of receiving surface waters.
- III. Sediment loads to surface waters increase turbidity, increase water temperatures, degrade fish habitat and spawning areas, and depress dissolved oxygen concentrations.
- IV. Moreover, toxic substances, trace metals and nutrients which are absorbed to soil particles can be transported into surface waters. The addition of these substances to surface waters degrades the existing water quality.
- V. No runoff containing sediment is permitted to flow off any construction site. Sediment must not be discharge into storm drainage systems, waterways or wetlands.
- VI. The contractor must provide and maintain the required sediment control barriers. The control barriers must not be removed until all roadways have been paved and a permanent and stable vegetation cover has been established.
- VII. An erosion and sediment control plan (ESCP) is required for most types of development within the City of Whitefish.
- VIII. Apply both source control and sediment containment BMP's to prevent erosion before it starts and capture sediment before it is transported off site.

B. Minimum Criteria for Requiring an Erosion Control Plan:

- I. An ESCP is required for land-disturbing activities which include, but are not limited to, excavation, planting, tilling, and grading, which disturbs the natural or improved vegetative ground cover to expose soil to the erosive forces of rain, stormwater runoff or wind.

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- II. The following land-disturbing activities require an ESCP:
 - a. Any activity where the total volume of material disturbed, stored, disposed of or used as fill exceeds five (5) cubic yards.
 - b. Any activity where the area disturbed exceeds one thousand (1000) square feet.
- C. Erosion and Sediment Control Plan:
 - I. The fee is \$100.00 for a single family or duplex ESCP and \$200.00 for an ESCP for all other development.
 - II. A professional with a good working knowledge of hydrology and ESCP practices, must prepare the ESCP. A copy of the ESCP must be located on the construction site or within reasonable access to the site. As site construction progresses, the ESC plan may require modification to reflect changes in site conditions.
 - III. Use the following Construction Management Best Practices (BMPs):
 - a. Erosion and Sediment Control BMP Manual (January 2015) – MDT
 - b. Stormwater Management During Construction Field Guide for BMPs – MDEQ
 - IV. The ESCP must accompany the road and drainage plans, grading plan, or permit request and should be integrated into the grading plan whenever possible. It must contain sufficient information to demonstrate to the City Engineer that potential problems associated with erosion, sediment, and pollution have been adequately addressed for the proposed project. The drawings and notes should be clear and concise and describe when and where each BMP is to be implemented.
- D. ESCP Requirements:
 - I. At a minimum, the following items must be addressed in the ESCP:
 - a. Construction Sequence
 - b. Clearing Limits
 - c. Construction Access Route
 - d. Install Sediment Controls
 - e. Soil Stabilization
 - f. Protection of Inlets
 - An Ultratech Drain Guard 9217 or approved equal must be used.
 - g. Runoff from Construction Sites
 - h. Washout Site for Concrete Trucks and Equipment
 - i. Material Storage/Stockpile

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- j. Cut and Fill Slopes
 - k. Stabilization of Temporary Conveyance Channels and Outlets
 - l. Control of Pollutants Other Than Sediment on Construction Sites
- E. Permanent BMPs:
 - I. Include permanent BMPs, if necessary, in the ESCP to ensure the successful transition from temporary BMPs to permanent BMPs.
 - II. Restore and rehabilitate temporary BMPs proposed to remain in place after construction as permanent BMPs.
- F. Maintenance Responsibility:
 - I. The property owner or owner's agent is responsible for ensuring BMPs are used, maintained, and repaired so performance standards continue to be met.
 - II. After all land-disturbing activity is complete and the site has been permanently stabilized, maintenance and prevention of erosion and sedimentation is the responsibility of the property owner. Remove temporary erosion control BMPs within 30 days after they are no longer needed.
- G. Inspections and Records:
 - I. A site inspection is required every 14 days and after major storm events to ensure all BMPs have been constructed and are functioning properly.
 - II. All inspections must be documented in written form, kept on the project site, and made available for review by the City.
- H. Enforcement and Appeals Process:
 - I. If any violation is found, a notice will be issued to the Responsible Party.
 - II. The notice will state the nature of the alleged violation(s), the action required to fix the violation(s), and a time limit to fix the violation(s).
 - III. The City has the authority to issue a stop work order, clean the public way and bill the owner directly for the actual cost of cleanup plus an administrative fee and issuing a civil citation.
 - IV. Any person, firm, or corporation violating any of the provisions or terms may be subject to penalties as a municipal infraction pursuant of Section 1-4-1 of the Whitefish City Code.
 - V. Each day of continued violation shall constitute a separate, additional offence.
- I. Stormwater Pollution Prevention Plan (SWPPP):
 - I. A construction site disturbing an acre or more in the City is required to submit a Stormwater Pollution Prevention Plan to the Montana Department of Environmental Quality (MDEQ).

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- II. MDEQ Requirements for the General Permit for Stormwater Discharges Associated with Construction Activity:
 - a. Develop a Stormwater Pollution Prevention Plan (SWPPP):
 - The SWPPP is a document developed to direct and assist operators in identifying sources of potential pollutants at the construction activity site and BMPs) to be used to help ensure pollutants do not impact receiving surface water through stormwater runoff.
 - The SWPPP must contain a narrative description of the project and a drawing of the site with proposed improvements and BMPs.
 - The plan must be kept on site and available for inspection by MDEQ and the City of Whitefish.
 - b. Review and submit a Notice of Intent (NOI):
 - To obtain the forms necessary to complete the NOI refer to the *MPDES General Permit for Stormwater Discharges Associated with Construction Activity*, which can be downloaded from www.deq.state.mt.us.
 - c. Post a copy of the complete NOI and SWPPP at the construction site until construction activity is complete.
 - d. Implement SWPPP prior to beginning land disturbance activity.
 - e. Inspect and maintain BMPs outlined in Permit MTR100000.
 - f. At the completion of the project submit a Notice of Termination (NOT) following permit requirements.

5.1.8 BR-7 Operations and Maintenance of Stormwater Facilities

- A. General Requirements:
 - I. Insufficient maintenance of stormwater control facilities can lead to poor performance, shortened life, increased maintenance and replacement costs, and property damage.
 - II. The City of Whitefish maintains the stormwater system structures located within the public right of way.
 - III. The project Owner must provide for the perpetual maintenance of all elements of the stormwater system located outside the public right of way.
 - IV. The high-frequency maintenance of vegetated cover, turf grass, and other landscaping within the public right of way and within easements that accommodate public road runoff is the responsibility of the adjacent property owner.
 - V. When applicable, the following maintenance-related items must be

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submitted with the Drainage Submittal for all projects:

- a. A copy of the conditions, covenants and restrictions (CC&Rs) for the homeowners' association (HOA) in charge of operating and maintaining all elements of the stormwater system.
 - b. A Financial Plan outlining the funding mechanism for the operation, maintenance, and repair of the private stormwater system, including contingencies.
 - c. An Operations and Maintenance (O&M) Manual.
 - d. A signed copy of the Maintenance Agreement.
- B. Homeowners' and Property Owners' Associations:
- I. For privately maintained stormwater systems in residential neighborhoods, a homeowner's association, or alternate entity acceptable to the City, must be formed to maintain the facilities located outside of the public right-of-way.
 - II. A draft copy of the CC&Rs for the HOA in charge of operating and maintaining the facilities associated with the stormwater system must be submitted as part of the Drainage Submittal review package:
 - a. The CC&Rs must summarize the maintenance and fiscal responsibilities of the HOA and reference the O&M Manual.
 - b. HOA dues must provide funding for the annual operation and maintenance of all facilities associated with the stormwater system.
 - III. For commercial/industrial and multi-family residential developments with joint stormwater systems and multiple owners, a property owners' association (POA) or similar entity such as a business must be formed, or a reciprocal-use agreement executed.
- C. Operation and Maintenance Manual:
- I. For stormwater systems operated and maintained by a HOA or POA an O&M Manual is required.
 - II. The O&M Manual summarizes the tasks required to ensure the proper operation of all facilities associated with the stormwater system and must include, as a minimum:
 - a. Description of the entity responsible for the perpetual maintenance of all facilities associated with the stormwater system, including legal means of successorship.
 - b. Description of maintenance tasks to be performed and their frequency.
 - c. An inspection check list to be used for the annual maintenance inspections.

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- d. A list of the expected design life and replacement schedule of each component of the stormwater system.
 - e. A general site plan (drawn to scale) showing the overall layout of the site, all the facilities associated with the stormwater system, and their elevations.
- D. Financial Plan:
 - I. A Financial Plan is required in order to provide the entity responsible for maintenance guidance with regard to financial planning for maintenance and replacement costs.
 - II. The Financial Plan must include the following items:
 - a. A list of all stormwater-related facilities and their expected date of replacement and associated costs.
 - b. Sinking fund calculations taking into consideration probable inflation over the life of the infrastructure and estimate the funds needed to be set aside annually.
 - c. A mechanism for initiating and sustaining the sinking fund account demonstrating perpetual maintenance of all facilities associated with the stormwater system will be sustained.
 - III. If the required maintenance and repairs are not being performed and inhibit the intended function of the stormwater system the City will hire a contractor to perform the required maintenance and all such expenses will be borne by the HOA, POA, or responsible property owner.
- E. Pumping Systems:
 - I. Storm water pumping stations are not allowed for use within the City of Whitefish City Limits without approval from the City of Whitefish Public Works Department. Pump systems (including the pumps, force mains, electrical and power supply equipment, structures and appurtenances) are not an approved method of conveying, storing, or treating storm water.
 - II. A deviation may be obtained from the Public Works Director in order to pump storm water if the following conditions are met:
 - a. The pump system must not be used to circumvent any code, engineering standard, or permit condition.
 - b. The construction and operation of the pump system must not violate any other City requirements.
 - c. The Developer demonstrates that the pump system is the only feasible alternative available to provide drainage.
 - d. Pump systems are owned, operated, maintained, repaired, and replaced (as needed) by property owner(s) served by such system.

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- e. Each pump is capable of discharging the design flow rate for the 100-year, 24-hour design storm.
 - f. The pump system must have dual, alternating pumps with emergency on-site, back-up power supply and an external alarms system for system failure and high-water level indicator.
 - g. A safe emergency overflow route is provided, if possible.
 - h. A Maintenance and Operation Schedule is prepared and submitted for review prior to permit insurance.
 - i. A note on the approved plan stipulates the private property owner(s) are responsible for any and all claims for injuries and damage due to the operation or non-operation of the pump equipment.
- F. Illicit Connections:
- I. Federal regulations define an illicit discharge as "any discharge that is not composed entirely of storm water...."
 - II. Examples of illicit discharges include:
 - a. Improperly connected/maintained sanitary sewers.
 - b. Dewatering construction sites (construction water requires pretreatment and/or a permit prior to discharge into the stormwater system).
 - c. Equipment washing.
 - d. Improper vehicle/machinery maintenance.
 - III. Runoff discharged into a stream must meet the Natural Resources Conservation Service standards and comply with Montana Department of Environmental Quality, and NPDES Phase II Requirements as applicable.
 - IV. Also, drainage and dewatering systems must not discharge into any sanitary sewer facility.
- 5.1.9 BR-8 Parcels and Easements
- A. General Requirements:
- I. Storm sewer facilities must be in street rights-of-way or in perpetual easements of appropriate width are subject to approval by the City Engineer.
 - II. Flow control and treatment facilities must be located within an individual parcel.
 - III. For lots larger than 1 acre, the drainage facility must be located within a drainage easement if the facility does not occupy more than 10% of the lot and does not straddle private property lines.
 - IV. Stormwater facilities serving commercial projects do not generally require parcels or easements unless they serve more than one parcel.

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- V. Other types of drainage systems, such as a pipe, may be in a drainage easement if they do not straddle private property lines. In no case may development of stormwater facilities be located on private lots, must be on a common lot for ease of access and maintenance.
- B. Parcels:
- I. Dedicate a drainage parcel for access, maintenance, operation, inspection and repair to the entity in charge of the maintenance and operation of the stormwater system.
 - II. Parcels are required for:
 - a. Flow control and treatment facilities.
 - b. Facilities that serve more than one commercial parcel or ownership.
 - c. Facilities associated with a stormwater system serving a residential development are located outside of the public right of way.
 - d. Drainage ditches are located in residential neighborhoods. The limits of the parcel may have to be delineated with a permanent fence when the ditch is located near property lines.
 - III. Parcels must be of sufficient width to provide access to, and maintain, repair or replace elements of, the stormwater system without risking damage to adjacent structures, utilities and normal property improvements, and without incurring additional costs for shoring or specialized equipment.
- C. Easements:
- I. A drainage easement for access, maintenance, operation, inspection, and repair must be granted to the entity in charge of the maintenance and operation of the stormwatersystem.
 - II. The easement must grant to the City of Whitefish the right to ingress/egress over the easement for purposes of inspection or emergency repair.
 - III. If not in a parcel, elements of the stormwater system must be in place of within easement:
 - a. Elements of a stormwater system, such as a pipe, located outside the public right-of-way.
 - b. Easements for stormwater conveyance pipes must be of sufficient width to allow construction of all improvements, including any associated site disturbances, and access to maintain, repair or replace the pipe and appurtenances without risking damage to adjacent structures or incurring additional costs for shoring or special equipment.
 - No storm pipe in a drainage easement may have its centerline closer than 5 feet to a private rear or side property line.

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- The storm drain must be centered in the easement.
 - The minimum drainage easement must be 20 feet.
 - The drainage easement must not straddle lot lines.
- c. For drainage ditches and natural drainage ways, the easement width must be wide enough to contain the runoff from a 100-year 24-hour storm event for the contributing stormwater basin.
 - d. Constructed drainage ditches are not allowed to straddle lot lines.
 - e. Natural drainage ways located on lots larger than 1 acre may be placed in an easement.
 - f. Easements for access roads and turnarounds must be at least 20 feet wide.
- IV. Easement documents must be drafted by the project owner for review by the City Engineer and recorded by the project owner.
- D. Easement Requirements:
 - I. Construct public conveyance systems must be constructed within the public right-of-way where possible.
 - II. Provide public utility easements or dedicated tracts must be provided when site conditions prevent public systems from being in public right of way.
 - III. Construct private drainage facilities outside of the public right-of-way, on private property.
 - IV. Provide a dedicated tract or access easement when vehicle access for maintenance is required.
 - a. The access easement conditions must prohibit the property owner from installing any landscaping, improvements, retaining walls, etc., which would hinder access to the drainage facility or necessitate restoration of access easement area.
 - V. The minimum utility easement width must be outside dimension plus 15 feet, rounded to the nearest whole foot, but not less than 20 feet in width for pipes/vaults 5 feet and greater in width.
 - VI. The minimum access easement width is 15 feet for maintenance access roads.

5.2 CONSTRUCTION STANDARDS

5.2.1 General

- A. Manholes:
 - I. The maximum spacing between storm manholes is 500 feet.
 - II. The storm drain manhole ring and cover must be East Jordan Iron Works Model 3772Z1, or an approved equal.
 - III. The cover must be marked Storm.

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- IV. A 24" sump is required for storm drain manholes.
 - B. Curbs and Gutters or Swales:
 - I. Streets and roads must be designed to ensure proper drainage and curbs and gutters or swales are required in all subdivisions.
 - II. Curbs and gutters of adjoining properties must be extended to match any new curb and gutter.
 - III. Gutter, ditch, and swale flow line grades must be greater than 0.5%.
- 5.2.2 Culverts and Storm Main
- A. Pipe Size:
 - I. The minimum diameter of any storm drainpipe is twelve inches except that a maximum length of sixty lineal feet of eight-inch diameter pipe may be used between inlets and manholes.
 - II. The minimum size of any storm drain culvert is twelve inches.
 - B. Provide and install culverts of adequate size where drainage channels intersect any street right-of-way or easement.
 - C. Extend all culverts at least the width of the base of the fill.
 - D. A licensed professional engineer must determine the amount of backfill to be placed over the culvert and a culvert's capacity.
 - I. This includes arrangements for driveway culverts.
 - E. Culverts larger than 24" must have flared ends.
- 5.2.3 Structures
- A. Drain Inlet Frame and Grate:
 - I. The curb inlet frame and grate must be Olympic SM 49, East Jordan Iron Works combination of product numbers 7222M1 or 7222M3 (Herringbone grate) or an approved equal.
 - II. "Dump No Pollutants, Outfall to Stream" must be on back. (See Standard Detail 58).
 - B. "Beehive" Area Drain Frame and Grate:
 - I. The beehive area drain frame and grate must be Neenah Foundry model R-2560-D6 "beehive grate with frame", East Jordan Iron Works 1205-2 or an approved equal (See Standard Detail 60).
 - C. "Drive Over" Area Drain Frame and Grate:
 - I. The drive over area drain frame and grate must be Neenah Foundry model R-2556-A Type C frame with Type G grate, East Jordan Iron Works model 1848-G or an approved equal.
 - D. Sump Requirements for Catch Basins:

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- I. An 18" sump is required for catch basins and drain inlets.

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6.1 DESIGN STANDARDS

6.1.1 General

- A. Roadway systems must be designed, constructed, and tested in accordance with the current editions of the Engineering Standards for the City of Whitefish, Montana, the Montana Public Works Standard Specifications and The Subdivision Regulations of the City of Whitefish.
- B. All roads within a proposed subdivision must be designed by a licensed professional engineer, approved by the City Engineer, and upon completion of construction, certified by a licensed professional engineer for compliance with these standards.
- C. Access driveways are defined as an access serving one or two lots and not more than three dwellings. Accesses serving more than two lots and three dwellings will be considered a road and must be built to road standards. This includes lots fronting on the street unless adequate driveway separation can be met.
- D. If a proposed road section differs from the City standard section, a geotechnical design report supporting the proposed section and an extended 5-year warranty is required.

6.1.2 Traffic Impact Study

- A. Developments which will contribute two hundred (200) or more new vehicle trips per day to the City Street System must have a Traffic Impact Study (TIS) stamped and submitted by a Professional Engineer.
 - I. If a project is to be reviewed through the public hearing process, (i.e., subdivision, planned unit development, conditional use permit) the TIS must be part of a complete application submittal to the Planning Department.
 - II. If a project only requires a building permit, the Traffic Impact Study will be reviewed and approved by the Public Works Department prior to the issuance of the building permit.
- B. The TIS study area must include all transportation facilities impacted by traffic generated by the project including transit, bicycle, and pedestrian.
- C. Prior to submitting a TIS, the applicant and/or engineer must have a scoping meeting with the Public Works Department.
- D. A TIS must include enough detail so reviewers are able to follow the path and methodology of the study. Assumptions must be documented, and published sources referenced, as necessary. The items described below, and any other items identified through the scoping process must be included:
 - I. Narrative
 - a. Description of the project

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- b. Phasing plan
 - II. Site Plan:
 - a. Proposed access points
 - b. Nearby intersections
 - c. Neighboring access points/driveways
 - III. Study Area (as identified through the scoping process)
 - IV. Vicinity Map
 - V. Existing Conditions:
 - a. Roadway classification and design
 - b. Sidewalks
 - c. Bike lanes
 - d. Trails
 - e. Other approved projects nearby with associated trip generation
 - f. Crash analysis
 - g. Capacity analysis
 - h. Intersection Level of Service
 - i. Transportation Improvements
 - VI. Development Traffic:
 - a. Number of trips generated (using the latest edition of the ITE Trip Generation Manual)
 - b. Distribution of trips
 - VII. Impact on City Transportation Network:
 - a. Analysis of impacts on roadways and intersections
 - VIII. Access Management
 - IX. Traffic Calming (if needed to deter cut through traffic and reduce speeds)
 - X. Bicycle and Pedestrian Analysis:
 - a. In reviewing the City's most current Bicycle and Pedestrian Master Plan, identify how a pedestrian or bicyclist from the proposed development will access nearby existing or planned nonmotorized infrastructure.
 - b. Offer recommendations to maximize access to facilities whether that be completion of nonmotorized infrastructure within, adjacent to the development or some other strategy.
 - XI. Mitigation Measures
- E. A copy of the TIS, if the project is on a Montana highway section or will be

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impacted by the project, will be forwarded to the Montana Department of Transportation for review, comment and recommendation.

6.1.3 Intersections

- A. Streets must intersect at 90° angles except where topography precludes. In no case will the angle of intersection be less than 75° for a minimum distance of 60 feet as measured along the centerline.
- B. Two streets meeting a third street from opposite sides must meet at the same point, or their centerlines must be offset at least 125 feet for local roads and 300 feet for arterials or collectors.
- C. No more than two streets may intersect at one point.
- D. Intersections of local streets with major arterials must be kept to a minimum.
- E. Hilltop intersections are only permitted if reasonable alternatives do not exist.
 - I. Intersections on local streets within 100 feet of a hilltop are prohibited.
 - II. Intersections on arterial or collector streets within 200 feet of a hilltop are prohibited.
- F. Maximum grade of approach to any intersection must not exceed five percent for a distance of 60 feet as measured from edge of travel ways to provide for adequate starting, stopping and stacking distances.

6.1.4 Dead-end Streets/Cul-De-Sacs

- A. Dead-end streets are strongly discouraged, and all dead-end streets must terminate in an approved cul-de-sac.
 - I. Roadways terminating at a cul-de-sac may not exceed one thousand (1000) feet.
 - II. The paved turnaround radius must be a minimum of fifty (50) feet.
 - III. If the development along this roadway consists of buildings three stories or higher, the minimum turn-around radius of the cul-de-sac must be sixty (60) feet unless approved by the Fire Department.
 - IV. The maximum allowed slope across a cul-de-sac is 5%.
 - V. A landscaped area is acceptable in the center of the cul-de-sac.
- B. Where a future street extension is proposed according to the City's Transportation Plan or as identified by the City, a temporary cul-de-sac or approved turn-around of adequate size must be provided and signed indicating the roadway is a "Future Street Connection."
- C. "T" Turnarounds, in-lieu of a cul-de-sac must be approved by the review authority (either the City Council through a subdivision variance or the Public Works and Fire Departments through a deviation to the Engineering Standards). "T" turnarounds must comply with the adopted Fire Code.

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6.1.5 Sight Distance

- A. Horizontal alignment of streets must ensure adequate sight distances.
- B. When street center lines deflect more than five (5) degrees, construction must be made by horizontal curves.

6.1.6 Collector and Arterial Standards

- A. Location of collector and arterial streets must comply with the Whitefish City-County Growth Policy or any other major street and highway plan adopted by the City of Whitefish.

**TABLE 6 -1
ROAD DESIGN STANDARDS FOR LOCAL SUBDIVISION STREETS**

<u>DESIGN STANDARDS</u>	<u>ARTERIAL</u>	<u>COLLECTOR</u>	<u>LOCAL</u>	<u>LID/ RURAL</u> ¹	<u>PRIVATE LOCAL</u>
Minimum Right-of-Way ²	80 ft.	60 ft.	60 ft.	60 ft.	50 ft.
Minimum Asphalt Width	³	³	24 ft. ⁴	20 ft. ⁵	20 ft.
Maximum Grade	6%	8%	9%	9%	9%
Cul-de-sac turn around:					
a. Outside Asphalt Radius			50 ft.	50 ft.	50 ft.
b. Minimum Outside Right-of-Way Radius ⁶			60 ft.	60 ft.	55 ft.

¹ Average net residential density of 1 acre or less. Low Impact Design (LID) requires approval by the City Engineer.

² Terrain and design constraints may dictate greater right-of-way.

³ Design approved by the City Engineer.

⁴ Where parking is required on both sides of street, 34 feet minimum roadway width is needed.

Note: Where density exceeds 8 units/net acre, parking is required on both sides of street unless overflow/visitor parking demands are met elsewhere. Zoning requires all parking to be met off street unless approved by Council.

⁵ No parking allowed on 20 feet rural street.

⁶ Right-of-way radius is intended to accommodate sidewalk and boulevard requirements.

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6.1.7 Traffic Control Signs, Street Name Signs, Street Names

- A. The Developer must provide and install the necessary Traffic Control in accordance with the latest edition of *Manual on Uniform Traffic Control Devices*.
- B. Plans must show locations of all signs, light poles, trees, etc.
- C. Street name signs must be installed at each intersection.
 - I. All street name signs are to meet City requirements. (See Standard Details 19 and 20).
- D. The Montana Department of Transportation's recommendations for traffic signals and widening along U.S. 93 for acceleration/deceleration lanes must be followed. When widening is necessary or traffic signals or electronic warning devices are required on-site or off-site, it is the Developer's responsibility, at the Developer's expense, to install such signals or devices, unless otherwise conditioned.
- E. Names of new streets aligned with existing streets must be the same as those of existing streets. Proposed street names must not duplicate or cause confusion with existing street names and require approval of the City Clerk.

6.1.8 Sidewalks

- A. All developments must have delineated walkways to allow pedestrians to safely travel from any part of the development to the boundaries of the development.
- B. Developments abutting existing or proposed roadways are required to have walkways within the public right-of-way parallel with the roadways.
- C. Unless approved by the City, sidewalks are required on both sides of the street in all residential and commercial subdivisions.
 - I. Residential sidewalks must be separated from the street by a boulevard or open space with a minimum width of six (6) feet (eight feet is the preferred width for boulevard tree planting).
 - II. The minimum width of a walkway is five (5) feet.
- D. ADA compliant handicap ramps must be installed at pedestrian crossings, see Standard Detail-14.
- E. A "cash in lieu" of sidewalk installation payment to the City equivalent to the cost of the sidewalks may be made at the discretion of the City Council in instances where actual sidewalk construction is determined to be premature.

6.1.9 Boulevards

- A. A minimum of 4" of topsoil is required within the boulevard.
- B. The finished surface of topsoil must provide adequate drainage from the top of the sidewalk to the top of the curb.
- C. Areas of topsoil that settle during the warranty period must be refinished.
- D. Topsoil must be fertile, natural loam surface soil, free of clay, weeds, roots or stones larger than one inch in any dimension.

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- E. The boulevard must either be sodded or seeded in accordance with the MPWSS. The Contractor is responsible during the warranty period to maintain the seed or sod until it is well established.
- F. Noxious weed control of boulevard areas is required for new developments.
- G. It is recommended that drought tolerant native grass be planted in the boulevards. See Appendix P for a list of native shrubs and grasses.

6.1.10 Multiple Use Paths

- A. Bicycle paths are part of the City's Connect Whitefish 2018 and must be a minimum of 10 feet with a cross slope of 2% and a 1 foot-wide gravel border along each edge, however, this minimum width may be reduced to 8 feet when constructed through critical areas or with approval with approval of the Public Works and Planning and Building Department Directors.
- B. The path bed must be excavated to a minimum depth of 11.5 inches.
- C. Bike path construction must be in accordance with Standard Detail 17.

6.1.11 On-Street Parking

- A. Parking spaces must be a minimum of 20 feet from crosswalks and a minimum of 8 feet from adjacent driveways.
- B. Stabilization fabric must be installed under the parking lot asphalt/gravel base section (MIFAFI 600X, AMOCO CEF 2004 or approved equal).

6.1.12 Driveways

- A. Driveways onto arterial streets are discouraged unless there are no other alternatives. Driveways onto collector streets must be separated by at least forty (40) feet and be at least (80) feet from the edge of the pavement of an intersecting street unless approved by the Public Works Director. The nearest edge of any driveway on all other streets must be not less than thirty-five (35) feet to the edge of the pavement of the nearest intersecting street. The maximum slope for driveways is 9%.
- B. The following standards must be followed in design of residential driveways:
 - I. Permits from the Public Works Department are required for all driveway construction (refer to standard approach detail SD 18).
 - II. Paved hard surface driveways are required except as provided for in the zoning regulations. Driveways are limited to a maximum width of 22-feet except as provided below and must be setback five (5) feet off property line.
 - III. Primary lots with less than 75 feet of road (street) frontage may have only one access (driveway) not to exceed 22 feet in width within the right-of-way.
 - IV. Sublots with less than 40 feet frontage are limited to one driveway per lot not to exceed 11 feet in width. (Shared driveways for sublots are preferred with widths not exceeding 22 feet.)

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- V. Driveways for adjoining lots in cul-de-sacs must be shared when the lots have less than 50 feet of frontage. Shared approaches when required, must be designated on the subdivision plat.
 - VI. Driveway limitations must appear on the plat.
 - VII. Residential driveway widths must not exceed 33% of the lot width within any public right-of-way.
- C. Commercial Driveways Standards: Driveways for commercial property are limited to a maximum width of 36 feet. A minimum 5-foot distance must be provided from driveway to propertyline.
- 6.1.13 Placement of Utilities
- A. Developer Responsibility:
 - I. It is the Developer's responsibility to obtain and provide the City with all easements and rights-of-way necessary to extend roadways and utilities to the farthest property line of the development.
 - II. It is the Developers responsibility to construct all roadways and utilities from the existing facilities to the farthest property line of the development or such point within the development that may be specified by the City Engineer.
 - III. The Developer must obtain written approval from the Public Works Department for the location of easements for the future extension of roadways and utilities that must be submitted with the final plat.
 - a. The written approval must be submitted along with an 11" by 17" legible copy of the approved final plat showing the utility and/or easement locations.
 - b. The easement language on the final plat shall state that no landscaping (other than lawn), buildings, or other obstruction is allowed within street and utility easements.
 - B. All utilities must be within a public right-of-way or easement to permit free and unobstructed access.
 - C. Utility lines must be designed by a licensed professional engineer or by the utility firms in cooperation with the subdivider.
 - D. All applicable laws, rules and regulations of appropriate regulatory authority having jurisdiction over such facilities must be observed.
 - E. Easements:
 - I. Easements for public utilities which cross private property must be delineated and dedicated to the City and recorded with Flathead County.
 - II. Water, sewer and storm sewer easements must be twenty (20) feet wide for a single pipeline with the pipe centerline five (5) feet from one easement edge.
 - III. With two pipelines, the minimum width must be twenty-five (25) feet with

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each pipe centerline five (5) feet from the easement edge.

- IV. Easements for all other utilities not adjacent to rights-of-way, must be twenty (20) feet wide unless specified otherwise by the utility company.
- V. The Design Engineer must reserve a 10' easement along the front lot line and side street lot line of each residential lot contiguous and adjacent to the lot line to provide an area between the sidewalk and easement line for the placement of privately owner underground utilities such as power, phone, gas, cable, etc.
- F. Utility Placement:
 - I. Location of all proposed utilities must be shown on the construction plans that are reviewed and approved by the Public Works Department.
 - II. Only water, sanitary sewer, storm sewers and street lighting elements may be placed within the street right-of-way.
 - III. No underground utilities may be place in the boulevard between the back of curb and sidewalk or within a sidewalk itself except:
 - a. Service sweeps from the utility trench to utility boxes
 - b. Pedestals
 - c. Vaults
 - d. Transformers
 - IV. No utility boxes, pedestals, vaults, or transformers may be placed within the following without approval by the Public Works Department:
 - a. The boulevard
 - b. The radial extension of an easement
 - c. A proposed roadway
 - d. An access way to any City facility
 - e. Ten (10) feet of fire hydrants or curb boxes
 - V. No private utilities may be located in water or sewer trenches.
 - VI. Utilities must maintain a minimum of 5' of undisturbed soil between water or sewer utility trenches.
 - VII. If TV, telephone or natural gas is not installed at the time of development, provisions must be made for installation at a later date without the cutting of paved roadways.

6.1.14 Alleys

- A. Publicly owned and maintained alleys must not be designed as the primary access for lots and must be paved to a width of no less than ten (10) feet or no more than sixteen (16) feet.
- B. A minimum of 5 feet of right-of-way must be provided for snow storage between the edge of pavement and property lines.

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- C. Alley approaches for parking or garages must be limited to no more than 50% of the lot frontage and must be at least 2 feet from an adjoining property line.
- D. No plantings (trees or shrubs) or structures may be located in the alley right-of-way within 5 feet of the edge of pavement.

6.1.15 Mailboxes

- A. Where the United States Postal Service (USPS) requires group mailbox pull outs on public streets, it is the responsibility of the property owners to maintain access as required or requested by the USPS.
- B. Individual mailboxes located in the public right-of-way are the maintenance responsibility of the property owner, no permanent structures are allowed.
- C. No individual mailboxes are allowed on collector streets where the pavement width is less than 32 feet.

6.1.16 Traffic Calming

- A. Traffic calming refers to several methods used to reduce vehicle speeds, improve safety, and enhance the quality of life. It may be achieved through the following actions:
 - I. Change the physical environment to reduce the negative effects of motor vehicle use.
 - II. Alter driver behavior and improve conditions for pedestrians and other non-motorized street users.
 - III. Address neighborhood and regional traffic concerns.
- B. Traffic calming is rarely seen on roadway facilities functionally classified higher than a collector roadway.
 - I. Calming is used on local streets to discourage non-local traffic.
 - II. Regardless of any traffic calming measures installed, the primary responsibility for safe use of the streets lies with the individual driver, cyclist, or pedestrian.
- C. Traffic calming projects which involve installing "hard" improvements must meet several criteria before being considered for implementation, because they can be disruptive to the residents in the surrounding area, difficult to fund and maintain, and difficult to remove once installed.
- D. Traffic calming elements can be incorporated into the initial design of subdivision or can be retrofitted into existing subdivisions.
- E. A table of traffic calming measures is included in Appendix M. :

6.2 CONSTRUCTION STANDARDS

6.2.1 Materials

- A. Recycled Materials in Concrete and Asphalt:
 - I. The Public Works Department may allow the use of recycled materials (i.e.

CHAPTER 6 STREETS

glass cullet and recycled asphalt) in pavement mix the design engineer can show that the section's strength and density is equivalent to the standard asphalt section. The cost of the project including the recycled materials is lower than if all new materials were used.

- II. Asphalt specifications and density requirements are listed in the Montana Public Works Standard Specifications Section 02510.
- B. All new roads must have a pavement preservation seal applied during the 2-year warranty period. The asphalt seal must be in accordance with the most recent version of the Montana Public Works Standard Specifications.
 - I. The Subdivision Improvement Agreement must include the cost of applying pavement preservation seal to the newly constructed streets.
- C. Bike Paths:
 - I. Path bed will consist of a minimum 9 inches of crushed gravel compacted to 95% of maximum density as determined by AASHTO T99, unless otherwise dictated by sub-soil type materials being compacted to road standard.
 - a. The overlay must consist of 3 inches of asphalt compacted to 93% of maximum density, as determined by ASTM D-2041.
 - b. Construction seal must be applied at 0.08 gallons/square yard after installation.
 - II. Concrete paths must have a base that consists of a minimum of 3 inches of crushed gravel compacted to 95% of maximum density as determined by AASHTO T-99.
 - a. Concrete must be a minimum of 6 inches of M4000 reinforced with 1.5 lbs. per cubic yard of Fiber mesh.
 - b. Where terrain allows, slope of the path should not exceed 12:1.
- III. Alternative materials, such as; porous pavement, pavers or porous concrete, may be substituted for asphalt or concrete upon approval by the Public Works Director.

**Chapter 7
STREET LIGHTING STANDARDS**

7.1 STREET LIGHTING

Decorative street lighting is required on all public and private streets, public and private parking lots and along all shared use paths. Any variation from this requirement must have approval of the Public Works Director. Streetlights must be installed concurrently with underground utilities. Street lighting will be decorative in character, unless otherwise approved by the City Council. All decorative streetlights must be compliant with the City's Outdoor Lighting Standards (Section 11-3-25 of the Whitefish City Code). Applicable lighting standard details 68 thru 80 must be included with lighting plans. Lighting plans must include features such as, but not limited to, service assembly, photo control, layout of poles, conduits and pull boxes, conduit and wire sizes, fuses, etc.

7.1.1 Residential – Streets, Parking Lots and Shared Use Paths

Use the following, or approved equal, streetlight poles and luminaires on residential streets, parking lots and shared use paths:

Vendor:	Mountain States Lighting (MSL)
Luminaire:	CYCLONE #AG10T4D-VS3AR-3MHS-34W-2200K-120- 277-F30-PT-SD-GM-SM- CP5493
Lamp:	34 Watt, 2200K LED
Pole:	MSL #14EFA-5-TT/3x3-16.5WF(Name)-LEG-J(Green)
Base:	MSL #WF-16.5"Wx48"H-500-HDEB-J(Green)
Break Away:	See SD-47h
Height:	17'-8" = Pole 14'-0" + Luminaire 3'-8"
Pole Foundation:	18" Sonotube, 3'-8" Deep (See SD-47f) Qty. 4 - ¾" x 18" Ell Bolts 10" (+) Pattern, 3-1/2" Bolt Projection
Isometric Footprint:	See Cut Sheets for Isometric Footprint Exhibit
Standard Drawing:	See SD-68

CHAPTER 7 STREET LIGHTING

7.1.2 Commercial – Downtown Streets and Parking Lots

Use the following, or approved equal, streetlight poles and luminaires on downtown streets and commercial parking lots:

Vendor:	Mountain States Lighting (MSL)
Luminaire:	CYCLONE #AG10T4D-VS3AR-3MHS-50W-2200K-120- 277-F30-PT-SD-GM-SM-MG
Lamp:	50 Watt, 2200K LED
Single Arm Pole:	MSL #22TFS-SA/17'/2'x2.375"/SCR-22" MAD(Madison)-C2316AF1XT-(1) BA-J(Green)
Double Arm Pole:	MSL #22TFS-DBLSA/17'/2'x2.375"/SCR-22" MAD(Madison)-C2316AF1XT-(2) BA-J(Green)
Base:	MSL#MAD(Madison)-22"Wx38"H-HDEB-J(Green)
Break Away:	None
Height:	Pole 22'-0"
Luminaire Height:	3'-8" Mounted on Arm at 17'-0"
Pole Foundation:	24" Sonotube, 5'-0" Deep Qty. 4 - 1" x 36" Ell Bolts 12" (+) Pattern, 3-1/2" Bolt Projection
Plant Hanger:	Qty. 1 at 15'-0"
Irrigation Ready:	Yes
Isometric Footprint:	Contact Mountain States Lighting
Standard Drawing:	See SD-69

CHAPTER 7 STREET LIGHTING

7.1.3 Commercial – MDT (HWY 93) Downtown

Use the following, or approved equal, streetlight poles and luminaries on MDT (HWY 93) downtown streets:

Vendor:	Mountain States Lighting (MSL)
Luminaire:	CYCLONE #AG10T4D-VS3AR-3MHS-50W-2200K-120- 277-F30-PT-SD-GM-SM-MG, or CYCLONE #AG10T4D-VS3AR-3MHS-68W-2200K-120- 277-F30-PT-SD-GM-SM-MG
Lamp:	50 Watt, 2200K LED, or 68 Watt, 2200K LED
Single Arm Pole:	MSL #25TFS-SA/17'/2'x2.375"/SCR-22"
Base:	MSL#MAD(Madison)-23.5"Wx44"H-HDEB-HADCO-J(Green)
Break Away:	None
Height:	Pole 25'-0"
Luminaire Height:	3'-8" Mounted on Arm at 17'-0"
Pole Foundation:	24" Sonotube, 5'-0" Deep Qty. 4 - 1" x 36" Ell Bolts 12" (+) Pattern, 3-1/2" Bolt Projection
Plant Hanger:	Qty. 1 at 13'-0"
Irrigation Ready:	Yes
Isometric Footprint:	Contact Mountain States Lighting
Standard Drawing:	See SD-70

CHAPTER 7 STREET LIGHTING

7.1.4 Commercial – MDT (HWY 93) West District

Use the following, or approved equal, streetlight poles and luminaries on MDT (HWY 93) West District streets:

Vendor:	Mountain States Lighting (MSL)
Luminaire:	HADCO #C0855E-250-HPS-J-(Green)
Lamp:	250 Watt High Pressure Sodium (HPS)
Single Arm Pole:	MSL#_____ (Call for Model Number)
Base:	MSL#MAD(Madison)-23.5"Wx44"H-HDEB-HADCO-J(Green)
Break Away:	None
Height:	Pole 25'-0"
Luminaire Height:	3'-8" Mounted on Arm at 25'-0"
Pole Foundation:	24" Sonotube, 7'-6" Deep Qty. 4 - 1" x 36" Ell Bolts 12" (+) Pattern, 3-1/2" Bolt Projection
Plant Hanger:	Qty. 2 at Bottom and Top
Flag Holder:	Qty. 1
Irrigation Ready:	Yes
Isometric Footprint:	Contact Mountain States Lighting
Standard Drawing:	See SD-71

7.1.5 Bollard – Share Use Paths

As an alternate to 7.1.1, the following, or approved equal, bollard lights may be used on share use paths:

Vendor:	Cyclone Lighting
Fixture Types:	Army Helmet Hood CBM1154C-CAP-3-25W-3K-240-BB3-NONE-GM-TX
Luminaire:	LAP, Pond Acrylic, 75% Diffusing
Optic:	LED Type 3, Full Cut-Off Standards, Dark Sky Friendly
Foundation:	18" Sonotube, 3'-8" Deep (See SD-47f) Qty. 4 – 1/4" x 18" Ell Bolts 3-1/2" (+) Pattern, 3-1/2" Bolt Projection
Base Skirt:	Hagerstown Decorative Base Skirt
Source:	240 Volt, 3K High Power LED, 3000K
Finish:	Dark Green Textured Powder Coat
Isometric Footprint:	Contact Cyclone Lighting Standard
Standard Drawing:	See SD-72

7.2 PULL BOXES

Pull boxes must be installed flush with finished grade. To promote drainage and stability, all pull boxes must receive a 6-inch deep foundation section of clean 3/8" minus aggregate chips extending 3-inches past the base of the box (See SD-76). Pull boxes must be placed at all locations where conduit layouts would result in 45-degree angles, except for streetlight base and service assembly pad sweeps. Pull boxes must be installed at the ends of all conduit runs.

Use the following, or approved equal, pull boxes:

- Brooks 38PB (superimposed, bolt down, 3/8" diamond plate steel cover)
- Old Castle 1324-12 (Model #13244180, steel cover)

7.3 CONDUITS, WIRING AND FUSES

All conduits must be Schedule 40 PVC. Minimum conduit size is 1 1/4". Minimum conduit bury depth is 1'-8". Conduit runs from power source to service assembly shall be 3" (See SD-77). All conduit work must be inspected by a licensed electrician prior to burial. When present, conduits must be placed 6" behind curbs (See SD-77). Conduits must be sealed from dirt, debris and rodents (dux seal, perma seal, etc.) when entering and existing light bases and pull boxes. Pull box splices must be made watertight.

CHAPTER 7 STRATEGIES

Wire and Conduit Sizing and Specifications				
Notes:				
1)	Keep linear footage of 1-1/4" conduit to 2,000' maximum with #8 and #6 wire sizes. (<i>measuring along main conduit run</i>)			
2)	For conduit runs over 2,000', use 2" conduit.			
3)	For conduit runs with #4 wire size, use 2" conduit.			
4)	For conduit runs with more than 1 circuit, use 2" conduit.			
5)	Simple wire size formula, $CM (wire\ size) = 1.3 \times L (linear\ footage) \times F (number\ of\ fixtures)$			
6)	Copper Wire Size	#8	16,510 CM	Maximum Circular Mills
		#6	26,240 CM	
		#4	41,740 CM	
7)	Sizing Chart			
	Fixture Qty.	Max. Linear Footage	Min. Wire Size	Min Conduit Size
	1	2,000	#8	1-1/4"
	2	2,000	#8	1-1/4"
	3	2,000	#8	1-1/4"
	4	2,000	#8	1-1/4"
	5	2,000	#8	1-1/4"
	6	1,500	#8	1-1/4"
	7	1,000	#6	1-1/4"
	7	1,500	#6	1-1/4"
	8	1,500	#6	1-1/4"
	8	2,000	#6	1-1/4"
	9	1,500	#6	1-1/4"
	9	2,000	#6	1-1/4"
	10	1,500	#6	1-1/4"
	10	2,000	#6	1-1/4"
	11	1,500	#6	1-1/4"
	11	2,000	#6	1-1/4"
	12	1,500	#6	1-1/4"
	12	2,000	#4	2"
	12	2,500	#4	2"

8)	Wire installed in conduit runs must not be smaller than #8 THHN copper stranded conductor.
9)	Wire installed in poles from base to luminaire shall be #10 THHN copper stranded conductor.
10)	Notes 1 thru 9 are minimum standards. (larger size wire and conduits are always acceptable).
11)	12 fixtures maximum per circuit.

Each luminaire must have two (2) watertight break away fuse holders with dual element midget fuses.

Fusing Specifications				
The following are acceptable fuse holders and fuses for decorative streetlights. Equals accepted on approval only.				
In Line Break Away Weatherproof Fuse Holders				
No.	Manufacturer	Single Pole	Terminal	Two Pole
1FH	Homac	SLK - M SLK - 6 SLK - 2	Screw Crimp Crimp	SLT - M SLT - 6 SLT - 2
2FH	Bussmann (Copper)	HEB - JW - RLC - J HEB - JW - RYC HEB - AW - RLC - J HEB - AW - RYC	Screw Screw Screw Crimp	HEY - JW - RLC - J HEY - JW - RYC HEY - AW - RLC - J HEY - AW - RYC
3FH	Ferraz - Shawmut	FEB - 81 - 81 - BA FEB - 11 - 11 - BA	Screw	FEX - 91 - 91 - BA FEX - 11 - 11 - BA
4FH	SEC Connector Company	SEC 1791 - SF	Screw	SEC 1791 - SDF
Midget Fuse, 1-1/2" x 13/32", Dual Element				
No.	Manufacturer	Fuse		
1F	Bussmann	FNM - 3 / 5		
2F	Ferraz - Shawmut	TRM - 3 / 5		
3F	Little Fuse	FLM - 3 / 5		

7.4 POLE SPACING, OFFSET AND INSTALLATION

Poles must be installed plumb and level. Anchor bolts and nuts must be corrosion resistant and installed with an anti-seize compound on threads. Decorative lights must be spaced 150 to 180 feet along residential streets. The light location should alternate from side to side of street. Lights must be placed a minimum of 3 feet from back of curb.

7.5 SERVICE ASSEMBLIES

Service assemblies must be 100 Amp, 120/240 Volt, 1 Phase. Service assemblies shall be bolted to a mounting base (Milbank CP-16DMNT-CALT or approved equal) that is bolted. Bolt anchors fixed in a reinforced concrete pad (See SD-79). Anchor bolts and nuts must be corrosion resistant and installed with an anti-seize compound on

threads.

Use the following, or approved equal, service assembly commercial pedestals:

- Milbank CP3B11115A22 Commercial Pedestal
- Cooper "B Line" Commercial Pedestal

All service assemblies must be controlled by a photo control (See SD-78). Photo control device shall be Tork #2107, or approved equal.

7.6 INSPECTIONS

Call for electrical conduit rough-in inspection before covering conduits. Call for electrical final inspection and compete working test before project sign-off. Project will not be complete until work test is finalized.

Inspection Contact Number: 406-253-6183 or 406-863-2460

7.7 PRODUCT SHEETS AND ISOMETRIC FOOTPRINT EXHIBIT

Product sheets for preapproved products can be obtained by contacting the Public Works Department (406-863-2460). Included are pull boxes, commercial pedestals, mounting base and photo control product sheets. Type 3 Residential Street Light Isometric Footprint. Exhibit can also be provided by the Public Work Department upon request.

APPENDIX A

Site Plan Review



City of Whitefish

PO Box 158
418 E 2nd Street
Whitefish, MT 59937
Phone: 406-863-2460 Fax: 406-863-2419

Date Submitted: _____

Intake Staff: _____

SITE PLAN REVIEW

The purpose of the Site Plan Review meeting is to assist applicants in preparing their development applications for submittal to the City, to identify potential problems and to expedite development applications. These meetings are informal and provide a one-stop meeting with City departments responsible for development review. Staff will describe the type of application necessary and the review process. While staff will attempt to identify significant issues and concerns, staff will not conduct a detailed review of the proposed plan nor will staff identify all City regulations that may apply to the proposed plan. Plans presented at the Site Plan Review meeting are nonbinding and do not vest a project nor is the information provided an implied or conditional approval of the project.

INSTRUCTIONS:

- Site Plan Review is recommended for all new subdivisions, conditional use permit requests, new commercial uses or projects, multi-family proposals with four or more units and any other proposals that may benefit from being reviewed by city staff.
- Submit the completed application and appropriate attachments to the [Assistant to the Whitefish Public Works Director](#) **one (1) week** prior to the Site Plan Review meeting.
- The regularly scheduled meeting of the Site Plan Review Committee is weekly on Thursdays at 1:30PM at City Hall at 418 E 2nd Street.

A. PROJECT INFORMATION:

Project Name: _____

Project Address: _____

Zoning Designation: _____ Lot Dimensions/Acreage: _____

Assessor's Tract No.(s) _____ Lot No(s) _____

Block # _____ Subdivision Name _____

Section _____ Township _____ Range _____

I hereby certify that the information contained or accompanied in this application is true and correct to the best of my knowledge. I acknowledge that I bear the burden of ensuring my proposed plan complies with all applicable City regulations. The signing of this application signifies approval for the Whitefish staff to be present on the property for routine monitoring and inspection during the approval and development process.

Owner's Signature¹

Date

Print Name

Applicant's Signature

Date

Print Name

¹ May be signed by the applicant or representative, authorization letter from owner must be attached. If there are multiple owners, a letter authorizing one owner to be the authorized representative for all must be included

B. APPLICATION CONTENTS:

Attached ELECTRONIC COPY OF THE APPLICATION AND 4 COPIES OF THE FOLLOWING:

____ Site Plan Review Application

____ Site Plan, drawn to a 1:20 scale, with vicinity map shall include the following:

- North Arrow
- Scale
- All property lines with dimensions
- All existing improvements on property (streets, drives, structures, fences, driveways, sidewalks)
- All existing utilities, utility easements, fire hydrants and adjacent right-of-ways
- All proposed improvements, including new construction, parking, landscaping, fencing, sidewalks, driveways, refuse disposal, snow storage areas, lighting, drainage, and any other proposed changes to the property
- All proposed utilities mains, extensions, easements, fire hydrant locations and any other proposed fire code related features

____ Building Elevations, if proposing more than 2-stories (all sides)

The applicant is encouraged to bring anything else that might explain the proposed project. The more detail provided in support of the application, the more information staff will be able to provide you as you move forward.

C. DESCRIPTION OF PROJECT:

D. OWNER(S) OF RECORD:

Name: _____ Phone: _____

Mailing Address: _____

City, State, Zip: _____

Email: _____

APPLICANT (if different from above):

Name: _____ Phone: _____

Mailing Address: _____

City, State, Zip: _____

Email: _____

TECHNICAL/PROFESSIONAL:

Name: _____ Phone: _____

Mailing Address: _____

City, State, Zip: _____

Email: _____

APPENDIX B

Planting Guidelines for Stormwater Facilities

APPENDIX B

Planting Guidelines For Stormwater Facilities

TYPE	ZONE	POND DEPTH
Edges and Upland	Transition	
Seasonally Flooded	SHALLOW	0-3"
Submerged, semi-permanently Flooded	MID	3"-18"
Permanently Flooded	DEEP or FLOAT	18-64"

NATIVE PLANTS

Availability

					SEEDS	PLANTS	CUTTINGS
Trees	<i>Alnus incana</i>	Thin-leaf Alder		Transition	SHALLOW	S	P
	<i>Betula occidentalis</i>	Water Birch		Transition	SHALLOW		P
	<i>Populus balsamifera ssp. trichocarpa</i>	Black Cottonwood		Transition			P
	<i>Populus tremuloides</i>	Quaking Aspen		Transition			P
Shrubs	<i>Acer glabrum</i>	Rocky Mountain Maple		Transition		S	P
	<i>Actaea rubra</i>	Baneberry		Transition		S	P
	<i>Amelanchier alnifolia</i>	Saskatoon Serviceberry		Transition		S	P
	<i>Cornus stolonifera</i>	Red-Osier Dogwood		Transition	SHALLOW	S	P
	<i>Crataegus douglasii</i>	Hawthorn		Transition	SHALLOW		P
	<i>Holodiscus discolor</i>	Mountain Spray		Transition		S	P
	<i>Prunus virginiana</i>	Common Chokecherry		Transition		S	P
	<i>Ribes cereum</i>	Squaw Currant		Transition		S	P
	<i>Rosa woodsii</i>	Woods Rose		Transition		S	P
	<i>Rubus parviflorus</i>	Thimbleberry		Transition		S	P
	<i>Salix boothii</i>	Booth's Willow		Transition	SHALLOW		P
	<i>Salix bebbiana</i> Sarg.	Bebb Willow		Transition	SHALLOW		P
	<i>Salix drummondiana</i>	Drummond Willow		Transition	SHALLOW		P
	<i>Salix exigua</i>	Coyote Willow		Transition	SHALLOW		P
	<i>Salix geyeriana</i>	Geyer's Willow		Transition	SHALLOW		P
	<i>Sambucus racemosa</i>	Elderberry		Transition		S	P
	<i>Symphoricarpos albus</i>	Snowberry		Transition		S	P
	Forbs	<i>Adiantum pedatum</i>	Maidenhair Fern		Transition		
<i>Aster chilensis</i>		Pacific Aster		Transition		S	P
<i>Athyrium filix-femina</i>		Lady Fern		Transition			P
<i>Dryopteris expansa</i>		Spiny Wood Fern		Transition			P
<i>Geum macrophyllum</i>		Large-Leaf Avens		Transition	SHALLOW	S	
<i>Iris missouriensis</i>		Iris		Transition	SHALLOW	S	P
<i>Maianthemum racemosa (Smilacina racemosa)</i>		False Solomon's Seal		Transition			P
<i>Mentha arvensis</i>		Wild Mint		Transition	SHALLOW	S	P
<i>Penstemon confertus</i>		Yellow Penstemon		Transition			P
<i>Pteridium aquilinum</i>		Bracken Fern		Transition			P
<i>Sisyrinchium montanum</i>		Mountain Blue-Eyed -Grass	Swales, Wet meadows, Ditches	Transition		S	P
<i>Solidago canadensis</i>		Canada Goldenrod		Transition		S	
<i>Tellima grandiflora</i>		Fringecup		Transition	SHALLOW		P
<i>Trollius laxus</i>		American Globeflower		Transition			P
<i>Myosotis laxa</i>		Small Flowered Forget -Me -Not		SHALLOW			P
<i>Nuphar lutea ssp. polysepala</i>		Yellow Waterlily		SHALLOW	MID	S	
<i>Potentilla anserina</i>		Silverweed Cinquefoil		SHALLOW		S	
<i>Sagittaria latifolia</i>		Duck Potato		SHALLOW			P
<i>Veronica americana</i>		American Speedwell		SHALLOW			P
<i>Hippuris vulgaris</i>		Mare's Tail		MID			P
<i>Alisma plantago-aquatica</i>		American Water-Plantain		MID	FLOAT		P
<i>Caltha leptosepala</i>		White Marsh Marigold		MID	FLOAT		P

* For questions concerning Planting Guidelines, contact;

APPENDIX B

Planting Guidelines For Stormwater Facilities

Grass Like Species				Availability		
				SEEDS	PLANTS	CUTTINGS
<i>Agrostis exarata</i>	Spike Bentgrass	Rhizomatous	Transition	SHALLOW	S	
<i>Calamagrostis canadensis</i>	Blue Joint Reed Grass	Bunch, Aggressive	Transition		S	
<i>Elymus glaucus</i>	Blue Wildrye		Transition	SHALLOW	S	P
<i>Elymus lanceolatus (Agropyron dastachyum)</i>	Streambank Wheatgrass	Critana, Cultivar	Transition		S	
<i>Juncus balticus</i>	Baltic Rush		Transition	SHALLOW	S	P
<i>Juncus ensifolius</i>	Daggerleaf Rush		Transition	SHALLOW		P
<i>Juncus mertensianus</i>	Merten's Rush		Transition	SHALLOW		P
<i>Juncus tenuis</i>	Slender Rush		Transition	SHALLOW		P
<i>Pascopyrum smithii (Elymus or Agropyrum)</i>	Western Wheatgrass	Sod Forming, rhizomatus	Transition		S	
<i>Alopecurus aequalis</i>	Shortawn Foxtail	Wet Meadows, Streambanks, Ditches	SHALLOW			P
<i>Beckmannia syzigachne</i>	American Sloughgrass	Rapid early est. for 4-5 yrs till outcompeted	SHALLOW		S	
<i>Carex aquatilis</i>	Water Sedge	Obligate	SHALLOW	DEEP	S	P
<i>Carex lasiocarpa</i>	Sieder Wetland Sedge		SHALLOW	MID		P
<i>Carex nebrascensis</i>	Nebraska Sedge		SHALLOW		S	
<i>Carex pellita (lanuginosa)</i>	Wooly Sedge		SHALLOW	MID	S	P
<i>Carex stipata</i>	Owlfruit sedge		SHALLOW		S	P
<i>Carex utriculata</i>	Beaked Sedge		SHALLOW	MID		P
<i>Carex vesicaria</i>	Bliester Sedge		SHALLOW	MID	S	
<i>Deschampsia cespitosa</i>	Tufted Hairgrass		SHALLOW	MID	S	
<i>Glyceria elata</i>	Fowl Mannagrass	Creeks, Ditch Bottoms	SHALLOW	MID	S	P
<i>Eleocharis palustris</i>	Common Spike Rush		MID	DEEP	S	P
<i>Schoenoplectus (Scirpus) acutus</i>	Hardstem Bulrush		MID		S	P
<i>Schoenoplectus (Scirpus) microcarpus</i>	Small-Flowered Bulrush		MID		S	P
<i>Schoenoplectus (Scirpus validus) tabernaemontani</i>	Softstem Bulrush		MID		S	P
<i>Typha latifolia</i>	Common Cattail	Will seed by itself- aggressive	MID			

Note: When seeding Wetland species; seeds need light to germinate.

Mix organic weed free compost into the top 4" of the soil, then seed, pressing seeds lightly into soil.

* For questions concerning Planting Guidelines, contact;

APPENDIX B

Planting Guidelines For Stormwater Facilities

TYPE	ZONE	POND DEPTH
Edges and Upland	Transition	
Seasonally Flooded	SHALLOW	0-3"
Submerged, semi-permanently Flooded	MID	3"-18"
Permanently Flooded	DEEP or FLOAT	18-64"

ORNAMENTAL PLANTS

These species are ornamental and are suitable for urban wetlands in a non- native setting.

