City Council – Discuss proposed Standard Specification Changes **11/21/2019**

Handout of proposed revisions on Part 1, Part 2, and Standard Drawings

1.1 Definitions – added additional definitions that are needed.

1.2 Required Improvements – Added section to clarify what improvements are required for new development including what off-site improvements might be required.

1.3 Added requirements for utility cuts on recently installed asphalt street.

1.7 Securities and Bonding – Section added for additional instructions on bonding for new development.

2.1.4 Easements – commercial site developments required to provide easements along boundary of property for utilities.

2.2.8 Suitability of Site to Low Impact Development – paragraph added referring to new requirements.

2.3 Storm Drainage

2.3.2 All developments shall now be required to provide underground drainage facilities.

2.3.8.E. No street shall drain more than 400 feet before an storm drain inlet shall be provided for storm drainage.

2.3.9.B. Storm drains shall always be extended to the far upstream side of development for future storm drainage.

Table 2.3.8 – Updated to allow additional storm drain materials

2.3.11 – Changes to headwall design requirements for storm drains

2.3.14 – New detention/retention requirements to make all basins more uniform in design. Includes a landscape design proposal of all basins.

2.5.6 Low Impact Development – new requirements to take effect March 1, 2020.

2.6.11 Sidewalks – meandering sidewalks changed to wandering sidewalks.

2.9.6 Air Valves – Added section. These are necessary occasionally in a water system to remove air from the piping system at high points.

2.9.8 Service Connections and Meters – section greatly expanded. Size of connection should be based fixture units, not on what is the best way to avoid paying too large of WCWCD fee.

2.9.9 Fire Hydrants – Additional standards on location.

2.11 Utility layout – better guidance on how to best layout underground utility systems.

Roadway Standard Drawings – assumes that the agenda item tonight passes with no changes for R-05, R-07, R-08. See red revision clouds for changes on R-01. R-03 and R-11 are totally new drawings.

Sewer Standard Drawings – Add standards for small diameter sewer systems S-08, S-09 and S-10.

Lighting Standard Drawings – assumes that the agenda item tonight passes with no changes.

Water Standard Drawings – See areas highlighted with red revision clouds for changes on W-01, W-02, and W-07

Irrigation Standard Drawings – See area highlighted with red revision clouds for changes on I-01

Grading and Erosion Control Drawings – See area highlighted with red revision clouds for changes on G-01

PART 1

GENERAL IMPROVEMENT REQUIREMENTS

1.0. INTRODUCTION

This section defines the engineering and design requirements within Ivins City. These requirements should be used along with professional judgment to serve as a guide to establish consistency in design. In no instance shall any plan deviate from these standards without the approval of the City Engineer on a case by case basis.

This part addresses the following areas of engineering and design:

1.1 Definitions
1.2 Required Improvements
1.3 Required City Permits
1.4 Other Permits
1.5 Applicable Ordinances
1.6 Construction Drawings/Plans
1.7 Securities and Bonding
1.8 Coordination

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1.1. DEFINITIONS

A. Wherever used in these specifications the following terms have the meanings indicated which are applicable to both the singular and plural thereof.

1. APPROVED DOCUMENTS: The approved drawings, standard specifications, standard drawings, and any other approved supplemental specifications and conditions.

2. APPROVED DRAWINGS: The graphic and pictorial portions of the approved documents approved by the City's Representative showing the design, location and dimensions of the work, and generally include, the plan, profiles, elevations, cross sections, details, schedules and diagrams, etc.

3. APWA: The American Public Works Association

4. APWA Manual of Standard Specifications: The specifications published by the Utah LTAP Center, Utah State University, Logan, UT in conjunction with the Utah Chapter of APWA, adopted by Ivins City with the modifications contained within this document.

5. APWA Manual of Standard Plans: The graphical and text displays published by the Utah LTAP Center, Utah State University, Logan, UT in conjunction with the Utah Chapter of APWA, adopted by Ivins City with the modifications contained within this document.

6. BONDS: An instrument of security submitted by the owner and approved by the City to guarantee and/or warranty the required improvements.

7. CITY: Ivins City, Utah, a governmental entity having authority to adopt and enforce ordinances.

8. CITY ENGINEER: The officially appointed Professional Engineer designated as the "City Engineer" to act in behalf of and for Ivins City. May also refer to the City Engineer's designated representative.

9. CITY'S REPRESENTATIVE: The person designated to act for and in behalf of Ivins City.

10. CONTRACTOR: The person, firm or corporation with whom the owner has entered into an agreement to construct the necessary work.

11. DEVELOPER: The authority, corporation, association or firm which undertakes the development or subdivision of land or properties and with whom the Contractor has entered into an agreement and for whom the work is to be provided.

12. DEVELOPMENT: The process of constructing a building or group of buildings for residential, commercial, industrial or other uses or the general changing of land or property into something other than its current or natural state or condition.

13. DRAWING OF RECORD: The drawing(s) or plan(s) which show the locations and dimensions of constructed facilities, based on actual measurements taken in the field, as governed by City policy and ordinances.

14. ENGINEER: A Civil Engineer registered with the Utah State Department of Business Regulation and licenced to practice as a Professional Engineer in the State of Utah.

15. JOINT UTILITY COMMITTEE (JUC): A formal group of representatives from public and private utility companies in the Ivins area that meet monthly to review and approve utility plans as required.

16. LOW IMPACT DEVELOPMENT (LID): Refers to systems and practices that use or mimic natural processes that result in the infiltration, evapotranspiration or use of stormwater in order to protect water quality.

~~15.~~17. OFFSITE IMPROVEMENTS: Street, landscaping, drainage and utility improvements that are part of a subdivision or site development but are not inside the developing property. They are adjacent to the development or are required to extend a minimum level of municipal and utility services to the development with proper transitions for proper and orderly development within the City.

~~16.~~18. OWNER: The authority, corporation, association or firm with whom the Contractor has entered into an agreement and for whom the work is to be provided. This can refer to the Developer or the Owner of the property being developed.

~~17.~~19. OWNER'S ENGINEER (OR THE ENGINEER): The professional engineer or engineering firm (registered with the Utah State Department of Business Regulation) which has been retained by the Owner to produce plans, specifications, oversee work, etc. required by the Owner in the prosecution of the development of said Owner's properties. (See engineer).

~~18.~~20. OWNER'S REPRESENTATIVE: The person, firm, or corporation designated to act for and in behalf of the owner.

~~19.~~21. PLANS (DRAWINGS): The graphic and pictorial portions of the documents approved by the City's Representative showing the design, location and dimensions of the work, which generally include all details, schedules and diagrams required for construction of the project.

~~20.~~22. PRIVATE IMPROVEMENTS: The work or improvements which are undertaken by the Owner or Developer for the benefit of a select group of private

individuals and are not maintained or repaired by the City and are not dedicated to the City for public use.

~~21.~~23. PROJECT: The total work to be provided under the approved documents.

24. PUBLIC IMPROVEMENTS: The work or improvements which are dedicated to and maintained by the City for the benefit of the public-at-large.

25. SUBDIVISION: Any land that is divided, subdivided or proposed to be divided into two or more lots, parcels, sites, units, plots or other division of land for the purpose, whether immediate or future, for offer, sale, lease or development.

~~22.~~26. SITE DEVELOPMENT: Any land that is being developed and is subject to City requirements to develop roads, utilities, drainage and other infrastructure into the project and to adjoining properties.

~~23.~~27. SPECIFICATIONS: Those portions of the approved documents consisting of these Standard Specifications as well as other requirements for materials, equipment, construction systems, standards and workmanship as applied to the work and certain applicable administrative details.

~~24.~~28. STANDARD SPECIFICATIONS: The specifications as contained and as referenced in these documents including the APWA Standard Specifications.

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1.2. REQUIRED IMPROVEMENTS

1.2.1. GENERAL

A. All subdivisions, site plans, condominiums and other developments shall be developed in an orderly manner and in such a way that the required improvements will be continuous and available as necessary during construction activities within the project, and that all of the improvements will be made available for the full, effective and practical use and enjoyment thereof by the purchaser, grantee, assignee, transferee or lessee of any lands developed within the time herein provided or in phases specified.

B. Developments shall be planned and developed to accommodate the continuation of roads, utilities, drainage and other infrastructure to adjoining properties.

C. All adjacent streets and utilities that are currently substandard shall be improved and raised to the current standard as defined by these standard specifications, which shall include the removal of existing substandard facilities and replacement with the current standard.

1.2.2. SUBDIVISIONS

A. Improvements shall be as required by Subdivision Ordinance, Title 15 of Ivins City Code

1.2.3. SITE DEVELOPMENT

A. Improvements shall be as required by Zoning Ordinance, Title 16 of Ivins City Code and Subdivision Ordinance, Tittle 15 of Ivins City Code.

1.2.4. OFF SITE IMPROVMENTS

A. Street, landscaping, drainage and utility improvements that are part of a subdivision or site development but are not inside the developing property.

B. These improvements are adjacent to the development or are required to extend a minimum level of municipal and utility services to the development with transitions for proper and orderly development within the City.

C. Utilities must be extended to the edges of the development to accommodate continuation of the development.

D. Developments may be required to extend off-site improvements beyond the limits of the immediately adjacent streets for:

1. Closing minor gaps in the roadway, including extending curb, gutter, and sidewalks. A minor gap shall be anything less than 100 feet.

2. Preventing drainage problems that are apparent due to the alteration of drainage paths.

3. Providing necessary access that meets all City codes and the Fire code.

1.2.5. INSTALLATION OF CITY PLANNED CAPITAL FACILITIES

A. If a development is adjacent to a city planned capital facility or if a development requires that a city planned capital facility be installed to provide a necessary service to that development and the City is collecting impact fees to pay for the capital facility such that the developers' installation of the capital facility would reduce the burden of the impact fee fund, then the developer is entitled to either reimbursement or credit towards the payment of impact fees in proportion to the reduction of burden on the impact fee fund.

~~1.2.~~1.3. REQUIRED CITY PERMITS

~~1.2.1.~~1.3.1. ENCROACHMENT PERMIT

A. Required when:

1. Excavating within any right-of-way
2. Removing, undermining, or tunneling under any pavement or other material within any right-of-way

B. See Encroachment Permit Form (IC Form 5011) for additional information on requirements and fees.

C. No street paved with asphalt shall be allowed to be cut for a period of 1-year. However, when such cuts are necessary the street asphalt shall be replaced at the half width of the new pavement or, on roads with more than three lanes, the full width of the lane and a minimum length equal to the width of the patch.

~~B.~~D. Any street cut that is required within 3-years of new asphalt installation must be patched with seamless patching.

~~C.~~E. Not required when excavation is part of a project that is covered by a construction permit.

~~1.2.2.~~1.3.2. SITE CONSTRUCTION PERMIT

A. Required for any of the following:

1. Construction of improvements required for a subdivision.
2. Construction of improvements required for a commercial and multi-family site development or site developments that include public improvements.
3. Site grading of areas greater than 1 acre.

B. No permit shall be issued, and no construction shall be started until:

1. Construction/Site Plans are approved.
2. Qualifications of Contractor hired by developer/owner are verified.
3. Storm Water Pollution Prevention Plan is approved and UPDES NOI has been issued.
4. Other necessary permits have been obtained.
5. When applicable, developer agreements are signed and executed.
6. When applicable, final plat application is approved.
7. When applicable, restoration bond has been posted.

C. Expires after 1 year unless contractor is showing diligent effort to complete the project in a timely manner. Additional fees will apply for any reapplication.

D. See Construction Permit Form (IC From 5009) for additional information on requirements and fees.

~~1.3.~~1.4. OTHER APPLICABLE PERMITS

~~1.3.1.~~1.4.1. UPDES STORMWATER PERMIT

A. A UPDES (Utah Pollutant Discharge Elimination System) Permit from the State of Utah is required for all projects that disturb greater than 1 acre or are less than 1 acre and part of common plan of development or sale that is greater than 1 acre.

B. Refer to Section 2.5 of these documents for additional City requirements regarding this permit and pollution controls.

~~1.3.2.~~1.4.2. BUILDING PERMITS

A. No building permit shall be issued for a subdivision until:

1. Roadbase is placed, graded, compacted, and approved on entire road surface.
2. Curb and gutter is in place.
3. Street signs are installed.
4. All underground utilities are in place, accepted, and functional.
5. It is reasonable to expect the subdivision improvements to be completed prior to the occupancy of the buildings.

~~1.3.3.~~1.4.3. OCCUPANCY PERMITS

A. A developer shall not sell any portion of an approved development without informing the prospective buyer or builder that occupancy may not be obtained until all permanent improvements are installed and approved by the City.

B. A certificate of occupancy may be issued upon compliance with the items listed in the Ivins subdivision ordinance Section 15.05.1002.

~~1.3.4.~~1.4.4. BLASTING PERMITS

A. The use of explosives or blasting is generally not allowed within the City, however, if explosives or blasting are permitted, their use is controlled by the adopted Fire Code. The Contractor shall obtain a special permit from the City Public Works for the use of explosives. A copy of this permit shall be delivered to the City's Representative prior to the use of explosives. The approval by the City for the use of explosives shall not relieve the Contractor from his responsibilities for proper use and handling of the explosives or for any and all damages resulting from their use. Explosives shall be transported, stored, handled and used in accordance with the provisions and requirements of all applicable laws, ordinances and regulations.

1. Permits and Blast Plan. When any blasting is to occur within the city a permit for such activity shall be applied for at least three working days prior to the desired

blasting day. A detailed blast plan shall be submitted for review at the time of application for a permit. The blast plan shall contain the following information:

- Number of holes per blast
- Blast pattern
- Depth of holes
- Maximum holes per delay
- Numbers of the delays used
- Type of explosives used
- Total pounds of explosives
- Maximum pounds per delay
- Method of detonation
- Proximity to nearest structure
- Expected duration of blasting activity
- Name of independent monitoring company
- Whether or not a pre-blast survey is required and the name of the company doing such a survey
- Plan outline for notification of Fire Marshall, Fire Chief, or governing agency one hour prior to detonation of each blast and approximate time of each blast

2. General Blasting Criteria. Blasting activity that is to occur within one thousand (1,000) feet of any school (public or private), university, day care center, church, library, medical facility, or any public building shall be conducted during off hours where possible and shall require seismic monitoring of each blast to insure the integrity of the building as well as the safety of the occupants of said buildings. Since there is a wide variety in the type density, specific gravity, velocity and general characteristics within the graphical area of southern Utah, there are varied methods that can be employed to attain the desired results. These methods, if used and however varied, shall adhere to the appropriate limit criteria.

3. Any blasting that is intended within five hundred (500) feet of any structure (building, tunnel, underground utilities, gas lines, overhead transmission lines, pump station, piping, radio tower, or any other structure of any kind) requires that the blast be monitored with a seismograph capable of measuring peak particle velocities in three spatial components of horizontal, vertical and transverse and be capable of printing this data into a permanent record as digital as well as wave form and air blast overpressure in terms of millibar, PSI or decibel (dB) recording of each event. Any structure such as residential homes, commercial buildings, public buildings, storage facilities, or any other permanent structure that lies within five hundred (500) feet of blasting activity shall be required to have a pre-blast survey performed at the expense of the Contractor and/or the blaster by an independent company whose primary nature of business is to conduct and perform these types of services. The said company shall furnish to the Fire Chief a copy of the pre-blast survey report prior to issuance of the blasting permit. A certificate of insurance issued by an underwriter

legally doing business within the State of Utah showing Contractor and/or blaster to be properly insured for the express purpose of blasting and showing the issuing agency as additional insured, shall be submitted with the application of the blasting permit. The amount of insurance shown on the certificate of insurance shall be in the amount required by City's Fire Department or Owner's Representative. A blasting permit shall be site specific and expire thirty days from issuance.

4. Furnish and erect special signs to warn the public of blasting operations. Said signs shall be located and maintained so as to be clearly evident to the public during all critical periods of blasting operations.

5. Notify each public utility company, having structures or facilities adjacent to the work, of his intention to use explosives. Such notice shall be given sufficiently in advance to enable the companies to advise the Contractor of any precautions that should be taken to protect their structures from damage.

6. Make a survey of adjacent properties, before commencing blasting operations, locating on drawings and by photographs all existing cracks and damages to structures. A copy shall be filed with the Representative, including a report of any property owners who refused to cooperate and permit entry and inspection.

7. Blasting shall be accomplished in such a manner that nearby buildings, structures, railways, highways, etc. will be safe from rocks and other projectiles. Adequate blasting mats or other means of protection shall be employed when blasting in congested area or close proximity to any of the above improvements. Steel mats shall not be allowed within two thousand (2,000) feet of powerlines.

8. Immediately prior to the time of firing, the Contractor shall station certified flaggers along the road(s) at sufficient distance from the blasting operation to control traffic as required.

9. The City reserves the right to order the discontinuance of blasting operations at any time.

10. Logs. The blaster shall, at the request of The City, surrender logs and records, or a copy thereof, for review within twenty-four hours of receiving such request. Failure to keep current and/or surrender the logs to the City will result in the immediate cancellation of any and all permits issued. No further permits will then be issued within thirty days of submission of said records.

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~~1.4.~~1.5. APPLICABLE ORDINANCES

~~1.4.1.~~1.5.1. ZONING ORDINANCE

A. The Developer and his Engineer must familiarize themselves with the existing zoing ordinances and requirements.

~~1.4.2.~~1.5.2. SUBDIVISION ORDINANCE

A. The Developer and his Engineer must familiarize themselves with the existing subdivision ordinances and requirements.

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~~1.5.~~1.6. CONSTRUCTION DRAWINGS

~~1.5.1.~~1.6.1. CITY APPROVAL OF DRAWINGS REQUIRED FOR

A. Subdivisions

B. Site Developments that include any of the following:

1. Grading more than one acre.
2. Installation of improvements required by City.
3. Installation of any improvements intended to become public.
4. When determined to be necessary by the City Engineer.

~~1.5.2.~~1.6.2. GENERAL STANDARDS

A. Final approval of the project shall not be granted until the plans have been reviewed and recommended for approval by the city engineer.

B. Standards are set for the purpose of standardizing the drawings and to obtain uniformity in appearance, clarity, size and reproduction.

C. All drawings and prints shall be clear and legible and conform to good engineering and drafting practices.

D. Size of drawings shall be 24 inches x 36 inches.

E. Title block is located on the right side of the sheet and includes:

1. Project Title
2. Sheet Title
3. Sheet Number
4. Name, address, and phone number of engineer

F. Engineer's stamp and signature with date is required on all sheets.

G. Include north arrow and graphical scale on all plan sheets.

H. Minimum text size is 0.08 inches.

~~1.5.3.~~1.6.3. CONSTRUCTION DRAWING STANDARDS

A. Title sheet

1. Showing:

- Sheet index

- Project title
- Vicinity map
- Engineer's certification
- Project benchmark information
- Basis of bearings
- General project boundary and layout map

2. Include Utility and City signature block:

   - Required City Signatures: City Engineer, Public Works Director, Building and Zoning Administrator, Public Safety Officer, Parks and Recreation Director.
   - Required Utility Signatures: Gas, Power, Phone, Postmaster, Cable, Others if applicable (i.e. Ivins Irrigation Co., Interlynx Fiber Optics, St. George City, Santa Clara City, WCWCD).

B. Construction Notes Sheet

C. Erosion Control Plan and Details

1. Showing:

   - Management practices to be employed
   - Temporary and permanent facilities to be installed to control soil erosion and prevent sedimentation impacts to adjacent properties and public facilities during and after construction.

D. Grading Plan and Cross Sections

1. Minimum scale is 1"=50'

2. Showing:

   - Relationship of street to curb, gutter, and sidewalk
   - Top of curb elevations at lot lines and curb returns
   - Curve data for curb returns
   - Existing and proposed contour topography (maximum 2' contour interval)
   - Slopes
   - Building pad elevations
   - Cross sections
   - Top of wall and bottom of wall elevations on retaining walls
   - Drainage flow arrows

E. Utility Plans

1. Shows the size, type, and location of the following:

   - Culinary water laterals, mains, meters, valves, and fire hydrants

- Secondary and irrigation water laterals, mains, valves, etc.
- Sanitary sewer pipes, manholes, cleanouts, and laterals
- Storm drain pipes, inlets, catch basins, manholes, headwalls, subdrains, and outfalls
- Power, natural gas, and cable television
- Street lights including conduit, pullboxes, and appurtenances.
- Any other utility the City may require.

2. Sewers and storm drains must have a profile drawing showing depths of pipes, slopes, lengths, and clearances at all pipe crossings. This may be combined with the street profile.

3. Shows all existing utilities

F. Street and Project Entrance Lighting Plan

G. Street Plan and Profiles

1. Minimum scale is 1"=50'

2. Shows all of the following:

- Existing profile of centerline and at both right-of-ways and labeled accordingly
- All existing elevations
- All existing conditions and structures
- Stationing
- Top back of curb elevations
- Centerline elevations
- Curve data
- Typical cross section for all street sizes and variations
- Pavement and Base thickness design per Geotechnical Evaluation (include in typical cross section).
- Benchmark location and elevation
- Street names
- Tapers
- Traffic control devices such as signage and striping. (May use separate sheet for traffic plans)

H. Landscaping Plan

1. Includes a Planting Plan (plant list).

2. Includes an Irrigation System Plan

- Show location, size, and material for all valves, controllers, and trunklines.

I. Detail Sheets (as needed)

1. Do not include standard details in the detail sheets that can be referenced directly on plan sheets.

~~1.5.4.~~1.6.4. APPROVAL PROCESS

A. First Submittal of Construction Plans:

1. Submit Construction Drawing Checklist (IC Form 7033), as included in Appendix K of these documents.
2. Submit construction cost estimate. (Appendix C)
3. Submit 3 sets of construction drawings, copies or original
4. Must be stamped by a professional engineer.
5. The approximate review period for the first submittal is 14 to 21 calendar days.
6. Upon review, one set of marked up construction drawings will be returned identifying the required changes for approval.

B. Subsequent Submittals of Construction Plans:

1. Submit markup copy of construction drawings from previous submittal.
2. Submit one original set of revised construction drawings with all utility signatures and stamped and signed by professional engineer.
3. City intends to keep the original set in its files. If the owner/developer or engineer wants to have a set of originals, additional originals may be provided.
4. Submit updated construction cost estimate, if necessary. (See Appendix C)
5. The approximate review period for the subsequent submittals is 7 to 14 calendar days.
6. Upon review, if all marked changes were corrected in the submittal, the original set of construction drawings will be returned with all necessary city signatures.

C. Final Submittal of Approved Construction Plans:

1. Submit original signed and stamped set of construction drawings.
2. Submit 2 additional copies of construction drawings.
3. Submit electronic copies of construction drawings and any final approved plats in AutoCAD format and in a scanned PDF format.

~~1.5.5.~~1.6.5. DESIGN REVISIONS

A. The approved drawings may be amended on or after the effective date to provide for additions, deletions and revisions in the work thereof.

B. All amendments, supplements, changes and directives require approval of the City Engineer or its Authorized Representative.

C. Process for Drawing Revisions

1. Submit revised drawings using clouds to highlight revised areas and referenced to a revision block that provides brief descriptions.

2. Drawing revisions must be stamped and signed by professional engineer.

   - If not the same professional engineer in the original sheet, provide a written consent from the original engineer for the revision, or a reasonable justification for not being able to provide the consent.

3. Include location in the revision block for City Engineer and Public Works Director to initial for approval.

4. Submit 4 review copies with at least one original for City files.

5. If approved, City will return one copy and keep 3 copies including the one original, or if not approved, a markup copy will be returned.

6. If deemed necessary, it may be required to receive consent from any affected utilities prior to approval of a revision.

7. No work on revision shall be allowed until approval of drawing.

D. Process for Field Revisions

1. No field revisions shall be allowed without the consent of the City Engineer or its authorized representative.

2. No field revision shall be allowed without the consent of the professional engineer that stamped the plans.

3. Any field revision that has the potential to impact more than three segments of a utility or more than an acre of area shall be required to submit a revised drawing unless otherwise approved by the City Engineer.

4. Field revisions shall be noted on the plans held by the City Engineer, the City Inspector and the Contractor.

~~1.5.6.~~1.6.6. EXPIRATION OF CONSTRUCTION DRAWING APPROVAL

A. Approval of construction drawings shall expire one year after approval by the city if no construction work has begun on the development.

B. Construction drawings shall also expire if construction of improvements is stopped during the construction for one year, unless an extension is granted by the city council prior to the expiration date or is included in the development agreement.

~~1.5.7.~~1.6.7. DRAWING OF RECORD REQUIREMENTS

A. Drawing of Record required to be submitted prior to request for final inspection.

B. Developer shall submit record drawing for all utilities and other improvements required.

C. Developer shall provide 3 sets of the drawing of record for review by city staff.

D. Upon approval of submitted record drawing, developer shall provide:

1. One corrected set of record drawings
2. Electronic version as a scanned pdf or tif version.
3. Electronic version as an AutoCAD file.
4. Text file of survey points collected for production of record drawing using State Plane NAD83 (Utah South) coordinate system.

E. Drawing of Record shall be prepared by a licensed surveyor or professional engineer and shall be stamped and signed.

F. Shall include the following:

1. Actual surveyed locations of the sewer mains and manholes (tied to acceptable positions) with their depths, grades, sizes and types. Also, the distance from the closest property line of each lot or parcel to the sewer lateral service shall be shown.
2. Actual surveyed locations with ties to all valves for the culinary water, secondary water and irrigation company water shall be shown. An approximation of the water mains, with their sizes and the type of water main, shall also be shown.
3. Actual surveyed location of the storm drain and sub-drain manholes, catch basins, inlet boxes and pipes with their depths, grades, sizes and types.
4. Actual surveyed location of above ground dry utility appurtenances and approximation of buried dry utility lines.
5. Benchmarks (at least 2) established and shown on the drawing of record that shall be located on or near the development.

6. The drawing of record shall reflect all field changes or any aspect of the original construction plans.

7. An elevation shall be established at the ends of all new curb and gutter, waterways and sidewalks, which are stubbed at the ends of the development.

8. Actual surveyed building pad elevations shall be shown and shall not vary from the construction plans by more than 0.5 feet

9. Detailed landscaping plans for landscape areas to be maintained by the City

10. Actual surveyed top and bottom elevations of walls adjacent to city streets at least every 100 feet with elevation of nearest curb.

G. Drawing of record must be approved prior to final acceptance and start of warranty period.

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1.7. SECURITIES AND BONDING

A. All site development construction and subdivision projects require bonding in accordance with Ivins City Code Title 15 Subdivision Regulations, Part 8 Bonding Requirement For Improvement Guarantee.

B. Restoration Bond

1. Protects the City from unfinished improvements that may create safety hazards or nuisance and debris problems.

2. Must be posted with cash.

3. Required bonding amount is $1,000 per disturbed acre with a minimum total bond of $2,500.

4. Bond shall be held for the duration of the project and is released when the project is complete and ready to start the warranty period.

C. Improvement Bond

1. Allows a developer conduct development activity or to record the final plat prior to completing all the required landscaping and infrastructure improvements.

2. Must be posted with cash, irrevocable letter of credit, or cash escrow held by an approved third party.

3. The improvement bond is calculated as 110% of the estimated the cost all items of the required improvement. This amount shall be the lesser of an estimate approved by the City Engineer or by submitting legitimate bids by the contractor's hired to complete the work.

4. An item must be installed and tested and then inspected by the City to be considered as completed.

5. When an improvement bond is being posted for a project that is partially completed. The bond is calculated as 100% cost of remaining items of the required improvements plus the surplus of 10% of the entire project cost estimate.

6. When the improvement bond is in place and as items become completed a developer may periodically request the partial releases of the bond. The bond will reduce the bond dollar for dollar of the approved cost estimate of the item.

7. Once a project is 95% complete, no further partial releases shall be made. Instead the remaining improvement bond will be held until the project is 100% completed and meets all the requirements for final acceptance, upon which time the City will release the improvement bond.

8. At the start of the warranty period, the remaining improvement bond may be converted into a warranty bond, with the City releasing any excess of the 10% required bonding.

D. Warranty Bond

1. Protects the City from defective improvements installed with a development during the warranty period.

2. Must be posted with cash, irrevocable letter of credit, or cash escrow held by an approved third party.

3. The warranty period is one year as defined by Ivins City Code Section 15.05.704.

4. The amount of the warranty bond is 10% of the lesser of the City engineer's approved estimate or the applicant's reasonable proven cost of completion.

5. The warranty bond shall be posted prior to the City giving a final acceptance of all improvements.

6. At the end of the warranty period, usually one year, the developer shall request the city staff to make a warranty period inspection of all improvements. If the city engineer verifies that the improvements are acceptable, the warranty bond shall be released.

E. Forfeiture of Bonding

1. Bonding is intended to guarantee that the improvements are made and to protect the City and future buyers being sold a lot or home without these improvements.

2. Restoration bonds and improvement bonds may be considered forfeited to the City if the site development has no construction activity for more than 90 days or the site development permit has been expired by a period of more than 30 days.

3. Warranty bonds may be considered forfeited to the City if the developer has been notified of a known defect for at least 30 days and has not repaired the item.

4. The City will notify the developer that posted the bond by certified mail of its intent to claim the bond. The developer will have 30 days to respond to the City's claim.

5. The City may use the forfeited funds to complete required improvements, make repairs, demolish unsafe structures, fill in unsafe excavations, stabilize the site from erosion, or any other activities that may be necessary to meet the purpose of the bond guarantee. The City may use the funds to reimburse the City for the staff time or contractors used in handling the event.

~~1.6.~~1.8. COORDINATION

~~1.6.1.~~1.8.1. COORDINATION WITH JOINT UTILITY COMMITTEE

A. The Joint Utility Committee is comprised of Ivins City and all private utilities that provide services including Questar Gas, Rocky Mountain Power, Qwest Communications (phone), Baja Broadband (cable), and Santa Clara Branch USPS Postmaster.

B. Depending on location of site, other utilities may be invited to participate such as Interlinx (fiber optic), St. George Water (Water Transmission), Santa Clara City (Water Transmission), Washington County Water Conservancy District (Water Transmission).

C. The Joint Utility Committee regularly meets on the 2nd Wednesday of each month at 9 A.M. unless otherwise rescheduled.

D. The purpose of the committee is to provide a tool for the City and utilities to communicate and coordinate regarding upcoming construction projects.

E. The committee is also useful for a developer and its engineer to coordinate with each utility as a whole rather than individually.

F. Developer projects are not required to submit to the Joint Utility Committee, however, it is recommended.

G. All utilities involved in a project, including Post Master and Address Coordinator, must submit a letter of approval to the City, or sign off on the construction drawings, for the design of their own utility. The letter will address how the utility will be installed and when.

H. Utility approval does not grant a right to proceed with construction.

~~1.6.2.~~1.8.2. PRIOR TO STARTING CONSTRUCTION

A. All work completed in the right of way shall use a qualified contractor.

1. Contractor shall be licensed in accordance with state laws.

2. When Ivins City is unfamiliar with a contractor, the contractor may be required to submit information regarding past experience with contact information of references from other municipalities for whom the contractor has completed public works type projects.

3. The City may refuse a contractor from public works construction for any of the following reasons from the past 5 years:

- Failure to pay suppliers or subcontractors on previous work.
- Poor communication.
- Threatening or intimidating communications.
- Willful and deceptive efforts to perform defective or substandard work.
- Defective or substandard work on previous projects.

- Unethical acts.

4. Any contractor banned from public works construction in any local municipality within Washington County shall not be allowed to perform any public works construction in Ivins.

5. Contractor shall have proper insurance.

   - Liability: $1 million per person, $2 million per event
   - Workers Compensation Insurance

B. Construction Permit Required (See Section 1.2.2)

C. Preconstruction Meeting

1. Required on all development or public works construction projects.

2. Verify:

   - Construction Permit Issued
   - Storm Water Pollution Prevention Plan is approved and UPDES NOI has been issued.
   - Other necessary permits have been obtained.
   - When applicable, developer agreements are signed and executed.
   - When applicable, final plat application is approved.
   - When applicable, restoration bond has been posted.

3. Attendance is required by contractor project manager and site supervisor(s), design engineer, geotechnical engineer, surveyor, significant subcontractors, significant suppliers, Public Works Director, City Engineer, City Inspector unless otherwise approved.

4. Discuss:

   - Site supervisors and 24-hour contacts
   - Coordination
   - Schedule
   - Required Submittals – Review form in Appendix B
   - Geotechnical issues
   - Survey Issues
   - Inspection
   - Specifications & Standards

~~1.6.3.~~1.8.3. SUBMITTALS

A. As required in Standard Specifications. Appendix B is a summary list of all submittals required.

B. Submit prior to manufacture, delivery, or installation unless otherwise indicated in the specifications.

C. Material suppliers may submit general product submittals for approval for all work in the City.

1. Submit to office of City Engineer.

2. Such submittals shall expire at the end of the calendar year.

~~1.6.4.~~1.8.4. INSPECTIONS AND TESTING

A. All work and materials must be inspected to insure that they comply with all related requirements and standards.

B. No materials or work of a required improvement shall be installed and buried or otherwise covered without inspection by the City.

C. Requests for inspection shall be the responsibility of the Developer and Contractor and must be submitted at least twenty four (24) hours in advance of the work; however, the work shall be available for inspection at all times.

D. All testing and reporting shall be the sole responsibility of the Developer and Contractor; however, the City can require additional testing if it is deemed necessary.

E. The minimum required testing is as listed in Appendix A.

F. All tests shall be performed by an independent testing firm and the test results shall become the property of the City.

G. All test results must be submitted to the City in a timely manner. Any failed test shall be immediately reported to the City.

H. The City shall be notified of the appointed time for testing at least 4 hours prior to any testing and shall have authority to direct the testing technician in selecting locations and materials for testing.

I. A Final Grading Report shall contain:

1. an organized copy of all tests performed (with pertinent identifying information),

2. and a map of test locations.

J. The final grading report shall be submitted to the City by the testing firm prior to conditional acceptance of the improvements by the City.

K. The City shall halt all work that has not been inspected or tested or for which test results have not been submitted.

L. Any work for which testing is required, but for which the testing was not performed, shall be subject to a 150% cash penalty (non-refundable and based on the cost to repair, remove and/or replace the work) or the work must be removed and replaced by the Contractor and properly tested.

M. The Contractor shall be responsible to insure that each portion of the work requiring testing complies fully with the standards.

N. Any item of work that fails its test must be brought into compliance by an acceptable method and retested by the same firm that performed the original test, or it will be assessed a cash penalty commensurate with the potential seriousness of failure and the degree of non-compliance.

O. Any deviations from the standards must be approved in writing by the City Engineer or Public Works Director.

P. The City shall have the right to halt construction for any violation or non-compliance with any provisions of this or other related ordinances, resolutions or policies established by the Local, State or Federal Governments.

Q. Any work for which inspection is required, but for which the inspection was not ordered and done as stated above, shall be subject to a 150% cash penalty (non-refundable and based on the cost to repair, remove and/or replace the work) or the work must be removed and replaced by the Contractor and properly inspected.

~~1.6.5.~~1.8.5. EXISTING UTILITIES

A. The contractor shall be responsible to physically locate all existing utilities which may be affected by construction activities.

B. Any existing utilities that must be raised, lowered, or relocated to accommodate the development, shall be done at the expense of the contractor and developer.

C. No interruption in existing service shall occur before affected residents are notified.

D. Notification shall be given no less than 24 hours, and no more than 72 hours in advance of a scheduled disruption in service.

~~1.6.6.~~1.8.6. FINAL INSPECTION PRIOR TO CONDITIONAL ACCEPTANCE

A. After all construction work is complete, the Developer shall request a "Construction Completion Inspection" (final inspection).

B. The initial submittals of the drawing of record and the final grading report shall be delivered prior to any final inspection.

C. Upon receipt of the request the City shall schedule the final inspection with the appropriate parties. Any missing, faulty or defective work shall be detailed in the City's inspection report or punchlist.

D. All faulty and defective work shall be corrected within 30 days from the date of the City's inspection report.

E. It is the responsibility of the Developer/Contractor to contact the City when all punchlist items are complete.

F. Conditional acceptance of the project will not be granted and the guarantee period will not commence until all faulty work has been corrected.

~~1.6.7.~~1.8.7. CONSTRUCTION CLOSEOUT

A. The following items shall be provided prior to starting the warranty period.

1. All required improvements have been installed.
2. All punchlist items have been corrected.
3. Final inspection and conditional acceptance has been provided by the City Public Works department.
4. The final grading report has been submitted, reviewed and approved by the City.
5. The record drawings has been submitted (including all electronic documents), reviewed and approved by the City.
6. All disturbed areas are permanently stabilized and Notice of termination (NOT) for the UPDES construction stormwater discharge permit is filed with the State of Utah, Division of Water Quality. The contractor must provide appropriate evidence to the City.

~~1.6.8.~~1.8.8. WARRANTY PERIOD

A. ~~Due to the commonality in Ivins of expansive and collapsible soils, and in some areas high groundwater, the warranty period shall be 2 years for all site construction projects~~The warranty period shall be 1 year for all site construction projects.

1. The Developer shall warrant and guarantee that the improvements provided for hereunder, and every part thereof, will remain in good condition
2. The Developer agrees to make all repairs to and maintain the improvements and every part thereof in good condition during the time with no cost to the City.
3. The Developer shall post a cash bond or other approved security for an amount equal to ~~25~~ 10 percent of the cost of the improvements to be warranted. A City Contractor shall have bonding in place to cover the warranty period.

- Improvements to be warranted include but are not limited to streets, curbs, gutters, sidewalks, public utilities, private utilities, landscaping, privacy walls,

and other accessories such as to include all improvements that were required as part of the development.

- The warranty bond shall not be calculated based from the cost of site grading, building structures, and private parking lots.

~~B. If the developer/engineer submits in writing with an opinion from a geotechnical engineer that the site is free from expansive and collapsible soils, high groundwater, or other similar geologic hazards, the City may reduce the warranty period to 1 year.~~

~~C.~~B. The determination for necessity of replacement, repairs and/or maintenance of the work rests with the City Engineer, Public Works Director or its authorized representative.

~~D.~~C. It is further agreed and understood that the determination for necessity of repairs and maintenance of the work rests with the City Engineer or Public Works Director. Their decision upon the matter shall be final and binding upon the Developer, and the guarantee hereby stipulated shall extend to and include, but shall not be limited to, the entire street base, and all pipes, joints, valves, backfill, hydrants, and compaction, as well as the working surface, curbs, gutters, sidewalks, and other accessories that are, or may be affected by the construction operations.

~~1.6.9.~~1.8.9. FINAL ACCEPTANCE AFTER WARRANTY

A. Prior to the end of the guarantee period, a final walk through will be conducted. The Owner and the Contractor should contact the City's Representative to schedule the walk through. All work found to be defective shall be corrected within 30 days. This is preparatory to final acceptance by the City.

B. If, on the basis of Owner's and Contractor's request that work be given final acceptance and City's Representative is satisfied that the work has been satisfactorily completed and after a final walk through has taken place, the City's Representative will give written notice to Owner that the work is acceptable and the guarantee period will end. Otherwise, City's Representative will indicate in writing to Owner the reasons for refusing to recommend final acceptance, in which case Owner shall make the necessary corrections and resubmit request for final acceptance approval.

