

IVINS CITY
STANDARD
SPECIFICATIONS
FOR
DESIGN AND
CONSTRUCTION



2010

Minor Update to Street Light Standards on June 2019

IVINS CITY STANDARD SPECIFICATIONS

FOR

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These Standard Specifications shall be used for all work located within public streets, rights-of-way, and easements within Ivins City. Also, many of the requirements of these documents are also applicable to the interior development of lots and subdivisions.

Nothing in these specifications shall be construed to prohibit the construction of higher type improvements, as approved by the City. In the case of any conflict between these standards and any City adopted ordinance or standard, the most stringent of the standards shall govern.

These Standard Specifications were approved by the City Council of Ivins by Resolution dated September 2, 2010.

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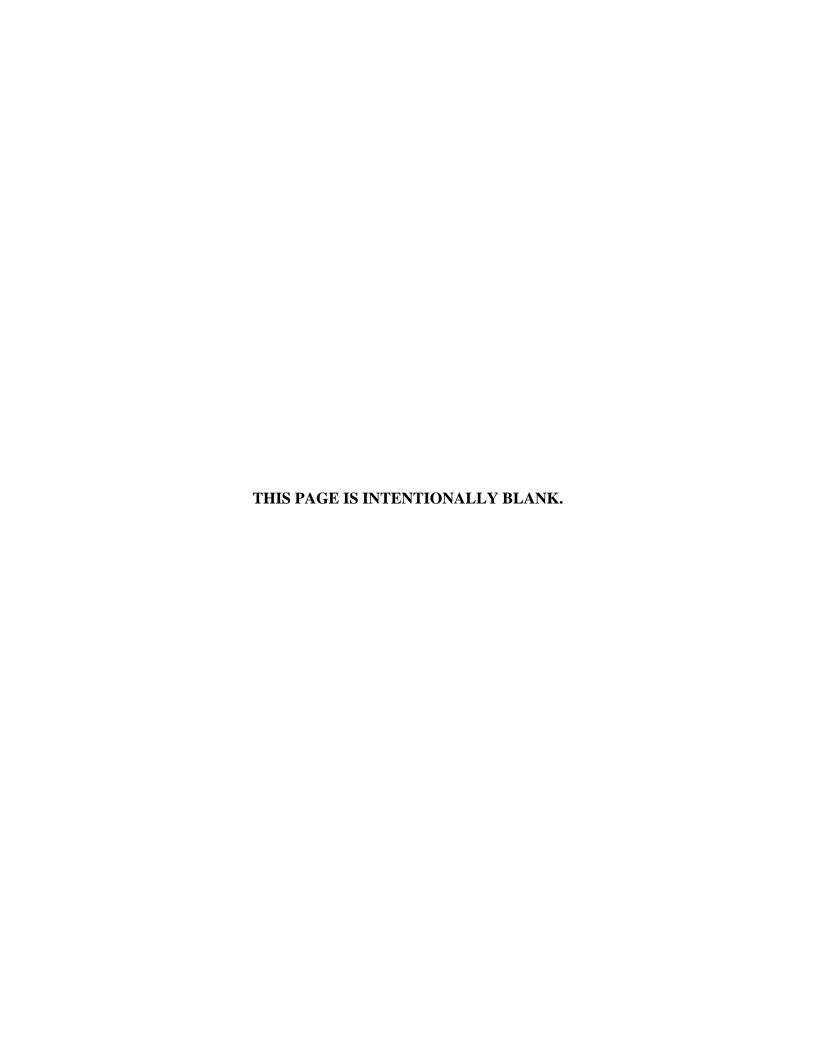
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INTRODUCTION

These Standard Specifications shall be used for all work located within public streets, rights-of-way, and easements within Ivins City. Also, many of the requirements of these documents are also applicable to the interior development of lots and subdivisions.

Nothing in these specifications shall be construed to prohibit the construction of higher type improvements, as approved by the City. In the case of any conflict between these standards and any City adopted ordinance or standard, the most stringent of the standards shall govern.

As used in this document, the phrases "approved by the City" and/or "prior City approval" or similar language shall mean and require prior approval by the City Engineer.

This document is divided into four parts:

PART 1: General Improvement Requirements

Most property development requires approval of engineering and design drawings for the construction of improvements. Part 1 defines the processes and standards that are applied to all construction projects of this nature.

PART 2: Engineering and Design Standards

In an effort to be equitable in the design of improvements for Ivins City it is necessary to develop engineering and design standards that pertain to all construction. Part 2 identifies these standards.

PART 3: Standard Specifications for Construction

In this document, **Ivins City adopts the most recent edition, including all amendments, of the APWA Utah Chapter's** *Manual of Standard Specifications*. Part 3 is a listing of all of the specifications from the APWA manual and identifies any modifications that have been made to these specifications. This section also includes specifications that have developed specifically for Ivins City. These standard specifications apply to all City contracts (unless otherwise specified) as well as all developer improvements.

PART 4: Standard Drawings for Construction

In this document, **Ivins City also adopts the most recent edition, including all amendments, of the APWA Utah Chapter's** *Manual of Standard Plans*. Part 4 is a listing of all of these standard drawings. It identifies which drawings are applicable to Ivins City, which are applicable with minor modifications, and which are not applicable. Also, standard drawings are included that are developed specifically for Ivins City. These standard drawings apply to all City contracts (unless otherwise specified) as well as all developer improvements.

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 City Permits
- 1.3 Other Permits
- 1.4 Applicable Ordinances
- 1.5 Construction Drawings/Plans
- 1.6 Coordination

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.
 - 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. 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. 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. OWNER'S REPRESENTATIVE: The person, firm, or corporation designated to act for and in behalf of the owner.
- 19. 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. 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. PROJECT: The total work to be provided under the approved documents.
- 22. PUBLIC IMPROVEMENTS: The work or improvements which are dedicated to and maintained by the City for the benefit of the public-at-large.
- 23. 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. STANDARD SPECIFICATIONS: The specifications as contained and as referenced in these documents including the APWA Standard Specifications.

1.2. REQUIRED CITY PERMITS

1.2.1. 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. Not required when excavation is part of a project that is covered by a construction permit.

1.2.2. 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. OTHER APPLICABLE PERMITS

1.3.1. 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. 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. 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. 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.

1.4. APPLICABLE ORDINANCES

1.4.1. ZONING ORDINANCE

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

1.4.2. SUBDIVISION ORDINANCE

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

1.5. CONSTRUCTION DRAWINGS

1.5.1. 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. 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. 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. 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.
- 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.
- 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. 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. 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. 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.

1.6. COORDINATION

1.6.1. 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. 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.
 - 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. 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. 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. 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. 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.

Ivins City Standard Specifications for Design and Construction Part 1 General Improvement Requirements

- 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. 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. 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. 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.
 - 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 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.

Ivins City Standard Specifications for Design and Construction Part 1 General Improvement Requirements

- 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. 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. 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. 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 Design
- 2.4 Grading
- 2.5 Erosion Control
- 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

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.

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.
- 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 | oad Functional Projected ADT | | Minimum AC | Minimum Base |
|------------------|------------------------------|-----|--------------------|--------------|
| Classification | | | Thickness (inches) | Thickness |
| | | | | (inches) |
| Residential | 10 to 1,250 | 5 | 2.5 | 6 |
| Residential | 1,260 to 2,000 | 5 | 3.0 | 6 |
| Collector | | | | |
| Minor Collector | 1,260 to 2,000 | 5.5 | 3.0 | 6 |
| Major Collector | 2,010 to 6,000 | 6 | 3.0 | 8 |
| Minor Arterial | 6,000 to 20,000 | 7 | 4.0 | 8 |
| Major Arterial | 20,000 to 40,000 | 8 | 4.0 | 8 |
| Local Commercial | | 10 | 4.0 | 8 |
| Local Industrial | | 10 | 4.0 | 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).
- C. Class A-6 or A-7 Soils: The subgrade shall be over-excavated and reconditioned in accordance with 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) | | | |
|--|---|--------------|------------------------------------|-----------|-----------|--------------------------|-----------|--------|---|--------|-----------------------|--|
| | A-1 | | | A-2 | | | | | | A-7 | | |
| Group Classification | A-1-a | A-1-b | A-3 | A- 2-4 | A- 2-5 | A- 2-6 | A- 2-7 | A-4 | A-5 | A-6 | A-7-5 A-7-6 | |
| Sieve Analysis, % passin | g | | | | | | | | | | | |
| 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 | n passing | 0.425 mm | (No. 40 | 0) | | | | | | | | |
| 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 fra gravel ar | fine sand | silty or clayey gravel and sand | | | silty soils clayey soils | | | 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.

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2.3. STORM 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 underground systems are provided, 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.
- 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.