Availability
SEEDS
PLANTS
CUTTINGS

					SEEDS	PLANTS	CUTTINGS
Trees	<i>Acer negundo</i> 'Sensation'	Sensation Maple		Transition	SHALLOW	P	
	<i>Acer rubrum</i> 'Northwood'	Northwood Red Maple		Transition	SHALLOW	P	
	<i>Celtis occidentalis</i>	Common Hackberry		Transition	SHALLOW	P	
	<i>Fraxinus pennsylvanica</i> 'Patmore'	Patmore Green Ash		Transition	SHALLOW	P	
	<i>Gleditsia triacanthos</i> 'Skyline'	Skyline Honeylocust		Transition	SHALLOW	P	
Shrubs	<i>Aronia arbutifolia</i>	Red Chokeberry		Transition	SHALLOW	P	
	<i>Clethra alnifolia</i> 'Hummingbird'	Hummingbird Summersweet		Transition	SHALLOW	P	
	<i>Cornus alba</i> 'Argenteo-marginata'	Euro. Variegated Dogwood		Transition	SHALLOW	P	
	<i>Cornus alba</i> 'Bailhalo'	Ivory Halo Dogwood		Transition	SHALLOW	P	
	<i>Cornus sericea</i> 'Flaviramea'	Yellow-Twigged Dogwood		Transition	SHALLOW	P	
	<i>Cornus sericea</i> 'Isanti'	Isanti Red-Twigged Dogwood		Transition	SHALLOW	P	
	<i>Ribes aureum</i>	Yellow Flowering Currant		Transition	SHALLOW	P	
	<i>Rhus aromatica</i> 'Grow Low'	Grow-Low Fragrant Sumac		Transition	SHALLOW	P	
	<i>Viburnum trilobum</i> (various cultivars)	American Cranberrybush		Transition	SHALLOW	P	

* For questions concerning Planting Guidelines, contact;

APPENDIX B
Planting Guidelines For Stormwater Facilities

					Availability		
					SEEDS	PLANTS	CUTTINGS
Perennials	<i>Achillea millefolium</i> cultivars	Yarrow		Transition			P
	<i>Actaea racemosa</i> (<i>Cimicifuga racemosa</i>)	Bugbane	Part to Full Shade	Transition			P
	<i>Adiantum pedatum</i>	Maidenhair Fern	Part to Full Shade; Rich, moist soils	Transition	SHALLOW		P
	<i>Ajuga reptans</i>	Ajuga	Part to Full Shade, Aggressive	Transition	SHALLOW		P
	<i>Aquilegia</i> spp.	Columbine		Transition			P
	<i>Anemone canadensis</i>	Canada anemone		Transition			P
	<i>Aruncus dioicus</i> 'Kneiffii'	Kneiffii Goat's-beard	Part to Full Shade; Rich, moist soils	Transition			P
	<i>Aster novae-angliae</i> 'Alma Potschke'	Alma Potschke Aster		Transition			P
	<i>Aster novae-angliae</i> 'Purple Dome'	Purple Dome Aster		Transition			P
	<i>Astilbe</i> spp.	Astilbe		Transition			P
	<i>Baptisia australis</i>	False Blue Indigo		Transition			P
	<i>Bergenia cordifolia</i>	Bergenia	Part to Full Shade	Transition			P
	<i>Chelone glabra</i>	Turtlehead	Part Shade	Transition	SHALLOW		P
	<i>Echinacea purpurea</i>	Purple Coneflower		Transition			P
	<i>Eupatorium maculatum</i>	Joe Pye Weed		Transition			P
	<i>Filipendula rubra</i> 'Venusta'	Queen of the Prairie	Part to Full Shade; Rich, moist soils	Transition			P
	<i>Heliopsis helianthoides</i> 'Summer Sun'	False Sunflower		Transition			P
	<i>Hemerocallis</i> spp.	Daylily		Transition			P
	<i>Iris ensata</i>	Japanese Iris		Transition			P
	<i>Iris pumila</i>	Dwarf Iris		Transition			P
	<i>Iris reticulata</i>	Dwarf Iris		Transition			P
	<i>Iris sibirica</i>	Siberian Iris		Transition			P
	<i>Liatris spicata</i>	Gayfeather		Transition			P
	<i>Ligularia stenocephala</i> 'The Rocket'	The Rocket Ligularia	Afternoon Shade	Transition	SHALLOW		P
	<i>Ligularia stenocephala</i> 'Little Rocket'	Little Rocket Ligularia	Afternoon Shade	Transition	SHALLOW		P
	<i>Lobelia cardinalis</i>	Cardinal Flower		Transition	SHALLOW		P
	<i>Matteuccia struthiopteris</i>	Ostrich Fern	Part to Full Shade; Rich, moist soils	Transition			P
	<i>Monarda didyma</i>	Bee- Balm	Afternoon Shade	Transition			P
	<i>Osmunda cinnamomea</i>	Cinnamon Fern	Part to Full Shade; Rich, moist soils	Transition			P
	<i>Penstemon digitalis</i>	Penstemon		Transition			P
	<i>Rodgersia</i> spp.	Rodgersia	Part to Full Shade	Transition	SHALLOW		P
	<i>Rudbeckia hirta</i>	Becky Black Eyed Susan		Transition			P
	<i>Rudbeckia fulgida</i> 'Goldsturm'	Goldsturm Black Eyed Susan		Transition			P
	<i>Scabiosa columbaria</i> 'Butterfly Blue'	Butterfly Blue Pincushion Flower		Transition			P
	<i>Scabiosa columbaria</i> 'Pink Mist'	Pink Mist Pincushion Flower		Transition			P
	<i>Solidago</i> hybrids	Goldenrod		Transition			P
	<i>Thalictrum rochebrunianum</i>	Lavender Mist meadow Rue	Part to Full Shade; Rich, moist soils	Transition			P
	<i>Tiarella cordifolia</i> (various cultivars)	Foam Flower	Part to Full Shade; Rich, moist soils	Transition			P
	<i>Trollius chinensis</i> 'Golden Queen'	Golden Queen Globeflower		Transition			P
	<i>Trollius laxus</i>	Globeflower		Transition			P
<i>Verbena hastata</i>	Blue Vervain		Transition	SHALLOW		P	
<i>Asclepias incarnate</i>	Swamp Milkweed		SHALLOW			P	
<i>Caltha palustris</i>	Marsh marigold		SHALLOW			P	
<i>Iris versicolor</i>	Blue Flag Iris		SHALLOW			P	
<i>Menyanthes trifoliata</i>	Bog Bean		SHALLOW			P	
<i>Mertensia virginica</i>	Virginia Bluebell		SHALLOW			P	
<i>Saururus cernuus</i>	Lizards's Tail		SHALLOW	MID		P	
<i>Nymphaea</i> 'Comanche'	Hardy Water Lily		MID	DEEP		P	
<i>Nymphaea</i> 'James Brydon'	Tropical Water Lily		MID	DEEP		P	
<i>Nymphaea</i> 'Martiacea Chromatella'	Hardy Water Lily		MID	DEEP		P	
<i>Nymphaea</i> 'Pygmaea Helvola'	Hardy Water Lily		MID	DEEP		P	
<i>Nymphaea</i> 'Sunny Pink'	Hardy Water Lily		MID	DEEP		P	

* For questions concerning Planting Guidelines, contact;

APPENDIX B
Planting Guidelines For Stormwater Facilities

2/9/2009

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Grass Like Species	Common Name	Transition	Shallow	Mid	Availability		
					SEEDS	PLANTS	CUTTINGS
<i>Carex flacca</i>	Blue Sedge	Transition					P
<i>Deschampsia caespitosa</i>	Tufted Hair Grass	Transition					P
<i>Deschampsia caespitosa 'Bronzeschleier'</i>	Bronze Veiled Tufted Hair Grass	Transition					P
<i>Deschampsia caespitosa 'Goldgehaenge'</i>	Golden Pendant Tufted Hair Grass	Transition					P
<i>Deschampsia caespitosa 'Schottland'</i>	Scottish Tufted Hair Grass	Transition					P
<i>Dryopteris expansa</i>	Spiny Wood Fern	Transition					P
<i>Osmunda cinnamomea</i>	Cinnamon Fern	Transition					P
<i>Panicum virgatum 'Prairie Sky'</i>	Prairie Sky Switch Grass	Transition					P
<i>Panicum virgatum 'Rotstrahlbusch'</i>	Red Switch Grass	Transition	SHALLOW				P
<i>Schizachyrium scoparium</i>	Little Bluestem Grass	Transition					P
<i>Sorghastrum nutans</i>	Indian Grass	Transition					P
<i>Carex grayi</i>	Gray's Sedge	SHALLOW					P
<i>Carex riparia 'Variegata'</i>	Variegated Greater Pond Sedge	SHALLOW		MID			P
<i>Carex squarrosa</i>	Squarrose sedge	SHALLOW		MID			P
<i>Carex vulpinoidea</i>	Fox Sedge	SHALLOW					P
<i>Typha minima</i>	Bullrush	SHALLOW					P

* For questions concerning Planting Guidelines, contact;

APPENDIX C

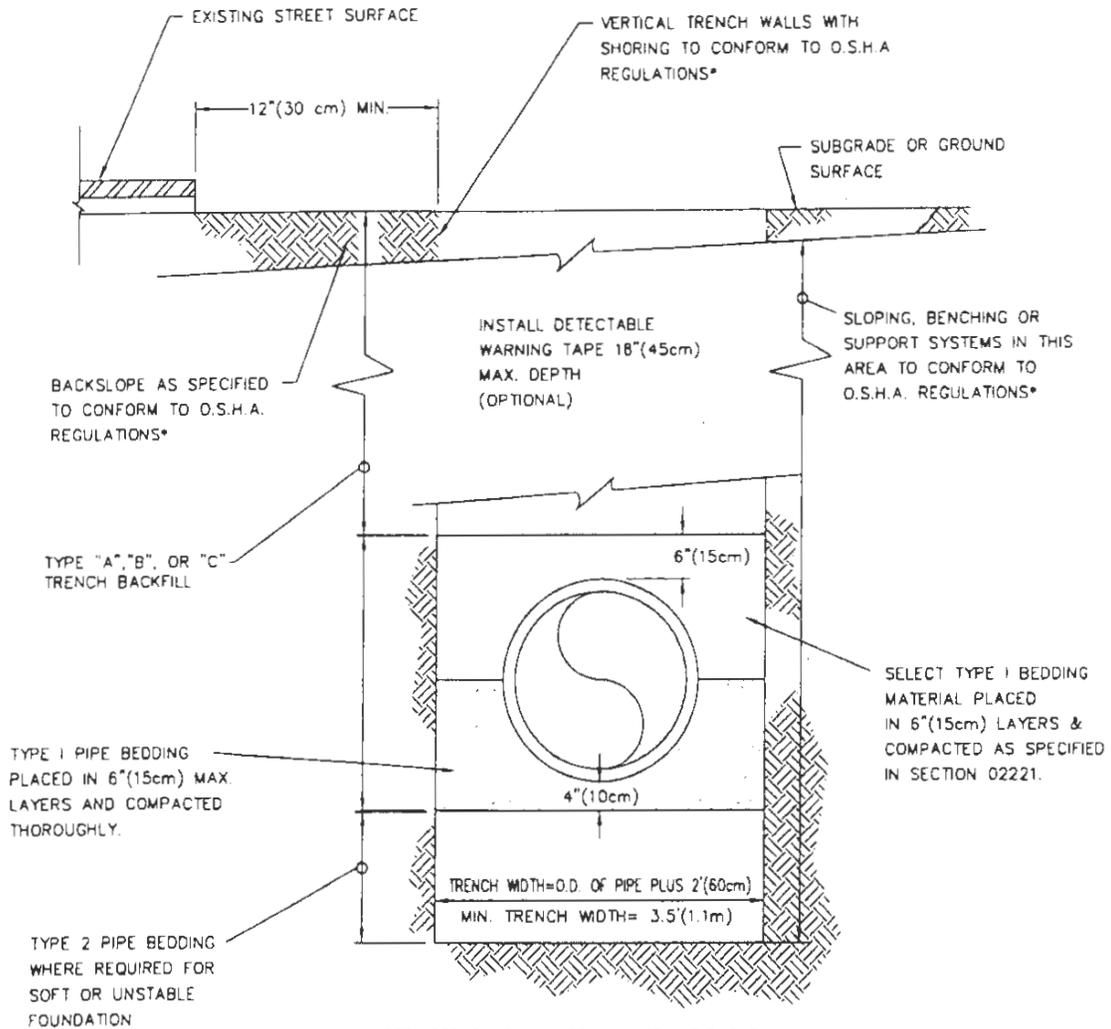
Excavation Permit Packet

Notice to all Contractors

EXCAVATORS ARE NOT ALLOWED TO DO ANY PLUMBING

- You are required to read the EXCAVATION GUIDELINES...
- No pea gravel for bedding -- Sand bedding only-- 100% imported backfill----
----- NO DRAIN ROCK....
- For downtown business areas and major traffic areas; Asphalt needs to be pre-cut the day before construction begins. Surrounding business owners are to be given at least a forty-eight (48) hour of advance notice of construction. Copy of all City activity is available upon request.
- Construction Ordinance: **5-2-5: DISTURBING THE PEACE**; During the period from ten o'clock (10:00) P.M. until seven o'clock (7:00) A.M. the following morning, a person shall be deemed to have knowingly disturbed the peace and quiet of a neighborhood if he or she operates construction, excavation, or earthmoving equipment, operates a dump truck or other heavy delivery truck (except when on a state highway), or engages in construction activities that produce noise.
- **NO TAPS ON FRIDAYS AND THE DAY BEFORE HOLIDAYS.**
New Year's Day (January 1st), Martin Luther King, Jr. Birthday (Third Monday in January), Presidents ' Day (Third Monday in February), Good Friday, Memorial Day (Last Monday in May), Independence Day (4th of July), Labor Day (First Monday in September), Columbus Day (Second Monday in October), General November Election Day, Veteran's Day (November 11th), Thanksgiving Day (Fourth Thursday in November), Friday following Thanksgiving, Christmas Day.
- Demolition Containers/Dumpster. Right-of-way permits for temporary construction or demolition containers/dumpster will allow them to remain on City property for a maximum of five (5) calendar days. Construction or demolition containers /dumpsters are not allowed to be placed on City streets at anytime between November 1st and March 15th. They are allowed to be placed on City streets for five (5) calendar days between March 15th and November 1st

NOTE: WHERE TRENCH PASSES THROUGH EXISTING PAVEMENT THE PAVEMENT SHALL BE CUT ALONG A NEAT VERTICAL LINE A MINIMUM OF 12" (30cm) FROM THE EDGE OF THE TRENCH OPENING WHERE NEAT LINE IS LESS THAN 3' (0.9m) FROM EDGE OF EXISTING PAVEMENT OR CURB AND GUTTER SECTION, REMOVE AND REPLACE ENTIRE PAVEMENT SECTION BETWEEN TRENCH AND EDGE OF PAVEMENT.



NOTE: SEE CONTRACT SPECIAL PROVISIONS FOR ANY MODIFICATIONS TO STANDARD TRENCH MATERIALS AND/OR OTHER TRENCH DESIGN FEATURES

* SEE O.S.H.A CONSTRUCTION STANDARDS FOR EXCAVATIONS

REVISED: 10/25/02

CONSTRUCTION STANDARDS
MPWSS

SCALE:
NONE

TYPICAL UTILITY TRENCH DETAILS

STANDARD DRAWING
NO. 02221-1

City of Whitefish – Public Works Department Construction & Maintenance Division



EXCAVATION GUIDELINES



This is a general guideline and check-list and does not contain all the necessary information or all of the requirements needed for excavating within the City of Whitefish.

The Excavating Contractor should be familiar with the latest editions of the following documents: The City of Whitefish Standards for Design and Construction, the Montana Public Works Standard Specifications – 5th Edition, the Manual on Uniform Traffic Control Devices 2003, the Montana Department of Transportation’s Manual for Work Zone Safety, OSHA and all other applicable Federal, State and Local laws and requirements.

Permits

City of Whitefish Ordinance: 7-1A-3: PERMIT REQUIRED

The Excavating Contractor must have a completed, signed, and approved copy of a City of Whitefish Excavation/Right-of-Way Permit in their possession **prior to excavating** in any City ROW or when excavating around utilities – directly connected to City owned mains.

- Additional permits may be required before an excavation begins depending on the location and the nature of the excavation, i.e., State and County ROW permits and City utility permits.
- The Contractor must have a current City of Whitefish Business License, proof of insurance, and have the required bond on file with the City Clerk’s office.

Utility Locates

- One-Call System (UDIG) utility locate request must be fulfilled prior to beginning any excavation within the City of Whitefish. Forty-eight (48) business hours advance notification is required and will be enforced.
- The Contractor will mark the proposed excavation site with white paint and/or white marking flags in accordance with APWA/UULC Standards.

Site & Route Cleanup

- The excavation site and truck haul routes must be cleaned of all debris, dirt or dust prior to the end of each project day by the Contractor. Additional cleaning(s) during the day may be necessary as conditions warrant.

Traffic Control

- A Traffic Control Plan must be submitted to and approved by the Public Works Department, at least forty-eight (48) business hours prior to the commencing of any excavation. The contractor must also notify the City Police and Fire Departments at least forty-eight (48) business hours prior to any street or alley closure. A news release to the news media is also required at least two (2) business days prior to the beginning of any construction activity that requires road or lane closures.
- All traffic control devices used must meet the MUTCD 2009, Montana Public Works Standard Specifications and City of Whitefish Standards for Design and Construction. Devices remaining during night hours will be constructed of reflective material, illuminated or lighted as required.
- All traffic control devices must be in-place prior to the commencement of the excavation.

Tracking Pads

- Only one access route is allowed to an excavation or construction site. A single tracking pad must be installed before excavating or hauling commences. All vehicles and equipment must enter/exit thru the tracking pad. The pad will be replaced or cleaned as needed when the material becomes contaminated and no longer functions. (See City of Whitefish Standards for Design and Construction for the detail on tracking pads.)

Inspection

- The City may require a pre-excavation “walk thru” inspection of the proposed site prior to startup with the Excavation Contractor.
- The Contractor must place a request with the Public Works Department, at least one (1) hour prior to backfilling, for an inspection of the excavation area, available compaction equipment and backfill materials. Inspection during compaction and a final inspection after paving will also be required.

Backfill Requirements

- 100% imported backfill is required in all City ROW. All native excavated materials will be immediately loaded into trucks, removed from the site and disposed of by the Contractor. Excavated materials will not be stockpiled on City ROW.
- The Contractor is only allowed to excavate the amount of trench which can be compacted and backfilled within each work day.
- All City of Whitefish Standards for Design and Construction and/or Montana Public Works Standard Specifications requirements for the type and compaction of backfill

materials must be met. Density and gradation submittals on the backfill material may be required.

- Compaction testing may be required by the City at the Contractor's expense.
- The Contractor will be responsible for **daily** maintenance of the excavation until final asphalt paving is completed. 3/4 inch minus crushed top surfacing will be used for this purpose.

Asphalt Pavement

- Pavements must be cut with a saw or pneumatic asphalt breaker prior to excavating. The trench will be cut along a neat vertical line a minimum of 12" from **each** edge of the trench opening. (For example: If the excavation bucket width is 2', then the width of the asphalt cut must be a minimum of 4' with the excavation centered between the two cuts.) **If placed incorrectly you will re-cut, removed and replaced!**
- If any adjacent longitudinal or transverse joints or cracks are less than 3' from the cut lines, the pavement will be removed and replaced to that joint or crack.
- Additional asphalt cuts will be required if the cut edges or adjoining sections of asphalt are disturbed during excavation.
- Permanent paving must be completed within seven (7) working days.
- Trench edges must be cleaned and a tack coat (SS-1, SS-1h or approved equal) applied before placing asphalt.
- Do not place asphalt hot-mix when the air temperature is less than 40°F and rising. Do not place asphalt upon a surface which is frozen or that has a temperature less than 32°F. Paving is not allowed during rainfall or if standing water is encountered.
- Pavement replacement: A minimum of four (4) inches' of Hot-mix Asphalt (PG 64-34) placed in two (2) properly compacted lifts. In no case will the new replacement be less than the existing section. Compaction testing may be required by the City at the Contractor's expense.
- Temporary paving with "winter" mix asphalt such as UPM or QPR is allowed only when Hot-mix Asphalt is not available: a three (3) inch minimum thickness is required. The contractor will maintain the temporary repair until final paving with Hot-mix is completed.
- Crack sealing of all asphalt joints may be required.

Gravel Surfaced Roads & Alleys

- Backfill and compaction requirements are the same as for paved roads, except that the final lift of material will be six (6) inches of three quarter (¾) inch minus crushed for surfacing.
- Excavated areas in gravel must be regularly maintained by the Contractor for a period of one (1) year after backfill has been completed.

Haul Routes – Sites & Route Cleanup

- A haul route map showing proposed direction of travel must be submitted and approved by the inspector before excavating begins.
- The excavation site and truck haul routes **must** be cleaned of all debris, dirt or dust prior to the end of **each** project day by the Contractor. A vacuum style street sweeper must be used. Additional cleanings(s) during the day may be necessary as conditions warrant. Failure to comply may result in the issuance of a monetary fine or a stop work order.

Warranty

- The Contractor is responsible for maintaining and or repairing any and all defects or failure in the excavation area; including but not limited to ditch settlement and asphalt failure for a period of two (2) years. The City will give notice of observed defects with reasonable promptness. In the event the Contractor fails to make such repairs. The City will have the repairs performed and charge the Contractor the cost thereby incurred.

Other

- Federal (OSHA) regulations require that the excavation be designed to provide worker protection if the excavation is greater than 5´ deep or if it is less than 5´ deep and there is indication of a potential collapse or cave-in. A trained Competent Person should be onsite at all excavations. **It is the CONTRACTORS RESPONSIBILITY to use OSHA approved shoring.**
- If construction fabric or geotextiles are encountered and disturbed in the existing road base, repairs to the fabric must meet the requirements of the Fabric Manufacturer and the Whitefish Public Works Department. Typically the repair consists of overlapping the existing fabric by 2´ with the newly placed section.
- Any existing facility that is damaged during the excavation such as water and sewer lines, manholes and covers, valve boxes, storm inlets, culverts, concrete sidewalks, curb or gutter sections, and traffic or street signs must be repaired or replaced immediately.

- Any paint stripes such as center lines, edge lines, parking lanes, or x-walk lines disturbed must be repainted within three (3) business days.
- The shallowest portion of any buried pipelines, conduit or other facility should not be less than 42" below the roadway surface.
- The Contractor will be responsible for daily maintenance of the excavation until final asphalt paving is completed. Three quarter (¾) minus crushed top surfacing will be used for this purpose.



<http://www.whitefish.govoffice.com/>

APPENDIX D

Engineering Plan Requirements

Appendix D

ENGINEERING PLAN REQUIREMENTS

1. Title Sheet

- a. Project name and legal description of property
- b. A location map showing the project site, road names, north arrow, scale, and associated landmarks
- c. Key map, on drawing sets of three sheets or more, of a scale reflecting the entire project
- d. Index of sheets
- e. Location of existing and proposed utilities
- f. Development data including size and quantity of improvements
- g. Legend and abbreviations
- h. Design Engineer's name, registration number, and signature (Note: all original sheets of plans shall have a seal and original signature of the design engineer)
- i. Name, address, and telephone number of the project proponent and of his/her representative who will act in authority for the project proponent
- j. The Approval Block (**Standard Detail SD-1a**)
- k. General Notes
- l. Record Drawings Certificate (**Standard Detail SD-1b**)
- m. All improvement plans with City of Whitefish facilities shall include the correct City of Whitefish horizontal and vertical control on the plans
- n. Designate all streets and utilities that are privately owned

2. Plan and Profile Sheets

The size of the plans shall be 24"x36". The plans shall show all existing facilities and improvements to be constructed. Scales shall be 1"=40' horizontal and 1"=4' vertical; or 1"=50' horizontal and 1"=5' vertical; or other scales may be used as necessary to show plan details. The stationing interval shall be 50' or 100'.

Streets

- a. Vertical and horizontal curve data
- b. Indicate roadway centerline and stationing along centerline
- c. Indicate slopes of centerline, sidewalks and gutter lines if necessary
- d. Indicate right-of-way location and survey monuments

- e. Indicate radii and grades at the ends, midpoint and $\frac{1}{4}$ points of curb returns
- f. Indicate drainage system and location
- g. Typical section
- h. Demonstrate that streets may be extended through adjacent properties if so required
- i. Show location, direction, size and type of MUTCD number of all permanent street signing on a separate plan sheet
- j. Show location and size of any postal delivery boxes to be placed on public right-of-way
- k. Show location of streetlights
- l. Appropriate site distances
- m. Handicap ramps at all sidewalk intersections
- n. Curb inlet basins on all arterial and collector streets
- o. Drainage control at low spots and storm sewers at sag curves
- p. Slope easements
- q. Clear vision area at intersection

Sewer

- a. Location of manholes, sewer line and services
- b. Stationing along sewer line
- c. In and out invert elevations at manholes
- d. Sewer is designed and extended to provide service to adjacent properties.
- e. Special details
- f. A profile demonstrating that sufficient cover shall be maintained and showing finished street where applicable
- g. All utilities with conflicts indicated
- h. Sewer service provided to each lot with station and offset at end of service line
- i. 4-inch minimum schedule 40 sewer service size
- j. Sewer manholes located on street centerline for 36-foot or wider streets and 6-feet from centerline on narrower streets.
- k. Slopes, distances and diameter of main runs
- l. Manholes identified

Water

- a. Location of valves, fittings, fire hydrants and services

- b. Stationing along waterline
- c. Water system is designed and extended to provide service to adjacent properties
- d. Special details
- e. A profile demonstrating that sufficient cover shall be maintained and showing finished street grade where applicable
- f. Fire flow requirement
- g. All utilities with conflicts indicated
- h. Service to each lot with station and offset at end of service line
- i. 6-foot minimum cover
- j. Pipe curvature radius and/or joint deflection angle
- k. Fittings specified with stations
- l. All fire service lines shall require an engineered plan and profile signed by a Professional Engineer

Grading and Drainage Plan

- a. Existing and proposed contours extending 50 ft. into adjacent properties; clearly identify areas of cut or fill
- b. Existing roadways and structures
- c. Erosion control and slope stabilization measures to be in place prior to and during construction
- d. Erosion control/slope stabilization/re-vegetation measures following final grading
- e. Dust control and other mitigation measures to be used during grading/clearing and until re-vegetation or stabilization has been completed for all graded areas and slopes
- f. Tree plan showing all trees 8-inch diameter at breast height (dbh) and larger
- g. Construction access/gravel construction entrances shown
- h. Temporary drainage control measures for entire site
- i. Permanent drainage improvement plan, including drainage basin boundaries, areas, and test volume calculations
- j. Location by station for drywells/drainage facilities
- k. Drainage easements
- l. Existing or natural drainage courses, canals, rivers, ponds
- m. Areas of cut or fill greater than two feet
- n. Critical areas to be preserved.
- o. Soils information where required

Signage

- a. Show location, direction, size and type of MUTCD number of all permanent street signing

Street Lighting

- a. Show location of City of Whitefish approved streetlights and the wiring plan.

Landscaping

- a. Show the location of the required landscaping

GENERAL NOTES

The following standard general construction notes to be shown on the title sheet:

- a. "All work shall be performed in accordance with the "Design and Construction Standards" of the City of Whitefish, and shall be completed to the satisfaction of the Director of Public Works. In the event that a design element does not reflect City standards, the matter must be immediately brought to the attention of the Engineer and the Director of Public Works. The Engineer shall be responsible for recommending a solution or alternative solutions to the City for review and approval."
- b. "These Plans have been checked by the City of Whitefish only for conformance with the "Design and Construction Standards," compliance with development agreement conditions, and for general conceptual approval of public improvements as shown. The City's review does not verify or ensure the accuracy of existing or proposed dimensions, lines, coordinates, or grades shown, including all existing utilities shown or not shown."
- c. "Utility locations shown reflect available record data. The Contractor shall take precautionary measures to protect all utility lines shown and other utility lines otherwise located. The Contractor shall contact the "Montana One Call Center / U-DIG" at (406) 752-6811 for utility locates giving a minimum of 2-full working days notice prior to beginning construction." Once located it shall be the contractor's responsibility to maintain markings.
- d. "Before work begins, the Contractor shall obtain a permit to work in the right of-way from the City and must notify the City Right-of-Way Inspection staff at least 24 hours in advance of commencing construction activities."
- e. "The Contractor shall obtain and maintain a complete and approved set of Construction Plans. These drawings, and any required permits, shall be available at the project site at all times and shall be made available to the City staff upon request. If construction plans are not readily available at the project site, the Director of Public Works may issue a stop work order and halt all construction activities pending compliance by the Contractor."
- f. "The Contractor agrees to comply with the provisions of the Traffic Control Plan and the "Manual on Uniform Traffic Control Devices," Part IV, for construction signage and traffic control."
- g. "All surplus materials, tools, and temporary structures, furnished by the Contractor, shall be removed from the project site by the contractor. All debris and rubbish caused by the operations of the Contractor shall be removed, and the area occupied during construction activities shall be restored

to its original conditions, within 48 hours of project completion, unless otherwise directed by the Director of Public Works.”

- h. “The Contractor is required to provide and maintain erosion and sediment control measures in accordance with the approved erosion control plan. The Director of Public Works may require the contractor to provide additional erosion control measures due to unforeseen erosion problems or if the plans do not function as intended.”
- i. “A Pre-Construction meeting with the City of Whitefish is required prior to the start of construction.”
- j. “All work shall be performed by City approved Contractors.”

**CITY OF WHITEFISH
PLAN REVIEW CHECKLIST**

SUBDIVISION NAME _____ DATE SUBMITTED _____

REVIEWING ENGINEER _____ DATE REVIEWED _____

YES	NO	N/A	<i>Preliminary Items</i>
			Provide two (2) sets of plans to Public Works Dept.
			Plan review fee paid.
			Review Preliminary Plat Conditions and attach to the plan checklist. Check Preliminary Plat layout and compare.
			Do sewer and water extend to property limits? How does this project fit with adjacent proposed projects? Do we want main extensions if only a few services are included?
			Conditions when individual services are required: Duplex – same owner; 2 water and 1 shared sewer service. Town home – separate owner; 2 water and 2 sewer services.

YES	NO	N/A	<i>General Plan and Cover Sheet Review</i>
			Title Block (Engineer's name, address and phone number, project name, name of sheet, sheet of , date designed, dates drawn, surveyed, checked and revised).
			Engineer's Stamp (signed, dated) on cover
			Approval Block for Public Works Director and Fire Marshal signatures (on cover sheet).
			Table of Contents (on cover sheet).
			Vicinity Map required for all plan sets.
			North Arrow & Bar Scale on Each Plan Sheet.
			Legend & Abbreviations.
			Benchmarks and Datum (must be NAVD 88 and located on cover or plan sheet).
			Overall Site Utility Plan (showing all exiting utilities and easements). Overall site plan required if more than 4 plan sheets. This can be at a smaller scale i.e. 1"=100' or so.
			Engineering Design Report required.
			Traffic Study required if stated as a condition of preliminary plat.
			Check that 10' Utility Easement is provided for behind ROW line.
			Separate sheets shall be used for streets, sewer, storm, and water. Sewer and water shall not be shown on the same plan and profile sheets.

YES	NO	N/A	<i>Street System Review</i>
			Include 10 foot utility easement for gas, electrical, cable.
			Street Plan/Profile (show existing and proposed grades and alignments for streets, sidewalks, curb and gutters, boulevards, right-of-ways, signage). Profile Views Provide 0.5% minimum grade to provide lateral storm water drainage to basins or other relief features (on roads with curb and gutter). Grades must be shown in decimal form with (+ or -) slope on all profile views. Vertical information, low point, high point, VPI, BVC, EVC, need to be clearly shown on all profile views.

			Plan Views - Stationing and Layout PC, PT, PI and Intersections shall be stationed accordingly. Curve information, delta, radius, length, and tangent shall be noted. Provide spot elevations, curb returns, begin curb radius (BCR) and end curb radius (ECR). Provide stationing for all proposed streets.
			Sidewalks Provide with and type of driveway entrances proposed. Provide handicap ramps as required, provide detail on ramps. Provide for boulevards.
			Driveways Max width of 22' for residential lots. Nearest edge of driveway shall not be less than 35' to the closest edge of the pavement of an adjacent intersection. 6" of concrete is required for approaches. Show distance between driveways.
			Road Sections Show pavement widths and thicknesses, gravel widths and thicknesses, stabilization fabric with specifications. Provide minimum 2% crown or cross sloping on all sections for surface drainage.
			Snow Removal Provide snow removal locations, especially around cul-de-sac areas. Provide drainage plan for melting snow.
			Standard Curb and Gutter Street section shows standard curb and gutter (drive over curb is not allowed).
			Trench Cuts into New City Streets Streets built within the last 10 years have geotextile fabric. Include note that a 2-foot overlap of the fabric is required; fabric shall be cut and not ripped. The City inspector or engineer must inspect the overlap of fabric. Also match existing section of street.
			Street Signage Sheet Street name and traffic control signs – specifications on materials and posts Need location sheet with conflicts of trees and lights. Show trees and other obstacles.
			Right-of-Way Width and boundary shall be clearly marked and identified.

YES	NO	N/A	<i>Grading and Erosion Control Sheet</i>
			Existing Topography show (existing buildings, trees, bodies of water, etc.). Existing and proposed contours of at least 2-foot intervals.
			Proposed Final Grades (contours or spot elevations) and Site Topography.
			Catch basin inlet protection, tracking pad, stabilization of disturbed areas, construction sequence, phasing of large projects, clearing limits, silt fence or wattles on down slope property line.
			Show trees that are going to be removed.

YES	NO	N/A	<i>Storm Drain Review</i>
			Drainage plan required when >10,000 sq. ft. impervious surface.
			Profile Views Provide profile view for proposed storm drains (required for primary drainage lines > 100 feet). Provide stationing, offsets, and elevations for all storm drain elements. Provide maximum spacing on 400 feet between manholes.
			Plan Views - Easements and Right-of-ways Check slopes and widths of proposed drainage ditches with provided easements and right-of-ways. When drainage easements are required, make sure they are recorded. Check minimum grade requirements for drainage pipe. Put pipe sizes on Plan View.
			Material and Sizing Minimum diameter of 12 inches shall be used for all storm drains (Variance allowed for 8" where engineering report justifies). Minimum diameter of 8 inches shall be used for inlet laterals.
			Maintenance Plan Required for Privately Maintained Detention and Conveyance Facilities – (Note on Cover Sheet).
			Details Provide details for inlets, manholes and lids, concrete collars. Cover and manhole ring shall be Inland Foundry 772-A, Olympic Model 37 or approved equal.

YES	NO	N/A	Sanitary Sewer System Review
			Profile Views Invert and rim elevations shown. Size, length and grades of pipe clearly shown. Show existing and proposed utilities.
			Plan Views Flow direction clearly shown. Provide service to property boundary of each lot with proposed or existing buildings. Distance to existing and proposed water mains and services clearly shown.
			Maximum Manhole Spacing 400' for slopes from 0.4% to 4.0% 300' for slopes from 4.0% to 8.0% 200' for slopes greater than 8.0%
			Manhole Type Designation Manholes shallower than 3' are impractical. Doghouses are not allowed. Manhole fillet on bottom to be precast (not cast in place). All manholes shall be numbered with station and offsets on all plan and profile views.
			Drop Manhole Use drop manhole if sewer drop > 24".
			Core Drilling Existing Manhole For existing manhole to be core drilled use link seal or approved equal to seal hole. (Link Seal LS-475-C-12)
			Manhole Rubberized Chimney Seals Chimney Seals shall be Cretex (or approved equal) meeting ASTM C-923 with a minimum thickness of 3/16".
			Pipe Sizing (part of engineering report) Verify that sewer improvements meet proposed and future flow demands per state regulations.
			Check Sewer Grades and Verify Inverts: 8" dia., 0.4% min. slope; 10" dia., 0.28% min. slope; 12" dia., 0.22% min. slope. Place at minimum grade for future extensions where practical.
			Sewage Velocities All systems shall be designed to transport sewage between the ranges of 2 to 10 feet per second. If > ___ fps. Blocking requirement per DEQ.
			Sewer Line is Straight Incorporate alignment changes into manholes. Flow angles shall not be less than 90 degrees through manholes.
			Sewer Line Terminal Ends Terminate with manhole. Install stub-outs when possible past pavements. Extend sewer to end of property.
			Manhole and Cleanout Locations All manholes and cleanouts shall be placed within right of ways and shall avoid low-lying areas to prevent storm water inflows.
			Minimum Sewer Clearances with Other Utilities 12" min. vertical separation with storm sewers (guideline). 18" min. vertical separation with water mains. 10' min. horizontal separation with water mains. 5' min horizontal separation with storm sewer and sanitary force mains (guideline).
			Sanitary Sewer Cover Min. 4 feet of cover is required. Determined by proposed final grade. Max. 15 feet of cover from proposed final grade to sewer invert elevation (guideline). Detectable warning tape 18" below finish grade along all sewer trenches is required. Min. 6 feet for force mains. Material for Manhole Ring and Cover –East Jordon Iron Works Model 3772Z1 or approved equal. Sealed lids with O-Ring in wet areas.
			Pipe Changes All pipe size and material changes shall take place only at manholes.
			Sewer Service Laterals Extend out perpendicular from the gravity main to right-of-way. Must extend a min. of 3 feet beyond property line to prevent damage to sidewalk.
			Materials Sanitary Sewer Services – PVC schedule 40. Sanitary Sewer Mains – PVC SDR 35. Sewer Saddles – Use Romac Saddle: CB-4.63 U.N. (for any main type).
			Septic Tank Abandonment If existing septic tank, provide note that tank is abandoned in accordance with UPC latest edition.

			Sewer Line Location Limitations Shall not be placed underneath sidewalks, curb and gutter, etc. Exception would be crossings for a short length.
--	--	--	--

YES	NO	N/A	<i>Sanitary Sewer Pumping Station Review</i>
			Study Detailing Proposed Development Impacts to Existing Lift Stations
			Study Detailing Proposed Development with the Addition of a New Lift Station
			Pumping Stations Limitations Stations shall only be used when gravity systems are not feasible.
			Emergency Power Supply Shall be required unless approved by the Public Works Director.
			Alarm System Phonetics Inc. / Sensaphone 1400 shall be used and linked by telephone dialer system. Appropriate phone numbers to be programmed by the City.
			Electrical Surge Protection Required for all stations.

YES	NO	N/A	<i>Sanitary Sewer Force Main System Review</i>
			Materials HDPE SDR 11 with butt fusion joints or HDPE 160 SDR11.
			Thrust Blocks Shall be used at all tees, bonds, offsets or plugged ends.
			Dead Ends A valve with thrust block shall be installed at all dead ends.
			Compliance with the City's Master Sewer Plan and State Regulations
			Air Release Valves To be placed at all high points on force main lines.
			Cleanout Spacing Cleanouts need to be spaced a min. of 300 feet. Check cleanout detail.
			Service Details Check service details for connection to force main.
			Existing Force Main Connections Valves shall be placed at all new force main connections to existing lines. Valve shall be placed on the upstream side of the connection and secured by a thrust block.

YES	NO	N/A	<i>Water System Review</i>
			Profile Views Provide profile view for all proposed water mains. Provide stationing, offsets and elevations for all water system elements.
			Plan Views with System Map Showing existing and proposed with main size, valves, hydrants and services. Show water main separation distances to sewer utilities. Service provided to each lot, including undeveloped. Provide backflow prevention devices as required per FCCHR.
			Materials Water main shall be PVC-C-900 DR 18 (235 psi) pipe for pipe < 12" diameter only. Minimum water main diameter shall be 8 inches.
			Fittings Provide thrust blocks for all fittings. Provide an eccentric or rotated 'T' at low point in main for sediment removal.
			Sewer Separation 18" min. vertical separation with sanitary and storm sewer lines. 10' min. horizontal separation with sanitary and storm sewer lines.
			Pressure Relief Valves Show on plans which lots require PRV's.
			Fire Hydrants Shall be placed at 360' intervals and in accordance with Fire Dept. requirements. Shall be placed on property lines fronting main.

			Concrete thrust block shall be noted on detail. All water systems shall meet minimum fire flow requirements. Mega lug restraints are required in addition to thrust blocks. Provide fire hydrant for blow off at high point and as blow off for dead end lines. At end of line provide fire hydrant, valve then 10 ft. stub.
			Curb Boxes Avoid placing in sidewalks, concrete or future driveway locations. Place inside street side of sidewalk centered in boulevard.
			Service Saddles Provide power seal, Romac stainless steel full circle design.
			Water Services and Curb Stops Service lines shall all be 1" Type K copper tubing or polyethylene pipe. Curb stop shall be ball valve Mueller 300 Ball Curb Valves with Insta-Tite or 110 compression fittings. SS liners are required for 110 compression fittings on PE pipe. Old services that are to be tied into new main need to be replaced to curb box as needed to meet current standards. Service must extend 3 feet beyond property line to prevent damage to sidewalk. Don't allow water services and curb stops within the concrete approach (City would be responsible to replace concrete in future). Check for abandonment notes for old services. Always abandon at corp. stop. Water services shall not be installed in the same trench excavated for fire hydrant leads. Min. 5 ft. separation between services and hydrant leads. Separation between water service taps min. 2.5 times the main pipe diameter.
			Couplings Mechanical Joint ductile iron solid sleeve only.
			Water Main Backfill Both toning wire and warning tape need to be called out in the details. Provide minimum of 6 feet of backfill to final grade upon all water mains. Each water sheet needs to have "minimum 6' bury" note on it.
			Valves All valves shall be fitted with a thrust block. Valves shall be located at not more than 800' intervals. Valves shall be placed at the ends of each main with a 10' capped stub. Dead ends shall be minimized by looping. Valves shall be positioned in a manner that allows system repair and maintenance upon the entire system. Check that a valve is provided for future extensions. At low point on main provide eccentric tee reducer or rotate tee downward for sediment removal.
			Tapping Contractor to install sleeve and test, City to tap. Tapping fee is \$.
			Provide Anchoring Requirements on Steep Water Mains

YES	NO	N/A	<i>Utility Detail Sheet or General Notes</i>
			No Pea gravel allowed for pipe bedding.
			Sewer Manholes - Rings 2 maximum, 12 -inch max. (if 1 ring then 1-12 inch, if 2 rings then 2-6 inches). External Chimney seals are required on manholes.
			Include detail for blow off fire hydrant with eccentric reducer for air release. Include detail for an eccentric or rotated "T" at low point in main for sediment removal.
			Include water and sewer service detail with curb box location in boulevard.
			For condos (see water service and meter pit Standard Detail).
			Fire Hydrant detail needs to include a note that fire hydrant to be +/- 0.1 feet from finished grade to bury line.

YES	NO	N/A	<i>Lighting Plan Sheet</i>
			Show Location – Trees, Lights, and Signs on plans. Lights; number required, service (electricity) location and specify type. Conflicts – Sign Posts. Driveways – No poles across from driveways.

APPENDIX E

Cold Weather Construction Requirements

Appendix E

Cold Weather Construction Requirements for Public Infrastructure

The following requirements shall apply to cold weather construction of new water mains, sewer mains, storm sewer mains, roads, appurtenances, and earthwork in the existing or proposed public right of way and shall be in effect when the air temperature is lower than 32 degrees or when frozen soils conditions exist. The Owner must indicate their acceptance of these requirements by signing below prior to the start of work.

Inspection Requirements

1. Full time inspection is required under the supervision of a Montana licensed civil engineer.
2. The Field Inspector shall document on-site activities using the DAILY INSPECTION LOG FOR COLD WEATHER CONSTRUCTION provided by the Public Works Department, or an approved equivalent. An inspection log shall be completed for each day of active construction, signed by both the Field Inspector and the Project Engineer, and submitted to the Public Works Department on the following business day.
3. The Project Engineer shall provide the Public Works Department with current proctor test results for all backfill material prior to use of that material.
4. The Field Inspector shall perform or oversee soil compaction testing for all backfill material to verify optimal moisture content and compliance with approved specifications. Compaction tests shall be taken at horizontal intervals of less than 100 feet and at various depths, with 50% of the tests in the lower half of the trench or road section.

Warranty Requirements

1. Prior to connecting any new mains to existing City facilities, the Owner shall enter into a two year warranty agreement with the City for all water mains, sewer mains, storm sewer mains, roads, appurtenances, or earthwork constructed in the public right of way or proposed right of way during cold weather conditions. The warranty shall be enforced by means of a letter of credit issued by a local bank in the City's name. The letter of credit shall provide an amount equal to 20% of the Project Engineer's estimate for the cost of improvements. The Public Works Director must approve the cost estimate prior to issuance of the letter of credit.

Construction Requirements

1. A competent Project Supervisor, employed by the General Contractor, shall be on the job site continuously during periods of active construction.
2. No frozen material shall be placed in backfill areas and all frozen soil, aggregate, snow, ice or other frozen material shall be removed before appropriate material is placed in the fill area.
3. The length of open trenches shall be limited to not more than 50 feet during active construction.
4. Each trench shall be backfilled to match the surrounding grade when construction activity ceases for any period of more than one hour.
5. Soil compaction shall be in accordance with the optimal moisture results of pertinent Proctor tests and shall conform to the approved plans and specifications.

6. Pipe installers shall abide by the manufacturers' cold weather guidelines, as well as the Uni-Bell Handbook of PVC Pipe, or an equivalent standard regarding the handling and installation of pipe, gaskets, fittings, etc.

The Public Works Department reserves judgment and authority to schedule or limit work near existing City utilities at their discretion.

A lack of compliance with these requirements may be cause for the Public Works Department to issue a stop work order or require work to be redone as a condition of final acceptance.

I, _____, as the Owner of the _____ project, hereby accept these requirements for cold weather construction of public infrastructure. I will enter into a separate two year warranty agreement with the City and understand the warranty period will start upon the City Engineer's written acceptance of the overall project. I will provide copies of this letter to my Engineer, _____ and Contractor, _____, immediately and direct them and their subcontractors to abide by these requirements, as well.

Signature

Printed Name

Company Name

CITY OF WHITEFISH

DAILY CONSTRUCTION REPORT

Project _____ Date _____
 Client _____ Project No. _____
 Contractor _____ Project Manager _____
 Weather _____ Temperature _____
 Wind _____ Precipitation _____

AVERAGE FIELD OFFICE

Name of Contractor	Prime or Subcontractor	No. of Men on Project	Remarks

ENGINEER'S PERSONNEL

Time	Name	Duties	Remarks

EQUIPMENT AT THE SITE

CONSTRUCTION ACTIVITIES

By: _____ Title _____ F:\admin\office\pforms\dcnsrpt.doc

REMARKS

APPENDIX F

Latecomers Agreement

After recording, return to:
Michelle Howke, City Clerk
City of Whitefish
PO Box 158
Whitefish, MT 59937-0158

LATECOMER AGREEMENT

THIS AGREEMENT is entered into as of the ____ day of _____, 20____, by and between the City of Whitefish, a municipal corporation ("CITY"), and [Developer's Name], [Developer's Address], ("DEVELOPER") with respect to the following facts:

A. The CITY owns and operates a domestic water system and a sewage disposal and treatment system that serves properties within the City of Whitefish and on its periphery.

B. DEVELOPER has developed the properties commonly known as [Address], Whitefish, Montana, and legally described as:

LEGAL DESCRIPTION

and, in connection therewith, has installed water and/or sewer mains, or irrelevant other utility facilities, which will benefit properties in addition to those developed by DEVELOPER. The parties have identified certain expenses associated with such water and sewer improvements for which DEVELOPER seeks reimbursement from properties that may eventually use the utility facilities installed by DEVELOPER.

THEREFORE, THE PARTIES AGREE AS FOLLOWS:

1. Entitlement to Reimbursement. The CITY agrees that DEVELOPER has installed the following utility facilities for which the CITY's existing policies entitle the DEVELOPER to seek reimbursement from future customers who use such facilities:

a. Water Facilities: _____

_____.

Based on evidence and information submitted by DEVELOPER, the CITY agrees that the DEVELOPER will be entitled to seek reimbursement, for the facilities described above in the amount of _____ DOLLARS as set forth further herein.

b. Sewer Facilities: _____

_____.

Based on evidence and information submitted by DEVELOPER, the CITY agrees that the DEVELOPER will be entitled to seek reimbursement, for the facilities described above in the amount of _____
DOLLARS as set forth further herein.

2. Identification of Properties. The parties agree that the properties identified on Exhibit "A" attached hereto and incorporated hereby by reference, are those properties from which DEVELOPER is entitled to seek reimbursement, and the reimbursement that DEVELOPER is entitled to seek is the amount set forth on Exhibit "A" with respect to each property and each utility. A copy of the area map is attached as Exhibit "B."

3. CITY'S Efforts to Collect. The CITY agrees that it will exercise its best, good faith efforts to assist DEVELOPER in collecting reimbursement as set forth herein. The CITY will exercise its best, good faith efforts to not allow the properties described on Exhibit "A" to connect to any of the facilities for which DEVELOPER is entitled to seek reimbursement unless and until such properties have deposited with the CITY the appropriate amount of reimbursement, as described on Exhibit "A." Other than exercising its best, good faith efforts to obtain reimbursement from those properties listed on Exhibit "A," the CITY will have no further obligation to police connections to the CITY's water and/or sewer system. The CITY will not incur liability for any unauthorized connection to the CITY's water and/or sewer system, and the CITY will not be obligated to pay to DEVELOPER any amount of reimbursement as set forth therein until the CITY has actually collected such amount from the properties described on Exhibit "A." DEVELOPER acknowledges that the CITY has entered into this Agreement as an accommodation and as a convenience to DEVELOPER, and the CITY does not guaranty that any amount of reimbursement will be collected for DEVELOPER; nor will the CITY be liable if it fails, through negligence or otherwise, to collect from a particular property.

4. Combination or Subdivision of Property

a. In the event that the number of properties identified on Exhibit "A" is reduced by the combining of one or more properties into a single property, the amount of reimbursement per property will remain the same, and the total amount of reimbursement that DEVELOPER is entitled to, as set forth in Section 1, will be reduced accordingly. For example, if initially ten properties each owe \$1,000.00 in reimbursement and two properties are combined to form one, the nine remaining properties will each owe \$1,000.00, and the total reimbursement to which DEVELOPER is entitled will be reduced to \$9,000.00.

b. In the event that the number of properties identified on Exhibit "A" is increased, by the subdivision of one or more properties, the amount of a particular property's reimbursement will be divided and spread equally over the number of subdivided lots that result, and the total amount of reimbursement that DEVELOPER is entitled to, as set forth in Section 1, will remain the same. For example, if initially ten properties each owe \$1,000.00 in reimbursement and one property is subdivided into five subdivided lots, then each of the five subdivided lots will owe \$200.00, and the total reimbursement to which DEVELOPER is entitled will remain \$10,000.00. In no event will the total amount of reimbursement to which DEVELOPER is entitled, as set forth in Section 1, be increased.

5. Payment to Developer. Within thirty (30) days of the CITY's collection of reimbursement from one of the property owners described on Exhibit "A," the CITY will remit such amount to the DEVELOPER, less a service charge equal to ten (10) percent of the amount collected to defray the CITY's costs of administering this Agreement.

6. Consent to Annexation. Pursuant to Section 7-13-4314, MCA, the CITY requires that any person, firm, or corporation outside of the incorporated city limits is required, as a condition to initiate such service, to consent to annexation of the tract served by CITY. Upon connection to the CITY'S water and/or sewer system by any residential or commercial building or any other structure located on the property described herein, DEVELOPER agrees to consent to annexation under the following conditions and in the following manner:

a. In the event the CITY decides to annex the real property subject to this Latecomer Agreement, DEVELOPER hereby consents to said annexation and waives any right of protest or judicial appeal to said annexation proceedings.

b. DEVELOPER hereby agrees and consents to, and hereby submits the real property described herein to municipal taxation and assessments including but not limited to water and sewer utility assessments in the same manner as other private property within the city is taxed and assessed for municipal tax, assessment and utility service purposes.

c. DEVELOPER hereby signs the petition requesting annexation attached to and made a part hereof under this Latecomer Agreement for municipal water and sewer services at the time of signing this Latecomer Agreement. Such petition will be filed with the City Clerk.

d. A copy of this Latecomer Agreement will be filed with the office of the Flathead County Clerk and Recorder.

e. Subsequent to this Latecomer Agreement all deeds to parcels of land within the property subject to this Latecomer Agreement granted by DEVELOPER will contain the following consent to annexation and waiver:

The Developer hereby covenants and agrees that acceptance of this deed does constitute a waiver of the statutory right of protest or judicial appeal against any annexation procedure initiated by the City of Whitefish with respect to the property described herein. Developer also agrees that acceptance of a deed constitutes an obligation on the part of Developer to initiate annexation procedures per the Petition to Annex on file at the City Clerk's Office.

This consent to annexation and waiver will run with the land and will forever be binding upon the Developer, their transferees, successors and assigns.

f. The CITY hereby retains the right to revoke water and sewer services to the herein described property in the event these conditions are not met by the property owners or the

heirs, successors, administrator, executors, personal representatives and assigns of the property owner.

7. Term - Incorporation of Policies. This Agreement will be in effect for a period of ten (10) years, after which time it will automatically terminate and will not be extended. DEVELOPER will have no right to reimbursement from any properties described on Exhibit "A" that connect to the CITY's water and/or sewer system after the termination of this Agreement; nor will the CITY have any further obligation to monitor or identify properties that connect after the termination of this Agreement. This Agreement incorporates by reference those policies of the CITY with respect to reimbursement of Developers that are in effect at the time of the execution of this Agreement.

8. Termination of Services. This Agreement will immediately become null and void and CITY will immediately revoke rights to CITY services including water and sewer service, upon any failure of DEVELOPER or DEVELOPER'S successors in interest to fulfill this Agreement.

9. Attorneys' Fees. In the event of any litigation to enforce or interpret the provisions of this Agreement, or to remedy a breach thereof, the prevailing party will be entitled to reasonable attorneys' fees as fixed by the court.

10. Entire Agreement. This Agreement contains the entire agreement of the parties hereto and supersedes any prior written or oral agreements between them concerning the subject matter contained herein. There are no representations, agreements, arrangements, or understandings, oral or written, between the parties hereto relating to the subject matter contained in this Agreement, which are not fully expressed herein. The provisions of this Agreement may be waived, altered, amended or repealed in whole or in part only upon the written consent of all parties to this Agreement.

11. Governing Law. The construction of this Agreement, and the rights and liabilities of the parties hereto, will be governed by the laws of the State of Montana.

12. Forum. Any litigation to enforce or interpret the provisions of this Agreement or the parties' rights and liabilities arising out of this Agreement or the performance hereunder will be maintained only in the courts in the County of Flathead, Montana.

13. Successors in Interest. This Agreement will inure to the benefit of, and will be binding upon the assigns, successors in interest, personal representatives, estate, heirs, and legatees of each of the parties hereto.

14. Notices. All notices, requests, payments, demands and other communications required or permitted to be given under this Agreement will be in writing and will either be delivered in writing personally or be sent by telegram or by regular or certified first-class mail, postage prepaid, deposited in the United States mail, and properly addressed to the party at his address set forth on the signature page of this Agreement, or at any other address that such party may designate by written notice to the other party.

Dated: _____

CITY OF WHITEFISH

By: _____

City Manager

PO Box 158

Whitefish, Montana 59937-0158

Dated: _____

DEVELOPER

By: _____

Printed Name: _____

Title: _____

Address: _____

STATE OF MONTANA)
 :SS
County of Flathead)

On this _____ day of _____, 20____, before me personally appeared _____, to me known to be the City Manager of the City of Whitefish, that executed the within and foregoing instrument, and acknowledged the said instrument to be the free and voluntary act and deed of the City of Whitefish for the uses and purposes therein mentioned, and on oath stated that he was authorized to execute said instrument on behalf of the City of Whitefish.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my Notarial Seal the day and year last above written.

Notary Public for the State of Montana

APPENDIX G

Plan Review and Construction Oversight

Appendix G

Whitefish Public Works Department
Plan Review and Construction Oversight Fee
Calculation Worksheet

Please submit this completed form and payment along with infrastructure improvement plans and related documents to the Public Works Administrative Assistant.

Date: _____

Name of Project: _____

Consultant: _____ Project Manager: _____

Mailing Address: _____

Telephone: _____ Email: _____

Please provide the following information (leave the line blank if an item does not apply to your project).

- a. Type of Development (check one and describe as indicated):
Subdivision
Number of lots ___ - Major subdiv. if 6 or more lots
Multi-family residential - 6-plex and larger
Commercial
Other (i.e. simple water or sewer main extension)
Description _____

- b. Utility Extension Information
Length of new water main: _____ feet
Length of new sewer main: _____ feet

- c. Does the project include water or sewer pumping facilities which will be owned by the City after construction? ___ yes ___ no

You may refer to the attached fee schedule and apply information from Items a, b, and c above to perform your own fee calculation. The Public Works Department will calculate fees as project documents are received.

- A. Base Plan _____
B. Water main extension _____
Sewer main extension _____
C. Pumping facilities _____
Total _____

The fee is due with the submittal of construction plans and related documents. Checks should be made payable to the City of Whitefish. Please review the attached fee schedule or contact the Public Works Department at 863-2460 for more information.

Whitefish Public Works Department
Plan Review and Construction Oversight Fees

	Major Subdivision	Minor Subdivision	Multi-Family or Commercial Site
A. Base Plan - site, streets, bike/ped facilities, drainage, lighting, etc.	\$500 + \$50 per lot	\$300	\$200
B. Water and Sanitary Sewer Main Extensions (fee for each utility)	0 to 500 LF		\$200
	More than 500 up to 2500 LF		\$350
	More than 2500 LF		\$450
C. Water or Sewer Pumping Facilities (City owned and operated)	\$400	\$200	\$200
D. Independent Consultant Review (for specialized design features)	\$150 + actual consultant fees		
E. Additional Plan/Report Submittal and Review	\$100 per additional submittal		

- 1 Fees for items A, B, and C are intended to cover City costs for 1 pre-design meeting, 2 final plan/document reviews, pre-construction and progress meetings, field inspection, warranty inspection and follow-up, record maintenance, and general administration.
- 2 For the purpose of this fee schedule, multi-family development is defined as a residential development project, other than a subdivision, including 6 or more dwelling units. A major subdivision is one which creates 6 or more lots.
- 3 Fees for stand-alone water or sanitary sewer main extension projects will be calculated using only Item B.
- 4 50% of fees calculated under items A, B, and C must be paid prior to start of final plan review.
- 5 The balance of fees calculated under items A, B, and C must be paid prior to the start of construction.
- 6 The need for independent consultant review will be determined by the Public Works Director and payment (Item D) is due prior to Public Works issuance of approval letter.
- 7 The review fee for additional submittals (Item E) is due prior to start of review for each additional submittal.