PART 2

ENGINEERING AND DESIGN STANDARDS

2.0. INTRODUCTION

This section defines the engineering and design requirements within Ivins City. These requirements should be used along with professional judgment to serve as a guide to establish consistency in design. In no instance shall any plan deviate from these standards without the approval of the City Engineer on a case by case basis.

This part addresses the following areas of engineering and design:

2.1 Surveying
2.2 Geotechnical Engineering
2.3 Storm ~~Water~~ Drainage Design
2.4 Grading
2.5 ~~Erosion Control~~Storm Water Pollution Prevention
2.6 Street Design
2.7 Traffic
2.8 Sanitary Sewer Design
2.9 Water System Design
2.10 Lighting
2.11 Utility Layout
2.12 Other Design Considerations

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2.1. SURVEYING

All surveying of property lines and construction surveying for the locating of construction improvements shall be conducted by a professional licensed surveyor.

2.1.1. HORIZONTAL CONTROL

A. Ivins City maintains all of its data in the North American Datum of 1983 (NAD83) Utah South Zone State Plane (U.S. Feet) coordinate system, also known as the Grid System. All construction data should be provided to Ivins in this coordinate system.

B. Appendix G provides the Ivins City Control Record of Survey showing a network of principal monuments through Ivins City with coordinate data in the NAD83 grid system as well as coordinate data for a local Ivins City Ground System.

C. It is strongly recommended that surveyors and engineers use this Grid System for base mapping on all projects. Surveyors and engineers may use ground distances propagated from the nearest state plane coordinate for the development of construction drawings, if doing so would not create an error greater than 0.1 feet. Prior to developing the construction drawings, the licensed surveyor should submit a request in writing identifying the maximum horizontal error.

D. Property plats and legal descriptions should use ground distances in accordance with standard practice, however, grid coordinates should be provided for all platted monuments and all principal corners of the subdivision boundary. There should be at least four principal corners in a subdivision plat and possibly more for uniquely shaped subdivisions with the intent of providing state plane data to define the major extents of the subdivision.

2.1.2. VERTICAL CONTROL

A. All vertical data should be in accordance with the North American Vertical Datum of 1988 (NAVD 88). Surveyors shall not develop a local vertical datum.

B. Ivins City has 2 foot interval contours accurate to a scale of 1" = 100' developed from aerial photography taken on January 22, 2006 in an electronic format available for use on development for a nominal handling fee.

2.1.3. SURVEY MONUMENTS

A. Monument classifications shall be as follows:

Class I –When within pavements use ring and lid per APWA Plan No. 274. Outside of paved roadways may use monument cap and base per APWA Std. Plan No. 272.

Class II – Rebar and aluminum cap stamped with PLS number driven flush to pavement surface.

Class III – Regular 8 inch spike or railroad spike with washer stamped with PLS number driven flush to pavement surface.

B. Monuments shall be set at:

1. All angle points in survey boundary (Class II).
2. All angle points of tangency and points of curvature on and along survey boundary (Class II).
3. All street centerline intersections Class I).
4. At a P.I. outside of right-of-way (Class II).
5. If the P.I. falls outside the limits of pavement, then P.C.'s and P.T.'s shall be monumented with Class I.
6. If the P.I. falls inside the pavement area, then a Class I monument is required and no monumentation required for P.C.'s and P.T.'s.
7. All intersections of street centerlines at survey boundary (Class II).
8. Six hundred foot intervals, unless otherwise approved. If line of sight is not obtainable within a six hundred foot interval, then monuments will be required to be closer together unless otherwise approved by the City.

C. All the above established points which fall within the limits of public or private rights-of-way shall be referenced with four permanently established reference points within a radius of twenty (20) feet to one hundred (100) feet all of which shall be outside the pavement area. The angle from tie to tie shall be as near ninety degrees as possible, radiating from the established intersection points.

D. A copy of the survey notes documenting the setting of the reference ties shall be kept by the responsible surveyor and a copy shall be delivered to the office of the City Engineer and the County Surveyor's depository.

E. When a section corner, quarter corner or sixteenth corner falls within a fully improved roadway and must be set, or reset, the responsible surveyor shall contact the County and City Engineer for directions and/or requirements.

F. All monuments shall have brass marker or aluminum cap in accordance with the standard drawings. The surveyor's registration or license number shall be stamped on the cap.

G. Monuments must be set prior to the final acceptance of the improvements.

H. Where hard rock or other physical obstructions are encountered, monument length sufficient to resist removal may vary within reasonable limits.

I. All monuments shall be set in such a manner that the accuracy of their relative positions is not less than second-order Class II, in accordance with the specifications established by the U.S. Federal Geodetic Control Committee. When monuments are being reset, the initial

order used in the setting shall be used, but in no event shall it be less than second-order Class II.

2.1.4. EASEMENTS

A. All plats shall show the existing and proposed easements. When easements are to be provided without a plat map, an easement agreement, legal description and exhibit map shall be provided to the City.

~~A.~~B. All commercial site developments and subdivisions shall provide utility easements of 7.5-foot width on sides and rear lot lines and 10-foot width on front yard lot lines.

2.1.5. PLATS

A. **Subdivisions:** All subdivision plats shall be in accordance with the City's subdivision ordinance.

B. **Right-Of-Way Dedication:** All roadways to be dedicated shall have a plat prepared in accordance with the standards for subdivision plats as defined in the City's subdivision ordinance.

C. **Road Abandonment:** Road abandonment plats shall meet the requirements of Ivins City Form 7045 Petition to vacate a public street or right-of-way.

2.1.6. CONSTRUCTION SURVEYING

All public improvements shall be installed based on construction survey stakes provided by a Utah Professional Licensed Surveyor.

A. GPS surveying equipment shall not be used to establish the grades for gutters, sewers, storm drains, or waterlines with slopes less than 2%.

B. Survey stakes for the construction of streets shall be installed at an interval no greater than 100 feet.

C. Fire hydrants shall not be installed without verifying the finished grade at the exact location of the hydrant to prevent improperly depressed or elevated hydrants.

D. All curb returns shall be installed based on a radius point provided by the surveyor.

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2.2. GEOTECHNICAL

All projects require a geotechnical investigation of the soils. All soil reports must be submitted to Ivins City for review and concurrence.

2.2.1. MINIMUM LEVEL OF INVESTIGATION

A. Subdivisions and Site Developments:

1. Minimum required extent and depth of exploration shall be in accordance Ivins City Form 7039 Geotechnical Report Check List as provided for reference in appendix E.

2. This form shall be submitted with any geotechnical report (at preliminary plan for subdivisions, prior to submittal of construction drawings for site developments).

3. Subdivisions and Site Developments must also comply with minimum requirements for new construction of streets where applicable.

B. For New Construction or Reconstruction of Arterial and Major Collector Streets:

1. For new construction and reconstruction projects, the minimum sampling requirements are as follows:

   - Excavate test holes to a minimum depth of 5 feet below subgrade.
   - 3 test holes for the 1,000 feet and 1 for every 700 feet thereafter, or as soil type varies.

2. Calculate "R" values using AASHTO T 190-93 or ASTM D2844-69 (1975) using exudation pressure of 300 PSI (2070 Kpa) corrected to 2.50 inches (63.50 mm) specimen. Calculate "CBR" values using AASHTO T 193-93 three point using T 180 (Method D) for mold compaction with exceptions as listed in 5.1.1 through 5.1.3 of Test Method T193-93. Minimum testing frequency is:

   - 2 tests with at least 1 test per significant soil type for roadway lengths up to 1,000 feet.
   - 3 tests with at least 1 test per significant soil type for roadway lengths of 1,000 feet to 5,000 feet.
   - 4 tests with at least 1 test per significant soil type for roadway lengths of 5,000 feet to 16,000 feet.
   - 2 tests per 5,000 feet of roadway with at least 1 per significant soil type for any roadway over 16,000 feet.

3. Conduct sieve analysis using either AASHTO T27-91 or ASTM C136-95. Conduct a sand equivalent test to determine the presence or absence of plastic fine material using either AASHTO T176-86(1993) 4.3.2 alternate method No. 2, pre-wet 4.3.3

mechanical shaker or ASTM D2419-91 9.4.2 Procedure B, 11.6.1 mechanical shaker. Minimum testing frequency is:

- 1 test for each stratum.

4. Calculate density in place using the drive-cylinder method ASTM D2937-83 or nuclear method ASTM D2922-93. Minimum testing frequency is:

   - 2 tests per test hole.

5. Expansion index of soils shall be determined using the Standard 60 pound swell test method per Section 1802.3.3 of the Southern Nevada Amendments to the 2006 International Building Code.

   - This test shall be conducted whenever potentially expansive soils are encountered in a test hole.

6. The above testing and design requirements may be waived by the City's Representative providing a prior development has already performed the above testing, design and construction on the first half of the roadway in the same location. In this case the new development shall be equal to or greater than the existing roadway section.

2.2.2. PAVEMENT DESIGN

A. Pavement designs are based on traffic indices. The following table shows what traffic index should be used for each road functional classifications for the design of pavements. Also shown are minimum asphalt concrete (AC) thicknesses.

Table 2.2.2 Traffic Index Requirements

Road Functional Classification	Projected ADT	Traffic Index	Minimum AC Thickness (inches)	Minimum Base Thickness (inches)
Residential	10 to 1,250	5	2.5	6
Residential Collector	1,260 to 2,000	5	3.0	6
Minor Collector	1,260 to 2,000	5.5	3.0	6
Major Collector	2,010 to 6,000	6	~~3.0~~3.5	8
Minor Arterial	6,000 to 20,000	7	4.0	8
Major Arterial	20,000 to 40,000	8	5.0~~4.0~~	8
Local Commercial		10	~~4.0~~5.0	8
Local Industrial		10	~~4.0~~5.0	8

B. Pavement must be designed structurally by accepted Engineering design methods for flexible pavement (i.e. AASHTO, UDOT, CALTRANS).

2.2.3. ROAD SUBGRADES

The geotechnical engineer shall identify each type of soil involved in the project and recommend subgrade preparations in accordance with geotechnical best practices. Geotech shall classify soils in accordance with AASHTO T-27, determine "R" value or "CBR" value for each soil type and subgrade preparation requirements shall be as a minimum:

A. Class A-1, A-2, A-3 or A-4 Soils: The subgrade shall be scarified to a depth of 8 inches, moisture conditioned and compacted.

B. Class A-5 Soils: The subgrade shall be over-excavated a minimum of 8 inches, replaced with a Class B aggregate (Section 32 11 23). Additional geotechnical recommendations may apply.

C. Class A-6 or A-7 Soils: The subgrade shall be specifically considered for over-excavated~~ed~~tion and reconditioned~~ed~~ing in accordance with the geotechnical recommendations.

AASHTO Soil Classification System Chart from AASHTO M 145 or ASTM D3282 is provided for reference:

Table 2.2.3 AASHTO Soil Classification System Chart

General Classification	Granular Materials (35% or less passing the 0.075 mm sieve)							Silt-Clay Materials (>35% passing the 0.075 mm sieve)			
Group Classification	A-1		A-3	A-2				A-4	A-5	A-6	A-7
	A-1-a	A-1-b		A-2-4	A-2-5	A-2-6	A-2-7				A-7-5 A-7-6
Sieve Analysis, % passing											
2.00 mm (No. 10)	50 max	...	...	...	...	...	...	...	...	...	...
0.425 (No. 40)	30 max	50 max	51 min	...	...	...	...	...	...	...	...
0.075 (No. 200)	15 max	25 max	10 max	35 max	35 max	35 max	35 max	36 min	36 min	36 min	36 min
Characteristics of fraction passing 0.425 mm (No. 40)											
Liquid Limit	...		...	40 max	41 min	40 max	41 min	40 max	41 min	40 max	41 min[(1)]
Plasticity Index	6 max		N.P.	10 max	10 max	11 min	11 min	10 max	10 max	11 min	11 min
Usual types of significant constituent materials	stone fragments, gravel and sand		fine sand	silty or clayey gravel and sand				silty soils		clayey soils	
General rating as a subgrade	excellent to good							fair to poor			

Note (1): Plasticity index of A-7-5 subgroup is equal to or less than the LL - 30. Plasticity index of A-7-6 subgroup is greater than LL - 30

2.2.4. UTILITY TRENCH BACKFILL MATERIAL

A. The geotechnical engineer shall classify materials for suitability of trench backfill material as follows:

Class I: Crushed Stone
Class II: Gravelly Sand (GW, GP, SW, SP, GW-GC, SP-SM, Non plastic SM*)
Class III: Sandy Silt (GM, GC, SM, SC)
Class IV: Inorganic clays (ML, CL, MH, CH)
Class V: Organic soils (OL, OH, PT)

Based on ASTM D2321 with a modification as noted with asterisk(*). Refer to Construction Specification Section 33 05 20 Backfilling Trenches as modified by Ivins City.

2.2.5. COLLAPSIBLE SOILS

A. Collapsible soils are common in Ivins City and design of pavements and structural foundations shall consider this serious soil hazard. All public streets and utilities constructed over collapsible soils shall employ mitigation techniques as recommended by the geotechnical engineer to ensure stable streets and utilities.

2.2.6. EXPANSIVE SOILS

A. Expansive soils are common in Ivins City and design of pavements and structural foundations shall consider this serious soil hazard.

B. All public streets and utilities constructed over expansive soils shall employ mitigation techniques as recommended by the geotechnical engineer to ensure stable streets and utilities.

2.2.7. GROUNDWATER

A. Shallow groundwater shall be considered as a potential problem in all areas where any of the following conditions exist:

1. Historic seepage of groundwater to the surface is evident by the presence of alkali salts on the ground surface.

2. Test pits or borings show any groundwater within 5 feet of the ground surface. Areas where soils are clayey shall install temporary piezometers to verify the absence of shallow groundwater.

3. The area has similar soils adjacent to an area with evident surface alkali salts.

B. Anywhere groundwater is considered a potential problem, a groundwater investigation shall be conducted prior to any subdivision or site development construction drawing approval. The groundwater investigation shall at a minimum:

1. Describe the risk of shallow groundwaters to surface.

2. Install a sufficient number of groundwater monitoring wells.

3. Determine an approximate contour map of the groundwater surface. Show the direction of flow.

4. Identify potential sources of the groundwater.

5. Determine the following chemical properties of the groundwater:

   - pH
   - Total dissolved solids
   - Sulfates
   - Hardness
   - Selenium

6. Determine measures to mitigate/prevent groundwater from surfacing within areas to be developed with any habitable structure or paved streets, sidewalks, curbs and gutters.

C. It is recommended that, prior to a groundwater investigation, the firm conducting the study submit a scope of work for City concurrence. If firm fails to submit scope, the City may

require additional monitoring prior to approval of the study. Monitoring of the wells may be required for up to 1 year.

D. If a groundwater analysis is conducted, the drains to mitigate surface groundwater may be as designed by a professional geotechnical engineer and in accordance with a groundwater analysis. Basements may be considered as recommended by the geotechnical engineer.

E. No groundwater drainage system shall affect downstream private properties without written permission.

F. All groundwater drains shall discharge to an approved drainage facility in a location as approved by the City Engineer.

2.2.8. SUITABILITY OF SITE TO LOW IMPACT DEVELOPMENT

A. All new development sites shall be considered for low impact development (LID) strategies in accordance with the City's MS4 UPDES storm water discharge permit mandated by State and Federal laws. LID strategies, according to the permit, must evaporate, evapotranspire or infiltrate all the storm water runoff for 90 percent of all storm events. The State has developed *A Guide to Low Impact Development* available at http://deq.utah.gov/division-water-quality .

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2.3. STORM DRAINAGE~~WATER~~ DESIGN

2.3.1. GENERAL

All subdivisions and site developments shall be designed to accommodate rainfall in systems separate and independent from the sanitary sewer system. A flood control system shall be designed and approved as part of the construction plans. Flood water may be conveyed in approved drainage facilities which is defined to mean storm drain pipes, major washes, designated floodway easements, or dedicated city streets. Minor washes may also be considered approved drainage facilities if the discharge of storm water from a developed area does not exceed what the natural flow of the wash was prior to any development or if a dedicated drainage easement or its equivalent for the wash is provided.

2.3.2. STORM SYSTEM SIZING CRITERIA

The following criteria are used in determining and designing flood conveyance:

A. Storm water runoff from the 10-year storm will be conveyed by approved drainage facilities such that all collectors and arterials shall maintain at least two 12-foot drivable lanes. All residential streets shall maintain at least one 12-foot drivable lane. ~~When~~ Where underground piping systems are provided, (all new developments shall include underground drainage facilities) all waters from the 10-year flood shall be contained within the system and not include over-ground flows as a portion of the capacity.

B. The 100-year storm will be conveyed within the limits of the street right-of-way or easements. All arterial streets must have a minimum 12-foot lane of travel in each direction.

C. Culverts and bridges should be sized as follows:

1. Arterial Streets – convey the 100-year flood.
2. Collectors – convey the 25-year flood.
3. All other streets – convey the 10-year flood.

D. Any exceptions must be approved by the City Engineer.

2.3.3. PRECIPITATION

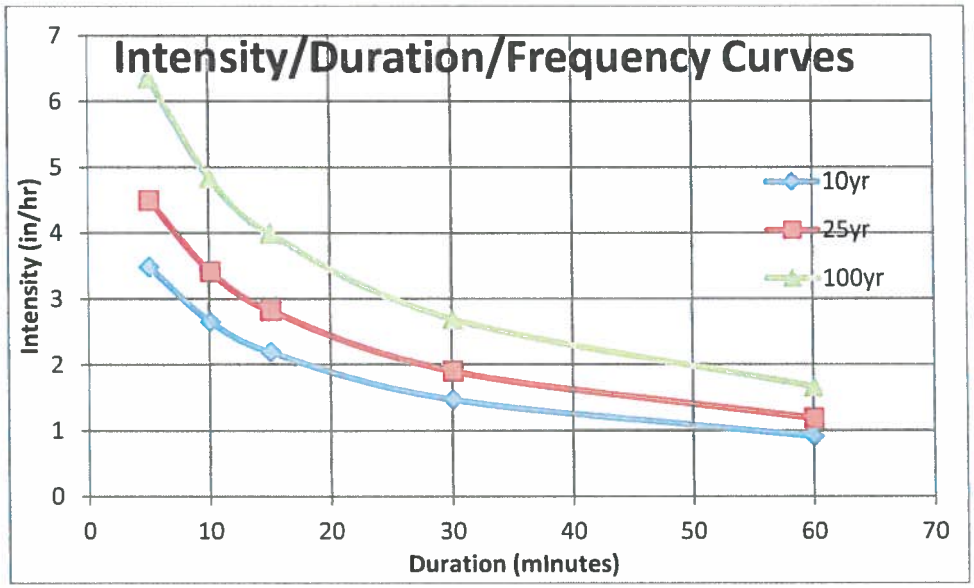
A. All drainage studies shall use rainfall data published by the National Oceanic and Atmospheric Administration (NOAA) in the *NOAA Atlas 14, Precipitation – Frequency Atlas of the Western United States, Volume 1, Version 4.0* or any modifications of such data by NOAA.

B. The Ivins City Storm Drain Capital Facilities Plan uses this data as listed for latitude 27.17 North, longitude 113.68 West, elevation 3162 feet, extracted from the NOAA Precipitation Frequency Data Server located at the following Internet web site:

http://hdsc.nws.noaa.gov/hdsc/pfds/sa/ut_pfds.html

Table 2.3.3 Point Precipitation Estimates from NOAA Atlas 14
for Ivins City
Utah 37.17N 113.68W 3162 feet

Precipitation Intensity Estimates (in/hr)										
ARI (years)	5 min	10 min	15 min	30 min	60 min	120 min	3 hr	6 hr	12 hr	24 hr
2	2.06	1.57	1.30	0.88	0.54	0.32	0.24	0.15	0.09	0.05
10	3.48	2.65	2.19	1.47	0.91	0.52	0.37	0.22	0.13	0.08
25	4.49	3.41	2.82	1.9	1.18	0.65	0.46	0.27	0.16	0.09
100	6.35	4.83	3.99	2.69	1.66	0.9	0.61	0.36	0.2	0.11
Precipitation Frequency Estimates (inches)										
2	0.17	0.26	0.33	0.44	0.54	0.64	0.71	0.89	1.08	1.27
10	0.29	0.44	0.55	0.74	0.91	1.04	1.11	1.32	1.56	1.92
25	0.37	0.57	0.71	0.95	1.18	1.30	1.38	1.62	1.92	2.16
100	0.53	0.81	1.00	1.35	1.66	1.80	1.83	2.16	2.40	2.64



C. Drainage studies should use these rainfall data unless there is sufficient justification otherwise.

2.3.4. STORM RUNOFF CALCULATIONS

A. The following storm distributions/methods are recommended for use:

1. Rational Method - recommended for small sites (less than 5 acres) and sizing individual inlets. Engineer may apply the 0.5 factor to the rational equation as recommended by the Clark County Hydrologic Criteria and Drainage Design Manual (1999, p611).

2. Farmer-Fletcher 3-hour Storm Distribution

3. SCS Type II compressed to a 6-hour Distribution

4. SCS Type II 24-hour Storm Distribution

B. The rational method may be used with hand calculations, however, if the Farmer Fletcher or SCS Type II distribution is used then a computer application must be used applying either the SCS TR-55, SCS Unit Hydrograph or Kinematic Wave method. All computer input and output data should be provided in the drainage report.

C. If a detention basin is being recommended, a storm distribution modeled through a computer application must be applied and a 3-hour, 6-hour and 24-hour storm shall all be considered.

D. Time of Concentration (tc) may be calculated as per methods recommended by the Clark County Hydrologic Criteria and Drainage Design Manual or any method approved by St. George City. The value should be comparative to the tc values calculated in the Storm Drain Capital Facilities Plan.

E. When using SCS curve numbers, if the proposed conditions have a curve number that is lower or nearly equal to the existing conditions then it may be necessary to calculate the runoff solely from the estimated proposed connected impervious areas.

~~E.~~F. SCS curve number for existing sites shall match the City Storm Drain Master Plan. The model shall also include the estimated percent impervious of all connected impervious areas without changing the curve number.

~~F.~~G. In a development where a fence or wall that would interrupt surface drainage is allowed but not installed with the development improvements, drainage must be designed for both scenarios of the fencing existing and not existing~~as if such fencing were existing.~~.

2.3.5. HYDRAULIC ANALYSIS

A. Any system with two or more inlets must be designed using hydraulic analysis software.

B. The EGL and HGL must be determined throughout the reaches of the pipe and must be shown on the construction drawings.

2.3.6. STREETS

A. Streets may be used as the primary storm drainage system in many subdivisions and site developments. Streets must be shown to adequately handle the variety of storms per the storm system sizing criteria given above.

B. All subdivisions and site development should indicate the carrying capacity of the street using the Manning's equation.

C. Highback curbs (versus modified curbs) may be required in locations where streets are on a grade 2% or steeper with a curvilinear shape.

2.3.7. MANHOLES

A. Manholes shall be provided for maintenance purposes at a maximum horizontal distance of 500 feet.

B. Cleanouts are not allowed in lieu of manholes.

C. Required at all changes in pipe size, horizontal alignment, or vertical alignment.

2.3.8. DROP INLETS

A. Combination curb opening/grate inlet type shall generally be used in any urban street unless otherwise approved.

B. A drop inlet shall be used to collect storm water in lieu of a cross gutter whenever located within 300 feet of an underground storm drainage system.

C. Inlets must be considered with 50% blockage.

D. Engineer shall verify inlet capacity following methodology in the Clark County Hydrologic Criteria and Drainage Design Manual (1999, p818)

~~D.~~E. All new development shall drain to a drop inlet with no streets having more than 400 feet of drainage without an inlet. Exceptions may be made when the connecting system is more than 880 feet away and overland flow will not impinge on minimum drivable lane widths per Section 2.3.2.

2.3.9. STORM DRAIN PIPELINES

A. Located within a dedicated right-of-way, drainage easement or equivalent.

~~A.~~B. Storm drain pipelines shall always be extended to the far upstream side of the development to facilitate adjacent future developments. It may be necessary to extend the storm drain in more than one location depending on the natural anticipated course of drainage.

~~B.~~C. Pipelines shall be designed to convey entire flood as per sizing criteria given above with no surface flooding following any inlets.

~~C.~~D. Minimum pipe diameter is 12 inches when slopes are 1.5% or greater, 15 inches when slopes are less than 1.5%.

~~D.~~E. Minimum pipe cover is 12-inches. If less than 24-inches must use reinforced concrete pipe with Class I backfill only. Less than 12-inches cover may be allowed with concrete encasement.

~~E.~~F. Pipelines must be installed straight between manholes/inlets. Curvilinear pipes may be considered if pipe is running parallel to a curvilinear road.

~~F.~~G. Approved pipe materials:

Table 2.3.8 Approved Storm Drain Pipe Materials

Type	Ref Std.	Common Brand Name*	Design Manning's n	Pipe Stiffness (psi)	Min Burial Depth (ft)	Max Burial Depth (ft)	Backfill Material Class	Allowed Pipe Diameters (in)	Notes
Reinforced Concrete	ASTM C76		0.013	Rigid	1	30**	I, II, III, IV	12" to 96"	
Non Reinforced Concrete	ASTM C14		0.013	Rigid	2	17**	I, II, III, IV	12" to 30"	
Corrugated HDPE	AASHTO M-252 & M294	ADS N-12	0.013	50 to 42	2	10**	I,II	12" & 15"	Larger diameters may be allowable with flowable fill in the pipe zone.
Double Wall Corrugated Polypropylene	ASTM F2736 & F2764	ADS N-12 HP	0.013	75 to 46	2	17**	I,II	12" to 30"	Larger diameters may be allowable with flowable fill in the pipe zone.
Triple Wall Corrugated Polypropylene	ASTM F2764	ADS Sanitite HP	0.013	46	2	17**	I,II	36"-60"	
Corrugated PVC	ASTM F949 & F794	Contech A-2000	0.013	46	2	17**	I,II	12" to 30"	Larger diameters may be allowable with flowable fill in the pipe zone.
Solid Wall PVC SDR35	ASTM D3034 & F679	Green Sewer Pipe	0.013	46	2	17**	I,II	4" to 30"	

*provided for reference only, other equal brands may be used upon approval.
** Greater depths may be allowed with prior written approval by City Engineer.

2.3.10. CULVERTS

A. The minimum culvert size is 18 inches in diameter.

B. The engineer shall consider a blockage factor of 50 percent for all culverts conveying storm drainage from undeveloped areas ~~as determined by the City~~. If area is developed and debris risk is considered to be less, the blockage factor shall be reduced to 25 percent.

C. Trash racks shall be used where the City determines that there is a high risk of severe blockages.

2.3.11. HEADWALLS

A. For any culvert entrance or exit a head wall and ~~concrete~~ armored apron shall be required to control erosion. Scour analysis calculations on exits may be required to determine the required length of the downstream apron.

B. Headwall shall be reinforced concrete if culvert pipe material is any type of plastic.

C. Stacked rock with an ~~concrete~~ armored apron may be used for concrete pipe culverts.

D. A railing ~~may~~shall be required ~~if the City~~when sidewalk or trail is within 5 feet of headwall and dropoff is 24 inches or more ~~determines there is a risk to pedestrians or bicyclists.~~.

2.3.12. BRIDGES

A. A minimum of 2 feet of freeboard shall be provided.

B. Local and regional scour analysis are required on the structure, upstream and downstream and embankments. All potential scour will be mitigated.

2.3.13. OPEN CHANNELS

A. Located within a dedicated right-of-way, drainage easement or equivalent.

B. Convey the 100-year flood event with a minimum freeboard of 1 foot.

C. Line with rock or other similar erosion control if velocities are expected to exceed 2 feet per second.

D. No side-slopes steeper than 2H:1V.

2.3.14. DETENTION/RETENTION

A. Required when:

1. Downstream conveyance facilities are considered to be at full capacity or the increased discharge would contribute to increasing the size of a flood plain mapped by FEMA.

2. Discharging to private property without a drainage easement unless discharge does not exceed that which existed prior to development, nor does it concentrate.

~~2.~~3. Necessary to control erosion/sediments from sites that are expected to generate more erosion than natural conditions.

B. Minimum of 1 foot freeboard.

C. Maximum ~~of 4H:1V~~ side-slope:

1. Unarmored: 4H:1V.

2. Armored with 3 to 6 inch rock: 3H:1V.

3. Armored with 6 to 9 inch rock: 1.5H:1V

~~1.~~4. When steeper slopes needed use retaining walls.

~~C.~~D. Provide monitoring and maintenance plan.

~~D.~~E. Provide vehicular access.

~~E. Provide emergency spillway sized with the assumption that outlet is closed in 10-year event or 50% clogged in 100-year event.~~

F. All detention facilities shall be landscaped.

G. No reduction of size shall be made for evaporation or infiltration.

H. Maximum depth~~ of 3 feet unless otherwise approved.~~:

1. 3 feet when side slopes are steeper than 5H:1V measured from spillway elevation to the bottom of side slope.

2. Pond may be deeper in the middle as long as the slope is not greater than 5% sloping away from the side slope for at least 8 feet.

~~1.~~3. Deeper detention basins may be approved with fencing that meets pool fencing requirements.

I. Outlet Structure shall include the following:

1. Main outlet shall be a grated drop inlet with an orifice plate covering the discharge piping.

2. Orifice plate~~Outlet~~ shall have a minimum discharge area of 6 square inches.

3. A secondary outlet shall be provided which will consist of a drop inlet with the grating set at 3-inches below the spillway elevation. It shall connect into the discharge piping bypassing the orifice plate.

~~2.~~4. Provide emergency spillway sized with the assumption that main outlet is 100% clogged and the secondary outlet is 50% clogged in 10-year event and 100-year event.

~~H.~~J. Retention basins:

1. Only allowed in extreme situations with written approval by City.

2. Percolation test must show that the capability of draining within 48 hours of storm event.

3. When located within 25 feet of adjacent property or structure, must be certified by geotechnical engineer to have no impact on the foundation stability strength of the soil underlying the adjacent property or structure.

4. Provide detailed maintenance plan.

K. Landscaping: all detention/retention basins must be landscaped as follows:

1. A 4-foot wide flat landscape area (not steeper than 5%) shall extend around the perimeter of the basin should be conceal the basin with shrubs, bushes and trees except where access to clean the basin is to be provided.

2. The slopes of the basin shall also include plantings to aid concealment of the basin. On steeper slopes, retaining walls are expected to be needed to provide for the irrigation trough around the planting.

~~4.~~3. The bottom sediment storage area of the basin shall not be planted and left bare dirt. The maintenance of the area shall include removal of noxious weeds but allow native plants when seemingly appropriate.

2.3.15. OFFSITE DRAINAGE IMPROVEMENTS

A. Any development that impacts offsite drainage facilities may be required to upsize or otherwise upgrade said facilities as determined necessary by the drainage study.

2.3.16. FLOOD PLAINS

A. Any development occurring within a flood plan shall comply with the City's Flood Damage Prevention ordinance located in Ivins City Code, Title 7, Chapter 11.

~~2.3.17. POST CONSTRUCTION POLLUTION PREVENTION~~

~~2.3.18. Storm water treatment for oil and grease are required on all sites with more than 6 parking spaces.~~

~~2.3.19. Provide a maintenance plan for the storm water treatment facility.~~

~~Erosion/sediment basins are required on developed sites that have the potential to produce more erosion than the natural desert environment as determined by the City.~~

~~2.3.20.~~2.3.17. DRAINAGE REPORTS

A. A preliminary drainage report shall be provided at preliminary plan for subdivisions.

B. A final drainage report shall be provided prior to any review of construction drawings for a subdivision or site development.

C. The drainage report shall contain all the information as provided in the drainage report checklist attached to these specifications in Appendix H. All reports shall be submitted with this checklist attached.

~~2.3.21.~~2.3.18. PRIVATE DRAINAGE SYSTEMS

A. Private systems not maintained by Ivins City must meet these above requirements except as follows:

1. Approved pipe and inlet materials do not apply.
2. Smaller pipe sizes may be used for systems draining roofs, landscape areas, or any area that is not considered common area nor used for public access and parking.
3. Cleanouts may be used in lieu of manholes.

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2.4. GRADING

All grading of site developments and subdivisions shall comply with the grading requirements of this section, Zoning Ordinance (16.11.134), Subdivision Ordinance (15.05.102), and Appendix J of the International Building Code (IBC) which has been adopted to be applicable to Ivins City.

2.4.1. STREETS

A. Streets should be designed to match natural grade as much as practical within design requirements. Any fills greater than 1 foot, measured at the street centerline, except for the crossing of washes and significant depressions may be determined by the City Engineer to be excessive.

B. When the design centerline of new streets exceed 2% grade, the streets shall be tabled across intersections at a grade that does not exceed 2% for the consideration of ADA compliant crosswalks.

2.4.2. CUTS/FILLS

A. Any cut or fill greater than 4 feet within 10 feet of a property line is generally prohibited without the approval of the adjacent property owner.

B. Filling in a drainage may be acceptable if the drainage report shows the drainage is no longer necessary.

C. Imported fills shall meet requirements of the geotechnical report.

D. Fills over the top of existing slopes steeper than 5H:1V shall be benched in accordance with IBC Appendix J.

2.4.3. SLOPES

A. Maximum slope of an embankment is 2H:1V except as allowed by the IBC Appendix J.

B. Cut and fill slopes shall be set back from the property lines in accordance with IBC Appendix J.

2.4.4. SUBDIVISION LOTS

A. If the pad elevations for two adjacent 11,000 square foot or smaller lots vary more than two feet, a retaining wall shall be required.

B. It is recommended that subdivisions with lots greater than 11,000 square feet be left with natural vegetation ungraded.

C. All lots graded flat shall be reseeded or be designed to retain water in a 1.5-inch storm event assuming no infiltration or evaporation during the storm.

1. Methods of retention may be by berming around the edge of the flat portion of the lot or by depressing the center of the lot.

2. Sizing of the berm or depth of depression must consider any sloped areas that drain into the lot. See Ivins Standard Drawing No. G-01Temporary Onsite Drainage Retention Berm for Unimproved Subdivision Lots.

3. The retaining area must have at least 3-inches of freeboard.

4. Water running onto a lot from an adjacent property should be diverted around any area to be left bare without vegetation.

5. Methods of retention/detention shall prevent storm water from crossing property lines.

6. Ivins Standard Drawing No. G-01 Temporary Onsite Drainage Retention Berm for Unimproved Subdivision Lots is provided as an example of an acceptable method of retention/detention to control erosion.

D. In fill areas, ~~P~~pad elevations must be set at no higher than 12-inches above top of curb elevation measured at the center of the lot. Pad may be additionally raised no higher than 12" above the curb elevation at upslope lot line unless otherwise approved by City.

2.5. ~~EROSION CONTROL~~STORM WATER POLLUTION PREVENTION

2.5.1. GENERAL

A. Necessary measures shall be taken to prevent erosion and pollution due to drainage at all points in new developments.

B. During grading and construction, the developer shall control all potential storm runoff so that eroded soil and debris cannot enter any downstream water course or adjoining property.

C. All drainage that leaves a new development shall be adequately addressed to mitigate all erosion on adjacent properties.

D. Erosion mitigation shall be permanent unless otherwise approved.

2.5.2. UPDES PERMIT

A. All new construction that disturbs one acre of land or more shall obtain a UPDES Storm Water General Permit for Construction Activities (Permit #~~UTR300000~~UTRC00000) from the Utah Division of Water Quality before construction begins. See https://deq.utah.gov/Permits/water/updes/stormwatercon.htm

~~A.~~B. The permit requires the operator, typically the contractor, to control and eliminate storm water pollution sources through the development and implementation of a Storm Water Pollution Prevention Plan (SWPPP).

~~B.~~C. The permit also requires inspection of the BMP controls either:

1. At least once every 7 calendar days, or

2. At least once every 14 days and within 24 hours of the end of a storm event of 0.5 inch or greater.

D. Ivins City will conduct monthly storm water inspections ~~(biweekly if considered a priority construction site)~~ to ensure that site operator is complying with the SWPPP. When facilities are not in compliance, followup inspection shall be conducted.

~~C.~~E. Post a sign at a safe, publicly accessible location adjacent to the site identifying UPDES Permit tracking number, operator name, phone number, and email address for obtaining additional project information. Applicant is required to respond to any inquiry within 24-hours.

~~D.~~F. Permit applicants should refer to general permit for details of requirements, however, please note the following summary of minimum erosion and sediment control requirements:

1. Minimize Area of Disturbance

2. Create natural buffers adjacent to surface water.

3. Construct perimeter controls (silt fencing, berming, or equivalents).

4. Construct temporary sediment basins (3600 cubic feet per disturbed acre) or equivalent.

5. Prevent sediment track-out onto streets.

6. Install perimeter controls and sediment controls prior to earth disturbance.

7. Control drainage discharges from stock piles.

8. Minimize dust during the duration of the project.

9. Preserve topsoil in all areas to be revegetated.

~~1.~~10. Protect storm drain inlets that will carry drainage water from project.

2.5.3. SWPPP

A. The Storm Water Pollution Prevention Plan (SWPPP) shall be prepared and submitted to the City for review before the contractor can obtain the UPDES permit.

B. Section ~~3.5~~7 of the UPDES Permit No. ~~UTR300000~~ UTRC00000 describes in detail what shall be included in the SWPPP.

C. The plan shall include, among other things:

1. Possible sources of storm water pollutants

2. Selection of Best Management Practices (BMPs) to reduce or eliminate pollutant impacts.

D. A SWPPP template that addresses all of the information required in the SWPPP can be obtained from the State of Utah Division of Water Quality web site:

https://deq.utah.gov/Permits/water/updes/stormwatercon.htm

2.5.4. PERMITTING PROCESS

A. The Operator prepares a SWPPP in accordance with the UPDES Permit.

B. The Operator Submits SWPPP to City for review.

C. Once the City has reviewed the SWPPP, the operator applies for the UPDES Permit by completing the Notice of Intent (NOI) form. The form can be completed online at: https://secure.utah.gov/stormwater/main.html

D. Construction may commence only after:

1. The SWPPP has been reviewed by the City

2. The NOI has been submitted

3. The Operator has attended a pre-construction meeting with designated City personnel to review and discuss the SWPPP, and

4. All other applicable permits have been obtained from the City.

E. Once construction has been completed and the site stabilized and approved by the City, the contractor shall complete the Notice of Termination (NOT) form and submit to the Division of Water Quality.

2.5.5. POST-CONSTRUCTION POLLUTION PREVENTION

A. Storm water treatment for oil and grease are required on all sites with more than 6 parking spaces.

B. Provide a maintenance plan for the storm water treatment facility.

C. Erosion/sediment basins are required on developed sites that have the potential to produce more erosion than the natural desert environment as determined by the City.

~~C.~~D. Maintenance agreements shall be required for all storm water treatment facilities including sediment collection basins, and low impact development facilities.

2.5.6. LOW IMPACT DEVELOPMENT

A. New developments are encouraged to consider low impact development approaches as a post-construction pollution prevention technique with structural BMPs such as:

1. Infiltration basins

2. Evaporation basins

3. Stormwater harvesting

4. Rain gardens

5. Vegetated swales

B. Any infiltration practices must consider sensitive soil conditions from expansive or collapsible soil properties. Where these soils exist, infiltration basins should be maintained away from buildings and other structures that are sensitive to settling or heaving.

C. Evaporation and infiltration basins must not hold exposed and standing storm water for longer than 72 hours to prevent mosquito hatchings.