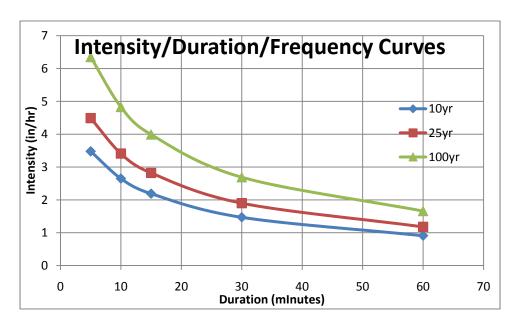
2.3.3. PRECIPITATION

- 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 | | |
| 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) | | | | | | | | | | | |
| 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. 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 be considered.
- C. 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.
- D. 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 impervious areas.
- E. 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 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)

2.3.9. STORM DRAIN PIPELINES

- A. Located within a dedicated right-of-way, drainage easement or equivalent.
- B. Pipelines shall be designed to convey entire flood as per sizing criteria given above with no surface flooding following any inlets.
- C. Minimum pipe diameter is 12 inches when slopes are 1.5% or greater, 15 inches when slopes are less than 1.5%.
- D. 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. Pipelines must be installed straight between manholes/inlets. Curvilinear pipes may be considered if pipe is running parallel to a curvilinear road.
- F. Approved pipe materials:

Table 2.3.8 Approved Storm Drain Pipe Materials

| Туре | 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 | ASTM F2648 | ADS N-12 | 0.013 | 50 to 42 | 2 | 10** | 1,11 | 12" & 15" | Larger diameters may be allowable with flowable fill in the pipe zone. |
| Corrugated Polypropylene | ASTM F2736 & F2764 | ADS N-12 HP | 0.013 | 75 to 46 | 2 | 17** | 1,11 | 12" to 30" | Larger diameters may be allowable with flowable fill in the pipe zone. |
| Corrugated PVC | ASTM F949 & F794 | Contech A- 2000 | 0.013 | 46 | 2 | 17** | 1,11 | 12" to 30" | Larger diameters may be allowable with flowable fill in the pipe zone. |

^{*}provided for reference only, other equal brands may be used upon approval.

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.
- 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 apron shall be required to control erosion
- B. Headwall shall be reinforced concrete if culvert material is any type of plastic.
- C. Stacked rock with a concrete apron may be used for concrete pipe culverts.
- D. A railing may be required if the City determines there is a risk to pedestrians or bicyclists.

2.3.12. BRIDGES

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

^{**} Greater depths may be allowed with prior written approval by City Engineer.

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.
 - 2. Discharging to private property without a drainage easement unless discharge does not exceed that which existed prior to development, nor does it concentrate.
- B. Minimum of 1 foot freeboard.
- C. Maximum of 4H:1V side-slope.
- D. Provide monitoring and maintenance plan.
- E. Provide vehicular access.
- F. Provide emergency spillway sized with the assumption that outlet is closed in 10-year event or 50% clogged in 100-year event.
- G. All detention facilities shall be landscaped.
- H. No reduction of size shall be made for evaporation or infiltration.
- I. Maximum depth of 3 feet unless otherwise approved.
- J. Outlet shall have a minimum discharge area of 6 square inches.
- K. 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.

2.3.15. FLOOD PLAINS

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.

2.3.16. 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.

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.

2.3.18. 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. Pad elevations must be set at 12-inches above top of curb elevation measured at the center of the lot. Pad may be additionally raised no higher than curb elevation at upslope lot line.

2.5. EROSION CONTROL

2.5.1. GENERAL

- A. Necessary measures shall be taken to prevent erosion 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) before construction begins.
- 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).
- 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.

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 of the UPDES Permit No. UTR300000 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:

http://www.waterquality.utah.gov/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, the contractor shall complete the Notice of Termination (NOT) form and submit to the Division of Water Quality.

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.
- 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).
- 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 fourway 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. If the existing/proposed street grade is greater than 5%, then a meandering sidewalk shall not be permitted.
- D. 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. 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.
 - 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 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.
- H. All pedestrian accesses shall conform to ADA standards.

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 trails should comply with the meandering requirements of sidewalks.

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 | Required | Minimum Driveway Spacing | | | |
|-----------------|---------|----------|--------------------------|---------------------|--|--|
| | Street | Sight | Same Side Upstream, | Opposing Downstream | | |
| | Spacing | Distance | Downstream, & | | | |
| | | | Opposing Upstream | | | |
| 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 | 250' | 300' | 100' | 75' | | |
| Collector | | | | | | |
| Residential | 150' | 300' | 50' | 50' | | |
| Standard | | | | | | |

Notes:

- 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.
- 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.
- 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.

- 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. For greater than 40 mph, right-turn traffic of 25 vph or more would require a right-turn deceleration lane.
- 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:

| | Peak Hour Trips |
|----------|-----------------|
| | Generated by |
| Category | 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 | | | | | Sco | pe of St | udy | |
|----------|-----------------------------|-------------------------------------|---------------------------|---|--|--------------------|--------------------------------------|--|--|--|
| 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.
- 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 | MINIMUM SLOPE |
|---------------------|---------------|
| (inches) | (%) |
| 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 D3035
 - 2. Ductile Iron, cement mortar lined
 - 3. 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. DEADENDS

A. Dead-end mains shall be avoided wherever possible, and if installed, shall not exceed 600 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. SERVICE CONNECTIONS

- A. Pressure reducing devices shall be installed by the owner on all water connections to buildings.
- B. Each service meter shall have a separate tap to the main.
- C. Service line shall be located in a perpendicular alignment to the street.
- D. Each building shall have a separate line and meter.
- E. Service line size shall match the meter size. Beyond the meter, the line may be increased only one size.
- F. Services shall be sized as follows:

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

2.9.8. 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.

2.9.9. 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
 - 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. 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 than 1500 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. 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 | | | | |
|-------------------------|----------|---------|----------|--------|---------------|-----------|-----------|-----------|---------------|
| | R/W | | | | - | Major | Minor | Res | Res Entrance/ |
| | Width | Minimum | Bollards | Round- | Arterial | Collector | Collector | Collector | Private St/ |
| Road Classification | (ft) | Spacing | on Paths | abouts | | | | | 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

1-14': One light, 14' pole

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 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.

^{*}unless within minimum spacing of another streetlight light, then NR

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

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):

- 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):

- 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:

- 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:

- 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.
 - F. 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. Generally, storm drain will be designed to fall at the inside lip of curb & gutter as per the detail.
 - H. 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. 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. Irrigation water mains should be generally installed 4' away from waterline towards centerline of street.

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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.

PART 3

STANDARD SPECIFICATIONS FOR CONSTRUCTION

3.0. INTRODUCTION

In this document, **Ivins City adopts the most recent edition (currently 2007), including all amendments, of the APWA Utah Chapter's** *Manual of Standard Specifications*. Part 3 is a listing of all of the specifications from the APWA manual and identifies any local modifications that have been made to these specifications.

3.1. APPLICATION TO DEVELOPER PROJECTS

All specifications listed with an asterisk (*) do not apply to developer projects and only apply to City contracts. All other specifications may apply to both a developer project as well as a City contract. In these specifications, any reference to "CONTRACTOR" may also imply a responsibility to the Developer as determined by the Developers private contract with its Contractors. All references to "OWNER" apply to Ivins City. All references to "ENGINEER" refer to Ivins City Engineer or other City representative acting with the scope of assigned duties.

3.2. LOCAL SPECIFICATIONS

All specifications shown in **BOLD** are not references to the APWA manual and are instead attached to PART 3 at the end of the document. These are standards that have been locally prepared for Ivins City and may replace an APWA specification or at the very least will govern over any conflict with an APWA specification.

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DIVISION 00 PROCUREMENT AND CONTRACTING REQUIREMENTS

SECTION 00 72 00 General Conditions

PART 1 GENERAL

- 1.1 DEFINED TERMS
- *PART 2 PRELIMINARY MATTERS
 - *2.1 DELIVERY OF BONDS AND INSURANCE
 - *2.2 COPIES OF DOCUMENTS
 - *2.3 COMMENCEMENT OF CONTRACT TIME NOTICE TO PROCEED
 - *2.4 STARTING THE WORK
 - *2.5 BEFORE STARTING CONSTRUCTION
 - *2.6 PRECONSTRUCTION CONFERENCE
 - *2.7 FINALIZING SCHEDULES
 - *2.8 COMMUNICATIONS FACILITATING CONTRACT ADMINISTRATION

PART 3 CONTRACT DOCUMENTS, INTENT, AMENDING, REUSE

- 3.1 INTENT
- 3.2 RESOLVING DISCREPANCIES
- *3.3 AMENDING AND SUPLEMENTING CONTRACT DOCUMENTS
- 3.4 REUSE OF DOCUMENTS
- 3.5 INTERPRETATION AND VENUE

PART 4 AVAILABLITY OF LANDS, SUBSURFACE AND PHYSICAL CONDITIONS; REFERENCE POINTS

- *4.1 AVAILABILITY OF LANDS
- 4.2 PHYSICAL CONDITIONS GENERAL
- 4.3 PHYSICAL CONDITIONS UNDERGROUND FACILITIES
- 4.4 REFERENCE POINTS AND MONUMENTS
- *4.5 ASBESTOS, PCBs, PETROLEUM, HAZARDOUS WASTE OR RADIOACTIVE MATERIAL
- *PART 5 BONDS AND INSURANCE
 - *5.1 PERFORMANCE, PAYMENT AND OTHER BONDS
 - *5.2 INSURANCE