APPENDIX H

GIS Control Points and Map

CITY OF WHITEFISH - GIS CONTROL POINTS

COORDINATES:

STATE PLANE INTERNATIONAL FEET
MONTANA 2500, NORTH AMERICAN DATUM 1983 (NAD83(1999))

ELEVATIONS:

US SURVEY FEET ABOVE MEAN SEA LEVEL (MSL)
NORTH AMERICAN VERTIVAL DATUM 1988 (NAVD88)

POINT NUMBER	NORTHING	EASTING	ELEVATION	POINT # ORIGINAL	MONUMENT DESCRIPTION
12710	1553127.279	794802.920	3035.54	MDT 127J	2" MDT ALUMINUM CAPS SET ON A 5/8" X 30" REBAR STAMPED WITH POINT NAME AND YEAR SET
12711	1553160.706	794453.333	3034.40	MDT 127K	2" MDT ALUMINUM CAPS SET ON A 5/8" X 30" REBAR STAMPED WITH POINT NAME AND YEAR SET
12712	1553169.884	794182.253	3031.95	MDT 127L	2" MDT ALUMINUM CAPS SET ON A 5/8" X 30" REBAR STAMPED WITH POINT NAME AND YEAR SET
12810	1553197.800	793834.938	3013.58	MDT 128J	2" MDT ALUMINUM CAPS SET ON A 5/8" X 30" REBAR STAMPED WITH POINT NAME AND YEAR SET
12811	1553166.538	793490.539	3013.87	MDT 128K	2" MDT ALUMINUM CAPS SET ON A 5/8" X 30" REBAR STAMPED WITH POINT NAME AND YEAR SET
12812	1553249.022	792836.784	3030.88	MDT 128L	2" MDT ALUMINUM CAPS SET ON A 5/8" X 30" REBAR STAMPED WITH POINT NAME AND YEAR SET
12813	1553281.727	792453.571	3030.87	MDT 128M	2" MDT ALUMINUM CAPS SET ON A 5/8" X 30" REBAR STAMPED WITH POINT NAME AND YEAR SET
12814	1553274.315	791874.094	3036.81	MDT 128N	2" MDT ALUMINUM CAPS SET ON A 5/8" X 30" REBAR STAMPED WITH POINT NAME AND YEAR SET
12815	1553377.290	791090.371	3044.02	MDT 128O	2" MDT ALUMINUM CAPS SET ON A 5/8" X 30" REBAR STAMPED WITH POINT NAME AND YEAR SET
12816	1553380.531	790300.338	3085.61	MDT 128P	2" MDT ALUMINUM CAPS SET ON A 5/8" X 30" REBAR STAMPED WITH POINT NAME AND YEAR SET
12817	1553455.771	789023.147	3084.60	MDT 128Q	2" MDT ALUMINUM CAPS SET ON A 5/8" X 30" REBAR STAMPED WITH POINT NAME AND YEAR SET
12904	1550807.136	784170.026	3304.57	MDT 129D	2" MDT ALUMINUM CAPS SET ON A 5/8" X 30" REBAR STAMPED WITH POINT NAME AND YEAR SET
12910	1553503.319	788160.261	3101.16	MDT 129J	2" MDT ALUMINUM CAPS SET ON A 5/8" X 30" REBAR STAMPED WITH POINT NAME AND YEAR SET
12911	1553502.961	787554.969	3101.15	MDT 129K	2" MDT ALUMINUM CAPS SET ON A 5/8" X 30" REBAR STAMPED WITH POINT NAME AND YEAR SET
12912	1553273.687	786849.271	3129.96	MDT 129L	2" MDT ALUMINUM CAPS SET ON A 5/8" X 30" REBAR STAMPED WITH POINT NAME AND YEAR SET
12913	1552298.283	785696.934	3183.73	MDT 129M	2" MDT ALUMINUM CAPS SET ON A 5/8" X 30" REBAR STAMPED WITH POINT NAME AND YEAR SET
12925	1553044.914	786415.459	3162.26	MDT 129Y	2" MDT ALUMINUM CAPS SET ON A 5/8" X 30" REBAR STAMPED WITH POINT NAME AND YEAR SET
13005	1551585.784	780091.536	3184.86	MDT 130E	2" MDT ALUMINUM CAPS SET ON A 5/8" X 30" REBAR STAMPED WITH POINT NAME AND YEAR SET
13010	1550541.335	783595.174	3307.74	MDT 130J	2" MDT ALUMINUM CAPS SET ON A 5/8" X 30" REBAR STAMPED WITH POINT NAME AND YEAR SET
13011	1551523.798	781287.900	3177.30	MDT 130K	2" MDT ALUMINUM CAPS SET ON A 5/8" X 30" REBAR STAMPED WITH POINT NAME AND YEAR SET
13023	1550350.121	783368.445	3290.96	MDT 130W	2" MDT ALUMINUM CAPS SET ON A 5/8" X 30" REBAR STAMPED WITH POINT NAME AND YEAR SET
13024	1550401.194	782514.419	3233.73	MDT 130X	2" MDT ALUMINUM CAPS SET ON A 5/8" X 30" REBAR STAMPED WITH POINT NAME AND YEAR SET
13025	1551258.401	781857.219	3202.55	MDT 130Y	2" MDT ALUMINUM CAPS SET ON A 5/8" X 30" REBAR STAMPED WITH POINT NAME AND YEAR SET
13110	1551549.565	778900.567	3182.15	MDT 131J	2" MDT ALUMINUM CAPS SET ON A 5/8" X 30" REBAR STAMPED WITH POINT NAME AND YEAR SET
13111	1550488.705	776072.709	3109.59	MDT 131K	2" MDT ALUMINUM CAPS SET ON A 5/8" X 30" REBAR STAMPED WITH POINT NAME AND YEAR SET
13112	1549977.551	774574.180	3118.50	MDT 131L	2" MDT ALUMINUM CAPS SET ON A 5/8" X 30" REBAR STAMPED WITH POINT NAME AND YEAR SET
13124	1551634.903	777924.617	3156.78	MDT 131X	2" MDT ALUMINUM CAPS SET ON A 5/8" X 30" REBAR STAMPED WITH POINT NAME AND YEAR SET
13125	1551455.294	777046.203	3143.46	MDT 131Y	2" MDT ALUMINUM CAPS SET ON A 5/8" X 30" REBAR STAMPED WITH POINT NAME AND YEAR SET
13126	1550041.955	775042.651	3110.49	MDT 131Z	2" MDT ALUMINUM CAPS SET ON A 5/8" X 30" REBAR STAMPED WITH POINT NAME AND YEAR SET
13202	1549037.766	772578.415	3099.20	MDT 132B	2" MDT ALUMINUM CAPS SET ON A 5/8" X 30" REBAR STAMPED WITH POINT NAME AND YEAR SET
13203	1549120.226	772000.978	3069.03	MDT 132C	2" MDT ALUMINUM CAPS SET ON A 5/8" X 30" REBAR STAMPED WITH POINT NAME AND YEAR SET
13310	1550364.954	768899.950	3022.91	MDT 133J	2" MDT ALUMINUM CAPS SET ON A 5/8" X 30" REBAR STAMPED WITH POINT NAME AND YEAR SET
50104	1549427.960	794910.577	3033.85	MDT D501	NGS BRASS DISC
50106	1553470.230	789811.867	3087.68	MDT F501	NGS BRASS DISC
50107	1551707.646	785009.964	3217.20	MDT G501	NGS BRASS DISC
50110	1551608.399	778562.065	3182.19	MDT J501	NGS BRASS DISC
50111	1549717.438	773727.294	3114.33	MDT K501	NGS BRASS DISC
50112	1550204.167	769536.281	3018.91	MDT L501	NGS BRASS DISC
50116	1563281.178	761864.380	3041.74	MDT P501	NGS BRASS DISC
620	1549921.736	770223.863	3018.39	MDT T-6	5/8" REBAR WITH MDOT ALUMINUM CONTROL CAP STAMPED "T-6 1992"

10001	1562703.118	796926.339	3236.43	EBY 1	3.25" EBY AC
10002	1551322.963	786661.390	3433.79	EBY 2	3.25" EBY AC
10003	1546356.553	797769.914	3035.21	EBY 3	5/8" REBAR
10004	1547285.783	793044.062	3091.88	EBY 4	5/8" REBAR
10005	1552343.977	801953.944	3052.08	EBY 5	5/8" REBAR
10006	1563868.692	792882.993	3087.41	EBY 6	5/8" REBAR
10007	1564031.859	791240.402	3107.60	EBY 7	5/8" REBAR
10008	1561393.717	793960.936	3000.95	EBY 8	5/8" REBAR
10009	1559956.560	794242.013	3006.02	EBY 9	5/8" REBAR
10010	1557276.507	791955.048	3000.04	EBY 10	5/8" REBAR
10011	1555902.655	793303.334	3043.57	EBY 11	MAGNAIL
10012	1555629.251	797148.627	3054.49	EBY 12	5/8" REBAR
10013	1555486.129	799816.409	3046.57	EBY 13	5/8" REBAR
10014	1553859.315	804650.051	3079.26	EBY 14	MAGNAIL
10015	1551519.337	799517.791	3068.30	EBY 15	1.25 YPC C4
10016	1551374.729	801803.700	3059.91	EBY 16	MAGNAIL
10017	1554878.060	789686.045	3036.35	EBY 17	5/8" REBAR
10018	1559135.042	786640.660	3003.26	EBY 18	5/8" REBAR
10019	1556426.907	786390.806	3093.88	EBY 19	5/8" REBAR
10020	1546249.144	803698.029	3055.42	EBY 20	5/8" REBAR
10021	1546151.908	799911.289	3028.05	EBY 21	5/8" REBAR
10022	1542100.355	801737.812	3036.87	EBY 22	5/8" REBAR
10023	1537892.838	803509.385	3045.01	EBY 23	5/8" REBAR
10024	1538264.878	799799.367	3039.00	EBY 24	5/8" REBAR
10025	1542628.315	798988.014	3029.61	EBY 25	5/8" REBAR
10026	1540520.338	796608.070	3060.75	EBY 26	5/8" REBAR
10027	1538519.769	796896.219	3079.92	EBY 27	5/8" REBAR
10028	1540602.558	792263.441	3168.55	EBY 28	5/8" REBAR
10029	1540713.618	789179.725	3125.65	EBY 29	5/8" REBAR
10030	1546963.587	790692.351	3141.84	EBY 30	5/8" REBAR
10031	1549738.005	789223.797	3150.51	EBY 31	5/8" REBAR
10032	1551287.889	792870.236	3041.84	EBY 32	MAGNAIL
10033	1550724.411	795390.674	3035.82	EBY 33	1.25" RPC
10034	1549793.305	785700.966	3199.22	EBY 34	5/8" REBAR
10035	1552037.177	786252.900	3244.67	EBY 35	5/8" REBAR
10036	1561079.440	797653.063	3103.05	EBY 36	5/8" REBAR
10038	1552078.758	797564.167	3033.82	EBY 38	SPIKE IN PAVEMENT
10039	1552143.825	797498.815	3034.70	EBY 39	WHITEFISH 1959
10040	1546817.023	796936.319	3033.59	EBY 40	5/8" REBAR
10101	1538286.246	799989.972	3035.89	EBY 101	NGS BRASS DISC "L509"
11005	1555093.520	793933.719	3039.95	MDT 0E	2" MDT ALUMINUM CAPS SET ON A 5/8" X 30" REBAR STAMPED WITH POINT NAME AND YEAR SET
11006	1556639.358	793980.743	3051.46	MDT 0F	2" MDT ALUMINUM CAPS SET ON A 5/8" X 30" REBAR STAMPED WITH POINT NAME AND YEAR SET
11101	1558212.815	794073.121	3060.51	MDT 1A	2" MDT ALUMINUM CAPS SET ON A 5/8" X 30" REBAR STAMPED WITH POINT NAME AND YEAR SET
11102	1559067.102	794125.147	3043.51	MDT 1B	2" MDT ALUMINUM CAPS SET ON A 5/8" X 30" REBAR STAMPED WITH POINT NAME AND YEAR SET
11201	1560583.946	794212.842	3009.04	MDT 2A	2" MDT ALUMINUM CAPS SET ON A 5/8" X 30" REBAR STAMPED WITH POINT NAME AND YEAR SET
11202	1562059.338	794291.430	3020.24	MDT 2B	2" MDT ALUMINUM CAPS SET ON A 5/8" X 30" REBAR STAMPED WITH POINT NAME AND YEAR SET
11203	1562834.777	794338.813	3035.55	MDT 2C	2" MDT ALUMINUM CAPS SET ON A 5/8" X 30" REBAR STAMPED WITH POINT NAME AND YEAR SET
11301	1563699.266	793744.532	3096.15	MDT 3A	2" MDT ALUMINUM CAPS SET ON A 5/8" X 30" REBAR STAMPED WITH POINT NAME AND YEAR SET
11302	1563802.969	793144.403	3082.63	MDT 3B	2" MDT ALUMINUM CAPS SET ON A 5/8" X 30" REBAR STAMPED WITH POINT NAME AND YEAR SET
11303	1563920.504	791406.918	3107.82	MDT 3C	2" MDT ALUMINUM CAPS SET ON A 5/8" X 30" REBAR STAMPED WITH POINT NAME AND YEAR SET
11401	1564326.993	790828.273	3115.48	MDT 4A	2" MDT ALUMINUM CAPS SET ON A 5/8" X 30" REBAR STAMPED WITH POINT NAME AND YEAR SET
11402	1565069.989	790641.155	3121.78	MDT 4B	2" MDT ALUMINUM CAPS SET ON A 5/8" X 30" REBAR STAMPED WITH POINT NAME AND YEAR SET
11403	1565810.049	790547.977	3126.76	MDT 4C	2" MDT ALUMINUM CAPS SET ON A 5/8" X 30" REBAR STAMPED WITH POINT NAME AND YEAR SET

30022	1552991.264	792884.042	3017.92	6TH 22	5/8" REBAR WITH RED PLASTIC CAP "RPA CONTROL"
30023	1552859.333	792717.708	3029.53	6TH 23	5/8" REBAR WITH RED PLASTIC CAP "RPA CONTROL"
30024	1552495.315	792727.587	3029.59	6TH 24	5/8" REBAR WITH RED PLASTIC CAP "RPA CONTROL"
30025	1552168.547	792918.422	3037.45	6TH 25	5/8" REBAR WITH RED PLASTIC CAP "RPA CONTROL"
30026	1551922.197	792878.327	3039.67	6TH 26	MAGNAIL
30027	1551879.426	793287.740	3032.82	6TH 27	5/8" REBAR WITH RED PLASTIC CAP "RPA CONTROL"
30028	1551611.866	793264.495	3019.40	6TH 28	5/8" REBAR WITH RED PLASTIC CAP "RPA CONTROL"
30029	1551561.107	793612.204	3007.66	6TH 29	MAGNAIL
30030	1551407.822	794018.775	3027.33	6TH 30	5/8" REBAR WITH RED PLASTIC CAP "RPA CONTROL"
30031	1551424.875	794413.444	3016.05	6TH 31	5/8" REBAR WITH RED PLASTIC CAP "RPA CONTROL"
31001	1552420.923	798575.114	3020.14	EASTSIDE 1	5/8" REBAR WITH RED PLASTIC CAP "RPA CONTROL"
31002	1552893.991	798578.270	3029.44	EASTSIDE 2	5/8" REBAR WITH RED PLASTIC CAP "RPA CONTROL"
31003	1553083.834	798394.283	3022.34	EASTSIDE 3	5/8" REBAR WITH RED PLASTIC CAP "RPA CONTROL"
31004	1553186.294	798373.637	3021.62	EASTSIDE 4	5/8" REBAR WITH RED PLASTIC CAP "RPA CONTROL"
31005	1553375.896	798394.398	3038.25	EASTSIDE 5	5/8" REBAR WITH RED PLASTIC CAP "RPA CONTROL"
31006	1553685.684	798378.482	3024.11	EASTSIDE 6	5/8" REBAR WITH RED PLASTIC CAP "RPA CONTROL"
31007	1553868.989	798453.150	3047.06	EASTSIDE 7	5/8" REBAR WITH RED PLASTIC CAP "RPA CONTROL"
31008	1554082.938	798437.919	3046.88	EASTSIDE 8	5/8" REBAR WITH RED PLASTIC CAP "RPA CONTROL"
31009	1554222.487	798454.314	3033.39	EASTSIDE 9	5/8" REBAR WITH RED PLASTIC CAP "RPA CONTROL"
31010	1553442.706	798641.209	3042.63	EASTSIDE 10	5/8" REBAR WITH RED PLASTIC CAP "RPA CONTROL"
31011	1552876.035	798294.686	3027.02	EASTSIDE 11	5/8" REBAR WITH RED PLASTIC CAP "RPA CONTROL"
31012	1552868.441	798945.724	3045.06	EASTSIDE 12	5/8" REBAR WITH RED PLASTIC CAP "RPA CONTROL"
31013	1552027.113	798958.773	3040.20	EASTSIDE 13	5/8" REBAR WITH RED PLASTIC CAP "RPA CONTROL"
31014	1551527.066	799101.554	3044.53	EASTSIDE 14	5/8" REBAR WITH RED PLASTIC CAP "RPA CONTROL"

APPENDIX 1

AutoCAD Layer Convention

Appendix I

AutoCAD As-Built Layering Convention

Layer Description	Layer Name
Control, New	
Control Point	C-CONTROL
Control, Existing	
Control Point	E-CONTROL
Property, All	
ROW	C-PROPERTY-ROW
Easements	C-PROPERTY-EASEMENTS
Parcels	C-PROPERTY-PARCELS
Sewer, New Construction	
Casing	C-SEWER-CASING
Clean Out	C-SEWER-CLEAN OUT
Fitting (transition, sleeve, reducer, cap)	C-SEWER-FITTING (TRANSITION_SLEEVE_REDUCER_CAP)
Lateral, Gravity	C-SEWER-LATERAL (GRAVITY)
Lateral, Pressure	C-SEWER-LATERAL (PRESSURE)
Lift Station	C-SEWER-LIFT STATION
Main, Gravity	C-SEWER-MAIN (GRAVITY)
Main, Pressure	C-SEWER-MAIN (PRESSURE)
Manhole	C-SEWER-MANHOLE
Pump	C-SEWER-PUMP
Valve, Control	C-SEWER-VALVE (CONTROL)
Valve, System	C-SEWER-VALVE (SYSTEM)
Water Distribution, New Construction	
Booster Pump	C-WATER-BOOSTER PUMP
Casing	C-WATER-CASING
Fitting (transition, sleeve, reducer, cap)	C-WATER-FITTING (TRANSITION_SLEEVE_REDUCER_CAP)
Hydrant	C-WATER-HYDRANT
Lateral, domestic/industrial/irrigation	C-WATER-LATERAL (DOMESTIC_INDUSTRIAL_IRRIGATION)
Lateral, Fire Service	C-WATER-LATERAL (FIRE SERVICE)
Lateral, Hydrant	C-WATER-LATERAL (HYDRANT)
Main	C-WATER-MAIN
Meter/ Meter Pit	C-WATER-METER_METER PIT
Reservoir/ Tank	C-WATER-RESERVIOR_TANK
Service Connection	C-WATER-SERVICE CONNECTION
Valve, Control	C-WATER-VALVE (CONTROL)

Valve, Curb Stop	C-WATER-VALVE (CURB STOP)
Valve, System	C-WATER-VALVE (SYSTEM)
Storm, New Construction	
Casing	C-STORM-CASING
Clean Out	C-STORM-CLEAN OUT
Culvert	C-STORM-CULVERT
Detention Area	C-STORM-DETENTION AREA
Discharge Point (outfall, overflow)	C-STORM-DISCHARGE POINT (OUTFALL_OVERFLOW)
Discharge Structure	C-STORM-DISCHARGE STRUCTURE
Filter Structure	C-STORM-FILTER STRUCTURE
Fitting (transition, sleeve, reducer, cap)	C-STORM-FITTING (TRANSITION_SLEEVE_REDUCER_CAP)
Inlet	C-STORM-INLET
Lateral (groundwater/sump pump collection)	C-STORM-LATERAL (GROUNDWATER_SUMP PUMP COLLECTION)
Main, Gravity	C-STORM-MAIN (GRAVITY)
Main, Pressure	C-STORM-MAIN (PRESSURE)
Manhole	C-STORM-MANHOLE
Manhole, Combo Inlet	C-STORM-MANHOLE_COMBO INLET
Open Drain	C-STORM-OPEN DRAIN
Valve, Control	C-STORM-VALVE (CONTROL)
Valve, System	C-STORM-VALVE (SYSTEM)
Weir Structure	C-STORM-WEIR STRUCTURE
Streets, New Construction	
Curb and Gutter	C-STREETS-CURB AND GUTTER
Ground Pull box	C-STREETS-GROUND PULL BOX
Light Pole/Lamp	C-STREETS-LIGHT POLE_LAMP
Light Service	C-STREETS-LIGHT SERVICE
Pavement	C-STREETS-PAVEMENT
Sidewalk/Path	C-STREETS-SIDEWALK_PATH
Signal	C-STREETS-SIGNAL
Signal Cabinet	C-STREETS-SIGNAL CABINET
Signs	C-STREETS-SIGNS
Street Furniture	C-STREETS-STREET FURNITURE
Landscaping, New Construction	
Ground Box	C-LANDSCAPING-GROUND BOX
Irrigation Controller	C-LANDSCAPING-IRRIGATION CONTROLLER
Irrigation Line	C-LANDSCAPING-IRRIGATION LINE
Manhole	C-LANDSCAPING-MANHOLE
Trees/shrubs	C-LANDSCAPING-TREES_SHRUBS

Sewer, Existing	
Casing	E-SEWER-CASING
Clean Out	E-SEWER-CLEAN OUT
Fitting (transition, sleeve, reducer, cap)	E-SEWER-FITTING (TRANSITION_SLEEVE_REDUCER_CAP)
Lateral, Gravity	E-SEWER-LATERAL (GRAVITY)
Lateral, Pressure	E-SEWER-LATERAL (PRESSURE)
Lift Station	E-SEWER-LIFT STATION
Main, Gravity	E-SEWER-MAIN (GRAVITY)
Main, Pressure	E-SEWER-MAIN (PRESSURE)
Manhole	E-SEWER-MANHOLE
Pump	E-SEWER-PUMP
Valve, Control	E-SEWER-VALVE (CONTROL)
Valve, System	E-SEWER-VALVE (SYSTEM)
Water Distribution, Existing	
Booster Pump	E-WATER-BOOSTER PUMP
Casing	E-WATER-CASING
Fitting (transition, sleeve, reducer, cap)	E-WATER-FITTING (TRANSITION_SLEEVE_REDUCER_CAP)
Hydrant	E-WATER-HYDRANT
Lateral, domestic/industrial/irrigation	E-WATER-LATERAL (DOMESTIC_INDUSTRIAL_IRRIGATION)
Lateral, Fire Service	E-WATER-LATERAL (FIRE SERVICE)
Lateral, Hydrant	E-WATER-LATERAL (HYDRANT)
Main	E-WATER-MAIN
Meter/ Meter Pit	E-WATER-METER_METER PIT
Reservoir/ Tank	E-WATER-RESERVIOR_TANK
Service Connection	E-WATER-SERVICE CONNECTION
Valve, Control	E-WATER-VALVE (CONTROL)
Valve, Curb Stop	E-WATER-VALVE (CURB STOP)
Valve, System	E-WATER-VALVE (SYSTEM)
Storm, Existing	
Casing	E-STORM-CASING
Clean Out	E-STORM-CLEAN OUT
Culvert	E-STORM-CULVERT
Detention Area	E-STORM-DETENTION AREA
Discharge Point (outfall, overflow)	E-STORM-DISCHARGE POINT (OUTFALL_OVERFLOW)
Discharge Structure	E-STORM-DISCHARGE STRUCTURE
Filter Structure	E-STORM-FILTER STRUCTURE
Fitting (transition, sleeve, reducer, cap)	E-STORM-FITTING (TRANSITION_SLEEVE_REDUCER_CAP)
Inlet	E-STORM-INLET
Lateral (groundwater/sump pump collection)	E-STORM-LATERAL (GROUNDWATER_SUMP PUMP COLLECTION)
Main, Gravity	E-STORM-MAIN (GRAVITY)

Main, Pressure	E-STORM-MAIN (PRESSURE)
Manhole	E-STORM-MANHOLE
Manhole, Combo Inlet	E-STORM-MANHOLE_COMBO INLET
Open Drain	E-STORM-OPEN DRAIN
Valve, Control	E-STORM-VALVE (CONTROL)
Valve, System	E-STORM-VALVE (SYSTEM)
Weir Structure	E-STORM-WEIR STRUCTURE
Streets, Existing	
Curb and Gutter	E-STREETS-CURB AND GUTTER
Ground Pull box	E-STREETS-GROUND PULL BOX
Light Pole/Lamp	E-STREETS-LIGHT POLE_LAMP
Light Service	E-STREETS-LIGHT SERVICE
Pavement	E-STREETS-PAVEMENT
Sidewalk/Path	E-STREETS-SIDEWALK_PATH
Signal	E-STREETS-SIGNAL
Signal Cabinet	E-STREETS-SIGNAL CABINET
Signs	E-STREETS-SIGNS
Street Furniture	E-STREETS-STREET FURNITURE
Landscaping, Existing	
Ground Box	E-LANDSCAPING-GROUND BOX
Irrigation Controller	E-LANDSCAPING-IRRIGATION CONTROLLER
Irrigation Line	E-LANDSCAPING-IRRIGATION LINE
Manhole	E-LANDSCAPING-MANHOLE
Trees/shrubs	E-LANDSCAPING-TREES_SHRUBS

APPENDIX J

Weekly Construction Inspection Report

Appendix J

	CONSTRUCTION PROGRESS AND INSPECTION REPORT	Period Ending Date, 2007
Project Name <p style="text-align: center;">Project, Whitefish, MT</p>		
Project Description Excavation, Water Line, Sewer Line, Storm Drain, Paving and Sidewalk Construction		Contractor's Name Construction Company, Inc. Kalispell, MT
1. Rough Estimate of Percent Completion to Date of Construction Phases <i>(Include items such as clearing, grading, drainage, base, surface, lighting, etc.)</i>		
2. Work Completed or in Progress this period		
3. Brief Weather Summary This Period Including Approximate Rainfall and Periods of Below Freezing Temperature <i>(On earthwork jobs include soil conditions)</i>		
4. Contract Time		5. Summary of Laboratory and Field Testing This Period <i>(note failing tests and any retests Summarize out-of-tolerance material. Identify material subject to pay reduction.)</i>
No Days Charged To Date	Last Working Day Charged (Date)	
6. Describe Anticipated Work by Contractor for Next Period		
7. Problem Areas/Other Comments <i>(Revisions to plans and specifications approved or denied, delays, difficulties, etc. and actions taken.)</i>		
SPONSOR'S INSPECTOR OR REPRESENTATIVE		
Date	Typed of Printed Name and Title	Signature

APPENDIX K

Preconstruction Meeting

Appendix K

PRECONSTRUCTION CONFERENCE AGENDA

Project Name:

Project Number:

Date:

Time:

Location:

Attendees: *(Sign in on sheet)*

Discussion

1. Project Organization:

Owner:

Engineer:

Contractor:

Subcontractors:

Utility Company Representatives:

Gas:

Electric:

Telephone:

Cable TV:

2. Purpose of Meeting

- Introduce and designate responsible personnel
- Establish working relationship
- Discuss project requirements
- Coordination with Utility Companies

3. Contractor's Tentative Schedule

Contract Time:

Start Date:

Completion Date:

Normal Work Week:

4. **Contractor's Submittals**
 - Construction Schedules
 - Traffic Plan
 - Other Technical Specification sections
 - Substitutions

5. **Applications for Payment**
 - Review of General Conditions
 - Review of Measurement and Payment
 - Materials on site

6. **Specific Requirements and Procedures**
 - Traffic Control
 - Adjacent Construction Activities
 - Certified payrolls
 - Temporary Construction Permits

7. **Critical Work Sequencing**
 - Material ordering and delivery
 - Utility Companies related work

8. **Field Decisions, Work Directives, and Change Orders**
 - Review of General Conditions

9. **Use of Premises, Storage Areas, Security, Field Office**

10. **Contractor's Assignments for Safety and First Aid**
 - Review Safety Standards

11. **Progress Meetings**

12. **Inspection and Testing**
 - Review Special Provisions No. 7

13. **Comments by Other Representatives**
 - Owner's Representative
 - Utility Companies

APPENDIX L

Municipal Facilities Exclusion Checklist



MONTANA DEPARTMENT OF ENVIRONMENTAL QUALITY
MUNICIPAL FACILITIES EXCLUSION

Subdivision Name: _____ Number of lots/parcels/units: __/__/__

Geocode: _____ (this can be found at http://svc.mt.gov/msl/mtcadastral)

Are main extensions necessary to serve the subdivision? __Yes __No If yes, have plans for the mains been submitted for review? __Yes __No

How will construction of the facilities be financed? _____

Owner Information:

Owner(s) Name: _____

Print name of owner(s)

Signature of all owners of record

Address: _____

Street or PO Box, City, State, Zip Code

Email: _____ Phone: _____

Consultant Information:

Company and Address: _____

Email: _____ Phone: _____

Eligibility Requirements:

All of the following criteria must be met:

- The project must be provided with adequate municipal WSD water and sewer, solid waste disposal and the municipality must review storm water plans.
- All the mains necessary to serve the subdivision must be municipality owned, operated and maintained. Privately owned mains or lift stations make the project ineligible for this exemption.
- The County WSD must be incorporated under Title 7, Chapter 13, MCA.
- The municipality must be a 1st or 2nd class municipality as described in MCA 7-4-111 or covered under a growth policy pursuant to Title 76, chapter 1.

The project must be one of the following (check applicable box):

- A new division subject to review under the Montana Subdivision and Platting Act, or
- Previously divided parcels recorded with Sanitary Restrictions prior to July 1, 1973 or
- Divisions or parcels of land that are exempt from Montana Subdivision and Platting Act review under 76-3-203 or 76-3-207 (1) (a), (b), (d), (e), or (f)

Submittal Requirements:

All of the following items must be submitted:

- _ This form, signed by the property owner, **and** the municipalities' representative.
- _ Copy of Preliminary Plat, COS, Amended Plat or Unit Declaration. The Plat, COS, Am Plat or Unit Declaration must contain the exemption 76-4-125 (1)(d)(i), (ii) or (iii). If using item (iii), the Plat, COS, Am Plat or Unit Declaration must also contain the appropriate Platting Act exemption.
- _ Vicinity map showing project location.
- _ Applicable zoning ordinances in effect ____ on file
- _ Copy of growth policy, if applicable ____ on file
- _ \$120 processing fee

Certification:

I hereby certify that I am licensed to practice engineering in the State of Montana, I am employed directly or retained by the municipality providing service and am authorized to sign on behalf of the municipality. In addition, I hereby certify that:

1. The existing water and wastewater systems are in compliance with the provisions of Title 75, chapters 5 and 6, and
2. The water and wastewater systems have adequate capacity to meet the needs of the project, and
3. The municipality has or will review plans to ensure adequate storm water drainage and adequate solid waste disposal.

(Signature of Professional Engineer)

(Date Signed)

Montana P.E. Number _____

PE Stamp

Send to: MTDEQ

PO Box 200901

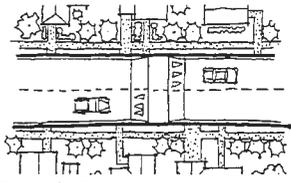
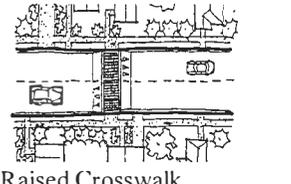
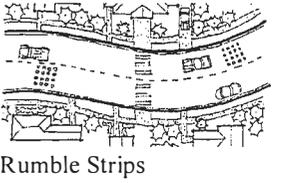
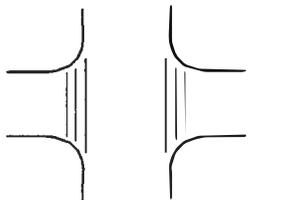
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APPENDIX M

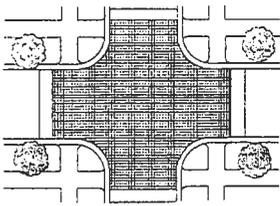
Traffic Calming

Appendix M

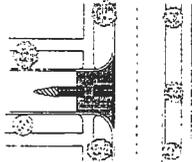
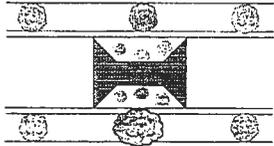
Table 7-1 Types of Traffic Calming Measures

Vertical Deflection				
Measure	Definition/Application	Advantages	Disadvantages	Special Considerations
 <p>Speed Hump</p>	<p>Paved hump in the street that causes discomfort at high speeds.</p> <ul style="list-style-type: none"> • Speed reduction • Possible traffic reduction 	<ul style="list-style-type: none"> • Effective if used in series at 300 to 500 foot spacing. • Self-enforcing. • Relatively inexpensive. 	<ul style="list-style-type: none"> • If not properly designed, drivers may skirt around to reduce impact. • Drivers may speed up between humps. • May increase volumes on other streets. • Difficult to properly construct. 	<ul style="list-style-type: none"> • Emergency vehicles • Drainage • Signage • Snow removal <p>Estimated Cost Range = \$1,000 to \$2,000</p>
 <p>Raised Crosswalk</p>	<p>Speed hump designed as a pedestrian crossing.</p> <ul style="list-style-type: none"> • Speed reduction at crossing • Possible traffic reduction 	<ul style="list-style-type: none"> • Highlights crosswalk. • Excellent pedestrian safe treatment. • Aesthetically pleasing if designed. • Relatively inexpensive. 	<ul style="list-style-type: none"> • Drivers may speed up between humps. • May increase volumes on other streets. • Difficult to properly construct. 	<ul style="list-style-type: none"> • Emergency vehicles • Drainage • Signage • Snow removal <p>Estimated Cost Range = \$1,000 to \$2,000</p>
 <p>Rumble Strips</p>	<p>Patterned sections of rough pavement.</p> <ul style="list-style-type: none"> • Possible speed reduction 	<ul style="list-style-type: none"> • Relatively inexpensive to install. • Create driver awareness. 	<ul style="list-style-type: none"> • High maintenance. • May adversely impact bicyclists. • Noisy by design, and not recommended for all areas. 	<ul style="list-style-type: none"> • Emergency vehicles <p>Estimated Cost Range = \$1,000 to \$2,000</p>
 <p>Surface Valley Gutters</p>	<p>Dips in the street that can be used to carry run-off as well as cause discomfort to drivers at high speeds.</p> <ul style="list-style-type: none"> • Speed reduction • Possible traffic reduction 	<ul style="list-style-type: none"> • Effective if used in series at 300 to 500 foot spacing. • Self-enforcing. • Relatively inexpensive during initial construction. 	<ul style="list-style-type: none"> • Drivers may speed up between dips. • May increase volumes on other streets. • Not usually appropriate for existing streets with established drainage patterns. 	<ul style="list-style-type: none"> • Emergency vehicles • Drainage • Signage <p>Estimated Cost Range = \$1,000 to \$2,000</p>

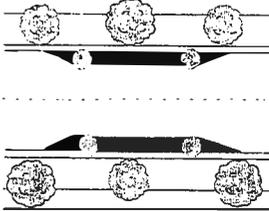
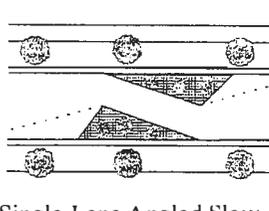
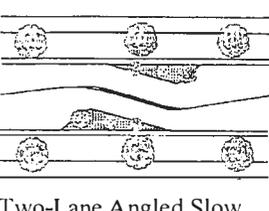
Vertical Deflection

Measure	Definition/Application	Advantages	Disadvantages	Special Considerations
 <p>Raised Intersection</p>	<p>Raised plateau where streets intersect.</p> <ul style="list-style-type: none"> • Speed reduction • Possible traffic reduction 	<ul style="list-style-type: none"> • Slows vehicles in the most critical area, reducing conflict. • Highlights intersection. • Excellent pedestrian safety treatment. • Aesthetically pleasing if well designed. • Better for emergency vehicles than speed humps. 	<ul style="list-style-type: none"> • Increases difficulty of making a turn. • Increased maintenance. • Requires adequate signage and driver education. 	<ul style="list-style-type: none"> • Emergency vehicles • Drainage • Signage • Snow removal <p>Estimated Cost Range = \$4,000 to \$6,000</p>

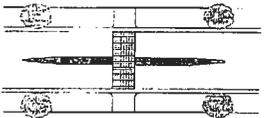
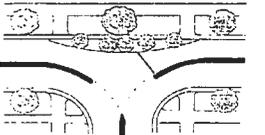
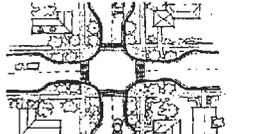
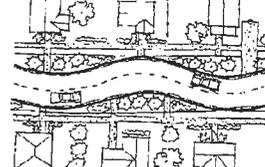
Horizontal Deflection

Measure	Definition/Application	Advantages	Disadvantages	Special Considerations
 <p>Gateway Treatment</p>	<p>Entry treatment that communicates a sense of neighborhood identity and a change in traffic conditions.</p> <ul style="list-style-type: none"> • Speed reduction at entry • Traffic reduction 	<ul style="list-style-type: none"> • Positive indication of a change in environment from arterial road to residential street. • Reduces pedestrian crossing distances. • On wide streets, provides space for landscaping in the median. 	<ul style="list-style-type: none"> • Low speed of turning vehicles may restrict flow on adjacent arterial. 	<ul style="list-style-type: none"> • Emergency vehicle access • Lighting • Irrigation and maintenance of landscaping <p>Estimated Cost Range = \$5,000 to \$25,000</p>
 <p>Lane Narrowing</p>	<p>Mid-block expansion of landscaped areas and/or on-street parking in order to physically narrow the street to a single traffic lane.</p> <ul style="list-style-type: none"> • Speed Reduction • Traffic Reduction 	<ul style="list-style-type: none"> • Minor inconvenience to drivers. • Minimal inconvenience to local traffic. • Shorter crossing distance for pedestrians. • Provides space for landscaping. • Effective when used in series. 	<ul style="list-style-type: none"> • Unfriendly to bicyclists unless designed to accommodate them. • Conflict between opposing drivers arriving simultaneously could create problems. • Contrary to driver expectation of unobstructed flow. 	<ul style="list-style-type: none"> • Emergency vehicle access • Lighting • Signage • Irrigation and maintenance of landscaping <p>Estimated Cost Range = \$8,000 to \$20,000</p>

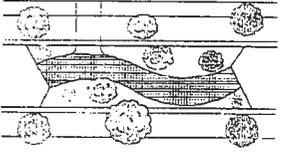
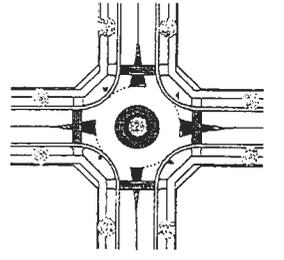
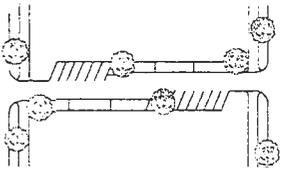
Horizontal Deflection

Measure	Definition/Application	Advantages	Disadvantages	Special Considerations
 <p>Two-Lane Slow Point</p>	<p>Mid-block expansion of landscaped areas and/or on-street parking in order to physically narrow the street.</p> <ul style="list-style-type: none"> • Speed reduction • Possible traffic reduction 	<ul style="list-style-type: none"> • Minor inconvenience to drivers. • Regulates parking if bulb-outs are placed in no parking zones. • Protects parked vehicles. • Reduces pedestrian crossing distance. • Provides space for landscaping. 	<ul style="list-style-type: none"> • Less effective in reducing speed and diverting traffic than the single-lane application. • Unfriendly to bicyclists unless designed to accommodate them. 	<ul style="list-style-type: none"> • Lighting • Signage • Irrigation and maintenance of landscaping <p>Estimated Cost Range = \$8,000 to \$20,000</p>
 <p>Single-Lane Angled Slow Point</p>	<p>Offset curb extensions used to narrow the street to a single lane and create angled deviations in the path of travel.</p> <ul style="list-style-type: none"> • Speed reduction • Traffic reduction 	<ul style="list-style-type: none"> • Minor inconvenience to drivers. • Minimal inconvenience to local traffic. • Shorter crossing distance for pedestrians. • Provides space for landscaping. • Effective when used in series. 	<ul style="list-style-type: none"> • Unfriendly to bicyclists unless designed to accommodate them. • Conflict between opposing drivers arriving simultaneously could create problems. • Contrary to driver expectation of unobstructed flow. 	<ul style="list-style-type: none"> • Emergency vehicle access • Lighting • Signage • Irrigation and maintenance of landscaping <p>Estimated Cost Range = \$8,000 to \$20,000</p>
 <p>Two-Lane Angled Slow Point</p>	<p>Offset curb extensions used to narrow the street and create angled deviations in the path of travel.</p> <ul style="list-style-type: none"> • Speed reduction • Possible traffic reduction 	<ul style="list-style-type: none"> • Same as Single-Lane Angled Slow Point, except pedestrian safety is reduced. 	<ul style="list-style-type: none"> • Same as Single-Lane Angled Slow Point, except less effective in controlling speeds because drivers can create a straighter through movement by driving over centerline. 	<ul style="list-style-type: none"> • Lighting • Signage • Irrigation and maintenance of landscaping <p>Estimated Cost Range = \$8,000 to \$20,000</p>

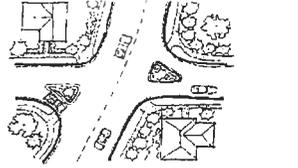
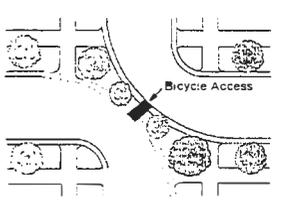
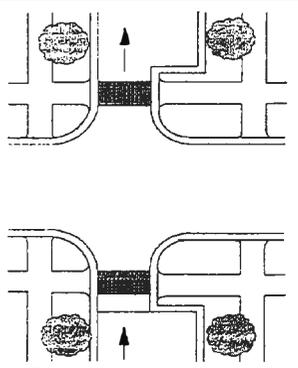
Horizontal Deflection

Measure	Definition/Application	Advantages	Disadvantages	Special Considerations
 <p>Mid-Block Median</p>	<p>Island or barrier in the center of a street that narrows lanes and segregates traffic.</p> <ul style="list-style-type: none"> • Possible speed reduction • Possible traffic reduction 	<ul style="list-style-type: none"> • Provides a refuge for pedestrians and bicyclists. • Can improve the streetscape if landscaped. 	<ul style="list-style-type: none"> • Limited reduction in vehicle speeds. 	<ul style="list-style-type: none"> • Lighting • Signage • Irrigation and maintenance of landscaping <p>Estimated Cost Range = \$5,000 to \$10,000</p>
 <p>Modified "T" Intersection</p>	<p>Modification of "T" intersection layout which gives priority to turning traffic.</p> <ul style="list-style-type: none"> • Speed reduction • Possible traffic reduction 	<ul style="list-style-type: none"> • Reduces through traffic along the top of the "T". • May provide space for landscaping. 	<ul style="list-style-type: none"> • Can cause confusion regarding priority movements, which may lead to accidents. 	<ul style="list-style-type: none"> • Lighting • Signage • Irrigation and maintenance of landscaping <p>Estimated Cost Range = \$5,000 to \$10,000</p>
 <p>Neckdown/Curb Bulbs</p>	<p>Physical curb reduction of road width at an intersection.</p> <ul style="list-style-type: none"> • Speed reduction 	<ul style="list-style-type: none"> • Reduces pedestrian crossing distance. • Can be used in multiple applications or on a single segment of roadway. • Aesthetically pleasing if landscaped. 	<ul style="list-style-type: none"> • Unfriendly to bicyclists unless designed to accommodate them. • Landscaping may cause sight line problems. 	<ul style="list-style-type: none"> • Lighting • Signage • Irrigation and maintenance of landscaping <p>Estimated Cost Range = \$20,000 to \$30,000</p>
 <p>Deviation/Chicanes</p>	<p>Offset curb extensions that cause deviation in the path of travel.</p> <ul style="list-style-type: none"> • Speed reduction • Possible traffic reduction 	<ul style="list-style-type: none"> • Imposes minimal inconvenience on local traffic. • Reduces pedestrian crossing distance. • Provides large area for landscaping. • Reduces speed without significantly increasing emergency response time. • Aesthetically pleasing. 	<ul style="list-style-type: none"> • May create opportunities for head-on conflicts on narrow streets. • Cost is greater than many other devices. • Unfriendly to bicyclists unless designed to accommodate them. 	<ul style="list-style-type: none"> • Lighting • Signage • Irrigation and maintenance of landscaping <p>Estimated Cost Range = \$20,000 to \$30,000</p>

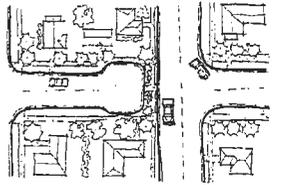
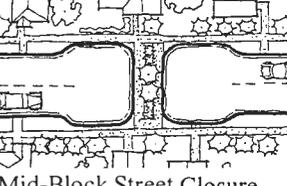
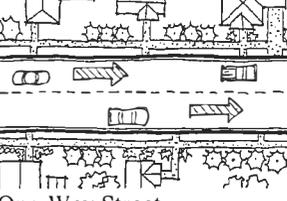
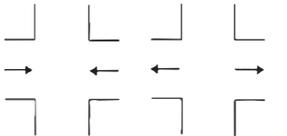
Horizontal Deflection

Measure	Definition/Application	Advantages	Disadvantages	Special Considerations
 <p>Driveway Link</p>	<p>Narrow winding driveway section placed between two standard street segments.</p> <ul style="list-style-type: none"> • Speed reduction • Traffic reduction 	<ul style="list-style-type: none"> • Changes the initial impression of the street. Appears to be a road closure yet allows through movements for local traffic. • Provides a large area for landscaping. 	<ul style="list-style-type: none"> • High cost can be prohibitive. Best installed in conjunction with street reconstruction or initial construction. • Unfriendly to bicyclists unless designed to accommodate them. 	<ul style="list-style-type: none"> • Emergency vehicle access • Lighting • Signage • Irrigation and maintenance of landscaping <p>Estimated Cost Range = \$20,000 to \$50,000</p>
 <p>Traffic Circle/Roundabout</p>	<p>Raised circular area placed in the center of an intersection. Drivers travel in a counter-clockwise direction and are required to yield upon entry.</p> <ul style="list-style-type: none"> • Speed reduction at intersection • Possible traffic reduction 	<ul style="list-style-type: none"> • Reduces accidents by 50% to 90% over stop control. • Provides space for landscaping. • Cheaper to maintain than signals. • Effective at multi-leg intersections. • Provides equal access to intersections for all drivers. • Provides a good environment for bicyclists. 	<ul style="list-style-type: none"> • May be restrictive for larger vehicles if designed to a low speed. (This can be minimized by the use of a mountable apron.) • Right of way may need to be purchased to accommodate left turns by large vehicles. • Initial safety issues as drivers adjust. • May increase volumes on adjacent streets. 	<ul style="list-style-type: none"> • Lighting • Signage • Irrigation and maintenance of landscaping <p>Estimated Cost Range = \$10,000 to \$50,000</p>
 <p>Shared Zone</p>	<p>A block with narrow entry points and high-density parking which functions similarly to a parking lot.</p> <ul style="list-style-type: none"> • Speed reduction • Traffic reduction 	<ul style="list-style-type: none"> • Provides a low speed shared environment that is safe for all users. • Improves amenity without restricting access. • Provides flexibility for on-street parking. 	<ul style="list-style-type: none"> • High cost unless part of original design. • May result in an increased number of low speed accidents. 	<ul style="list-style-type: none"> • Emergency vehicle access • Signage <p>Estimated Cost Range = \$15,000 to \$25,000</p>

Obstruction

Measure	Definition/Application	Advantages	Disadvantages	Special Considerations
 <p>Forced Turn Barriers/ Diverters</p>	<p>Small traffic islands installed at intersections to restrict and channelize turning movements.</p> <ul style="list-style-type: none"> Traffic reduction Possible speed reduction 	<ul style="list-style-type: none"> Changes driving patterns May reduce cut through traffic. May be attractive if landscaped. 	<ul style="list-style-type: none"> May increase trip length for some drivers. May increase response times for emergency vehicles. 	<ul style="list-style-type: none"> Lighting Signage Irrigation and maintenance of landscaping <p>Estimated Cost Range = \$4,000 to \$8,000</p>
 <p>Diagonal Road Closure</p>	<p>Barrier placed diagonally across a four-legged intersection, interrupting traffic flow across the intersection.</p> <ul style="list-style-type: none"> Traffic reduction Speed reduction 	<ul style="list-style-type: none"> Eliminates through traffic Provides area for landscaping. Reduces traffic conflict points. Increases pedestrian safety Can include bicycle path connection. 	<ul style="list-style-type: none"> May inconvenience residents gaining access to their properties. May inhibit access by emergency vehicles. May divert through traffic to other local streets. Altered traffic patterns may increase trip length. 	<ul style="list-style-type: none"> Lighting Signage Irrigation and maintenance of landscaping <p>Estimated Cost Range = \$10,000 to \$20,000</p>
 <p>Partial Street Closure</p>	<p>Blockage of one direction of traffic on a two-way street. The open lane of traffic is signed one-way, and traffic from the blocked lane is not allowed to drive around the barrier in the open lane.</p> <ul style="list-style-type: none"> Traffic reduction Speed reduction 	<ul style="list-style-type: none"> Reduces through traffic in one direction. Allows two-way traffic on the remainder of the street. Shorter crossing distance for pedestrians. Provides space for landscaping. Two-way bicycle access can be maintained. Emergency vehicles can drive around partial closure with care. 	<ul style="list-style-type: none"> Reduces access for residents. Compliance with semi-diverters is not 100%. May increase trip length. 	<ul style="list-style-type: none"> Lighting Signage Irrigation and maintenance of landscaping <p>Estimated Cost Range = \$10,000 to \$20,000 each side of intersection</p>

Obstruction

Measure	Definition/Application	Advantages	Disadvantages	Special Considerations
 <p>Cul-De-Sac/Street Closure</p>	<p>Street closed to motor vehicles at the end of a block using planters, bollards, barriers, etc.</p> <ul style="list-style-type: none"> Traffic reduction Speed reduction 	<ul style="list-style-type: none"> Eliminates through traffic. Improves safety for all street users. Pedestrian and bicycle access maintained. 	<ul style="list-style-type: none"> Reduces emergency vehicle access. Reduces access to properties for residents. May increase trip lengths. May increase volumes on other streets. 	<ul style="list-style-type: none"> Emergency vehicle access Lighting Signage Irrigation and maintenance of landscaping <p>Estimated Cost Range = \$15,000 to \$25,000</p>
 <p>Mid-Block Street Closure</p>	<p>Street closed to motor vehicles mid-block using planters, bollards, barriers, etc.</p> <ul style="list-style-type: none"> Traffic reduction Speed reduction 	<ul style="list-style-type: none"> Eliminates through traffic. Improves safety for all street users. Pedestrian and bicycle access maintained. 	<ul style="list-style-type: none"> Reduces emergency vehicle access. Reduces access to properties for residents. May increase trip lengths. May increase volumes on other streets. 	<ul style="list-style-type: none"> Emergency vehicle access Lighting Signage Irrigation and maintenance of landscaping <p>Estimated Cost Range = \$15,000 to \$25,000</p>
 <p>One-Way Street</p>	<p>Street upon which motor vehicles may operate in just one direction.</p> <ul style="list-style-type: none"> Possible traffic reduction 	<ul style="list-style-type: none"> Increased safety due to lack of opposing traffic. Can be used to open up more resident parking. Maintains reasonable access for emergency vehicles. Can discourage through traffic. 	<ul style="list-style-type: none"> Can lead to increased vehicle speeds. May increase trip lengths. May increase volumes on other streets. Initial safety concerns as drivers adjust. Alternative route must exist. 	<ul style="list-style-type: none"> Signage <p>Estimated Cost Range = \$2,000 to \$3,000</p>
 <p>Imploding/Exploding One-Way Street Intersections</p>	<p>Intersection at which opposing legs carry one-way traffic in different directions.</p> <ul style="list-style-type: none"> Traffic reduction 	<ul style="list-style-type: none"> Increased safety due to lack of opposing traffic. Maintains reasonable access for emergency vehicles. Interrupts the flow of through traffic. 	<ul style="list-style-type: none"> May increase trip lengths. May increase volumes on other streets. Initial safety concerns as drivers adjust. Alternative route must exist. 	<ul style="list-style-type: none"> Signage <p>Estimated Cost Range = \$3,000 to \$5,000</p>

APPENDIX N

Example Maintenance Agreement

Appendix N

Example Maintenance Agreement

Responsible Party

List the party that shall be permanently responsible for the maintenance of structural or non-structural measures required by the Operation Manual. (e.g. owner, governmental agency, or other legal established entity)

Designated personnel for inspection and maintenance:

Name: _____

Address: _____ Contact

Phone: _____ Cell: _____

Property Description

List legal description of property: _____

Operation and Maintenance

Has the Operation and Maintenance Manual been created? Yes No

Responsible Party shall ensure the continued performance of the maintenance obligation in accordance with the Operation and Maintenance Manual.

Failure to Maintain Stormwater Systems

If the required maintenance and repairs are not being performed and inhibit the intended function of the stormwater system the City may hire a contractor to perform the required maintenance and bill the HOA, POA, or responsible property owner.

In the event the HOA, POA, or responsible property owner fail to perform the required maintenance and repairs to the stormwater facility and inhibit the intended function of the stormwater system, a stormwater maintenance district program may be formed in accordance with §7-12-4102 MCA incorporating all the lots within a development. The taxes levied within the maintenance district shall be determined by the Public Works Department with approval by the Whitefish City Council.

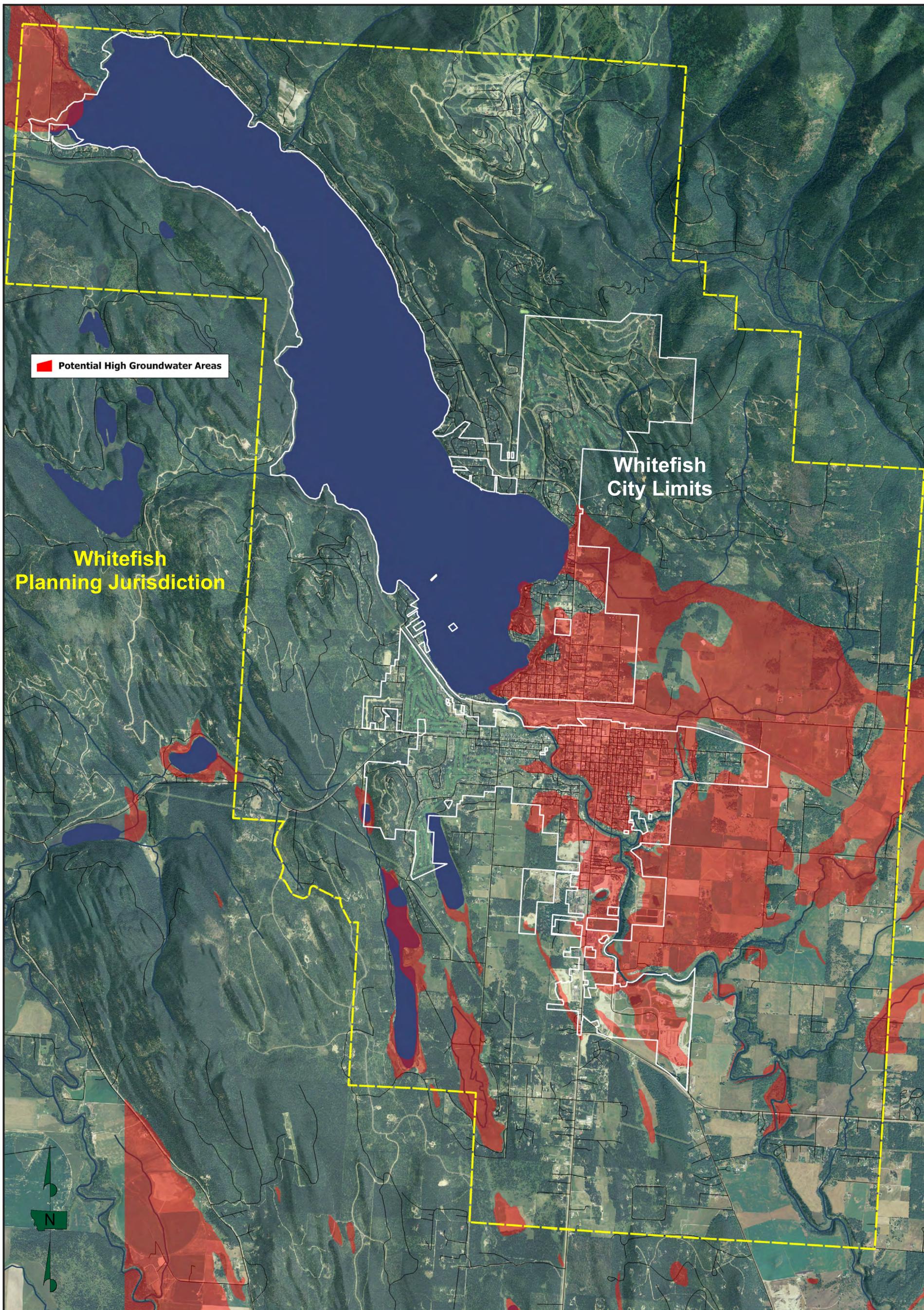
By signing the Maintenance Agreement the Responsible Party shall assume full responsibility for the maintenance of the stormwater system.

X _____
Signature of Responsible Party

Date

APPENDIX O

High Groundwater Map



Potential High Groundwater Areas

SCALE: None

Figure 5-1

DISCLAIMER

This map is strictly for use in this report. The City shall maintain a permanent, larger-scale version of this map on record and available to the public for planning purposes. Applicants are responsible for determining the actual presence and location of critical areas on their properties, for independent review by the City.

APPENDIX P

Tree Protection and Planting Requirements

APPENDIX P

Work on Public Trees

Authority: The Director of Parks and Recreation or designated representative shall have the authority and jurisdiction of regulating the planting, maintenance and removal of public trees on streets and other publicly owned property and to affix reasonable conditions to the granting of a permit to ensure safety and to preserve the aesthetics of such public places.

Permit Required for Work On Public Trees: No person shall plant, spray, perform major pruning, remove or otherwise disturb any public tree without written permission issued by the Director of Parks and Recreation or his designated representative. The person receiving the permission shall abide by the arboricultural specifications and standards identified in the permit. Public liability insurance may be required at the discretion of the Director of Parks and Recreation and will be decided on a case-by-case basis.

Removal of Public Trees, Replacement, And Allocation of Costs

No trees shall be removed from public places unless they are dead, diseased, constitute a hazard to life or property, are a public nuisance, or because a revision of planting plans necessitates.

No person or property owner is to remove a public tree from the boulevard for the purpose of construction, or for any other reason, without first obtaining written permission from the Director of Parks and Recreation.

Public trees removed under this subsection must be replaced as deemed appropriate by the Director of Parks and Recreation. The person or property owner shall bear the cost of removal and replacement of all public trees removed, unless trees are being removed at the request of the City.

Unless specifically authorized by the Director of Parks and Recreation, it is unlawful for any person to intentionally damage, cut, carve, transplant, or remove any public tree; attach any rope, wire, nails, signs, notices, or other contrivance to any public tree; allow any gaseous liquid or solid substance which is harmful to such trees to come in contact with them; or set fire or permit any fire to burn when such fire or the heat thereof could injure any portion of any public tree.

Protection of Trees

All trees on any street or other publicly owned property near any excavation or construction of any building, structure or street work, shall be guarded with a substantial fence, frame, or box. All building material, dirt or other debris shall be kept outside the barrier.

It is unlawful for any person to excavate any ditches, tunnels, trenches, or lay drive within a radius of ten feet (10') of any public tree without first obtaining written permission from the Director of Parks and Recreation. Maintenance or repair work on existing underground utilities will be permitted. Excavation for new utilities and structures within a radius of ten feet (10') of any public tree will not be permitted unless it is determined by the Director of Parks and Recreation that it will not adversely affect the tree.

To protect the public from danger, suitable street and sidewalk barriers, highway cones, or signs must be used when pruning, removing or spraying trees. Flashing signals or flares must be placed on all barriers or obstructions remaining in the street after dark. All safety devices must conform to the standards as set forth in "The Manual of Uniform Traffic Control Devices" distributed by the Federal Highway Administration, U.S. Department of Transportation.

The stumps of all removed public trees shall be cut to at least eight inches (8") below the ground, the soil shall be replaced, and the area leveled. If the area where the tree is removed is to be paved, the stump shall be removed to meet general construction standards. In the event of a private landowner wanting to remove a stump, they bear all the costs of its removal and all damages to the sidewalk curb shall be repaired by and paid for by the owner.

Planting Strip Landscaping and Street Trees

The following specifications for planting strip landscaping and street trees applies to plantings for subdivisions within a public right of way or other public spaces and does not apply to landscaping on private property.

All subdivisions shall provide a minimum six foot (6') wide landscaped planting strip located between the curb and sidewalk unless otherwise approved by the public works director. The planting strip shall consist of a minimum of four inches (4") of topsoil. Topsoil shall be a fertile, natural loam surface soil, free of clay, weeds, roots or stones larger than one inch (1") in any dimension. The planting strip shall either be sodded or seeded and planted with street trees in accordance with this section. The plantings shall be warranted for a minimum of two (2) years. The subdivider shall be responsible during the warrantee period to maintain the seed or sod and trees until they are well established.

Prior to submittal of a final plat application, the subdivider shall submit a planting strip landscaping plan to the Planning Department for review by the Public Works department and Parks and Recreation Department and final approval from the Planning Department. The landscape plan shall include the planting strip width, soil preparation, seeding or sodding, variety and spacing of street trees and a maintenance plan. The approval letter from the Planning Director or designee shall be submitted with the final plat application.

Species, Cultivars, Or Varieties Permitted

A list of acceptable trees for planting in the planting strip and the public sites of the City of Whitefish is available from the Parks and Recreation Department and is appended to this document. Undesirable trees will not be approved for general planting, and their use, if any, shall be restricted to special locations where, because of certain characteristics of adaptability or landscape effect, they can be used to advantage. Only desirable, long lived trees of good appearance, beauty, adaptability, and generally free from injurious insects or disease shall be planted in planting strip areas and public sites.

Location and Spacing

Based on a forty (40) year cycle, no tree which will attain a trunk diameter greater than twelve inches (12") shall be planted in a planting strip less than four feet (4') in width. In planting strips less than four feet (4') in width, or where overhead lines or building setback presents a special problem, the selection of the site and species shall be determined by the Planning Director or designee.

Trees shall be planted at least ten feet (10') from street intersections and at least ten feet (10') from driveways and alleys.

No tree shall be planted closer than ten feet (10') from a utility pole.

Trees shall be planted at least ten feet (10') from buildings.

Trees shall be planted no closer than ten feet (10') from fire hydrants.

Trees shall not be planted within five (5) lateral feet of underground water lines/mains.

Medium and large trees shall not be planted under or within fifteen (15) lateral feet of overhead utility wires, depending on voltage.

Trees shall be planted at least ten feet (10') from decorative streetlights.

Trees shall be planted at least ten feet (10') from street signs, unless approved by the city.

Spacing of trees should be determined by the Planning Director or designee according to local conditions, the species, cultivars, or varieties used, their mature height, spread, and form. Generally, all large trees shall be planted no closer than forty feet (40') on center; all medium sized trees shall be planted a minimum of thirty feet (30') on center; and all small trees shall be planted a minimum of twenty feet (20') on center.

All planting on unpaved streets without curbs must have the special permission of the Planning Director or designee who shall determine the tree's location so it will not be injured or destroyed when the street is curbed and paved.

Irrigation shall not be installed in any public right of way or boulevard without first obtaining an encroachment permit. Irrigation shall not be installed prior to planting strip landscaping and street trees.

Native Trees, Shrubs, Subshrubs Or Varieties Permitted

Portions of certain city rights of way have retained their native appearance and plant materials. In these areas it may be more desirable to use native plants rather than structured ornamental planting strip plants. Only acceptable native plants on the list will be allowed in these native areas. Undesirable trees and shrubs shall not be recommended for general planting, and their use, if any, shall be restricted to special locations where, because of certain characteristics of adaptability or landscape effect, they can be used to advantage.

A list of acceptable trees for planting in the planting strip and the public sites of the City of Whitefish is available from the Parks and Recreation Department and is appended to this document.

Work on Public Trees: All work on public trees related to the development of a subdivision will comply with this chapter and require the prior approval by the planning director.

Agreement for Planting Strip Landscaping and Street Trees (Cash in Lieu of Street Trees)

The subdivider may enter into an agreement with the City to cover the necessary costs to cover the purchasing and planting of the trees, placement of topsoil, planting strip prep and seeding. The City will perform the actual work at the request of the current or future property owner. This option is only available for trees on local access streets.

The actual costs for the materials and planting will be set on an annual basis and generally established by contract bids. The costs may change from year to year based on contractor competitive bids. There shall be a contract administrative fee of twenty percent (20%) of the total to be applied to the developer's agreement at the time of submittal.

Planting shall generally occur after the homeowner has purchased the property and the home has been completed, thereby increasing the survival rate of the landscaping and trees while also allowing the homeowner to approve the location and species of tree(s). Irrigation shall not be placed in the boulevard/planting strip prior to landscaping and street tree planting.

Native Tree, Shrub, Groundcover & Grasses List

Common Name

Botanical Name

Trees

Grand Fir	<i>Abies grandis</i>
Multi Stem Paper Birch	<i>Betula papyrifera</i> (multi stem)
Single Stem Paper Birch	<i>Betula papyrifera</i> (single stem)
Western Larch	<i>Larix occidentalis</i>
Englemann Spruce	<i>Picea engelmannii</i>
Lodgepole Pine	<i>Pinus contorta</i>
Western White Pine	<i>Pinus monticola</i>
Ponderosa Pine	<i>Pinus ponderosa</i>
Quaking Aspen	<i>Populus tremuloides</i>
Douglas Fir	<i>Pseudotsuga menziesii</i>

Shrubs

Rocky Mountain Maple	<i>Acer glabrum</i>
Serviceberry	<i>Amelanchier alnifolia</i>
Redoiser Dogwood	<i>Cornus stolonifera</i>
Mountain Spray	<i>Holodiscus discolor</i>
Common Juniper	<i>Juniperus communis</i>
Creeping Mahonia	<i>Mahonia repens</i>
Mallow Ninebark	<i>Philadelphus malvaceus</i>
Bunch Cinquefoil	<i>Potentilla fruitcosa</i>
Slender Cinquefoil	<i>Potentilla gracilis</i>

Mock Orange

Philadelphus lewisii

Chokecherry

Prunus virginiana

Alpine Currant

Ribes aplinum

Woods Rose

Rosa woodsii

Blue Elderberry

Sambucus caerulea

Black Elderberry

Sambucus racemosa

Mountain Ash

Sorbus scopulina

White Spirea

Spirea betulifolia

Pink Spirea

Spirea douglasii

Snowberry

Symphoricarpos albus

False Huckleberry

Menziesia ferruginea

Grouseberry

Vaccinium scoparium

Silver Sagebrush

Artemisia cana

Three-Leaved Sumac

Rhus trilobata

Groundcovers

Spreading Dogbane

Apocynum androsaemifolium

Oregon Grape

Berberis repens

Kinnikinnick

Arctostaphylos uva-ursi

Grasses

Sideoats Grama

Bouteloua curtipendula

Blue Grama

Bouteloua gracilis

Rough Fescue

Festuca campestris

Idaho Fescue

Festuca idahoensis

Prarie Junegrass

Rough-leaved Ricegrass

Bluebunch Wheatgrass

Little Bluestem

Koeleria macrantha

Oryzopsis asperifolia

Pseudoroegneria spicata

Schizachyrium scoparium

City of Whitefish Approved Boulevard Trees

Large Tree List (40 ft. and up)

Common Name

Botanical Name

Paper Birch

Betula papyrifera

Horse Chestnut

Aesculus hippocastanum

Bur Oak

Quercus macrocarpa

White Oak

Quercus alba

Red Oak

Quercus rubra

American Linden

Tilia Americana

Littleleaf Linden

Tilia cordata

Glenleven Littleleaf Linden

Tilia cordata 'Glenleven'

Boulevard Linden

Tilia Americana 'Boulevard'

Kentucky Coffee Tree

Gymnocladus dioica

Ohio Buckeye

Aesculus glabra

Northern Pin Oak

Quercus ellipsoidalis

Morton Accolade Elm

Ulmus 'Morton'

Medium Tree List (25 ft. to 40 ft)

Common Name

Botanical Name

Prairie Pride Hackberry

Celtis occidentalis 'Prairie Pride'

Thornless Honey Locust

Gleditsia triacanthos var. *inermis*

Havre Northern Acclaim Honey Locust

Gleditsia triacanthos var. *inermis* 'Havre'

Redmond Linden

Tilia mongolica 'Redmond'

Greenspire Littleleaf Linden

Tilia cordata 'Greenspire'

Harvest Gold Linden

Tilia mongolica 'Harvest Gold'

Dropmore Linden	Tilia x faveszens 'Dropmore'
Discovery Elm	Ulmus davidiana 'Discovery'
Prospector Elm	Ulmus wilsoniana 'Prospector'
Gingko Biloba	Gingko Biloba
Quaking Aspen	Populus tremuloides

Small Tree List (15ft. to 25 ft.)