D. Beginning March 1, 2020:

1. All new development sites must manage rainfall on-site and prevent the off-site discharge of the precipitation from all rainfall events less than or equal to the 90th

percentile rainfall event which has been determined to be 0.64 inches per rainfall event. This objective must be accomplished by the use of practices that are designed, constructed, and maintained to infiltrate, evapotranspire and/or harvest and reuse rainwater.

2. The State of Utah, Division of Water Quality has developed a Low Impact Development Manual. Engineers/Architects/Designers are encouraged to become familiar with this manual.

3. If meeting this standard is technically infeasible, a rationale shall be provided on a case-by-case basis for the use of alternative design criteria. The project must document and quantify that infiltration, evapotranspiration and rainwater harvesting have been used to the maximum extent technically feasible and that full employment of these control are infeasible due to the site constraints.

2.6. STREET DESIGN

2.6.1. GENERAL DESIGN STANDARDS

A. Streets shall conform to the following design standards:

Table 2.6.1 General Street Design Standards

Road Classification	Right-of-Way Width (ft)	Maximum Grade (%)	Pavement Width (ft)	Minimum Half Street Asphalt Width (ft)	Design Speed (mph) [1]	Centerline Minimum Curvature Radius (ft) [1]	Sidewalk Minimum Width (ft)[4]	Curb Return Radius (ft) [2]
Residential Standard 50'	50	12%[5]	28	26	25	100	5 [3]	20
Residential Alternative 43'	43	12%[5]	28	26	25	100	5 [3]	20
Residential Alternative 38'	38	12%[5]	28	26	25	100	5 [3] (one side)	20
Residential Private Rural	38	12%[5]	26	26	15	70	5 [3]	15
Residential Collector	55	12%[5]	32	26	25	200	5	25
Minor Collector	60	8%	32	26	30	200	5	25
Major Collector	66	8%	42	30	35	400	5	30
Minor Arterial - Center Street	85	8%	60	35	45	700	6	35
Minor Arterial - Western Corridor	90	8%	64	45	45	700	6	35
Major Arterial - Old Highway 91 (3-lanes)	100	8%	50	50	55	1000	6 [or 10' trail]	40

1. Private Residential Roads may use lower design speeds and centerline curve radii.
2. Curb Return Radius shall use the largest street type found at the intersection.
3. See Transportation Master Plan for additional information.
4. Sidewalks in areas of high pedestrian traffic may require greater width.
5. See Ivins City Zoning Ordinance

B. Streets shall be designed to provide adequate stopping and sight distance, degree of curve, and superelevation in accordance to standard engineering practice.

C. Subdivisions and other developments shall be designed to provide future access to adjoining vacant parcels

1. Developments shall also be designed so that existing stub streets in existing developments will be connected to the proposed streets and accesses.

2. Where a stub street is provided which accesses more than 2 lots on each side, a temporary turnaround and public use easement at least 80 feet in diameter shall be provided.

3. The city may require improvements to be installed in temporary turnaround areas.

D. Streets in subdivisions, excluding collector streets, exceeding 80 feet in length are encouraged to be curvilinear or provide sufficient alignment variation to calm traffic and enhance aesthetic appeal in the subdivision.

E. Cul-de-sac streets may not exceed 600 feet in length as measured from the center of the intersection of a connecting through street to the center of the turnaround area.

1. The maximum length of a cul-de-sac street may not be extended by additional turnarounds between the intersecting through street and the cul-de-sac.

2. If the distance from the end of a proposed cul-de-sac to a connecting road is less than 1/3rd the length of the proposed cul-de-sac street, connection to the connecting road shall be required if doing so does not violate requirements of the Ivins City transportation master plan, does not disturb or eliminate any unique geographical feature, and does not prevent full development of approved densities.

2.6.2. CROSS SECTIONS

A. Cross-sections are as approved by the Transportation Master Plan which are attached to this document in Appendix H for reference.

B. All asphalt edges for half street sections shall abut concrete or a 2-foot aggregate base shoulder.

2.6.3. ROAD NETWORKS

A. All streets in a development shall conform to the Ivins City Transportation Master Plan.

B. Curvilinear streets are encouraged to reduce, or eliminate long straight stretches of residential roadways.

C. Streets and accesses to streets should be completed in accordance with the access management standards provided in the Transportation Master Plan.

2.6.4. TECHNICAL DESIGN REQUIREMENTS

A. Street grades:

1. All street grades shall have a maximum grade as shown in Table 2.6.1.

2. A request to increase the maximum street grades shown in Table 2.6.1 may be considered upon submittal of a request and information justifying such a request to the City Engineer. Request for approval must be based upon and in accordance with

the latest edition of AASHTO's "A Policy on Geometric Design of Highways and Streets" guidelines. Any approvals for increased grades must be consistent with access requirements of fire apparatus as defined by the Fire Department. The City Engineer's decision will be final. Cost of construction will not be justification for approval.

B. Intersections:

1. Street intersections shall be as near to 90 degrees as possible.
2. Up to 15 degree skew angle may be allowed on a case by case basis if no other reasonable option exists.
3. Street intersection centerline offsets shall be not less than 150 feet.
4. Intersections should be sloped at an angle no greater than 2 percent to accommodate pedestrian crossings. It may be necessary to "table" an intersection in new construction areas.
5. Proper combination of horizontal and vertical alignment should be obtained by engineering study and consideration of the general guidelines listed in AASHTO (Section Titled: Combination of Horizontal and Vertical Alignment, 1990 edition).
6. Intersections should not be located on the interior of, or near, sharp curves. Intersections should be located a sufficient distance from all curves to provide proper sight distance for vehicles on the intersecting road or driveway and on the through road.
7. New intersections with more than four "legs" are generally not permitted.
8. When designing local road networks, "T" and "L" intersections are desired. Four-leg intersections on local road networks are generally discouraged. A development must obtain approval from City Engineer prior to design of the road network.
9. When designing local road networks, block lengths without an intervening connector street shall not exceed eight hundred feet (800') in length unless previous approval has been obtained from the City Engineer. Cul-de-sacs are not considered an intervening connecting street.
10. Accesses must be in accordance with the Access Management as provided in Section 2.7.1.
11. The intersection of two local roads should be designed to operate with minimal traffic control devices. For example, do not design an intersection to operate with a four-way stop or signal control.
12. Direct access will not be allowed for parking, loading or driveway areas that require backing maneuvers onto major collector or higher order streets. This requirement

shall apply to commercial and industrial use regardless of the order or classification of street.

13. Residential and commercial developments are generally required to provide at least two improved accesses to the development depending upon the forecasted traffic volumes and number of homes and lots.

2.6.5. CURB SIDE MAILBOXES

A. All roadside mail boxes should be installed in accordance with applicable postal standards in the following locations:

1. In areas where the sidewalk is next to the curb, install boxes behind the sidewalk so as to not encroach into the sidewalk;

2. In areas where a planter strip is provided, mail boxes may be installed within the strip, provided no part extends into the sidewalk or beyond the back of the curb;

3. In rural areas where no barrier curb is installed, a minimum clear zone of 10 feet from the traveled way should be provided.

B. All mailboxes shall be handicap accessible.

2.6.6. SIGNS AND PAVEMENT MARKINGS

A. All street name and traffic control signs and pavement markings required on the street system within a development or as a result of the development, shall be installed at the developer's expense in accordance with the standard drawings and MUTCD standards.

B. A signing plan should be submitted with the engineering drawings, however, additional signing and traffic control may be added to the project as determined by the City's Representative.

2.6.7. PAVEMENT

A. All streets, public or private, shall be surfaced to grade, with asphalt concrete pavement, to the required minimum width and thickness in accordance with these specifications.

B. All streets require a fog seal coat to be installed no sooner than 6 months after completion yet prior to release of the warranty bond.

2.6.8. CURB AND GUTTER

A. All public or private streets shall use curb and gutter of the type shown in standard cross-sections unless otherwise approved by the City Engineer.

B. No curb shall be cut for the installation of a driveway without the installation of a concrete apron in accordance with standard details.

2.6.9. TRANSITIONS/TAPERS

A. All streets shall transition with tapers set at a ratio of no less than 12:1.

B. The transition taper area may be installed as a temporary asphalt section with no less than 2 inches of asphalt over 6 inches of roadbase.

2.6.10. CROSS-GUTTERS

A. No cross gutters shall be allowed across major collector or major and minor arterial streets.

B. On commercial and industrial streets, cross gutters are generally not allowed and require approval by the City Engineer for their use.

C. The City Engineer may prohibit construction of cross gutters on any street deemed necessary.

2.6.11. SIDEWALKS

A. Widths shall be in accordance with Table 2.6.1.

B. A maximum grade of 5%, or 2% greater than the existing/proposed street grade, whichever is less, shall be required as measured along the running length of a meandering sidewalk.

~~C.~~A. ~~If the existing/proposed street grade is greater than 5%, then a meandering sidewalk shall not be permitted.~~

~~D.~~C. Whenever any sidewalk connects with any trails, paths and/or other sidewalks that are larger or smaller in width, a transitional area will be required for design and safety standards.

~~E.~~A. ~~Sidewalk and bike paths shall be meandering on streets 66 feet wide or wider.~~

~~F. Meandering sidewalks shall be carefully laid out on the construction plans as follows:~~

~~1. Distance between inflection points of meander shall be typically spaced 200 to 300 feet. For 10 paths, increase distance to 400 to 00 feet.~~

~~2. In no case shall the distance be less than 100 feet unless necessary to avoid an obstacle as approved by the City.~~

~~3. Meander should not curve at a radius less than 200 feet unless nessessary~~necessary to ~~avoid an obstacle as approved by City.~~

~~G. Additional easements may be required for the placement of serpentine sidewalks along the rights of way.~~

D. All pedestrian accesses shall conform to ADA standards.

~~H.~~E. Comply with standards for wandering sidewalks and trails given below.

2.6.12. CONCRETE COLOR

A. If the developer chooses to color required curb, gutter, and sidewalks, the color shall be either Davis 160-Sunset Rose, or Davis 641-Yosemite Brown.

2.6.13. PLANTER STRIPS

A. Must be landscaped with at least 50%, by area of matured plant, of live vegetation.

B. Shall not be filled with any impervious material.

C. Shall be sloped at a minimum of 2% and a maximum of 12%.

2.6.14. ASPHALT TRAILS /PATHS

A. Shared use trails shall be installed in accordance with the Transportation Master Plan.

B. Provide a 10-foot wide trail with 2.5-inches of asphalt over 4-inches of roadbase.

C. ~~Meandering~~ Comply with standards for wandering sidewalks and trails given below~~trails should comply with the meandering requirements of sidewalks~~.

2.6.15. WANDERING SIDEWALKS AND TRAILS

A. Wandering sidewalks and trails shall be pleasant, smoothly transitioned, seemingly random, and create view corridors down the trail or sidewalk that appear as a partial tall thin "S" with vegetation on both sides.

~~If the existing/proposed street grade is greater than 5%, then a meandering sidewalk shall not be permitted.~~

B. Sidewalk and bike paths shall be ~~meandering~~wandering on streets 66 feet wide or wider.~~:~~

C. Additional easements may be required for the placement of wandering sidewalks and trails along the rights-of-way.

D. Construction drawings shall carefully consider the location of the wandering sidewalk and trail and shall be staked in the field in accordance with approved drawings prior to any subgrade preparation, roadbase and concrete/asphalt installation.

E. The typical lineal distances between the maximum and minimum wander points is 200 to 400 feet for sidewalks and 400 to 800 feet for trails.

F. The wandering sidewalk and trail shall never be closer than 3 feet from the back of the curb or drainage ditch or privacy wall.

~~C.~~G. Some exceptions may be made if necessary to tie into a handicap accessible ramp or to avoid an object that cannot be reasonably moved as approved by the City.

2.7. TRAFFIC

2.7.1. ACCESS MANAGEMENT

A. Corner Spacing

1. Access distance from corners is as given in the following table:

Table 2.7.1 Access Distance from Corner According to Facility Type.

Facility Type	Public Street Spacing	Required Sight Distance	Minimum Driveway Spacing	
			Same Side Upstream, Downstream, & Opposing Upstream	Opposing Downstream
Major Arterial	1320'	500'	250'	150'
Minor Arterial	660'	500'	200'	150'
Major Collector	660'	400'	175'	150'
Minor Collector	250'	400'	150'	125'
Residential Collector	250'	300'	100'	75'
Residential Standard	150'	300'	50'	50'

Notes:
1. All access is determined by City and distances shown may be adjusted on a case-by-case basis if warranted by specific traffic conditions.
2. Measurement of public streets spacing shall be from centerline of right-of-way to centerline of right-of-way.
3. Measurement of driveway spacing shall be from centerline of proposed access to corner/edge of nearest driveway or road.
4. When two or more accesses serve the same multi-family/commercial development, distance between shall be at least 300 feet on Arterials and Major Collectors and 200 feet for all other roads.
5. When non-residential driveways cannot be separated with the spacing shown above they should be combined into a shared access with necessary access easements and agreements.

2. Access to corner lots should be from the lesser-classified road at the greatest distance possible from the intersection, and should not be less than the distances shown in the table above.

3. Accesses should be aligned directly with existing access on opposite side of parcel.

4. Where it is not feasible to align driveways, major driveways on opposite side of the street should not be offset less than 150 feet.

5. Where commercial lots are not large enough to allow access on opposite sides of the street to be aligned, the center of driveways not in alignment should be offset a minimum of 250 feet on all collector streets, and 300 feet on all major and arterial streets.

6. Greater distances may be required if needed for left-turn storage lanes.

7. Where two or more accesses serve the same or adjacent non-single family residential development, the minimum distance between the centerlines of accesses should be at

least 200 feet on streets with design speeds below 30 mph and 300 feet on streets with design speeds above 30 mph.

8. If adjacent driveways cannot be separated by the distances outlined, they should be combined into a single joint access.

9. At least 300 feet of clear sight distance shall be provided for drivers entering or leaving all accesses onto local streets; 400 feet for collector streets; and 500 feet for arterial streets.

B. Number of accesses per parcel:

1. Accesses may be limited to one per commercial or multifamily residential development.

2. Additional accesses may be approved by the City upon completion of a circulation plan or Traffic Impact Study provided to the City indicating that more than one access is required to adequately handle the developments traffic volumes and further indicating that the additional access will not be detrimental to traffic flow on the adjacent street network or to meet emergency access requirements.

3. Number of accesses shall not exceed two for frontage of 300 feet or less, three for 300 to 600 feet of frontage and a maximum of three accesses for frontage greater than 600 feet, as approved by the City.

4. Where multiple parcels are consolidated, accesses shall also be consolidated according to City design and spacing standards.

5. Temporary access may be granted to undeveloped property prior to completion of a final development plan if access is needed for construction or preliminary site access. Temporary accesses are subject to removal, relocation, or redesign after final development plan approval.

6. Shared access between adjacent parcels shall be required where possible.

C. Single Family Residential Access:

1. New single family residential developments and subdivisions shall not have driveway access on arterials and major collectors.

2. Minor subdivisions or "flag lots" are discouraged along arterials and major collectors.

3. Accesses for these minor subdivisions are under the same criteria for design and spacing listed in the table above.

4. When two or more accesses serve adjacent single-family residential property, the minimum distance between the nearest points of the two accesses shall be at least 12 feet.

5. For corner residential lots, one access on each frontage may be permitted if it is determined by the City that two driveways are needed to provide safe access for traffic entering and leaving the lot because of site distance and geometric design considerations.

6. Double frontage residential lots will only have one access onto the lesser classified roadway unless approved by the City.

7. Circular driveways are considered one access.

8. If a lot has a circular driveway then only a maximum of one more additional access may be granted.

9. Single-family residential driveways shall have a maximum curb cut of 40 feet.

10. Circular driveways should have a maximum curb cut of 20 feet per side.

D. Right-turn Deceleration lanes:

1. Minimum requirements for installation of a right-turn lane on a rural two-lane road that is 40 mph or less is 50 vehicles per hour (vph).

2. Minimum requirements for installation of a right-turn deceleration lane on a rural two-lane road that is ~~For~~ greater than 40 mph~~, right-turn traffic of~~ is 25 ~~vph or more would require a right-turn deceleration lane.~~vehicles per hour (vph).

3. Taper lengths and storage lengths of these lanes shall comply with AASHTO's Policy on Geometric Design of Highways and Streets.

E. Based upon safety and operational studies, median treatments such as Two-Way-Left-Turn Lanes (TWLTL) and Raised non-Transferable medians may be required on major collector and arterial streets, as determined by the City and the Transportation Master Plan.

F. New access locations created by development shall be unified whenever possible to create the fewest number of access points onto arterials or major collectors. Joint use agreements shall be required where necessary.

2.7.2. TRAFFIC IMPACT STUDIES

A. Development conditions which trigger Traffic Impact Study (TIS) requirement:

1. TIS is required if development will generate new peak hour trips (as determined by the latest edition of ITE *Trip Generation* Manual) during the morning, afternoon, or Saturday peak hour as follows:

Category	Peak Hour Trips Generated by Development
I	100 to 500
II	500 to 1,000
III	More than 1,000

2. Category I TIS may also be required by the City for any specific traffic problems or concerns such as:

   - Proposed or existing offset intersections.
   - Situation with a high number of traffic accidents.
   - Driveway conflicts with adjacent developments.
   - Nearby intersections that have reached their capacity.
   - Proposed property rezones when there is a significant potential increase in traffic volumes.
   - When the original TIS is more than two years old, or where the proposed traffic volumes in the original TIS increase by more than twenty percent.

B. Scope of each TIS category is as follows:

	TIS Period Evaluations					Scope of Study				
Category	Opening Year of Development	Year of Completion of Each Phase	Completion of Development	Five Years after the development's completion	10 years after the developments completion	Site Access Drives	Affected Signalized Intersections	Affected major unsignalized street intersections	Signalized Intersections within 1/2 mile	Unsignalized major street intersections within 1/2 mile
I	x		x			x	x	x		
II	x	x	x	x		x	x	x	x	x
III	x	x	x	x	x	x	x	x	x	x

C. Initial TIS determination process:

1. Developer, or their agent, estimates number of trips

2. City provides concurrence or modifies estimate. City makes recommendation on category of TIS.

3. Developer, or their agent, submits a draft table of contents for the TIS, a map of intersections to be analyzed, and a draft of the proposed trip distribution for site traffic.

4. City provides concurrence or recommends modifications to the submittal. Upon approval, actual TIS work may begin.

D. Analysis and Approach Methods:

1. TIS must be conducted and prepared under the direction of a Professional Engineer, licensed in the State of Utah.

2. The extent of the study area may be either enlarged or decreased, depending on special conditions as determined by the City.

3. Both the morning and afternoon weekday peak hours should be analyzed, unless the proposed project is expected to generate no trips, or a very low number of trips, during either the morning or evening peak periods. If this is the case, the requirement to analyze one or both of these periods may be waived by the City.

4. Where the peak traffic hour in the study area occurs during a different time period than the normal morning or afternoon peak travel periods (for example mid-day), or occurs on a weekend, or if the proposed project has unusual peaking characteristics, these additional peak hours should also be analyzed.

5. When directed by the City, traffic volumes for the analysis hours should be adjusted for the peak season, in cases where seasonal traffic data is available.

E. All data should be collected in accordance with the latest edition of the ITE Manual of Traffic Engineering Studies:

1. **Turning Movement Counts:** Manual turning movement counts should be obtained for all existing cross-street intersections to be analyzed during the morning, afternoon and Saturday peak periods (as applicable). Turning movement counts may be required during other periods as directed by the City. Turning movement counts may be extrapolated from existing turning movement counts, no more than two years old, with the concurrence of the City.

2. **Daily Traffic Volumes:** The current and projected daily traffic volumes should be presented in the report. If available, daily count data from the local agencies may be extrapolated to a maximum of two years with the concurrence of the City. Where daily count data is not available, mechanical counts will be required at locations agreed upon by the City.

3. **Roadway and Intersection Geometrics:** Roadway geometric information should be obtained. This includes, but is not limited to, roadway width, number of lanes, turning lanes, vertical grade, location of nearby driveways, and lane configuration at intersections.

4. **Traffic Control Devices:** The location and type of traffic controls should be identified at all locations to be analyzed.

F. Trip Generation:

1. The latest edition of ITE's Trip Generation Manual should be used for selecting trip generation rates. Other rates may be used with the approval of the City in cases where Trip Generation does not include trip rates for a specific land use category, or includes only limited data, or where local trip rates have been shown to differ from the ITE rates.

2. Site traffic should be generated for daily, AM, PM and Saturday peak hour periods (as applicable).

3. Adjustments made for "pass-by", "diverted-link" or "mixed-use" traffic volumes shall follow the methodology outlined in the latest edition of the ITE Trip Generation Manual or the ITE Trip Generation Handbook.

4. A "pass-by" traffic volume discount for commercial centers should not exceed twenty-five percent unless approved by the City.

5. A trip generation table should be prepared by phase showing proposed land use, trip rates, and vehicle trips for daily and peak hour periods and appropriate traffic volume adjustments, if applicable.

G. Trip Distribution and Assignment:

1. Projected trips should be distributed and added to the projected non-site traffic on the roadways and intersection under study.

2. The specific assumptions and data sources used in deriving trip distribution and assignment should be documented in the report and reviewed with the City.

3. Future traffic volumes should be estimated using information from transportation models, or applying an annual growth rate to the base-line traffic volumes.

4. The future traffic volumes should be representative of the horizon year for project development.

5. If the annual growth rate method is used, the City must give prior approval to the growth rate used. In addition, any nearby proposed development projects currently under review by the City ("on-line") should be taken into consideration when forecasting future traffic volumes. The increase in traffic from proposed "on-line" projects should be compared to the increase in traffic by applying an annual growth rate.

6. If modeling information is unavailable, the greatest traffic increase from either the "on-line" developments, the application of an annual growth rate or a combination of

an annual growth rate and "on-line" developments, should be used to forecast the future traffic volumes.

7. The site-generated traffic should be assigned to the street network in the study area based on the approved trip distribution percentages. The site traffic should be combined with the forecasted traffic volumes to show the total traffic conditions estimated at development completion.

8. A "figure" should be prepared to represent the site specific traffic impacts to existing conditions: It must show:

    - Daily and peak period turning movement volumes for each traffic study intesection.
    - Existing base-line volumes of the street network.
    - Volumes of the street network with the site generated traffic added.

H. Capacity Analysis

1. Level of service (LOS) shall be computed for signalized and unsignalized intersections in accordance with the latest edition of the Highway Capacity Manual.

2. The intersection LOS should be calculated for each of the following conditions (if applicable):

    - Existing peak hour traffic volumes ("figure" required).
    - Existing peak hour traffic volumes including site-generated traffic ("figure" required).
    - Future traffic volumes not including site traffic ("figure" required).
    - Future traffic volumes including site traffic ("figure" required).
    - LOS results for each traffic volume scenario ("table" required).

3. The LOS table should include LOS results for AM, PM and Saturday peak periods, if applicable.

4. The table shall show LOS conditions with corresponding vehicle delays for signalized intersections, and LOS conditions for the critical movements at unsignalized intersections.

5. For signalized intersections, the LOS conditions and average vehicle delay shall be provided for each approach and the intersection as a whole.

6. The incremental increases in site traffic from each phase, where applicable, should be included in the LOS analysis for each preceding year of development completion.

7. A "figure" will be required for each horizon year of phased development.

I. Traffic Signal and Roundabout Studies

1. An intersection needs study should be conducted for all new proposed roundabouts and/or traffic signals for the base year. If the warrants are not met for the base year, they should be evaluated for each year in the five-year horizon. Traffic signal and roundabout needs studies should be conducted by a method pre-approved by the City.

2. Speed Considerations: Vehicle speed is used to estimate safe stopping and cross corner sight distances. In general, the posted speed limit represents the 85th percentile speed. The design speed of the roadway should be used to calculate safe stopping and cross corner sight distances.

3. Improvement Analysis: The roadways and intersections within the study area should be analyzed, with and without the proposed development to identify any projected impacts in regard to LOS and safety.

4. Where the highway will operate at LOS C or better without the development, the traffic impact of the development on the roadways and intersections within the study area should be mitigated to LOS D for arterial and collector streets and LOS C on all other streets during peak hours of travel. Mitigation to LOS D on other streets may be acceptable with the concurrence of the City.

J. TIS report format shall conform to the format given in Appendix J. Deviations from this format must receive prior approval of the City

2.8. SANITARY SEWER DESIGN

2.8.1. DESIGN FLOWS

A. All sanitary sewers and appurtenances shall be designed to carry the design flows from all contiguous areas which may, within a reasonable period of time, be tributary thereto.

B. Sanitary sewers shall be designed to carry the peak discharge as specified below:

1. Laterals and collector mains: 400 gallons/capita/day

2. Interceptor and outfall mains: 250 gallons/capita/day

C. Other flow rates supported by accepted engineering practice may be submitted for review by City Engineer.

D. Minimum manning's "n" value is 0.012.

2.8.2. MINIMUM SLOPES

A. The following shall be the minimum slopes to be provided, unless approved otherwise by the City:

SEWER PIPE DIAMETER (inches)	MINIMUM SLOPE (%)
4	2.00
6	1.00
8	0.50
10	0.40
12	0.35
15	0.30
18	0.25
21	0.20
24 and greater	0.15

B. Any deviation from these minimum slopes will require a justification with calculations from a licensed engineer showing that a 2 foot per second velocity can be maintained even in a low flow condition.

C. Where design velocities are projected to be greater than 15 feet per second, the sewers and manholes shall be protected against displacement by erosion and impact

2.8.3. MINIMUM SIZE AND DEPTH

A. Minimum pipe diameter for a sewer main is 8 inches.

B. Sanitary sewers shall be designed of sufficient depth to permit sewer laterals from basements to be connected. Exceptions may be granted in subdivisions or areas in which no basements are to be constructed. A note shall be made on the plat to prohibit basements in these areas.

C. Sewer shall be installed at a depth at least 18-inches below bottom of waterline wherever possible.

D. Minimum depth of a sewer main, to top of pipe, will be not less than 36" below subgrade of roadway and a minimum of 30" below any parallel running water main.

2.8.4. ALIGNMENT

A. Provide a uniform slope and alignment between manholes.

B. Provide a distance of at least ten (10) feet horizontally from any existing or proposed water main.

2.8.5. SERVICE CONNECTIONS

A. Only one property owner shall be served by each lateral connected to the public main, except in condominium type buildings.

B. All sewer laterals shall intersect the sewer main on the top third of the sewer main pipe.

C. Offset a minimum of ten (10) feet, measured horizontally, from any culinary water line or tapping.

D. All sewer laterals minimum size is as follows:

TYPE OF UNIT OR RESIDENCE	MINIMUM SEWER LATERAL DIAMETER (inches)
Single Family	4
Townhomes (each unit)	4
Multi-Family Condominiums	4
Mobile Homes	4
Apartments	4
Commercial Establishments	6

E. Lateral size shall be based on the number of fixture units in the residence and slope of lateral. Up to 90 fixture units shall be allowed per each 4 inch lateral set at a 2 percent slope. See International Building Code for larger laterals.

F. Laterals 8 inch diameter and larger shall use manholes for maintenance access in lieu of cleanouts.

G. No roof drains, storm drains, foundations drains, or sub-drains shall be connected to the sanitary sewer system.

2.8.6. MANHOLES

A. Provide at all changes in grade, size, alignment and intersections.

B. Provide at distances no greater than 400 feet apart.

C. City maintenance vehicle accessibility to all manholes is required.

D. Drop manholes shall be provided for a sewer line entering a manhole at an elevation of 18 inches or more above the manhole invert. Drop must be made on exterior of manhole unless otherwise approved by City.

E. Flow lines of straight through-lines (less than 10 degree horizontal bend) shall be graded through the manhole to match the average grade of the incoming and outgoing sewer pipes.

F. Flow lines of junction lines or bend lines greater than 10 degrees shall enter manhole 0.2 feet higher than the outgoing line.

G. When a smaller sewer joins a large one, the invert of the larger sewer should be lowered sufficiently to maintain the same energy gradient.

H. Manholes shall be a minimum 4-foot diameter.

I. Manholes shall be a minimum of 5-foot diameter if any of the following conditions exist:

1. Any sewer line is 12-inches or larger.
2. The junction of two or more inflowing sewerlines.
3. The flowline of the sewer is 12 feet or lower than the rim.
4. Drop manholes.

2.8.7. SEWER MAIN PIPELINES

A. Located within a dedicated right-of-way, sewer easement or equivalent. Sewer easements shall provide at least 20 feet of unobstructed width.

B. Pipelines must be installed straight between manholes/inlets. Curvilinear pipes are not allowed.

C. Approved Pipe Materials:

1. Solid Wall PVC, SDR 35, ASTM D3034

2. Ductile Iron, cement mortar lined

3. Corrugated triple wall polypropolyne

4. Other materials may be approved by the City Engineer on a case by case basis.

2.8.8. UTILTY CLEARANCES

A. Sewers crossing below water mains shall be separated by a minimum vertical distance of 18 inches.

B. Sewers crossing above water mains shall be laid to provide a minimum vertical distance of 18 inches between the outside of the water main and the outside of the sewer. Sewer joints shall be spaced as far as possible from the crossing. (i.e. 10 feet when using 20-foot lengths of pipe)

C. When it is impossible to obtain proper horizontal and vertical separation as stated above, the sewer shall be designed and constructed of ductile iron pipe with mechanical joints for the minimum distance of 10 feet on either side of the point of crossing. Section must be pressure tested.

2.8.9. PUMPING AND FORCE MAINS

A. Generally not allowed except where shown on Ivins City Wastewater Capital Facilities Plan.

B. Pumps and equipment shall be located in an above ground building structure.

C. Pumps must be as manufactured by Gorman Rupp.

D. Other requirements may apply on a case by case basis.

E. Velocity of force main shall be never less than 3 feet per second.

F. Air relief valves may be required to prevent air lock. Air vent shall be filtered to prevent odor with an approved device.

G. No segment of force main shall have zero slope.

H. Force main shall discharge at a manhole and if necessary, provisions shall be made to direct or baffle sewage into the manhole.

I. Force main shall be designed to handle normal pressure, loads and surges. Calculations must be provided.

J. Force mains shall be installed with tracer wire.

K. Odor control equipment using charcoal filters or equivalent as approved by the City shall be installed on any manhole receiving a wastewater discharge from a force main or any other discharge that is expected to have become septic from periods of stagnation in a holding tank.

2.8.10. SUSPENDED CROSSINGS

A. Adequate support shall be provided for all joints.

B. Supports shall be designed to prevent frost heave, overturning and settlement.

C. Precautions to prevent freezing such as insulation or increased slope shall be provided.

D. The bottom of the pipe shall be set no lower than the 100 year flood elevation.

E. Supports shall be designed to allow for future grade adjustments.

2.9. WATER SYSTEM DESIGN

All culinary water mains and appurtenances shall be designed to provide for adequate future service for all contiguous areas which may, within a reasonable period of time, be tributary thereto.

2.9.1. DESIGN FLOW AND PRESSURES

A. Water mains shall be designed to provide a minimum residual pressure of 20 psi under peak day demand conditions, including designed fire flow.

B. A minimum of 40 psi residual pressure must be maintained under peak instantaneous conditions without fire flow.

C. Commercial or industrial areas may require special investigation to determine fire flow requirements.

D. Existing and future static pressure and flow information used in the design must be obtained from or approved by the City Engineer.

2.9.2. FLOW DESIGN CRITERIA

A. Use the following flow design criteria:

	Peak Instant	Peak Day	Avg Annual	Storage Requirement
Indoor Use	Q (gpm) = 10.8 * $ERU^{0.64}$	0.56 gpm per ERU	0.45 AF per ERU	400 gallons per ERU
Irrigation Use	9.8 gpm per irrigated acre	4.9 gpm per irrigated acre	3.26 AF per irrigated acre	4,964 gallons per irrigated acre

B. Minimum fire flow is 1,000 gpm for 2 hours for residential areas with dwellings no larger than 3,600 sq. ft per floor.

C. Fire flow for areas with larger residences and commercial residences should be as per International Building Code.

D. Water usage form (Form 7042) included in Appendix E shall be submitted with preliminary plan on subdivisions and with any application for site development.

2.9.3. HYDRAULIC ANALYSIS

A. A computer network model shall be required for all system expansions in accordance with State of Utah rules.

B. The model must show that the new expansion will not detrimentally impact other areas in the system.

2.9.4. MINIMUM SIZE AND DEPTH

A. The minimum depth of cover for water mains shall be 3 feet below the final grade of the street.

B. Where final grades have not been established, mains shall be installed at least 4 feet deep or greater to insure three feet of cover below the future grade based on the best information available.

C. The minimum size of a water main shall be not less than 4 inches in diameter.

D. The minimum size of a water main , with connecting hydrants, shall be not less than 8 inches in diameter.

E. Hydrant barrels and laterals to hydrants may be 6-inches in diameter.

F. Size of mains must be verified to be sufficient through an engineering analysis to meet the prescribed design flows and pressures.

2.9.5. VALVES

A. Valves shall be spaced and system must be looped such that:

1. No more than 2 fire hydrants will be isolated at any time.
2. No more than 30 services are isolated at any time.
3. A maximum of five valves will be required to isolate any location.

B. Install valves within 20 feet of the end of all temporary dead end lines.

C. Transmission mains may space valves at intervals of 2,500 feet when outside of a pressure zone

D. Gate valves shall be used on 12-inch pipe and smaller.

E. Gate valves or butterfly valves may be used on larger pipe.

F. All distribution mains connecting to larger supply mains shall be valved near the connection.

G. A valve near the main shall be located on all services and hydrant laterals greater than 2-inch in size.

H. Valves shall generally be located in clusters near a tee or cross.

2.9.6. AIR VALVES

A. Air valves are utilized for the release of air in a pipe under pressure, release of air in a non-pressurized pipe (pipeline filling), and the intake of air under vacuum conditions.

B. Release of air is necessary at all high points in the system. Designers and engineers should eliminate local high points when it is possible by lowering the profile of the pipeline.

C. All waterlines should be shown on the street profiles of new construction for identifying and if possible eliminating local high points.

D. Distribution Mains: For pipelines 12-inch in diameter or less, one-inch air release valves are required if a service connection or fire hydrant is not located in the proximity of the local high point. Proximity shall be evaluated such that an air bubble of no more than one quarter of the pipe diameter can form.

E. Transmission Mains: Combination air valves should be installed at local high points and on the downhill side of isolation valves to aid in the draining and filling of the line during maintenance activities.

F. Coordinate a specific design with the City Engineer.

~~2.9.6.~~2.9.7. DEADENDS

A. Dead-end mains shall be avoided wherever possible, and if installed, shall not exceed ~~600~~ 750 feet.

B. Hydrants shall be located at the end of dead-end mains for flushing purposes as well as for fire protection.

C. Dead ends may have a 2-inch flush valve installed in lieu of a fire hydrant, if approved by the City on a case by case basis.

~~2.9.7.~~2.9.8. SERVICE CONNECTIONS AND METERS

A. Service connections are defined as the pipeline connecting the meter to the main water pipeline.

B. Pressure reducing devices shall be installed by the owner on all water connections to buildings on the inside of the building.

C. Service line shall be located in a perpendicular alignment to the curb or edge of the street.

D. Each service meter for single family homes and duplexes shall have a separate ~~tap~~ service connection pipe to the main. On multi-family or similar increased density projects, it may be appropriate to cluster meters. When three or more meters are clustered in an area, the service line may be shared using a meter manifold fitting assembly.

~~A.~~E. Separate parcels including individually owned townhomes with separate parcel numbers shall each have a separate meter. Exception may be made for multistory condominiums on a case by case basis.

~~B.~~ On parcels of land with a single parcel number and multiple primary buildings, ~~Service line shall be located in a perpendicular alignment to the street.~~

F. ~~E~~each building shall each have a separate ~~separate line and~~ meter. Landscape irrigation shall also have a separate meter.

~~C.~~G. Apartment buildings under one owner and never intending to be subdivided may use master metering. Secondary metering is not allowed when master metered.

~~D.~~H. Service line size shall match the meter size unless the service line is longer than 50 feet for which case the service line may be upsized by one pipe size increment. Beyond the meter, the line may be increased only ~~one~~ two pipe size increments. If service line is located in an area known to have normal working pressures less than 45 psi, larger meter sizers and/or service lines may be allowed with engineering calculations providing justification.

~~E.~~I. Services shall be sized as follows:

~~SERVICE LINE SIZE~~	~~MAXIMUM UNITS SERVED~~
~~3/4"~~	~~1~~
~~1"~~	~~5~~
~~1.5"~~	~~12~~
~~2"~~	~~20~~

Water Meter Size	Maximum Allowable GPM	Maximum Fixture Units (when using flush tanks)	Maximum Fixture Units (when using flush valves)
3/4"x5/8"	20	24	7
3/4"	30	53	14
1"	50	129	50
1.5"	100	375	245
2"	160	696	625
3" compound	320	1955	1955
4" compound	500	3728	3728
6" compound	1000	TBD	TBD
8" compound	1600	TBD	TBD

Notes:
- Typical 3-bedroom 2-bathroom residential household is 19 fixture units for indoor only and 24 units for indoor and outdoor.
- Fixture units in accordance with 2015 International Plumbing Code (IPC)
- GPM: Gallons per minute
- TBD: To be determined in an analysis that follows the IPC and stamped by a professional mechanical engineer.

~~2.9.8.~~2.9.9. FIRE HYDRANT SPACING AND LOCATION

A. Generally locate on the same sides of streets throughout a subdivision.

B. Fire hydrants are preferred near intersections.

C. In residential areas, fire hydrant spacing shall be no greater than 500 feet, and no house shall be greater than 250 feet from a hydrant via a street access to the property being served.

D. In industrial, business, or commercial areas, fire hydrant spacing shall not be greater than 350 feet, nor shall any building be greater than 175 feet from a hydrant via public access to the property being served.

E. Generally, hydrants shall be located in line with extensions of the property line when located mid-block.

F. Hydrants shall be placed in the park strip or, if there is no park strip, behind the sidewalk in such a manner than no part of hydrant encroaches on the walkway, and at such a height that lowest water outlet is not less than 18 inches nor more than 30 inches from the final ground elevation.

G. All fire hydrants shall be installed on dedicated easements or public rights-or-way, and will be owned and maintained by the City.

H. Hydrants shall have at least 5 feet clearance on sides and front and 3 feet on rear.

1. If park strip is less than 3 feet, install hydrant behind sidewalk.

2. No closer than 6 feet to a driveway, streetlight, power pole, or any obstruction.

3. No closer than 6 feet to a turning radius.

~~2.9.9.~~2.9.10. CULINARY WATER PIPELINES

A. Located within a dedicated right-of-way, waterline easement or equivalent. Waterline easements shall provide at least 20 feet of unobstructed width.

B. Install in straight segments between bends unless approved by the City.

C. Approved Pipe Materials:

1. Solid Wall PVC, AWWA C-900, Class 200 minimum

2. Ductile Iron, Class 200, cement mortar lined, must be bagged to prevent corrosion.

3. Solid wall HDPE, submit calculations for wall thickness.

4. Steel, cement mortar lined and coated, submit calculations for wall thickness, must submit plan for cathodic protection.