PART 6 CONTRACTOR'S RESPONSIBILITIES

- 6.1 CONTROL OF THE WORK
- 6.2 LABOR, MATERIAL AND EQUIPMENT
- 6.3 ADJUSTING PROGRESS SCHEDULE
- 6.4 SUBSTITUES OR "OR-EQUAL" ITEMS
- 6.5 SUBCONTRACTORS, SUPPLIERS AND OTHERS
- 6.6 PATENT FEES AND ROYALTIES
- 6.7 PERMITS
- 6.8 LAWS AND REGULATIONS
- 6.9 TAXES
- 6.10 USE OF PREMISES
- 6.11 RECORD DOCUMENTS
- 6.12 SAFETY AND PROTECTION

- **6.13 EMERGENCIES**
- 6.14 SHOP DRAWINGS AND SAMPLES
- 6.15 CONTINUING THE WORK
- 6.16 CONTRACTOR'S GENERAL WARRANTY AND GUARANTEE
- 6.17 INDEMNIFICATION
- 6.18 HAZARDOUS WASTE GENERATION

PART 7 OTHER WORK

- 7.1 RELATED WORK AT SITE
- 7.2 COORDINATION
- 7.3 UTLITY REARRANGEMENTS
- 7.4 WORK DONE BEYOND THE SITE
- *PART 8 OWNER'S RESPONSIBILITIES
 - *8.1 OWNER'S RESPONSIBILITIES

PART 9 ENGINEER'S STATUS DURING CONSTRUCTION

- 9.1 OWNER'S REPRESENTATIVE
- 9.2 PROJECT REPRESENTATIVE
- 9.3 AUTHORITY AND DUTIES OF RESIDENT PROJECT REPRESENTATIVE
- 9.4 CLARIFICATIONS AND INTERPRETATIONS
- 9.5 AUTHORIZED VARIATIONS IN WORK.
- 9.6 REJECTING DEFECTIVE WORK
- 9.7 NOTICE OF INTENTION TO APPEAL
- 9.8 DECISIONS ON DISPUTES
- 9.9 LIMITATIONS ON ENGINEER'S RESPONSIBILITIES

PART 10 CHANGES IN THE WORK

- *10.1 ADDITIONS, DELETIONS, REVISIONS
- *10.2 WORK NOT REQUIRED BY CONTRACT DOCUMENTS
- 10.3 NOTICE TO SURETY
- *PART 11 CHANGE OF CONTRACT PRICE
 - *11.1 CONTRACT PRICE
 - *11.2 CONTRACT PRICE ADJUSTMENT
 - *11.3 DETERMINING CONTRACT PRICE ADJUSTMENT
 - *11.4 COST OF THE WORK
 - *11.5CONTRACTOR'S FEE
 - *11.6 CASH ALLOWANCES
 - *11.7 UNIT PRICE WORK
 - *11.8 FORCE ACCOUNT WORK (COST OF THE WORK PLUS CONTRACTOR'S FEE)
- *PART 12 CHANGE OF CONTRACT TIME
 - *12.1 CONTRACT TIME ADJUSTMENT
 - *12.2 DELAY NOT CAUSED BY CONTRACTOR
 - *12.3 DELAYS RELATED TO WEATHER
- PART 13 TESTS AND INSPECTIONS; CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK
 - 13.1 NOTICE OF DEFECTS
 - 13.2 ACCESS TO WORK

- *13.3 TESTS AND INSPECTIONS
- 13.4 DEFECTIVE WORK
- 13.5 UNCOVERING WORK
- 13.6 CORRECTION OR REMOVAL OF DEFECTIVE WORK BY CONTRACTOR
- *13.7 CORRECTION PERIOD
- 13.8 ACCEPTANCE OF DEFECTIVE WORK
- 13.9 OWNER MAY CORRECT DEFECTIVE WORK
- *PART 14 PAYMENTS TO CONTRACTOR AND COMPLETION
 - *14.1 BASIS FOR PROGRESS PAYMENTS
 - *14.2 APPLICATION FOR PROGRESS PAYMENTS
 - *14.3 CONTRACTOR'S WARRANTY OF TITLE
 - *14.4 REVIEW OF APPLICATIONS FOR PROGRESS PAYMENT
 - *14.5 SUBSTANTIAL COMPLETION
 - *14.6 PARTIAL UTILIZATION
 - *14.7 FINAL INSPECTION
 - *14.8 FINAL APPLICATION FOR PAYMENT
 - *14.9 FINAL PAYMENT AND ACCEPTANCE
 - *14.10 WAIVER OF CLAIMS
- *PART 15 SUSPENSION OF WORK AND TERMINATION
 - *15.1 OWNER MAY SUSPEND WORK
 - *15.2 OWNER MAY TERMINATE
 - *15.3 TERMINATION OF WORK BY CONTRACTOR
- *PART 16 DISPUTE RESOLUTION
 - *16.1 APPEALS PROCESS
- PART 17 MISCELLANEOUS
 - 17.1 GIVING NOTICE
 - 17.2 COMPUTATION OF TIME
 - 17.3 NOTICE OF CLAIM TIME LIMITS
 - 17.4 CUMULATIVE REMEDIES

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DIVISION 01 GENERAL REQUIREMENTS

*SECTION 01 11 00 Summary of Work

No Modifications

*SECTION 01 24 00 Value Analysis

No Modifications

*SECTION 01 25 00 Product Options and Substitutions

No Modifications

*SECTION 01 26 00 Contract Modification Procedure

No Modifications

*SECTION 01 29 00 Payment Procedure

No Modifications

SECTION 01 31 13 Coordination

Modified as follows:

1. Modify paragraph on page 100 as follows:

2.1 INTERUPTION OF OWNER'S OPERATIONS

- C. Shutdown of utilities must be accomplished during approved hours at no additional cost to the OWNER. If work requires a longer shutdown, it must then be accomplished during separate periods.
 - 1. No interruption in existing service shall occur before affected residents are notified.
 - 2. Notification shall be given no less than 24 hours prior and no more than 72 hours.
 - 3. When possible, shutdowns should occur on a weekday between 8:00 a.m. and 4:00 p.m.

*SECTION 01 31 19 Preconstruction Conference

No Modifications - See Part 1 for additional Preconstruction Conference Requirements

SECTION 01 31 20 Partnering

No Modifications

SECTION 01 32 16 Progress Schedule

No Modifications

SECTION 01 33 00 Submittal Procedure

Modified as follows:

1. City may allow submittals to be transferred electronically as agreed by all involved parties.

SECTION 01 35 10 Acceptance

No Modifications

SECTION 01 42 19 References

No Modifications

SECTION 01 43 00 Quality Assurance

No Modifications

SECTION 01 43 40 Resident Superintendent

No Modifications

SECTION 01 45 00 Quality Control

No Modifications

SECTION 01 55 26 Traffic Control

Modified as follows:

- 1. Modify paragraph on page 126 as follows:
 - 2.1 PAVEMENT MARKINGS, SIGNS, BARRICADES

A. MUTCD

SECTION 01 57 00 Temporary Controls

Modified as follows:

- 1. Modify paragraph on page 127 as follows:
 - 3.1 NOISE CONTROL
 - B. Control construction noise in residential areas from <u>10:00 pm to 6:00 am.</u>
 - <u>C. During the months of April through October, concrete pouring may begin at 3:00 am with written approval from the City.</u>

No Modifications

^{*}SECTION 01 64 00 Owner-furnished Products

SECTION 01 65 00 Product Delivery and Handling

No Modifications

SECTION 01 66 00 Product Storage and Protection

Modified as follows:

1. Do not store products in City right-of-way outside of the construction area unless prior written approval is granted.

SECTION 01 71 13 Mobilization and Demobilization

No Modifications

SECTION 01 71 23 Construction Layout

No Modifications

SECTION 01 72 24 Survey Referencing

No Modifications

SECTION 01 73 29 Cutting and Patching

No Modifications

SECTION 01 74 13 Progress Cleaning

No Modifications

SECTION 01 75 16 Startup Procedures

No Modifications

SECTION 01 78 23 Operation and Maintenance Data

No Modifications

SECTION 01 78 39 Project Record Documents

Modified as follows:

- 2. For all construction (including developer projects) within 100 feet of any privately or publicly owned structure, Contractor shall provide pre-construction photography to the City. This information shall be provided at pre-construction conference.
- 3. Contractor may submit construction photography, video or still imagery, in a commonly used electronic format on CD, DVD or flash drive.
- 4. Modify paragraph on page 155-6 as follows:
 - 1.4 DOCUMENTS ON SITE

- A. Keep at job site 1 copy of each of the following, if issued for the Work.
 - 1. Contract Drawings.
 - 2. Project Manual.
 - 3. Addenda.
 - 4. Reviewed Shop Drawings, Product Data and Samples.
 - 5. Modifications to the Contract Documents.
 - 6. Field test records.
 - 7. Inspection certificates.
 - 8. Manufacturer's certificates.
 - 9. Survey documentation.
 - 10. Storm Water Pollution Prevention Plan (SWPPP).
 - 12. Permits (as required).