Common Name

Botanical Name

Autumn Brilliance Serviceberry	Amelanchier x grandiflora
Lustre Allegheny Serviceberry	Amelanchier laevis 'Rogers'
Snowbird Hawthorn	Crataegus x mordenensis 'Toba'
Spring Snow Crabapple	Malus x 'Spring Snow'
Thunderchild Crabapple	Malus x 'Thunderchild'
Amur Chokecherry	Prunus maackii
Princess Kay Plum	Prunus nigra 'Princess Kay Plum'
Mountain Frost Ussurian Pear	Pyrus ussuriensis 'Bailfrost'
Ivory Silk Japanese Lilac Tree	Syringa reticulata 'Ivory Silk'
Tatarian Maple	Acer tataricum

***All other maple trees have been removed temporarily from the list due to the current number in our inventory.**

*** Ash trees have been removed from the list due to the Emerald Ash Borer disease on the rise.**

***If another species is desired please submit a request to the Parks & Recreation Department for consideration.**

GENERAL AND STREET DETAILS

APPROVAL BLOCK	SD-1
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SURVEY MONUMENT-PLACED IN ASPHALT	SD-3
LOCAL STREET WITH PARKING (BOTH SIDES)	SD-4
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STANDARD SIDEWALK	SD-14
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RADIUS DETECTABLE WARNING INSTALLATION	SD-16
BICYCLE / PEDESTRIAN PATH	SD-17
DRIVEWAY APPROACH	SD-18
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PVC TRENCH BEDDING AND BACKFILL (PAVED SURFACE)	SD-21
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PVC TRENCH BEDDING AND BACKFILL (UNIMPROVED SURFACE)	SD-23
PVC TRENCH BEDDING AND BACKFILL NOTES	SD-24
TRENCH PLUG	SD-25

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RESIDENTIAL SERVICE WITH SPLIT IRRIGATION	SD-32
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AIR/VACUUM RELIEF VALVE VAULT	SD-35
AIR/VACUUM RELIEF VALVE VAULT	SD-36
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SANITARY SEWER MANHOLE WITH DROP INLET	SD-40
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MANHOLE ADJUSTMENT	SD-42
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PRESSURIZED SEWER SERVICE TO FORCE MAIN	SD-44
PRESSURIZED SEWER SERVICE VALVE SETTING	SD-45
PRESSURIZED SEWER SERVICE TO GRAVITY MAIN	SD-46
PRESSURIZED SEWER CLEANOUT	SD-47
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INTERIOR GREASE INTERCEPTOR	SD-52
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CONCRETE VALLEY GUTTER W/APRON	SD-56
CONCRETE VALLEY GUTTER W/APRON	SD-57
STORM DRAIN INLET DETAIL	SD-58
STORM DRAIN MANHOLE	SD-59
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TREE PLANTING DETAILS

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STREET TREE PLANTING IN SIDEWALK	SD-67

STREET LIGHTING DETAILS

LUMINARE AND POLE DETAIL (Residential-City Street, Parking & shared use paths)	SD-68
LUMINARE AND POLE DETAIL (Commercial-City Street & Parking Lot)	SD-69
LUMINARE AND POLE DETAIL (MDT Hwy 93 Downtown)	SD-70
LUMINARE AND POLE DETAIL (MDT Hwy 93 Commercial West District)	SD-71
LUMINARE AND BOLLARD DETAIL (Shared Use Path)	SD-72
RESIDENTIAL POLE AND BOLLARD FOUNDATION (Residential City Street, Parking Lot and shared use path)	SD-73
COMMERCIAL POLE FOUNDATION (Commercial City Street and Parking Lot)	SD-74
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STREET LIGHT ELECTRICAL SERVICE AND WIRING DIAGRAM	SD-78
STREET LIGHT ELECTRICAL SERVICE BASE	SD-79
UTILITY POWER SERVICE CONDUIT RISER	SD-80

GENERAL AND STREET DETAILS

APPROVED FOR CONSTRUCTION

BY: _____ DATE: _____

CITY ENGINEER

BY: _____ DATE: _____

FIRE MARSHALL

CHAPTER 6 STREETS

The following note must be placed on the title sheet (first sheet) of all improvement plans submitted to the City of Whitefish Public Works Department. Prior to improvement plans being accepted as complete, the signed RECORD DRAWINGS CERTIFICATE will be required.

RECORD DRAWINGS CERTIFICATE

ALL INFORMATION SHOWN ON THESE PLANS HAS BEEN PREPARED BY OR UNDER DIRECTION OF, THE UNDERSIGNED ENGINEER. ADJUSTMENTS MADE IN THE FIELD DURING CONSTRUCTION ARE INCLUDED HEREIN AND ARE BASED UPON FIELD OBSERVATIONS MADE UNDER THE DIRECTION OF OR BY THE UNDERSIGNED AND CITY OF WHITEFISH WHEN THE ENGINEER IS ADVISED IN WRITING OF SUCH CHANGE. THE ENGINEER PREPARING THESE PLANS WILL NOT BE RESPONSIBLE FOR, OR LIABLE FOR CHANGES TO THESE PLANS NOT AUTHORIZED BY THE ENGINEER.

DATE

ENGINEER SIGNATURE
(STAMP OR SEAL)

DATE

CONTRACTOR SIGNATURE

The following must be included in the lower right hand corner of all remaining sheets of a plan set. The date and initials of the responsible engineer shall be completed, as part of the "RECORD DRAWINGS" required as noted below.

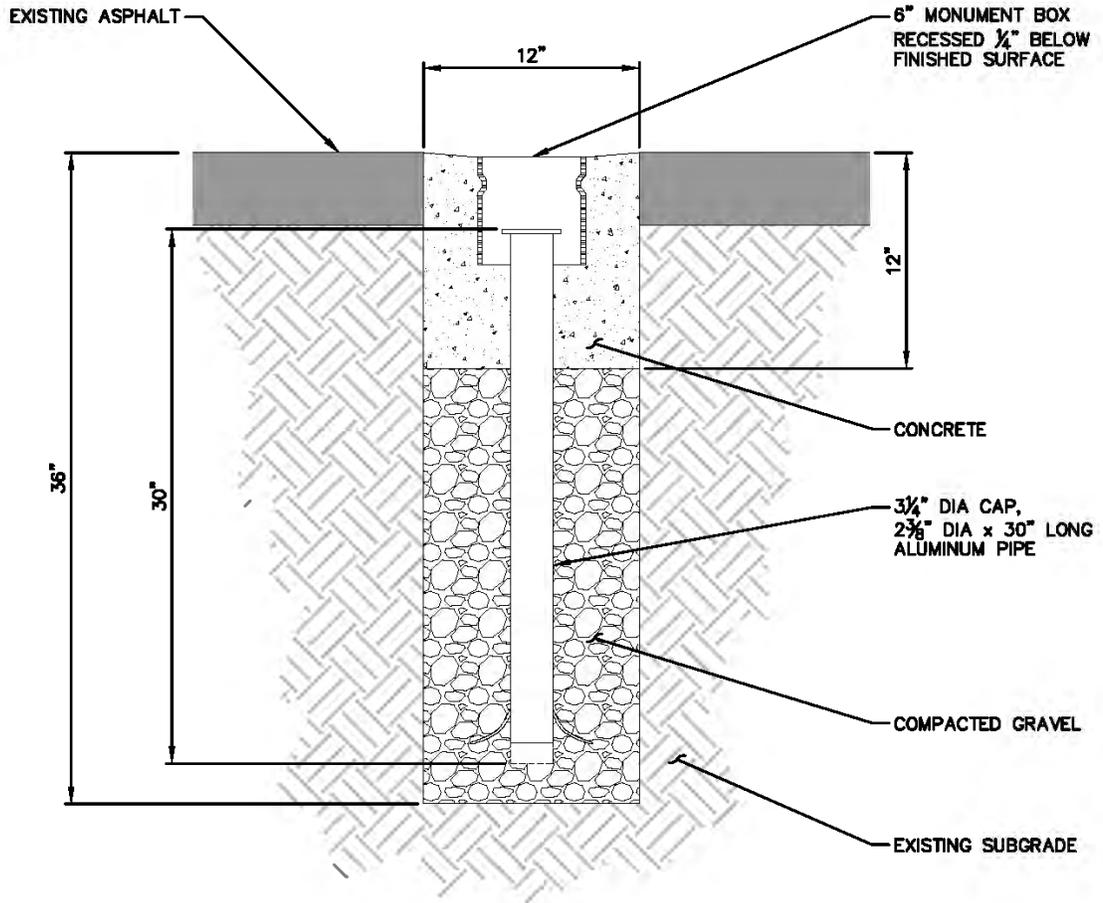
RECORD DRAWINGS

DATE

ENGINEER INITIAL

DATE

CONTRACTOR INITIAL



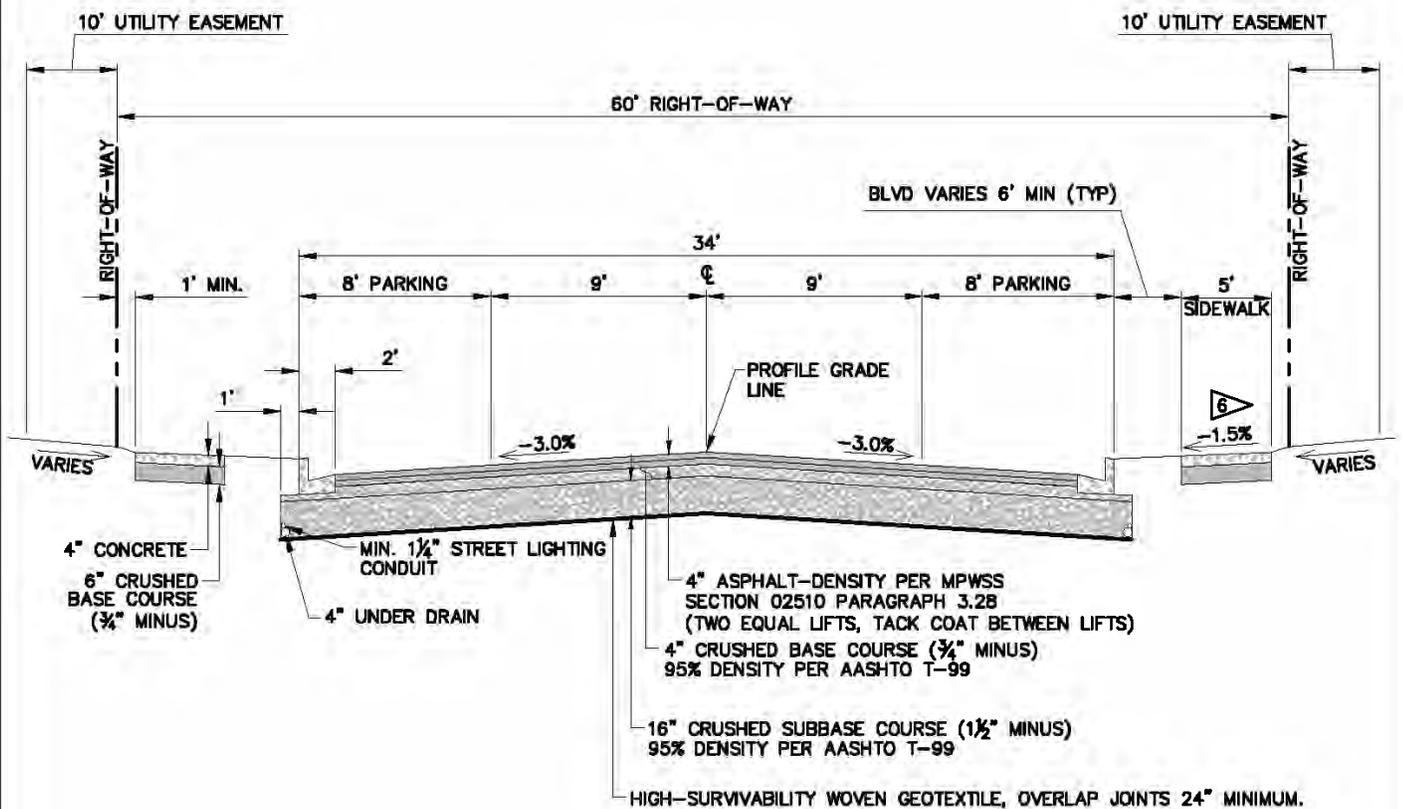
SURVEY MONUMENT - PLACED IN ASPHALT

SCALE: NONE

NOTES:

1. MONUMENT BOX COVER SHALL STATE "MON" OR "SURVEY".

CHAPTER 6 STREETS



34 FT. TYPICAL ROADWAY SECTION

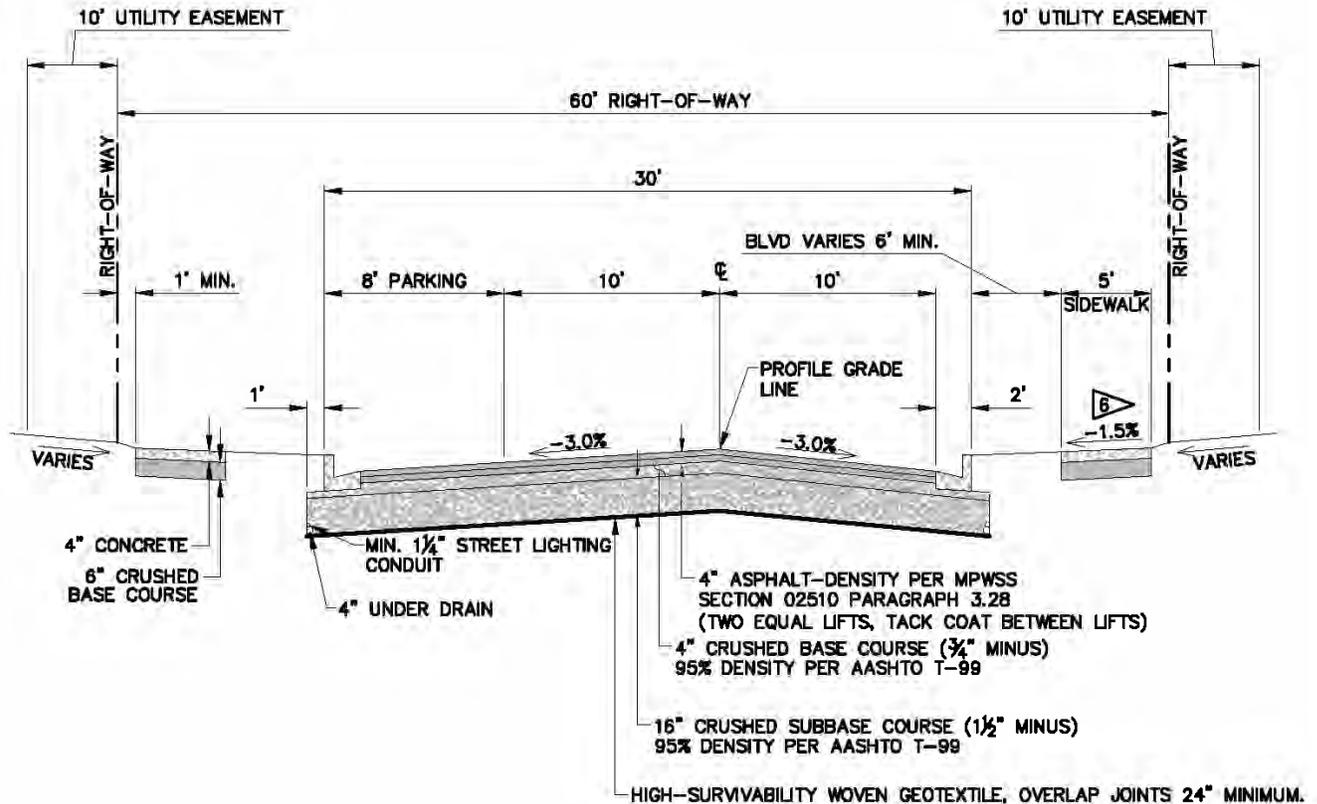
SCALE: NONE

NOTES:

1. THE WIDTH OF THE RIGHT OF WAY MAY HAVE TO BE INCREASED DUE TO ROAD SLOPES, UTILITIES, TRAFFIC VOLUME OR OTHER REQUIREMENTS.
2. ALL TOPSOILED AREAS TO BE SEEDED OR SODDED.
3. THE MAXIMUM GRADE SHALL BE 9%.
4. GEOTEXTILE SHALL BE MIRAFI 500x OR APPROVED EQUAL.
GEOTEXTILE INSTALLATION:
A. COMPACT SUBGRADE TO 95% PROCTOR.
B. REMOVE ALL WRINKLES.
C. DO NOT DRIVE OR OPERATE EQUIPMENT ON FABRIC.
5. UTILITY NOTE: NO UNDERGROUND UTILITIES SHALL BE PLACED IN THE BOULEVARD BETWEEN THE BACK OF CURB AND SIDEWALK, UNDERGROUND UTILITIES (OTHER THAN SEWER, WATER, STORM SEWER, UNDER DRAIN AND STREET LIGHTING) SHALL BE LOCATED BETWEEN BACK OF SIDEWALK AND THE EASEMENT LINE.

6 -2.0% MAX (TYP).

CHAPTER 6 STREETS



30 FT. TYPICAL ROADWAY SECTION

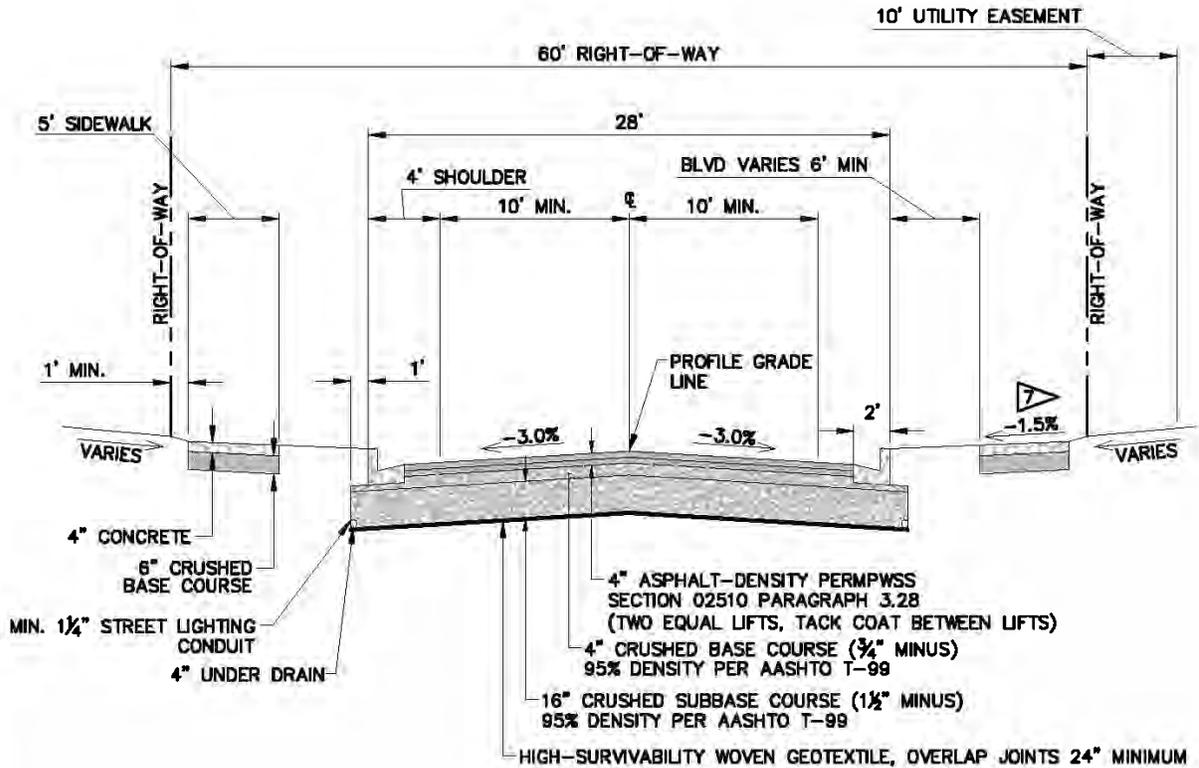
SCALE: NONE

NOTES:

1. THE WIDTH OF THE RIGHT OF WAY MAY HAVE TO BE INCREASED DUE TO ROAD SLOPES, UTILITIES, TRAFFIC VOLUME OR OTHER REQUIREMENTS.
2. ALL TOPSOILED AREAS TO BE SEEDED OR SODDED.
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4. GEOTEXTILE SHALL BE MIRAFI 500x OR APPROVED EQUAL.
 GEOTEXTILE INSTALLATION:
 A. COMPACT SUBGRADE TO 95% PROCTOR.
 B. REMOVE ALL WRINKLES.
 C. DO NOT DRIVE OR OPERATE EQUIPMENT ON FABRIC.
5. UTILITY NOTE: NO UNDERGROUND UTILITIES SHALL BE PLACED IN THE BOULEVARD BETWEEN THE BACK OF CURB AND SIDEWALK, UNDERGROUND UTILITIES (OTHER THAN SEWER, WATER, STORM SEWER, UNDER DRAIN AND STREET LIGHTING) SHALL BE LOCATED BETWEEN BACK OF SIDEWALK AND THE EASEMENT LINE.

6 -2.0% MAX (TYP).

CHAPTER 6 STREETS



28 FT. TYPICAL ROADWAY SECTION

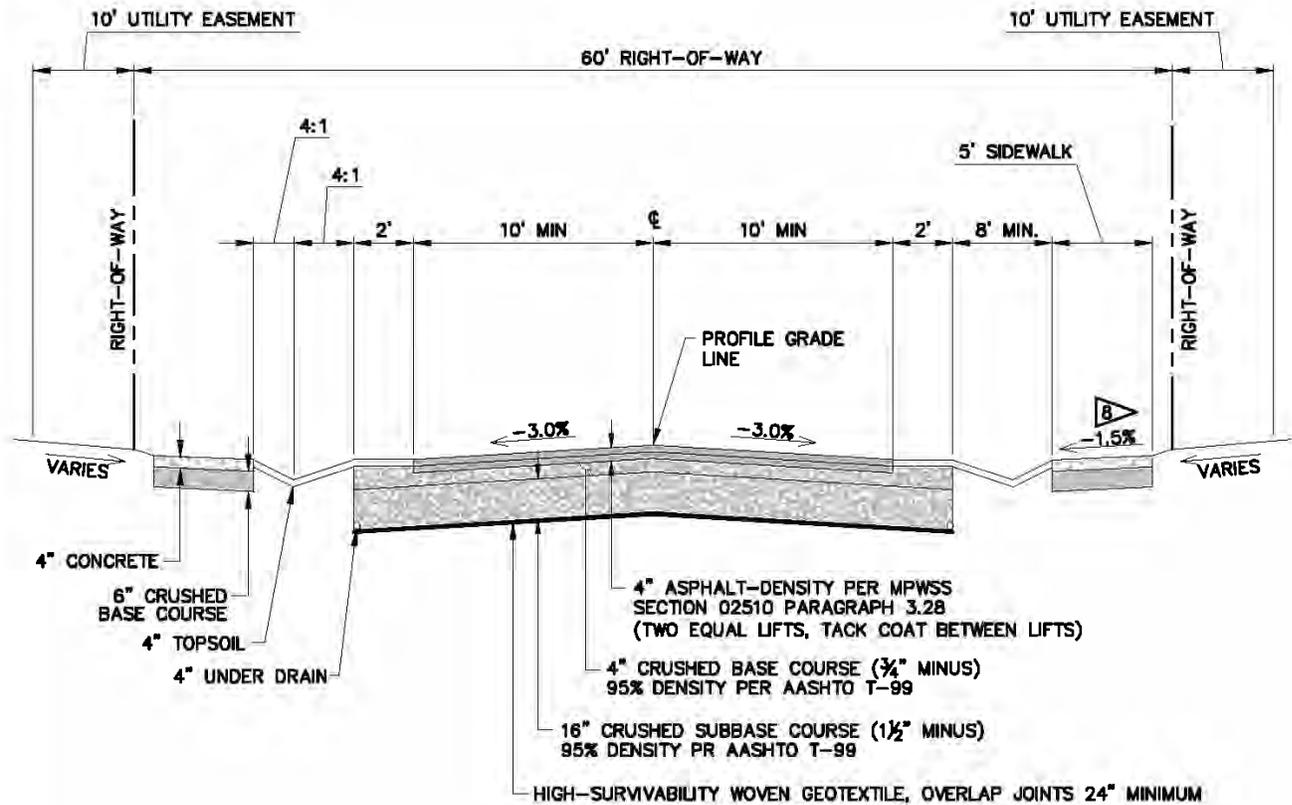
SCALE: NONE

NOTES:

1. THE WIDTH OF PAVEMENT WILL DEPEND ON LOCAL CONDITIONS SUCH AS WIDTH OF EXISTING STREETS IN THE AREA, ANTICIPATED TRAFFIC VOLUME, PARKING REQUIREMENTS, FUTURE EXTENSIONS, ETC.
2. THE WIDTH OF THE RIGHT OF WAY MAY HAVE TO BE INCREASED DUE TO ROAD SLOPES, UTILITIES, TRAFFIC VOLUME OR OTHER REQUIREMENTS.
3. ALL TOPSOILED AREAS TO BE SEEDED OR SODDED.
4. THE MAXIMUM GRADE SHALL BE 9%.
5. GEOTEXTILE SHALL BE MIRAFI 500x OR APPROVED EQUAL.
 GEOTEXTILE INSTALLATION:
 A. COMPACT SUBGRADE TO 95% PROCTOR.
 B. REMOVE ALL WRINKLES.
 C. DO NOT DRIVE OR OPERATE EQUIPMENT ON FABRIC.
6. UTILITY NOTE: NO UNDERGROUND UTILITIES SHALL BE PLACED IN THE BOULEVARD BETWEEN THE BACK OF CURB AND SIDEWALK, UNDERGROUND UTILITIES (OTHER THAN SEWER, WATER, STORM SEWER, UNDER DRAIN AND STREET LIGHTING) SHALL BE LOCATED BETWEEN BACK OF SIDEWALK AND THE EASEMENT LINE.

▽ -2.0% MAX (TYP).

CHAPTER 6 STREETS



24' RURAL ROADWAY SECTION (20' ASPHALT)

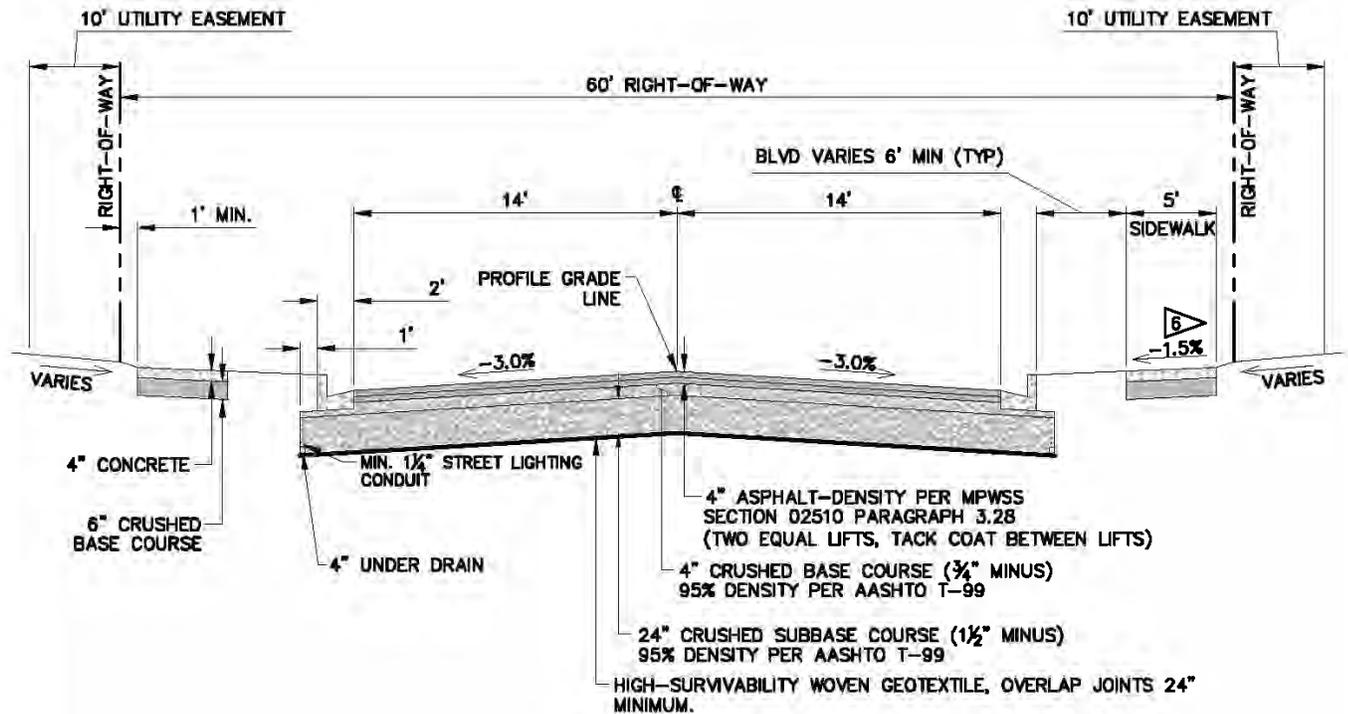
SCALE: NONE

NOTES:

1. THIS CROSS-SECTION MAY BE USED ONLY WHEN THE AREA ADJACENT TO THE PROPOSED DEVELOPMENT DOES NOT HAVE CURBING OR ESTABLISHED STORM DRAINAGE SYSTEMS. THIS CROSS-SECTION MUST BE APPROVED BY THE PUBLIC WORKS DIRECTOR PRIOR TO INCORPORATING INTO THE DRAWINGS.
2. THE ASPHALT EDGE MUST BE THICKENED TO PREVENT CRACKING.
3. THE WIDTH OF THE RIGHT OF WAY MAY HAVE TO BE INCREASED DUE TO ROAD SLOPES, UTILITIES, TRAFFIC VOLUME OR OTHER REQUIREMENTS.
4. ALL TOPSOILED AREAS TO BE SEEDDED OR SODDED.
5. THE MAXIMUM GRADE SHALL BE 9%.
6. GEOTEXTILE SHALL BE MIRAFI 500x OR APPROVED EQUAL.
 GEOTEXTILE INSTALLATION:
 A. COMPACT SUBGRADE TO 95% PROCTOR.
 B. REMOVE ALL WRINKLES.
 C. DO NOT DRIVE OR OPERATE EQUIPMENT ON FABRIC.
7. UTILITY NOTE: NO UNDERGROUND UTILITIES (OTHER THAN SEWER, WATER, STORM SEWER AND UNDER DRAIN) SHALL BE LOCATED BETWEEN BACK OF SIDEWALK AND THE EASEMENT LINE.

▽ -2.0% MAX.

CHAPTER 6 STREETS



32 FT. TYPICAL ROADWAY SECTION

SCALE: NONE

NOTES:

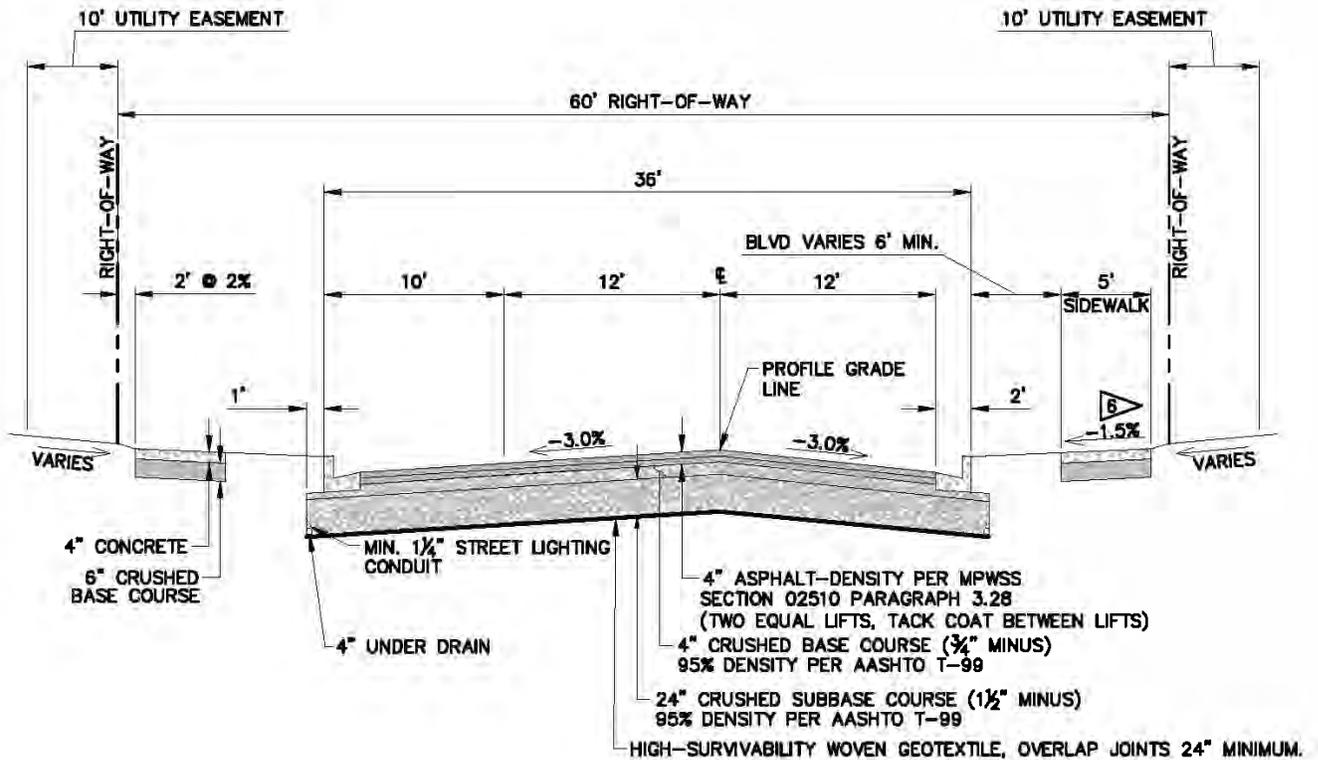
1. THE WIDTH OF THE RIGHT OF WAY MAY HAVE TO BE INCREASED DUE TO ROAD SLOPES, UTILITIES, TRAFFIC VOLUME OR OTHER REQUIREMENTS.
2. ALL TOPSOILED AREAS TO BE SEEDDED OR SODDED.
3. THE MAXIMUM GRADE SHALL BE 8%.
4. GEOTEXTILE SHALL BE MIRAFI 500x OR APPROVED EQUAL.

GEOTEXTILE INSTALLATION:

- A. COMPACT SUBGRADE TO 95% PROCTOR.
 - B. REMOVE ALL WRINKLES.
 - C. DO NOT DRIVE OR OPERATE EQUIPMENT ON FABRIC.
5. UTILITY NOTE: NO UNDERGROUND UTILITIES SHALL BE PLACED IN THE BOULEVARD BETWEEN THE BACK OF CURB AND SIDEWALK, UNDERGROUND UTILITIES (OTHER THAN SEWER, WATER, STORM SEWER, UNDER DRAIN AND STREET LIGHTING) SHALL BE LOCATED BETWEEN BACK OF SIDEWALK AND THE EASEMENT LINE.

6 -2.0% MAX.

CHAPTER 6 STREETS



36 FT. TYPICAL ROADWAY SECTION

SCALE: NONE

NOTES:

1. THE WIDTH OF THE RIGHT OF WAY MAY HAVE TO BE INCREASED DUE TO ROAD SLOPES, UTILITIES, TRAFFIC VOLUME OR OTHER REQUIREMENTS.
2. ALL TOPSOILED AREAS TO BE SEEDED OR SODDED.
3. THE MAXIMUM GRADE SHALL BE 8%.
4. GEOTEXTILE SHALL BE MIRAFI 500x OR APPROVED EQUAL.

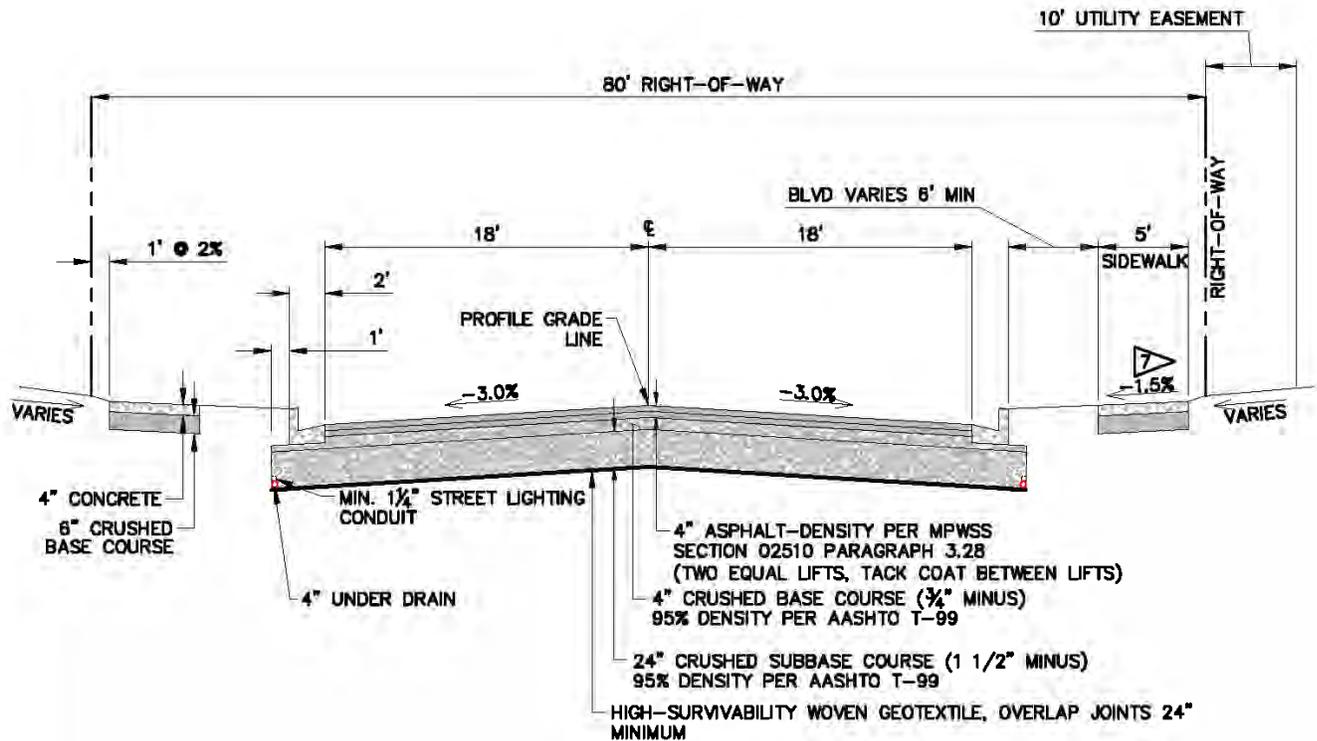
GEOTEXTILE INSTALLATION:

- A. COMPACT SUBGRADE TO 95% PROCTOR.
- B. REMOVE ALL WRINKLES.
- C. DO NOT DRIVE OR OPERATE EQUIPMENT ON FABRIC.

5. UTILITY NOTE: NO UNDERGROUND UTILITIES SHALL BE PLACED IN THE BOULEVARD BETWEEN THE BACK OF CURB AND SIDEWALK, UNDERGROUND UTILITIES (OTHER THAN SEWER, WATER, STORM SEWER, UNDER DRAIN AND STREET LIGHTING) SHALL BE LOCATED BETWEEN BACK OF SIDEWALK AND THE EASEMENT LINE.

6 -2.0% MAX.

CHAPTER 6 STREETS



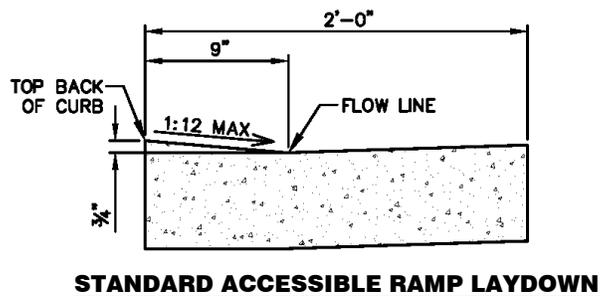
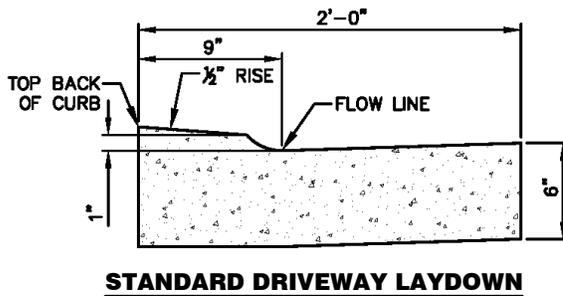
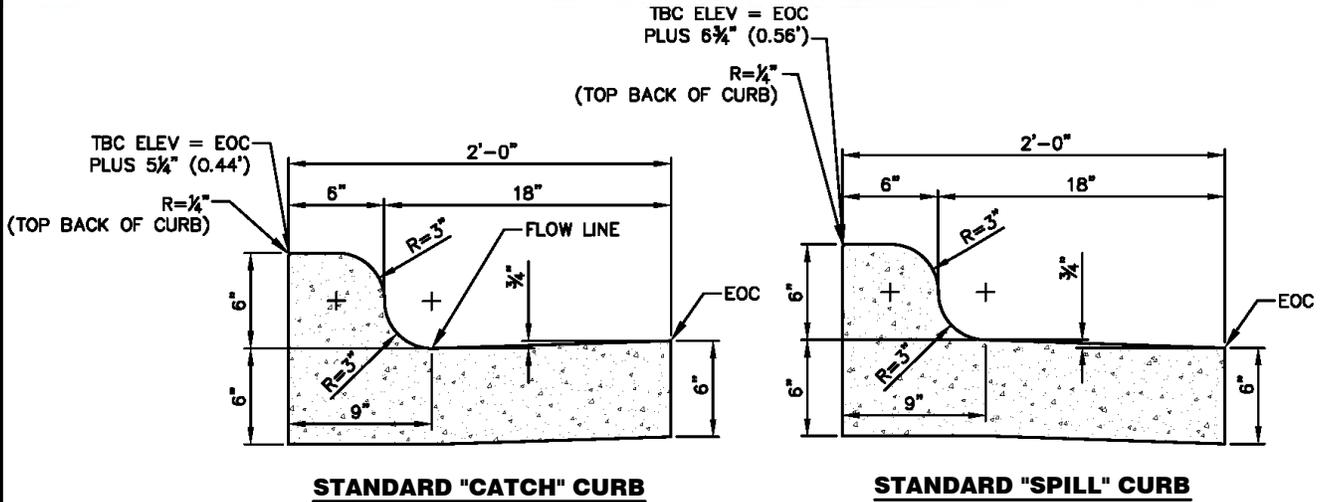
40' ARTERIAL TYPICAL ROADWAY SECTION

SCALE: NONE

NOTES:

1. THE WIDTH OF THE RIGHT OF WAY MAY HAVE TO BE INCREASED DUE TO ROAD SLOPES, UTILITIES, TRAFFIC VOLUME OR OTHER REQUIREMENTS.
2. ALL TOPSOILED AREAS TO BE SEEDED OR SODDED.
3. THE MAXIMUM GRADE SHALL BE 6%.
4. THE CITY ENGINEER MAY REQUIRE THAT TRAFFIC LOAD AND SOIL ANALYSIS BE DONE AS PART OF STREET DESIGN PREPARED BY A PROFESSIONAL ENGINEER.
5. GEOTEXTILE SHALL BE MIRAFI 500x OR APPROVED EQUAL.
 GEOTEXTILE INSTALLATION:
 A. COMPACT SUBGRADE TO 95% PROCTOR.
 B. REMOVE ALL WRINKLES.
 C. DO NOT DRIVE OR OPERATE EQUIPMENT ON FABRIC.
6. UTILITY NOTE: NO UNDERGROUND UTILITIES SHALL BE PLACED IN THE BOULEVARD BETWEEN THE BACK OF CURB AND SIDEWALK, UNDERGROUND UTILITIES (OTHER THAN SEWER, WATER, STORM SEWER, UNDER DRAIN AND STREET LIGHTING) SHALL BE LOCATED BETWEEN BACK OF SIDEWALK AND THE EASEMENT LINE.

-2.0% MAX.



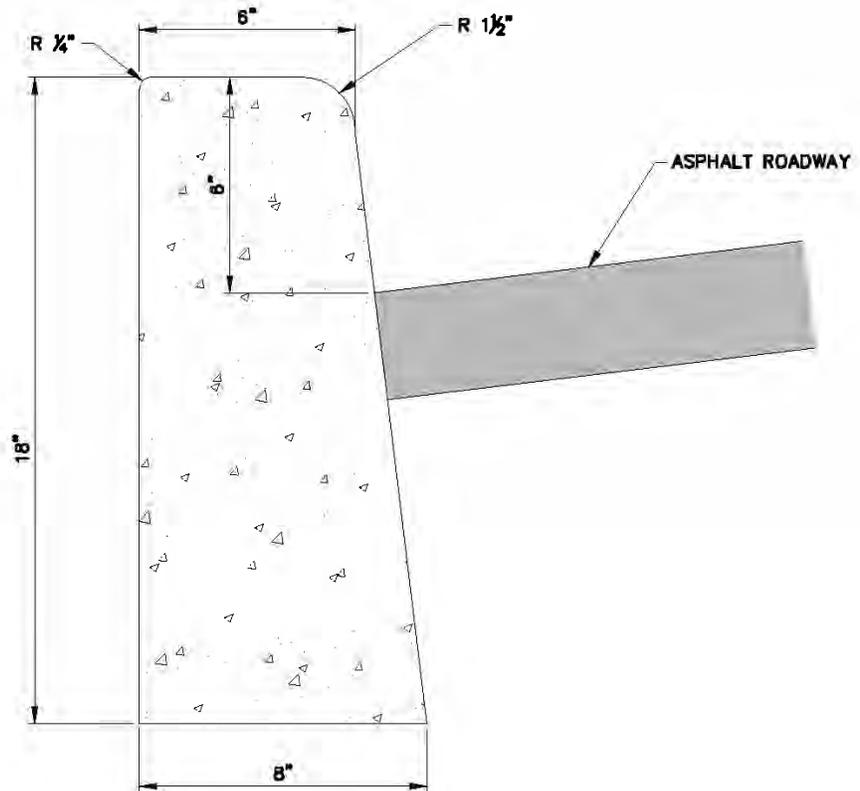
STANDARD CURB AND GUTTER

SCALE: NONE

NOTES:

1. EXPANSION AND CONTRACTION JOINTS SHALL BE PLACED IN ACCORDANCE WITH MPWSS 02528.
2. 1/2" EXPANSION JOINT MATERIAL SHALL BE PLACED AT THE P.C.
3. CONTRACTION JOINT SHALL BE PLACED AT EVERY 15' OF CURB LENGTH AND SHALL HAVE A MINIMUM DEPTH OF 3/4" AND MINIMUM WIDTH OF 1/8". CONTRACTION JOINTS SHALL BE CONSTRUCTED BY SAWING OR SCORING. A TOOL SHALL BE USED WHICH WILL LEAVE CORNERS ROUNDED AND DESTROY AGGREGATE INTERLOCK FOR THE SPECIFIED MINIMUM DEPTH.
4. VISIBLE EDGES SHALL BE FINISHED TO A RADIUS OF 1/4", UNLESS OTHERWISE NOTED.
5. GRADE, ALIGNMENT AND FORMS SHALL BE INSPECTED BY THE CITY PRIOR TO POURING.
6. CONCRETE SHALL BE M-4000 WITH 3/4" MAXIMUM AGGREGATE AND A 28-DAY STRENGTH OF 4000 PSI, 5% TO 8% AIR CONTENT WITH A MAXIMUM SLUMP OF 4".
7. CONCRETE SHALL INCLUDE THE USE OF FIBER MESH (0.75 POUNDS PER CUBIC YARD OF CONCRETE).
8. INDIVIDUAL CONTRACTORS FORMS MAY VARY SLIGHTLY FROM THIS PATTERN. PATTERNS WHICH ACHIEVE ESSENTIALLY THE SAME RESULT AS THE ABOVE PATTERN MAY BE APPROVED BY THE CITY.
9. FOUR INCHES OF BASE MATERIAL IS REQUIRED. BASE MATERIAL SHALL BE 3/4" CRUSHED BASE COURSE COMPACTED TO 95% PER AASHTO T-99.

CHAPTER 6 STREETS



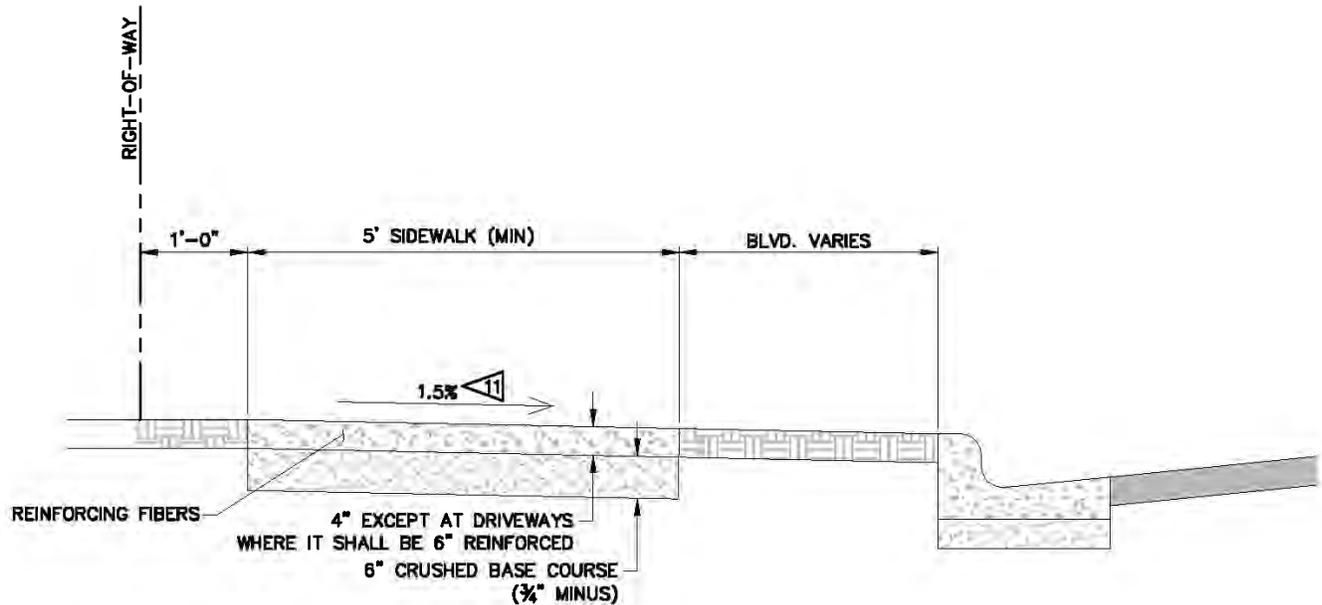
STRAIGHT CURB

SCALE: NONE

NOTES:

1. $\frac{1}{2}$ " EXPANSION JOINT MATERIAL SHALL BE PLACED AT THE P.C.
2. CONTRACTION JOINT SHALL BE PLACED AT EVERY 15' OF CURB LENGTH AND SHALL HAVE A MINIMUM DEPTH OF $\frac{3}{4}$ " AND MINIMUM WIDTH OF $\frac{1}{8}$ ". CONTRACTION JOINTS SHALL BE CONSTRUCTED BY SAWING OR SCORING. A TOOL SHALL BE USED WHICH WILL LEAVE CORNERS ROUNDED AND DESTROY AGGREGATE INTERLOCK FOR THE SPECIFIED MINIMUM DEPTH.
3. GRADE, ALIGNMENT AND FORMS SHALL BE INSPECTED BY THE CITY PRIOR TO POURING.
4. CONCRETE SHALL BE M-4000 WITH $\frac{3}{4}$ " MAXIMUM AGGREGATE AND A 28-DAY STRENGTH OF 4000 PSI, 5% TO 8% AIR CONTENT WITH A MAXIMUM SLUMP OF FOUR (4) INCHES.
5. CONCRETE SHALL INCLUDE THE USE OF FIBER MESH (0.75 POUNDS PER CUBIC YARD OF CONCRETE).
6. INDIVIDUAL CONTRACTORS FORMS MAY VARY SLIGHTLY FROM THIS PATTERN. PATTERNS WHICH ACHIEVE ESSENTIALLY THE SAME RESULT AS THE ABOVE PATTERN MAY BE APPROVED BY THE CITY.
7. FOUR INCHES OF CRUSHED BASE COURSE MATERIAL IS REQUIRED. BASE MATERIAL SHALL BE $\frac{3}{4}$ " CRUSHED GRAVEL COMPACTED TO 95% PER AASHTO T-99.
8. USE OF STRAIGHT CURB IS RESTRICTED TO SPECIFIC APPLICATION AND SHALL REQUIRE PRIOR APPROVAL FROM THE CITY ENGINEER.

CHAPTER 6 STREETS



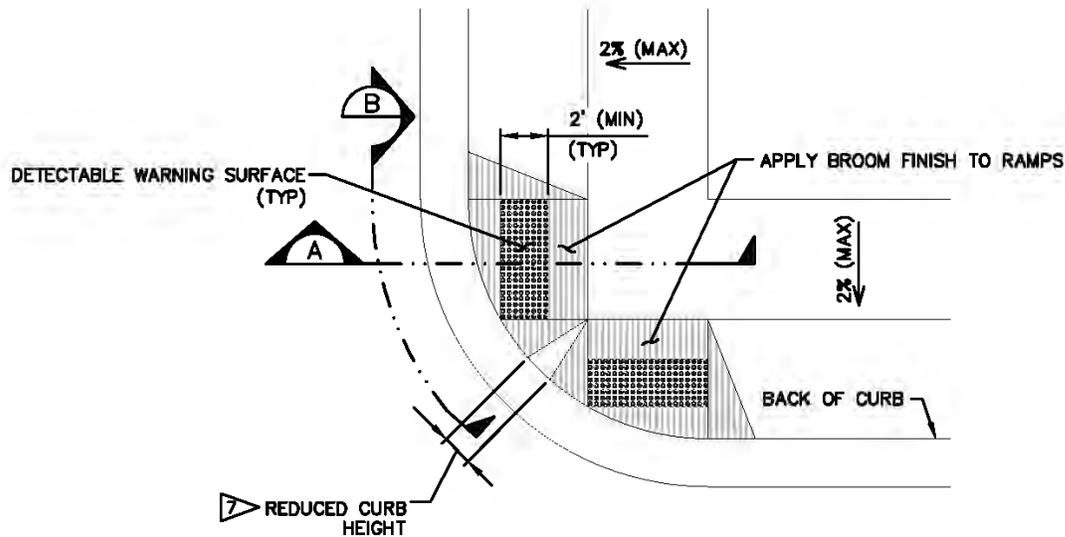
STANDARD SIDEWALK

SCALE: NONE

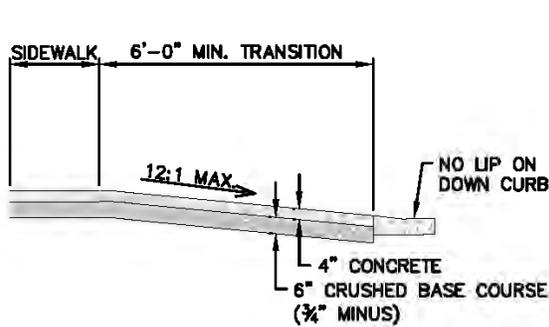
NOTES:

1. CONCRETE SHALL BE M-4000 WITH $\frac{3}{4}$ " MAXIMUM AGGREGATE AND A 28-DAY STRENGTH OF 4000 PSI, 5% TO 8% AIR CONTENT WITH A MAXIMUM SLUMP OF FOUR (4) INCHES.
2. CONCRETE SHALL INCLUDE 0.75 POUNDS OF REINFORCING FIBERS PER CUBIC YARD.
3. CONTRACTION JOINTS SHALL BE SPACED THE SAME DIMENSION AS THE WIDTH BUT NOT EXCEED 6 FEET EACH WAY. CONTRACTION JOINTS SHALL BE CONSTRUCTED BY SAWING OR SCORING. A TOOL SHALL BE USED WHICH WILL LEAVE CORNERS ROUNDED AND DESTROY AGGREGATE INTERLOCK FOR THE SPECIFIED MINIMUM DEPTH. CONTRACTION JOINTS SHALL BE A MINIMUM OF $\frac{1}{4}$ OF THE TOTAL DEPTH OF THE CONCRETE.
4. ALL SIDEWALKS GREATER THAN SIX FEET IN WIDTH SHALL BE SAWCUT LENGTHWISE DOWN THE CENTER A MINIMUM OF $\frac{1}{4}$ THE TOTAL DEPTH OF THE CONCRETE.
5. EXPANSION JOINTS, USING $\frac{1}{2}$ " MATERIAL SHALL BE SPACED AT INTERVALS OF 45' MAXIMUM.
6. ALL EDGES AND JOINTS SHALL BE ROUNDED WITH AN EDGING TOOL OF A MINIMUM $\frac{1}{4}$ " RADIUS.
7. SIX INCHES OF BASE MATERIAL IS REQUIRED. BASE MATERIAL SHALL BE $\frac{3}{4}$ " CRUSHED BASE COURSE COMPACTED TO 95% PER AASHTO, T-99, OR SAND THOROUGHLY COMPACTED IN PLACE.
8. GRADE, ALIGNMENT AND FORMS SHALL BE INSPECTED BY THE CITY OR THEIR DESIGNATED INSPECTOR PRIOR TO POURING.
9. ALL CONCRETE DRIVEWAY SECTIONS SHALL BE 6" THICK WITH REINFORCEMENT. (SEE DRIVEWAY APPROACH DETAIL SD-15)
10. ALL COLD JOINTS SHALL HAVE SMOOTH DOWEL BARS PLACED IN BOTTOM $\frac{1}{3}$ OF CONCRETE AT 18" O.C. EACH WAY AND 6" FROM EDGES, OR KEY WAYS INSTALLED TO PREVENT VERTICAL SEPARATION.

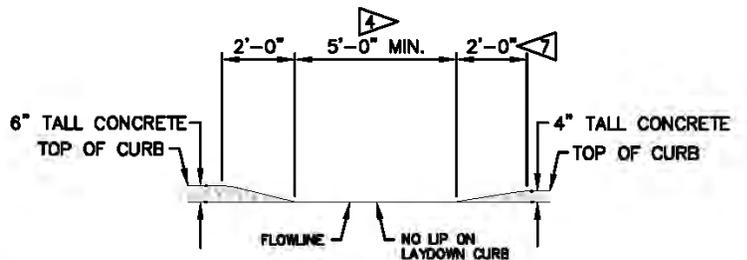
2.0% MAX.



PLAN
PEDESTRIAN RAMPS
SCALE: NONE



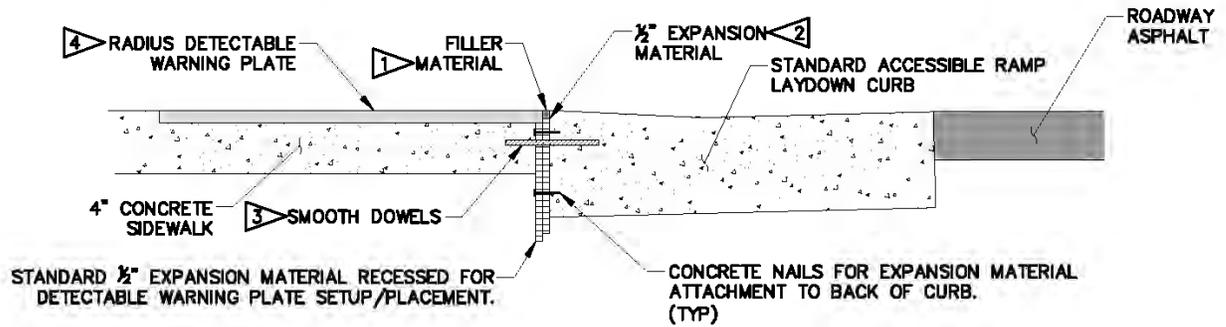
SECTION "A"
SCALE: NONE



SECTION "B"
SCALE: NONE

NOTES:

1. RAMP SLOPE SHALL NOT BE STEEPER THAN 12:1.
2. SIDEWALK CROSS-SLOPES SHALL NOT EXCEED 2%.
3. BEGIN RAMP SLOPE AT FLOWLINE OF GUTTER.
4. VARIES WITH CURB RETURN RADIUS.
5. APPLY BROOM FINISH TO RAMPS AS SHOWN ABOVE
6. SEE MPWSS 02529 FOR JOINT REQUIREMENTS.
7. TRANSITION TO 4" TALL CURB BETWEEN PEDESTRIAN RAMPS, UNLESS INLET IS INSTALLED.
8. CURB RAMPS MUST HAVE A DETECTABLE WARNING FEATURE EXTENDING THE FULL WIDTH OF THE RAMP. THE DETECTABLE SURFACE MUST CONSIST OF RAISED TRUNCATED DOMES WITH A DIAMETER OF NOMINAL 0.9 INCHES, A HEIGHT OF NOMINAL 0.2 INCHES, A CENTER-TO-CENTER SPACING OF NOMINAL 2.35 INCHES AND BE AT LEAST 2' IN WIDTH. THE TEXTURE AND COLOR OF THE DETECTABLE WARNING FEATURE MUST CONTRAST WITH THE SURROUNDING SURFACES (EITHER LIGHT-ON DARK OR DARK-ON-LIGHT).