~~2.9.10.~~2.9.11. NETWORK HYDRAULIC ANALYSIS

A. Required when:

1. The project is a major subdivision with an internally looped system.
2. The project is located in the higher elevations of a low static pressure zone.
3. A high fire flow demand is required (greater than1500 gallons per minute).
4. There will be extensive irrigation.
5. The new water plans will complete a loop on the current system.
6. As otherwise required by the City Engineer.

B. The consulting engineer should request the source hydraulic grade line (HGL) from the public works department prior to the initial design where a network hydraulic analysis is required.

C. Engineer must submit Water usage form (Form 7042) when requesting the HGL.

~~2.9.11.~~2.9.12. SECONDARY (IRRIGATION) WATER SYSTEM

A. Designed in accordance with all culinary water system requirements with the following exceptions:

1. Design pressures should be 10 psi higher than the culinary water system in the same pressure zone unless otherwise approved.
2. The pipe material shall be colored purple, or a discrete color different from the culinary water main.
3. There shall be no cross connection between secondary and culinary water systems.
4. Shall be installed at a minimum depth of 30 inches and generally installed above the culinary water line.

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2.10. LIGHTING DESIGN

(Section Last Updated, June 2019)

2.10.1. IVINS CITY STANDARD STREET LIGHT

Ivins City has selected a light fixture system as manufactured by ANP Lighting as a standard for City street lights. All streetlights installed on public streets must use the system as herein described. Refer to website at http://www.anplighting.com. The City will pre-purchase poles, luminaires, and bases and keep these materials in stock for developers to use and reimburse the City to prevent suppliers from profiteering from the sole source manufacturer.

Table 2.10.1

					Intersections				
Road Classification	R/W Width (ft)	Minimum Spacing	Bollards on Paths	Round-abouts	Arterial	Major Collector	Minor Collector	Res Collector	Res Entrance/ Private St/ Comm Drive
Major Arterial	100	250'	Yes	4-18'	2-18'	2-18'	2-18'	2-18'	1-12'*
Minor Arterial	80/85	250'	Yes	4-18'	2-18'	2-18'	2-18'	2-18'	1-12'*
Major Collector – 200 E	66	200'	Yes	4-18'	2-18'	2-18'	2-18'	2-18'	1-12'*
Major Collector	66	200'	Yes	2-14'	2-18'	2-14'	2-14'	2-12'	1-12'*
Minor Collector	60	200'	No	2-14'	2-18'	2-14'	2-14'	2-12'	1-12'*
Residential Collector	55	125'	No	2-12'	2-12'	2-12'	2-12'	2-12'	1-12'*
Residential	50/43/38	125'	No	NR	1-12'	2-12'	2-12'	2-12'	NR
Private Street	n/a	125'	No	NR	1-12'	1-12'	1-12'	1-12'	NR
Rural Section	**	**	**	**	**	**	**	**	**

R/W: Right of Way NR: Not Required Notation Examples: 2-18': Two lights, 18' poles
*unless within minimum spacing of another streetlight light, then NR 1-14': One light, 14' pole
** Reserved for Future Update: Developers must budget for standard lighting as applicable.

A. Light fixture:

1. Light fixture shall be ANP Lighting LA160, ~~clear lens cover,~~ LED lighting, 3000 K color temperature, 46 watts/3800 lumens, and Copper Clay color paint finish over the entire hood and body in accordance with Table 2.10.1.

2. The fixture will be supplied will 3000K color LED and ~~then shall be retrofitted~~fitted with an orange/amber acrylic lens cover provided by the City over the LEDs to lower color temperature to mimic high pressure sodium (approx. 2200 K).

3. Fixture shall be equipped with 90° house side shield when placed on street corners and with a 120° house side shield if ever placed mid-block.

B. Photocell:

1. When metered, locate photocell at meter base. Otherwise, photocell shall be housed in the pole with a drilled hole exposing the sensor at 7.5 feet above the base of the pole.

2. Rotatable housing shall be oriented to point photocell in direction of least luminance from adjacent light fixtures.

C. Pole:

1. Poles shall be aluminum as manufactured by ANP Lighting as per the following table:

Table 2.10.2

Road Classification	Pole Height	Base Cover	Diameter	Wall Thickness	Model Designation
Major Arterial	18	CB1206	5"	0.250"	BD5S18
Minor Arterial	18	CB1206	5"	0.250"	BD5S18
Major Collector (200 E)	18	CB1206	5"	0.250"	BD5S18
Major Collector (All others)	14	BDC4	4"	0.188"	BD4S14
Minor Collector	14	BDC4	4"	0.188"	BD4S14
Residential Collector	12	BDC4	4"	0.188"	BD4S12
Residential	12	BDC4	4"	0.188"	BD4S12
Residential Entrance	12	BDC4	4"	0.188"	BD4S12
Rural Section	**	**	**	**	**

** Reserved for Future Update: Developers must budget for standard lighting as applicable.

2. Poles shall be cast aluminum A356 alloy free of any porosity, foreign materials, or cosmetic fillers and shall be heat treated to a T-6 condition, of uniform wall thickness with no warping or mold shifting.

3. Poles shall be bolted into a cast in place concrete foundation with breakaway bolts. Bolt size, length and pattern shall be according to the manufacturer.

4. Pole base shall be decorative for Major and Minor Arterials and 200 East, ANP Lighting Model CB1206 and shall also include a concealed GFI 15-amp receptacle, ANP Lighting model CGFI set at 14 feet above base of pole.

D. Twin Arm Mounts: All light poles placed in medians on arterial or major collector roads shall be mounted with a twin post arm mount ANP Lighting PA215 for the placement of double fixtures.

E. Street Signage: Where poles are located at intersections, street signs shall be attached to pole.

F. Color: Poles, Base Covers, Arm Mounts, Adapters, Photocell Housing and Fixtures shall match in color and shall all be a color of Standard Grade "Copper Clay" as manufactured by ANP Lighting.

G. Power Source: Power source shall be as per Rocky Mountain Power requirements.

1. Option A: Direct connect via fused junction box per Standard Drawing No. L-05.

2. Option B: Connect with service meter pedestal. Service pedestal shall be a manufactured fully contained rainproof (NEMA Type 3R Enclosure) cabinet no

larger than 12-inches x 12-inches x 63-inches tall with fully hinged meter section cover and window for meter reading. Milbank A-Style CP3A or equal. When plug in receptacles or irrigation timers are on the service this option shall be required.

H. Banner Arms: On 18-foot poles, banner arms for a 24-inch by 72-inch banner shall be provided. When the light is installed in the median, the light shall be equipped with dual banners.

2.10.2. STREETLIGHT LOCATIONS

Streetlights shall be placed in accordance with the following:

A. Traffic Signalized Intersections:

1. All signalized intersections shall have light fixtures located on top of the signal pole. The fixture will be selected by the City to best match the

2. The signal pole and signal cross arm shall match the ANP Lighting "Copper Clay" color as best as possible.

B. Residential Entrances:

1. All residential developments accessed from arterial or collector roads shall have a streetlight consisting of a 12-foot pole mounted with a single LA160 fixture.

2. A residential entrance light will not be required if an adjacent residential entrance light is located within 125 feet on any arterial or major collector or within 250 feet on minor or residential collectors.

C. Major Arterials (Highway 91):

1. Streetlights, consisting of 18-foot poles mounted with single LA160 fixtures, shall be located at all intersections with collector roads, located on two corners, and located diagonally across the intersection.

2. Only one light is required on T-intersections.

3. In commercial areas, twin arm mounted poles will be required in the street median.

D. Arterials (Snow Canyon Parkway/Center Street/Highway 91):

1. Streetlights, consisting of 18-foot poles mounted with single LA160 fixtures, shall be located at all intersections with collector roads, located on two corners, and located diagonally across the intersection.

2. Only one light is required on T-intersections.

3. Twin arm LA160 fixtures mounted on 18-foot poles will be required in the street medians in accordance with Table 2.10.1.

E. Major Collectors:

1. Streetlights, consisting of 14-foot poles mounted with single LA160 fixtures, shall be located at all intersections with collector roads, located on two corners, and located diagonally across the intersection.

2. Only one light is required on T-intersections.

F. Minor/Residential Collectors:

1. A streetlight, consisting of a 12-foot pole mounted with a single LA160 fixture, shall be located at all intersections with collector roads, located on one corner of the intersection.

G. Rural Section: The rural section of Ivins City is defined by the Ivins Transportation Master Plan, Figure 10.

- Reserved for Future Update. Developers in the rural section must budget for standard streetlighting, but not install until specification is updated, as applicable.

2.10.3. IVINS CITY STANDARD BOLLARD FOR PAVED TRAILS

Ivins City has selected the Bounce Bollard light fixture system as manufactured by Kim Lighting as a standard for all trail lighting. Refer to Kim website at http://www.kimlighting.com/.

A. Bollard Fixture:

1. Bollard fixture shall be the Bounce Bollard Model No. BNB1 as manufactured by Kim Lighting.

2. Lighting element shall be LED with the Type 3 light distribution (27L) and 2200K color temperature.

3. If manufacturer does not supply fixture in 2200 K, it shall be supplied with 3000K and then shall be retrofitted by replacing the clear lens with an orange/amber acrylic lens as provided by the City to further reduce the color temperature to mimic high pressure sodium.

4. Fixture shall include Optional Matte Black Body Cap (Cat. No. BBC) to meet IES designation for "cutoff".

B. Color: Bollard shall be a standard color of Dark Bronze as manufactured by Kim Lighting.

C. Locations: Bollard lighting of trails will be required on all arterial and major collector roads, including the rural zone.

D. Spacing: Bollards shall be placed at a target spacing of 80 feet with a maximum spacing of 90 feet along these trails.

2.10.4. REQUIREMENTS FOR NEW DEVELOPMENT

A. Conduit, wiring and streetlights shall be installed at the developer's expense in all new and proposed subdivisions or commercial areas. Streetlights and bollards, since they are sole sourced and as such to avoid the potential for predatory pricing, shall be purchased by the City in larger quantities and stored and then resold to developers without any markup.

B. Those subdivisions and commercial areas will be lighted in accordance with a written plan that addresses intersections, public facilities, trails and crosswalks. (See Zoning Ordinance Chapter 11 for details)

C. Non-Standard Lighting for New Development.

1. In the event that a new subdivision or commercial area presents a written lighting plan that uses non-standard streetlights, the plan must be approved by the Planning and Zoning Commission and the City Council.

2. All costs associated with installation, operation and maintenance of non-standard lights shall be by other than Ivins City.

3. All non-standard lighting must meet the requirements of Ivins City Outdoor Lighting Ordinance (Ord. No. 2007-11).

D. Exceptions may be made by the City Engineer or Public Works Director on the location of lighting if crosswalks and street signs along collector and arterial streets are provided with alternative lighting as proposed by a developer.

2.10.5. EXISTING SUBDIVISIONS

A. Existing subdivisions which do not want streetlights shall not be required to install them.

B. In the event a resident living in an established, built-out area requests the installation of a street light, the resident must have the approval and signatures of all adjoining residents impacted by the street light installation, and the City Council. The requesting resident is responsible for costs associated with the street light and its installation. The City will assume ownership after installation.

C. If an existing subdivision or project has non-standard lights installed, approval may be given to continue the non-standard street lights. All non-standard lights shall not be maintained by Ivins City unless already under Ivins City maintenance.

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2.11. UTILITY LAYOUT

2.11.1. The following Design and Construction Standards are to be followed at all times, unless a problem exists. When the Standards cannot be followed, the City Engineer will be required to approve the alternative.

A. All utilities, i.e. gas, cable, power, sewer and water will be shown on the appropriate drawings.

B. Phone, cable and power joint trench will be located on the north and west side of roadways, back of sidewalk within new developments as much as possible. In planned developments without sidewalks, joint utility trench will be located 36 inches back of curb.

C. Gas mains will stay 5 feet minimum off of back of sidewalk on public streets.

D. Water will be located on south and east side of roadway 5 feet into roadway off of curb as much as possible or opposite power. In planned development, lip of curb for gas, water stays the same.

E. Water, sewer and drainage layout will be first utilities designed.

~~E.~~F. Locate all manholes and valves out of wheel path of vehicles where possible.

~~F.~~G. Generally, sewer will be located 10 feet off curb & gutter opposite of waterline. In private development or streets, the centerline will be used to align sewer as much as possible.

~~G.~~H. Generally, storm drain will be designed to fall at the inside lip of curb & gutter as per the detail.

~~H.~~I. Cable and phone boxes will be located on the right and left side of power transformers and secondary boxes. Cable will be on the left and phone on the right looking from the street.

~~I.~~J. Gas and water stubs will be placed 5 and 2 feet, respectively, to the right and left of the property lot line, with gas on the left and water on the right looking from the street.

~~J.~~K. Irrigation water mains should be generally installed 4' away from waterline towards centerline of street.

2.11.2. UTILITY SEPARATIONS AND CROSSINGS

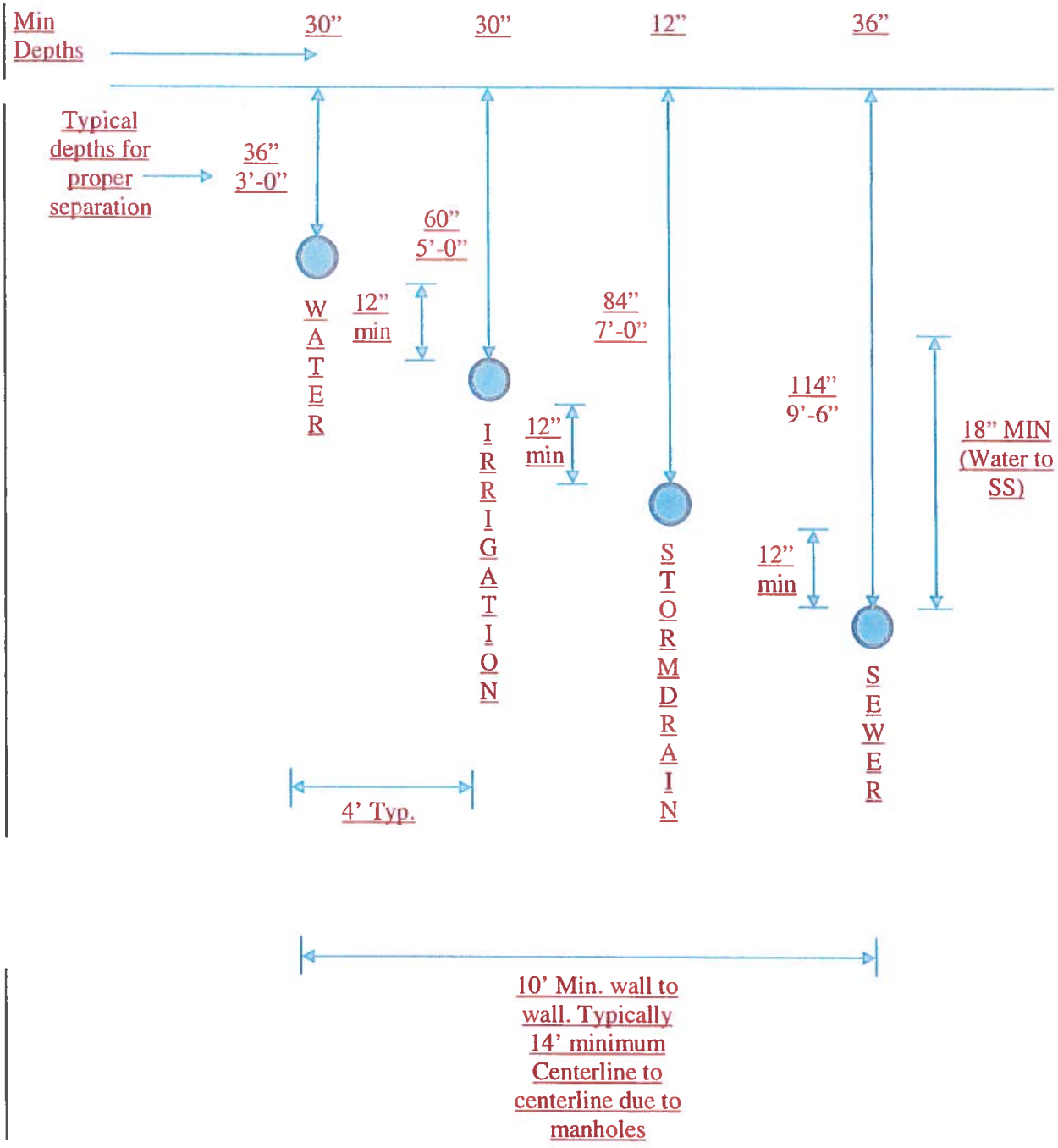
A. Per Utah State Administrative Code, R317-3 and R309-500,

1. Sewer must be installed at least 18 inches (outside wall to outside wall) lower than the water main at all crossings.

2. Sewer must be installed at least 10 feet horizontally from the water main.

- Where local conditions make it impossible to maintain minimum separations, follow State Administrative Code. May require a submittal to State for review.

B. In general, pipes should be separated by at least 12 inches at all crossings. If 12 inches is not obtainable due to local constraints, the absolute minimum separation shall be 3-inches and must be supported with concrete piers per APWA Plan No. 373.



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2.12. OTHER DESIGN CONSIDERATIONS

2.12.1. SENSITIVE LANDS

Ivins City has identified in the zoning ordinance lands that are considered sensitive and require special consideration. The Ivins City Sensitive Lands Map is available as part of the zoning ordinance which has inventoried on a broad scale which areas of the city are determined to contain sensitive lands. When a development is determined to contain sensitive lands, an application must be made in accordance with the Zoning Ordinance. The following lands are identified as sensitive:

A. All areas subject to flooding, as identified by the Ivins City Sensitive Lands Map, incorporated herein by reference.

B. All areas of wetlands, as identified by the Ivins City Sensitive Lands Map or as may be identified by the U.S. Army Corps of Engineers.

C. All areas where the increase or decrease in the elevation of the natural grade is equal to or greater than 8 percent, otherwise 1 foot of grade change for every 12-1/2 feet of horizontal run for a minimum distance of forty feet.

D. Habitat Conservation Plan areas, as identified on the Ivins City Sensitive Lands Map.

E. Areas of lava fields and rock outcroppings with an area of 8,000 square feet, or larger, as identified by the Ivins City Sensitive Lands Map.

F. Areas of known geologic hazards, as identified by the Ivins City Sensitive Lands Map, or as may be identified by a county, state, or federal agency with authority.

There are important design standards that should be considered by any designer for a development within these lands. It is recommended that the engineer/designer of any development become familiar with these guidelines in the initial planning stages.

2.12.2. IVINS CITY DESIGN GUIDELINES

Ivins City has developed and adopted design guidelines to promote a general level of design consistency, sensitivity to the scenic environment of Ivins, and to protect and promote the unique identity of the community. The objectives of the guidelines include:

- Promote the preservation of open spaces
- Protect views
- Promote compatibility between development and the natural environment
- Promote a subdued character in buildings, lighting, and signage.
- Promote continuity of streetscape design
- Promote drought tolerant landscaping that is in harmony with the desert environment

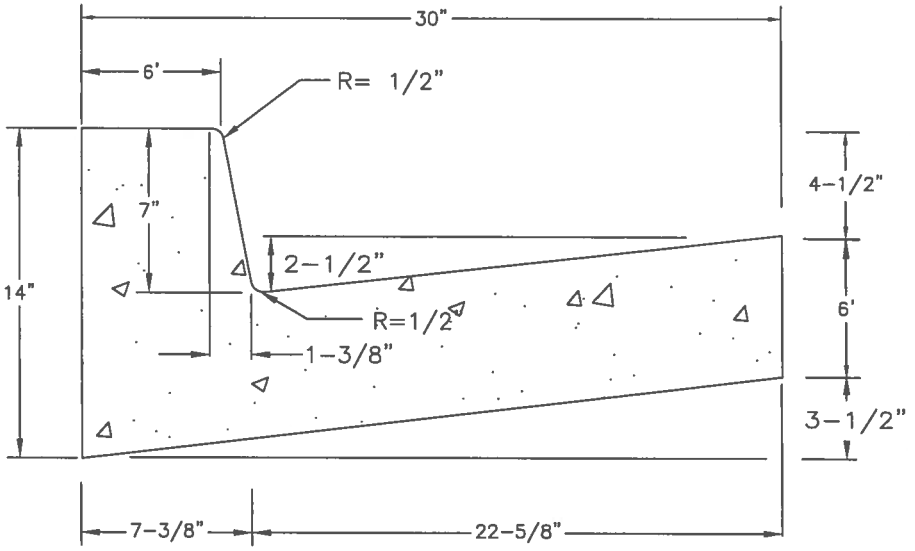
It is recommended that the designer of any development become familiar with these guidelines in the initial planning stages.

2.12.3. ZONING ORDINANCE STANDARDS

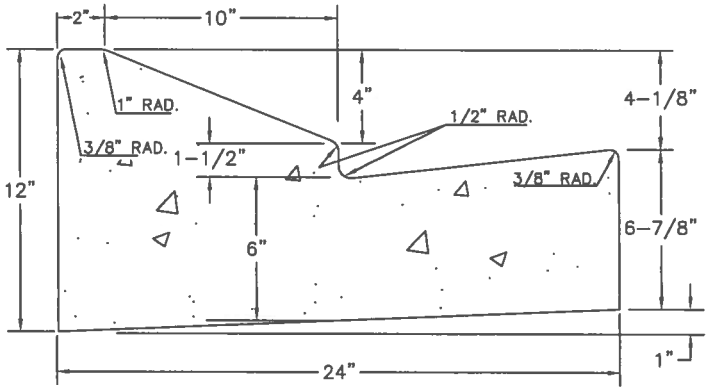
The adopted zoning ordinance has also developed General Development Standards (Chapter 11) and Supplementary Development Standards (Chapter 12) which provide additional design standards with which developments must comply.

CONSTRUCTION NOTES:

1. SUBGRADE: Compact per geotechnical recommendations.
   - 1.a. May require overexcavation.
   - 1.b. As a minimum, scarify 8 inches, moisture recondition and recompact per APWA Section 32 05 10.
2. UNTREATED BASE COURSE: Provide material specified in APWA Section 32 11 23.
   - 2.a. Minimum 6" thick beneath curb and gutter.
   - 2.b. Place material per APWA Section 32 05 10.
3. CONCRETE: Class 4000 per APWA Section 03 30 04.
   - 3.a. Place concrete per APWA Section 03 30 10.
   - 3.b. Provide $\frac{1}{2}$ inch radius on concrete edges exposed to public view.
   - 3.c. Cure concrete per APWA Section 03 39 00 with type ID Class A or B (clear with fugitive dye) membrane forming compound unless specified otherwise.
4. EXPANSION JOINT: Make expansion joints vertical, full depth, $\frac{1}{2}$ inches wide with type F1 filler material per APWA Section 32 13 73.
   - 4.a. Set top of filler flush with surface of concrete.
   - 4.b. Expansion joints are required at the start or end of a street intersection curb return.
   - 4.c. Expansion joints are required at 40 foot intervals.
5. CONTRACTION JOINT: Make contraction joints vertical.
   - 5.a. $\frac{1}{8}$" wide and 2 inches deep.
   - 5.b. Match location with sidewalk when abutting.
   - 5.c. Contraction joints are required at 10 foot intervals.
6. FINISH: Broomed.
7. PROTECTION AND REPAIR:
   - 7.a. Fill flow-line with water. Repair construction that does not drain.



30" HIGHBACK CURB & GUTTER
(NOT TO SCALE)



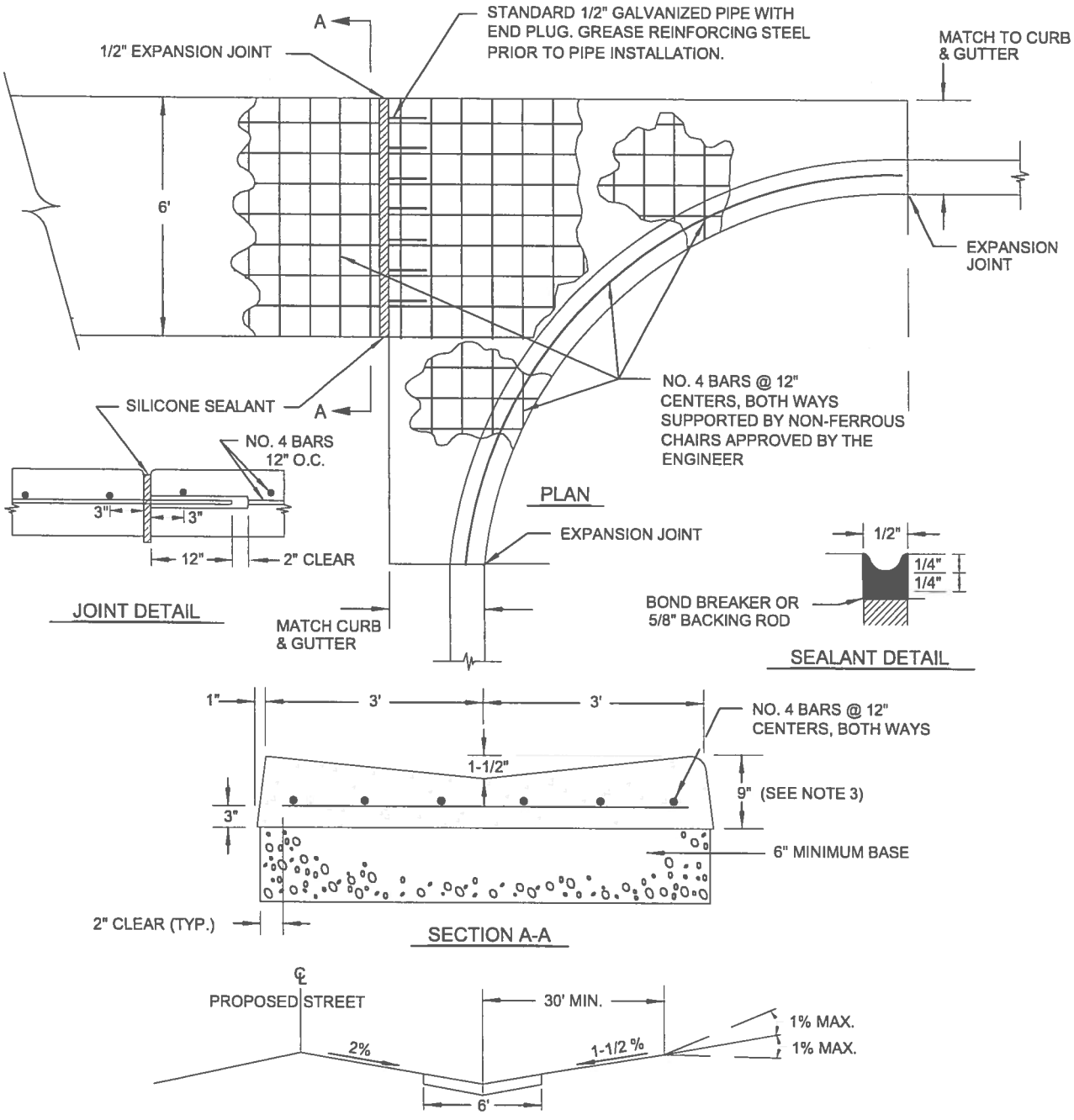
24" MODIFIED CURB & GUTTER
(NOT TO SCALE)

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435-674-5486 (fax)

rev. 07-2010

CURB AND GUTTER

Standard Drawing R-01



TYPICAL PROFILE AT LOCAL RESIDENTIAL STREET INTERSECTIONS

NOTES:

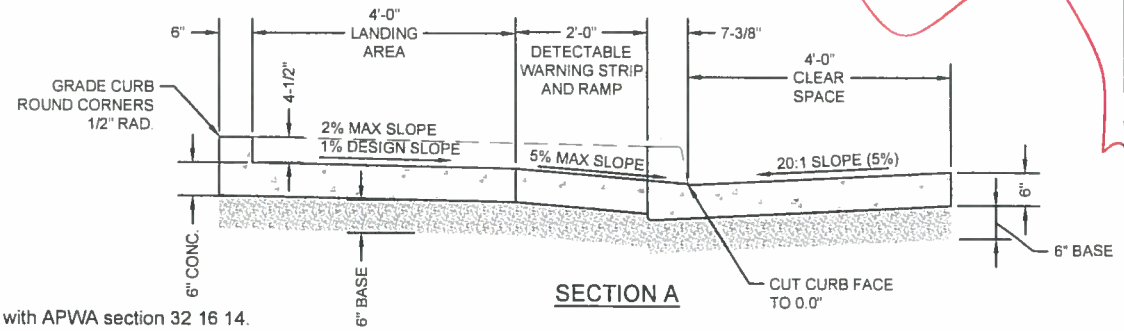
1. FINISHED ASPHALT CONCRETE SURFACE TO BE FLUSH WITH CROSS GUTTER LIP.
2. CONSTRUCTION OF CROSS GUTTER IS NOT ALLOWED ACROSS MAJOR COLLECTOR OR ARTERIAL STREETS.
3. ADJACENT SPANDREL SHALL BE 9" THICK.

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rev. 07-2010

CROSS GUTTER

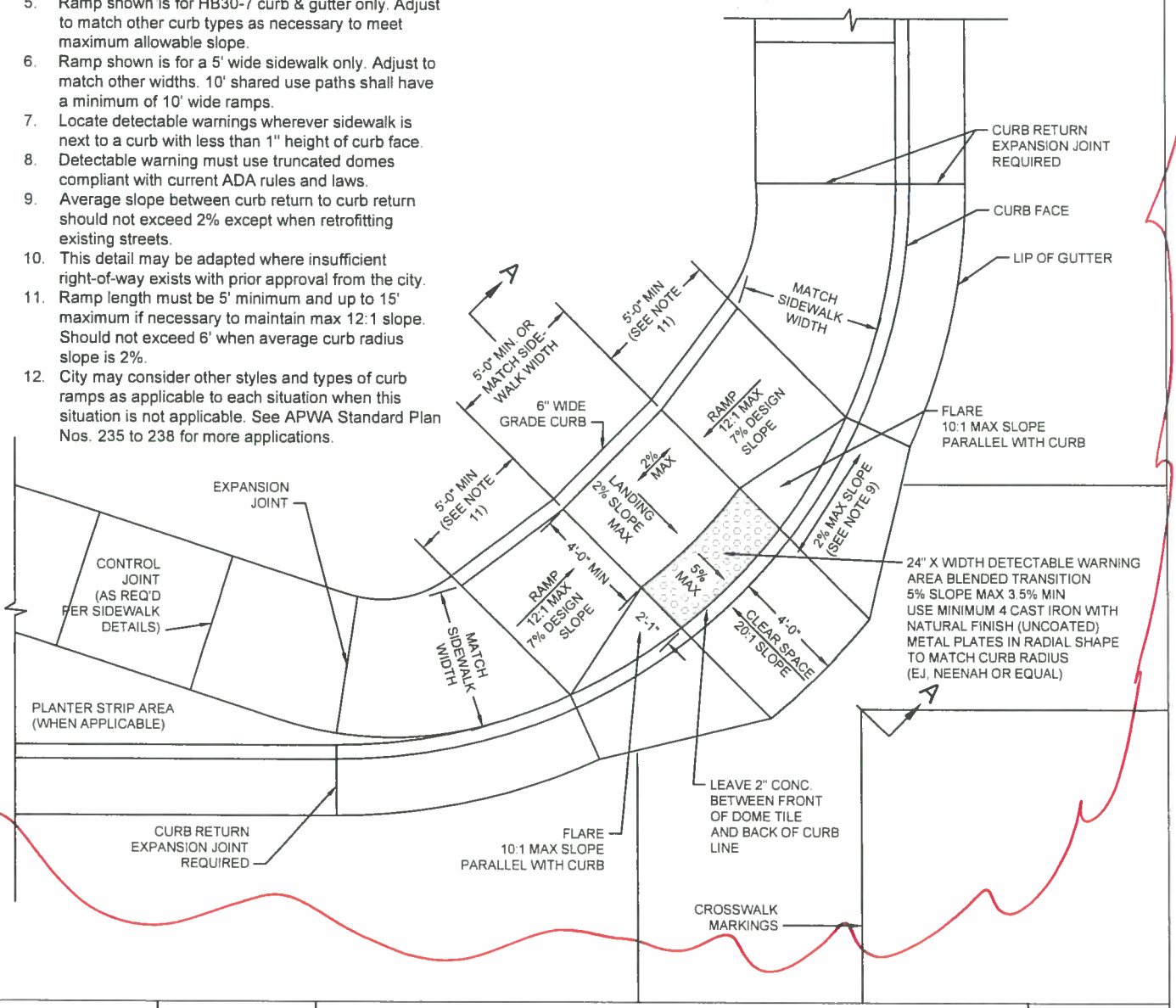
Standard Drawing R-02



SECTION A

NOTES:

1. Install in accordance with APWA section 32 16 14.
2. Pour curb & gutter separately from ramp sidewalk.
3. Ramps shall be located at midpoint of curb return unless otherwise approved.
4. Ramps shall have a rough broom finish transverse to the slope of ramp.
5. Ramp shown is for HB30-7 curb & gutter only. Adjust to match other curb types as necessary to meet maximum allowable slope.
6. Ramp shown is for a 5' wide sidewalk only. Adjust to match other widths. 10' shared use paths shall have a minimum of 10' wide ramps.
7. Locate detectable warnings wherever sidewalk is next to a curb with less than 1" height of curb face.
8. Detectable warning must use truncated domes compliant with current ADA rules and laws.
9. Average slope between curb return to curb return should not exceed 2% except when retrofitting existing streets.
10. This detail may be adapted where insufficient right-of-way exists with prior approval from the city.
11. Ramp length must be 5' minimum and up to 15' maximum if necessary to maintain max 12:1 slope. Should not exceed 6' when average curb radius slope is 2%.
12. City may consider other styles and types of curb ramps as applicable to each situation when this situation is not applicable. See APWA Standard Plan Nos. 235 to 238 for more applications.



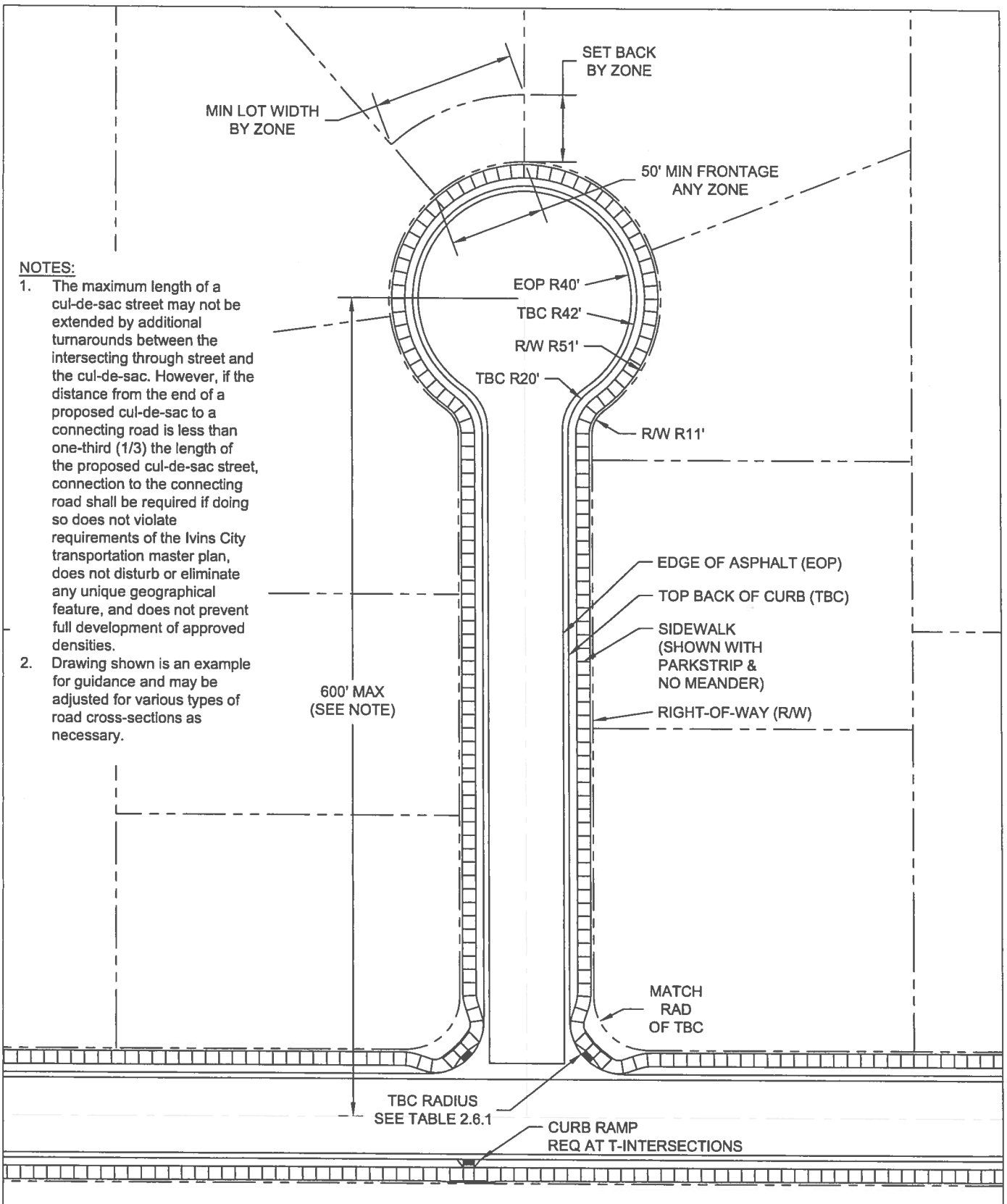
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IVINS CITY

SIDEWALK CURB RAMP

Standard Drawing R-03

rev. 11-2019



NOTES:

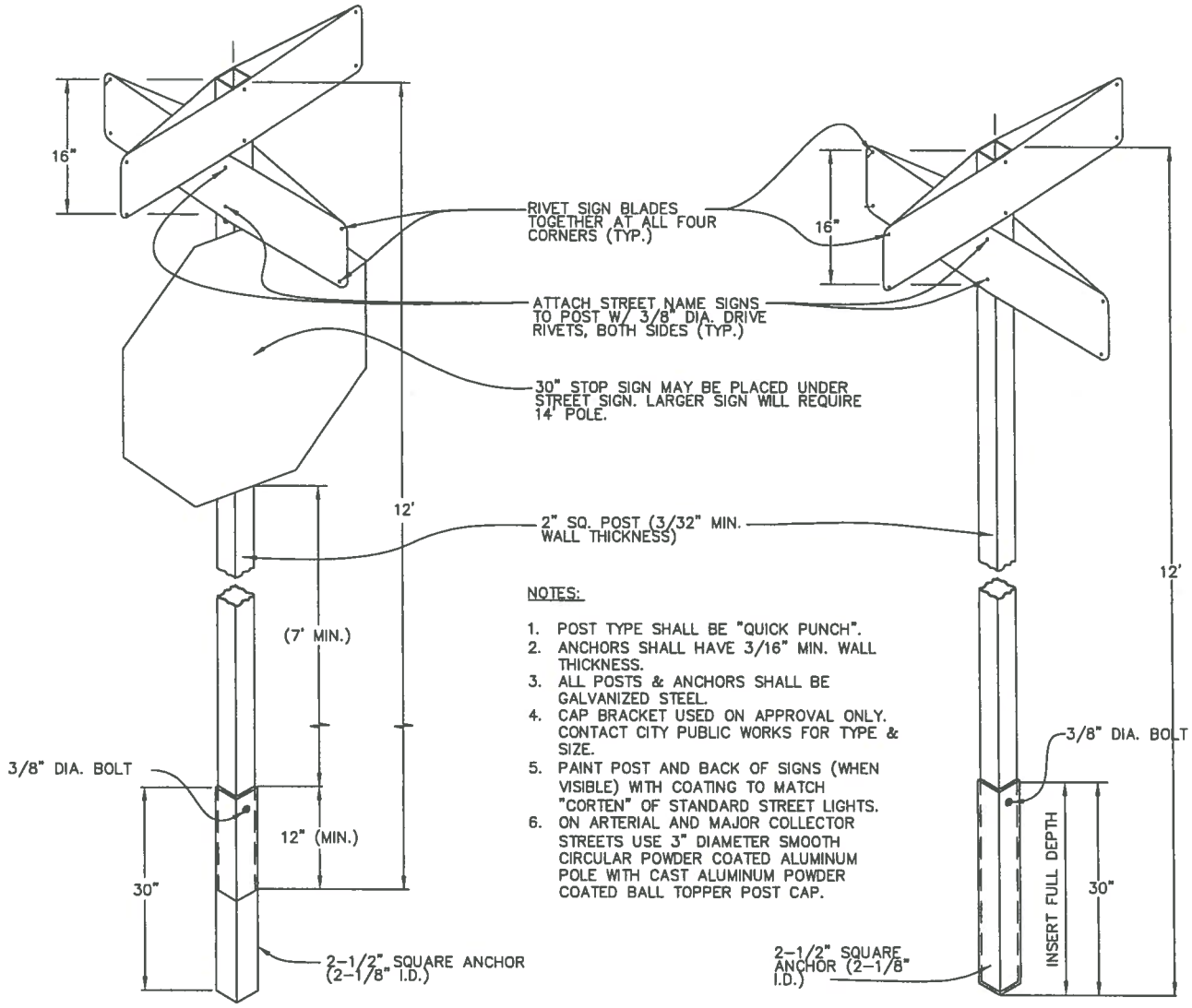
1. The maximum length of a cul-de-sac street may not be extended by additional turnarounds between the intersecting through street and the cul-de-sac. However, if the distance from the end of a proposed cul-de-sac to a connecting road is less than one-third (1/3) the length of the proposed cul-de-sac street, connection to the connecting road shall be required if doing so does not violate requirements of the Ivins City transportation master plan, does not disturb or eliminate any unique geographical feature, and does not prevent full development of approved densities.
2. Drawing shown is an example for guidance and may be adjusted for various types of road cross-sections as necessary.