SECTION 01 78 50 Closeout Procedures

No Modifications

DIVISION 02 EXISTING CONDITIONS

APWA Utah Chapter's *Manual of Standard Specifications*, most recent edition, published by the Utah T2 Center are incorporated as listed with modifications noted:

SECTION 02 41 13 Selective Site Demolition

No Modifications

SECTION 02 41 14 Pavement Removal

Modified as follows:

- 1. When colored concrete is removed, it must be replaced with a best possible match of colored concrete.
- When removing concrete curb and gutter adjacent to asphalt pavement, if the asphalt is damaged, an additional strip of asphalt approximately 12 inches wide must be saw cut, removed and replaced.

SECTION 02 41 15 Pavement Pulverizing

Modified as follows:

1. Modify paragraph on page 171 as follows:

1.5 ACCEPTANCE

- A. Gradation: Random measure each 15,000 square feet.
- B. Depth: Random measure each 5,000 square feet. All measurements shall not be deficient by more than 1-inch. The average measurement shall not be less than the design thickness. If there is insufficient material to match design, supplement with crushed aggregate base unless directed by ENGINEER otherwise.
- C. Density: Nuclear gage or proof roll. See Section 32 05 10 for proof rolling requirements.
- D. Quantity of stabilizer added matches submittal data.

SECTION 02 41 19 Selective Building Demolition

No Modifications

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DIVISION 03 CONCRETE

APWA Utah Chapter's *Manual of Standard Specifications*, most recent edition, published by the Utah T2 Center are incorporated as listed with modifications noted:

SECTION 03 11 00 Concrete Forming

No Modifications

SECTION 03 20 00 Concrete Reinforcing

No Modifications

SECTION 03 30 04 Concrete

Modified as follows:

- 1. All concrete in contact with soils shall be sulfate resistive in accordance with paragraph 2.5 A. 1.
- 2. Class 2000 concrete shall not be used except in special nonstructural cases, but never without prior approval by City Engineer.
- 3. Class 3000 concrete shall only be used for minor semi-nonstructural items such as thrust blocks, anchors, and mass concrete, unless specifically waived prior to delivery by the City Engineer.
- 4. Concrete color shall be in accordance with Part 2 Engineering and Design Standards, paragraph 2.6.12 A.
- 5. Modify Table 3 Mix Properties and Limitations as follows:
 - a. Slump shall not exceed 4-inches as measured prior to any admixtures without prior approval of City Engineer.
 - b. Entrained air shall be 5 percent plus or minus 1 percent.
- 6. Modify paragraph on page 196 as follows:

2.5 MIX DESIGN

- E. Selection of Mix Properties:
 - 1. Cold Weather: ACI 306. Unless allowed otherwise by ENGINEER, increase cement content in the mix design by 1 bag *when low temperatures are predicted to be less than* 20 degrees, i.e. 5.5 becomes 6.5, or 6.5 becomes 7.5, etc.

SECTION 03 30 05 Concrete Testing

No Modifications

SECTION 03 30 10 Concrete Placement

No Modifications

SECTION 03 35 00 Concrete Finishing

No Modifications

SECTION 03 39 00 Concrete Curing

No Modifications

SECTION 03 40 00 Precast Concrete

No Modifications

SECTION 03 61 00 Cementitious Grouting

No Modification

DIVISION 04 MASONRY

APWA Utah Chapter's *Manual of Standard Specifications*, most recent edition, published by the Utah T2 Center are incorporated as listed with modifications noted:

SECTION 04 05 16 Masonry Mortar and Grout

No Modifications

SECTION 04 21 00 Clay Unit Masonry

No Modifications

SECTION 04 05 16 Concrete Unit Masonry

No Modifications

DIVISION 05 METALS

APWA Utah Chapter's *Manual of Standard Specifications*, most recent edition, published by the Utah T2 Center are incorporated as listed with modifications noted:

SECTION 05 05 10 Metal Galvanizing

No Modifications

SECTION 05 05 23 Bolts, Nuts and Accessories

No Modifications

SECTION 05 12 00 Structural Steel Framing

No Modifications

SECTION 05 51 00 Metal Stairs

No Modifications

SECTION 05 53 00 Gratings and Floor Plates

No Modifications

SECTION 05 56 00 Metal Castings

DIVISION 06 WOOD, PLASTICS AND COMPOSITES

APWA Utah Chapter's *Manual of Standard Specifications*, most recent edition, published by the Utah T2 Center are incorporated as listed with modifications noted:

SECTION 06 10 00 Rough Carpentry

No Modifications

DIVISION 07 THERMAL AND MOISTURE PROTECTION

APWA Utah Chapter's *Manual of Standard Specifications*, most recent edition, published by the Utah T2 Center are incorporated as listed with modifications noted:

SECTION 07 19 00 Water Repellent

No Modifications

SECTION 07 21 00 Insulation

No Modifications

DIVISION 09 FINISHES

APWA Utah Chapter's *Manual of Standard Specifications*, most recent edition, published by the Utah T2 Center are incorporated as listed with modifications noted:

SECTION 09 91 00 Painting

Modified as follows:

1. Color coding may not be required if specified otherwise.

SECTION 09 96 23 Graffiti Resistant Coating

No Modifications

SECTION 09 97 14 Coatings for Steel Bridges

No Modifications

SECTION 09 97 15 Coatings for Steel Water Storage Tank

No Modifications

DIVISION 13 SPECIAL CONSTRUCTION

APWA Utah Chapter's *Manual of Standard Specifications*, most recent edition, published by the Utah T2 Center are incorporated as listed with modifications noted:

SECTION 13 34 19 Metal Building

No Modifications

DIVISION 22 PLUMBING

APWA Utah Chapter's *Manual of Standard Specifications*, most recent edition, published by the Utah T2 Center are incorporated as listed with modifications noted:

SECTION 22 05 00 Mechanical General Requirements

No Modifications

SECTION 22 11 13 Facility Water Distribution Piping

No Modifications

SECTION 22 11 23 Water Pump

No Modifications

SECTION 22 12 19 Water Storage Tank

No Modifications

SECTION 22 13 33 Submersible Pump

No Modifications

DIVISION 26 ELECTRICAL

APWA Utah Chapter's *Manual of Standard Specifications*, most recent edition, published by the Utah T2 Center are incorporated as listed with modifications noted:

SECTION 26 05 00 Electrical General Requirements

No Modifications

SECTION 26 05 13 Conductors and Cables

No Modifications

SECTION 26 05 33 Raceway

No Modifications

SECTION 26 05 34 Electrical Boxes and Fittings

No Modifications

SECTION 26 09 26 Panelboard

No Modifications

SECTION 26 13 13 Circuit Breaker

No Modifications

SECTION 26 56 19 Roadway Lighting

Modified as follows:

- 1. See Part 2, Section 2.10 Lighting Design for fixture, photocell, and pole requirements for streetlights and bollards.
- 2. Modify paragraph on p 3.74 as follows:

2.4 JUNCTION BOXES

B. Cover stencil: "Ivins City Street Lighting". Voltage greater than 600 V not allowed.

DIVISION 31 EARTHWORK

APWA Utah Chapter's *Manual of Standard Specifications*, most recent edition, published by the Utah T2 Center are incorporated as listed with modifications noted:

Section 31 05 10 Boundary Markers and Survey Monuments

No modifications

Section 31 05 13 Common Fill

Modified as follows:

1. All material proposed to be imported shall be subject to the review and approval of the City Engineer prior to starting of hauling operations.

Section 31 05 15 Cement Treated Fill

No modifications

Section 31 05 19 Geotextiles

No modifications

Section 31 05 21 Geogrids/Geocomposites

No modifications

Section 31 11 00 Site Clearing

No modifications

Section 31 23 16 Excavation

No modifications

Section 31 23 17 Rock Removal

No modifications

Section 31 23 23 Backfilling for Structures

Modified as follows:

- 1. When backfilling with common fill, no material larger than 3-inches will be allowed unless otherwise approved by the City.
- 2. Table 1
 - a. Lot Size for Structural Backfilling Operations (p418) has been modified (refer to the Ivins City Minimum Field Testing Checklist in Appendix A).

- b. Test Criteria shall use Modified Proctor Density (ASTM D1557)
- 3. Compaction (Paragraph 3.6): See Section 31 23 26 modifications.

Section 31 23 26 Compaction

Modified as follows:

- 1. All compaction shall be as follows:
 - a. Landscape Areas: 90 percent
 - b. Under Footings: 95 percent
 - c. Under Roadways (Pavement, Curbs, Gutters, Sidewalks, Driveways): 95 percent
 - d. Exception for fine grained soils: 91 percent
- 2. Modify paragraph on page 422 as follows:

2.1 FIELD QUALITY CONTROL

C. Optimum Soil Density: Use ASTM D2216 and <u>ASTM D1557 Method A or D (Modified Proctor) for all soils.</u>

Section 31 25 00 Erosion and Sedimentation Control

No modifications

Section 31 31 19 Vegetation Control

No modifications

Section 31 36 00 Gabions

No modifications

Section 31 37 00 Rip Rap or Rock Lining

No modifications

Section 31 41 00 Shoring

No modifications

DIVISION 32 EXTERIOR IMPROVEMENTS

APWA Utah Chapter's *Manual of Standard Specifications*, most recent edition, published by the Utah T2 Center are incorporated as listed with modifications noted:

Section 32 01 05 Information, Regulatory, and Warning Signs

No modifications

Section 32 01 06 Post Mounted Signs

No modifications

Section 32 01 07 Relocate Post Mounted Signs and Mail Boxes

No modifications

Section 32 01 10 Relocate Fences and Gates

No modifications

Section 32 01 13 Slurry Seal

Modified as follows:

1. Modify paragraph on page 453 as follows:

2.1 PAVING ASPHALT

- B. Emulsified Asphalt: Use a polymer modified emulsion CQS-1HP, meeting CQS-1H specifications identified in AASHTO M 208 and ISSA A 105, using solid synthetic rubber or latex material.
 - 1. Combine the polymer modifier with the base asphalt or asphalt emulsion at a minimum rate of 3 percent solids by weight of asphalt, prior to loading at the manufacturing plant.
 - 2. Use a polymer modified emulsion compatible with the mix design developed for the conventional slurry seal.