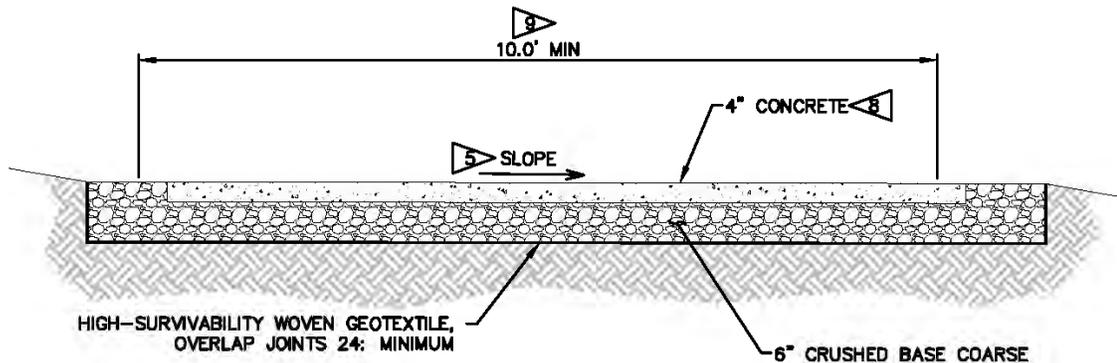
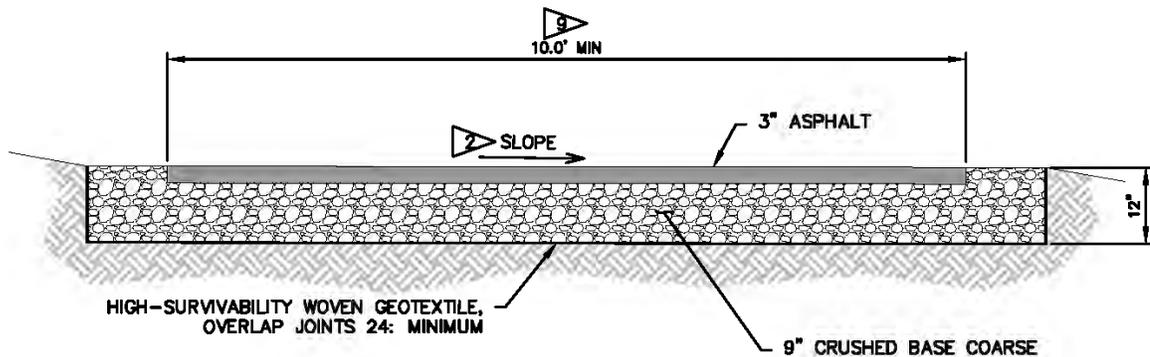
RADIUS DETECTABLE WARNING INSTALLATION

SCALE: NONE

NOTES:

- 1 CONTRACTOR SHALL FILL WITH BASF, SONOLASTIC NP1, GUN GRADE POLYURETHANE SEALANT, OR APPROVED EQUAL.
- 2 1/2" EXPANSION MATERIAL SHALL BE "POLYFOAM-LIGHTWIGHT FLEXIBLE FOAM EXPANSION JOINT", OR APPROVED EQUAL. TOP 1/2" PORTION OF THE JOINT MATERIAL SHALL BE REMOVABLE.
- 3 INSTALL 12" LONG SMOOTH BAR DOWELS (1/2" DIA) AT CONCRETE CONNECTION (2' OC).
- 4 EAST JORDAN IRON WORKS, DURACAST RADIAL DETECTABLE WARNING PLATE, GRAY IRON, OR APPROVED EQUAL.

CHAPTER 6 STREETS

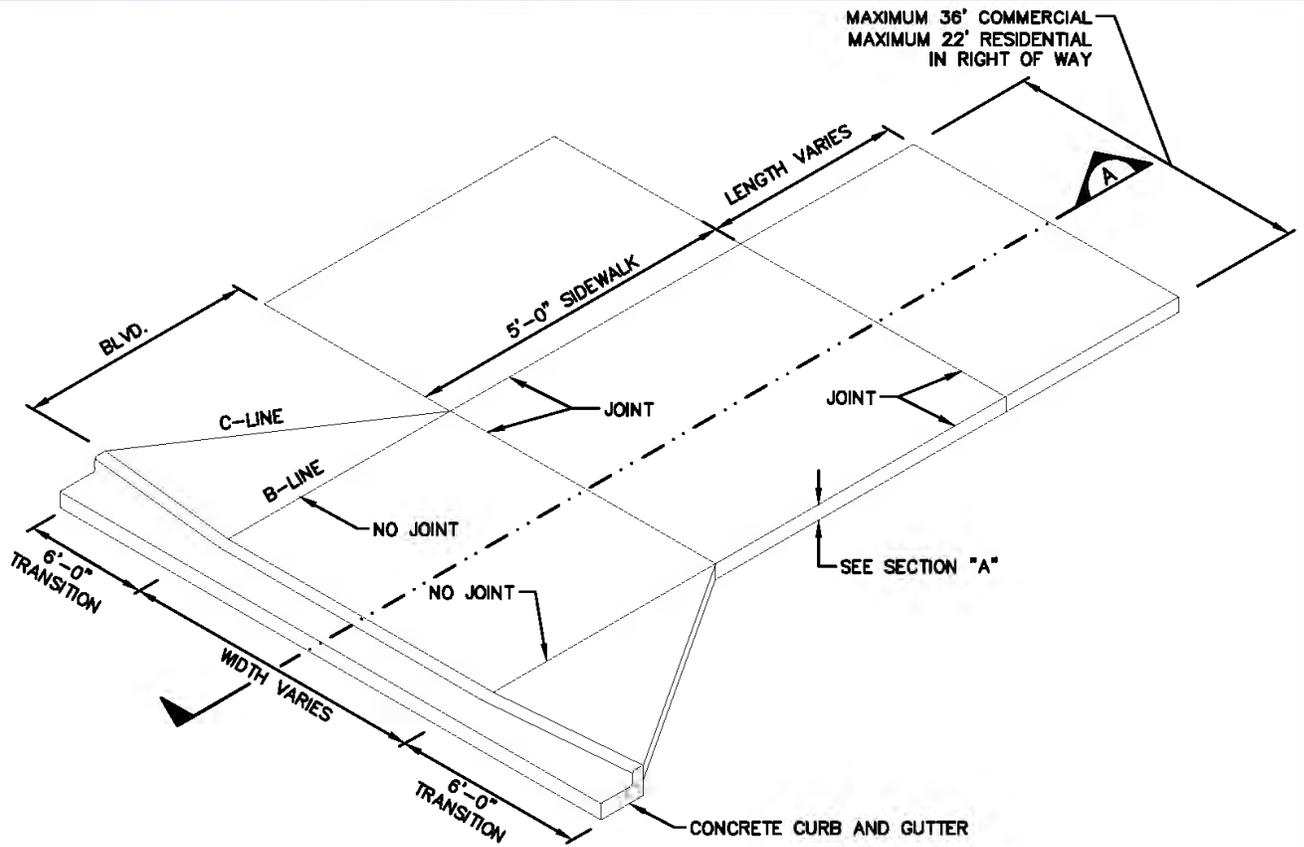


BIKE PATH

SCALE: NONE

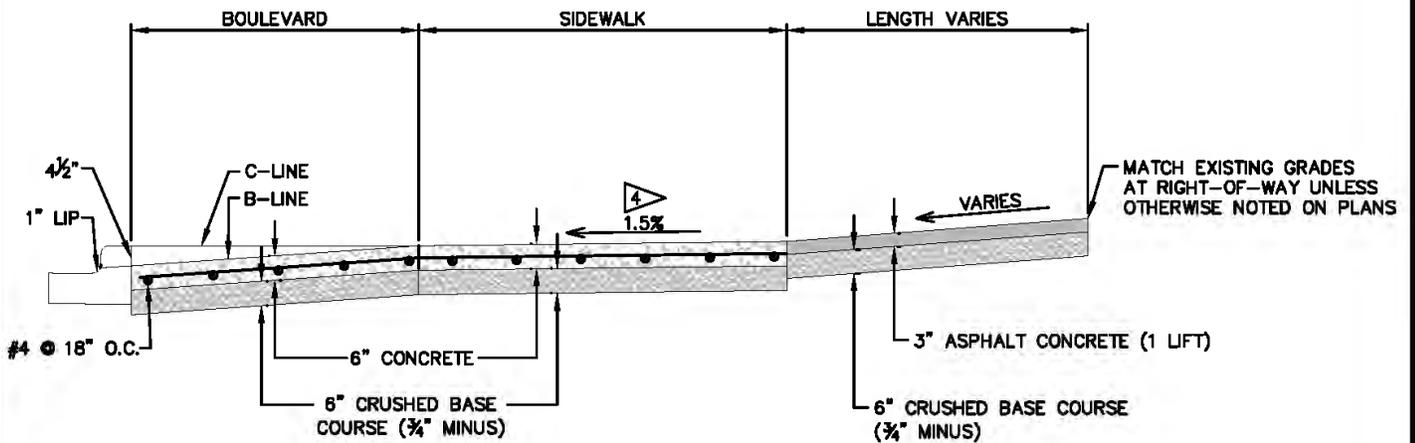
NOTES:

1. BIKE PATHS SHALL BE DESIGNED TO SUPPORT A MINIMUM 12,500 POUNDS.
2. ASPHALT PATHS SHALL BE A MINIMUM OF 10 FEET WITH A CROSS SLOPE OF 1.5% (2.0% MAX) AND A 1 FOOT WIDE GRAVEL BORDER ALONG EACH EDGE.
3. PATH BED SHALL CONSIST OF A MINIMUM 9 INCHES OF CRUSHED GRAVEL COMPACTED TO 95% OF MAXIMUM DENSITY AS DETERMINED BY AASHTO T99, UNLESS OTHERWISE DICTATED BY SUB-SOIL TYPE MATERIALS BEING COMPACTED TO ROAD STANDARD.
4. THE OVERLAY SHALL CONSIST OF 3 INCHES OF ASPHALT COMPACTED TO 93% OF MAXIMUM DENSITY, AS DETERMINED BY ASTM D-2041. CONSTRUCTION SEAL SHALL BE APPLIED AT 0.08 GALLONS/SQUARE YARD AFTER INSTALLATION.
5. CONCRETE PATHS SHALL BE A MINIMUM OF 10 FEET WITH A CROSS SLOPE OF 1.5% (2.0% MAX).
6. PATH BASE SHALL CONSIST OF A MINIMUM OF 6 INCHES OF CRUSHED GRAVEL COMPACTED TO 95% OF MAXIMUM DENSITY AS DETERMINED BY AASHTO T-99. CONCRETE SHALL BE A MINIMUM OF 4 INCHES OF M4000 REINFORCED WITH 1.5 lbs. PER CUBIC YARD OF FIBER MESH.
7. WHERE TERRAIN ALLOWS, SLOPE OF THE PATH SHOULD NOT EXCEED 12:1.
8. PROVIDE 6 INCHES OF CONCRETE WITH REINFORCEMENT AT DRIVEWAY APPROACH.
9. WHEN CONSTRUCTED THROUGH WATER QUALITY PROTECTION AREA THE MINIMUM WIDTH MAY BE REDUCED TO 8 FEET.



DRIVEWAY APPROACH

SCALE: NONE



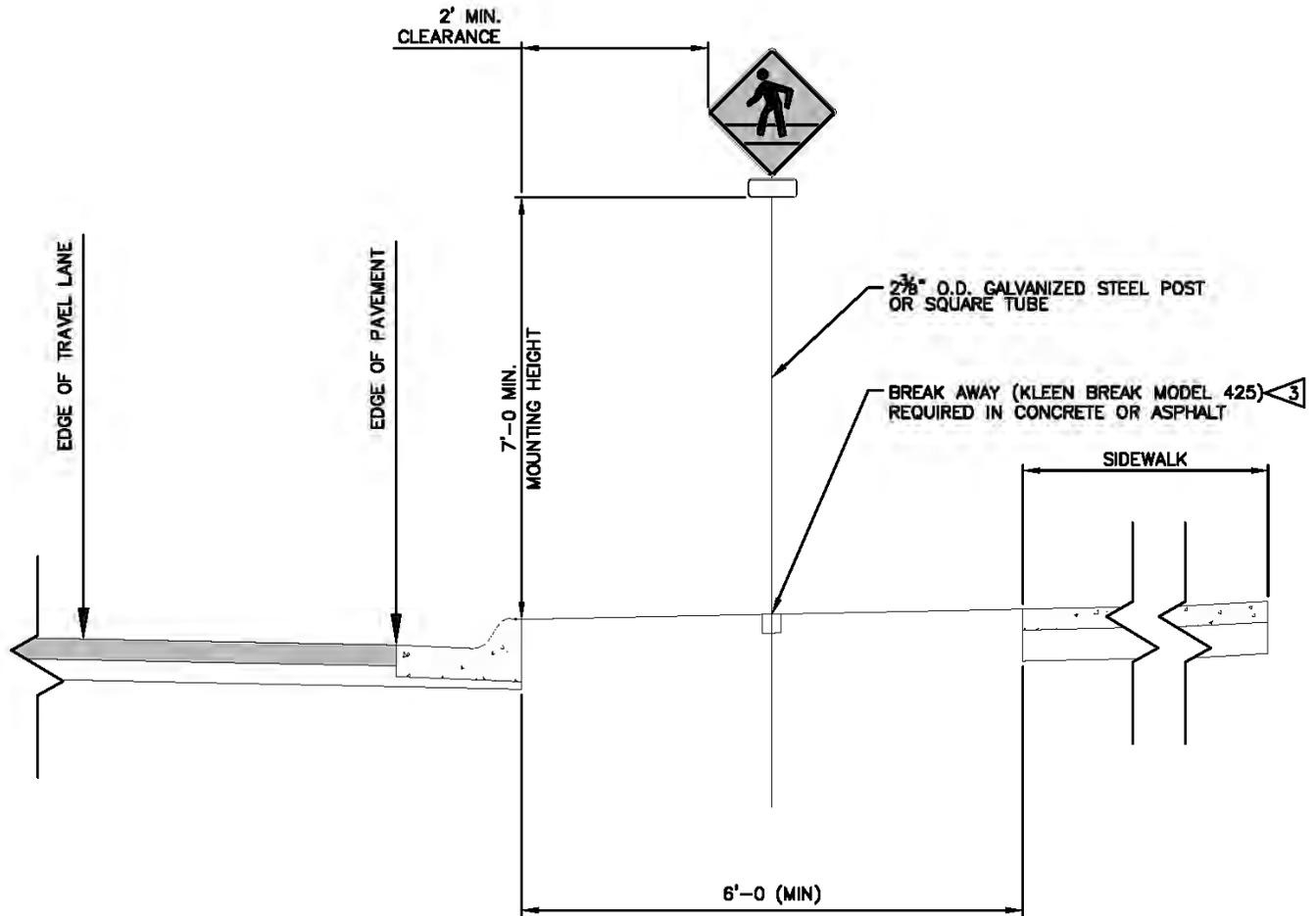
SECTION "A"

SCALE: NONE

NOTES:

1. PLACE #4 REBAR @ 18" O.C. SUPPORTED BY 2" TALL CHAIRS IN ALL 6" CONCRETE.
2. SEE MPWSS 02529 FOR JOINT REQUIREMENTS.
3. CONCRETE SHALL INCLUDE THE USE OF FIBER MESH (0.75 POUNDS PER CUBIC YARD OF CONCRETE).

2.0% MAX.

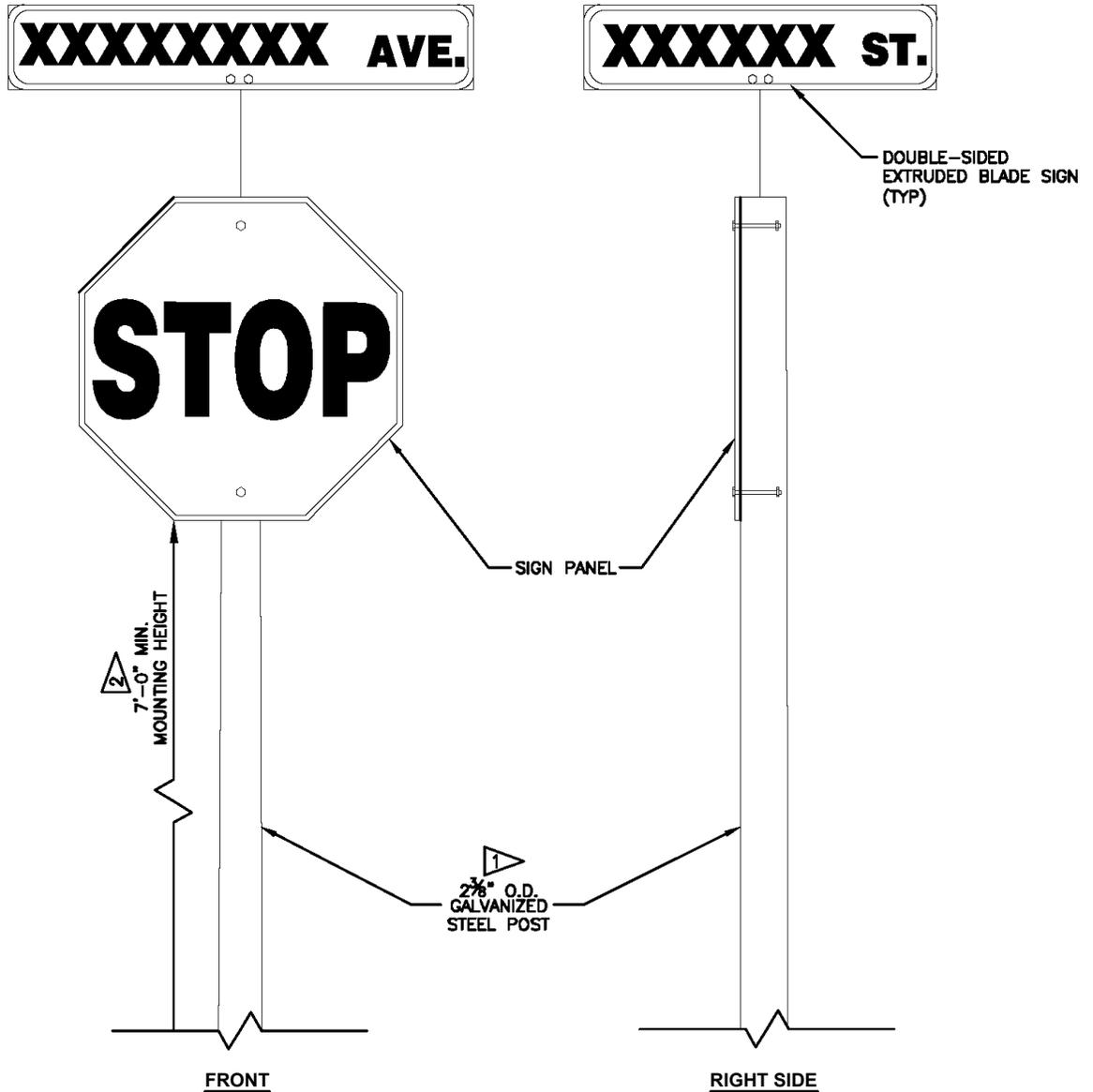


TYPICAL SIGN PLACEMENT

SCALE: NONE

NOTES:

1. PLACE STOP SIGNS ADJACENT TO STOP BARS.
2. PLACE ALL SIGNS AT SPECIFIED CLEARANCES.
3. WHEN STEEL POST IS INSTALLED IN DIRT CONTRACTOR SHALL USE V-LOC 23-VR4 (034-00113), OR APPROVED EQUAL. WHEN STEEL POST IS INSTALLED IN CONCRETE CONTRACTOR SHALL USE V-LOC 20-VR1, OR APPROVED EQUAL. INSTALL PER MANUFACTURE'S RECOMMENDATIONS.
1. ALL SIGN BLANKS SHALL BE .080 GAUGE FLAT ALUMINUM STOCK.
2. STOP SIGN FACES SHALL BE 3M HIGH INTENSITY GRADE REFLECTIVE SHEETING, OR APPROVED EQUAL.
3. ALL SIGN MATERIALS AND CONSTRUCTION PROCEDURES SHALL CONFORM TO THE 'STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION,' 1995 EDITION, DISTRIBUTED BY THE MONTANA DEPARTMENT OF TRANSPORTATION (MDT).
4. UNIFORM MANUAL NUMBERS ARE REFERENCED TO THE 'MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES' BY THE FEDERAL HIGHWAYS ADMINISTRATION.



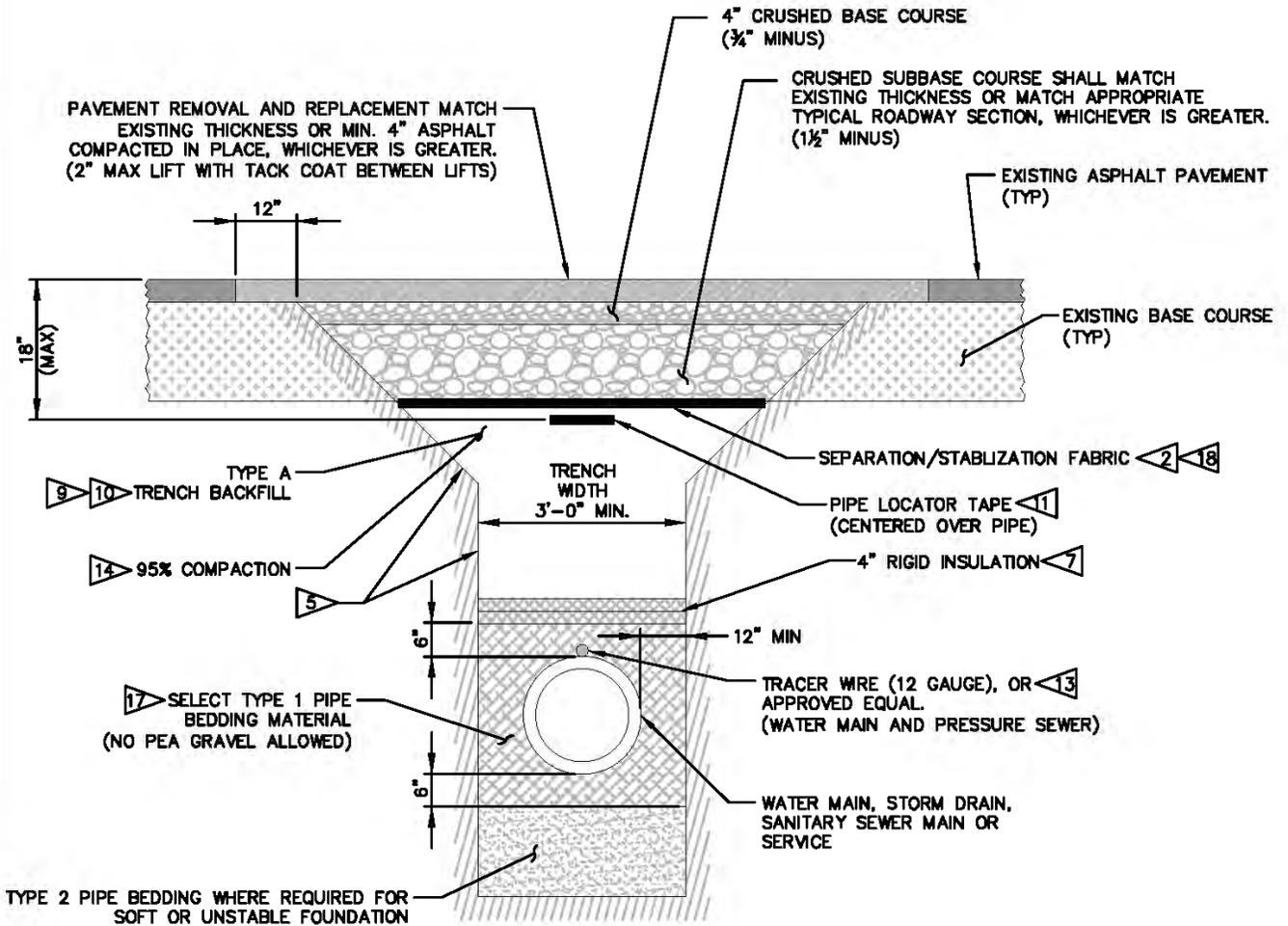
TYPICAL D-3 SIGN MOUNTING

SCALE: NONE

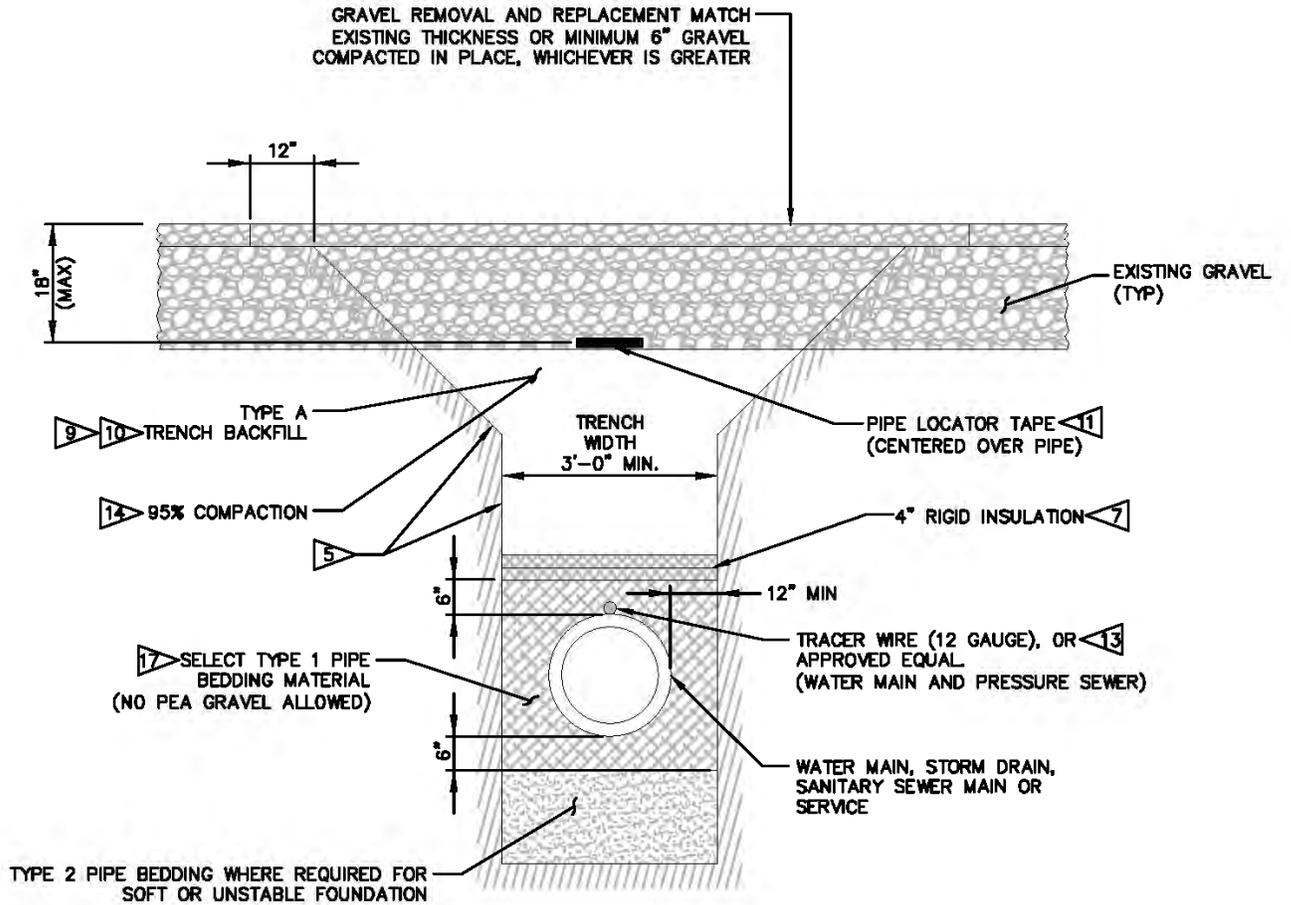
SIGN SPECIFICATIONS:

- 1 THESE POSTS SHALL INCLUDE 3 1/8" WIDE RED/FLORESCENT YELLOW-GREEN POST REFLECTORS AS REQUIRED.
- 2 BOTTOM OF SIGN PER MUTCD. (7'-0" MIN.)
3. STREET NAME SIGN BACKING SHALL BE 3M GREEN 3277 HIGH GRADE.
4. STREET NAME SIGN LETTERING SHALL BE 3M WHITE 3290 HIGH GRADE REFLECTIVE SHEETING, OR APPROVED EQUAL LETTERING SHALL BE PER THE LATEST MUTCD.
5. STREET NAME SIGN SHALL BE ATTACHED TO THE TOP OF THE SIGN POST WITH A ROUND CAP SIGN HOLDER WITH A 6" LONG MOUNTING BRACKET. A 6" LONG 90 CROSS PIECE SHALL BE USED FOR DUAL SIGN APPLICATIONS.

CHAPTER 6 STREETS

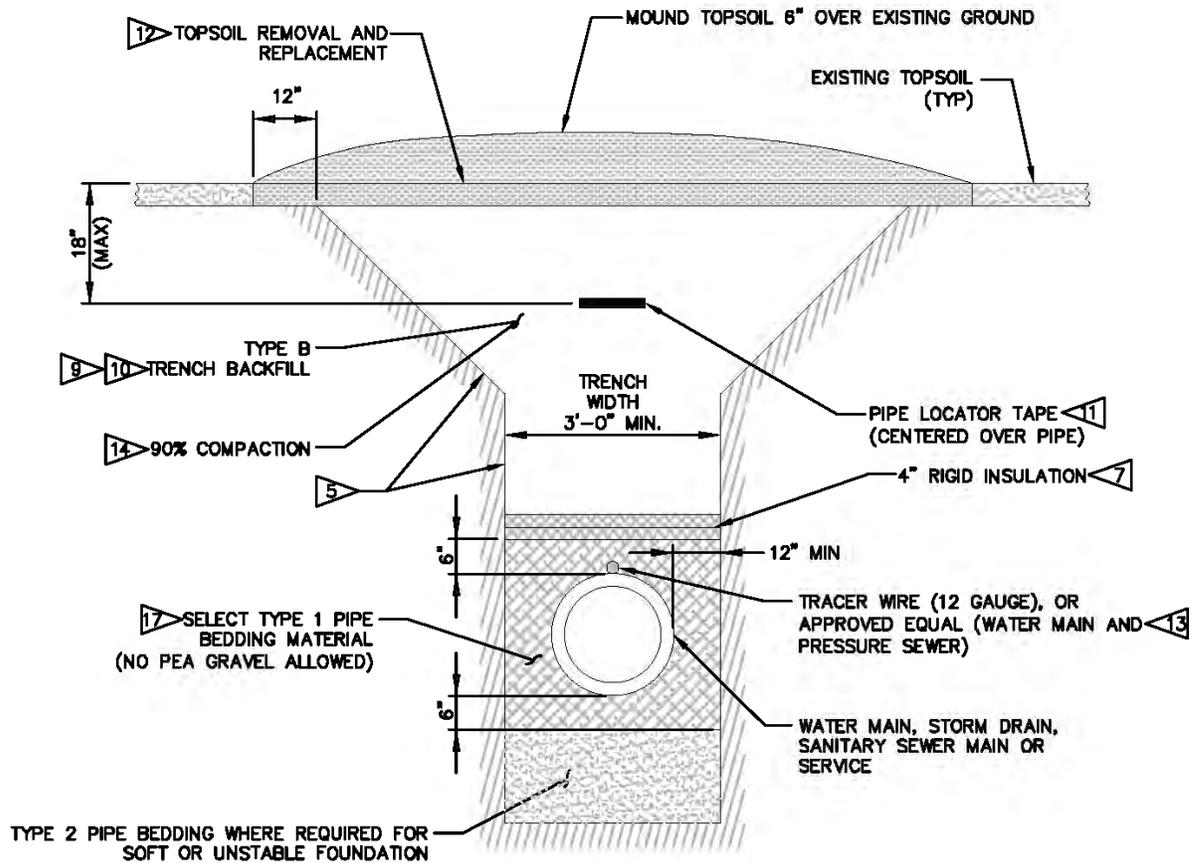


CHAPTER 6 STREETS



3 GRAVELED SURFACE
SCALE: NONE

CHAPTER 6 STREETS



4 **UNIMPROVED SURFACE**
 SCALE: NONE

CHAPTER 6 STREETS

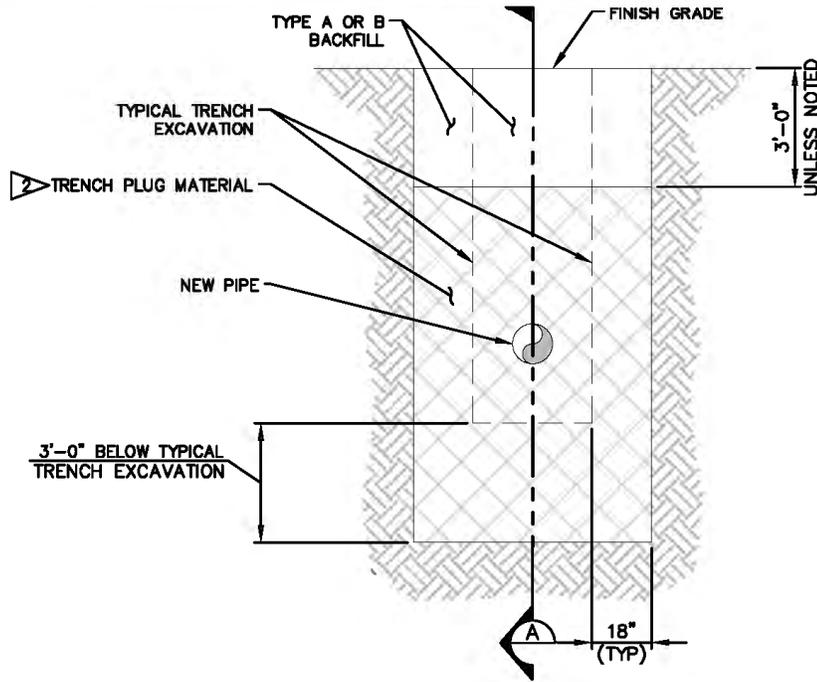
CONSTRUCTION NOTES:

- 1 **WHERE TRENCH PASSES THROUGH EXISTING PAVEMENT:**
THE PAVEMENT SHALL BE CUT ALONG A NEAT VERTICAL LINE A MINIMUM OF 12" FROM THE EDGE OF THE TRENCH OPENING.
- 2 **WHERE TRENCH PASSES THROUGH EXISTING PAVEMENT:**
SAWCUT THE ASPHALT ALONG A NEAT VERTICAL LINE PER LIMITS SHOWN ON THE PLANS. WHERE SUITABLE TRENCH BACKFILL IS NOT USED, SEPARATION/STABILIZATION FABRIC AMOCO 2006 OR CONTECH C-300 GEOTEXTILE FABRIC, OR APPROVED EQUAL WILL BE USED.
- 3 **WHERE TRENCH PASSES THROUGH EXISTING GRAVEL:**
THE GRAVEL SHALL BE REMOVED AND REPLACED A MINIMUM OF 12" FROM THE EDGE OF THE TRENCH OPENING.
- 4 **WHERE TRENCH PASSES THROUGH EXISTING UNIMPROVED SOIL:**
THE TOPSOIL SHALL BE REMOVED AND REPLACED A MINIMUM OF 12" FROM THE EDGE OF THE TRENCH OPENING.
- 5 TRENCH SHALL BE CONSTRUCTED TO OSHA SPECIFICATIONS FOR EXCAVATION. DRAWINGS DO NOT SHOW TRENCH DIMENSIONS OR BACKSLOPES THAT MAY BE REQUIRED. CONTRACTOR REQUIRED TO DETERMINE WHICH OSHA SPECIFICATIONS ARE APPLICABLE. CONTRACTOR SHALL BE RESPONSIBLE FOR TRENCH EXCAVATION AND SAFETY PER OSHA SPECIFICATIONS.
- 6. ALL SPOILS SHALL BE REMOVED AND DISPOSED OF AT AN APPROVED LOCATION.
- 7 **INSTALL 4" OF WATER RESISTANT RIGID INSULATION THE FULL WIDTH OF THE TRENCH WHEN BURY TO TOP OF PIPE IS LESS THAN 6'-0" FOR WATER, 4'-0" FOR SEWER. (SHALL BE APPROVED BY CITY ENGINEER)**
- 8. ALL ROCKS GREATER THAN 12" IN ANY DIMENSION SHALL BE HAULED OFF SITE AND DISPOSED OF PROPERLY.
- 9 **NO ROCKS OR LUMPS LARGER THAN 2" IN ANY DIMENSION SHALL BE ALLOWED WITHIN 6" OF THE PIPE.**
- 10 **USE SUITABLE NATIVE MATERIAL FOR BACKFILL:**
WITH PRIOR APPROVAL OF THE CITY AND THE ENGINEER, ON-SITE EXCAVATED SOIL MAY BE USED TO BACKFILL WATER MAINS, WATER SERVICES, FIRE HYDRANT LEADS, SEWER MAINS AND SEWER SERVICES. BLOCKY OR PLATY CLAY, AND SATURATED OR NEAR SATURATED SOILS, WILL NOT BE PERMITTED FOR USE AS BACKFILL MATERIAL. BACKFILL MATERIAL SHALL BE PLACED IN 12-INCH MAXIMUM LOOSE LIFTS AND SHALL BE COMPACTED TO AT LEAST 95% OF THE MATERIAL'S MAXIMUM DRY DENSITY, AS DETERMINED BY AASHTO T-99 OR ASTM D698. NO ROCKS LARGER THAN 3", ANY DIMENSION, WILL BE PERMITTED IN FIRST LIFT OF BACKFILL. THE CONTRACTOR SHALL PROVIDE THE ENGINEER WITH A PROCTOR (MOISTURE-DENSITY RELATIONSHIP) FOR THE BACKFILL MATERIAL.
- 11 **USE LABELED AND COLOR-CODED TAPE FOR THE APPROPRIATE UTILITY PIPE.**
- 12 **SEED, FERTILIZE, AND MULCH ALL DISTURBED AREAS WHICH ARE NOT PAVED, CONCRETED, GRAVELED, OR SODDED PER SPECIFICATIONS.**
- 13 **FOR WATER MAINS AND PRESSURE SEWERS; TRACER WIRE (12 GAUGE MIN.), OR APPROVED EQUAL, SHALL BE TAPED TO TOP OF ALL PLASTIC PIPE (PVC OR POLYETHYLENE) AND BROUGHT UP IN "SNAKE PIT" BEHIND FIRE HYDRANT AND COILED AT END OF SERVICE.**
- 14 **COMPACTION REFERS TO PERCENT OF MAXIMUM DENSITY DETERMINED BY A STANDARD PROCTOR. AASHTO T-99 OR AASHTO T-99.**
- 15. FINISHED GRADE MUST MATCH THE ORIGINAL EXISTING GRADE WHERE PIPE IS INSTALLED UNLESS OTHERWISE NOTED.
- 16. VERIFY THAT COMPACTION METHODS ARE COMPATIBLE WITH PIPE MANUFACTURER'S RECOMMENDATIONS. ANY DAMAGE TO THE PIPE WILL BE THE CONTRACTOR'S RESPONSIBILITY.
- 17 **SELECT TYPE 1 PIPE BEDDING MATERIAL SHALL BE ¾" MINUS CRUSHED PER MPW 55 SECTION 02235.2.3.A WITH THE FOLLOWING GRADATION:**

SIEVE NO.	PERCENT PASSING (BY WEIGHT)
¾"	100
#4	40-70
#10	25-55
#200	2-10

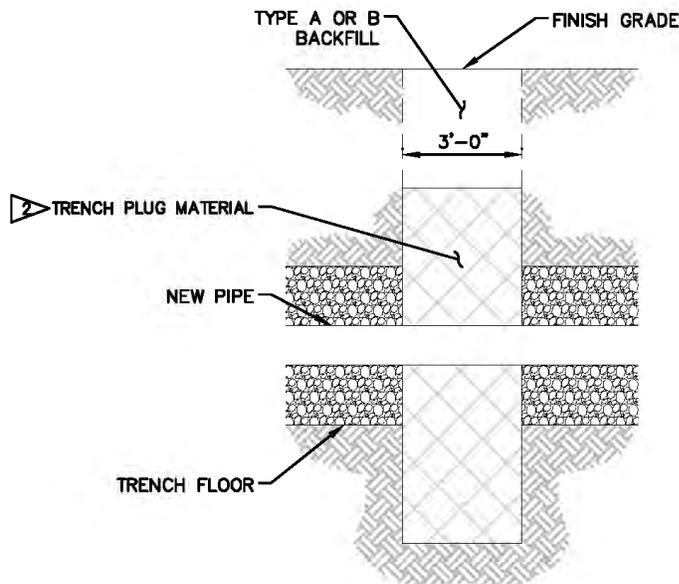
- 18 **GEOTEXTILE REPLACEMENT:**
THE CONTRACTOR SHALL EXCAVATE TO STREET SUBGRADE AND EXPOSE THE GEOTEXTILE FABRIC WITHOUT DISTURBING IT. THE FABRIC SHALL BE CUT AND ROLLED BACK INTACT. A MINIMUM TWO FEET OF FABRIC SHALL BE EXPOSED ON EITHER SIDE OF THE CUT. THE FABRIC CUTS SHALL BE MADE WITH A SHARP KNIFE OR SCISSORS, RIPPING WITH A BACKHOE OR OTHER MACHINE IS NOT ACCEPTABLE. AFTER PIPE BACKFILL, THE FABRIC SHALL BE PATCHED BY THE FOLLOWING METHOD:
 - A. CONTRACTOR SHALL INSTALL NEW FABRIC WITH A MINIMUM OVERLAP OF TWO FEET BEYOND ANY CUT MADE TO THE EXISTING FABRIC.

THE PATCHING OF THE GEOTEXTILE FABRIC MUST BE INSPECTED BY THE CITY OF WHITEFISH PRIOR TO BACKFILLING.



TRENCH PLUG

SCALE: NONE



SECTION "A"

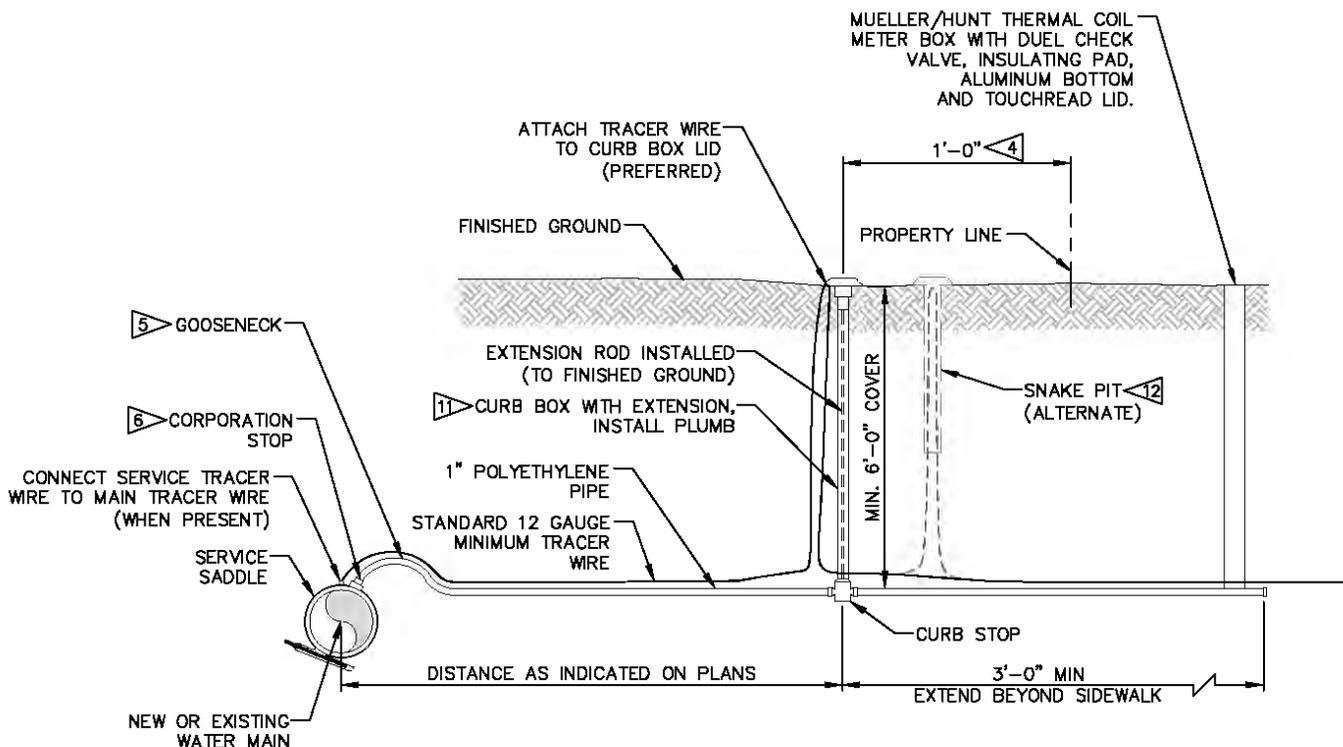
SCALE: NONE

TRENCH PLUG NOTES:

1. THE PURPOSE OF THE TRENCH PLUG IS TO PREVENT TYPE 1 & TYPE 2 BEDDING FROM BECOMING A CONDUIT FOR GROUNDWATER.
2. PER MPWSS SECTION 02222.2.1.A OR FLOWABLE FILL.
3. TRENCH PLUGS SHALL BE INSTALLED AT A MINIMUM OF 100'-0" APART, OR CROSSING OF STREAMS, DITCHES OR OTHER SOURCES OF GROUNDWATER. TRENCH PLUGS SHALL BE INSTALLED WITHIN 10'-0" UPSTREAM OF ALL SANITARY SEWER MANHOLES. WHEN DIRECTED BY THE ENGINEER, TRENCH PLUGS SHALL ALSO BE INSTALLED ALONG SERVICE UTILITY TRENCHES.
4. TRENCH PLUGS ARE REQUIRED ON ALL SANITARY SEWER MAINS.

WATER SYSTEM DETAILS

CHAPTER 3 WATER



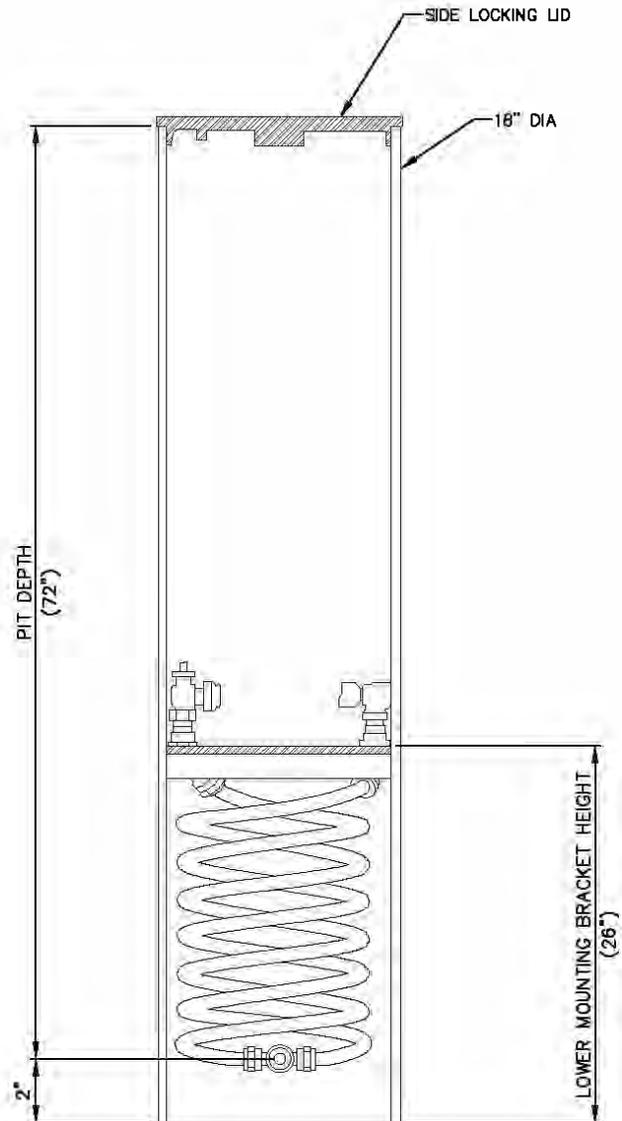
WATER SERVICE

SCALE: NONE

NOTES:

1. THIS DETAIL APPLIES TO SERVICES THAT ARE 2" IN DIAMETER OR SMALLER. SERVICE LINES OVER 2" ARE INSTALLED SIMILAR TO WATER MAINS.
2. WATER SERVICE LINES SHALL BE CONNECTED/INSTALLED WHERE SHOWN ON THE DRAWINGS OR AS SPECIFIED.
3. BEDDING MATERIAL WITHIN 6-INCHES OF THE SERVICE LINE SHALL BE TYPE 1 PIPE BEDDING.
4. THE CURB BOX SHALL BE INSTALLED 1'-0" FROM THE PROPERTY LINE OR WHERE SHOWN ON THE DRAWINGS. WHERE A SIDEWALK IS ADJACENT TO THE PROPERTY LINE, INSTALL CURB BOX IN THE CENTER OF THE BOULEVARD.
5. THE GOOSENECK IN THE SERVICE LINE AT THE CONNECTION TO THE CORPORATION STOP SHALL BE MADE IN THE HORIZONTAL PLANE WHEN POSSIBLE.
6. THE CORPORATION SHALL BE TAPPED AT 45° VERTICAL ANGLE ON THE PIPE (MEASURED FROM THE HORIZONTAL).
7. CONCRETE AND/OR PAVEMENT REMOVAL AND REPLACEMENT SHALL BE PROVIDED AS NECESSARY.
8. MINIMUM 6'-0" COVER SHALL BE MAINTAINED ALONG THE ENTIRE SERVICE LINE.
9. WHEN A 'WATER SERVICE' IS CALLED OUT THE CONTRACTOR SHALL PLACE THE ENTIRE SERVICE, FROM THE MAIN TO THE PROPOSED CURB STOP LOCATION. THIS INSTALLATION INCLUDES NEW CORPORATION STOP, SERVICE SADDLE, TUBING, CURB STOP, TRACER WIRE, CURB STOP BOX, TRACER WIRE AND EXTENSION ROD.
10. WIRE CONNECTOR WILL BE LUG TYPE WITH SILICON. MAIN LINE WIRE SHALL NOT BE CUT. TYPE: DRYCON OR EQUAL.
11. CURB STOP BOX SHALL BE MUELLER H-10334, McDONALD 5607LTW, OR FORD EA2-65-40-TW.
12. SNAKE PIT SHALL BE COPPERHEAD INDUSTRIES MODEL LD14TP, LD14TP-ADJ, OR APPROVED EQUAL.

CHAPTER 3 WATER



METER PIT

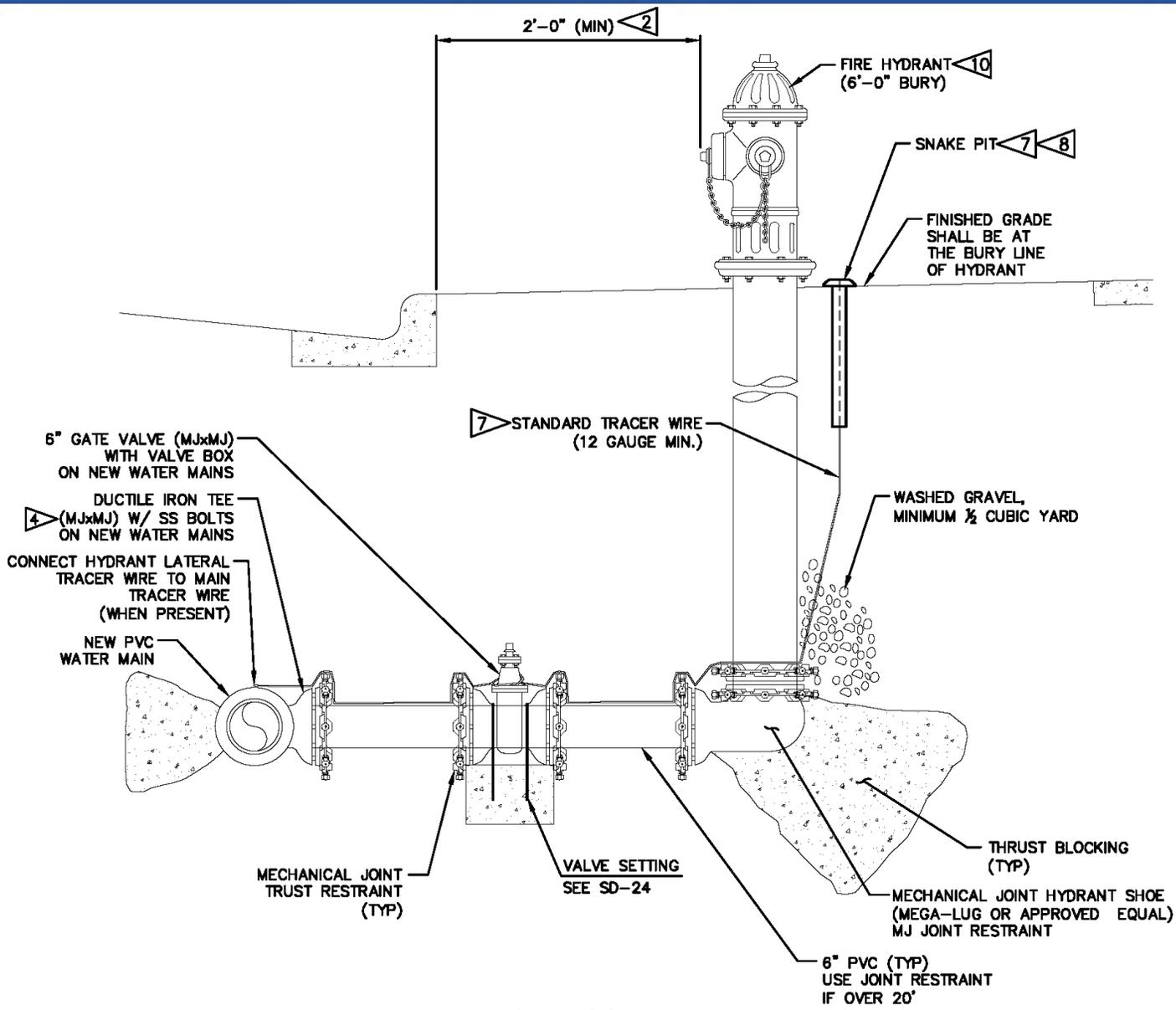
SCALE: NONE

ORDERING INFORMATION:

SETTING TYPE: STANDARD COIL PIT SETTER
INLET VALVE TYPE: FULL PORT ANGLE BALL VALVE
OUTLET VALVE TYPE: CASCADING ANGLE DUEL CHECK VALVE (ASSE)
METER SIZE: 1"
TYPE OF INLET/DUTLET CONNECTION: 1"(MIP) x 1"(MIP)

ACCESSORIES:

INSULATING FOAM DISC FOR 18" (1½" THICK, VALUE OF R4/IN)
ELECTRONIC METER READING LID (2" HOLE)



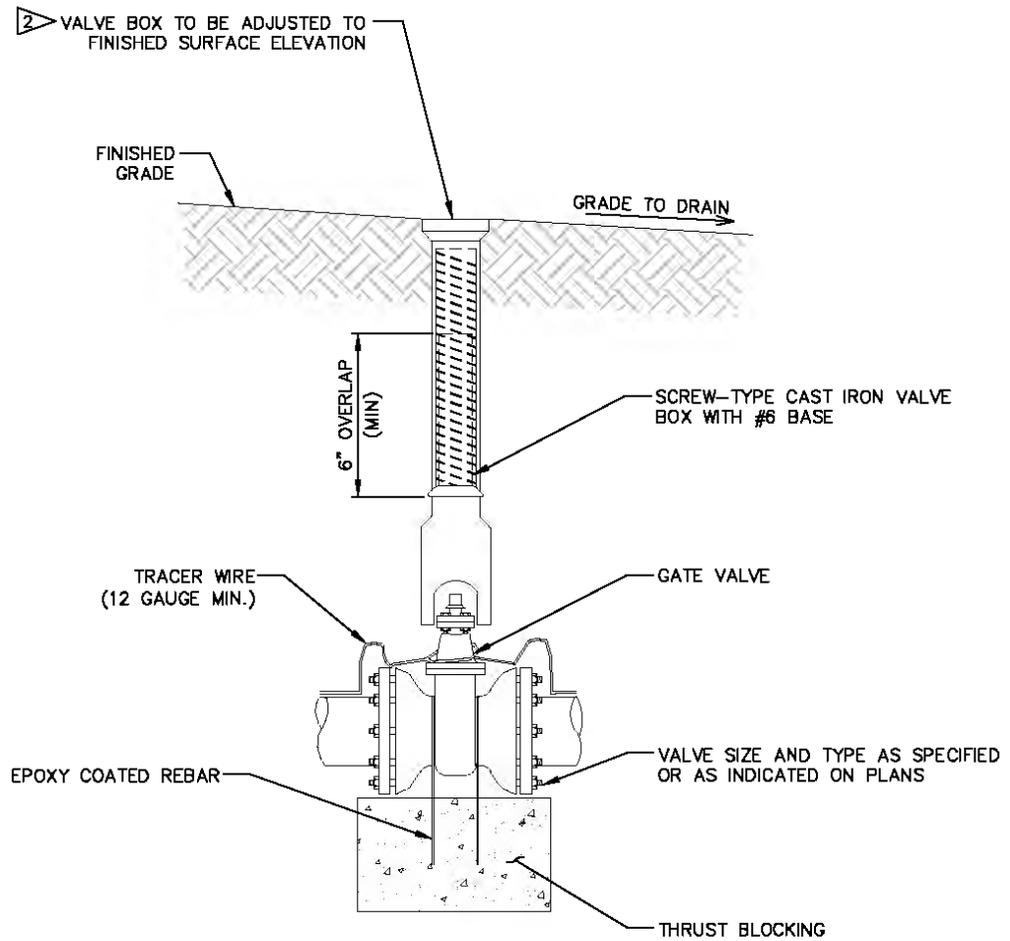
FIRE HYDRANT

SCALE: NONE

NOTES:

1. INSTALL HYDRANT WITH PUMPER NOZZLE FACING STREET UNLESS OTHERWISE DIRECTED BY FIELD ENGINEER.
2. HYDRANTS SHALL BE PLACED IN THE CENTER OF BOULEVARDS, WHERE APPLICABLE OR A MINIMUM OF EITHER 2'-0" FROM TBC OR 5'-0" FROM EDGE OF PAVEMENT WHERE THERE IS NO CURB AND GUTTER.
3. PROVIDE BOTH MECHANICAL JOINT THRUST RESTRAINT AND CONCRETE THRUST BLOCKING ON THE TEE, VALVE AND HYDRANT.
4. ON EXISTING WATER MAINS TAP EXISTING MAIN WITH 6" TAPPING SLEEVE AND FLANGE CONNECTED VALVE.
5. WRAP ALL DIRECT BURY CAST IRON OR DUCTILE IRON PIPE AND FITTINGS INCLUDING HYDRANTS, VALVE BOXES, CURB BOXES AND ALL OTHER METAL PARTS AND SURFACES, IN POLYETHYLENE ENCASEMENT.
6. STANDARD TRACER WIRE (12 GAUGE MIN.), SHALL BE TAPED TO TOP OF ALL PIPE AND BROUGHT UP SNAKE PIT AS SHOWN.
7. TRACER WIRE WILL BE RUN UP BACK OF THE HYDRANT INSTALLED IN SNAKE PIT. WIRE WILL ALSO GO TO THE CURB BOX. TRACER WIRE SHALL NOT BE RUN UP THE MAIN VALVE, CAN BOX OR AUXILIARY VALVE BOXES.
8. SNAKE PIT SHALL BE COPPERHEAD INDUSTRIES MODEL LD14TP, LD14TP-ADJ OR APPROVED EQUAL.
9. WIRE CONNECTOR WILL BE LUG TYPE WITH SILICON. MAIN LINE WIRE SHALL NOT BE CUT. TYPE: DRYCON OR EQUAL.
10. INSTALL 4-FOOT TALL HYDRANT FLAG. HYDRANT FLAG SHALL BE NEW CONCEPT TOOLS, HYDRANT SPRING FLAG WITH REFLECTIVE BANDS, BONNET BOLT MOUNTED, OR APPROVED EQUAL.