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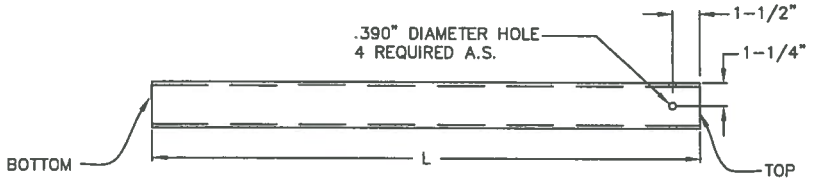
RESIDENTIAL CUL-DE-SAC

Standard Drawing R-04



INSTALLATION METHOD A

INSTALLATION METHOD B



MARK	DIM.	TOLERANCE
D	2-1/8"	+1/16',-0"
L	30"	±1/2"
W	2-1/2"	±1/64"

SIGN ANCHOR DETAIL

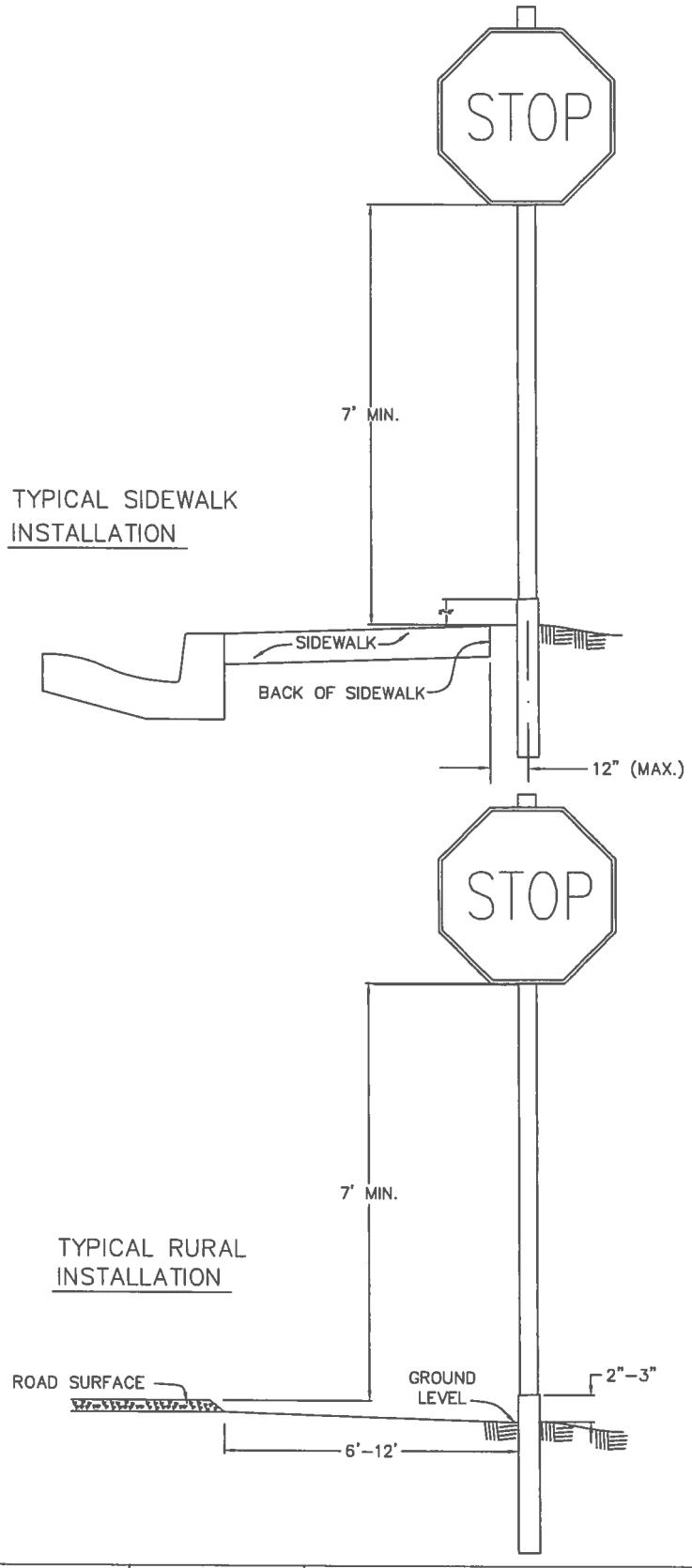
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SIGN POST MATERIALS

Standard Drawing R-05



NOTES:

1. SIGNS SHALL BE PLACED IN CONFORMANCE WITH THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES. (M.U.T.C.D.).
2. STREET NAME SIGNS SHALL BE REQUIRED ON ALL CITY STREETS.
3. ALL POST COMPONENTS SHALL BE GALVANIZED STEEL.
4. STREET NAME SIGNS PLACED ABOVE STOP SIGN SHALL BE AS SHOWN IN DRAWING R–05.
5. WHERE PLANTER STRIP LIES BETWEEN SIDEWALK AND CURB, SIGNS SHALL BE INSTALLED IN PLANTER STRIP AS PER M.U.T.C.D.
6. SIGNS SHALL BE PLACED TO BE CLEARLY VISABLE. ALL OBSTRUCTIONS SUCH AS TREES, POLES, OTHER SIGNS, ETC, SHALL BE AVOIDED.

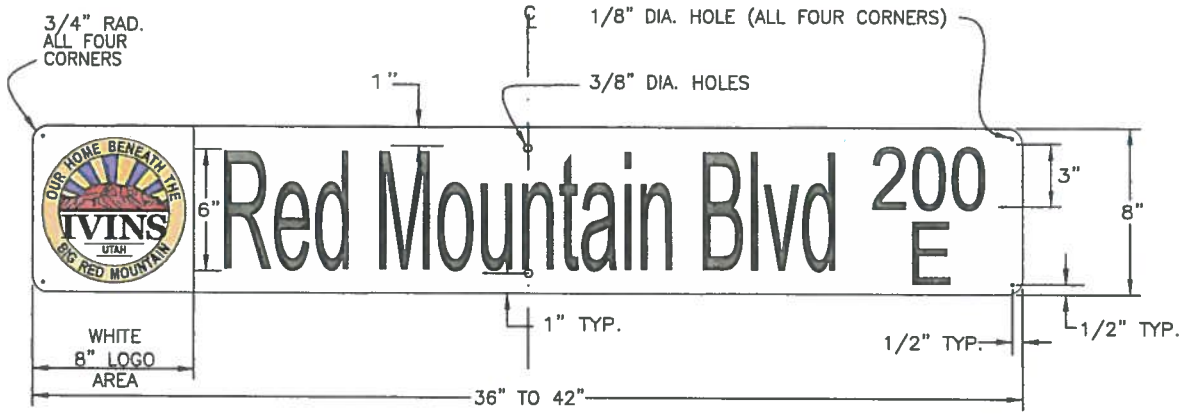
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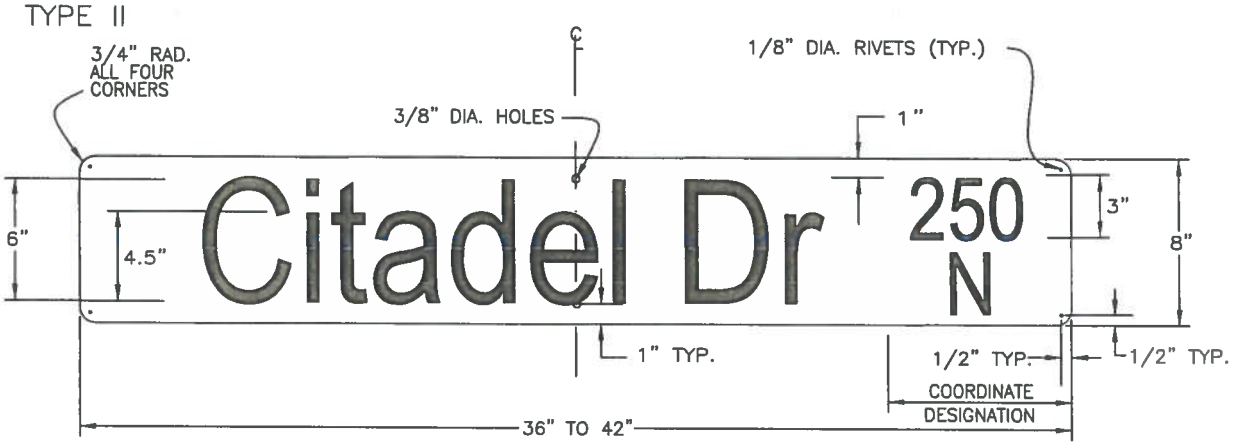
SIGN POST INSTALLATION

Standard Drawing R-06

TYPE I FOR MAJOR INTERSECTIONS



TYPE II



OR



NOTES:

1. BACKGROUND SHALL BE GREEN, LEGEND AND LETTERS SHALL BE WHITE.
2. ALL SHEETING SHALL BE HIGH INTENSITY REFLECTIVE SHEETING. (FP-85 TYPE III A)
3. SIGNS SHOULD BE MADE BY THE "REVERSE OUT" PROCESS. NO STICK ON LETTERS.
4. SIGN BLANK SHALL BE 6061-T6 HEAT TREATED HIGH TENSILE DEGREASED ALUMINUM WITH ALODINE 1200 FINISH. MIN. THICKNESS SHALL BE 0.080".
5. EACH SIGN SHALL CONSIST OF TWO PLATES RIVETED TOGETHER AND MOUNTED AS REQUIRED.
6. SIGNS ON PRIVATE ROADS ARE REQUIRED AND SHOULD MEET SAME SPECIFICATIONS OF STANDARD SIGNS EXCEPT FOR BACKGROUND COLOR.
7. ALL STREETS WITH NAMES SHALL ALSO HAVE THE COORDINATE DESIGNATION ON THE SIGN IN THE APPROPRIATE LOCATION UNLESS OTHERWISE APPROVED.
8. ADDRESS COORDINATOR SHALL BE CONTACTED PRIOR TO MAKING SIGNS TO VERIFY PROPER NAMES AND COORDINATES.
9. ALL LETTERS SHALL BE UPPER & LOWER CASE. LETTERS AND NUMBERS SHALL CONFORM TO THE HEIGHT, WIDTH, STROKE WIDTH, AND SPACING AS PER THE U.S. DEPT. OF TRANSPORTATION PUBLICATION "STANDARD ALPHABET FOR HIGHWAY SIGNS".
10. MAJOR INTERSECTIONS INCLUDE ALL INTERSECTIONS OF COLLECTOR STREETS WITH OTHER COLLECTOR STREETS AND ALL INTERSECTIONS WITH MAJOR COLLECTOR AND ARTERIAL STREETS.
11. PRIVATE STREETS SHALL USE BLUE BACKGROUND.
12. STREET DESIGNATION SHALL BE ABBREVIATED (I.E. ST, LN, CIR, BLVD, PKWY, RD, TRL)

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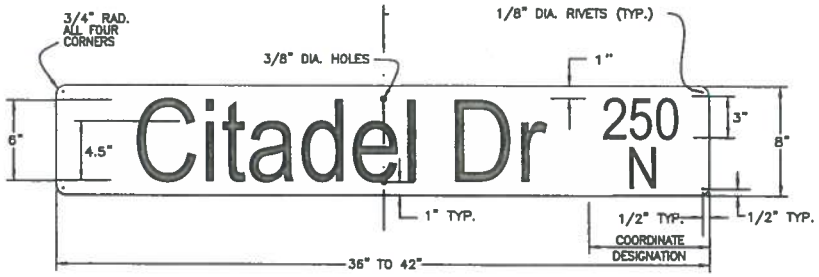
STANDARD STREET SIGN

Standard Drawing R-07

SIGN DESIGNATION FORM

PROJECT NAME

DATE BY



STANDARD IVINS CITY SIGN

THIS FORM TO BE COMPLETED BY THE CITY ADDRESS COORDINATOR PRIOR TO ORDERING OF STREET SIGNS BY DEVELOPER.

NOTES:

1. SEE DRAWING NO. R-07 FOR SIGN SPECIFICATIONS.
2. SIGNS ON PRIVATE ROADS WHEN REQUIRED BY THE CITY ENGINEER SHALL MEET ALL SPECIFICATIONS OF STANDARD SIGNS EXCEPT BACKGROUND SHALL BE BLUE.
3. ADDRESS COORDINATOR MUST BE CONTACTED PRIOR TO MAKING SIGNS TO VERIFY PROPER NAMES AND COORDINATES.
4. ALL STREETS WITH NAMES WILL ALSO HAVE COORDINATES DESIGNATED ON SIGN.

LOCATION GUIDE

	☐	
	☐	
	☐	
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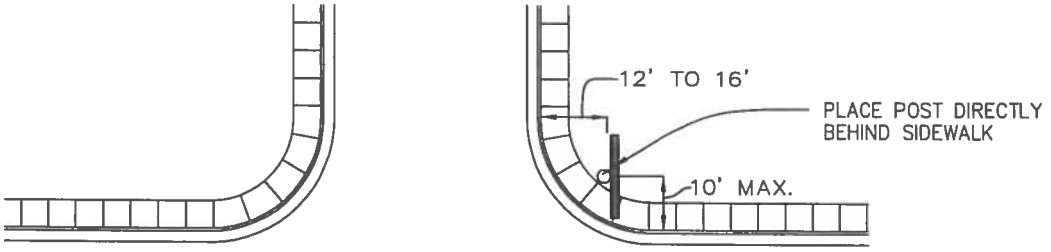
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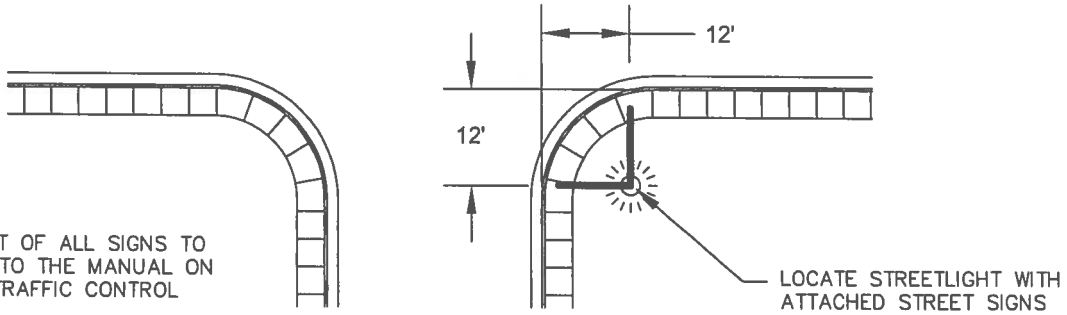
IVINS CITY

SIGN DESIGNATION FORM

Standard Drawing R-08

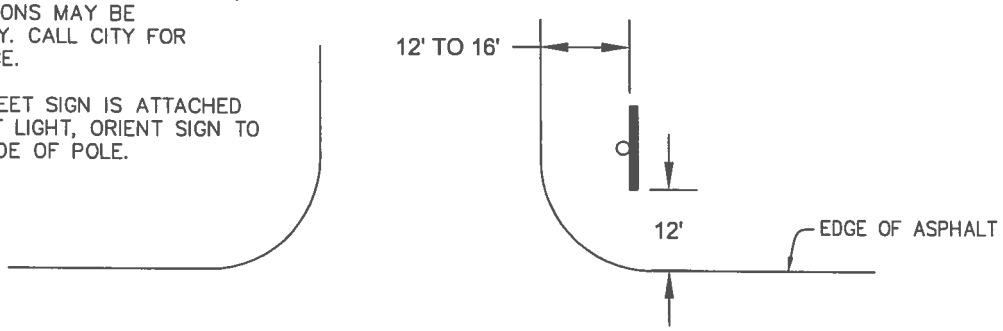


TYPICAL URBAN INSTALLATION

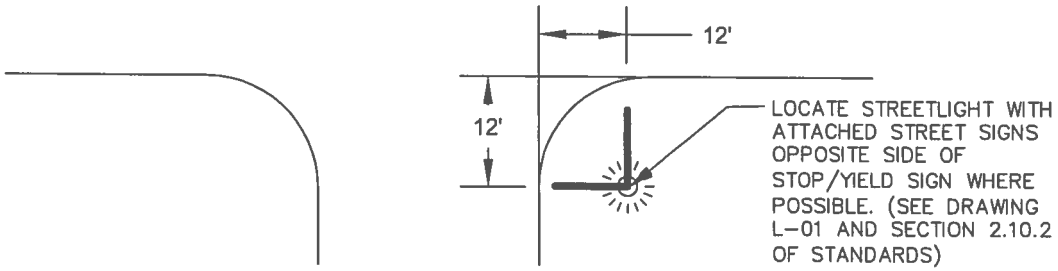


NOTES:

1. PLACEMENT OF ALL SIGNS TO CONFORM TO THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.
2. IF PLACEMENT STANDARDS CANNOT BE MET, CONTACT CITY ENGINEERING DEPARTMENT.
3. IF INSTALLATION ACCORDING TO STANDARDS CAUSES THE SIGN TO BE OBSTRUCTED OR ITS VISIBILITY IMPAIRED IN ANY WAY, MODIFICATIONS MAY BE NECESSARY. CALL CITY FOR ASSISTANCE.
4. WHEN STREET SIGN IS ATTACHED TO STREET LIGHT, ORIENT SIGN TO STREET SIDE OF POLE.



TYPICAL RURAL INSTALLATION

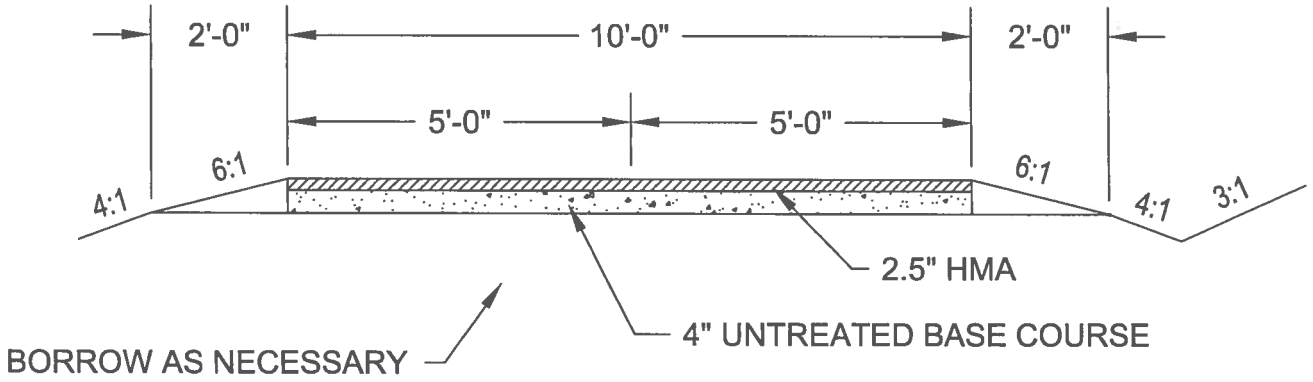


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TYPICAL INTERSECTION SIGN PLACEMENT

Standard Drawing R-09



TYPICAL SECTION

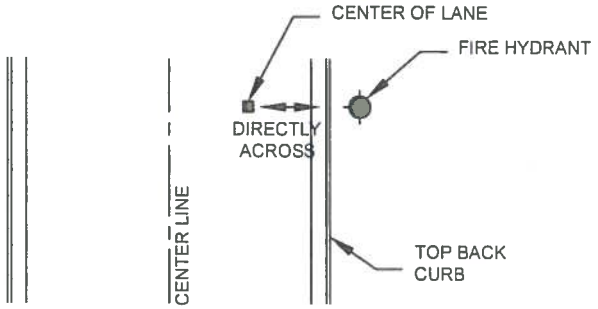
NOTE: TRAIL TO MEET AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO) "GUIDE FOR DEVELOPMENT OF BICYCLE FACILITIES" DESIGN STANDARDS.

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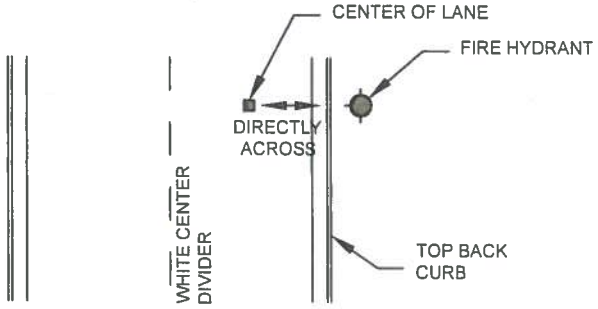
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10' TRAIL SECTION

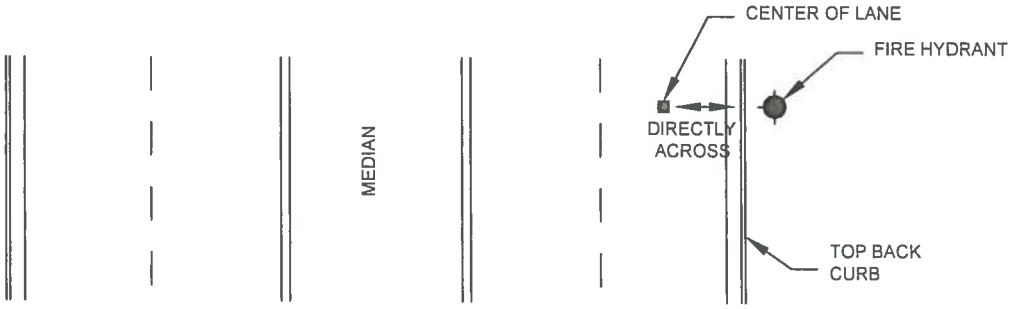
Standard Drawing R-10



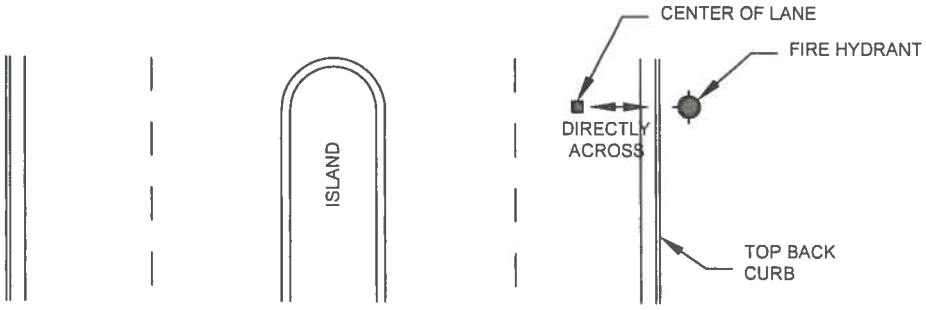
(CASE 1)
CENTER LINE W/OUT PAINT



(CASE 2)
CENTER LINE WITH PAINT



(CASE 3)
MEDIAN



(CASE 4)
ISLAND

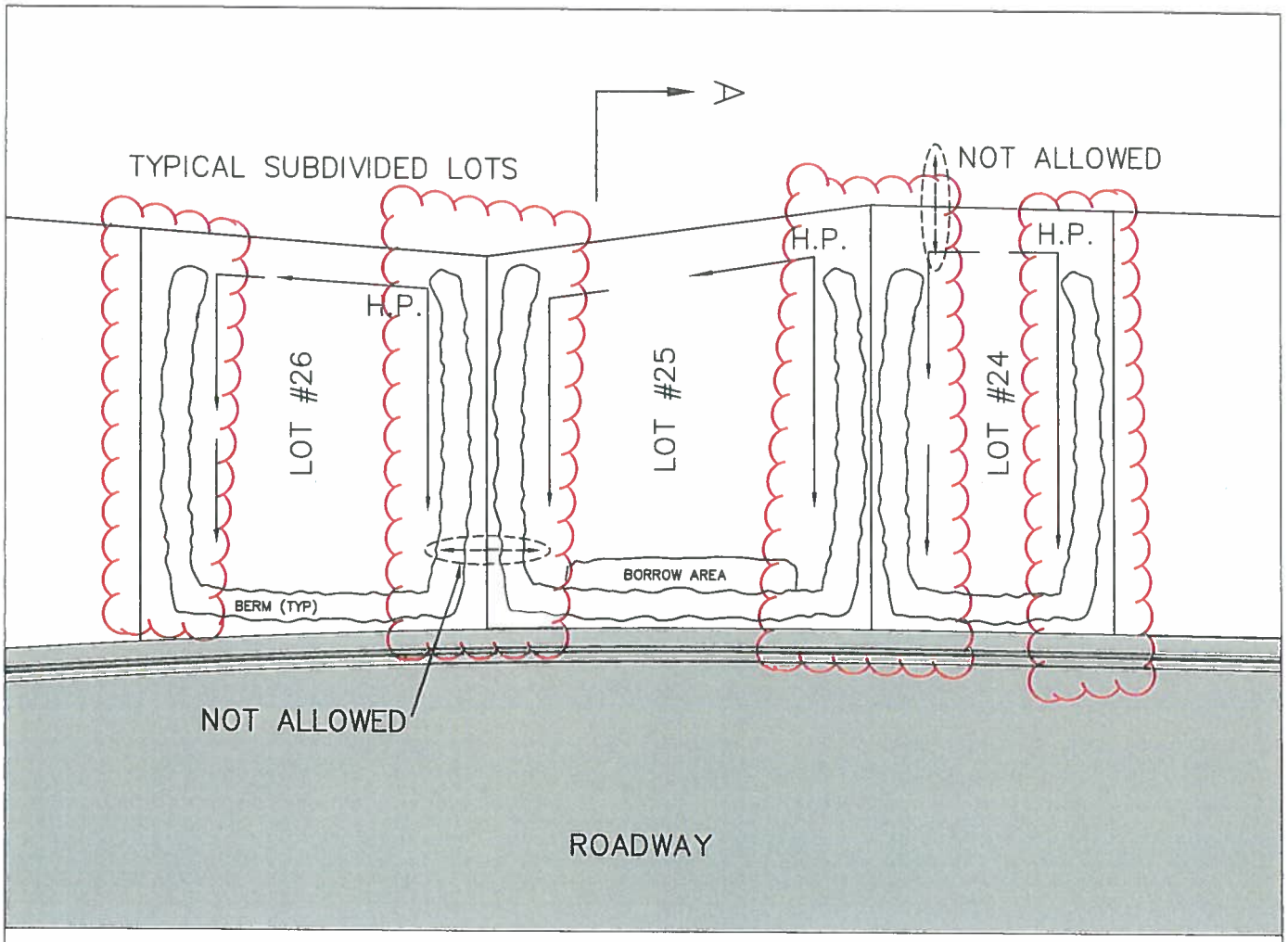
Notes:
1. BLUE DOTS AS MANUFACTURED BY STIMSONITE-MODEL 88 "A" OR APPROVED EQUAL
2. BLUE REFLECTOR TO BE SET DIRECTLY ACROSS FROM FIRE HYDRANT

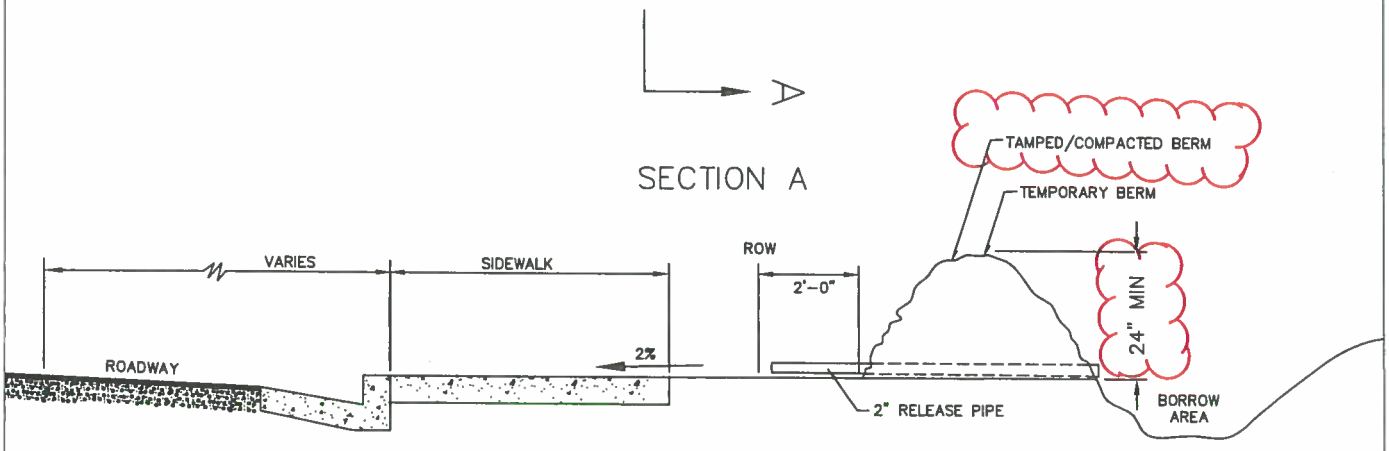
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REFLECTOR LOCATIONS FOR FIRE HYDRANTS

Standard Drawing R-11





NOTES:

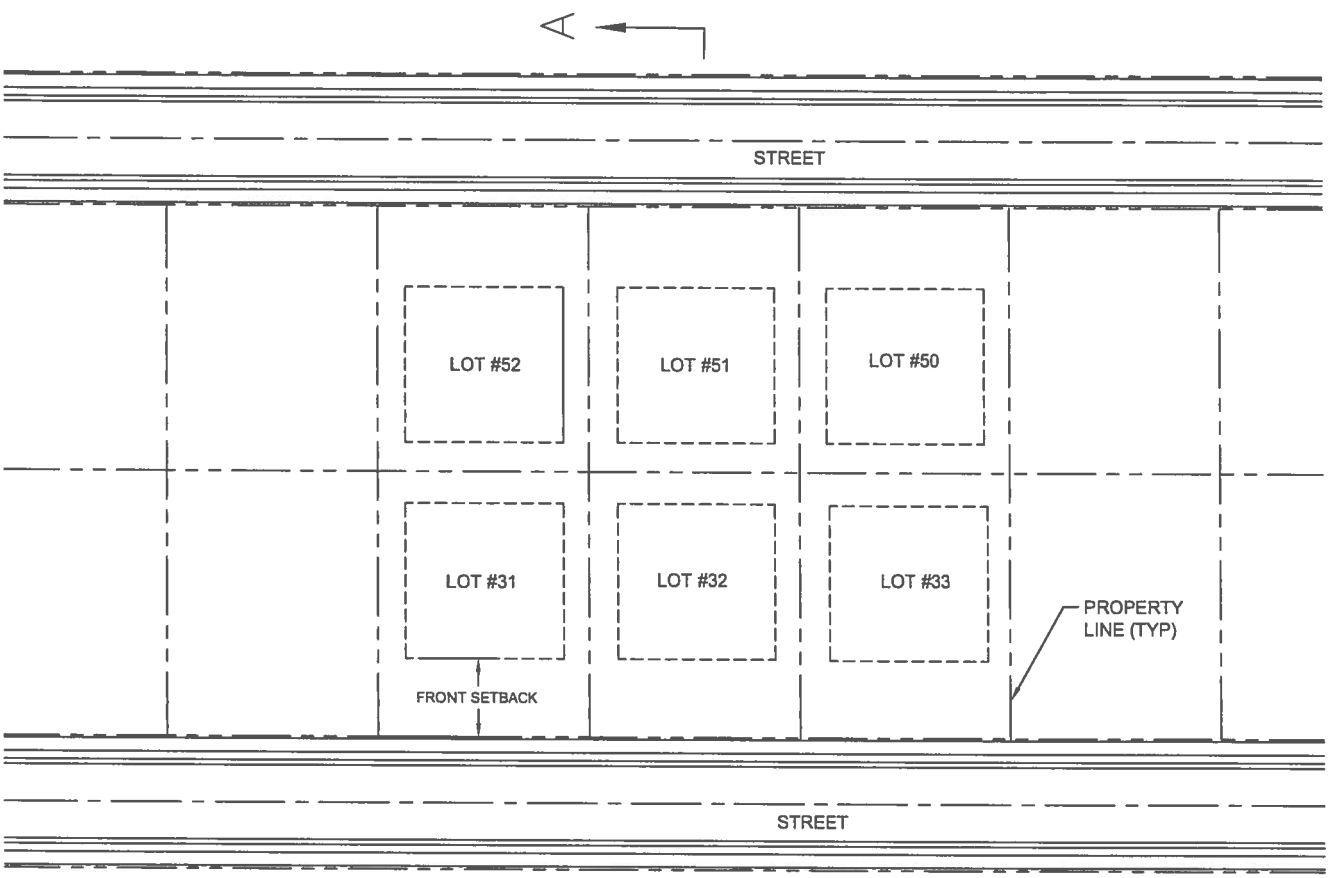
1. BERM SHALL INCLUDE ø2" DRAIN PIPE. PIPE MUST EXTEND BEYOND THE OUTER FACE OF THE BERM.
2. EACH LOT MUST CONTAIN ITS OWN STORM WATER.
3. CROSS LOT DRAINAGE SHALL NOT BE ALLOWED.
4. DEVELOPER MAY PROPOSE OTHER METHODS TO STABILIZE GRADED AREAS AND PREVENT EROSION AS APPROVED BY CITY.

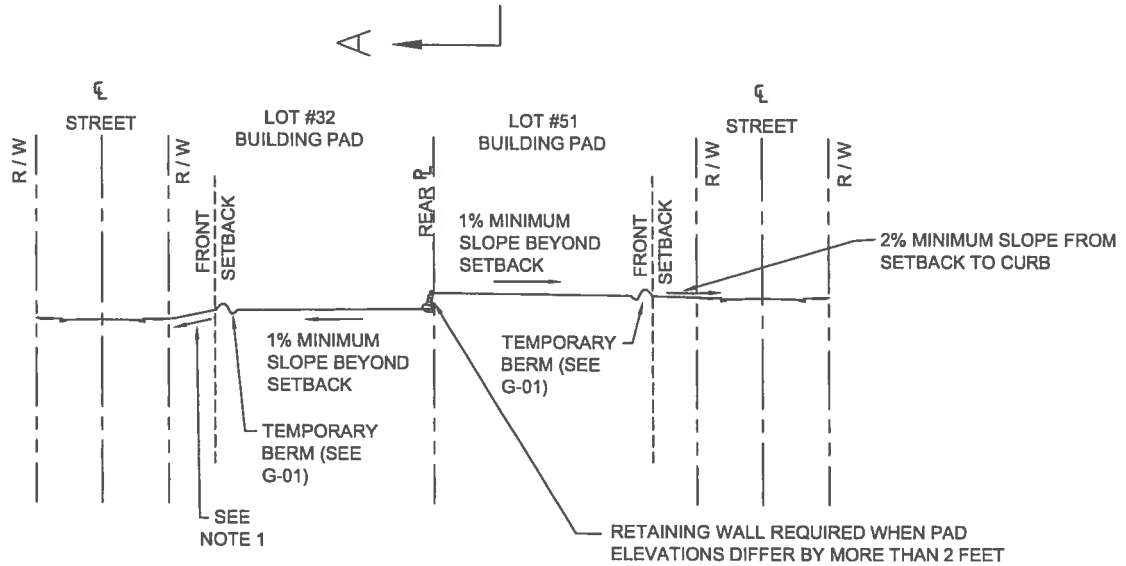
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TEMPORARY ONSITE DRAINAGE RETENTION BERM FOR UNIMPROVED SUBDIVISION LOTS

Standard Drawing G-01





SECTION
A - A

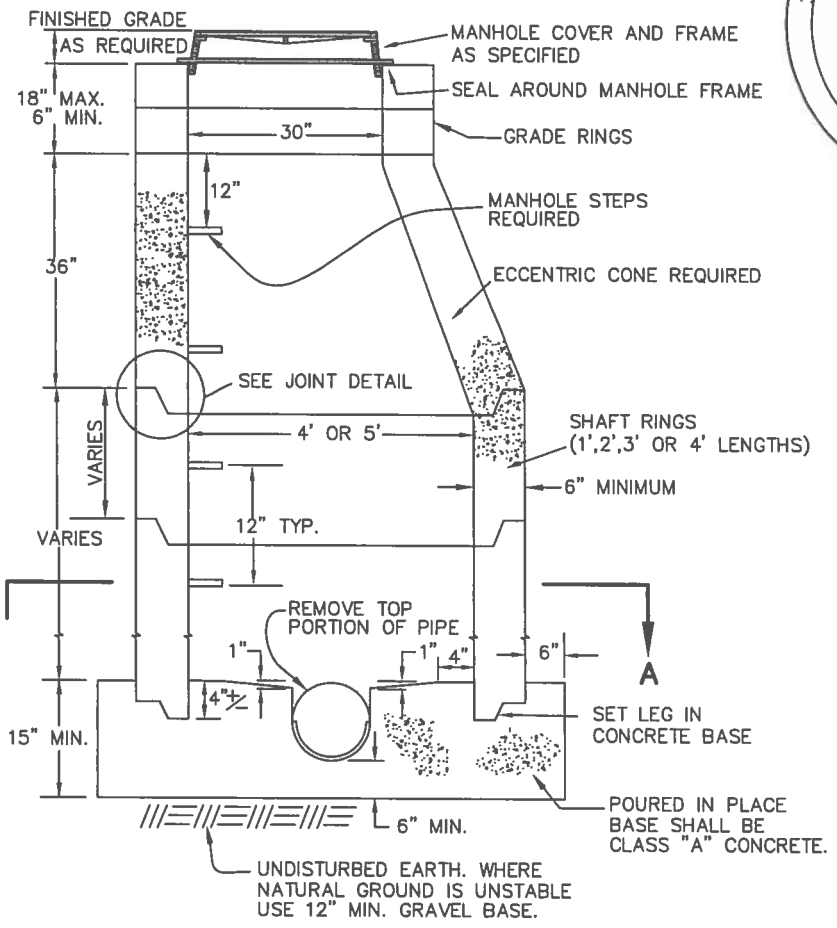
NOTES:
1. IF PAD ELEVATION CREATES A SLOPE OF 5% OR MORE IN THE FRONT SETBACK AREA, LOCATE TEMPORARY RETENTION BERM AT TOP OF SLOPE (SEE G-01).
2. ANY EVIDENCE OF EROSION OUTSIDE OF AREAS PROTECTED BY BERM MAY REQUIRE EROSION CONTROL MEASURES.