(Note: sourced from UDOT Standard Specification 02789)

Section 32 01 14 Chip Seal

No modifications

Section 32 01 15 Micro Surface Seal

No modifications

Section 32 01 16 Recycled Asphalt Paving

No modifications

Section 32 01 17 Pavement Crack Seal

No modifications

Section 32 01 18 Fog Seal

As attached. Required on all new pavements in the first year prior to release of warranty bonds.

Section 32 01 19 Asphalt Emulsion Seal Coat

As attached.

Section 32 01 26 White Top Inlay

No modifications

Section 32 01 29 Concrete Paving Raising

No modifications

Section 32 01 90 Plant Maintenance

No modifications

Section 32 01 91 Tree Root Cutting

No modifications

Section 32 01 93 Pruning Trees

No modifications

Section 32 05 10 Backfilling Roadways

Modified as follows:

- 1. Table 1 Lot Sizes (p498) has been modified refer to the Ivins City Minimum Field Testing Checklist in Appendix A.
- 2. Compaction (Paragraph 3.6): See Section 31 23 26 modifications.
- 3. Proof Rolling (Paragraph 3.8): In addition to following the APWA specifications.
 - a. Verify no deflections.
 - b. Measure amount of deflection and where occurring.
 - c. Correct any areas that deflect in accordance with geotechnical recommendations.
 - d. Retest at no additional cost to City.

Section 32 11 23 Crushed Aggregate Base

Modified as follows:

- 1. Table 1 Placement Type and Sub-lot Size (p7 of 2007 Supplement) has been modified (refer to the Ivins City Minimum Field Testing Checklist in Appendix A).
- 2. Modify paragraph on Page 7 of 2007 Supplement as follows:

1.6 ACCEPTANCE

- C. Gradation: Lot size is <u>15,000 square feet</u>. Collect samples from grade prior to compaction. Conduct at least 1 gradation test for each Lot. Material not within tolerance may remain in-place at ENGINEER's discretion provided density requirements are met. Tolerance deficiency must be corrected before placement continues.
- F. Thickness: Measure at least twice every 9,000 square feet. All measurements shall not be deficient by more than 1-inch. The average measurement shall not be deficient by more than 1/4-inch of the design thickness.
- 3. Modify paragraph on Page 10 of 2007 Supplement as follows:

1.6 PLACEMENT

D. Finish: Uniform with surface deviation no more than 3/8 of an inch from line and grade in 10 feet in any direction. *Measure in two locations per a lot size of 1000 square feet*.

| Section 32 12 03 Paving Asphalts |
|---|
| No modifications |
| Section 32 12 05 Asphalt Concrete |
| No modifications |
| Section 32 12 06 Superpave |
| No modifications |
| Section 32 12 13 Prime Coat |
| No modifications |
| Section 32 12 14 Tack Coat |
| No modifications |
| Section 32 12 16 Plant-Mix Asphalt Paving |

Modified as follows:

- 1. No surface course shall be placed less than 1 inch in thickness.
- 2. Profilograph only required to be used on arterial streets.
- 3. Modify paragraph on Page 13-14 of 2007 Supplement as follows:

1.6 ACCEPTANCE

- E. Compaction: Basis for acceptance is core density, non-destructive density, or control strip density with visual observation. Use <u>non-destructive density testing by gage</u> unless specified otherwise.
 - 1. **Core Density:** This method compares the average density of cores extracted from a pavement surface to maximum theoretical density.
 - a. Lot: <u>7,000 square feet</u> or part thereof. A lot is acceptable if average core density does not exceed pay factor 1.00 limits.
 - b. Sampling Protocol: ASTM D 3665 for random test location selection with at least 2 test locations per Lot. ASTM D 5361 for collection and <u>1 core sample</u> per test location. Samples are full depth or overlay depth in overlay construction.

 <u>CONTRACTOR may take additional cores at no additional cost to the City and with prior approval by the ENGINEER.</u>
 - d. Repair core hole with at least 4-inch thick concrete within two days of sample.
 - 2. Non-Destructive Density (Marshall) Testing by Gage:
 - a. Lot: One days' production with 7,000 square feet sub-lots.

| Table 1.5 Density Testing Acceptance | | | | | | |
|---|--------------------|-----------------------|------------------------------|--|--|--|
| Maximum Laboratory Density (Marshall), Percent | | Air Voids, Percent | Acceptance | | | |
| Average | Lowest Test | rerecit | | | | |
| 96 or greater | 92 or greater | Test not required | Pass | | | |
| 93 to 96 | 92 or greater | 3 to 5 | Pass | | | |
| 93 to 96 | 92 or greater | 5 to 7 | Add Type II Slurry Seal | | | |
| 91 to 93 | 90 or greater | Test not required | Mill edges near concrete and | | | |
| | | | install 1" asphalt overlay | | | |
| Less than 91 | Less than 90 | Test not required | Remove and replace | | | |

- b. Sampling Protocol: ASTM D3665 for random test location selection with at least 1 test location per *sub-lot*.
- c. Testing Protocol: ASTM D2950 (nuclear gage) or AASHTO TP 68 (Non-nuclear gage) and ASTM D2041 for maximum theoretical density.

G. Thickness:

- 1. Lot Size: 7,000 square feet or part thereof.
- 2. Sampling Protocol: ASTM D 3665 and ASTM D 5361 with at least 2 test locations per Lot and <u>1 core sample</u> per test location. Samples are full depth. Thickness not measured in overlay construction. <u>CONTRACTOR may take additional cores at no additional cost to the City and with prior approval by the ENGINEER.</u>
- 3. Coring requirement may be waived if City inspector determines that sufficient inspection verifying the pavement thickness was provided during the installation.
- 4. Modify paragraph on Page 540 as follows:

1.6 TOLERANCES

E. Roughness: <u>Profilograph only arterial streets unless the ENGINEER requests it due to</u> suspicion of a roughness defect.

Section 32 12 17 Cold-Mix Asphalt Paving

No modifications

Section 32 13 13 Concrete Paving

No modifications

Section 32 13 73 Concrete Paving Joint Sealants

No modifications

Section 32 14 13 Precast Concrete Unit Paving

No modifications

Section 32 14 16 Brick Unit Paving

No modifications

Section 32 16 13 Driveway, Sidewalk, Curb, Gutter

Modified as follows:

1. Sidewalk contraction joints should be spaced as close to the width of the sidewalk as possible. In no instance should the width to length ratio of a single square created by the contraction joints exceed 1.2:1 in either direction. (i.e. a 5 foot wide sidewalk should have contraction joints spaced between 4.2 and 6.0 feet.).

Section 32 16 14 Curb Ramp

Modified as follows:

- 1. Refer to standard drawings for additional information.
- 2. Truncated domes shall be either plastic composite or uncoated cast iron with an earth tone color contrasting with the concrete curb ramp.
- 3. Modify paragraph on page 580 as follows:

3.3 LAYOUT

- A. Curb Cut (excluding flare or curb radius measurement):
 - 1. Width: 5 feet for each crosswalk served.
- 4. Modify paragraph on page 578 as follows:

3.9 PROTECTION AND REPAIRS

C. Repair: 03 30 10

- 1. Correct all humps or depressions
- 2. Replace all cracked sidewalks.

No modifications

- 3. Seal all cracked curb and gutters if crack is smaller than width of dime, otherwise replace cracked curb and gutters.
- 4. Secure ENGINEER's acceptance of method of correction.

| Section 32 17 23 Pavement Markings |
|---|
| No modifications |
| Section 32 31 13 Chain Link Fences and Gates |
| No modifications |
| Section 32 31 16 Welded Wire Fences and Gates |
| No modifications |
| Section 32 32 26 Crib Walls |
| No modifications |
| Section 32 84 23 Underground Irrigation Systems |
| No modifications |
| Section 32 91 19 Landscape Grading |
| No modifications |
| Section 32 92 00 Turf and Grasses |
| No modifications |
| Section 32 93 13 Ground Cover |
| No modifications |
| Section 32 93 43 Tree |

DIVISION 33 UTILITIES

APWA Utah Chapter's *Manual of Standard Specifications*, most recent edition, published by the Utah T2 Center are incorporated as listed with modifications noted:

Section 33 05 01 Acrylonitrile-Butadiene-Styrene (ABS) Pipe

No modifications

Section 33 05 02 Concrete Pipe and Culvert

No modifications

Section 33 05 03 Copper Pipe

No modifications

Section 33 05 04 Corrugated Metal Pipe

No modifications

Section 33 05 05 Ductile Iron Pipe

Modified as follows:

1. Ductile Iron Pipe must be double bagged with polyethylene materials per manufacturer recommendations for corrosive soils.