CHAPTER 3 WATER

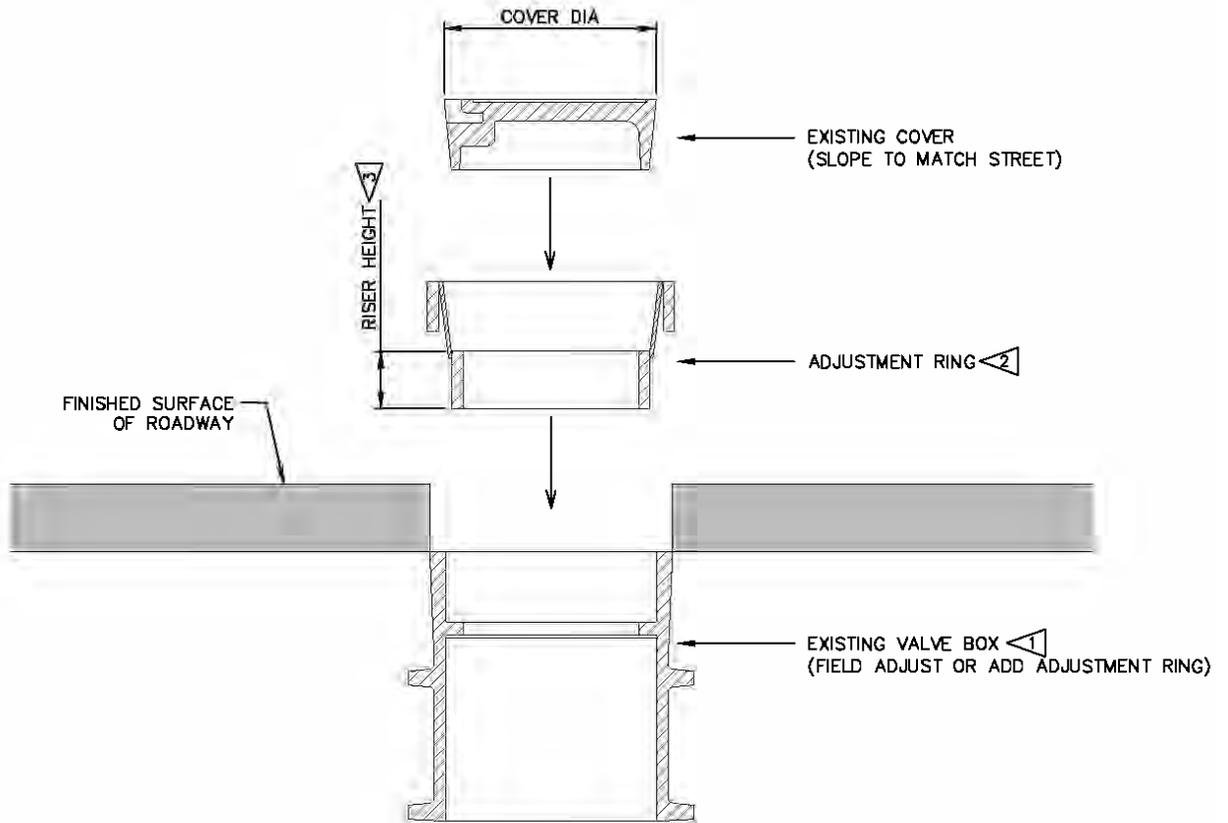


VALVE SETTING

SCALE: NONE

NOTES:

1. THIS DETAIL APPLIES TO ALL BURIED VALVES.
2. ADJUST VALVE BOX TO BE $\frac{1}{4}$ " \pm $\frac{1}{8}$ " BELOW FINISHED PAVEMENT/CONCRETE SURFACE. MAKE FINAL ADJUSTMENTS PRIOR TO PAVING.



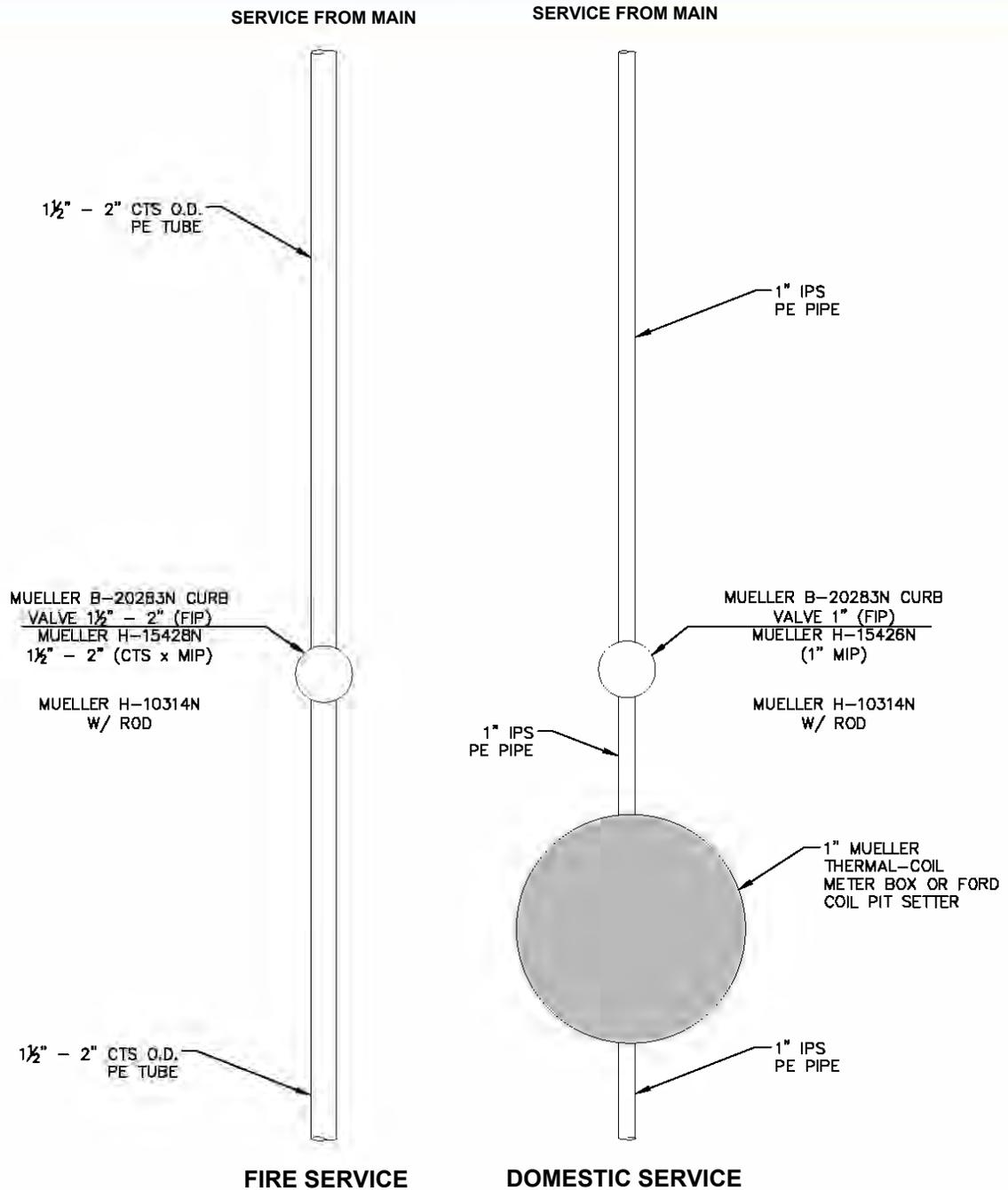
VALVE BOX ADJUSTMENT

SCALE: NDNE

NOTES:

- 1 THE PREFERRED METHOD FOR FIELD ADJUSTMENT IS BY 'SCREWING' VALVE BOX. IF CONTRACTOR IS UNABLE TO ADJUST BY 'SCREWING' VALVE BDX AN ADJUSTMENT RING WILL BE REQUIRED.
- 2 ADJUSTMENT RING SIZE/THICKNESS SHALL BE VERIFIED BY CONTRACTOR PRIOR TO ORDERING.
- 3 RISER HEIGHT 6" MAXIMUM FOR SLIP TYPE.
- 4. FINISHED VALVE BOX COVER SHALL BE $\frac{1}{8}$ " TO $\frac{1}{4}$ " (MAXIMUM) LOWER THAN FINISHED SURFACE.

CHAPTER 3 WATER

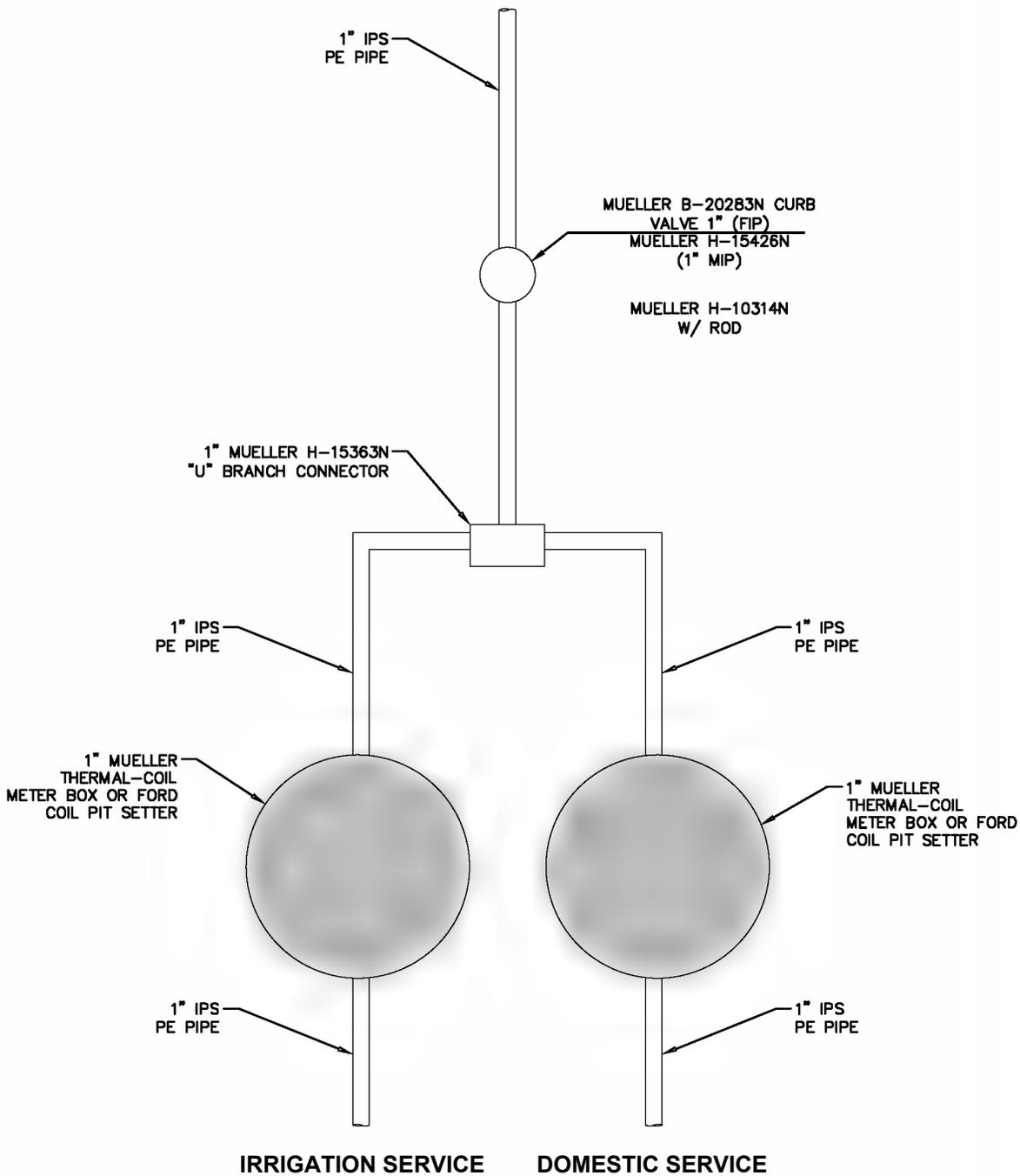


TYPICAL METER BOX SPECIFICATION:

- LOCKING FULL PORT ANGLE BALL VALVE INLET
- ASSE DUAL CHECK VALVE OUTLET
- ATTACHED ALUMINUM BASE
- SIDE LOCKING LID
- 72" DEPTH
- INSULATING PAD

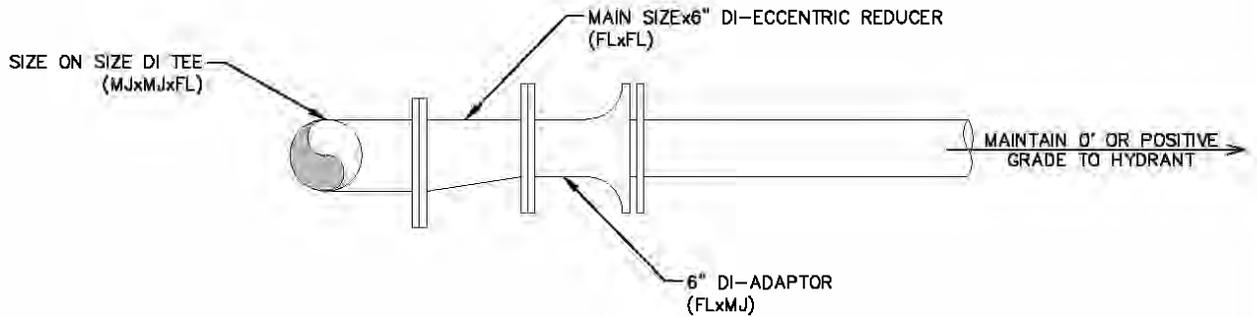
*USE MUELLER H-10334 FOR PLACEMENT IN CONCRETE FOR DRIVEWAYS.

SERVICE FROM MAIN



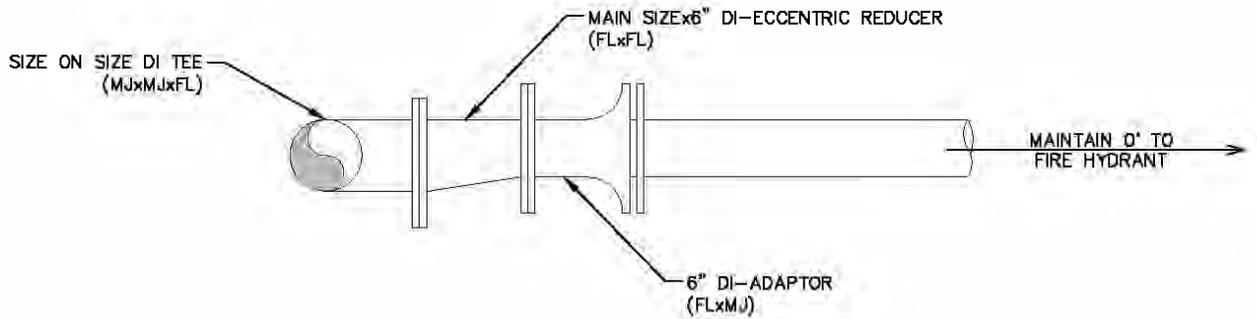
TYPICAL METER BOX SPECIFICATION:

- LOCKING FULL PORT ANGLE BALL VALVE INLET
- ASSE DUAL CHECK VALVE OUTLET
- ATTACHED ALUMINUM BASE
- SIDE LOCKING LID
- 72" DEPTH
- INSULATING PAD



AIR RELEASE HYDRANT FITTINGS ELEVATION VIEW

SCALE: NONE

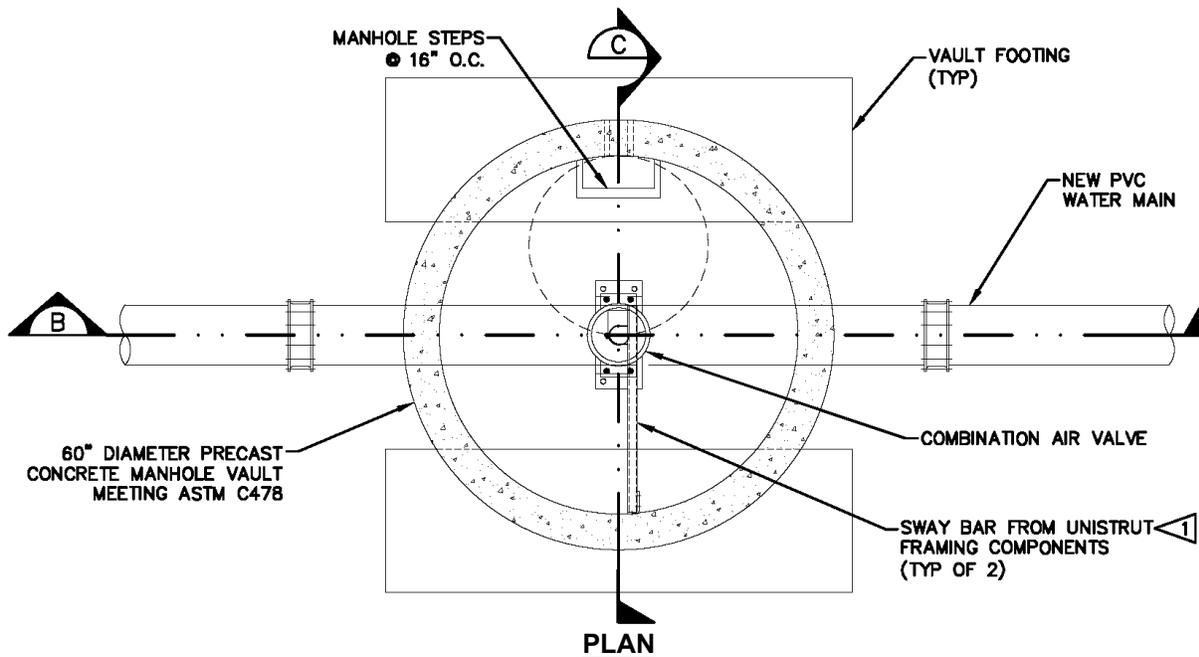


BLOWOFF FIRE HYDRANT ELEVATION VIEW

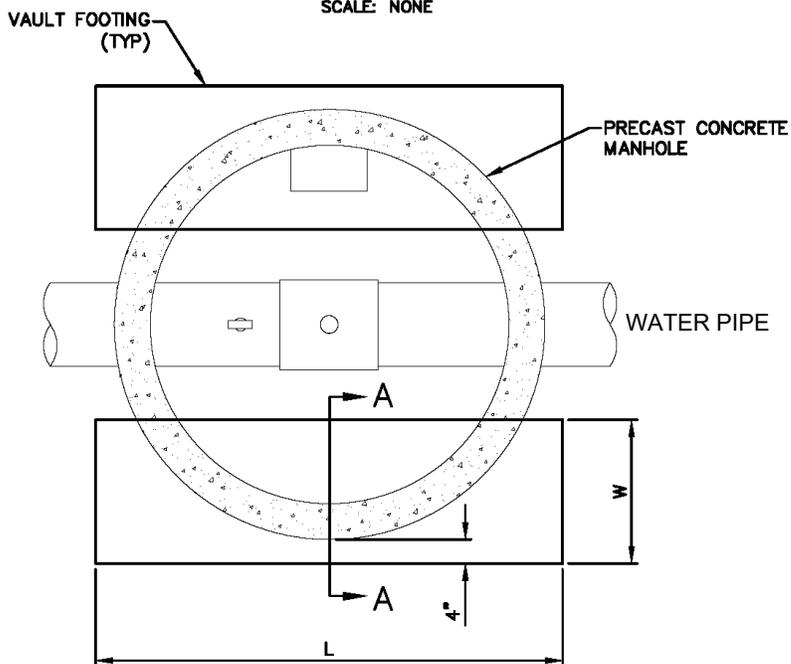
SCALE: NONE

NOTES:

1. SWAY BRACE PRODUCT NUMBERS ARE UNISTRUT. USE UNISTRUT, KINLINE OR EQUAL. SECURE SCAV INLET PIPING TO SWAY BRACE USING SERIES 1100 PIPE BRACKET, SIZED FOR INLET PIPING. PAINT ALL GALV. ITEMS BEFORE INSTALLATION (SEE SPECS).
2. MANHOLE, RISER, AND LID SHALL BE PRECAST CONCRETE PER ASTM C478 AND SHALL BE MINIMUM HS-20 TRAFFIC RATED.

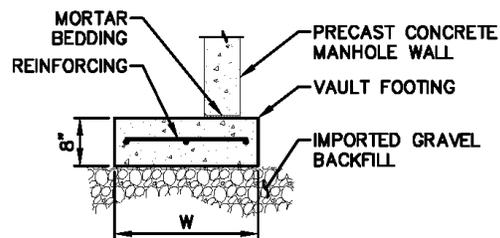


AIR/VACUUM RELIEF VALVE VAULT
SCALE: NONE



PLAN

VAULT FOOTING
SCALE: NONE

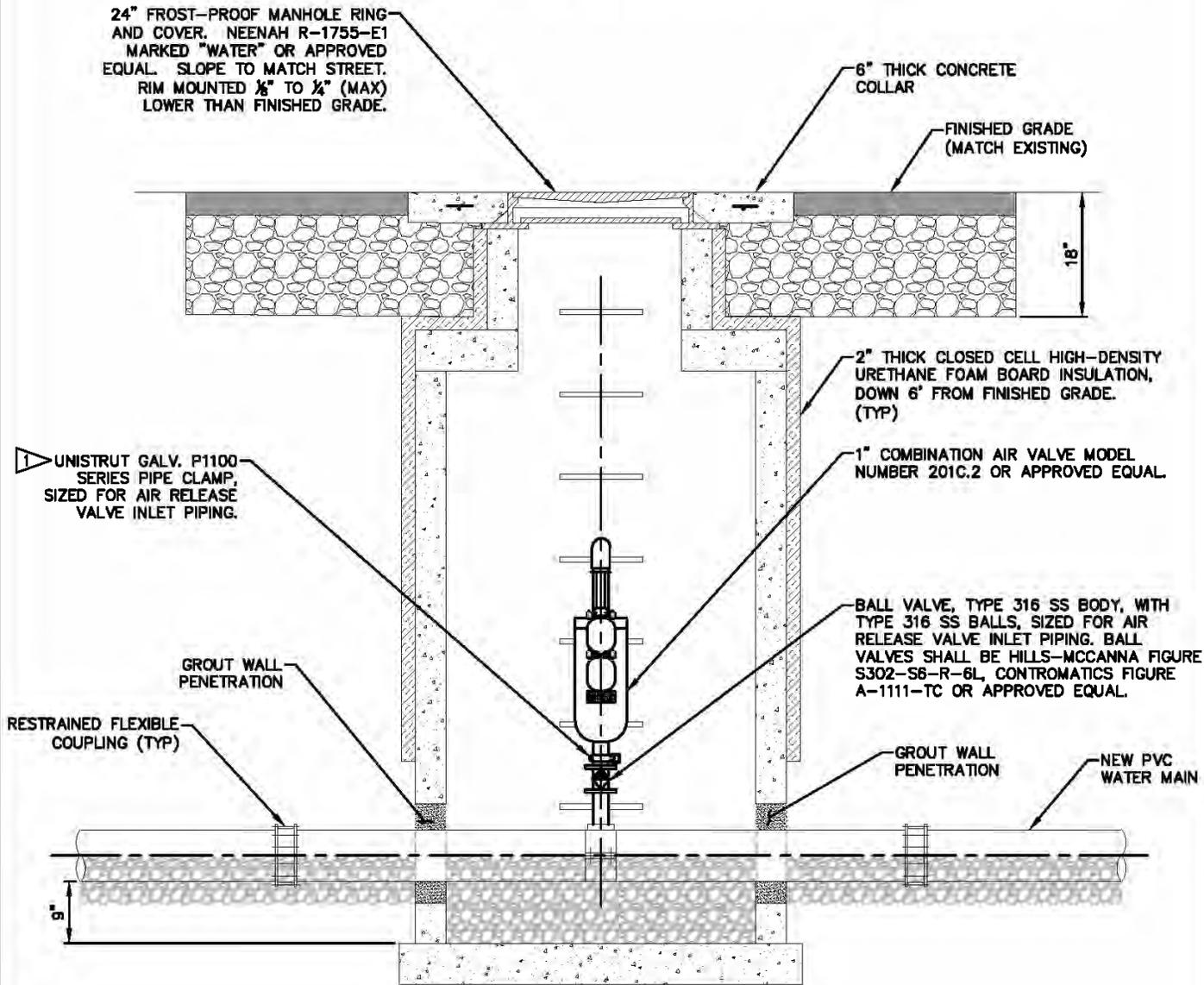


SECTION A-A
SCALE: NONE

MANHOLE SIZE	L	W	REINFORCING
48" MANHOLE (58" O.D.)	6'-4"	2'-0"	W/3~#4 LONG, 4~#4 TRANS. (SHORT)
60" MANHOLE (72" O.D.)	6'-6"	2'-0"	W/3~#4 LONG, 4~#4 TRANS. (SHORT)
84" MANHOLE (100" O.D.)	8'-10"	3'-8"	W/4~#4 LONG, 6~#4 TRANS. (SHORT)
90" MANHOLE (107" O.D.)	9'-4"	3'-8"	W/4~#4 LONG, 6~#4 TRANS. (SHORT)
96" MANHOLE (114" O.D.)	10'-0"	3'-8"	W/4~#4 LONG, 6~#4 TRANS. (SHORT)

NOTES:

- 1. SWAY BRACE PRODUCT NUMBERS ARE UNISTRUT. USE UNISTRUT, KINLINE OR EQUAL. SECURE SCAV INLET PIPING TO SWAY BRACE USING SERIES 1100 PIPE BRACKET, SIZED FOR INLET PIPING. PAINT ALL GALV. ITEMS BEFORE INSTALLATION (SEE SPECS).
- 2. MANHOLE, RISER, AND LID SHALL BE PRECAST CONCRETE PER ASTM C478 AND SHALL BE MINIMUM HS-20 TRAFFIC RATED.



SECTION-B

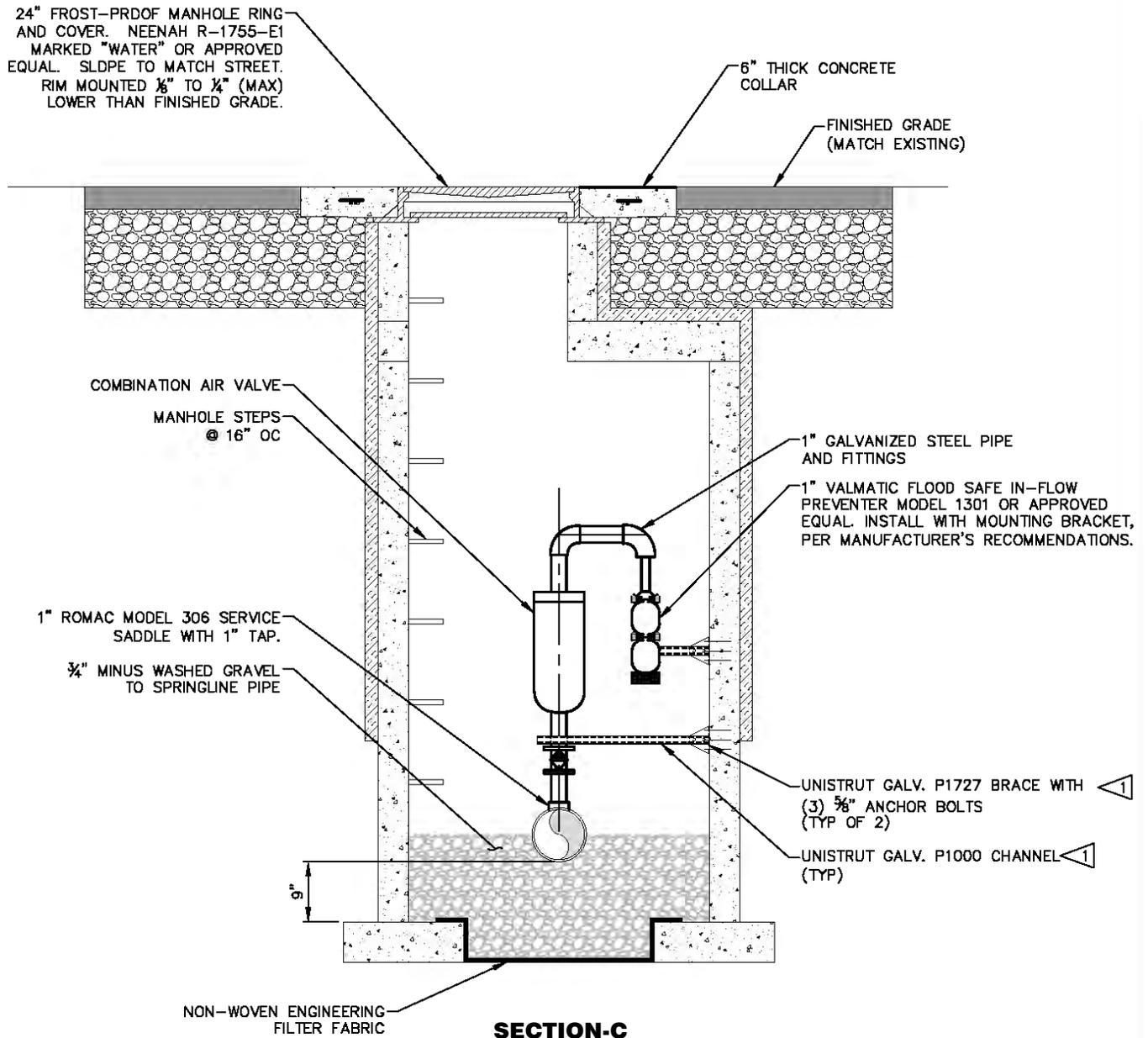
AIR/VACUUM RELIEF VALVE VAULT

SCALE: NONE

CHAPTER 3 WATER

NOTES:

1. SWAY BRACE PRODUCT NUMBERS ARE UNISTRUT. USE UNISTRUT, KINLINE OR EQUAL. SECURE SCAV INLET PIPING TO SWAY BRACE USING SERIES 1100 PIPE BRACKET, SIZED FOR INLET PIPING. PAINT ALL GALV. ITEMS BEFORE INSTALLATION (SEE SPECS).
2. MANHOLE, RISER, AND LID SHALL BE PRECAST CONCRETE PER ASTM C478 AND SHALL BE MINIMUM HS-20 TRAFFIC RATED.

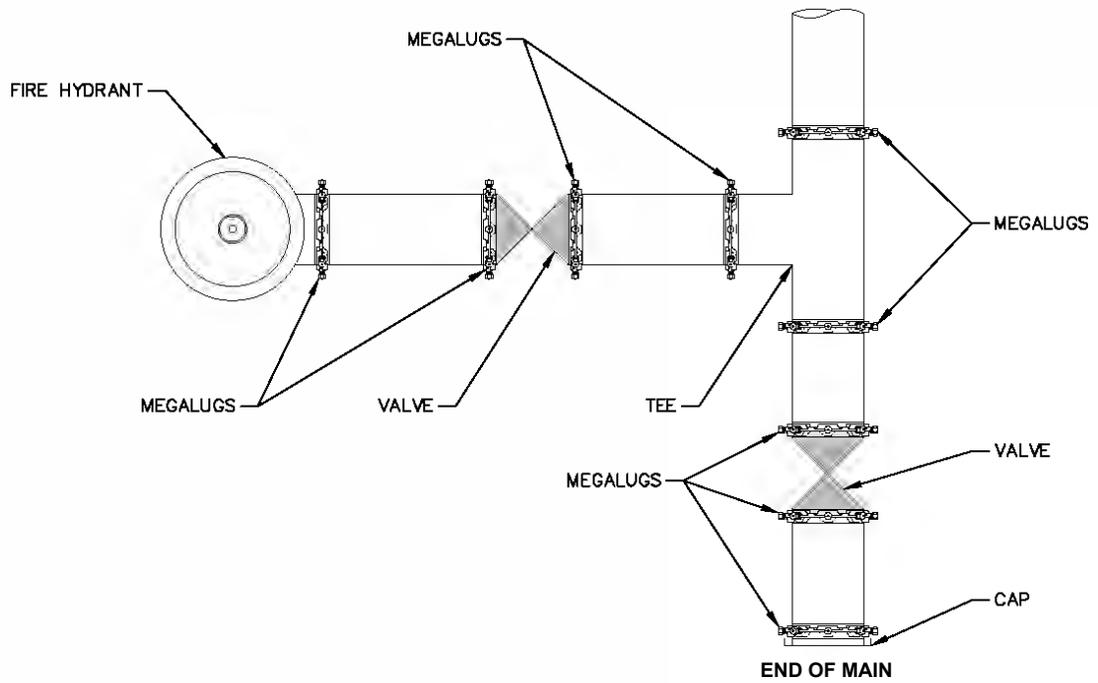
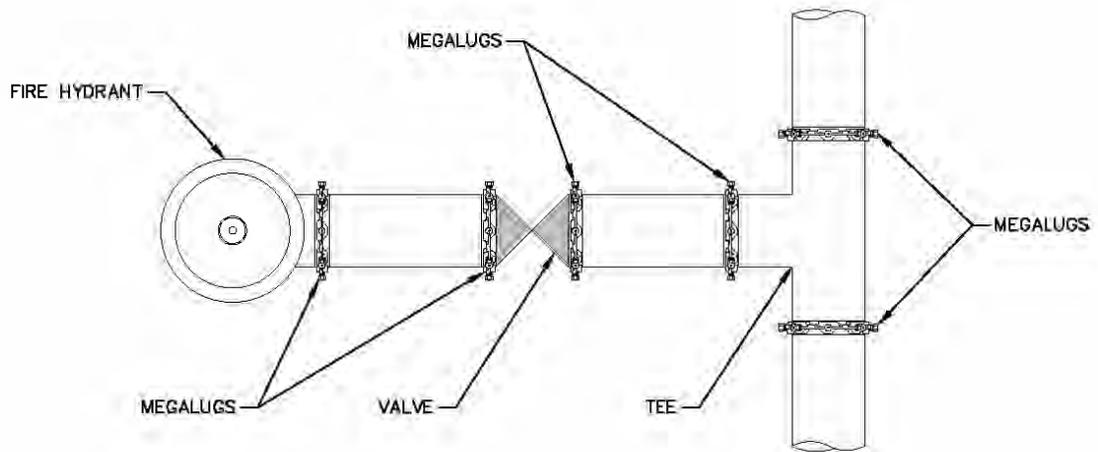


SECTION-C

AIR/VACUUM RELIEF VALVE VAULT

SCALE: NONE

CHAPTER 3 WATER



JOINT RESTRAINTS

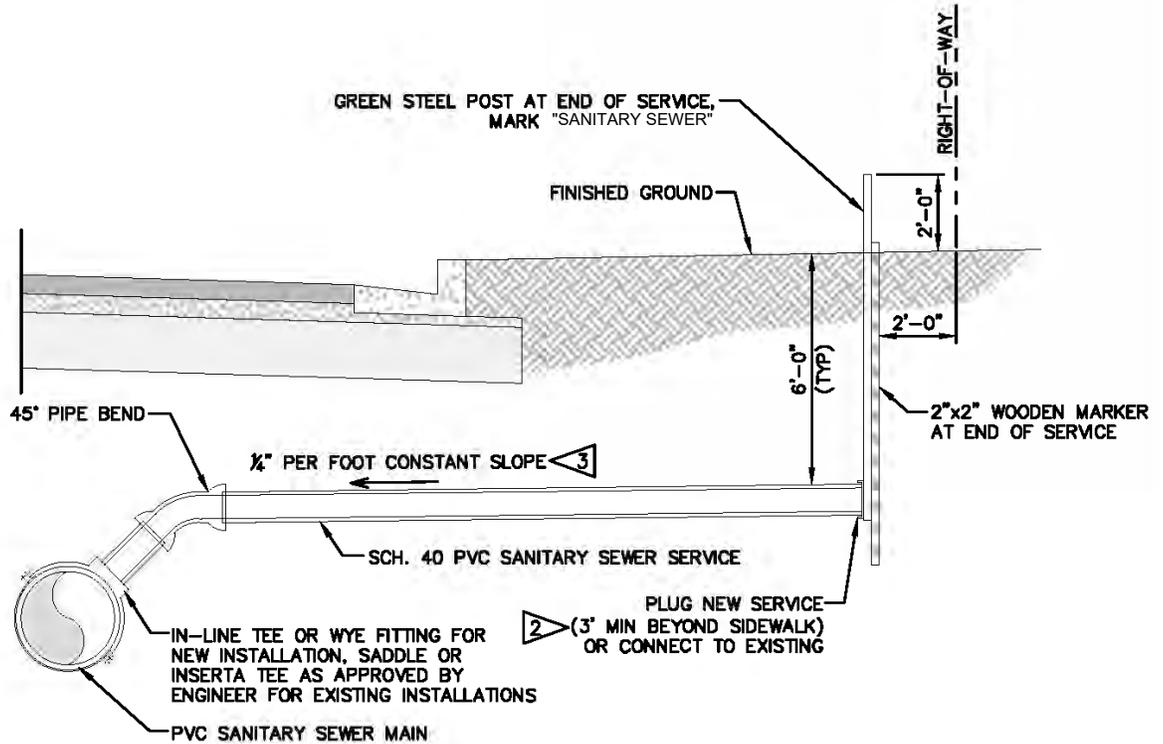
SCALE: NONE

NOTES:

1. THRUST BLOCKS ARE REQUIRED FOR JOINT RESTRAINTS. MEGALUGS ARE REQUIRED AS SHOWN ABOVE.
2. PIPE LENGTHS BETWEEN FITTINGS AND VALVES PER MANUFACTURER'S RECOMMENDATIONS.

SANITARY SEWER DETAILS

CHAPTER 4 SANITARY SEWER

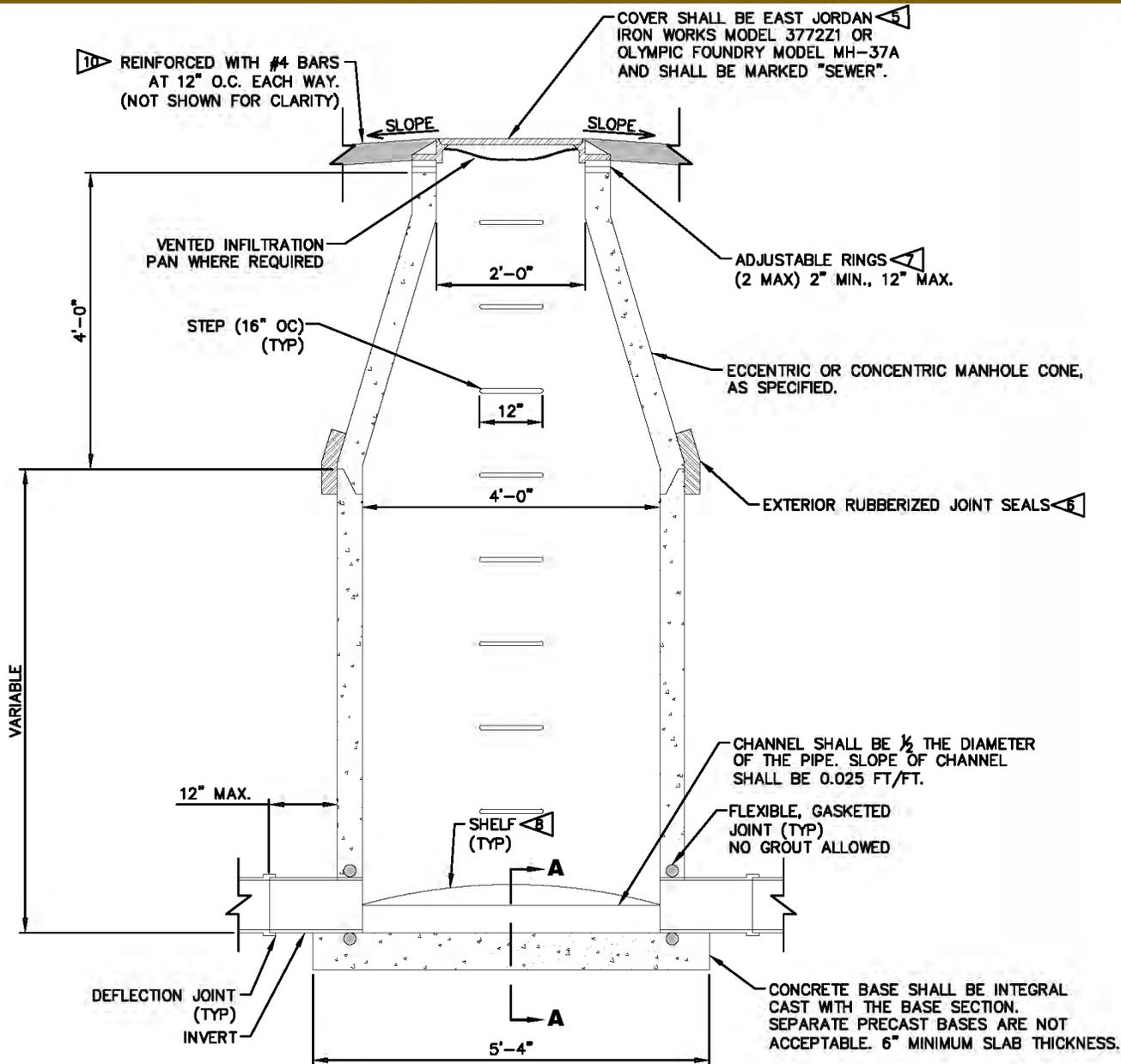


SANITARY SEWER SERVICE

SCALE: NONE

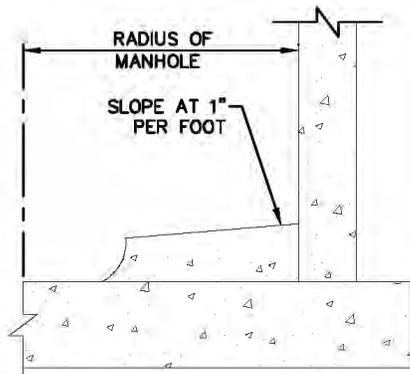
CONSTRUCTION NOTES:

1. ACTUAL DEPTH OF BURY FOR EACH SERVICE VARIES.
- 2** CONTRACTOR SHALL PROVIDE ALL FITTINGS AND PIPING AS NECESSARY TO CONNECT TO THE EXISTING SANITARY SEWER LATERALS. CONNECTION SHALL BE MADE WITH AN APPROVED STAINLESS STEEL REINFORCED FLEXIBLE COUPLING.
- 3** MATCH EXISTING SANITARY SEWER SERVICE SLOPE FOR ALL SERVICE CONNECTIONS.
4. ALL BACKFILL SHALL BE TYPE A UNLESS OTHERWISE NOTED.
5. SERVICE CONNECTION SHALL MEET ALL REQUIREMENTS OF THE INTERNATIONAL PLUMBING CODE, INCLUDING REQUIRED CLEANOUTS.



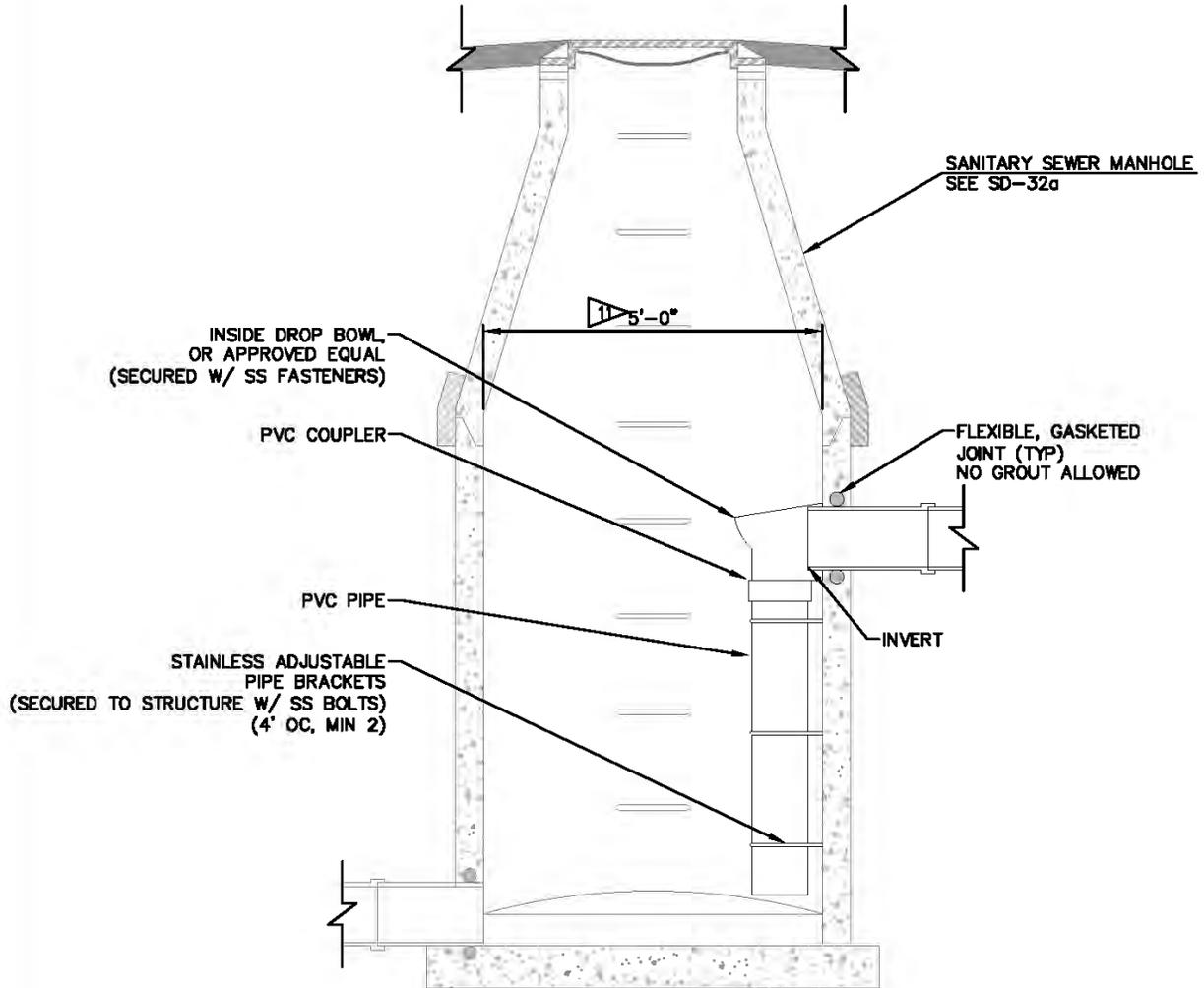
SANITARY SEWER MANHOLE

SCALE: NONE



SECTION "A-A"

SCALE: NONE



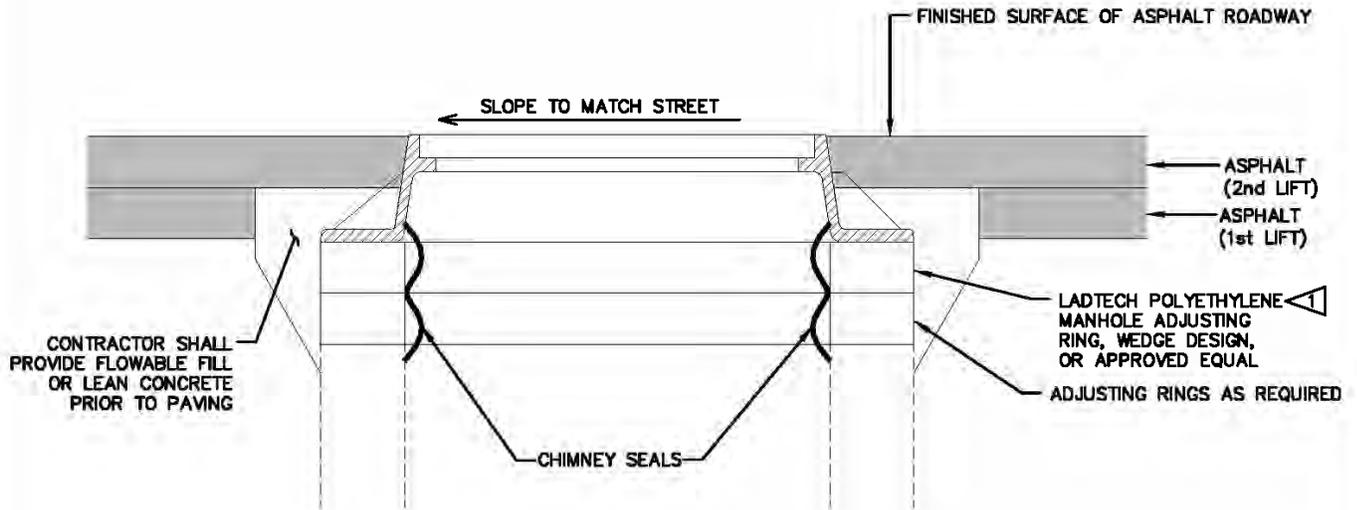
SANITARY SEWER MANHOLE WITH DROP INLET

SCALE: NONE

CHAPTER 4 SANITARY SEWER

MANHOLE NOTES:

1. ALL MANHOLES NOT MANUFACTURED IN ACCORDANCE WITH ASTM C-478M-93 MUST HAVE BITUMINOUS OR COAL TAR EPOXY COAT ON EXTERIOR.
2. PRECAST REINFORCED CONCRETE MANHOLE RISER AND ECCENTRIC CONE TOP PER ASTM C-478.
3. ECCENTRIC MANHOLES REQUIRED ON ALL 4' DIAMETER MANHOLES GREATER THAN 5'-0" IN OVERALL HEIGHT UNLESS SPECIFIED OTHERWISE.
4. ALL JOINTS BETWEEN MANHOLES SECTIONS, ADJUSTING RINGS, MANHOLE RING & TOP SECTION AND AROUND SEWER PIPE INTO MANHOLE SHALL BE WATERTIGHT. JOINTING MATERIAL SHALL BE "RAM-NEK" OR EQUAL FOR ALL JOINTS EXCEPT BETWEEN SEWER PIPE AND MANHOLE WALL.
5. FIELD SET COVER TO GRADE WHEN MANHOLE IS LOCATED WITHIN A STREET OR ALLEY, AND INSTALL INFILTRATION PAN OTHERWISE SET COVER 6" ABOVE GRADE.
6. EXTERIOR RUBBERIZED JOINT SEALS, MEETING ASTM C-877. TYPE II WITH A MINIMUM WIDTH OF 9".
7. RUBBERIZED CHIMNEY SEALS ON ALL MANHOLE COVER FRAMES AND ADJUSTING RING COMBINATIONS, MEETING ASTM C923 WITH A MINIMUM THICKNESS OF $\frac{3}{8}$ " . 1" TO 6" (ONE GRADE RING MAX) / 6" TO 12" (TWO GRADE RINGS MAX)
8. SHELVES SHALL SLOPE AT 1" PER FOOT TOWARD CHANNEL.
9. FINISHED MANHOLES SHALL BE IN COMPLIANCE WITH LATEST EDITION OF MPW STANDARD SPECIFICATIONS.
10. FOR MANHOLES NOT LOCATED IN STREETS, PROVIDE A 4'-0"x4'-0"x6" CONCRETE PAD. PROVIDE SLOPE THAT DROPS 0.50FT FROM MANHOLE LID TO EDGE OF THE SLAB.
11. UNLESS OTHERWISE SHOWN ON THE PLANS. INTERIOR DROP MANHOLES SHALL BE 5'-0" INSIDE DIAMETER.



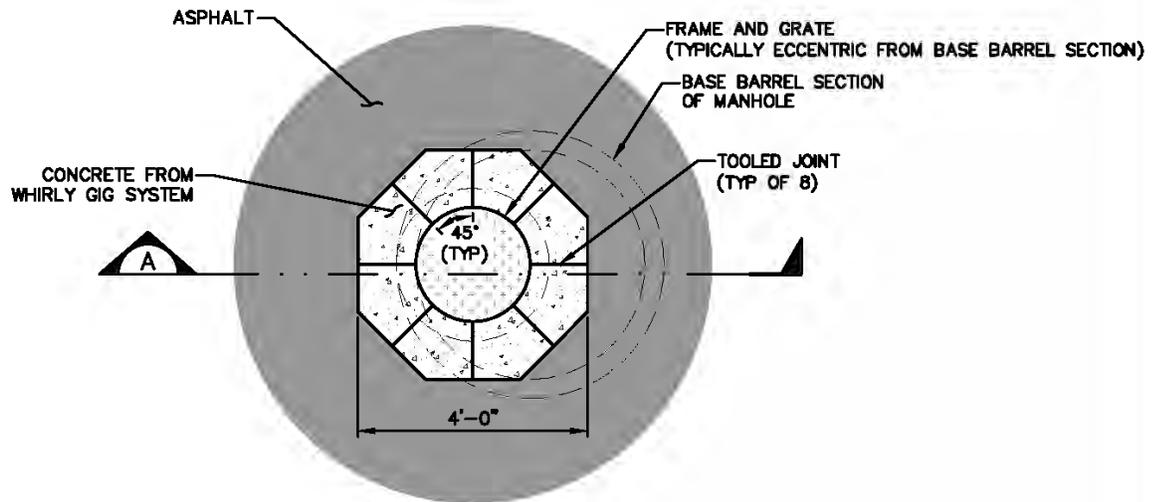
MANHOLE ADJUSTMENT

SCALE: NONE

NOTES:

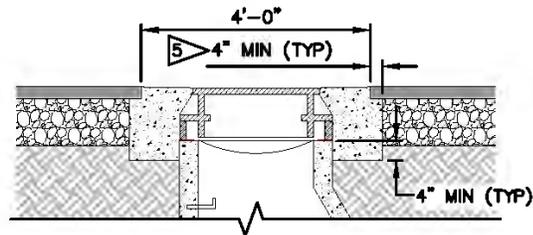
- 1.  ADJUSTMENT RING SIZE/THICKNESS SHALL BE VERIFIED BY CONTRACTOR PRIOR TO ORDERING.
- 2. ADJUST MANHOLE UPWARD WITH ADJUSTMENT RINGS UNDER FRAME. (MAXIMUM 12" / MAXIMUM 2 RINGS)
- 3. ADJUST MANHOLE DOWNWARD BY REMOVING A PORTION OF THE MANHOLE RISER AND REBUILDING TO PROPER DIAMETER. SLOPE MANHOLE RING AS REQUIRED TO MATCH LONGITUDINAL AND TRANSVERSE GRADE ON STREET FINAL MANHOLE ADJUSTMENT WILL BE MADE AFTER PAVING.
- 4. SLOPE MANHOLE FRAME AS REQUIRED TO MATCH SLOPE OF STREET.
- 5. FINISHED MANHOLE COVER SHALL BE $\frac{1}{8}$ " TO $\frac{1}{4}$ " (MAXIMUM) LOWER THAN FINISHED SURFACE.

CHAPTER 4 SANITARY SEWER



CONCRETE WHIRLY GIG SYSTEM

SCALE: NONE



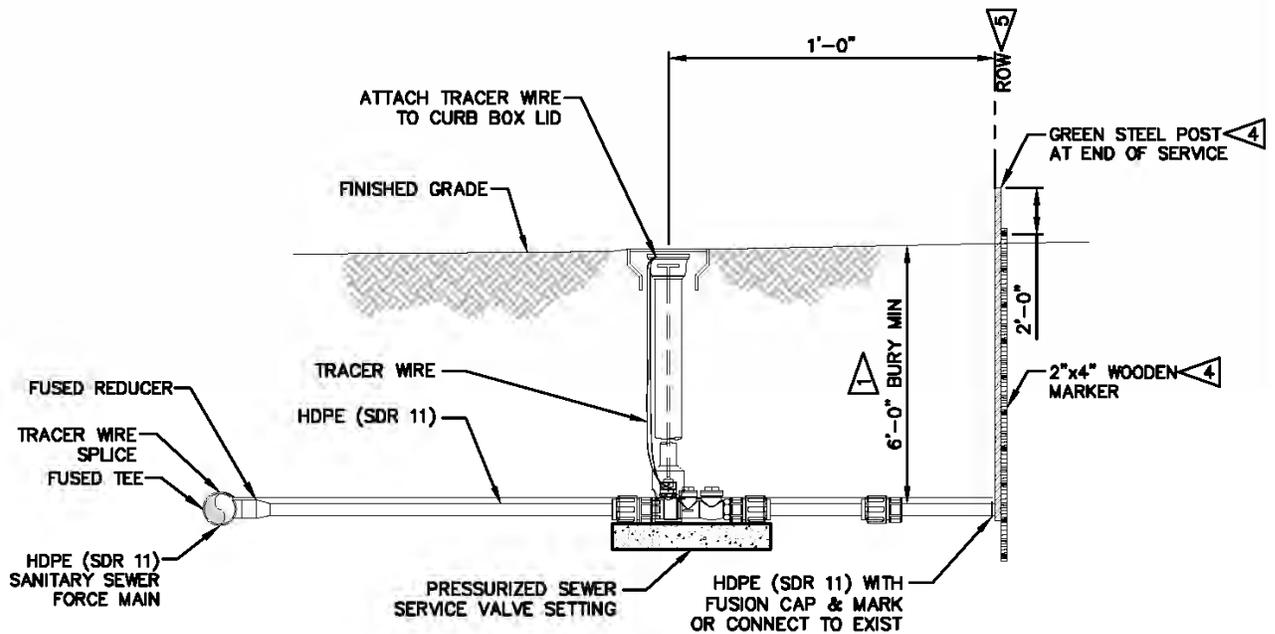
SECTION-A

SCALE: NONE

NOTES:

1. CONCRETE WHIRLY GIG SYSTEM TO ONLY BE IMPLEMENTED UNDER A PUNCH LIST OR WARRANTY SITUATION. (AS DEEMED NECESSARY BY THE ENGINEER)
 2. ANY FRAME/GRATE/COVER WITHIN ROADWAY SURFACING THAT FAILS TO MEET THE SPECIFIED SURFACE TOLERANCES WILL BE REQUIRED TO BE RESET USING THE CONCRETE WHIRLY GIG SYSTEM.
 3. CONCRETE SHALL INCLUDE THE USE OF FIBER MESH (0.75 POUNDS PER CUBIC YARD OF CONCRETE).
 4. FINISHED MANHOLE OR COMBINATION MANHOLE INLET COVER SHALL BE $\frac{1}{8}$ " \pm $\frac{1}{8}$ " BELOW FINISHED SURFACE.
- 5** CONCRETE SHALL BE "KEYED" UNDER ASPHALT TO PREVENT HEAVING.

CHAPTER 4 SANITARY SEWER



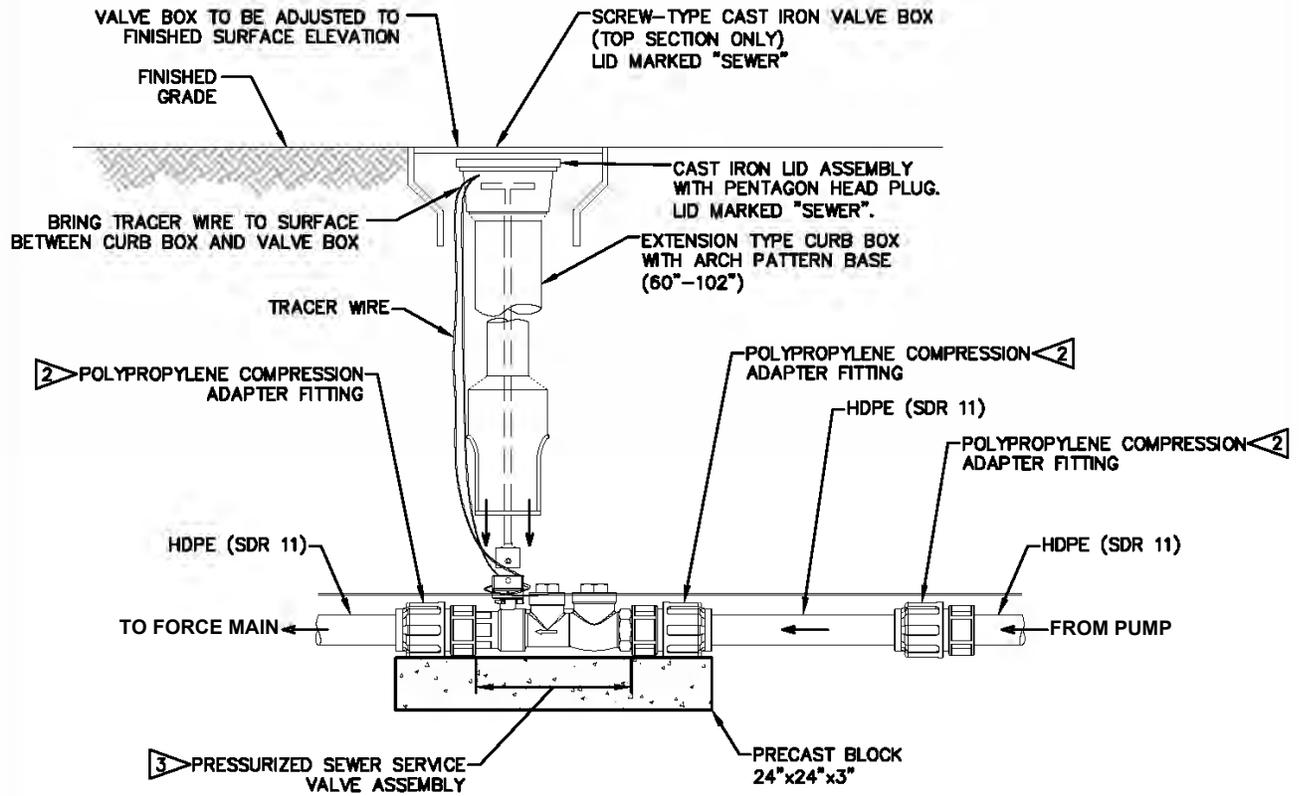
PRESSURIZED SEWER SERVICE

SCALE: NONE

NOTES:

- 1. ACTUAL DEPTH OF BURY FOR EACH SERVICE VARIES. SERVICES WITH LESS THAN 6'-0" OF BURY SHALL RECEIVE 4" OF RIGID INSULATION THE FULL WIDTH OF THE TRENCH.
- 2. ALL BACKFILL SHALL BE TYPE A UNLESS OTHERWISE NOTED.
- 3. SERVICE CONNECTION SHALL MEET ALL REQUIREMENTS OF THE INTERNATIONAL PLUMBING CODE, INCLUDING REQUIRED CLEANOUTS.
- 4. DO NOT INSTALL WHEN CONNECTION TO EXISTING SERVICE.
- 5. SERVICE SHALL EXTEND TO THE RIGHT-OF-WAY LINE, UNLESS OTHERWISE SHOWN ON THE PLANS.