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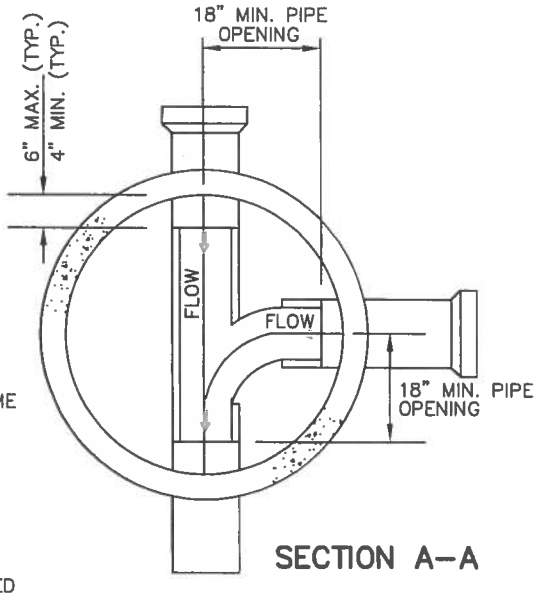
rev. 07-2010

SUBDIVISION LOT GRADING DETAILS

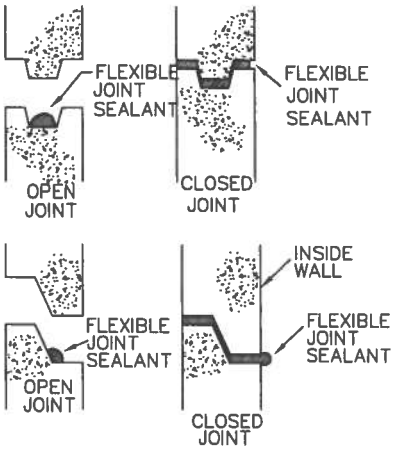
Standard Drawing G-02



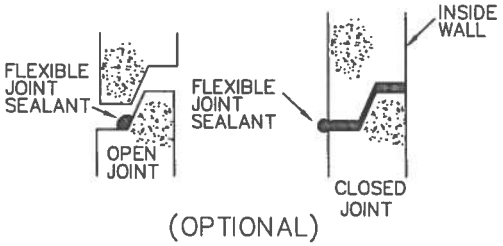
SECTION THRU CENTER



SECTION A–A



(STANDARD)



(OPTIONAL)

JOINT DETAILS

NOTES:

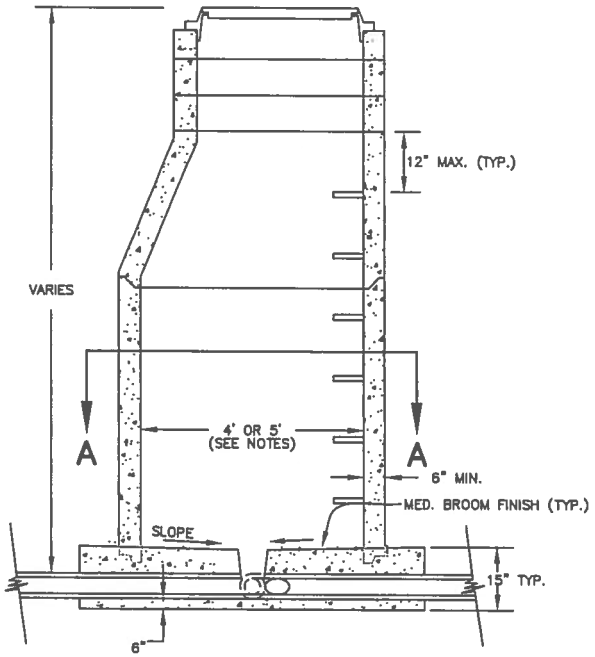
1. SEE DRAWING NO. S–02 FOR JUNCTION AND DROP MANHOLE SIZES.
2. PRECAST BASE MAY BE USED, BUT REQUIRES MINIMUM 6" BASE PLACED BENEATH STRUCTURE.
3. IF OPTIONAL JOINT IS USED, ALL MANHOLE SECTIONS SHALL BE CLEARLY MARKED ON THE INSIDE AS TO THE MANUFACTURER AND TYPE OF JOINT BEING USED.
4. ALL MANHOLE SECTIONS SHALL BE CLEARLY MARKED ON THE INSIDE AS TO MANUFACTURER AND DATE OF MANUFACTURE.

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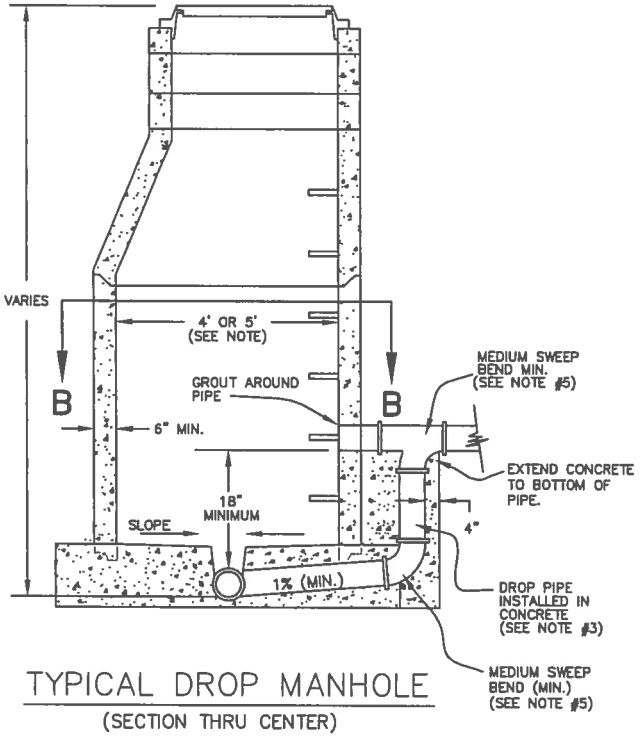
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STANDARD MANHOLE

Standard Drawing S-01



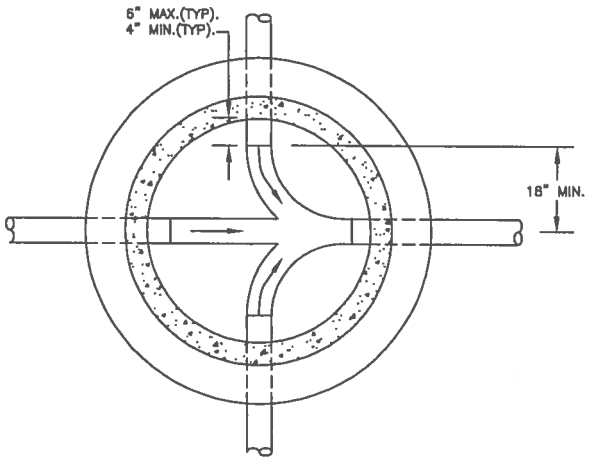
TYPICAL JUNCTION MANHOLE
(SECTION THRU CENTER)



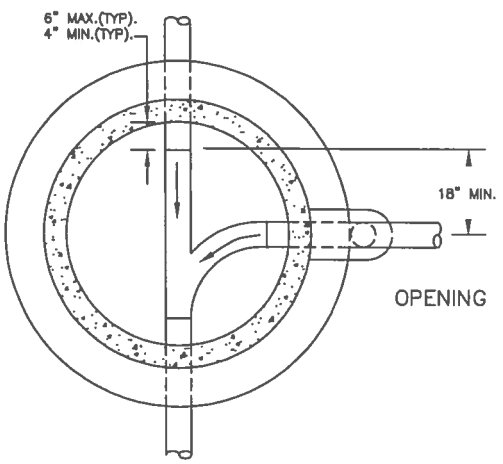
TYPICAL DROP MANHOLE
(SECTION THRU CENTER)

NOTES:

1. MANHOLE SHALL BE MINIMUM 4' DIAMETER.
2. MANHOLE SHALL BE 5' DIAMETER WHEN:
   a. ANY LINE IS 12' OR DEEPER.
   b. ANY LINE IS 12" IN DIAMETER OR LARGER.
   c. JUNCTION OF TWO OR MORE INFLOWING SEWER LINES.
   d. DROP MANHOLES.
3. VERTICAL DROP PIPE AND FITTINGS SHALL BE THE SAME SIZE AS THE INCOMING SEWER PIPE.
4. NO LATERALS SHALL BE INSTALLED DIRECTLY INTO MANHOLES UNLESS PRIOR APPROVAL BY CITY REPRESENTATIVE.
5. BENDS CAN BE 45° OR 90° - (90° IS SHOWN). ALL OTHER REQUIREMENTS ARE THE SAME.
6. FLOW LINES OF JUNCTION LINES OR BEND LINES GREATER THAN 10° SHALL ENTER MANHOLE AT 0.2' HIGHER THAN OUTFLOWING LINE.



SECTION A–A



SECTION B–B

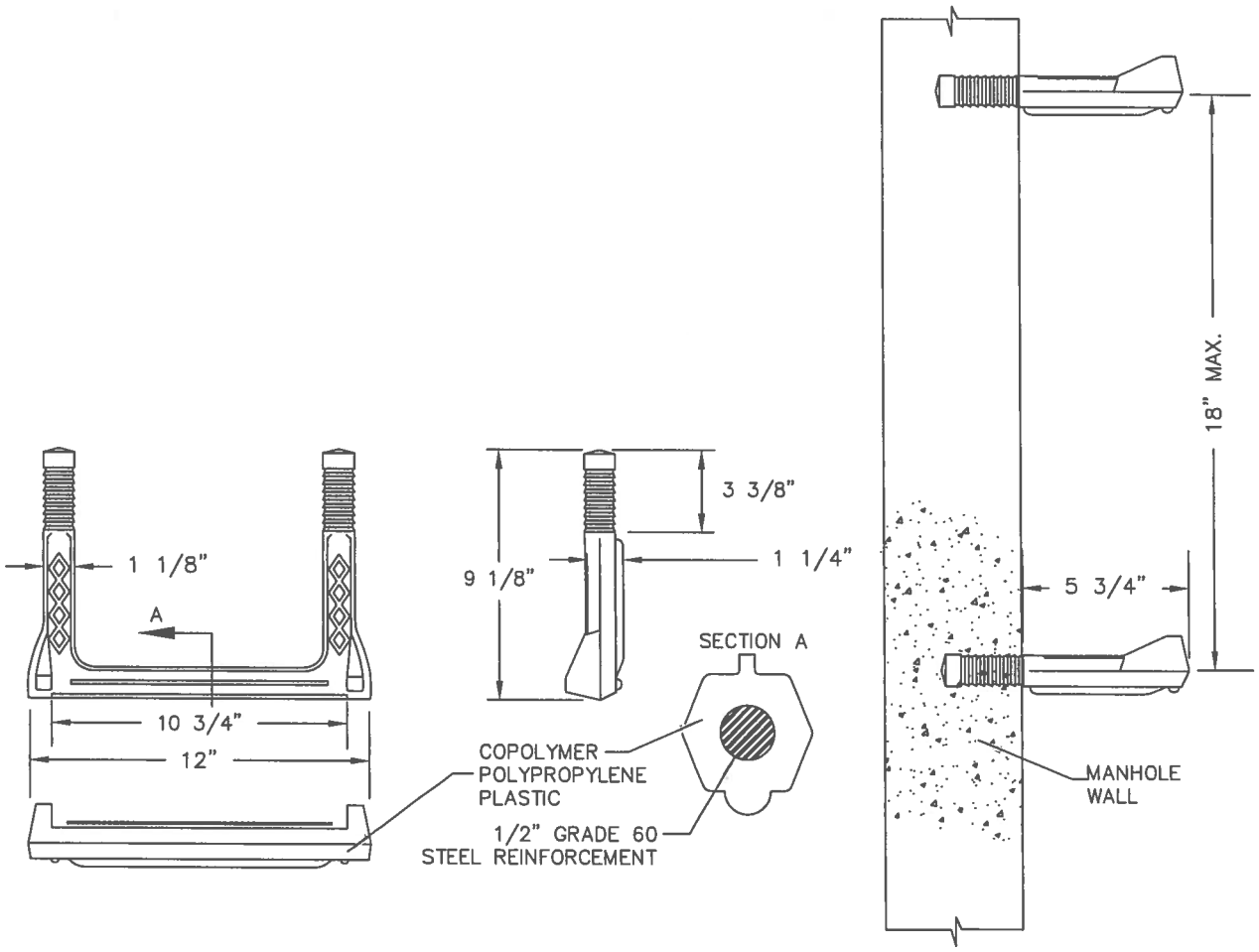
NO SCALE

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JUNCTION & DROP MANHOLE

Standard Drawing S-02



MANHOLE STEPS

NOTES:

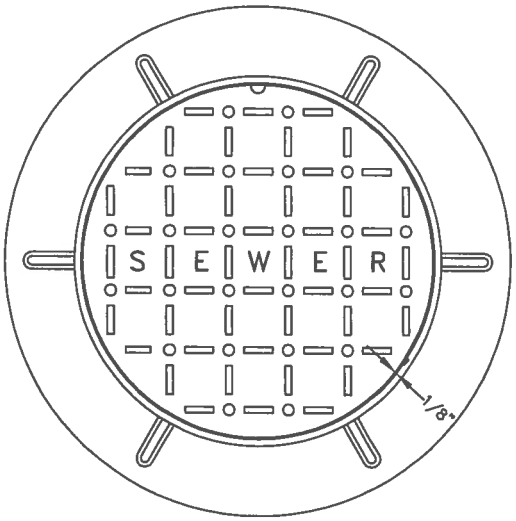
1. INSTALL STEPS PER MANUFACTURERS RECOMMENDATIONS.
2. STEPS SHALL BE ALIGNED VERTICALLY.

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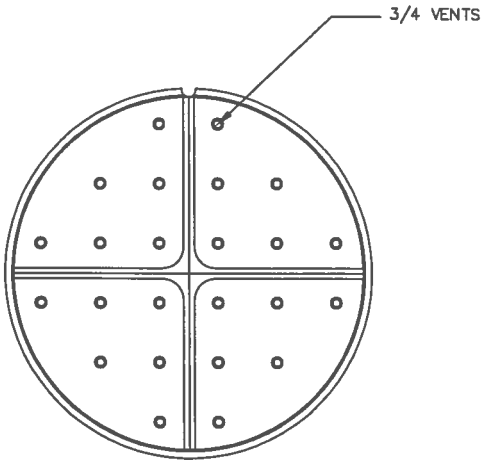
rev. 07-2010

MANHOLE STEP DETAIL

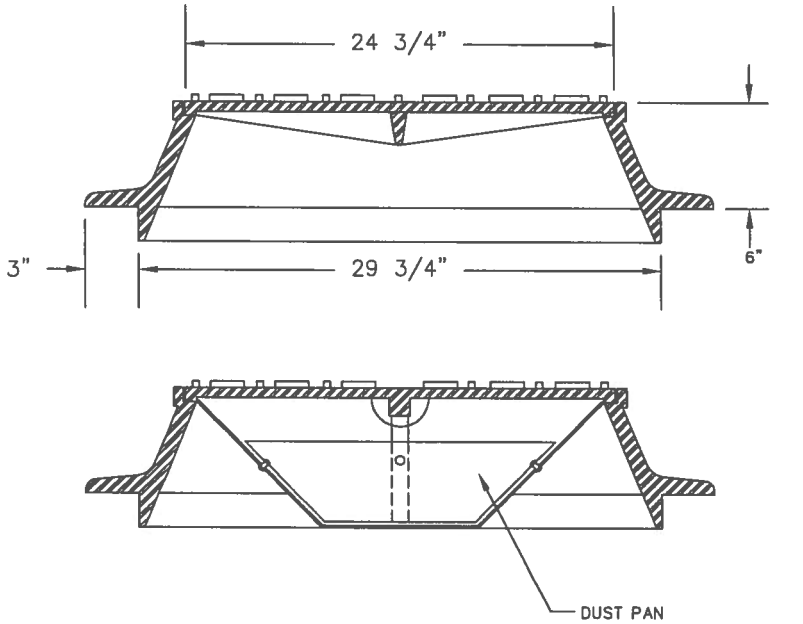
Standard Drawing S-03



PLAN OF COVER & RING



BOTTOM VIEW OF COVER



SECTIONS

NOTES:

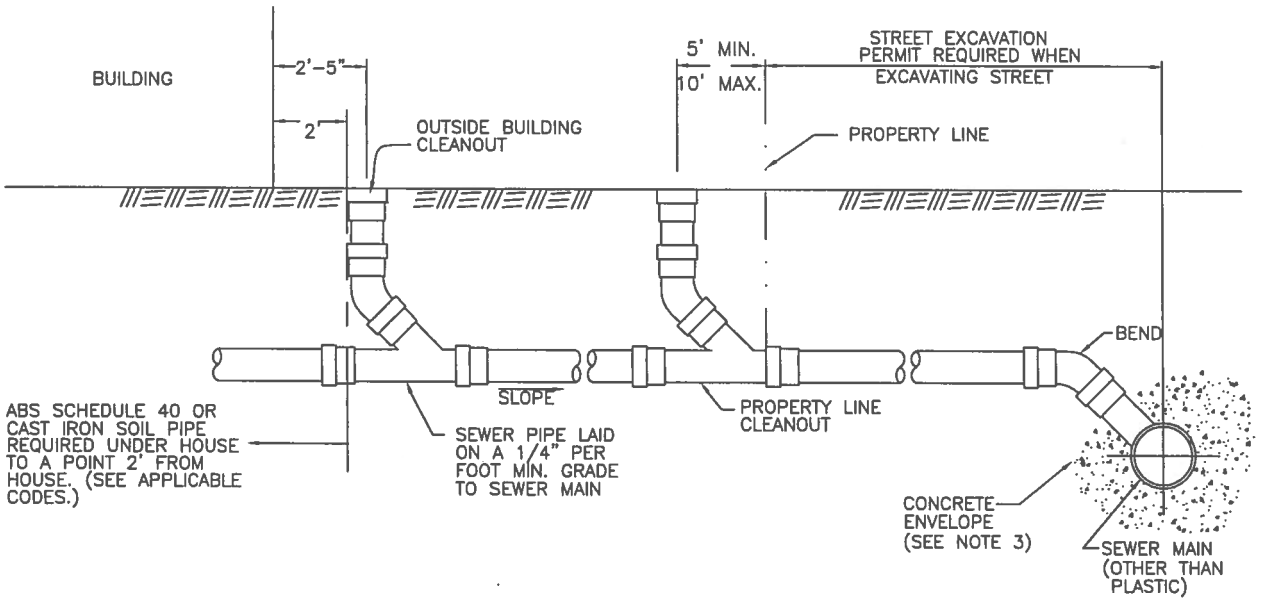
1. USE OF MANHOLE TO BE CLEARLY MARKED ON EACH LID (I.E. "SEWER", "STORM").
2. MUST MEET HS-20 LOADING.
3. A LOW PROFILE RING MAY NOT BE USED WHEN ADJUSTING TO GRADE IF A MANHOLE SECTION IS REMOVABLE.

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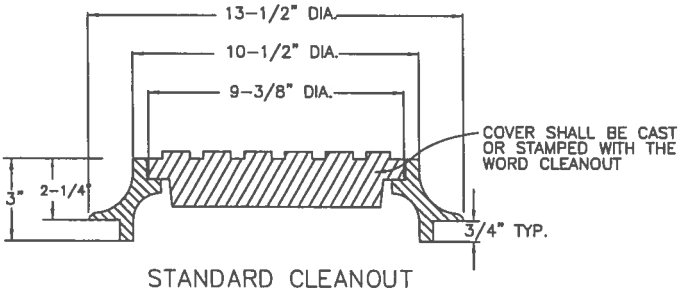
MANHOLE FRAME & COVER

Standard Drawing S-04

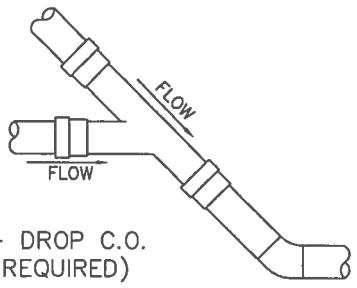


NOTES:

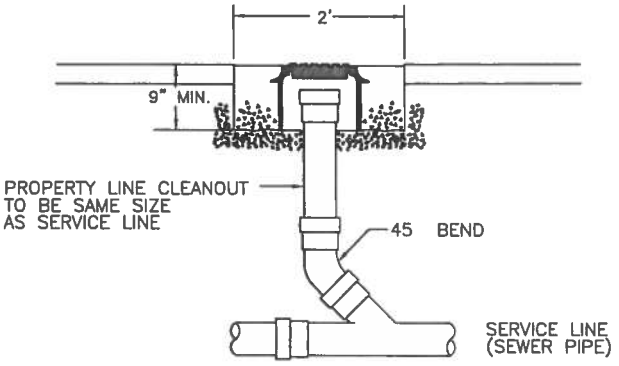
1. PROPERTY LINE AND OUTSIDE BUILDING CLEANOUTS ARE REQUIRED AS SHOWN.
2. CLEANOUT REQUIRED AT 100' MAX. SPACING (STRAIGHT RUNS) AND FOR EACH AGGREGATE CHANGE IN DIRECTION, WHERE TOTAL AGGREGATE CHANGE EXCEEDS 135°.
3. ALL LATERALS CUT INTO EXISTING MAINS SHALL BE ADAPTED WITH SADDLES. WHERE SADDLES ARE NOT WATER TIGHT, A CONCRETE ENVELOPE SHALL BE REQUIRED. LATERALS SHALL NOT PROTRUDE INTO SEWER MAINS.
4. ALL CLEANOUTS LOCATED IN DRIVEWAYS, WALKWAYS OR OTHER AREAS SUBJECT TO VEHICLE OR PEDESTRIAN TRAFFIC SHALL HAVE A CAST IRON RING AND COVER OR OTHER APPROVED PROTECTIVE DEVICE WITH CONCTRETE COLLAR.
5. FOR COMMERCIAL APPLICATION CONTACT WASTE WATER DIVISION.



STANDARD CLEANOUT
RING & LID
(H-20 RATING)



DETAIL - DROP C.O.
(WHERE REQUIRED)



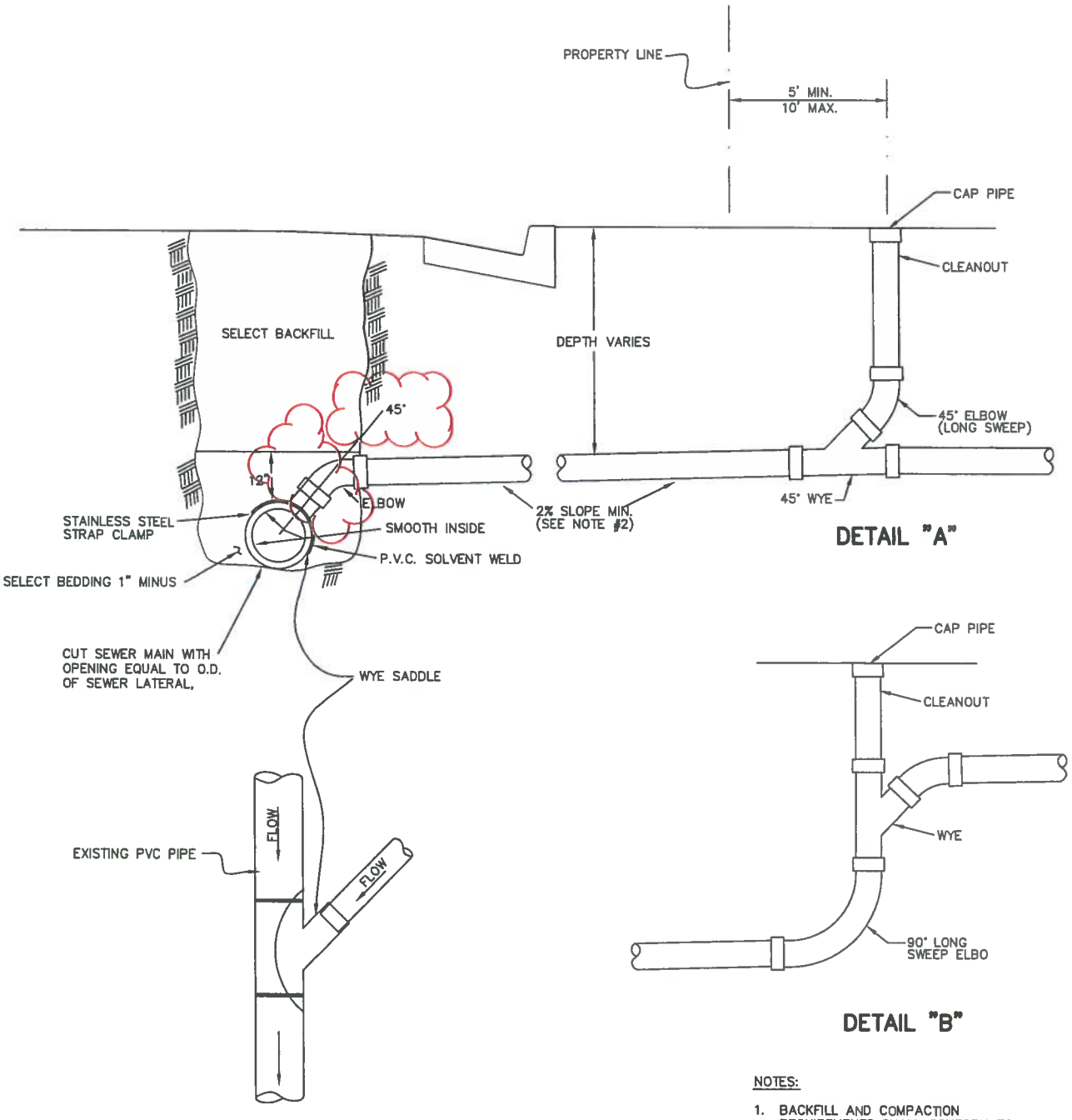
CLEANOUT DETAIL B

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TYPICAL SEWER CONNECTION DETAILS

Standard Drawing S-05



DETAIL "A"

DETAIL "B"

NOTES:

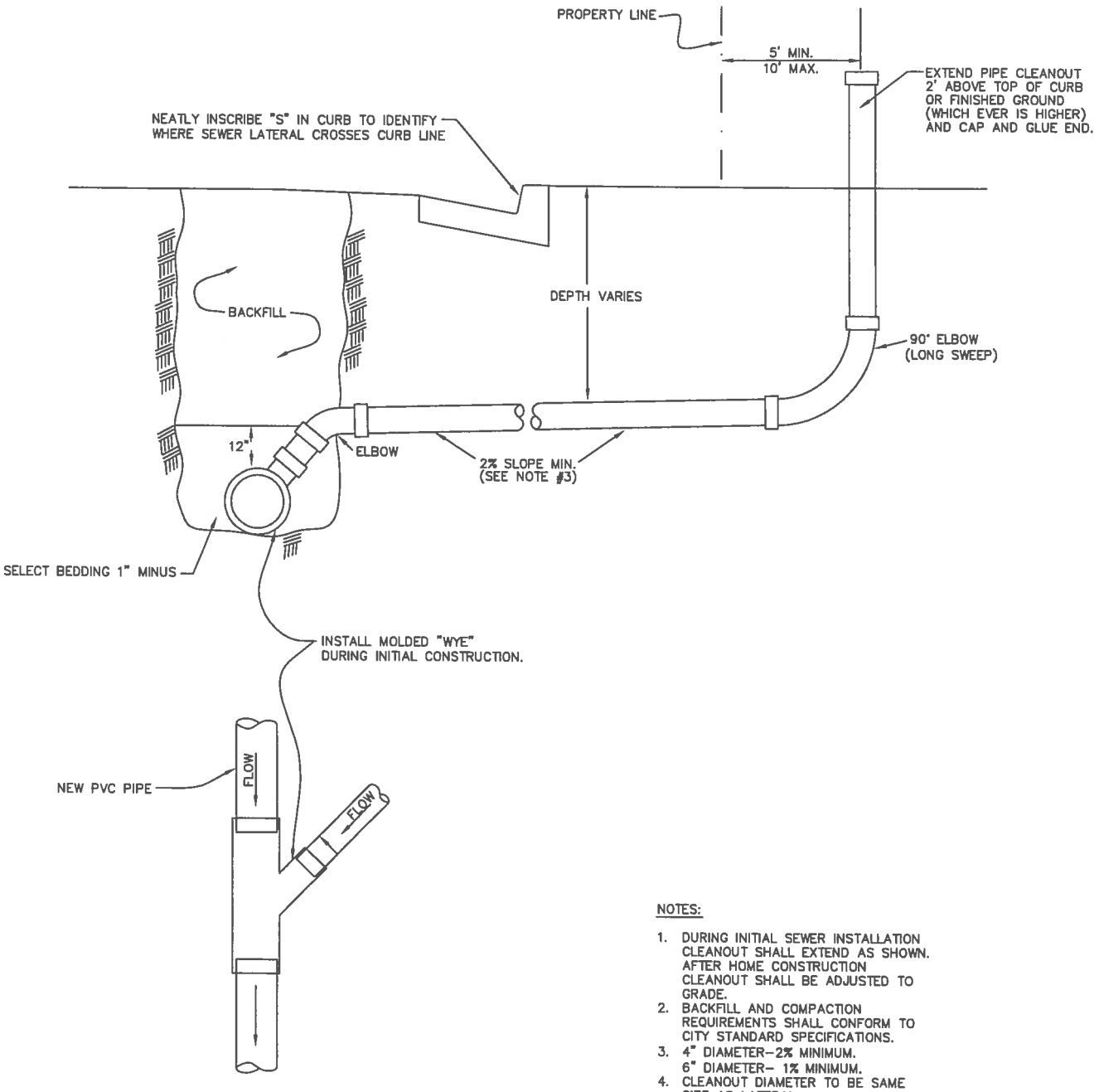
1. BACKFILL AND COMPACTION REQUIREMENTS SHALL CONFORM TO CITY STANDARD SPECIFICATIONS.
2. 4" DIAMETER–2% MINIMUM.
   6" DIAMETER– 1% MINIMUM.
3. CLEANOUT DIAMETER TO BE SAME SIZE AS LATERAL.
4. INSTALL WYE SADDLE PER MANUFACTURER'S RECOMMENDATIONS.
5. PIPE LAID WITH BELL ENDS UP-GRADE.
6. INSERTA WYE IS AN ACCEPTABLE OPTION ONLY FOR CONNECTIONS INTO EXISTING MAINS, NOT FOR NEW CONSTRUCTION. MUST BE CONCRETE ENCASED.

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PVC SERVICE CONNECTION TO EXISTING PVC MAIN

Standard Drawing S-06



NOTES:

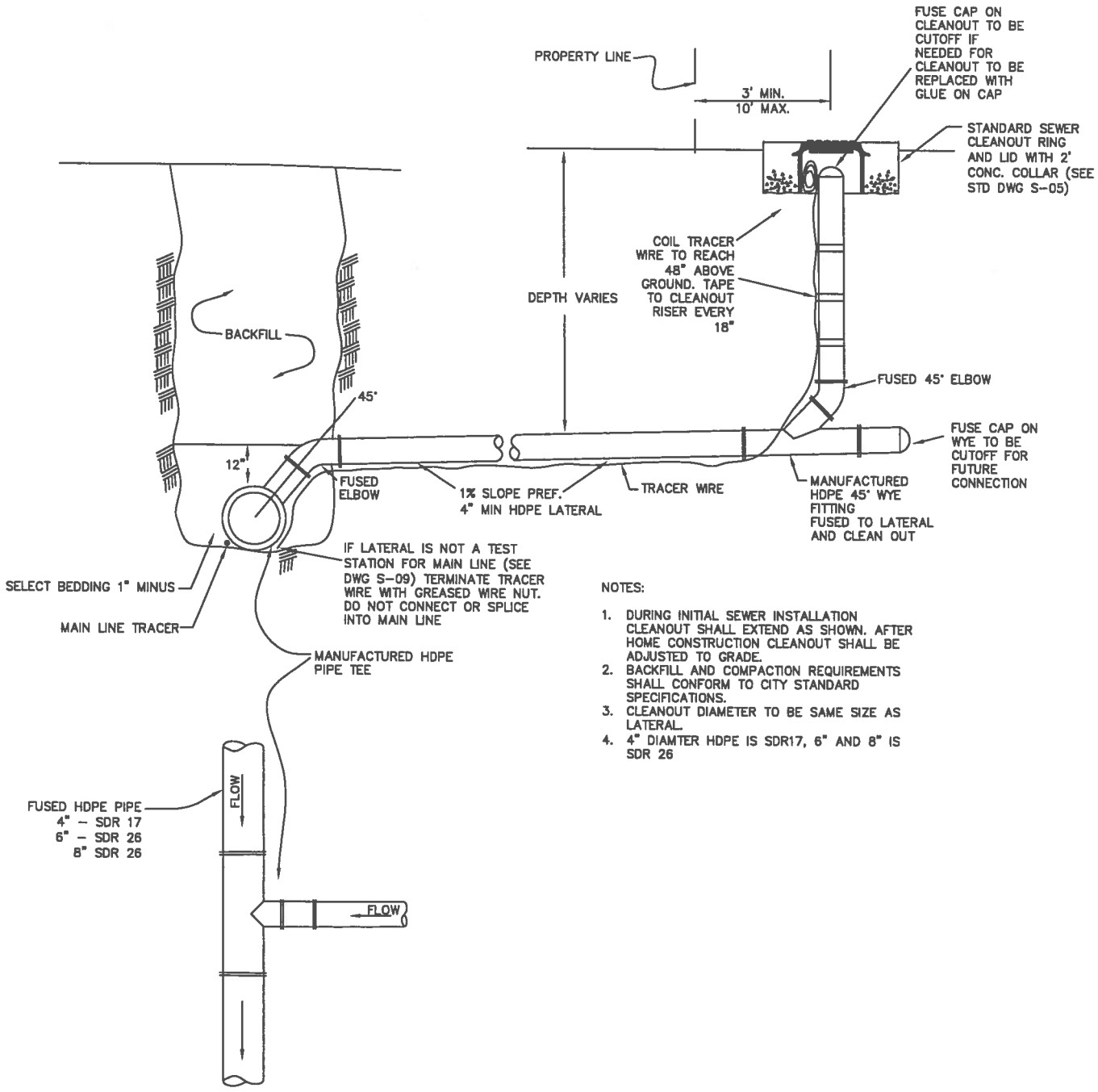
1. DURING INITIAL SEWER INSTALLATION CLEANOUT SHALL EXTEND AS SHOWN. AFTER HOME CONSTRUCTION CLEANOUT SHALL BE ADJUSTED TO GRADE.
2. BACKFILL AND COMPACTION REQUIREMENTS SHALL CONFORM TO CITY STANDARD SPECIFICATIONS.
3. 4" DIAMETER–2% MINIMUM.
   6" DIAMETER– 1% MINIMUM.
4. CLEANOUT DIAMETER TO BE SAME SIZE AS LATERAL.
5. BRASS PLUG MARKED WITH "S" PLACED IN TOP OF CURB MAY BE USED IN LIEU OF INSCRIBED "S" IN FACE.
6. PIPE LAID WITH BELL ENDS UP–GRADE.