Section 33 05 06 Polyethylene Pipe

No modifications

Section 33 05 07 Polyvinyl Chloride Pipe

Modified as follows:

1. Modify paragraph on page 648 as follows:

1.3 PRESSURE PIPE SYSTEMS

- D. Fittings: Ductile Iron and Grey Cast Iron
 - 1. In accordance with AWWA C110 and C153
 - 2. Lined with cement mortar in accordance with AWWA C104.
 - 3. Provide flange adapter designed for AWWA C900 and AWWA C905 when connecting PVC pressure pipe to flanged fittings or flanged valves.
 - 4. Restrain joints with ductile iron joint restraints as manufactured by EBAA, Romac, Star or approved equal.

Section 33 05 08 Pre-Stressed Concrete Pipe

No modifications

Section 33 05 09 Steel Pipe - Lined and Coated

No modifications

Section 33 05 10 Vitrified Clay Pipe

No modifications

Section 33 05 14 Utility Grade Adjustments

Modified as follows:

1. Modify paragraph on page 667 as follows:

3.4 INSTALLING COVER COLLAR

B. Set concrete collar to <u>1/8 inch</u> minimum to <u>1/4 inch</u> maximum below asphalt concrete pavement surface and 1/4 inch below Portland cement concrete pavement surface.

Section 33 05 20 Backfilling Trenches

Modified as follows:

- 1. Table 1 Lot Sizes for Trench Backfilling Operation (p 670) has been modified (refer to Ivins City Minimum Field Testing Checklist in Appendix A).
- 2. Compaction (Paragraph 3.6): See Section 31 23 26 modifications.
- 3. Table 2 (as shown below) shall be associated with paragraph 3.3 Pipe Zone.

| Table 2 | | | | | | | |
|--|--|--------|--|--|--|--|--|
| Foundation and Pipe Zone Backfill Material | | | | | | | |
| Sieve Size | Sieve Size Foundation Material (if required) | | Final Backfill Material | | | | |
| | Percentag | | | | | | |
| 12" | | | X | | | | |
| 6" | 100 | | Native material which | | | | |
| 3" | | | contains no sod, | | | | |
| 2" | 90-100 | | vegetation, rocks larger than 6" diameter, | | | | |
| 1" | 70-90 | 100 | asphalt or concrete | | | | |
| 1/2" | 51-75 | 90-100 | chunks, etc. | | | | |
| #4 | 31-65 | 50-80 | No clays without prior | | | | |
| #16 | 16-40 | 30-42 | approval. | | | | |
| #200 | 2-12 | 9-25* | appiovai. | | | | |

*Must be non-plastic backfill material (Class I or Class II) when installed with flexible pipe systems (i.e. PVC, HDPE, and other plastic pipes)

4. Continuous plastic line markers are not required as indicated in paragraph 3.4D.

Section 33 05 23 Trenchless Utility Installation

No modifications

Section 33 05 25 Pavement Restoration

No modifications

Section 33 08 00 Commissioning of Water Utilities

Modified as follows:

1. Modify paragraph on page 686 as follows:

1.3 PRESSURE TEST

- A. Air Test: Per pipe manufacturer's recommendation.
 - 1. Required for all gravity drain (sewer and storm drain) pipes.
 - 2. Follow ASTM F1417 or UNI-B-6 (by Uni-bell) for plastic gravity drain pipes.
 - 3. Follow ASTM C924 for concrete pipes.
- E. If any leakage is detected, even if within acceptable limits, contractor shall check all pipe fittings (tees, bends, service taps, etc.) for leakage and tighten fittings to stop all leaks at these locations.
- 2. Modify paragraph on page 687 as follows:

3.4 PIPE TESTING SCHEDULE

- B. Deflections:
 - 2. Maximum reduction of internal diameter in any plane measured full length of installation and not less than 30 days after installation as follows.
 - a. Polyvinyl chloride pipe, 5 percent
- 3. Modify paragraph on page 687 as follows:

3.5 INFILTRATION TEST

- A. Maximum is 25 gallons per inch diameter per mile per 24 hours.
- 4. Add the following paragraphs on page 687:

3.6 VIDEO INSPECTION

- A. Run water through gravity system prior to video inspection
- B. Conduct at least 30 days after backfill and prior to installation of pavements.
- C. City inspector shall be present during video inspection.
- <u>D. Video shall be color and in an electronic format viewable with any standard computer</u> with standard video playback software.
- E. The date, identification of pipe reach, upstream and downstream manhole numbers, and manhole to manhole footage shall be displayed on the video data at all times.
- F. Provide video inspection log as a computerized data report with a map of the system inspected with appropriate identification labels as referenced in the video.

3.7 TRACER WIRE CONTINUITY TEST

- A. Test all tracer wire sections for continuity.
- 5. Modify paragraph on page 687-688 as follows:

3.7 PIPE TESTING SCHEDULE

A. Irrigation (*for landscaping*) - Gravity System:

- 1. Grade test: All circuits drain.
- B. Irrigation (*for landscaping*) Pressure System:
 - 1. Grade test: All circuits drain.
 - 2. Pressure test.
 - 3. Operational Testing:
 - a. Perform operational testing after hydrostatic test is complete; backfill is in place and sprinkler heads adjusted to final coverage.
 - b. Demonstrate system meets coverage requirements and automatic controls function properly.
 - c. Coverage requirements are based on operation of 1 circuit at a time.

C. Sanitary Sewers:

- 1. Alignment and grade test.
- 2. Obstructions and deflection test.
- 3. Infiltration test for gravity pipeline systems.
- 4. Pressure test for pressure pipeline systems.
- 5. Video inspection.
- 6. Air test.
- D. Subdrains:
 - 1. Grade test: All circuits drain.
 - 2. Obstructions and deflection test.
- E. Storm Drains:
 - 1. Alignment and grade test.
 - 2. Obstructions and deflection test.
 - 3. Infiltration test for gravity pipeline systems.
 - 4. Pressure test for pressure pipeline systems.
 - 5. Video inspection.
 - 6. Air test.
- E. Potable Water System:
 - 1. Obstruction and deflection test.
 - 2. Pressure test.
 - 3. Disinfection (Section 33 13 00)
 - 4. Tracer wire continuity test.
- F. Secondary Water System
 - 1. Obstruction and deflection test.
 - 2. Pressure test.
 - 3. Flushing (See Section 33 13 00 disinfection not required)
 - 4. Tracer wire continuity test.

Section 33 11 00 Water Distribution and Transmission

Modified as follows:

1. Modify paragraph on page 689 as follows:

1.3 PERFORMANCE REQUIREMENTS

- A. Depth of Cover:
 - 1. <u>30</u> inches minimum to top of pipe, service line. <u>48 inches minimum where final street</u> <u>grades are undetermined.</u> 72 inches maximum unless ENGINEER authorizes otherwise.
- 2. Modify paragraph on page 691 as follows:

2.7 SERVICE CONNECTION

- A. <u>Polyethylene Pipe (Iron Pipe Size)</u>
- 3. Add paragraph on page 691 as follows:

2.8 TRACER WIRE

- A. Wire must be at least 14 AWG in size with THWN insulation.
- B. Provide wire coils in valve boxes, fire hydrants, and meter services such that wire can be lifted at least 3 feet above the ground surface.
- C. No splices allowed unless approved by City. (Do not splice in laterals to main line tracer wire.)
 - 1. If splice is allowed, must use an approved water tight splicing system.
- D. Place wire under haunch of pipe prior to trench backfill and compaction.
- E. When reasonably possible, loop tracer wire into valve box with appropriate length of coil and continue along main without cutting the wire.
- <u>F. All wire ends shall be terminated with a greased wire nut.</u>

Section 33 11 11 Relocate Water Meters and Fire Hydrants

No modifications

Section 33 12 16 Water Valves

Modified at follows:

- 1. For regular distribution or transmission system valves, use direct buried gate valves for sizes 3-inches through 12-inches. For larger sizes, may use butterfly valves.
- 2. Gate Valves, use:
 - a. Mueller
 - b. M&H
 - c. Kennedy
 - d. AVK
 - e. Or approved equal.
- 3. Butterfly Valves, use:
 - a. Pratt
 - b. M&H
 - c. Crispin, K-flow series
 - d. Or approved equal.
- 4. Check Valves, use:
 - a. Crispin

- b. Kennedy
- c. Val-matic
- d. Or approved equal.
- 5. Pressure Reducing Valve Main Line, use:
 - a. Cla-Val Co., 90 Series
 - b. Watts
 - c. Or approved equal.
- 6. Corporation Stops
 - a. A.Y. McDonald
 - b. Mueller Co.
 - c. Ford Meter Box Co.
 - d. Or approved equal.
- 7. Air Release
 - a. ARI Flow Control Accessories, D-040
 - b. Crispin / Multiplex Manufacturing Co., PL Series
 - c. Or approved equal.
- 8. Air & Vacuum
 - a. Crispin
 - b. Vent-o-mat, RBX
 - c. Valve and Primer Corp. (Apco/Willamette), 1604/152
 - d. Or approved equal.
- 9. Combination Air Valves
 - a. Crispin
 - b. Valve and Primer Corp. (Apco/Willamette), APCO 143C 151C
 - c. Val-Matic Valve and Mfg. Corp., 200C Series
 - d. Golden Anderson Industries, Series 945E Kinetic
 - e. Or approved equal.