CHAPTER 4 SANITARY SEWER



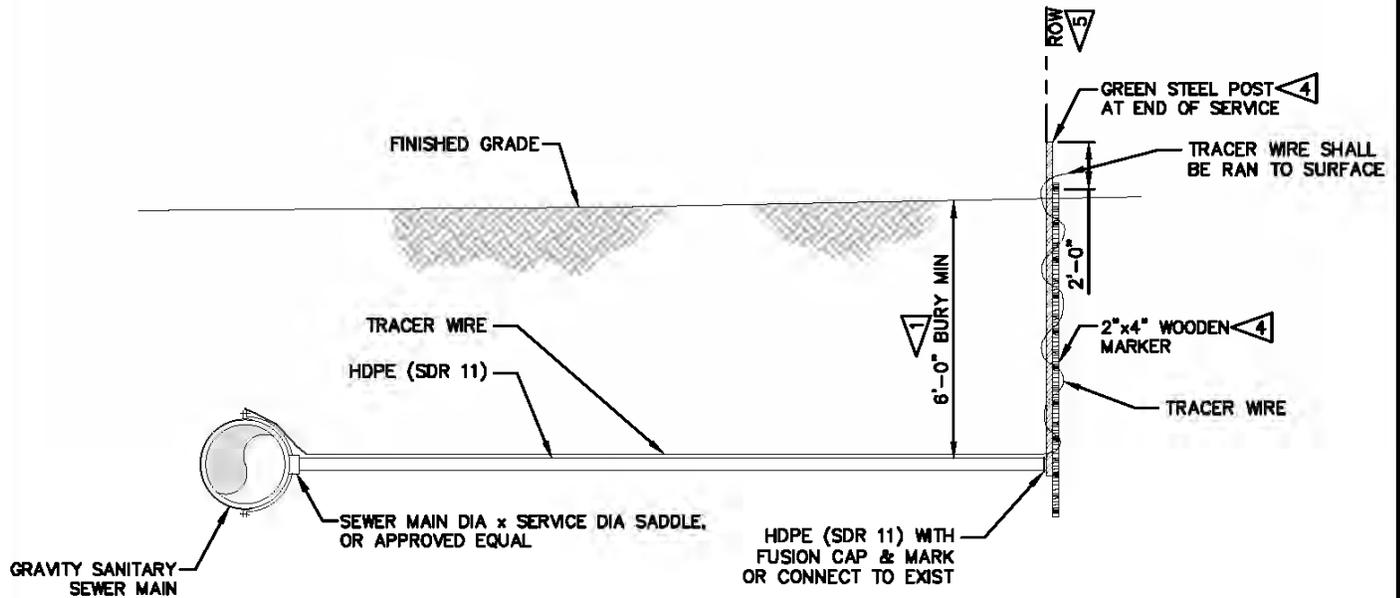
PRESSURIZED SEWER SERVICE VALVE SETTING

SCALE: NONE

NOTES:

1. NEED TO INSULATE WHERE PIPE IS LESS THAN 6'-0" DEEP. MUST HAVE APPROVAL OF THE PUBLIC WORKS DIRECTOR IF LESS THAN 6'-0".
2. TO ASSEMBLE, APPLY A DOUBLE LAYER OF TEFLON TAPE, AND A LAYER OF PIPE DOPE TO THE THREADS ON THE PLASTIC FITTINGS AND INSTALL PER THE MANUFACTURER'S RECOMMENDATIONS.
3. E-ONE STAINLESS STEEL LATERAL KIT (1/4" SDR 11 HDPE PIPE) NA0330P02, OR APPROVED EQUAL.

CHAPTER 4 SANITARY SEWER

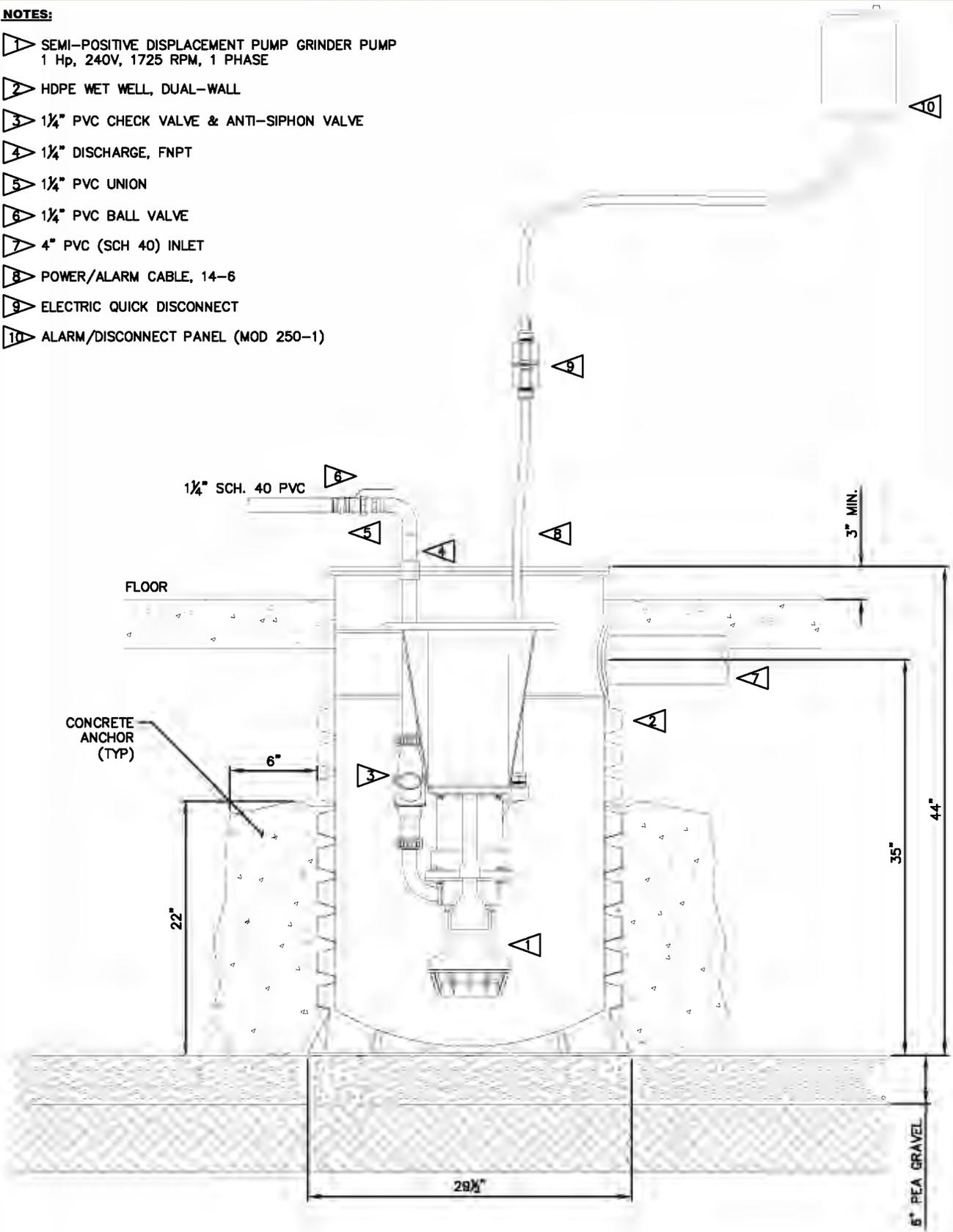


NOTES:

- 1 ACTUAL DEPTH OF BURY FOR EACH SERVICE VARIES. SERVICES WITH LESS THAN 6'-0" OF BURY SHALL RECEIVE 4" OF RIGID INSULATION THE FULL WIDTH OF THE TRENCH.
2. ALL BACKFILL SHALL BE TYPE A UNLESS OTHERWISE NOTED.
3. SERVICE CONNECTION SHALL MEET ALL REQUIREMENTS OF THE INTERNATIONAL PLUMBING CODE, INCLUDING REQUIRED CLEANOUTS.
- 4 DO NOT INSTALL WHEN CONNECTING TO EXISTING SERVICE.
- 5 SERVICE SHALL EXTEND TO THE RIGHT-OF-WAY LINE, UNLESS OTHERWISE SHOWN ON THE PLANS.
6. TRACER WIRE SHALL BE TAPED TO TOP OF ALL PIPE. ALL SPLICES, BREAKS, ETC. TO USE "DRY-CONN" CONNECTORS OR APPROVED EQUAL.

NOTES:

- 1 SEMI-POSITIVE DISPLACEMENT PUMP GRINDER PUMP
1 Hp, 240V, 1725 RPM, 1 PHASE
- 2 HDPE WET WELL, DUAL-WALL
- 3 1¼" PVC CHECK VALVE & ANTI-SIPHON VALVE
- 4 1¼" DISCHARGE, FNPT
- 5 1¼" PVC UNION
- 6 1¼" PVC BALL VALVE
- 7 4" PVC (SCH 40) INLET
- 8 POWER/ALARM CABLE, 14-6
- 9 ELECTRIC QUICK DISCONNECT
- 10 ALARM/DISCONNECT PANEL (MOD 250-1)

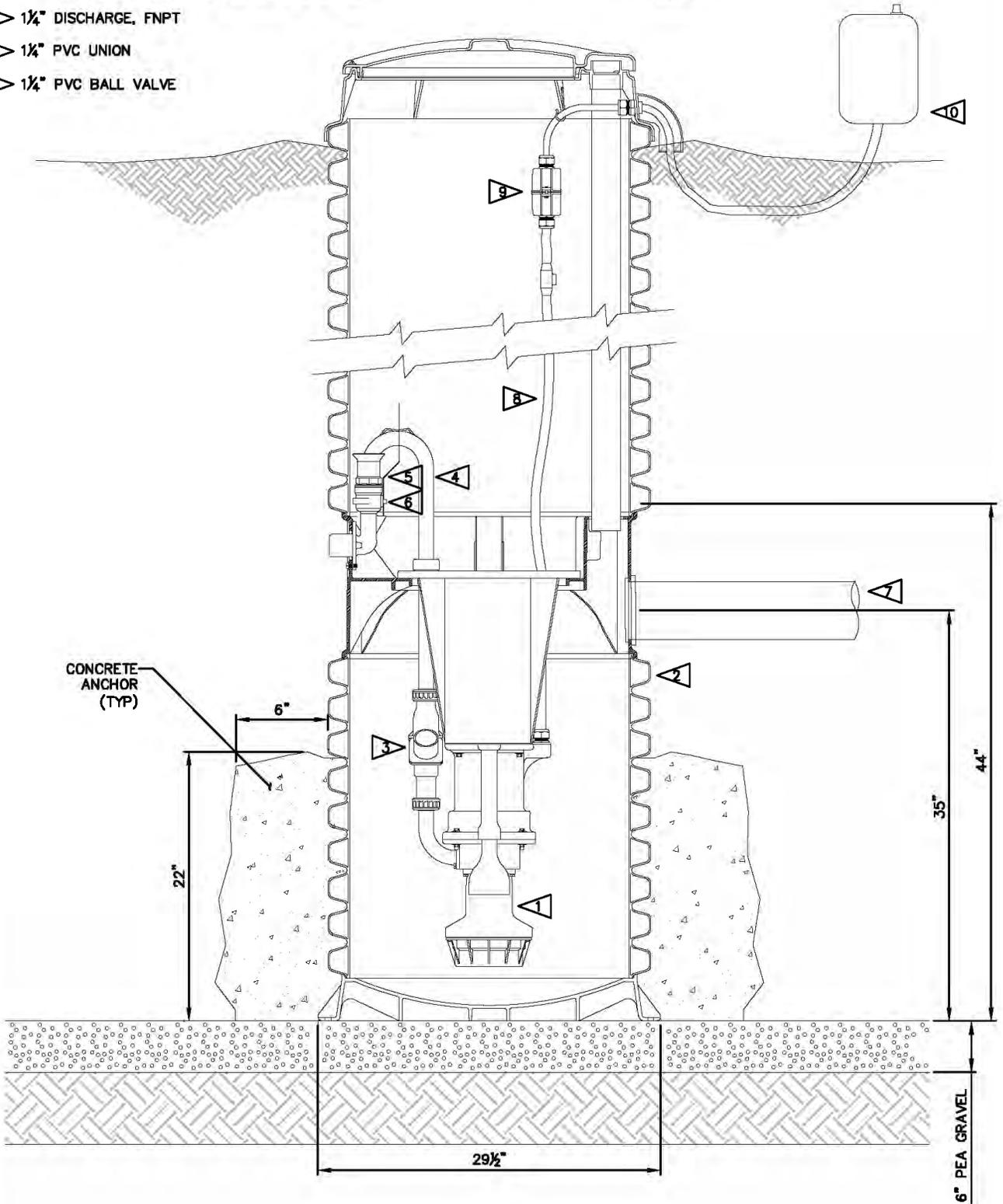


INSIDE GRINDER PUMP
SCALE: NONE

CHAPTER 4 SANITARY SEWER

NOTES:

- 1 SEMI-POSITIVE DISPLACEMENT PUMP GRINDER PUMP
1 Hp, 240V, 1725 RPM, 1 PHASE
- 2 USE WHEN SINGLE GRINDER PUMP (ONE RESIDENCE)
CONNECTED TO CITY GRAVITY SANITARY SEWER MAIN.
- 3 1¼" PVC CHECK VALVE & ANTI-SIPHON VALVE
- 4 1¼" DISCHARGE, FNPT
- 5 1¼" PVC UNION
- 6 1¼" PVC BALL VALVE
- 7 4" PVC (SCH 40) INLET
- 8 POWER/ALARM CABLE, 14-6
- 9 ELECTRIC QUICK DISCONNECT
- 10 ALARM/DISCONNECT PANEL (MOD 250-1)



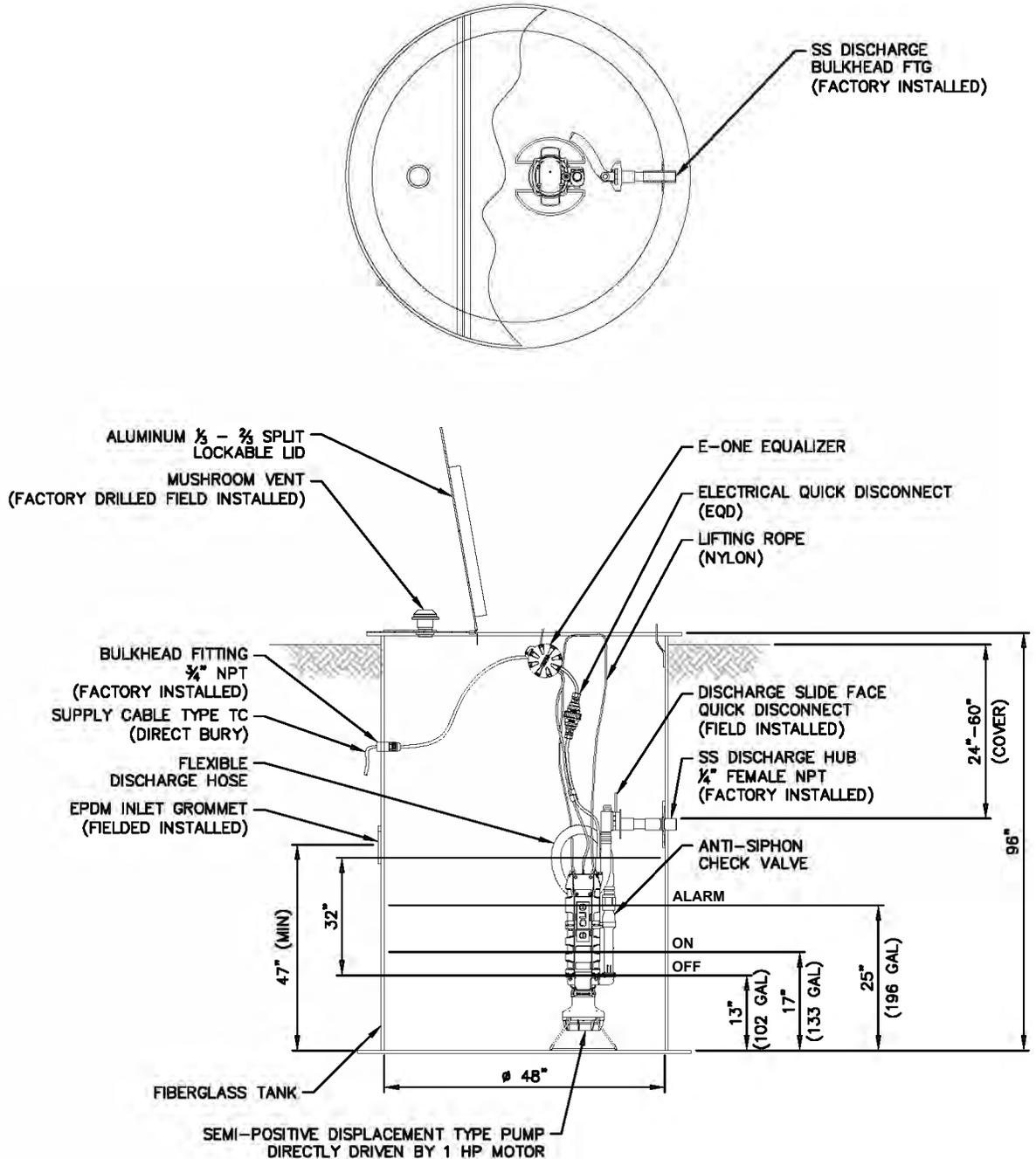
OUTSIDE GRINDER PUMP

SCALE: NONE

CHAPTER 4 SANITARY SEWER

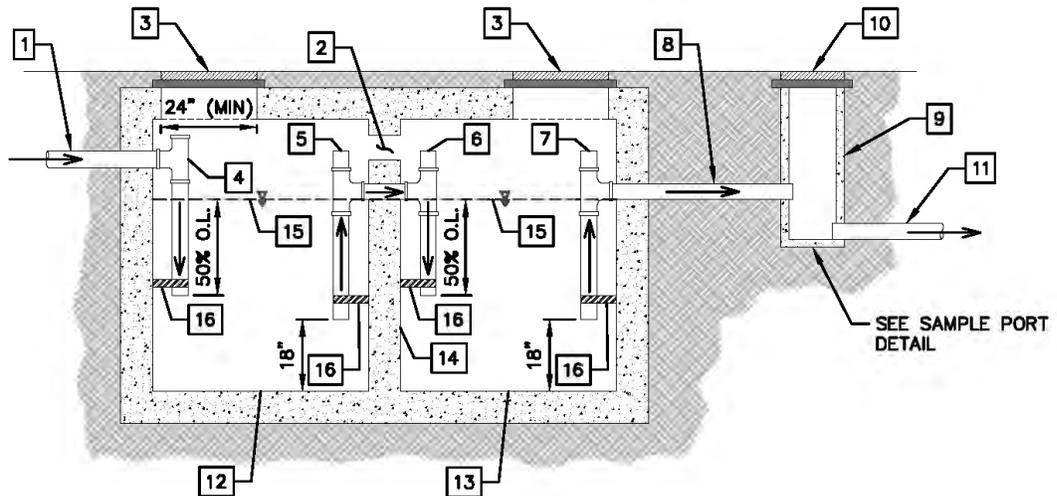
NOTES:

1. STATION TO BE USED WITH (1) SENTRY SIMPLEX PANEL.
2. USE WHEN MULTIPLE GRINDER PUMPS ARE CONNECTED TO SHARED SEWER FORCE MAIN. SIZE PER DEQ CIRCULAR 2, APPENDIX C.



NOTES:

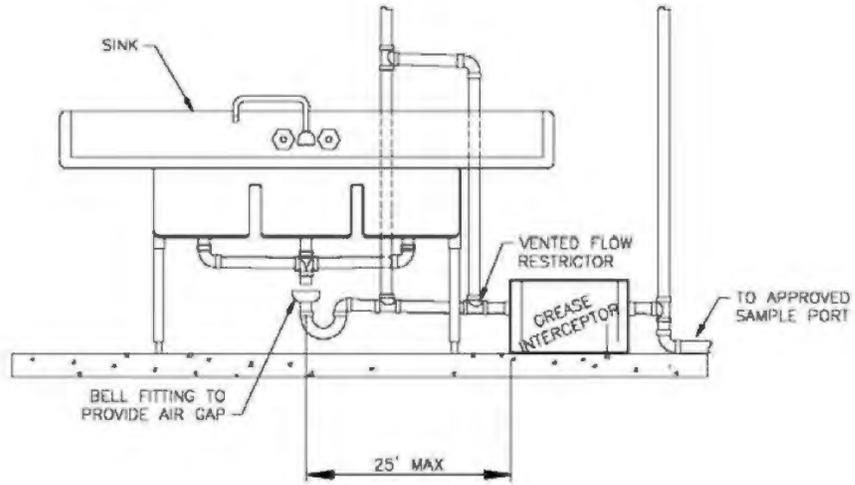
- 1 INFLUENT LINE
- 2 6" DIAMETER VENT SLEEVE
- 3 MINIMUM 24" OPENING WITH RING AND LID
- 4 PRIMARY CHAMBER OUTLET PIPING (MUST EXTEND TO 50% OF THE OPERATING LEVEL)
- 5 PRIMARY CHAMBER OUTLET PIPING (MUST EXTEND TO 18" FROM BOTTOM OF CHAMBER)
- 6 SECONDARY CHAMBER INLET PIPING (MUST EXTEND TO 50% OF THE OPERATING LEVEL)
- 7 SECONDARY CHAMBER OUTLET PIPING (MUST EXTEND TO 18" FROM BOTTOM OF CHAMBER)
- 8 GREASE INTERCEPTOR DISCHARGE LINE
- 9 SAMPLE PORT
- 10 SAMPLE PORT RING AND LID
- 11 SAMPLE PORT DISCHARGE LINE TO CITY'S SANITARY SEWER
- 12 PRIMARY CHAMBER (2/3 TOTAL VOLUME)
- 13 SECONDARY CHAMBER (1/3 TOTAL VOLUME)
- 14 BAFFLE
- 15 GREASE INTERCEPTOR OPERATING LEVEL
- 16 PIPE SUPPORT



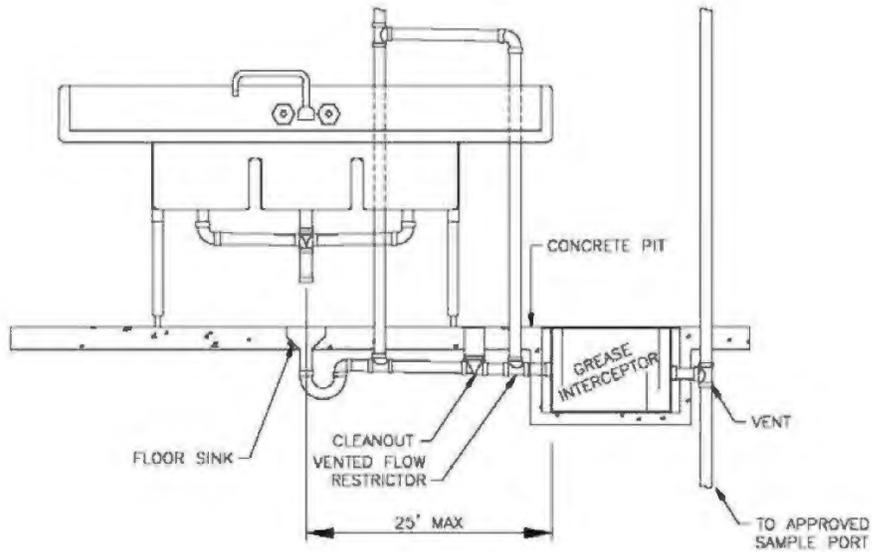
EXTERIOR GREASE INTERCEPTOR

SCALE: NONE

CHAPTER 4 SANITARY SEWER



INTERIOR ABOVE GRADE INTERCEPTOR



INTERIOR BELOW GRADE INTERCEPTOR

INTERIOR GREASE INTERCEPTOR

SCALE: NONE

EXTERIOR GREASE, SAND & OIL INTERCEPTOR AND SAMPLE PORT REQUIREMENTS

MATERIALS:

TRAFFIC RATED LOCATIONS:

1. CONCRETE GRADE RINGS - 4,000 PSI MINIMUM
2. REINFORCED CONCRETE PIPE - 4,000 PSI MINIMUM

NON-TRAFFIC RATED LOCATIONS:

1. CONCRETE GRADE RINGS - 4,000 PSI MINIMUM
2. HDPE GRADE RINGS
3. BLACK DOUBLE WALL CORRUGATED HDPE PIPE

GROUT AND SEALANTS:

1. RAMNEK OR APPROVED EQUIVALENT MUST BE USED TO SEAL BETWEEN THE GREASE INTERCEPTOR LID, EACH GRADE RING AND THE MANHOLE RING
2. THE FIRST GRADE RING MUST BE GROUTED TO THE INTERCEPTOR LID.

COMPOSITE, POLYETHYLENE AND FIBERGLASS INTERCEPTORS:

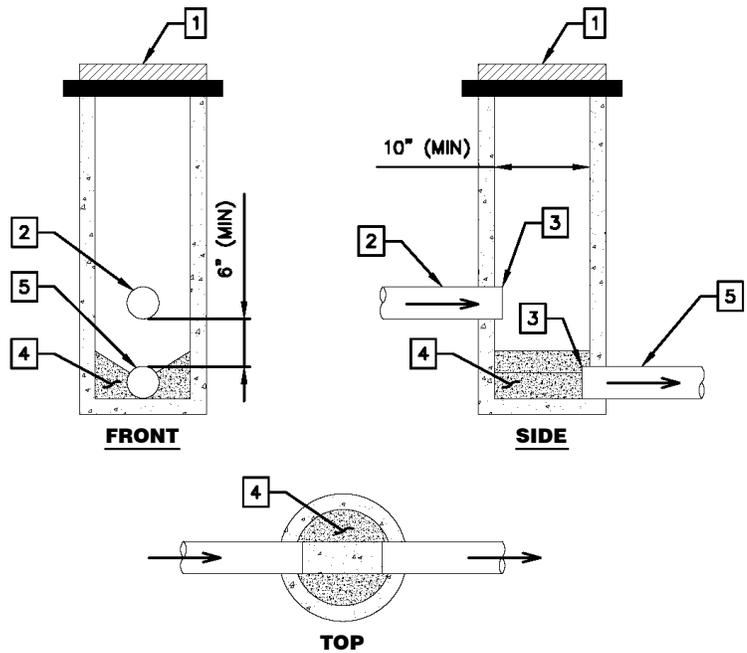
1. THESE INTERCEPTORS CAN ONLY USE MANUFACTURER SUPPLIED MANHOLE AND INSPECTION PORT RISERS.
2. IF LOCATED IN TRAFFIC AREAS, MEASURES MUST BE PUT IN PLACE TO MEET HS-20 LOADINGS FOR ALL APPLICABLE AREAS OF THE SYSTEM.

SAMPLE PORTS:

1. ALL INTERCEPTORS ARE TO BE INSTALLED WITH A SAMPLING PORT THAT RECEIVES FLOW FROM THE INTERCEPTOR'S EFFLUENT.
2. TEE PIPING ON THE INTERCEPTOR'S INTERIOR WILL NOT SUFFICE AS A SAMPLE PORT.
3. SAMPLE PORTS MUST BE LOCATED IN AREAS PROTECTED FROM VEHICLE TRAFFIC.
4. SAMPLE PORTS ARE TO BE CLEANED AND INSPECTED DURING ROUTINE INTERCEPTOR PUMPING.
5. SAMPLE PORTS WILL HAVE A MINIMUM 10" DIAMETER ACCESS COVER.
6. SAMPLE PORTS WILL HAVE A MINIMUM 6" DROP BETWEEN INLET AND DISCHARGE PIPING.
7. SAMPLE PORTS MUST DRAIN COMPLETELY AND NOT HOLD WATER. BOTTOM TO BE GROUTED AND SLOPED.
8. INLET PIPE PENETRATION MUST EXTEND 1" PAST THE INSIDE WALL OF THE SAMPLE PORT. PENETRATIONS ARE TO BE SEALED TO PREVENT LEAKS.

NOTES:

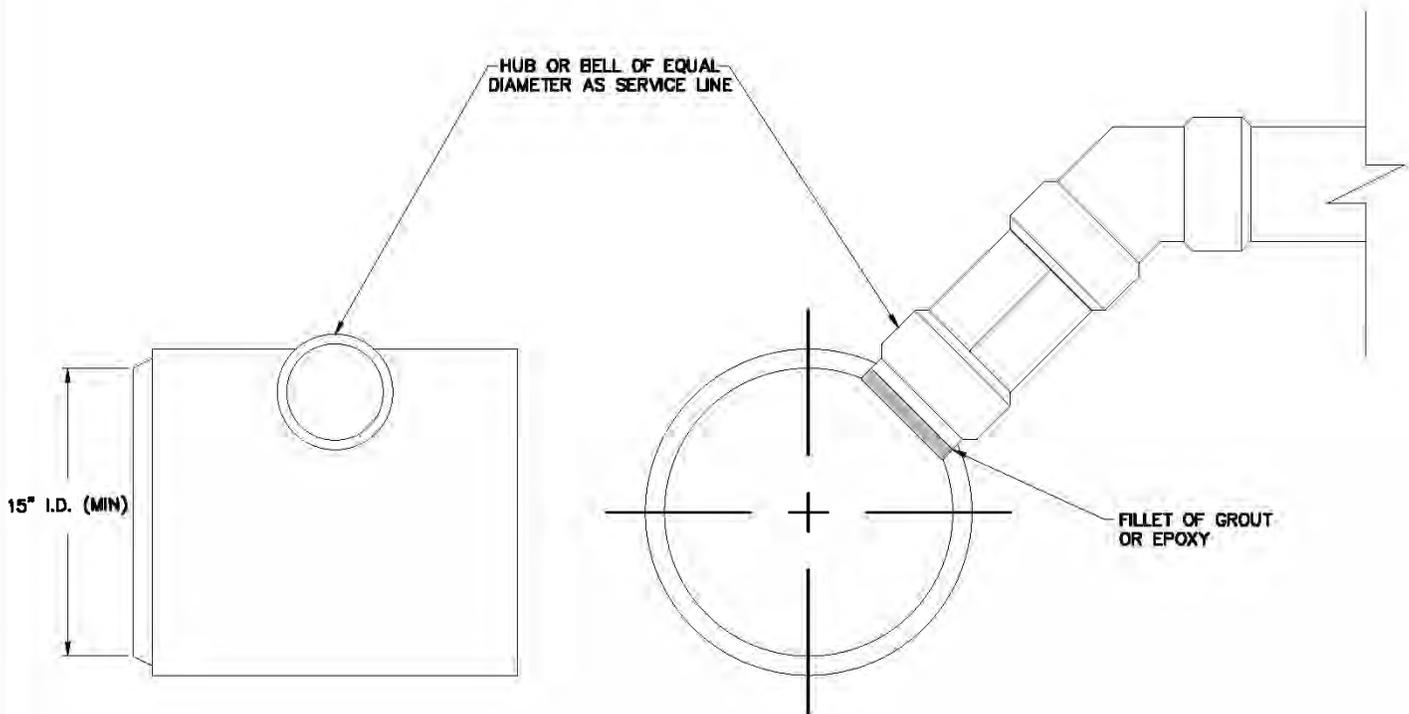
- 1 SAMPLE PORT RING AND LID
- 2 GREASE INTERCEPTOR DISCHARGE LINE
- 3 PIPE PENETRATION (EXTEND 1" PAST THE INSIDE WALL OF THE SAMPLE PORT, MUST BE SEALED TO PREVENT LEAKS. IF USING PVC, A SADDLE MUST BE USED)
- 4 GROUT (SLOPED TO WASTEWATER CHANNEL. THE SAMPLE PORT MUST DRAIN COMPLETELY AND NOT HOLD WATER)
- 5 SAMPLE PORT DISCHARGE LINE TO CITY'S SANITARY SEWER



**EXTERIOR GREASE, SAND & OIL INTERCEPTORS
SAMPLE PORT DESIGN & MATERIALS**

SCALE: NONE

STORM SEWER DETAILS

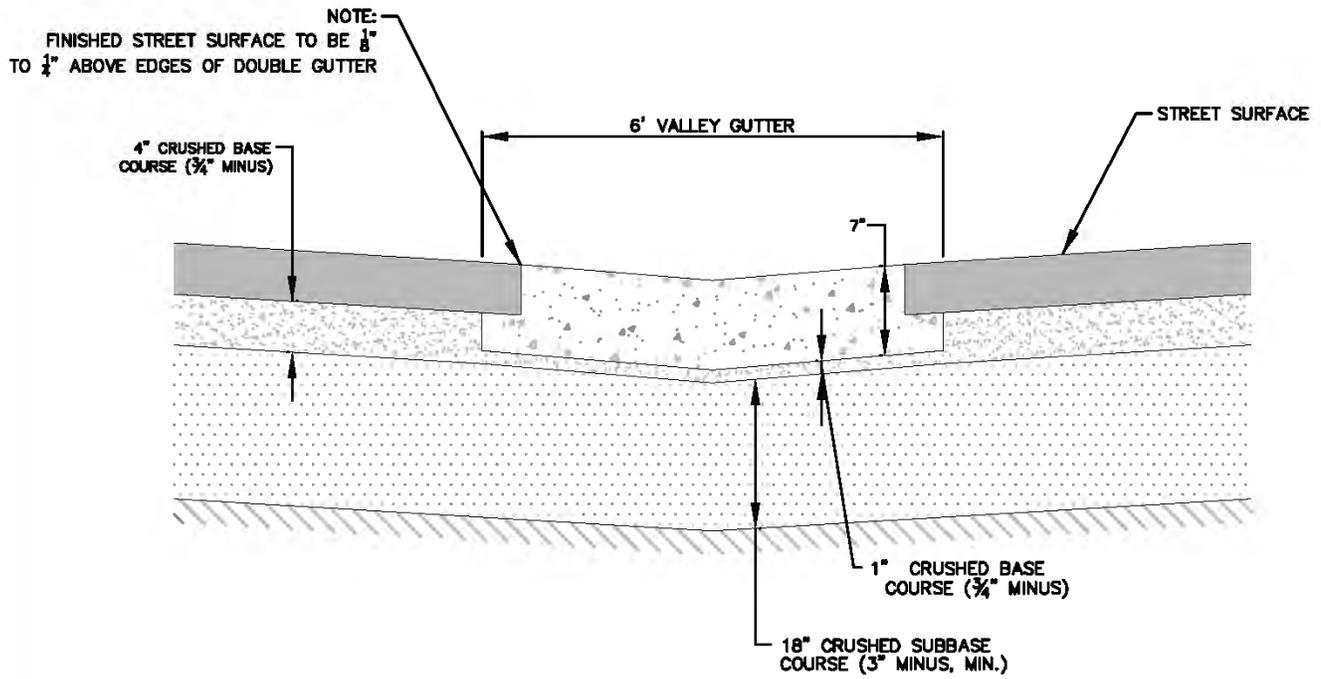


STORM DRAIN SERVICE CONNECTION

SCALE: NONE

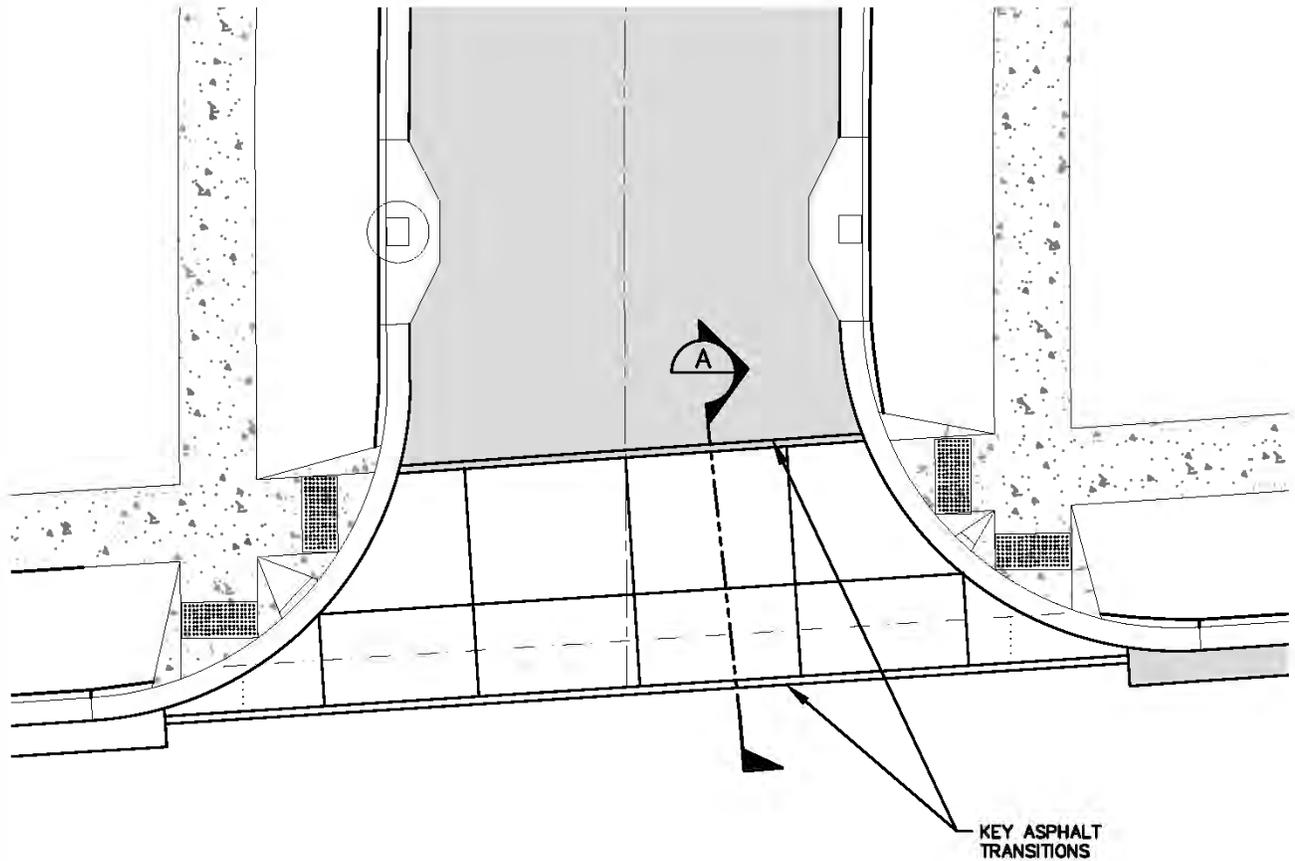
NOTES:

1. THIS TYPE OF CONNECTION SHALL BE USED ON MAINS OF 15 INCHES OR LARGER DIAMETER.
2. HUB OR BELL OF EQUAL DIAMETER AND TYPE OF PIPE WHICH WILL BE USED FOR THE SERVICE LINE SHALL BE USED FOR THE CONNECTION FITTING TO THE EXISTING MAIN.
3. HUB OR BELL MUST NOT PROTRUDE MORE THAN $\frac{1}{4}$ INCH INTO EXISTING MAINS.
4. ALL CONNECTIONS TO MAINS SHALL BE WATERTIGHT. A FILLET OF GROUT OR EPOXY SHALL BE APPLIED AROUND THE DIAMETER OF THE HUB OR BELL TO ASSURE A WATERTIGHT OR LEAK PROOF CONNECTION.
5. THIS TYPE OF CONNECTION SHALL BE APPROVED BY THE CITY PRIOR TO INSTALLATION.
6. ALL CONSTRUCTION PHASES OF THIS TYPE OF CONNECTION SHALL BE INSPECTED BY THE CITY OF WHITEFISH'S PUBLIC WORKS DEPARTMENT.
7. LINES UNDER 15" I.D. WILL REQUIRE A SADDLE.

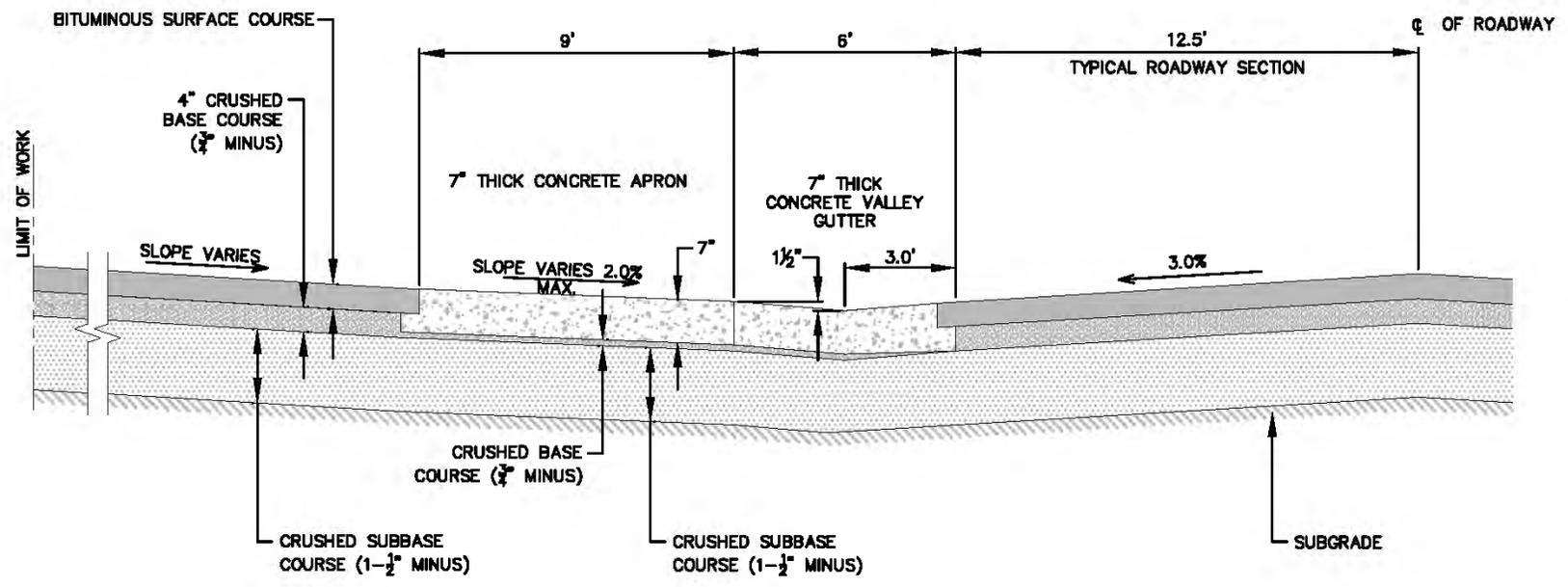


CONCRETE VALLEY GUTTER

SCALE: NONE

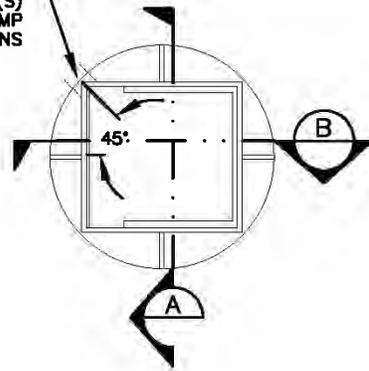


PLAN VIEW CONCRETE VALLEY GUTTER W/ APRON
SCALE: NONE

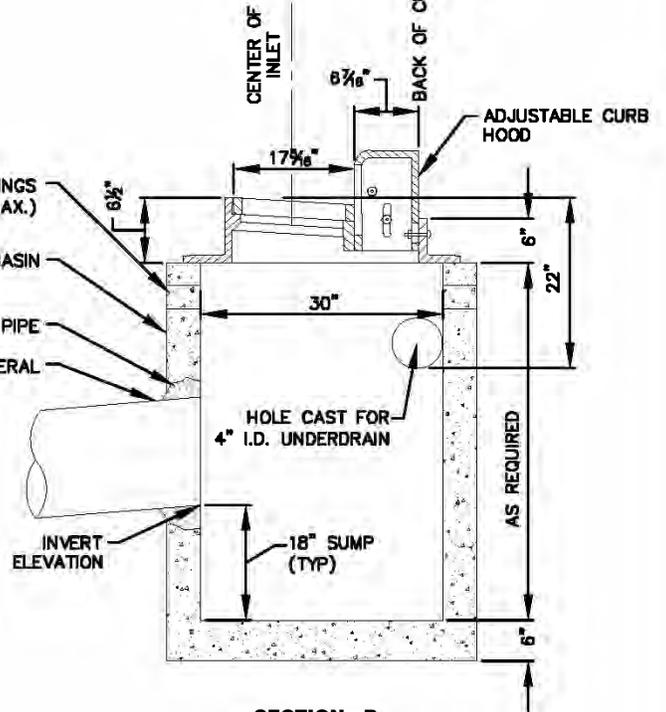
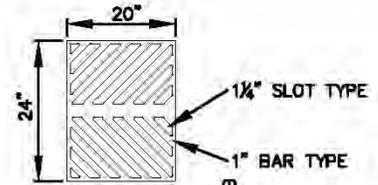


CONCRETE VALLEY GUTTER WITH APRON SECTION (A)
 SCALE: NONE

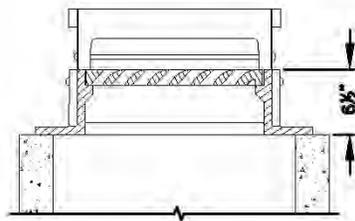
HOLE CAST FOR 4" I.D. UNDERDRAIN ON UPHILL SIDE(S) ONLY, BOTH SIDES IN SUMP LOCATIONS



PLAN



SECTION - B



SECTION - A

NOTES:

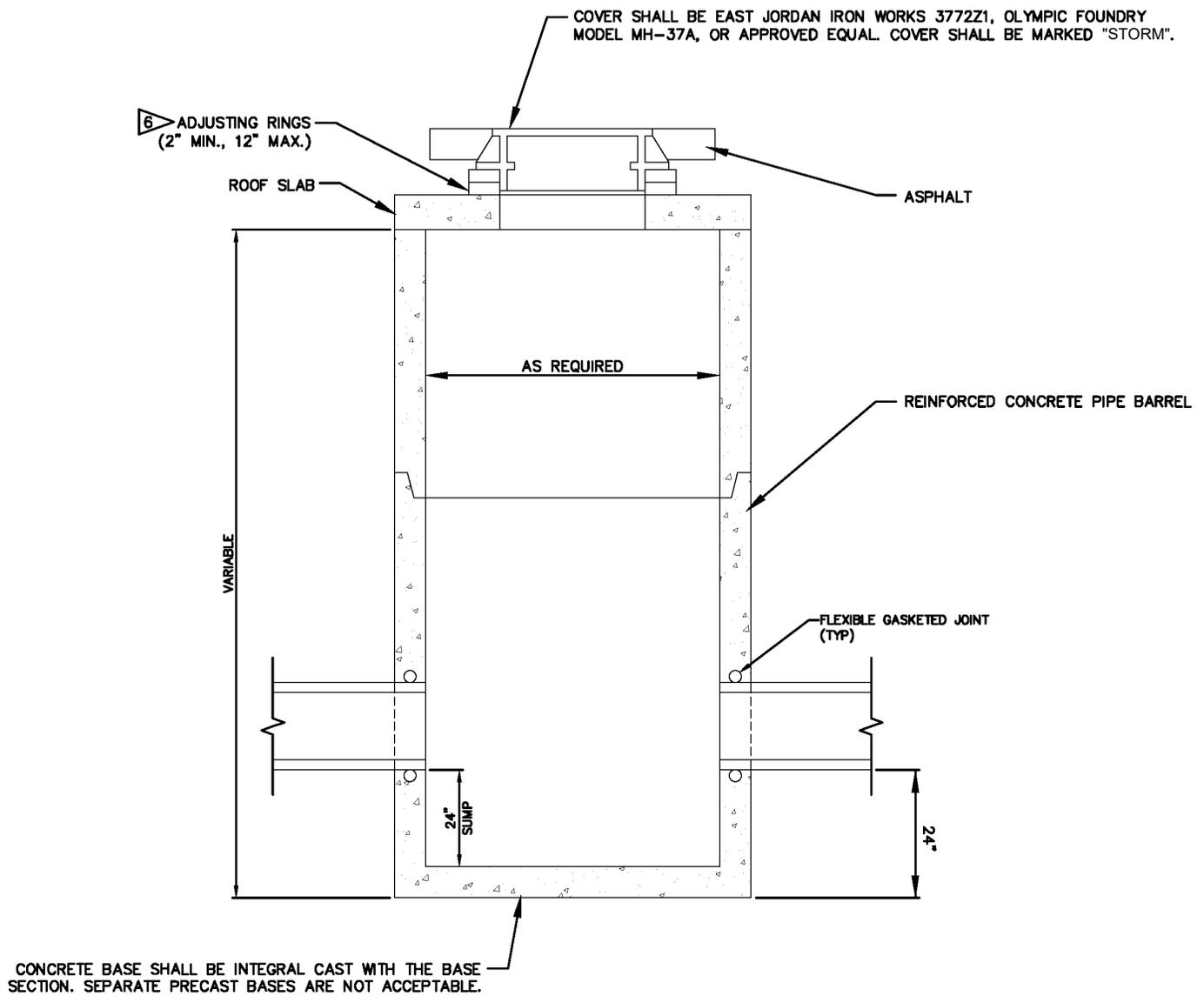
1. ALL CURB INLETS SHALL BE EAST JORDAN IRON WORKS 7752 CURB AND GUTTER INLET WITH 7750 M1 (HERRINGBONE) GRATE, OR APPROVED EQUAL.
2. ALL HOLES IN NEW INLETS SHALL BE CAST OR CORED. UNDER DRAIN HOLES MAY BE "ROTO-HAMMERED" IN THE FIELD.
3. "DUMP NO POLLUTANTS, OUTFALL TO STREAM" SHALL BE FORGED IN TOP OF HOOD, OR APPROVED EQUAL.

STORM DRAIN INLET DETAIL

SCALE: NONE

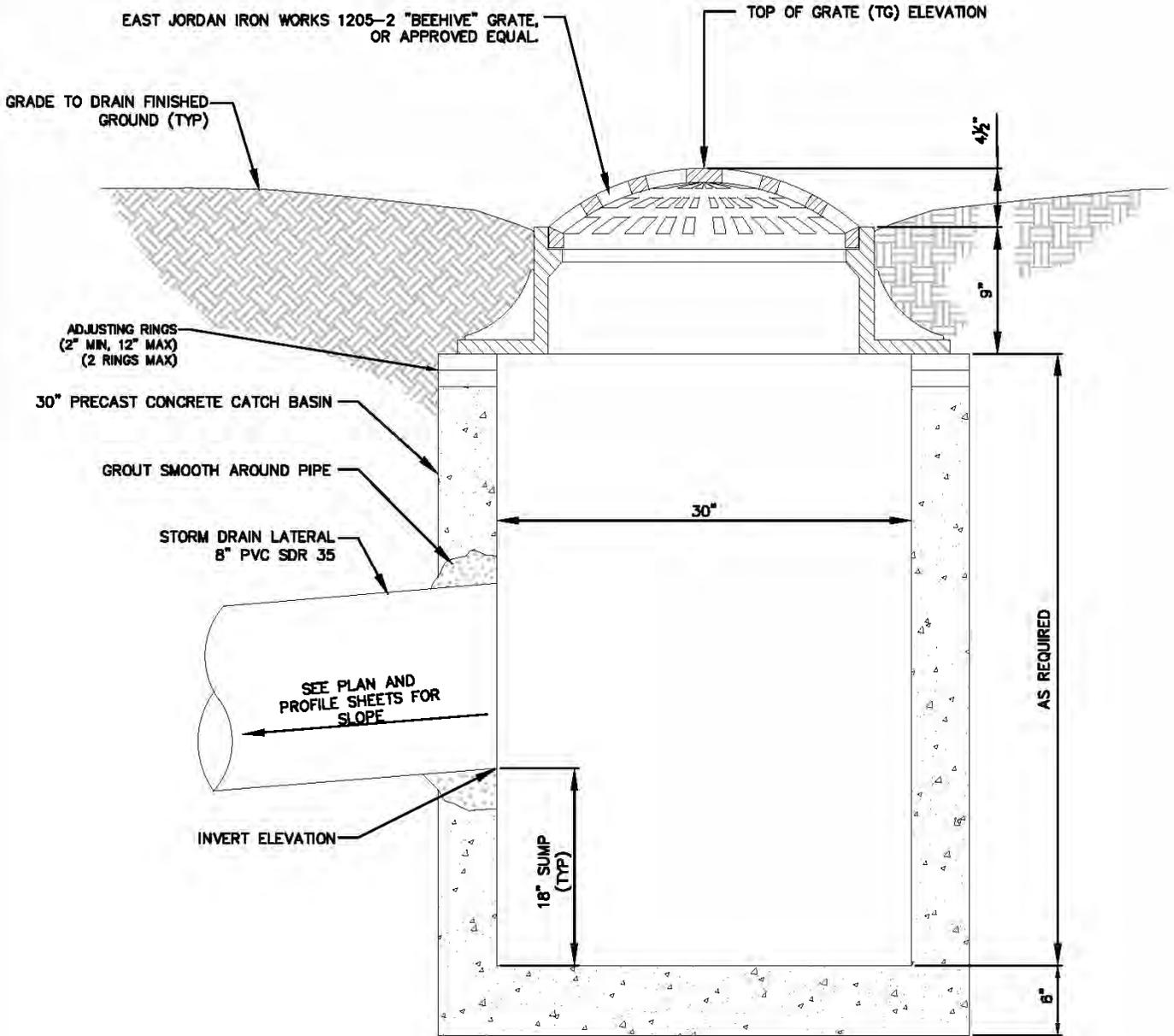
NOTES:

1. ALL JOINTS BETWEEN MANHOLE SECTIONS, ADJUSTING RINGS, AND MANHOLE FRAME SHALL BE WATERTIGHT. JOINT MATERIAL SHALL BE "RAM-NEK" OR EQUAL.
2. PRECAST REINFORCED CONCRETE MANHOLES SHALL CONFORM TO ASTM C-478.
3. ALL HOLES IN NEW MANHOLES SHALL BE CAST OR CORED.
4. ALL STORM MANHOLES SHALL BE STRAIGHT MANHOLES.
5. ADJUST FRAME AND LID TO MATCH CROWN AND GRADE OF STREET.
6. FIELD SET ADJUSTMENT RINGS TO MATCH STREET/FINISHED GROUND. MANHOLES IN STREETS SHALL INCLUDE AT LEAST ONE (1) LADTECH POLYETHYLENE MANHOLE ADJUSTING RING, WEDGE DESIGN, OR APPROVED EQUAL.



STORM DRAIN MANHOLE

SCALE: NONE

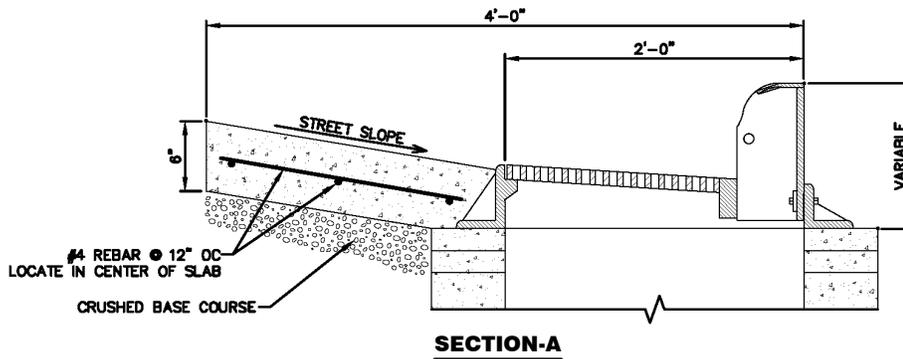
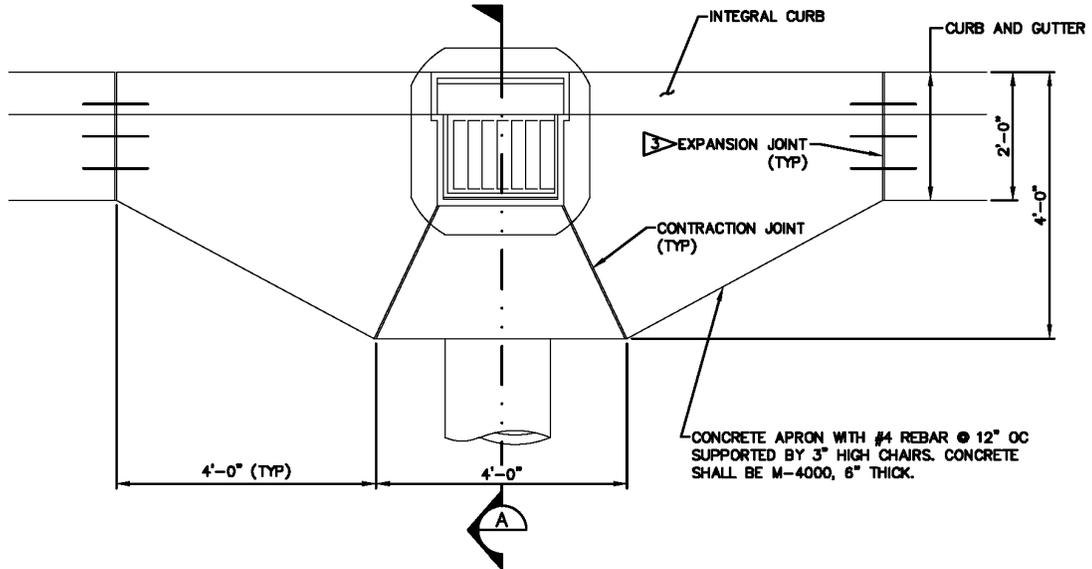


AREA DRAIN AND CATCH BASIN

SCALE: NONE

NOTES:

1. PROVIDE CONCRETE APRON AT ALL CURB INLETS.
2. CONCRETE SHALL INCLUDE THE USE OF FIBER MESH (0.75 POUNDS PER CUBIC YARD OF CONCRETE).
3. CONCRETE APRON EXPANSION JOINTS SHALL HAVE 12" SMOOTH DOWELS ($\frac{1}{2}$ " DIAMETER) PLACED 8" ON CENTER TO PREVENT HEAVING.

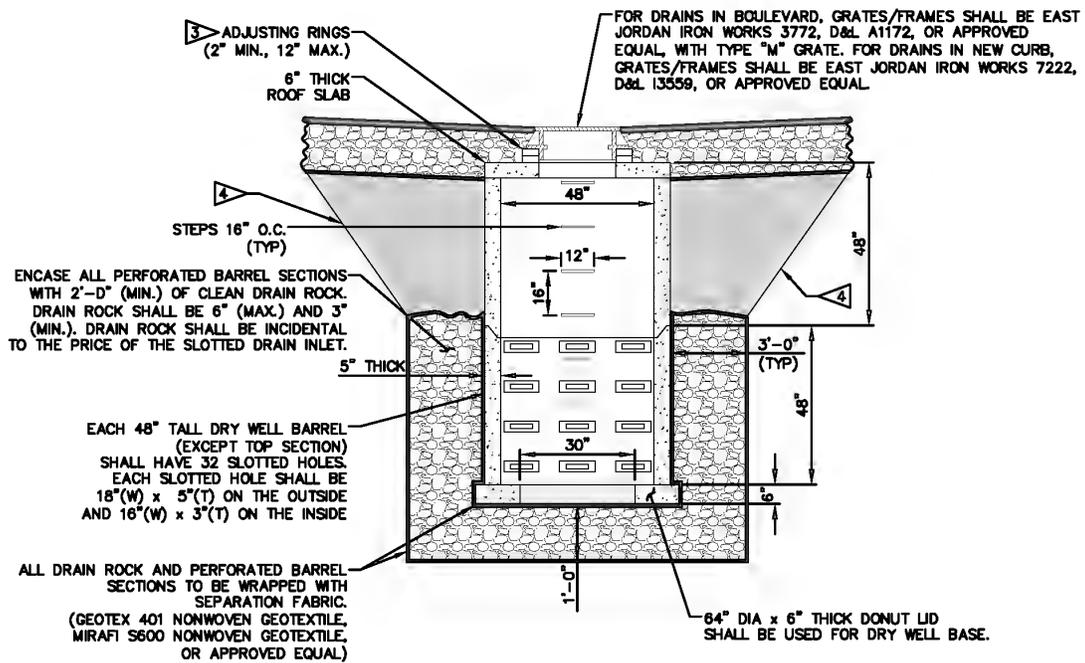


CONCRETE INLET APRON

SCALE: NONE

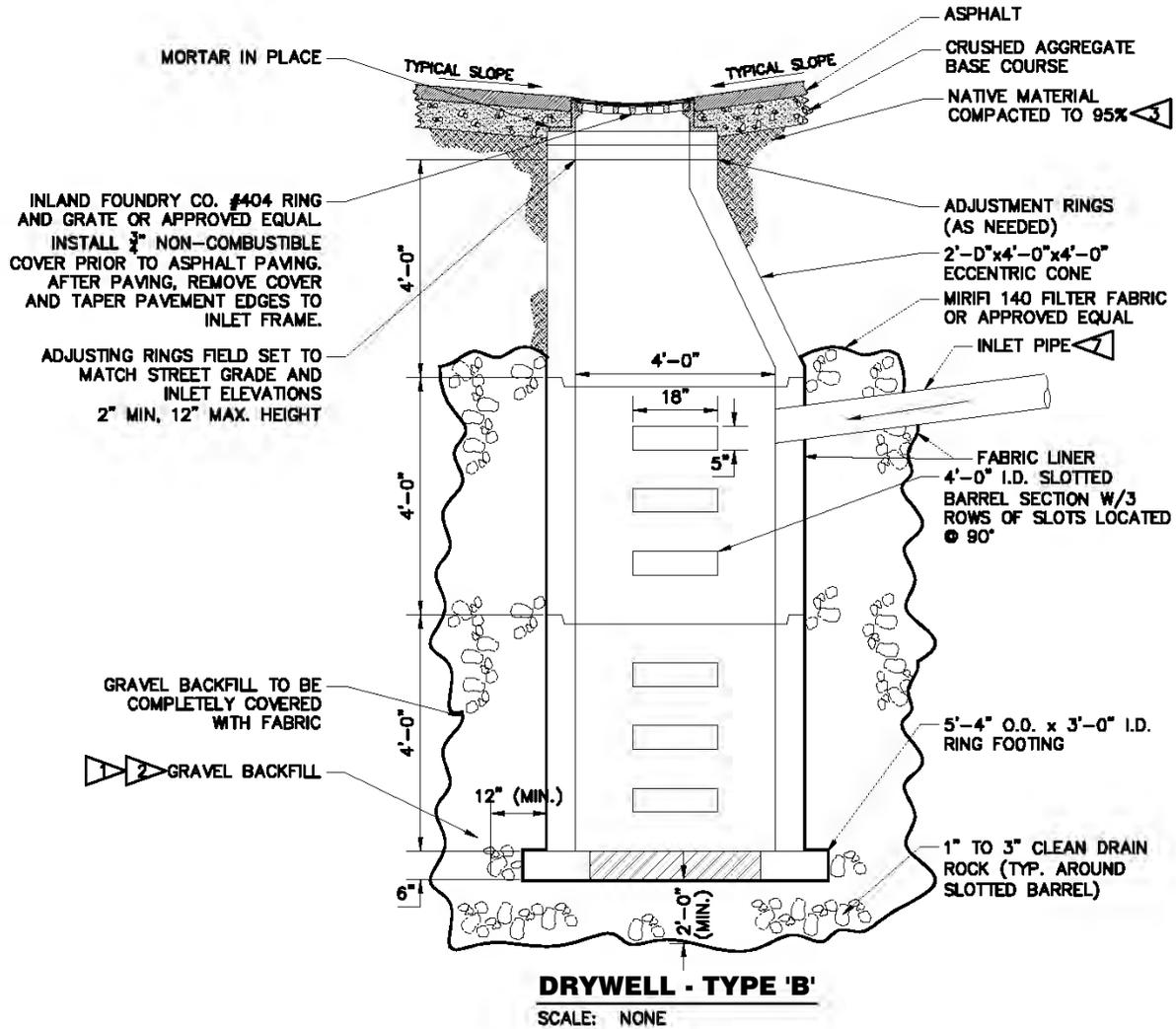
NOTES:

1. ALL HOLES IN NEW INLETS SHALL BE CAST OR CORED.
2. PRECAST REINFORCED CONCRETE SHALL CONFORM TO ASTM C-478.
3. FIELD SET ADJUSTMENT RINGS TO MATCH STREET/FINISHED GROUND.
4. TRENCH SHALL BE CONSTRUCTED TO OSHA SPECIFICATIONS FOR EXCAVATION. DRAWINGS DO NOT SHOW TRENCH DIMENSIONS OR BACKSLOPES THAT MAY BE REQUIRED. CONTRACTOR REQUIRED TO DETERMINE WHICH OSHA SPECIFICATIONS ARE APPLICABLE. CONTRACTOR SHALL BE RESPONSIBLE FOR TRENCH EXCAVATION AND SAFETY PER OSHA SPECIFICATIONS.