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PVC SERVICE CONNECTION TO NEW PVC SEWER MAIN

Standard Drawing S-07



NOTES:

1. DURING INITIAL SEWER INSTALLATION CLEANOUT SHALL EXTEND AS SHOWN. AFTER HOME CONSTRUCTION CLEANOUT SHALL BE ADJUSTED TO GRADE.
2. BACKFILL AND COMPACTION REQUIREMENTS SHALL CONFORM TO CITY STANDARD SPECIFICATIONS.
3. CLEANOUT DIAMETER TO BE SAME SIZE AS LATERAL.
4. 4" DIAMTER HDPE IS SDR17, 6" AND 8" IS SDR 26

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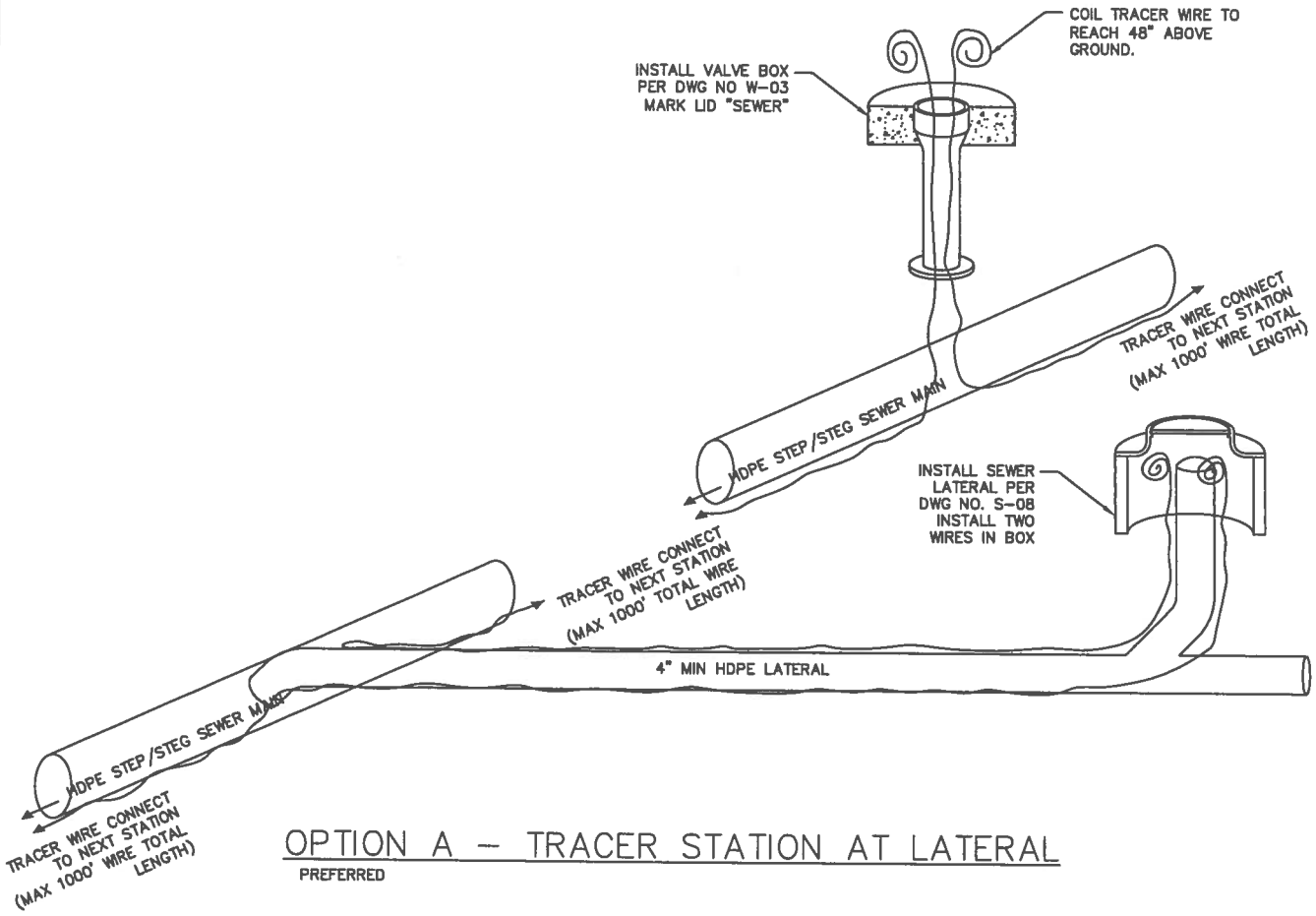
rev. 08-2019

STEP/STEG LATERAL

Standard Drawing S-08

OPTION B – MAIN TRACER STATION IN STREET

PREFERRED



OPTION A – TRACER STATION AT LATERAL

PREFERRED

TRACER WIRE NOTES:

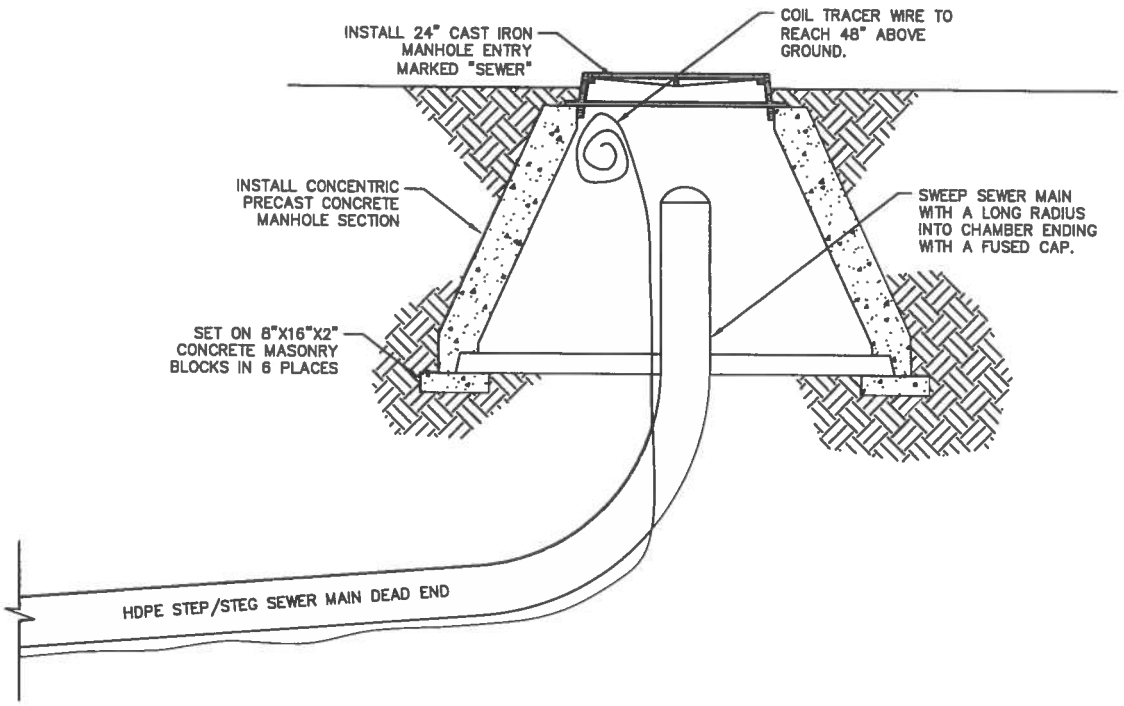
1. SEPTIC TANK EFFLUENT SEWERS SHALL HAVE TRACER WIRE INSTALLED ON ALL MAINS AND LATERALS. SEE DRAWING S-08 FOR TRACER WIRE CONFIGURATION ON LATERALS THAT ARE NOT A MAIN TRACER WIRE STATION.
2. TRACER WIRE MAY BE TUCKED UNDER HAUNCH OF PIPE OR TAPED TO THE TOP OF THE PIPE
3. MAXIMUM LENGTH OF BURIED TRACER WIRE IS 1,000 FEET. NO SPLICING ALLOWED.

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STEP/STEG TRACER WIRE

Standard Drawing S-09

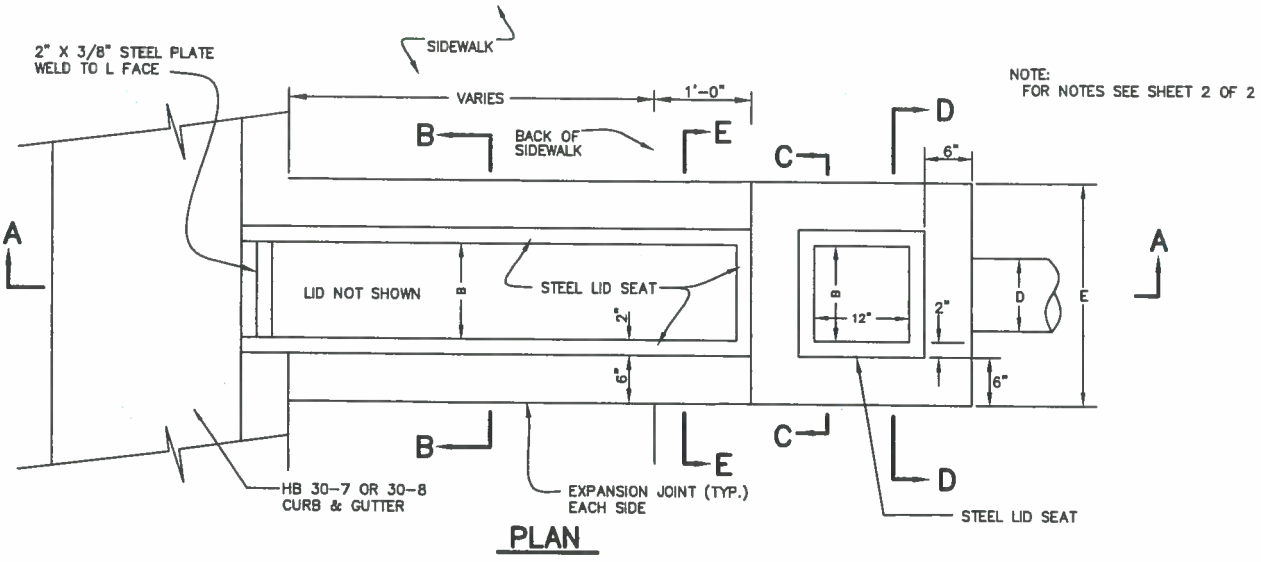


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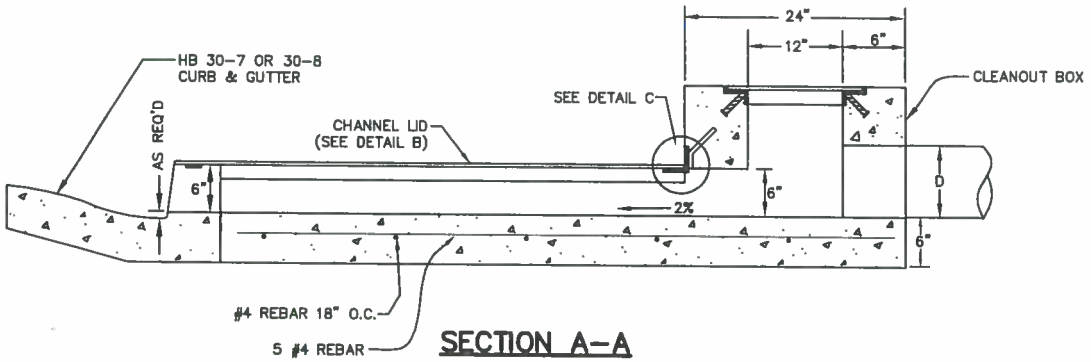
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STEP/STEG SEWER DEAD END

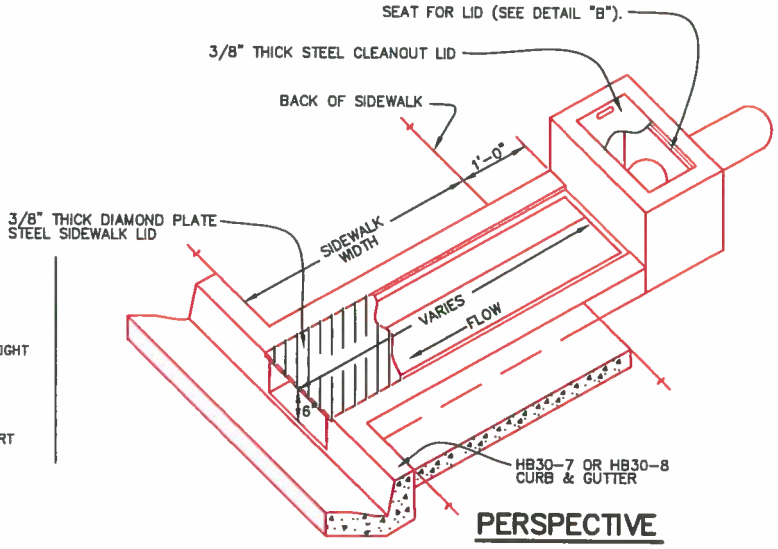
Standard Drawing S-10



PLAN



SECTION A-A



PERSPECTIVE

MARK	DIMENSION (INCHES)				COMMENTS
B	10	15	20	30*	INSIDE WIDTH
C	20	22	24	27	CLEANOUT BOX HEIGHT
D	≤8	10	12	15	INLET PIPE
E	22	27	32	42	BOX WIDTH
K	18	23	28	38	STEEL END SUPPORT

DIMENSION TABLE

*REQUIRES ENGINEERED DESIGN FOR LID & BOX.

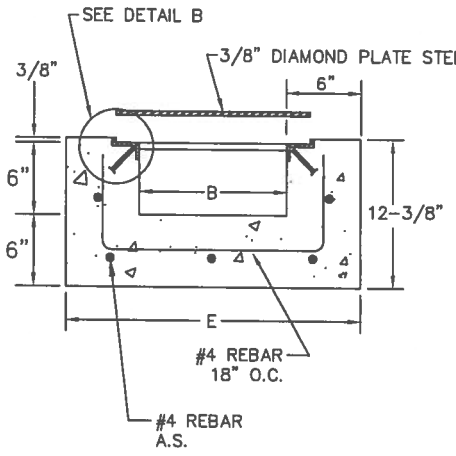
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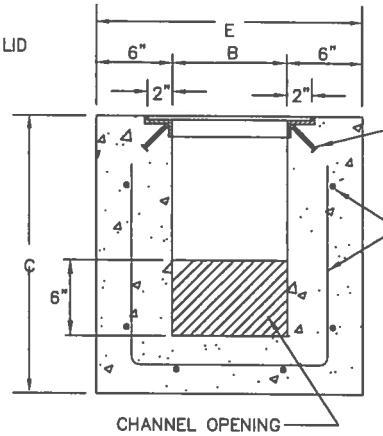
SIDEWALK DRAINAGE STRUCTURE

Standard Drawing SD-01

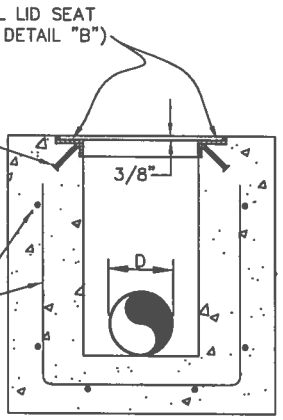
NOTE:
STEEL LID TO BE FLUSH
WITH CONCRETE SIDEWALK.



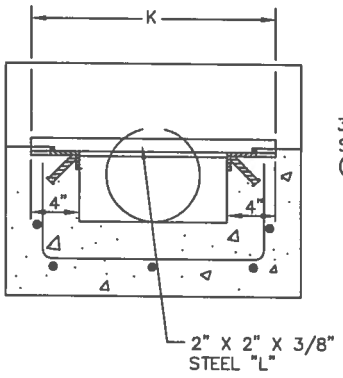
SECTION B–B



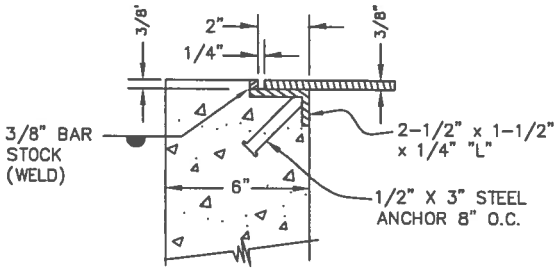
SECTION C–C



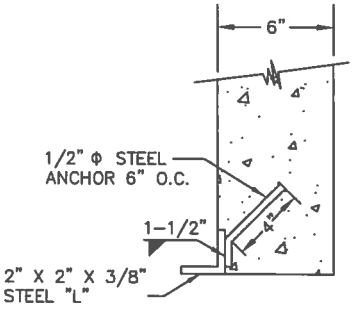
SECTION D–D



SECTION E–E



DETAIL B



DETAIL C

MARK	DIMENSION (INCHES)				COMMENTS
B	10	15	20	30*	INSIDE WIDTH
C	20	22	24	27	CLEANOUT BOX HEIGHT
D	≤8	10	12	15	INLET PIPE
E	22	27	32	42	BOX WIDTH
K	18	23	28	38	STEEL END SUPPORT

DIMENSION TABLE

*REQUIRES ENGINEERED DESIGN FOR LID & BOX.

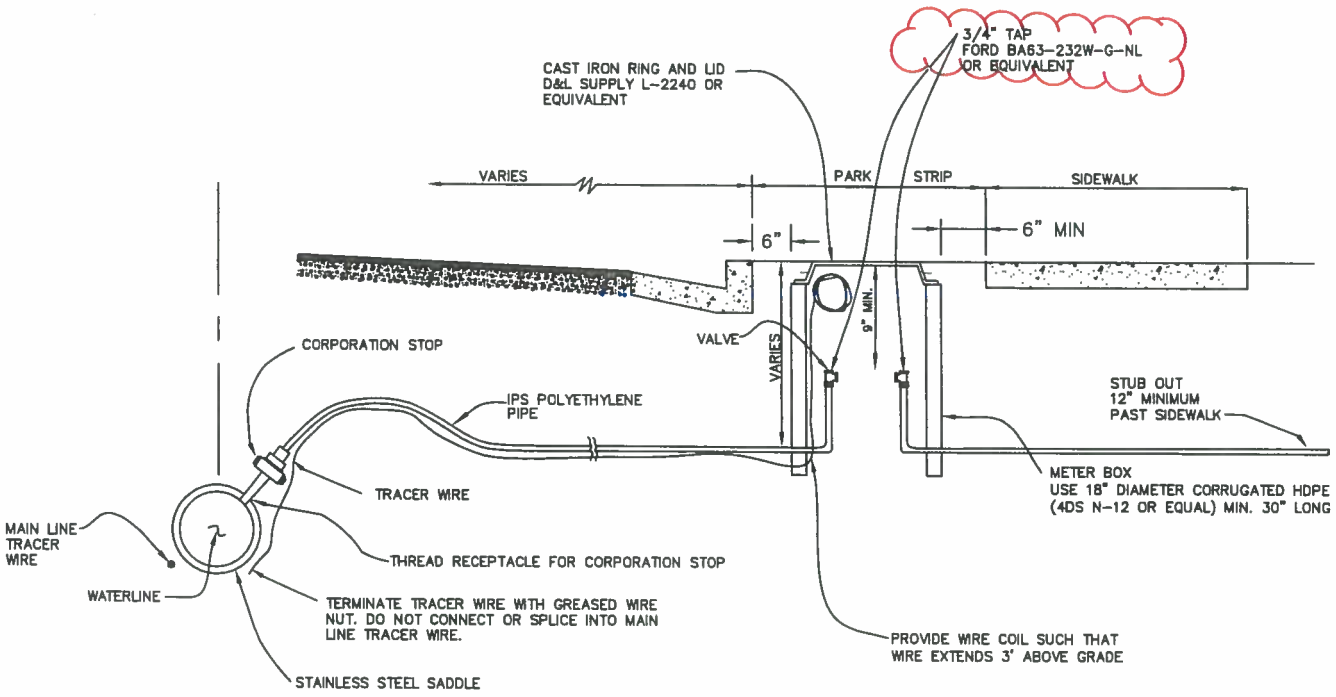
NOTES:
1– ALL REBAR SHALL HAVE 2" MIN. CLEAR.
2– STEEL LID SHALL BE FLUSH WITH CONCRETE.
3– BOX DIMENSIONS BASED UPON INLET PIPE SIZE "D".
4– ALL STEEL SHALL BE GRADE 60.
5– LID FOR CLEANOUT BOX SHALL HAVE 1–4 INCH X 1" SLOT FOR LIFTING. LID MAY BE SMOOTH OR DIAMOND PLATE STEEL.
6– SIDEWALK LID SHALL BE DIAMOND PLATE STEEL.
7– STANDARD REBAR SHALL NOT BE USED FOR STEEL ANCHORS.
8– ALL EXTERIOR EDGES OF CLEANOUT BOX TO HAVE 3/4" TO 1" CHAMFER (NOT SHOWN IN DETAILS FOR CLARITY).
9– STEEL LIDS AND SEAT TO BE PAINTED GREY IN ACCORDANCE WITH CITY STANDARDS.

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SIDEWALK DRAINAGE STRUCTURE DETAILS

Standard Drawing SD-02



NOTES:

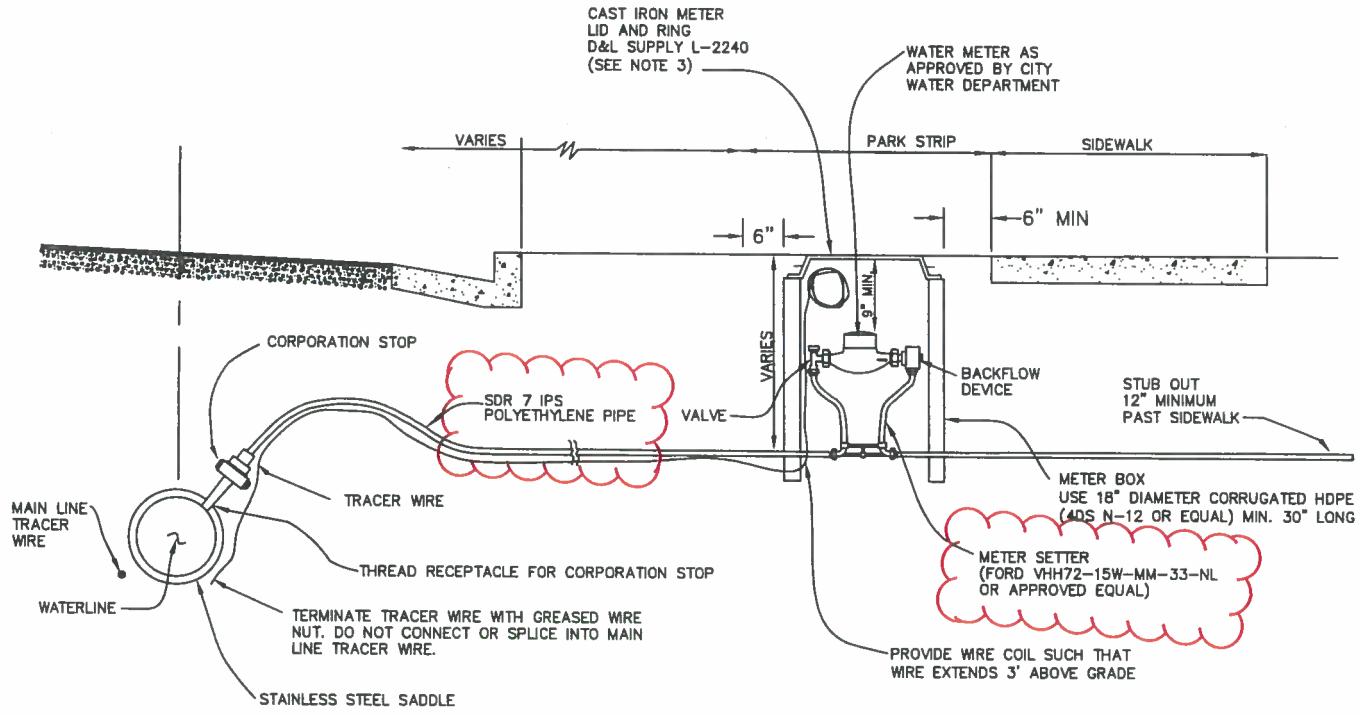
1. ALL TRENCH EXCAVATION AND COMPACTION SHALL BE IN ACCORDANCE WITH STANDARD SPECIFICATIONS.
2. CORPORATION STOP AND SERVICE PIPE SHALL MATCH SIZE OF METER.
3. METER LID SHALL BE MARKED "IRRIGATION".
4. IF PARK STRIP IS LESS THAN 3 FEET, THEN MOVE TO BEHIND SIDEWALK.
5. EACH SERVICE SHALL HAVE ITS OWN TAP. DO NOT COMBINE SERVICES TO REDUCE NUMBER OF TAPS.

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3/4" AND 1" IRRIGATION WATER CONNECTION

Standard Drawing I-01



NOTES:

1. ALL TRENCH EXCAVATION AND COMPACTION SHALL BE IN ACCORDANCE WITH STANDARD SPECIFICATIONS.
2. CORPORATION STOP AND SERVICE PIPE SHALL MATCH SIZE OF METER.
3. METER LID SHALL HAVE 1-3/4" HOLE IN CENTER OF LID.
4. IF PARK STRIP IS LESS THAN 3 FEET, THEN MOVE TO BEHIND SIDEWALK.
5. EACH SERVICE SHALL HAVE ITS OWN TAP. DO NOT COMBINE SERVICES TO REDUCE NUMBER OF TAPS.

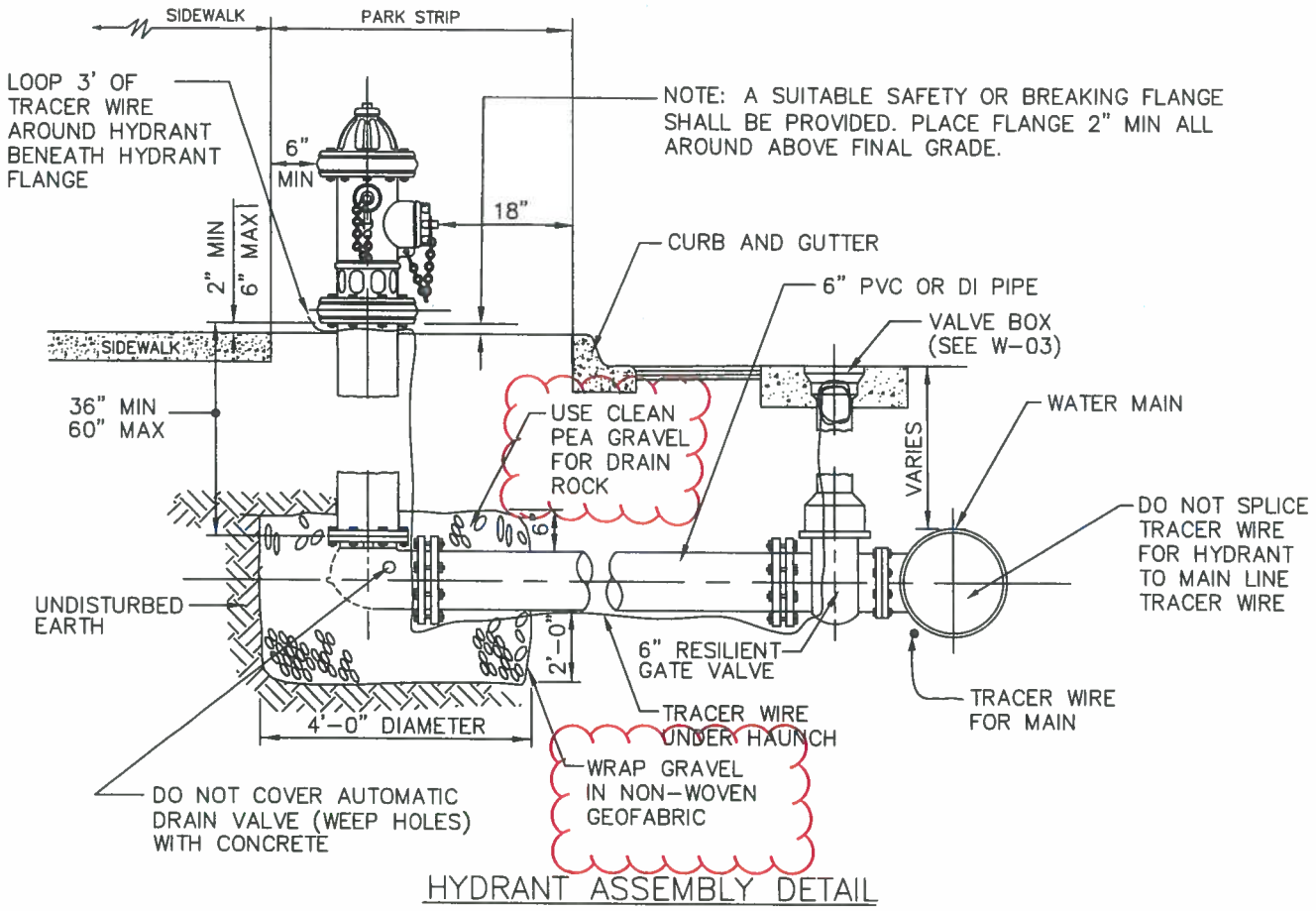
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3/4" AND 1" WATER SERVICE CONNECTION

Standard Drawing W-01

UNIFORM DESIGN STANDARDS FOR WATER DISTRIBUTION SYSTEMS



HYDRANT ASSEMBLY DETAIL

NOTES:

1. IF PARK STRIP IS LESS THAN 3 FEET, INSTALL HYDRANT BEHIND SIDEWALK.
2. NO HYDRANT SHALL BE LOCATED WITHIN 25 FEET OF ANY STRUCTURE OR 6 FEET OF A DRIVEWAY, POWER POLE, LIGHT STANDARD, OR ANY OTHER OBSTRUCTION. FOR WALLS, FENCE, AND PLANTER LOCATIONS, A PERIMETER AROUND THE HYDRANT MEASURING A MINIMUM OF 3 FEET FROM ITS CIRCUMFERENCE SHALL BE MAINTAINED CLEAR OF ALL OBSTRUCTIONS AT ALL TIMES. HYDRANTS MUST BE LOCATED A MINIMUM OF 6 FEET AWAY FROM THE BEGINNING OF A TURNING RADIUS.
3. 6" FIRE HYDRANT LATERAL SHALL BE THE SAME PRESSURE CLASS AS THE DISTRIBUTION MAIN.
4. DUCTILE IRON PIPE TO BE ENCASED WITH TWO LAYERS EIGHT MILS THICK POLYETHYLENE FILM. DO NOT ENCASE FIRE HYDRANT BARREL.
5. ALL FIRE HYDRANTS SHALL BE REPAINTED AS REQUIRED IF DAMAGED DURING INSTALLATION.
6. ELEVATION OF FIRE HYDRANTS SHALL BE VERIFIED PRIOR TO INSTALLATION WHEN SITE IS STILL ROUGH GRADED.
7. RESTRAIN ALL JOINTS AS REQUIRED FOR THRUST CONTROL. CONCRETE THRUST BLOCKS ONLY ALLOWED WITH PRIOR CITY APPROVAL.

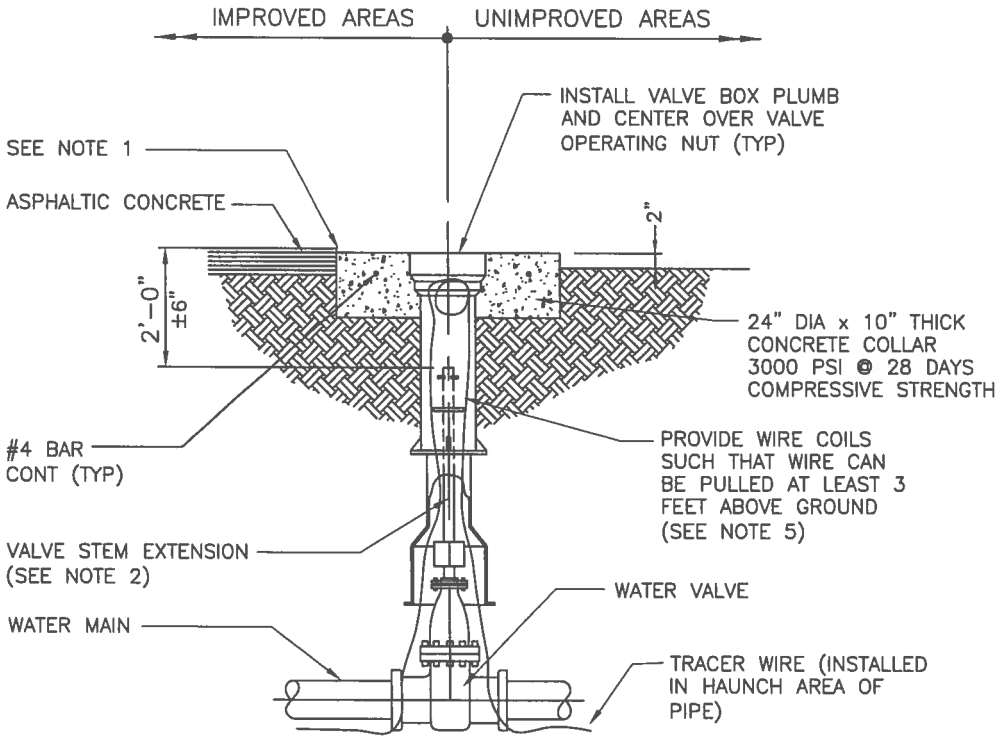
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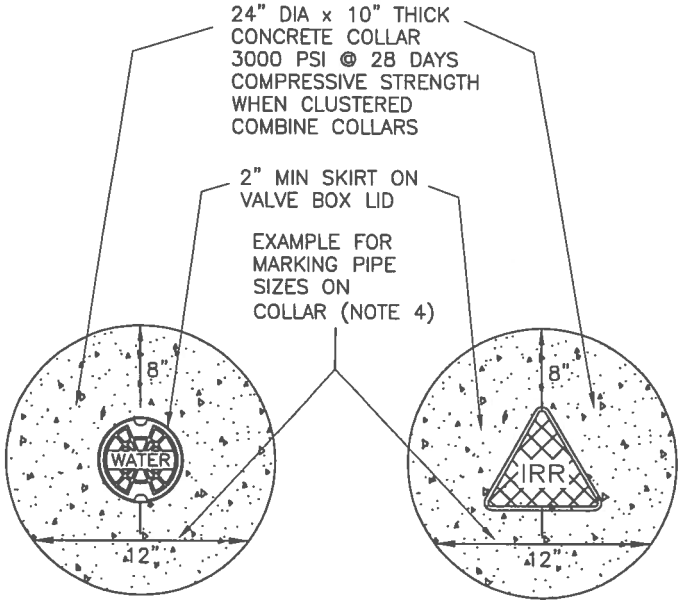
FIRE HYDRANT INSTALLATION

Standard Drawing W-02

UNIFORM DESIGN STANDARDS FOR WATER DISTRIBUTION SYSTEMS



SECTION



CULINARY WATER

IRRIGATION WATER

NOTES:

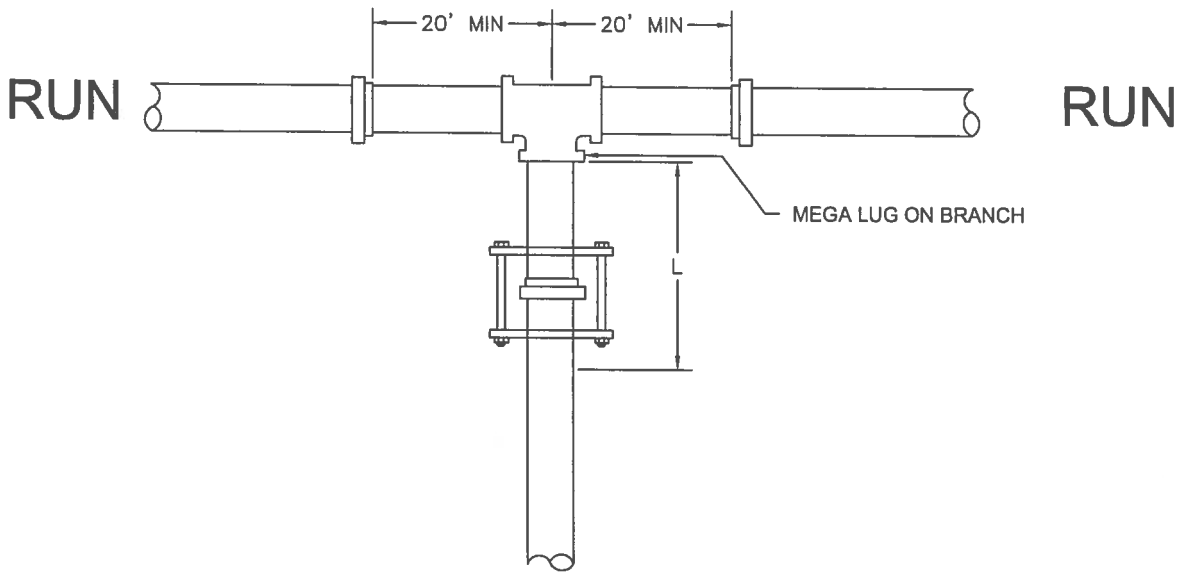
1. FINAL RIM ELEVATION TO BE 1/8" BELOW FINAL STREET GRADE.
2. A VALVE STEM EXTENSION SHALL BE PROVIDED TO WITHIN 2' OF FINISHED GRADE WHERE THE DEPTH TO THE OPERATING NUT EXCEEDS 5'.
3. CONTRACTOR TO FORM CONCRETE COLLAR IN UNIMPROVED AREAS WITH SONOTUBE OR EQUAL AND REMOVE PRIOR TO BACKFILL INSTALLATION (TYP).
4. MARK PIPE SIZES ON COLLARS.
5. WHEN TRACER WIRE TERMINATES IN VALVE BOX, INSTALL GREASED WIRE NUT.
6. THIS DETAIL SHALL APPLY TO IRRIGATION SYSTEM VALVES WITH THE EXCEPTION THAT IRRIGATION SYSTEMS SHALL USE TRIANGLE SHAPED VALVE BOX LIDS AND RINGS.

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VALVE AND VALVE BOX INSTALLATION

Standard Drawing W-03



RUN SIZE DIAMETER

BRANCH SIZE DIAMETER	4	6	8	10	12	14	16	18	20	24
4	*	*	*	*	*	*	*	*	*	*
6		*	*	*	*	*	*	*	*	*
8			*	*	*	*	*	*	*	*
10				10	*	*	*	*	*	*
12					28	12	4	*	*	*
14						45	31	17	3	*
16							62	49	37	11
18								78	67	44
20									95	74
24										127

* - FOR THIS CONDITION NEED ONLY RESTRAIN THE BRANCH OUTLET OF THE TEE.

RESTRAINED LENGTHS, "L" (IN FEET)

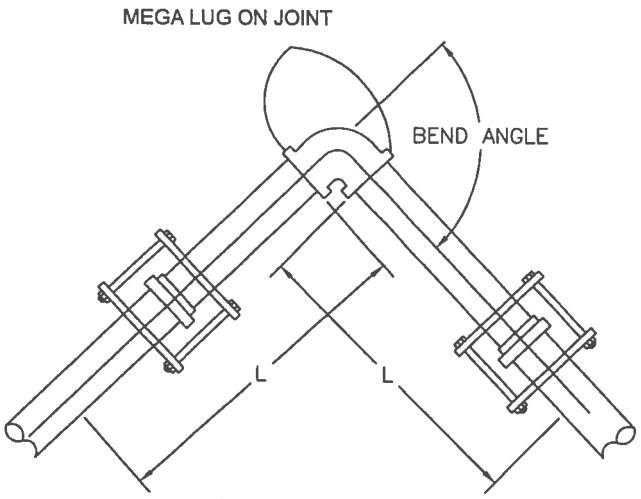
1. RESTRAIN THE TWO MECHANICAL JOINTS ON THE RUN SIDES OF THE TEE. THERE SHOULD BE A FULL 20' LENGTH OF PIPE INSTALLED ON EACH SIDE OF THE RUN.
2. ALL JOINTS WITHIN THE LENGTH "L" ON THE BRANCH MUST BE RESTRAINED. USE RETAINER GLAND AT MECHANICAL JOINTS AND HARNESS ON PUSH-ON PIPE PER CITY SPECIFICATION.

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STANDARD TEE PVC RESTRAINING SYSTEM DETAIL

Standard Drawing W-04

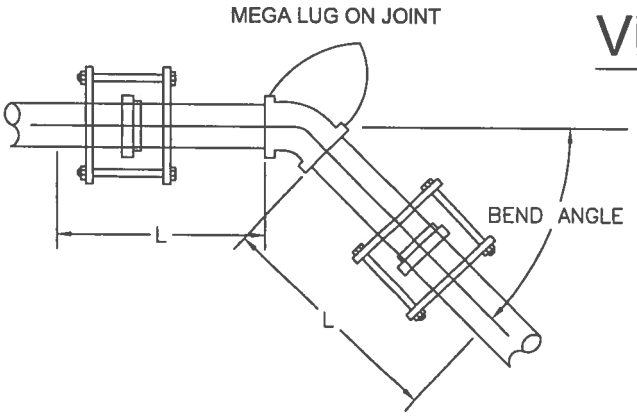


HORIZONTAL BEND

1. ALL JOINTS WITHIN LENGTH "L" MUST BE RESTRAINED. USE RETAINER GLAND AT MECHANICAL JOINTS AND HARNESS WITH PUSH-ON PIPE PER CITY SPECIFICATION.
2. FOR TEST PRESSURES AND LAYING CONDITIONS SEE SECTION ON GENERAL NOTES FOR USE OF RESTRAINED JOINT LENGTHS.