Section 33 12 19 Hydrants

Modified as follows:

- 1. Hydrants shall be mechanical joint without foot valve as follows:
 - a. Mueller, Modern Centurion, Model A-423;
 - b. Kennedy, Model K-81A
 - c. AVK, Series 2780
 - d. Or equal
- 2. Modify paragraph on page 703 as follows:

2.1 INSTALLATION

- B. Install so bottom of hydrant flange is 2 to 4 inches above final grade. Verify final grade with survey equipment prior to installation.
- 3. Paint materials as follows:
 - a. Primer: as delivered by manufacturer.
 - b. Final Coat: as recommended by manufacturer after installation.

Section 33 12 33 Water Meters

Modified as follows:

- 1. All service lines 1-inch or less shall use smooth wall polyethylene pipe, IPS, SDR 9 per Section 33 05 06.
 - a. Fitting connectors shall be brass compression type with pipe stiffeners.
 - b. Use of pipe sealing compounds, pipe dope, and detergent type lubricants are not permitted.
- 2. Meters, (provided by City):
 - a. Badger,
 - b. No substitutions.
- 3. AMR transmitter, (provided by City)
 - a. Itron
 - b. No substitutions.
- 4. Meter Box, use:
 - a. For 3/4" or 1" meters outside of traffic areas, use 18 21 inch diameter corrugated polyethylene pipe.
- 5. Meter Box Ring and Lid, use:
 - a. D&L Supply, L-2240
 - b. Culinary water Cast with 1-3/4" hole and marked with lid casting "WATER"
 - c. Secondary water No holes or text markings.
 - d. No substitutions
- 6. Meter Setters (Meter Yoke), use:
 - a. Mueller H-1404
 - b. Ford
 - c. Or approved Equal

Section 33 13 00 Disinfection

No modifications

Section 33 31 00 Sanitary Sewer Systems

Modified as follows:

1. Pipe 8 inches in diameter, and larger, shall be laid with the use of an electronic laser or equivalently precise method of establishing line and grade.

Section 33 41 00 Storm Drainage Systems

Modified as follows:

1. Pipe shall be laid with the use of an electronic laser or equivalently precise method of establishing line and grade.

Section 33 47 00 Ponds

No modifications

Section 33 71 73 Electrical Utility Services

This specification does not apply to Ivins City. Refer to Rocky Mountain Power.

DIVISION 34 TRANSPORTATION

APWA Utah Chapter's *Manual of Standard Specifications*, most recent edition, published by the Utah T2 Center are incorporated as listed with modifications noted:

Section 34 41 13 Traffic Signals

No modifications

Section 34 71 13 Vehicle Barriers

No modifications

Section 34 71 19 Vehicle Delineators

No modifications

PART 4

STANDARD DRAWINGS FOR CONSTRUCTION

4.0. INTRODUCTION

In this document, **Ivins City adopts the most recent edition (currently 2007), including all amendments, of the APWA Utah Chapter's** *Manual of Standard Plans*. Part 4 is a listing of all of the drawings from the APWA manual and identifies any local modifications that have been made.

4.1. APPLICATION TO DEVELOPER PROJECTS

All drawings listed with an asterisk (*) do not apply to developer projects and only apply to City contracts. All other specifications may apply to both a developer project as well as a City contract. In these specifications, any reference to "CONTRACTOR" may also imply a responsibility to the Developer as determined by the Developers private contract with its Contractors. All references to "OWNER" apply to Ivins City. All references to "ENGINEER" refer to Ivins City Engineer or other City representative acting with the scope of assigned duties.

4.2. LOCAL DRAWINGS

All drawings shown in **BOLD** are not references to the APWA manual and are instead attached to Part 4 at the end of the document. These are standard drawings that have been locally prepared for Ivins City and may replace an APWA standard plan or at the very least will govern over any conflict with an APWA specification.

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PART 4 GENERAL REQUIREMENTS

Contract Closeout

Plan No. 110 Arrow diagram for project close-out (p3)

No Modifications

Erosion Control

Plan No. 121 Straw bale barrier (p5)

No Modifications

Plan No. 122 Silt fence (p7)

No Modifications

Plan No. 123 Diversion dike (p9)

No Modifications

Plan No. 124 Inlet protection (p11)

No Modifications

Plan No. 125 Equipment and vehicle wash down area (p17)

No Modifications

Plan No. 126 Stabilized roadway entrance (p19)

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PART 2 - ROADWAY

Abbreviations and Symbols

Plan No. 201 Abbreviations and symbols for roadway drawings (p23)

No Modifications

Curb, Gutter, Driveway, Sidewalk

Plan No. 205 Curb and gutter (p25)

Ivins Standard Drawing R-01 Curb and Gutter shall be used in place of this APWA standard plan.

Plan No. 209 Curbs (p29)

No Modifications

Plan No. 211 Waterway (p31)

Ivins Standard Drawing R-02 Cross Gutter shall be used in place of this APWA standard plan.

Plan No. 213 Waterway transition structure (p33)

Ivins Standard Drawing R-02 Cross Gutter shall be used in place of this APWA standard plan.

Plan No. 215 Dip driveway approach (p35)

No Modifications

Plan No. 216 Mountable curb driveway approach (p37)

No Modifications

Plan No. 221 Flare driveway approach (p39)

No Modifications

Plan No. 222 Saw-cut driveway approach (p43)

No Modifications

Plan No. 225 Open driveway approach (p45)

No Modifications

Plan No. 229 Piped driveway approach (p47)

No Modifications. Not allowed without prior City approval.

Plan No. 231 Concrete sidewalk (p51)

Modified as follows:

- 1. Expansion joints required at 20-foot intervals.
- 2. Expansion joints filler material shall extend 1" below concrete slab.
- 3. Contraction joints required at 5-foot intervals on a 5' sidewalk, plus or minus to fit site geometry.
- 4. Compact subgrade per geotechnical recommendations.
 - a. May require overexcavation.
 - b. As a minimum, scarify 8 inches, moisture recondition and recompact per APWA Section 32 05 10.

Plan No. 232 Patterned concrete park strip (p53)

No Modifications. Not allowed without prior City approval.

Plan No. 235 Corner curb cut assembly (p55)

Ivins Standard Drawing No. R-03 replaces this APWA standard plan.

Plan No. 236 Tangent curb cut assembly (p61)

No Modifications

Plan No. 237 Islands and median (p67)

No Modifications

Plan No. 238 Detectable warning surface (p69)

No Modifications

Plan No. 241 Parking meter post (p71)

No Modifications

Plan No. 242 Form strip filler (p73)

No Modifications

Roadways

Plan No. 251 Asphalt concrete pavement tie in (p75)

No Modifications

Plan No. 252 Curb and gutter replacement without pavement tie in (p77)

No Modifications

Plan No. 253 Asphalt concrete pavement overlay (p79)

| No Modifications |
|---|
| Plan No. 255 Asphalt concrete "T" patch (p83) |
| No Modifications |
| Plan No. 256 Concrete pavement patch. (p87) |
| No Modifications |
| Plan No. 261 Concrete pavement joints (p89) |
| No Modifications |
| Plan No. 265 Crack sealing – asphalt pavement (p93) |
| No Modifications |
| Plan No. 266 Crack filling – asphalt pavement (p95) |
| No Modifications |
| Survey Monument |
| Plan No. 271 Corner and boundary markers (p97) |
| No Modifications |
| Plan No. 272 Monument cap and base (p99) |
| No Modifications |
| Plan No. 273 Frame and cover for monument (p101) |
| No Modifications |
| Plan No. 274 Survey monument placement under pavements (p103) |
| No Modifications |
| Plan No. 275 Cover collar for survey monuments (p105) |
| Modified as follows: |
| 1. Install one #4 rebar in concrete collar. |
| General |
| Plan No. 291 Defective concrete (p107) |

Plan No. 292 Street name sign (typical) (p109)

Ivins Standard Drawing R-06 Sign Post Installation shall be used in place of this APWA standard plan.