SLOTTED DRAIN INLET

SCALE: NONE



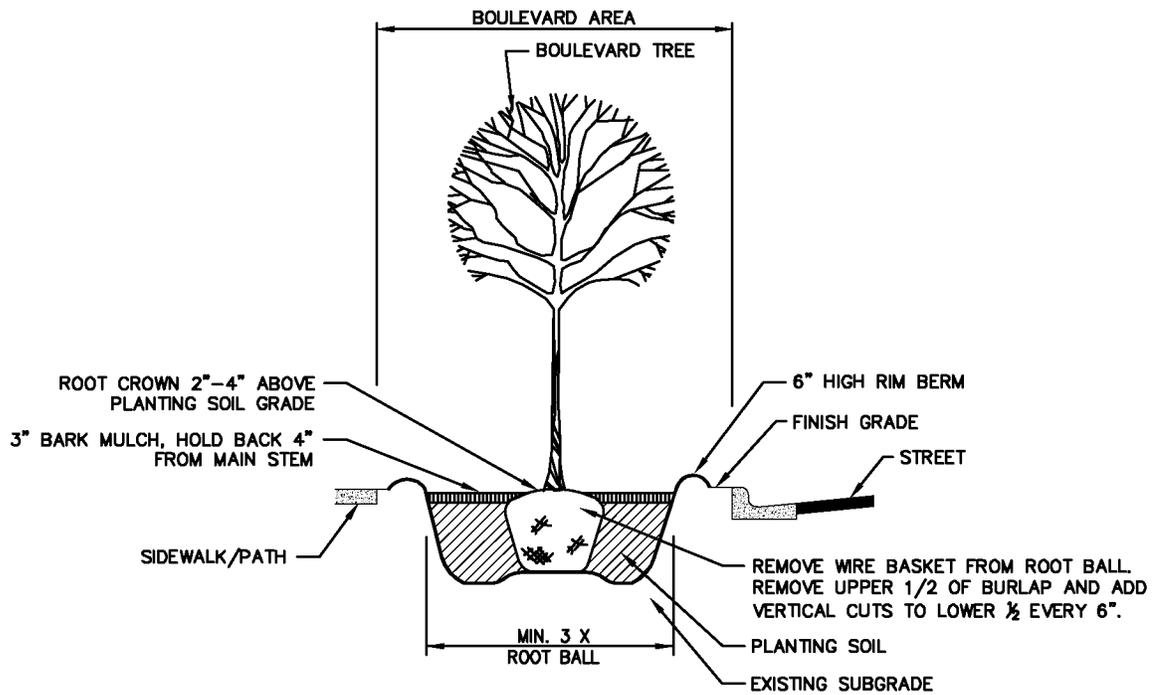
DRYWELL NOTES:

- 1 ▷ GRAVEL BACKFILL QUANTITY FOR DRYWELLS:
TYPE "A" - 30 CUBIC YARDS MINIMUM / 42 TONS.
TYPE "B" - 40 CUBIC YARDS MINIMUM / 56 TONS.
- 2 ▷ SPECIAL BACKFILL MATERIAL FOR DRYWELLS SHALL CONSIST OF WASHED GRAVEL GRADED FROM 1" TO 3" WITH A MAXIMUM OF 5% PASSING THE U.S. No. 200 SCREEN, AS MEASURED BY WEIGHT. A MAXIMUM OF 10% OF THE AGGREGATE, AS MEASURED BY WEIGHT, MAY BE CRUSHED OR FRACTURED ROCK. THE REMAINING 90% SHALL BE NATURALLY OCCURRING UNFRACTURED MATERIAL.
- 3 ▷ NATIVE BACKFILL: WITH PRIOR APPROVAL OF THE CITY AND THE ENGINEER, ON-SITE EXCAVATED SOIL MAY BE USED TO BACKFILL WATER MAINS, WATER SERVICES, FIRE HYDRANT LEADS, SEWER MAINS AND SEWER SERVICES. BLOCKY OR PLATY CLAY, AND SATURATED OR NEAR SATURATED SOILS, WILL NOT BE PERMITTED FOR USE AS BACKFILL MATERIAL. BACKFILL MATERIAL SHALL BE PLACED IN 12" MAXIMUM DRY DENSITY, AS DETERMINED BY AASHTO T-99 OR ASTM D698. THE CONTRACTOR SHALL PROVIDE THE ENGINEER WITH A PROCTOR (MOISTURE-DENSITY RELATIONSHIP) FOR THE BACKFILL MATERIAL.
4. ADJUSTMENT BLOCKS SHALL BE CEMENT CONCRETE.
5. PRECAST RISER MAY BE USED IN COMBINATION WITH OR IN LIEU OF ADJUSTING BLOCKS.
6. WHEN PVC PIPE IS USED A PVC ADAPTER SHALL BE INSTALLED.
- 7 ▷ PIPES SHALL BE GROUTED INTO DRYWELLS.

TREE PLANTING DETAILS

NOTE:

1. ALL TREE PLANTINGS IN TURF AREAS SHALL BE IN A 5' DIAMETER MULCH RING.
2. ALL BOULEVARD TREE PLANTINGS SHALL BE CENTERED IN BOULEVARD AREA.

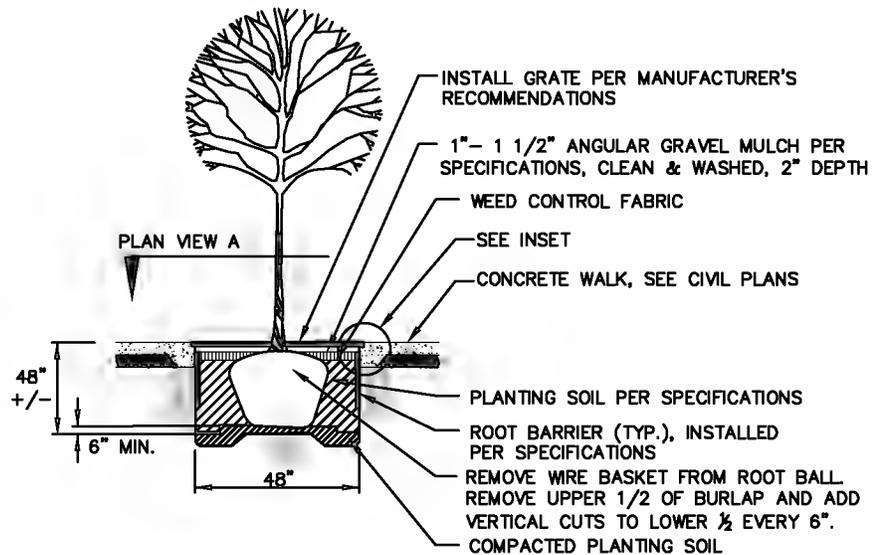
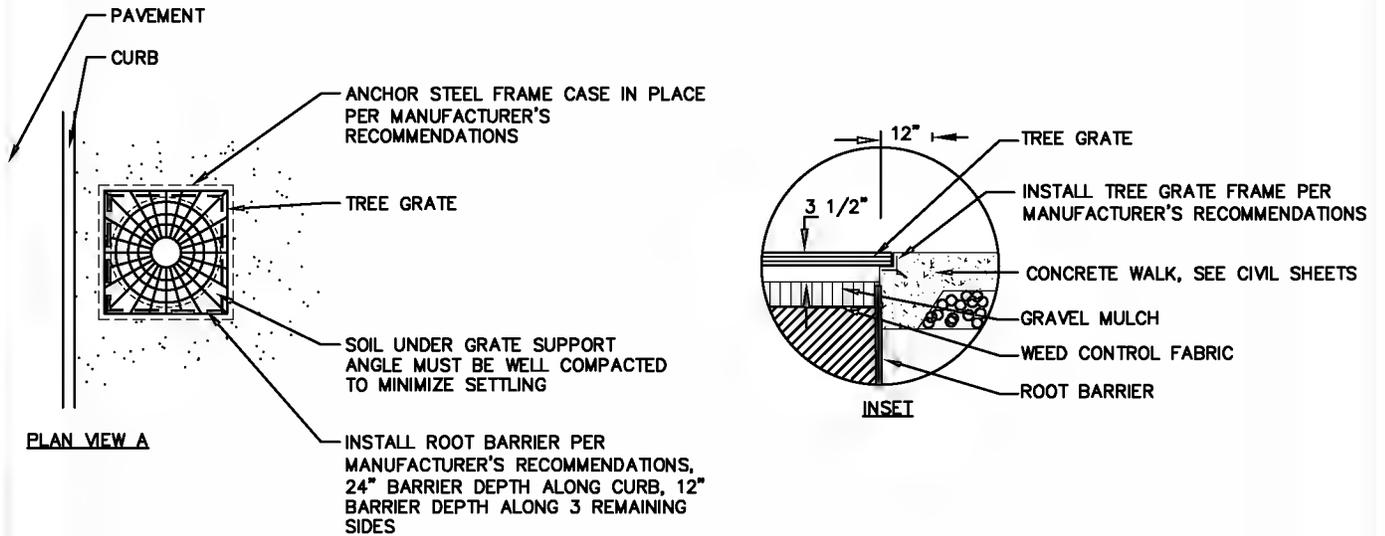


BOULEVARD TREE PLANTING

NOT TO SCALE

NOTE:

1. TREE GRATES AND FRAMES SHALL MEET ASTM A 48, CLASS 35b OR BETTER, GREY-IRON CASTINGS OF SHAPE, PATTERN AND SIZE INDICATED.
2. TREE GRATE SHALL BE URBAN ACCESSORIES MODEL CHINOOK TREE GRATE, CAST IRON, 4 FEET SQUARE WITH NATURAL FINISH, OR APPROVED EQUAL.
3. FRAME SHALL BE URBAN ACCESSORIES MODEL STEEL FRAME, 4 FEET SQUARE WITH NATURAL FINISH, OR APPROVED EQUAL

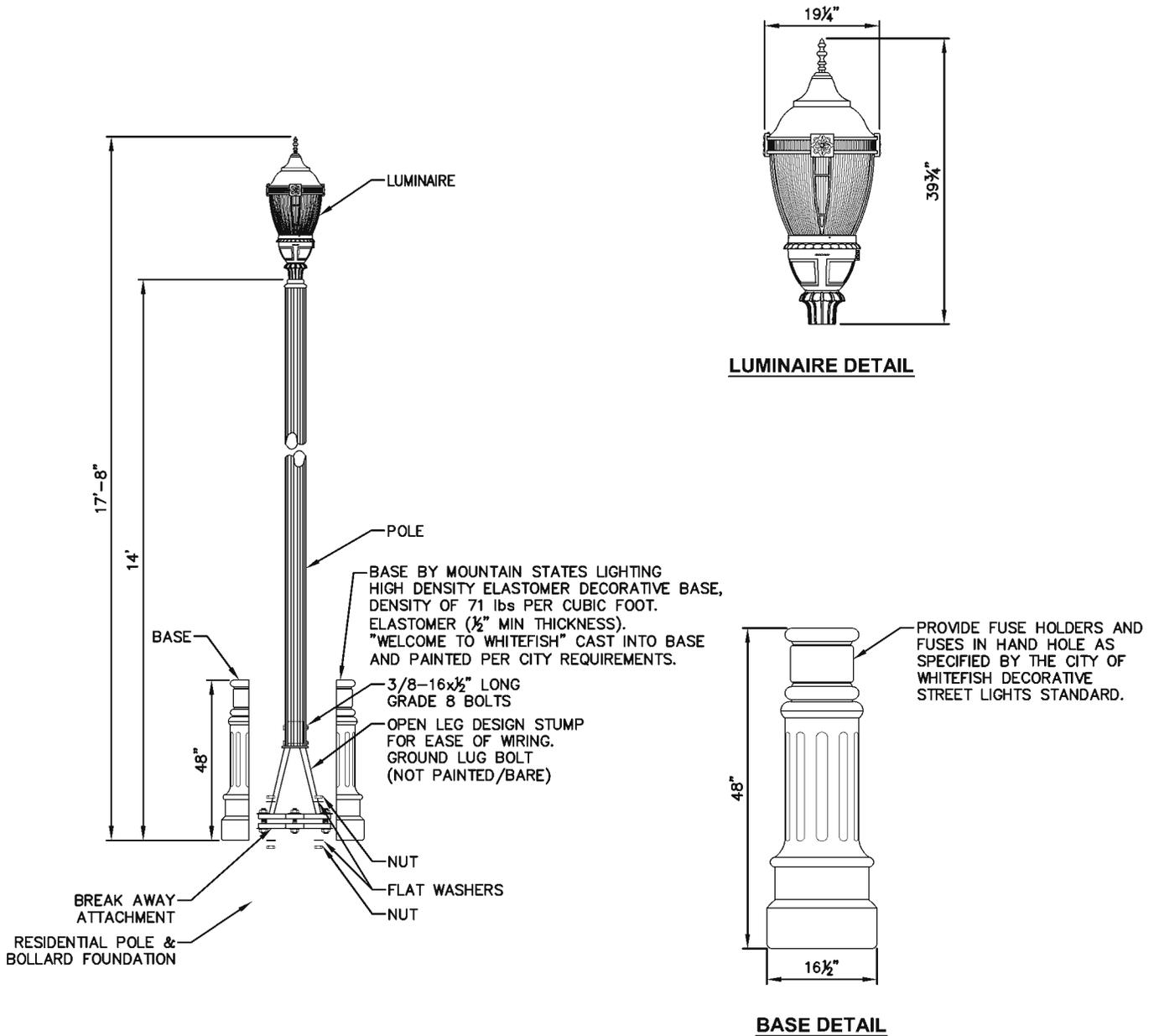


STREET TREE AND GRATE

STREET LIGHTING DETAILS

LUMINAIRE: CYCLONE #AG10T4D-VS3AR-3MHS-34W-2200K-120-277-F30-PT-SD-GM-SM-CP5493
 POLE: MSL #14EFA-5-TT/3x3-16.5WF(NAME)-LEG-J (GREEN)
 BASE: MSL #WF-16.5"Wx48"H-50D-HDEB-J (GREEN)

COLOR: "J" GREEN

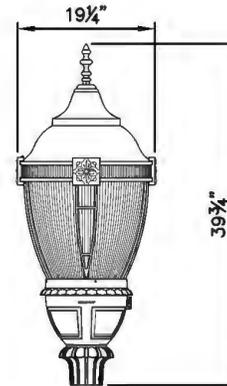
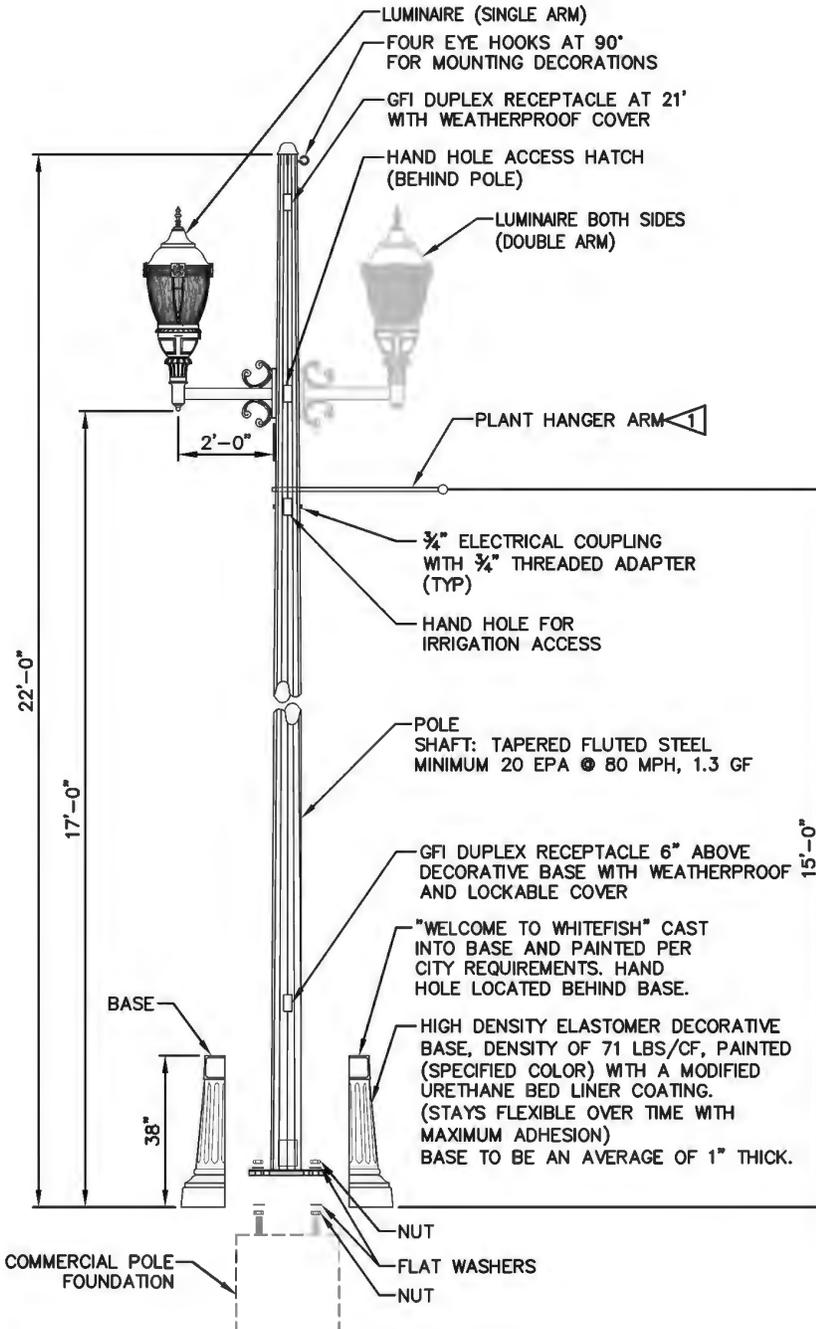


LUMINAIRE: CYCLONE #AG10T4D-VS3AR-3MHS-50W-2200K-120-277-F30-PT-SD-GM-SM-MG
 SINGLE ARM POLE: MSL #22TFS-SA/17'/2'x2.375"/SCR-22"
 MAD(Madison)-C2316AF1XT-(1)BA-J (GREEN)
 DOUBLE ARM POLE: MSL #22TFS-DBLSA/17'/2'x2.375"/SCR-22"
 MAD(Madison)-C2316AF1XT-(2)BA-J (GREEN)
 BASE: MSL #MAD(Madison)-22"Wx38"H-HDEB-J

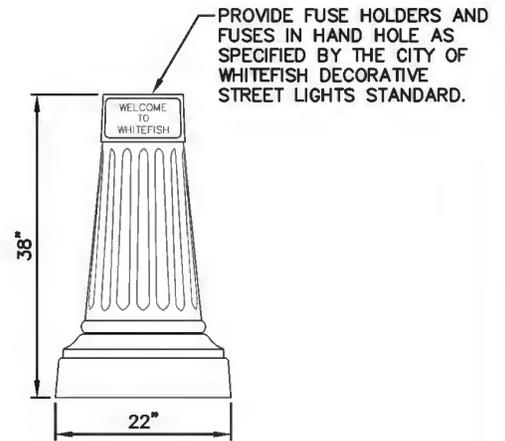
COLOR: "J" GREEN

NOTES:

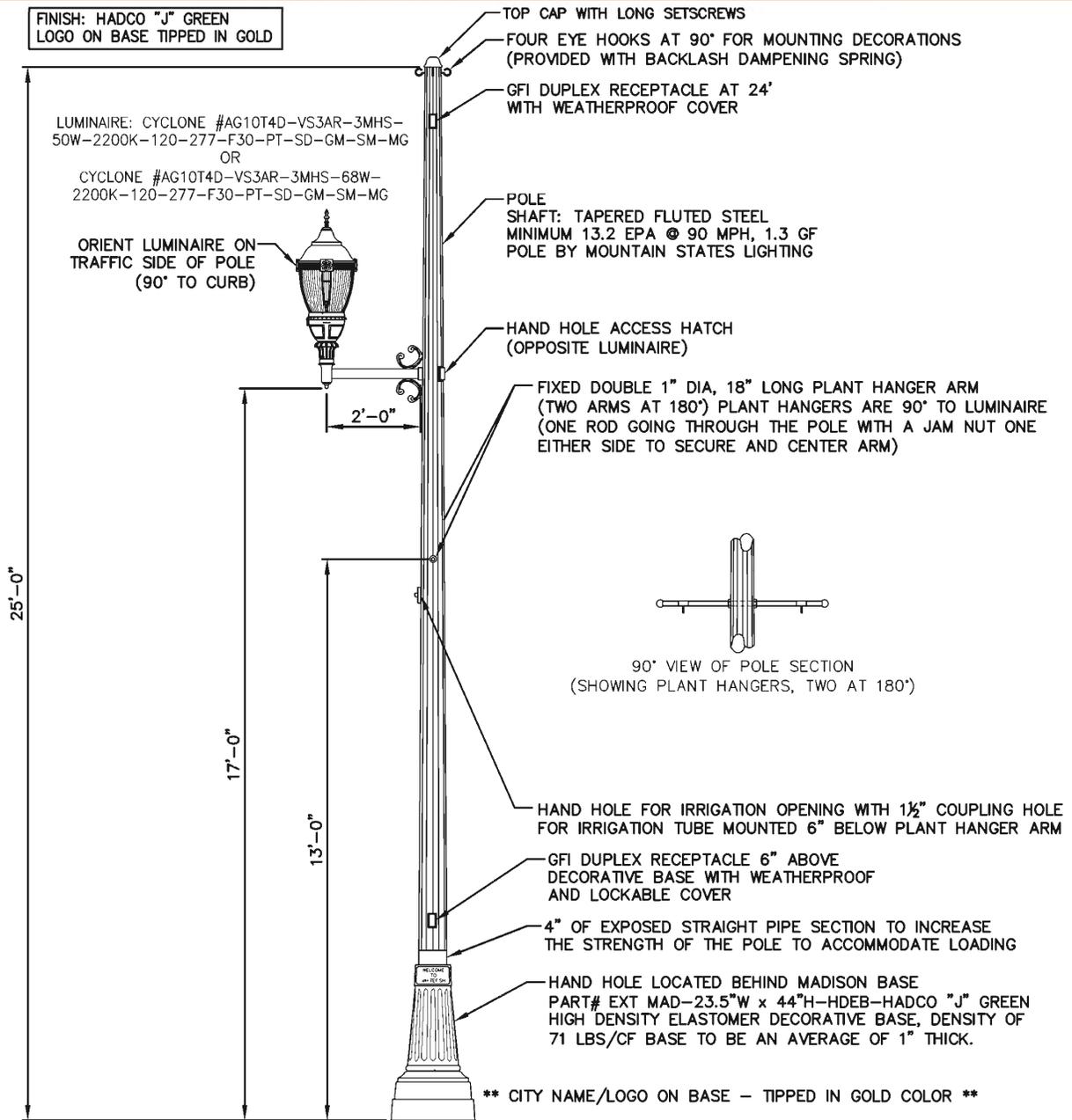
▶ PLANT HANGER ARM COMES OUT OF SHEET ON DOUBLE LIGHT POLE, NOT SHOWN FOR CLARITY.



LUMINAIRE DETAIL



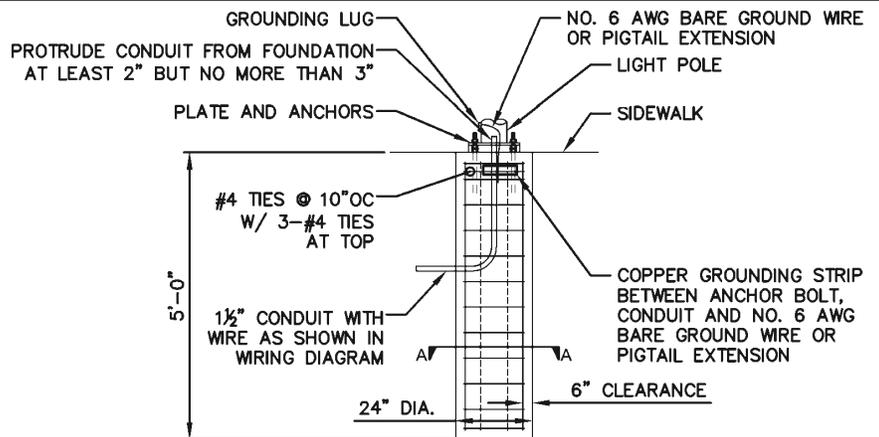
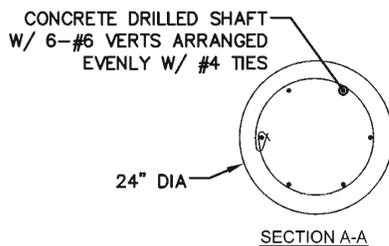
BASE DETAIL



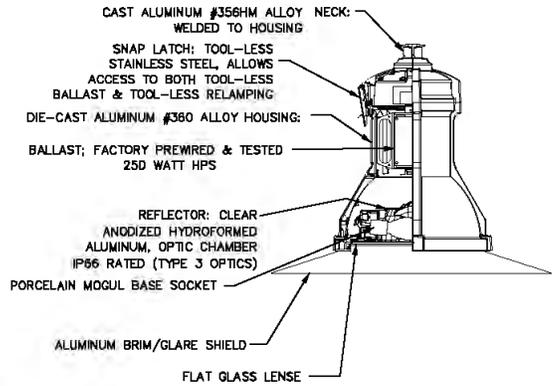
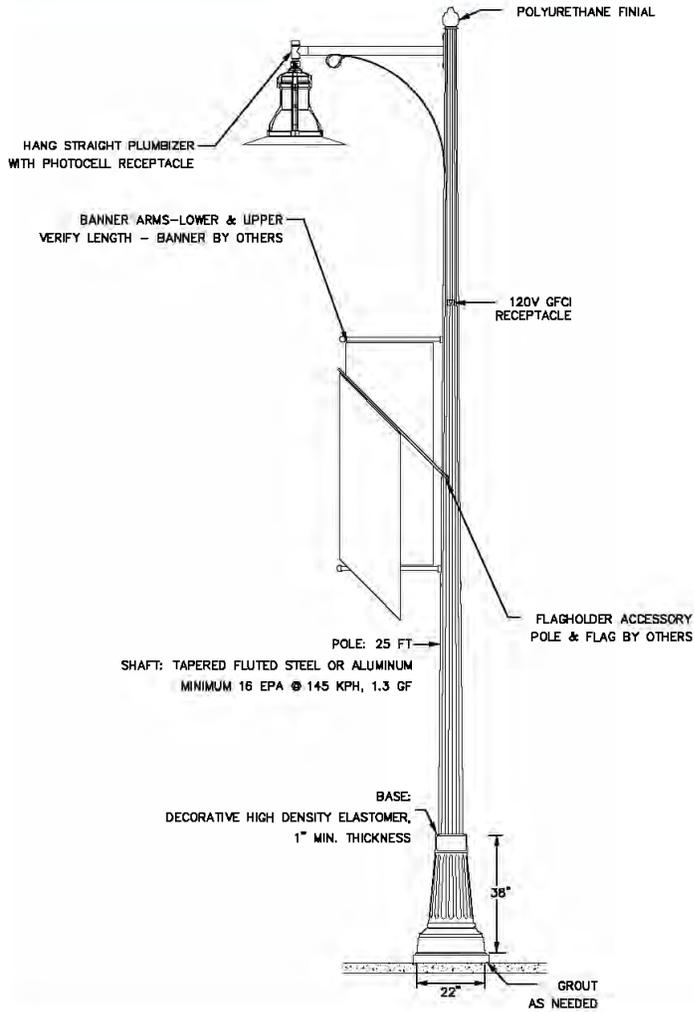
SINGLE FIXTURE DECORATIVE LUMINAIRE POLE, DBL PLANT HANGER ARM, IRRIGATION HOLE
 POLE TO HAVE 12" BOLT CIRCLE TO ACCOMMODATE 1"x36" BOLTS WITH A 4" BOLT PROJECTION

NOTES:

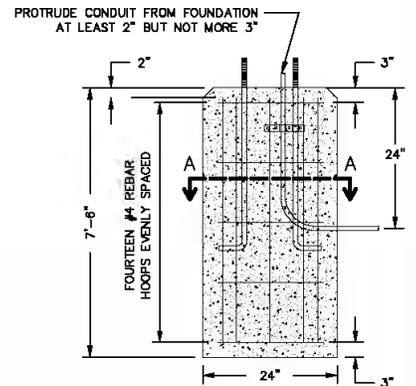
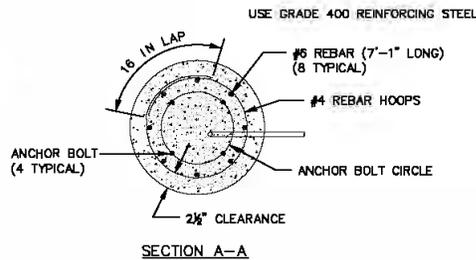
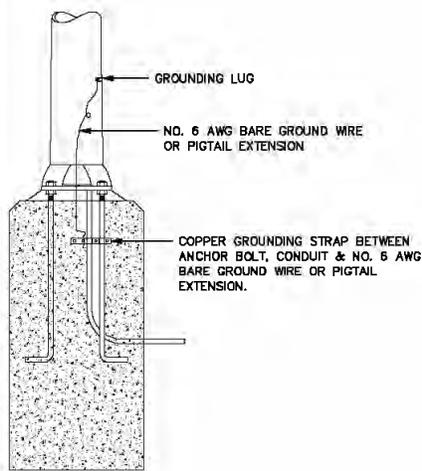
- ALL CONCRETE SHALL BE CLASS "DD" PER MDT STANDARDS SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION AND HAVE A MINIMUM COMPRESSIVE STRENGTH OF F'C=3,000 PSI AT 28 DAYS, NORMAL WEIGHT.



DECORATIVE LUMINAIRE POLE FOUNDATION



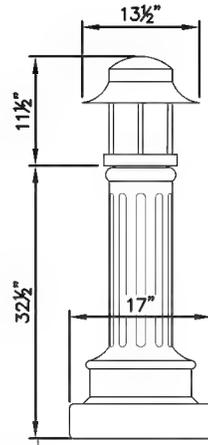
DECORATIVE LUMINAIRE POLE — TYPE 2
NO SCALE



DECORATIVE LUMINAIRE POLE TYPE 2 FOUNDATION

SCALE: NONE

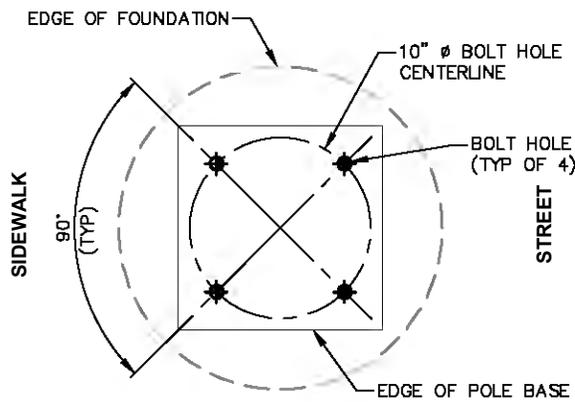
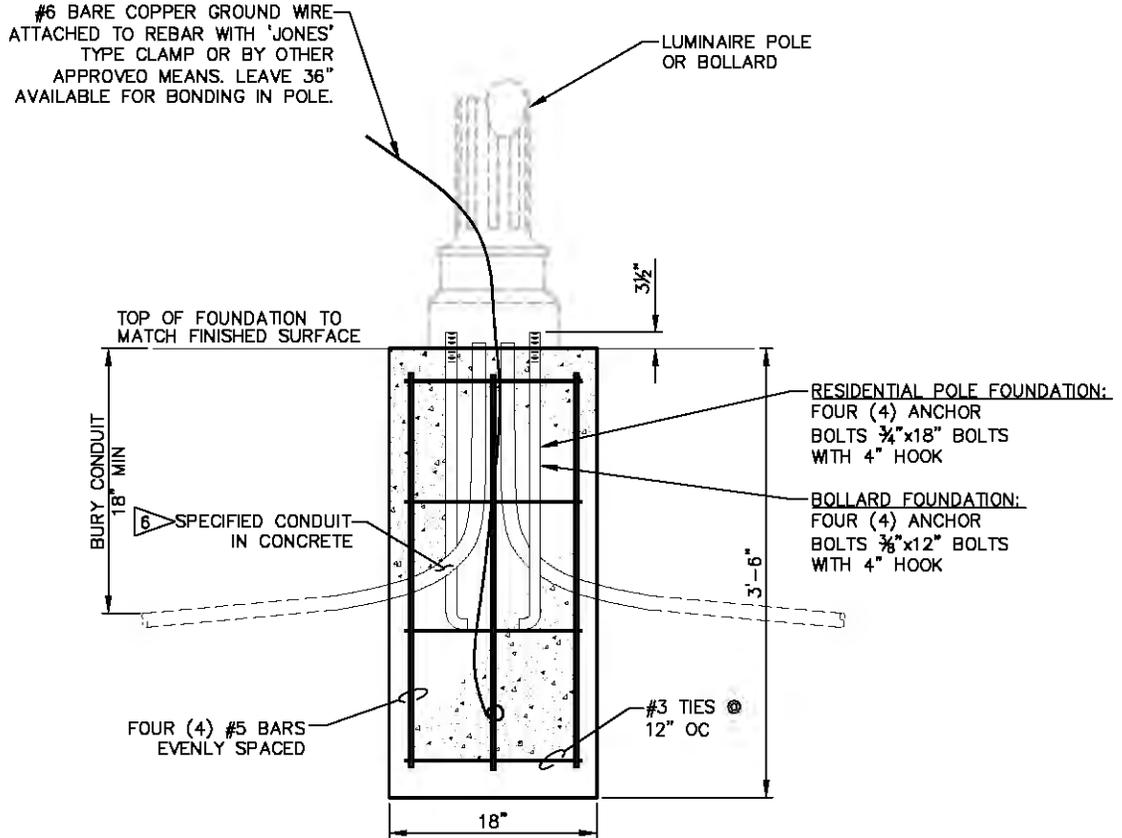
FIXTURE TYPE: CBM1154C-CAP-3-25W-3K-240-BB3-NONE-GM-TX
LUMINAIRE: LAP, POND ACRYLIC, 75% DIFFUSING
OPTIC: LED TYPE 3
SOURCE: 240 VOLT, 3K HIGH POWER LED, 3000K
FINISH: DARK GREEN TEXTURED POWDER COAT



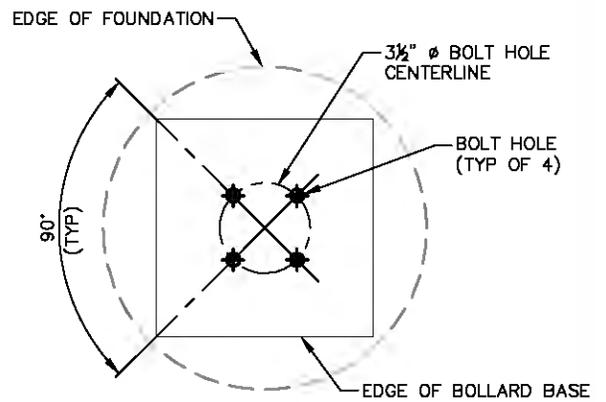
RESIDENTIAL POLE &
BOLLARD FOUNDATION

NOTES:

1. GROUND LIGHT POLE BASES PER MANUFACTURER'S RECOMMENDATIONS.
 2. SET ANCHOR BOLTS WITH OR $3\frac{1}{2}$ " OF THREADS EXPOSED.
 3. LIGHT POLE FOUNDATION SHALL BE BACKFILLED USING SUITABLE ON-SITE MATERIAL. BACKFILL TO BE COMPACTED TO 95% OF ASTM D-698.
 4. ALL LIGHT POLE FOUNDATIONS SHALL BE CAST IN PLACE. PRECAST LIGHT POLE FOUNDATION SHALL NOT BE USED.
 5. TOP OF FOUNDATION SHALL BE PLUMB SO THAT BASE SITS FLAT ON FOUNDATION.
6. INSTALL ONLY ONE CONDUIT CENTERED WITHIN BOLLARD FOUNDATION. ADJACENT PULL BOX MAY BE REQUIRED.



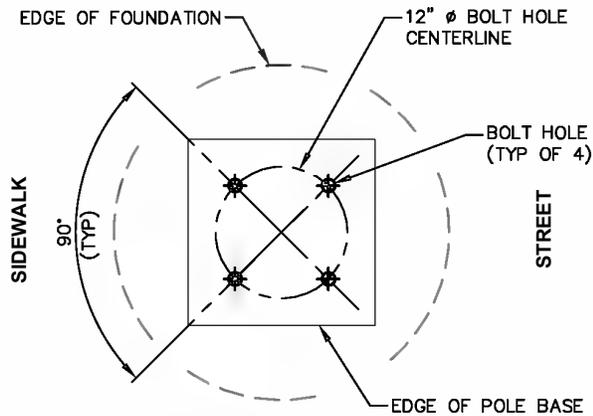
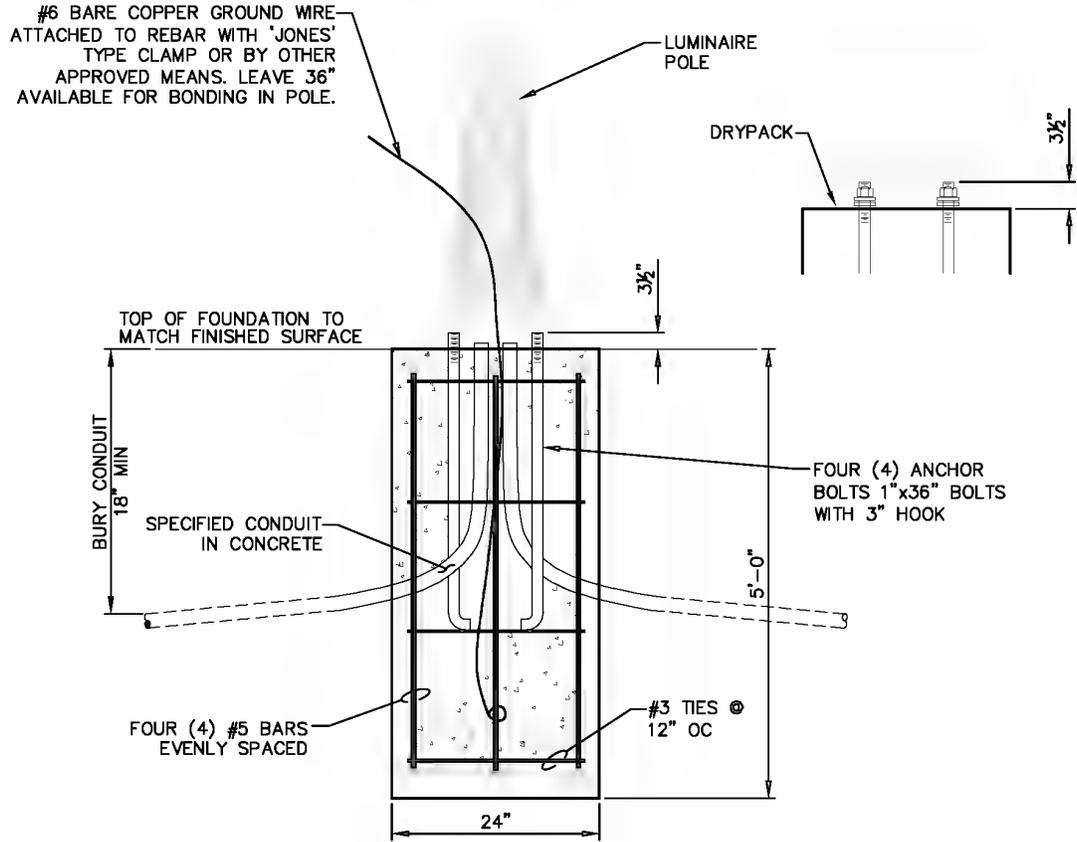
ANCHOR BOLT TEMPLATE
(RESIDENTIAL POLE FOUNDATION)



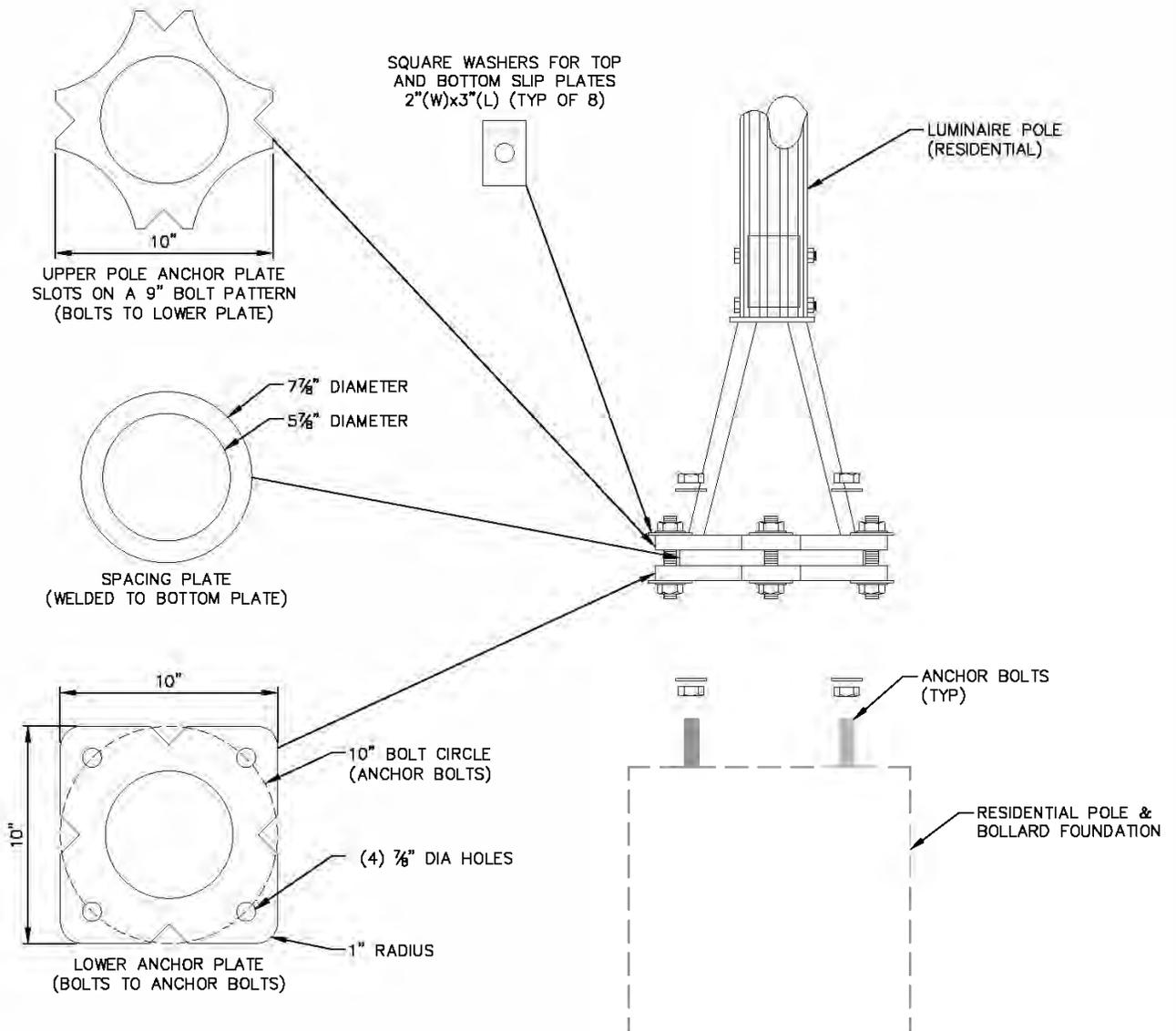
ANCHOR BOLT TEMPLATE
(BOLLARD FOUNDATION)

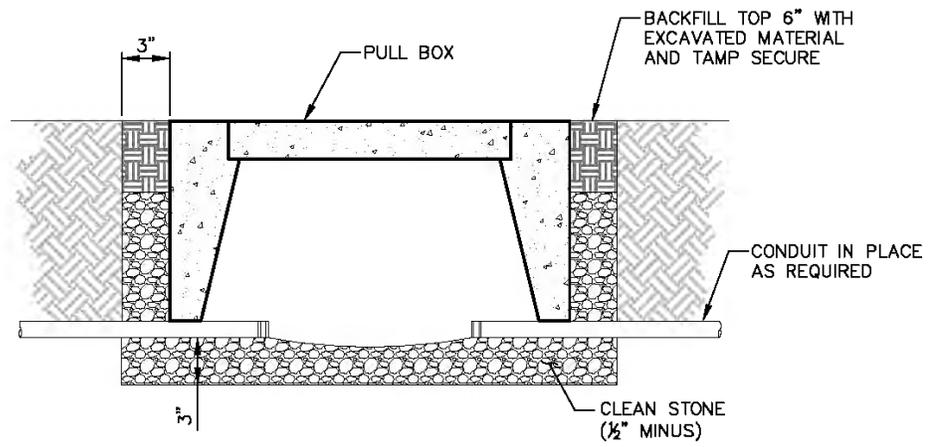
NOTES:

1. GROUND LIGHT POLE BASES PER MANUFACTURER'S RECOMMENDATIONS.
2. SET ANCHOR BOLTS WITH 3½" OF THREADS EXPOSED.
3. LIGHT POLE FOUNDATION SHALL BE BACKFILLED USING SUITABLE ON-SITE MATERIAL. BACKFILL TO BE COMPACTED TO 95% OF ASTM D-698.
4. ALL LIGHT POLE FOUNDATIONS SHALL BE CAST IN PLACE. PRECAST LIGHT POLE FOUNDATION SHALL NOT BE USED.
5. TOP OF FOUNDATION SHALL BE PLUMB SO THAT BASE SITS FLAT ON FOUNDATION.
6. IRRIGATION CONDUITS SHALL BE PROVIDED. (NOT SHOWN FOR CLARITY)



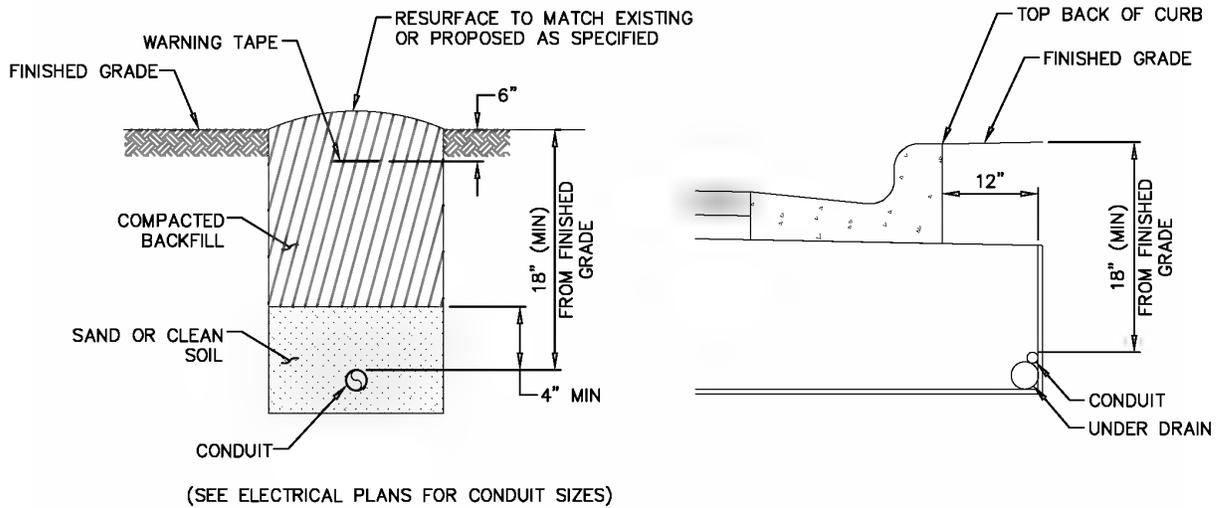
ANCHOR BOLT TEMPLATE

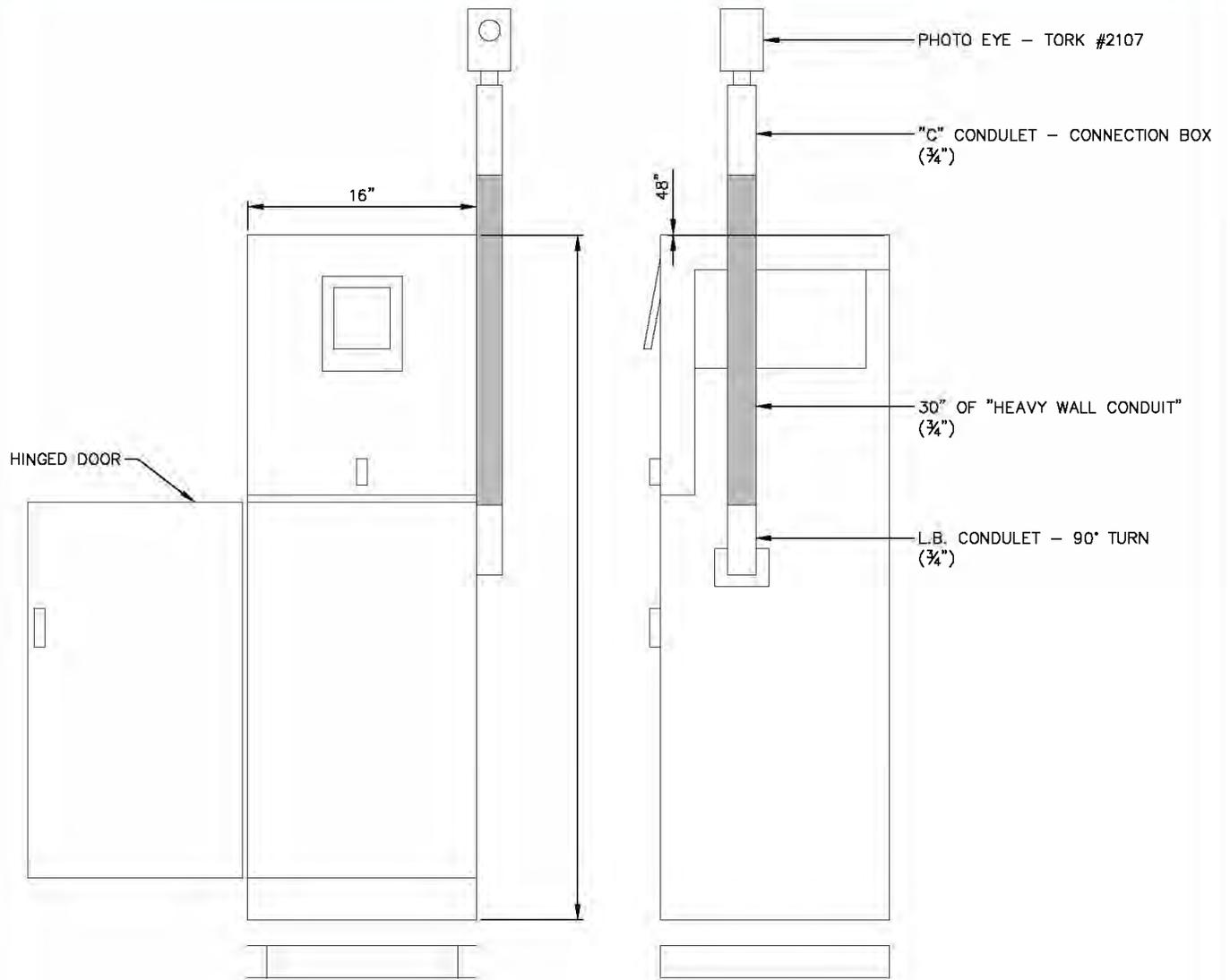




NOTES:

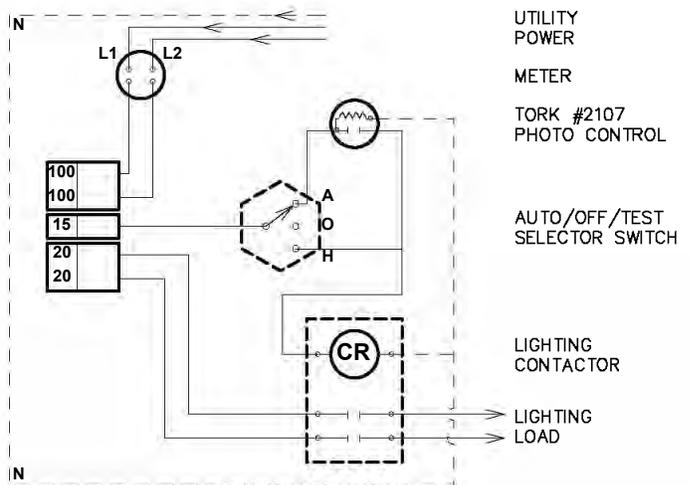
1. COORDINATE TRENCHING TO SHARE TRENCHES WITH OTHER UTILITIES WHEN FEASIBLE





STREET LIGHT ELECTRICAL SERVICE

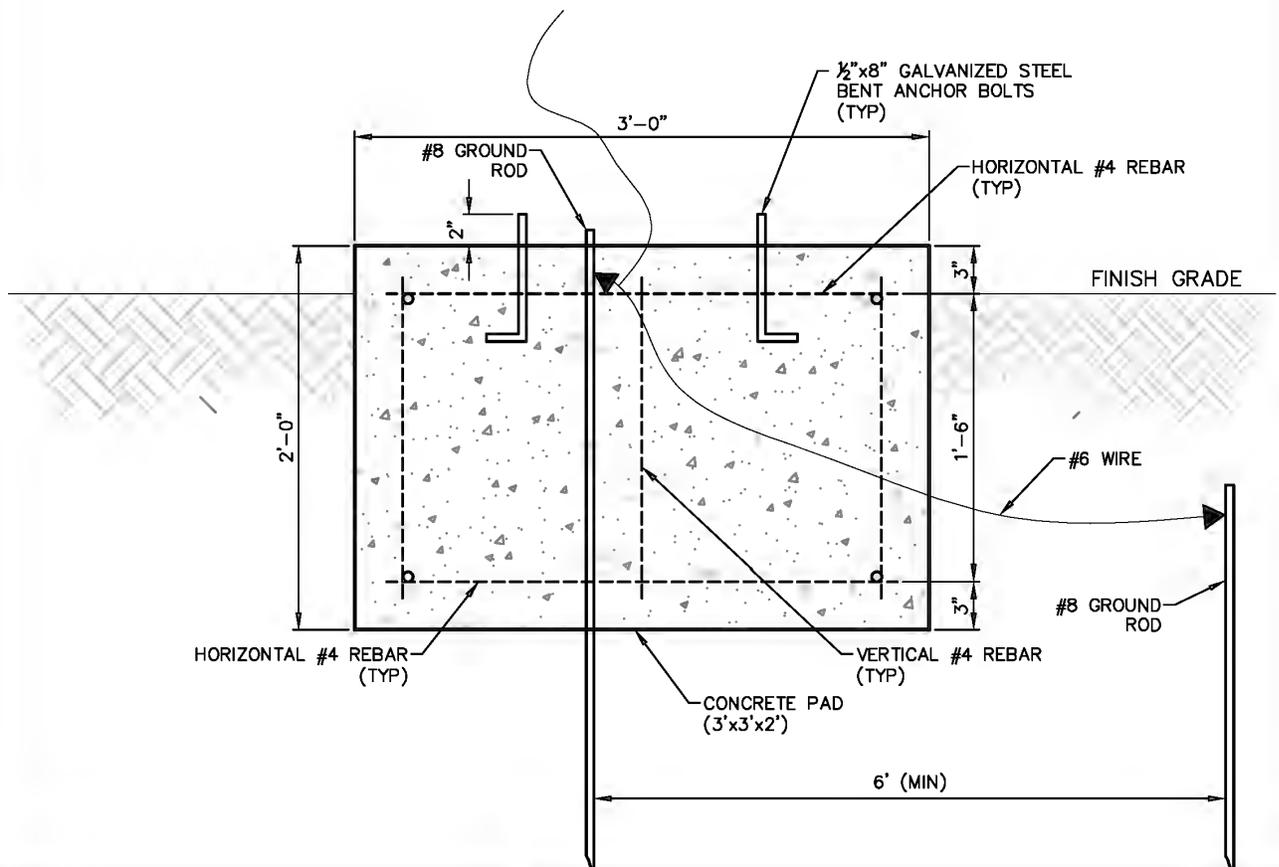
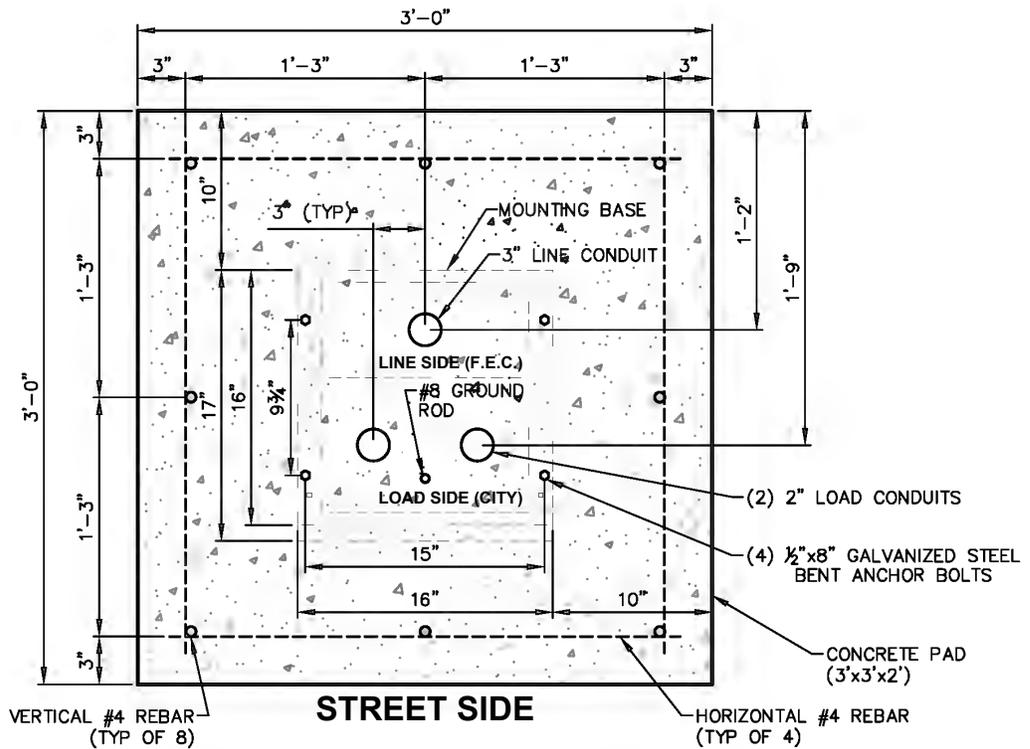
SERVICE BREAKER SCHEDULE		
100 AMP	2 POLE	MAIN SERVICE DISCONNECT
15 AMP	1 POLE	CONTROL CIRCUIT
20 AMP	2 POLE	LIGHTING LOAD



WIRE DIAGRAM

NOTES:

- (2) 8' COPPER CLAD GROUND RODS. INSTALL 6' APART. #6 AWG GROUND WIRE WITH 6' FREE CONDUCTOR FOR CONNECTION TO SERVICE.



NOTES:

1. 3" PVC RISER AT F.E.C. POLE STUB UP SEPARATION 6" TO CENTERLINE.