BEND ANGLE	SIZE DIAMETER 4	6	8	10	12	14	16	18	20
11.25	2	3	4	4	5	6	7	7	8
22.5	4	6	7	9	10	12	13	15	16
45	8	12	15	18	21	24	28	30	33
90	20	28	37	44	52	59	67	73	81

RESTRAINED LENGTHS, "L" (IN FEET)



VERTICAL DOWN BEND

1. ALL JOINTS WITHIN LENGTH "L" MUST BE RESTRAINED. USE RETAINER GLAND AT MECHANICAL JOINTS AND HARNESS WITH PUSH-ON PIPE PER CITY SPECIFICATION.
2. 2. FOR TEST PRESSURES AND LAYING CONDITIONS SEE SECTION ON GENERAL NOTES FOR USE OF RESTRAINED JOINT LENGTHS.

BEND ANGLE	SIZE DIAMETER 4	6	8	10	12	14	16	18	20
11.25	6	8	10	12	14	15	17	20	20
22.5	11	15	19	23	27	31	35	40	40
45	23	31	40	48	56	64	72	80	80

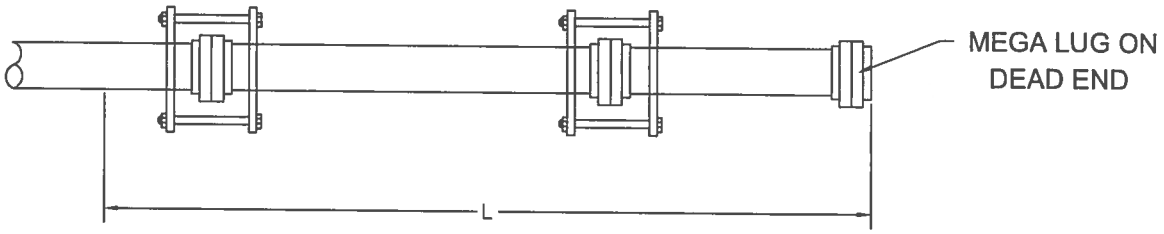
RESTRAINED LENGTHS, "L" (IN FEET)

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STANDARD BENDS FOR PVC RESTRAININGSYSTEM DETAIL

Standard Drawing W-05



1. ALL JOINTS WITHIN LENGTH "L" MUST BE RESTRAINED. USE RETAINER GLAND AT MECHANICAL JOINTS AND HARNESS WITH PUSH-ON PIPE PER CITY SPECIFICATION.
2. FOR TEST PRESSURES AND LAYING CONDITIONS SEE SECTION ON GENERAL NOTES FOR USE OF RESTRAINED JOINT LENGTHS.

PIPE SIZE IN INCHES

4	6	8	10	12	14	16	18	20
44	62	82	99	118	135	153	169	187

RESTRAINED LENGTHS, "L" (IN FEET)

RESTRAINED JOINT LENGTHS USAGE GENERAL NOTES

RESTRAINED LENGTH CALCULATIONS ARE BASED ON THE FOLLOWING DESIGN TYPICALLY USED WITH BACKFILL IN ST. GEORGE.

1. THREE (3) FEET MINIMUM DEPTH OF COVER.
2. A SAFETY FACTOR OF 1.5
3. SOIL TYPE SANDY CLAY
4. TYPE 5 TRENCH COMPACTION FROM FOUR (4) INCHES MINIMUM UNDER THE PIPE TO THE CENTER LINE OF THE PIPE, AND COMPACTED GRANULAR OR SELECTED MATERIAL FROM THE CENTER LINE OF THE PIPE TO THE TOP OF THE PIPE (90 PERCENT STANDARD PROCTOR DENSITY, AASHTO T-99).
5. 200 PSI TEST PRESSURES FOR FOUR (4) THROUGH SIXTEEN (16) INCH SIZE PIPES.

IF ACTUAL CONDITIONS DIFFER FROM THOSE LISTED ABOVE OR THE REQUIRED RESTRAINED LENGTH CANNOT BE MET, THE RESTRAINED JOINT LENGTH SHALL BE DETERMINED BY THE WATER AND POWER ENGINEER.

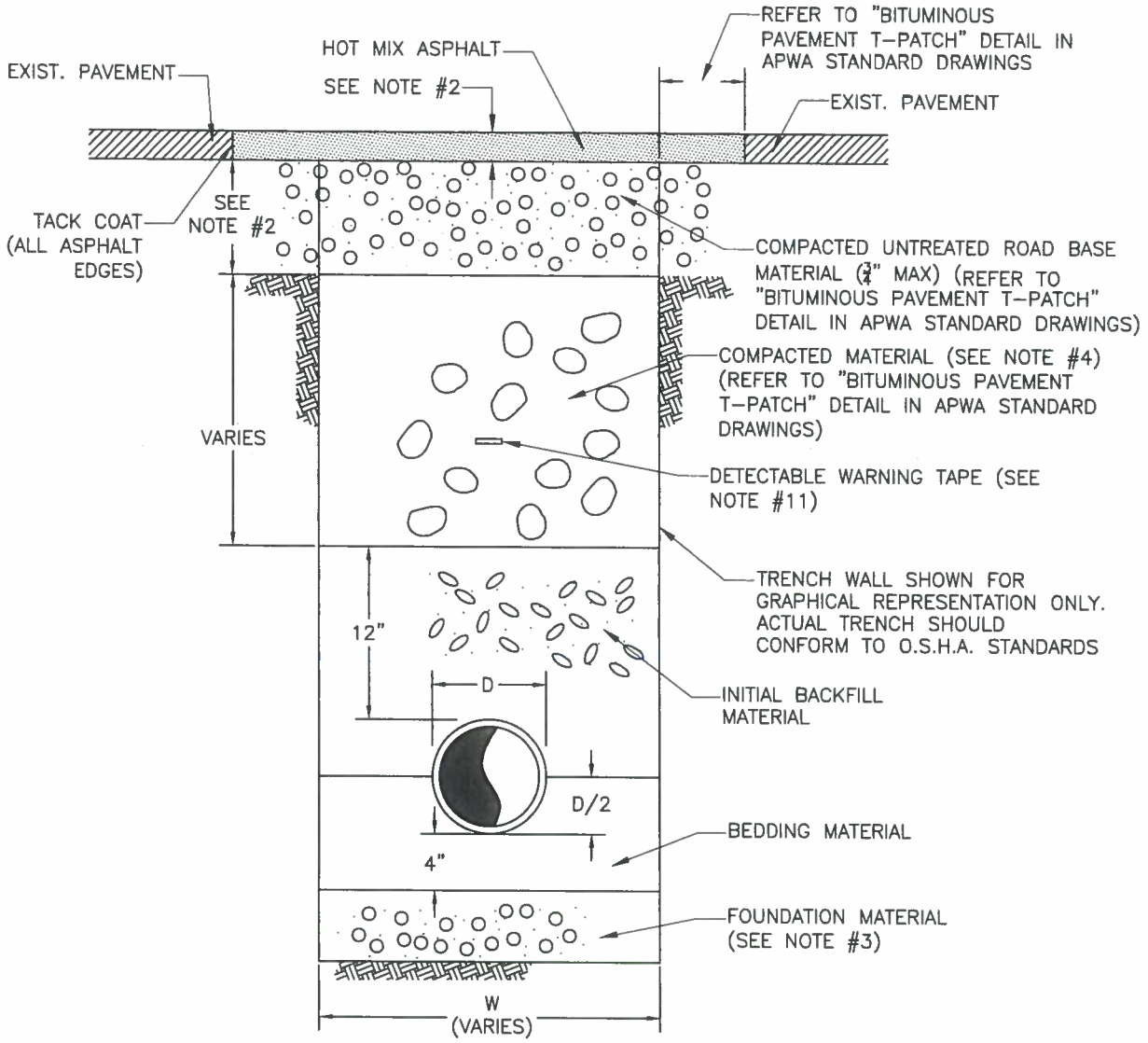
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IVINS CITY — OUR HOME BENEATH THE BIG RED MOUNTAIN — UTAH

IN LINE / DEAD END ON PVC PIPE DETAIL

Standard Drawing W-06



NOTES:

1. ALL EXCAVATIONS WITHIN PUBLIC RIGHT–OF–WAY REQUIRE AN ENCROACHMENT PERMIT FROM THE CITY.
2. MINIMUM THICKNESS OF ASPHALT AND BASE SHALL BE AS OUTLINED IN THE ROADWAY REQUIREMENTS. IN NO CASE SHALL THE THICKNESS BE LESS THAN THE EXISTING
3. FOUNDATION MATERIAL SHALL BE USED WHEN TRENCH BOTTOM IS UNSTABLE.
4. MINIMUM COMPACTION SHALL BE 95%. WHEN APPROVED FLOWABLE FILL OR SLURRY IS USED COMPACTION TESTING WILL NOT BE REQUIRED.
5. WHEN MATERIAL UNDER THE 6" OVERCUT SLUFFS OFF OR IS REMOVED, BASE SHALL BE COMPACTED TO THE BOTTOM LEVEL OF EXISTING ASPHALT. AN ADDITIONAL 6" IN WIDTH OF ASPHALT SHALL BE CUT, REMOVED AND REPLACED AS PART OF THE OVERALL PATCH.
6. WHERE ROAD SECTION HAS A DESIGNED GRANULAR SUB–BASE, IT SHALL BE REPLACED IN KIND OR WITH ROAD BASE GRAVEL.
7. IN GENERAL, STREET SURFACES LESS THAN 24 MONTHS OLD WILL NOT BE CUT! IF A CUT MUST BE MADE, ADDITIONAL, STRICTER REQUIREMENTS MAY BE INVOKED. SEE CITY ENGINEER.
8. 24 HOUR NOTICE REQUIRED ON ALL INSPECTIONS.
9. ALL TRENCH BACKFILL SHALL MEET MIN. COMPACTION REQUIREMENTS.
10. EXCLUDING EMERGENCY CLOSURES, ALL ROAD CLOSURES AND DETOURS REQUIRE 48 HOURS PRIOR NOTICE.
11. DETECTABLE WARNING TAPE TO BE INSTALLED 24" ABOVE TOP OF PIPE. FOR SHALLOW PIPES, INSTALL TAPE AS CLOSE TO 24" ABOVE PIPE AS POSSIBLE WHILE STAYING BELOW AND OUT OF BASE COURSE MATERIAL.
12. REFER TO APWA STANDARD DRAWING – BITUMINOUS PAVEMENT T–PATCH DETAIL FOR ALL ASPHALT PATCH REPAIRS.

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TRENCH BACKFILL AND REPAIR DETAIL

Standard Drawing W-07

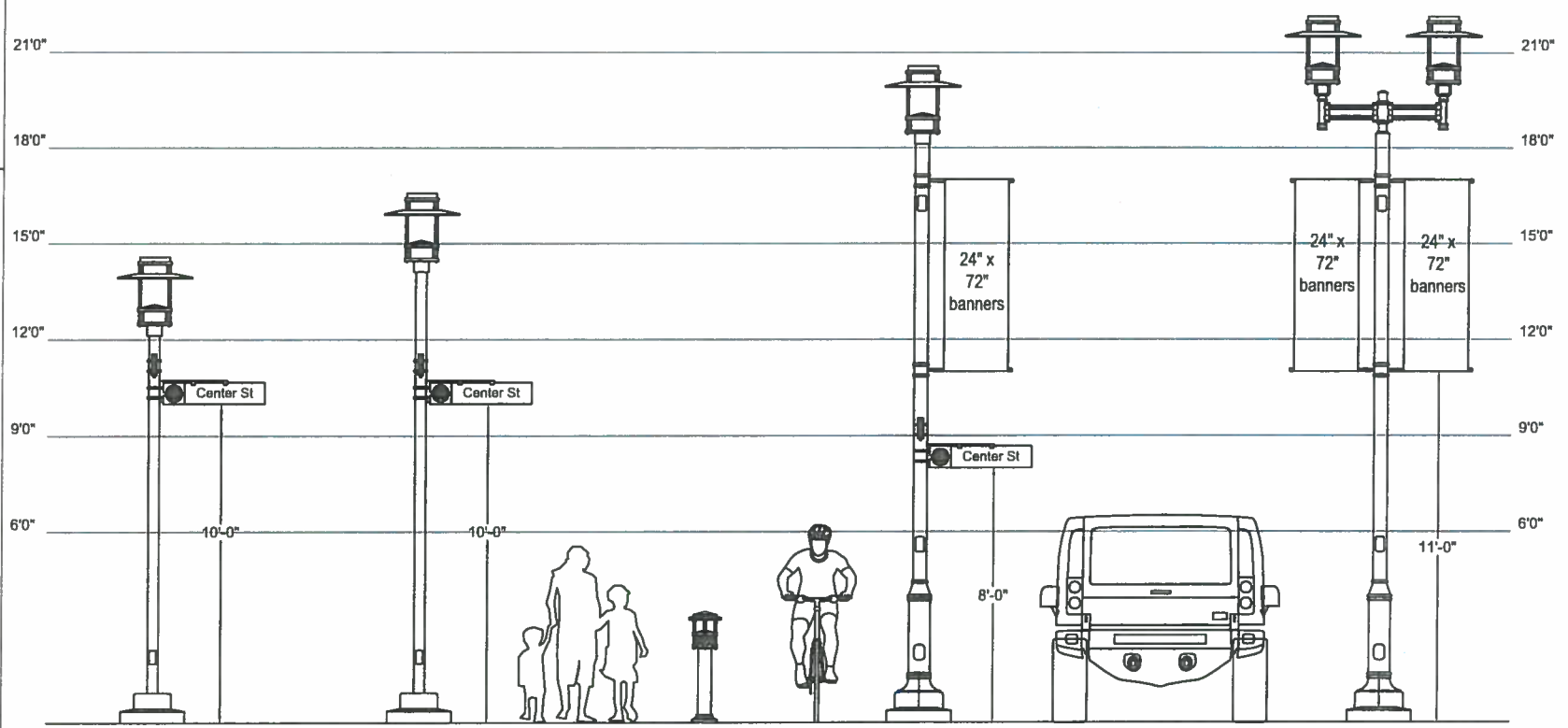
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IVINS CITY

STREET LIGHTING PERSPECTIVE

Standard Drawing L-01



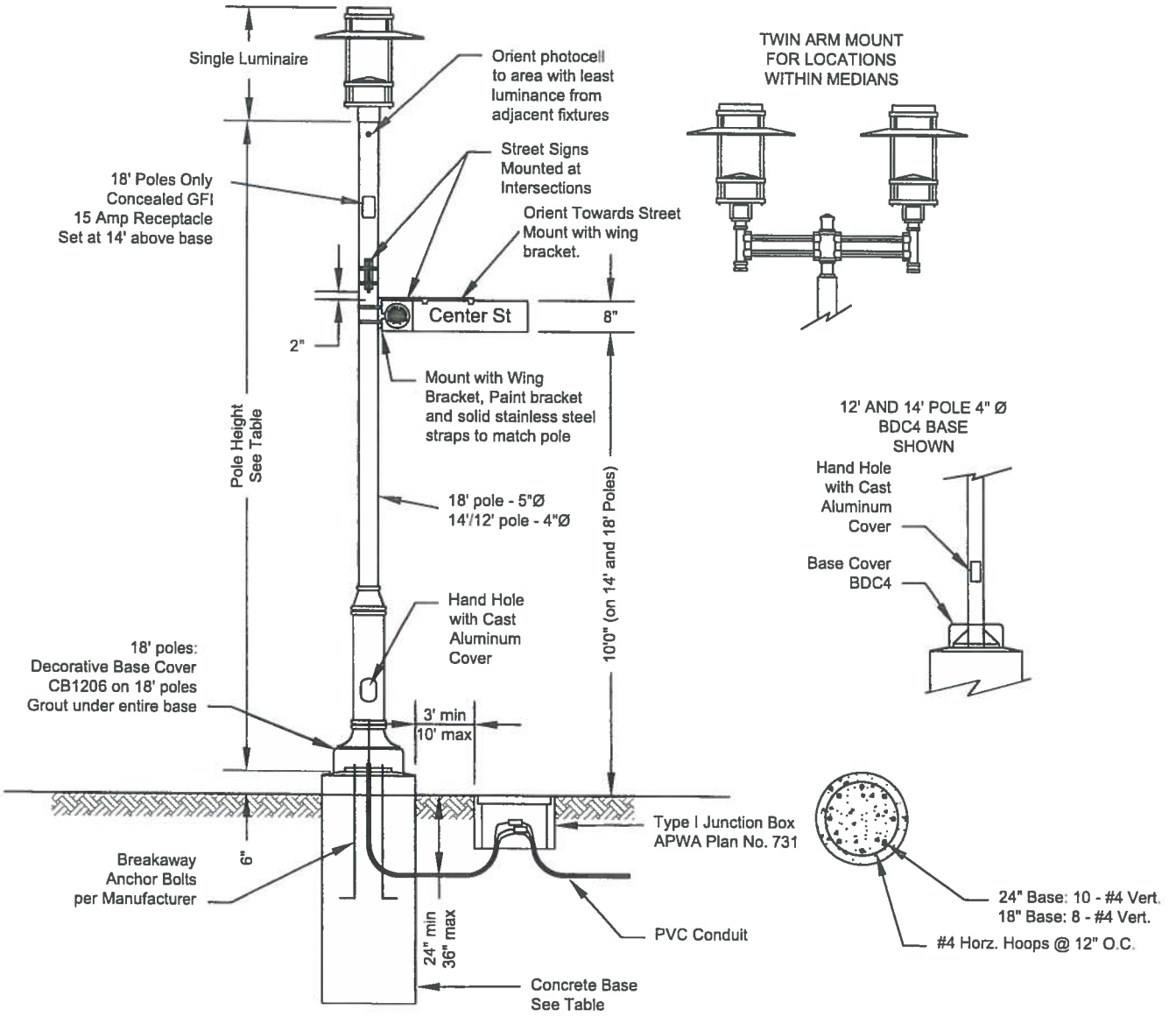
12' Pole
For All Streets in Rural Zone

14' Pole
Collectors For street corners

Bollard
On Trails adjacent to Arterials and Major Collectors

18' Pole
Arterials For street corners

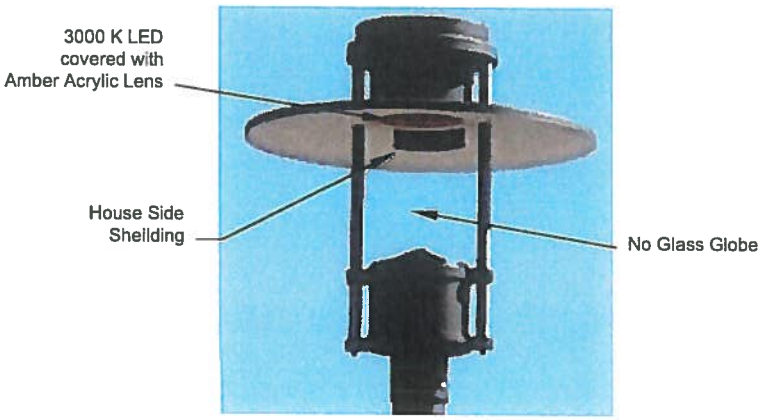
18' Pole - Double
Arterials For median placements



Pole Height Table

Pole Height	Fixture	Pole
18'	LA160	5" (BD5S18)
14'	LA160	4" (BD4S14)
12'	LA160	4" (BD4S12)

Mfg: ANP Lighting www.anplighting.com
Fixture has been modified specific for Ivins City
See Section 2.10 of Standard Specifications for more details



Concrete Base Table

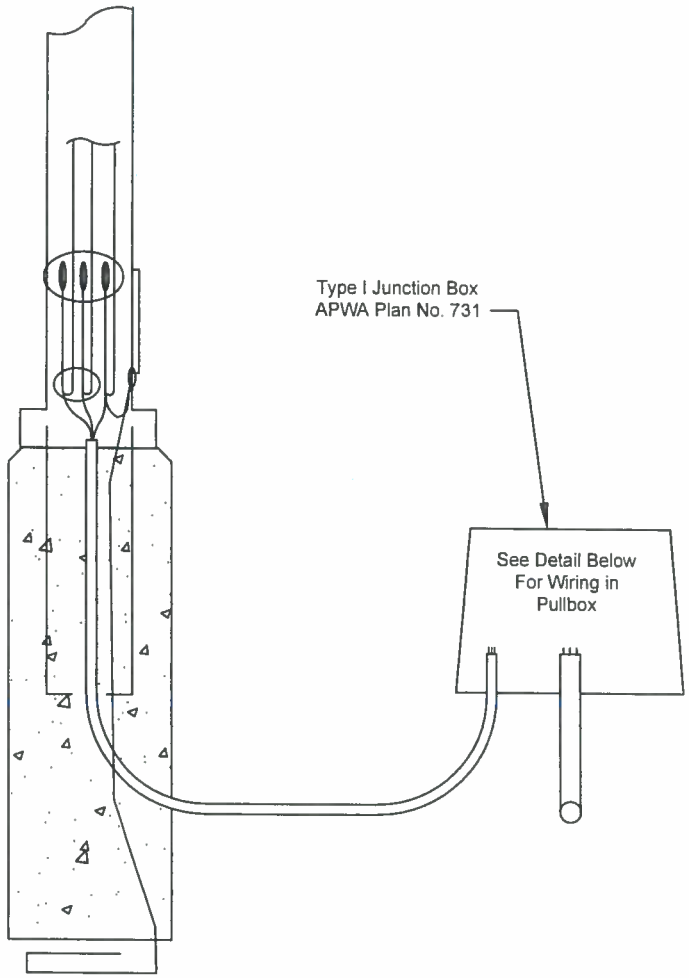
Pole Height	Base Depth	Base Diameter
18'	6'	24"
14'/12'	4'	18"

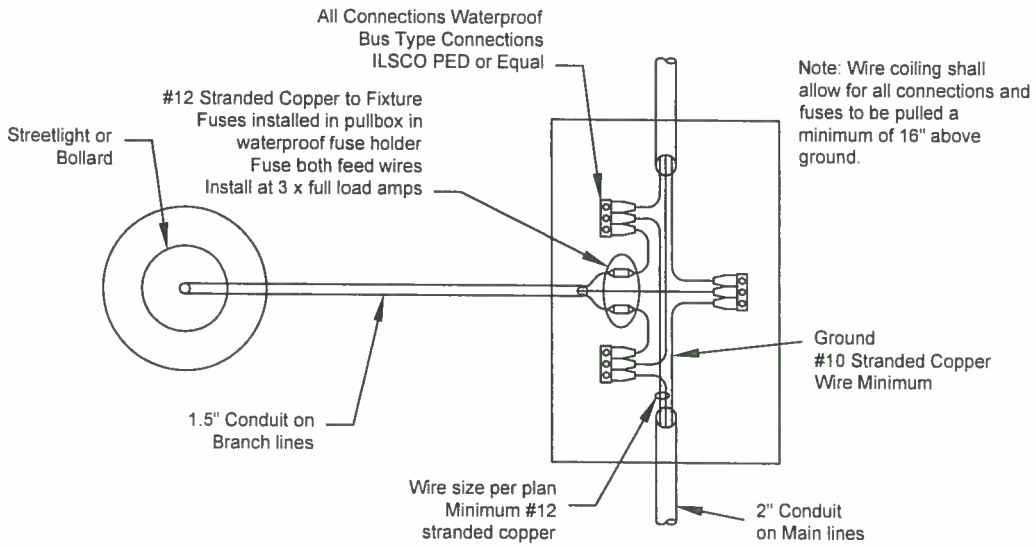
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STREET LIGHTING

Standard Drawing L-02





PULL BOX CONNECTION DETAILS

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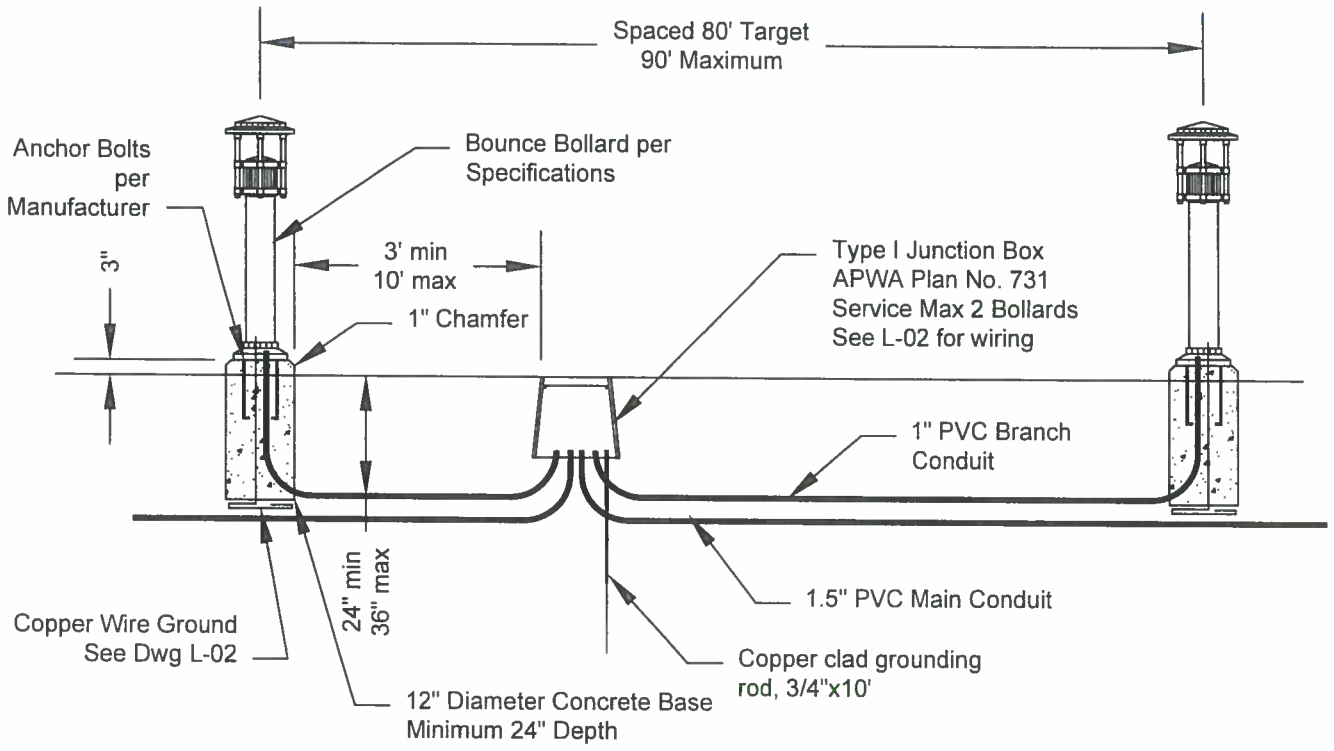
IVINS CITY

STREET LIGHT WIRING DETAIL

Standard Drawing L-03

Notes:

1. Junction Box shall be plastic when in landscape areas and polymer concrete when in paved areas.
2. APWA Section 26 56 19, Roadway Lighting.
3. Bollard Specifications:
   MFR: Kim Lighting (www.kimlighting.com)
   Model: Bounce Bollard, 27 LED Type 3 Distribution, Color Temp. 3000K, Finish dark bronze with dark sky compliant Black Body Cap
   Catalog #: BNB1-27L-3K-UV-DB-BBC (Voltage as determined by plans/elecrician)
4. Replace glass lens with amber colored acrylic lens provided by Ivins City.



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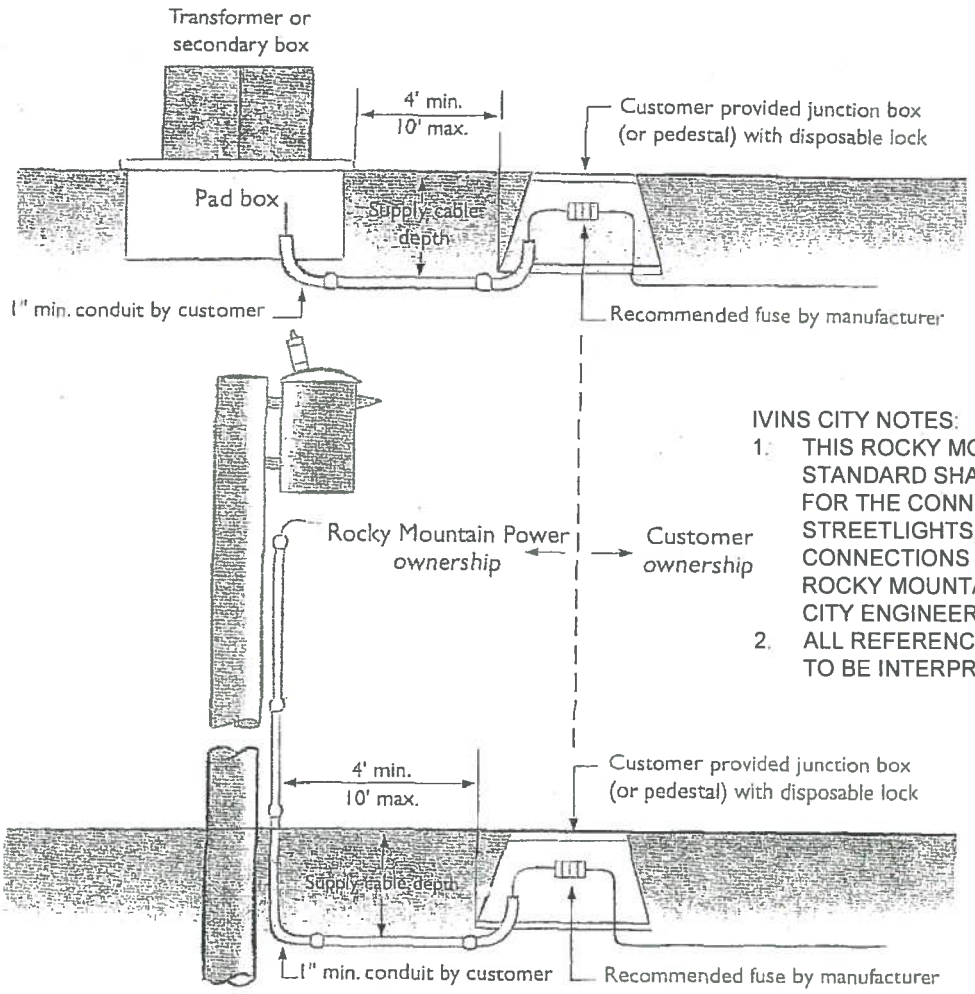
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BOLLARD DETAIL

Standard Drawing L-04

Streetlight Point-of-Disconnect Diagram



IVINS CITY NOTES:

1. THIS ROCKY MOUNTAIN POWER STANDARD SHALL BE THE STANDARD FOR THE CONNECTION OF ALL IVINS CITY STREETLIGHTS. ALTERNATIVE TYPES OF CONNECTIONS SHALL BE APPROVED BY ROCKY MOUNTAIN POWER AND IVINS CITY ENGINEER.
2. ALL REFERENCES TO "CUSTOMER" ARE TO BE INTERPRETED AS IVINS CITY.

Customer is responsible for:

- Providing and installing a junction box or pedestal, conduit, fusing and customer-owned wire. The junction box or pedestal must be strong enough for incidental traffic areas
- *Coordinating with Rocky Mountain Power on junction box or pedestal location and all* digging within the vicinity of Rocky Mountain Power facilities
- Ensuring that construction of new or remodeled installations conform to applicable provisions of the NEC State Rules, as well as city and county codes

Rocky Mountain Power is responsible for:

- Making the connection within Rocky Mountain Power facilities (transformer or secondary box)

ROCKY MOUNTAIN POWER

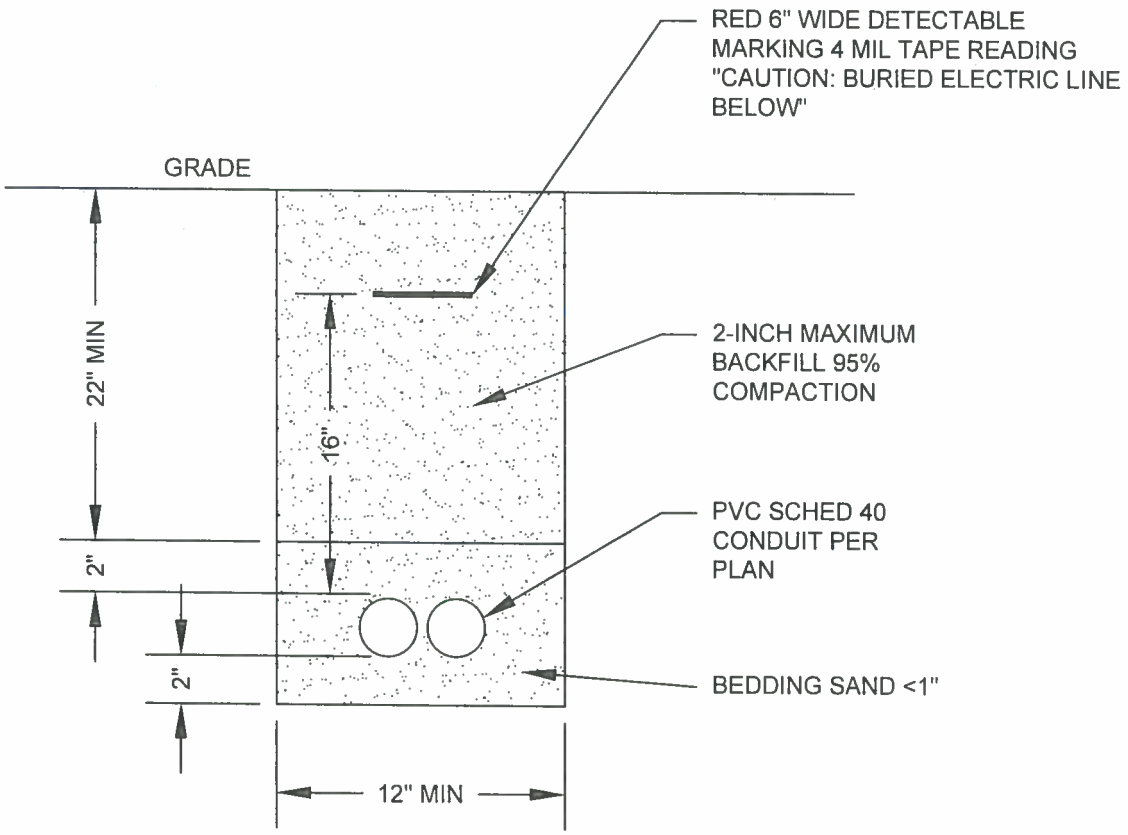
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IVINS CITY

STREET LIGHT CONNECTION TO ROCKY MOUNTAIN POWER

Standard Drawing L-05



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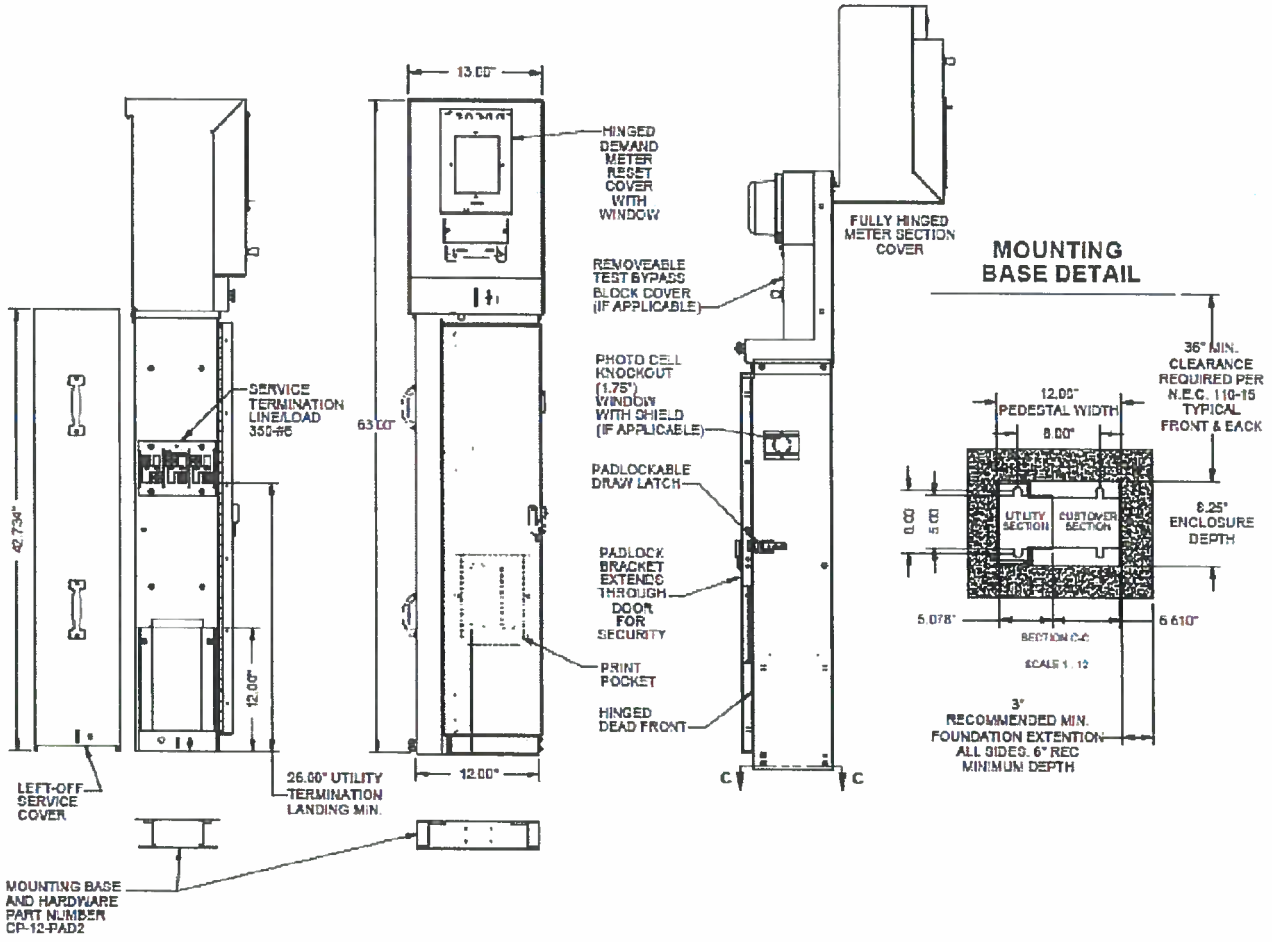
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IVINS CITY

STREET LIGHT CONDUIT TRENCH DETAIL

Standard Drawing L-06

"A" STYLE SLIMLINE METERED COMMERCIAL PEDESTAL



NOTES:

1. MILBANK "A" STYLE SLIMLINE CP3A OR SIMILAR EQUAL 100 AMP SERVICE PEDESTAL.
2. SET ON A 18" X 18" X 10" CONCRETE BASE USING MOUNTING BASE HARDWARE OPTION PER MFR RECOMMENDATIONS.
3. FINISH COLOR: MATCH TO NERD BROWN CLC 1284N BY KWAL-HOWELL, FORMULA: AV-0590,LB-4Y24, RO-736, TW-36
4. SET BACK TO EDGE OF RIGHT-OF-WAY NO CLOSER THAN 3' TO NEAREST WALL.
5. SET PHOTOCELL ON SERVICE PEDESTAL.

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ELECTRICAL METER SERVICE PEDESTAL

Standard Drawing L-07