PART 3 - STORM DRAIN

Abbreviations and Symbols

Plan No. 301 Abbreviations and symbols for storm drains (p113)

No Modifications

Catch Basins, Inlets, Outlets and Hardware

Plan No. 302 30" Frame and cover (p115)

No Modifications

Plan No. 303 44" Frame and cover (p119)

No Modifications

Plan No. 304 48" Cover and frame (p121)

No Modifications

Plan No. 305 51" Cover and frame (p123)

No Modifications

Plan No. 308 35 1/2" Grate and frame with adjustable curb box (p129)

No Modifications

Plan No. 309 47 3/4" Grate and frame (p131)

No Modifications

Plan No. 310 48" Grate and frame (p135)

No Modifications

Plan No. 315 Catch basin (p137)

Modified as follows:

1. Precast boxes may be provided. Contractor must submit product data prior to installation.

Plan No. 316 Combination inlet/cleanout box (p141)

Modified as follows:

1. Precast boxes may be provided. Contractor must submit product data prior to installation.

Plan No. 317 Curb inlet/outlet (p143) Modified as follows: 1. Precast boxes may be provided. Contractor must submit product data prior to installation. Plan No. 320 Debris grate inlet (p147) No Modifications Plan No. 321 Automatic flap gate (pressurized storm drains) (p149) No Modifications Plan No. 322 Curb outlet (p151) No Modifications Plan No. 323 Pipe outfall access control rack (p153) No Modifications **Cleanout Box and Hardware** Plan No. 330 Cleanout box (p155) No Modifications Plan No. 331 Cleanout box (p157) No Modifications Plan No. 332 Cast in-place manhole (p159) No Modifications Plan No. 335 Adjust reinforced concrete deck to grade (p161) No Modifications Manhole and Hardware Plan No. 341 Precast manhole (p163)

Plan No. 345 Concrete deck (p167)

No Modifications

No Modifications. Use Eccentric Deck Plan unless otherwise approved.

Plan No. 360 Raise frame to grade – plastic form (p169) No Modifications Plan No. 361 Raise frame to grade – grade ring (p171) No Modifications Plan No. 362 Cover collar for storm drains (p173) Modified as follows: 1. Install one #4 rebar in concrete collar. **Piping** Plan No. 372 Area drain (p175) No Modifications Plan No. 373 Concrete pier (p177) No Modifications **Trenching** Plan No. 381 Trench Backfill. (p179) No Modifications Plan No. 382 Pipe zone backfill (p181)

Modified as follows:

1. See Ivins City Modification to Section 33 05 20 Backfilling Trenches, paragraph 3.3 Pipe Zone for allowable material to be installed within the pipe zone.

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PART 4 - SANITARY SEWER

Abbreviations and Symbols

Plan No. 401 Abbreviations and symbols for sewer (p185)

No Modifications

Manholes and Hardware

Plan No. 402 30" Frame and cover (p187)

No Modifications

Plan No. 411 Sanitary sewer manhole (p189)

Ivins Standard Drawing No. S-01 Standard Manhole shall be used in place of this APWA standard plan.

Plan No. 412 Invert cover (p191)

No Modifications

Plan No. 413 Cover collar for sanitary sewer manhole (p193)

Modified as follows:

1. Install one #4 rebar in concrete collar.

Piping

Plan No. 431 Sewer lateral connection (p195)

Ivins Standard Drawing No. S-05, S-06, and S-07 shall be used in place of this APWA standard plan.

Plan No. 432 Sewer lateral relocation (p197)

No Modifications

Plan No. 433 Pipe drop (p199)

Ivins Standard Drawing No. S-02 Junction & Drop Manhole shall be used in place of this APWA standard plan.

Liquid Separation Systems

Plan No. 441 Grease trap. (p201)

All grease traps shall be in accordance with City of St. George standards in place of this APWA standard plan.

Trenching - See Trenching requirements under Section 3

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PART 5 - WATER SYSTEMS

Abbreviations and Symbols

Plan No. 501 Abbreviations and symbols for water (p205)

No Modifications

Concrete Boxes and Hardware

Plan No. 502 27" Frame and cover (p207)

Modified as follows:

1. Inscription shall be "WATER".

Plan No. 503 38" Frame and cover (p209)

Modified as follows:

1. Inscription shall be "WATER".

Plan No. 505 Concrete boxes (p211)

No Modifications

Fire Hydrants

Plan No. 511 Fire hydrant with valve (p213)

Ivins Standard Drawing No. W-02 Fire Hydrant Installation shall be used in place of this APWA standard plan.

Meters

Plan No. 521 3/4" and 1" meter (p215)

Ivins Standard Drawing No. W-01 ¾" or 1" Water Service Connection shall be used in place of this APWA standard plan.

Plan No. 522 1 1/2" and 2" meter. (p217)

No Modifications

Plan No. 523 3" & 4" Compound meter with 2" bypass (p219)

No Modifications

Plan No. 525 6" Compound meter with 2" bypass (p221)

Plan No. 527 8" Compound meter with 2" bypass (p223)

No Modifications

Plan No. 529 10" Turbo meter with 6" turbo meter and 2" bypass (p225)

No Modifications

Monitoring Systems

Plan No. 535 Electrolysis monitoring station details (p227)

No Modifications

Piping

Plan No. 541 Water service line. (p229)

Ivins Standard Drawing No. W-01 ¾" or 1" Water Service Connection shall be used in place of this APWA standard plan.

Plan No. 542 Waterline loop (p231)

Modified as follows:

1. Use joint restraints for thrust control unless otherwise approved.

Plan No. 543 Fire hydrant relocation (p233)

No Modifications

Plan No. 551 3/4" and 1" Service taps (p235)

Modified as follows:

- 1. Use IPS polyethylene pipe for service lines.
- 2. Service line minimum depth is 36".

Plan No. 552 1 1/2" and 2" Service taps. (p237)

Modified as follows:

1. Use IPS polyethylene pipe for service lines.

Thrust Blocks

Plan No. 561 Direct bearing thrust block. (p239)

Direct bearing thrust blocks are not allowed except in certain circumstances as approved by the City. Joint restraints shall be used as the standard for thrust control. See Ivins Standard Drawing No. W-04, W-05, and W-06 for PVC restraining systems.

Plan No. 562 Tie-down thrust restraints (p241)

Tie-down thrust restraints are not allowed except in certain circumstances as approved by the City. Joint restraints shall be used as the standard for thrust control.

Trenching - See Trenching requirements under Section 3

Valves

Plan No. 571 2" Washout valve (p243)

Required on all dead ends except when hydrant is located within 100 feet.

Plan No. 572 Detector check valve with 3/4" bypass meter (p245)

No Modifications

Plan No. 573 6" Pressure reducing valve with 2" bypass (p247)

No Modifications

Plan No. 574 Cover collar for water valve boxes (p249)

Ivins Standard Drawing No. W-03 Valve and Valve Box Installation shall be used in place of this APWA standard plan.

Plan No. 575 Air release assembly (p251)

Modified as follows:

1. Replace copper tubing with IPS polyethylene pipe.

General

Plan No. 593 Pressurized irrigation water and potable water interface (p253)

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PART 6 – IRRIGATION AND LANDSCAPING

Abbreviations and Symbols

Plan No. 601 Abbreviations and symbols for irrigation and landscaping (p259)

No Modifications

Gravity Flow System

Plan No. 611 Curb inlet box for irrigation (p261)

No Modifications

Plan No. 613 Irrigation diversion box (p263)

No Modifications

Plan No. 614 Irrigation diversion box (p265)

No Modifications

Heads

Plan No. 621 Stationary head (p267)

No Modifications

Plan No. 622 Pop-up head (p269)

No Modifications

Valves

Plan No. 631 Backflow preventer. (p271)

No Modifications

Plan No. 632 Drain valve (p273)

No Modifications

Plan No. 633 Control valve (p275)

No Modifications

Plan No. 635 Isolation shut-off valve (p277)

No Modifications

Electrical

Plan No. 651 Wire runs for landscape irrigation (p279)

No Modifications

Trees and Plants

Plan No. 681 Tree (p281)

No Modifications

Plan No. 683 Shrubs and bushes (p283)

PART 7 - COMMUNICATIONS, LIGHTING, TRAFFIC CONTROL

Street Lighting

Plan No. 710 Riser (p287)

No Modifications

Plan No. 730 Collar for street light pole (p289)

Not applicable to Ivins City. See Ivins Standard Drawings No. L-01, L-02, L-03, and L-04.

Plan No. 731 Pull box (p291)

No Modifications

Plan No. 732 Trench for street light conduit (p293)

No Modifications

Plan No. 733 Joint use trench – street lighting (p297)

No Modifications

Plan No. 736 Street light pole terminal (p299)

No Modifications

Plan No. 737 Street light meter pedestal (p301)

No Modifications

Plan No. 741 Screw-in base street light pole (p303)

Not applicable to Ivins City. See Ivins Standard Drawings No. L-01, L-02, L-03, and L-04.

Plan No. 742 Direct burial street light pole (p305)

Not applicable to Ivins City. See Ivins Standard Drawings No. L-01, L-02, L-03, and L-04.

Light Pole Standards

Plan No. 751 Signal pole foundation (p307)

No Modifications

Plan No. 752 Signal pole wiring (p309)

Speed Humps

Plan No. 761 Speed Bump (p311)

No Modifications

Plan No. 762 Speed Table (p313)

PART 8 - GENERAL FACILITIES

Design Standards

Plan No. 805 Design vehicle – type A. (p317)

No Modifications

Plan No. 805 Design vehicle – type B. (p319)

No Modifications

Security Fencing

Plan No. 831 Chain link fence (p321)

No Modifications

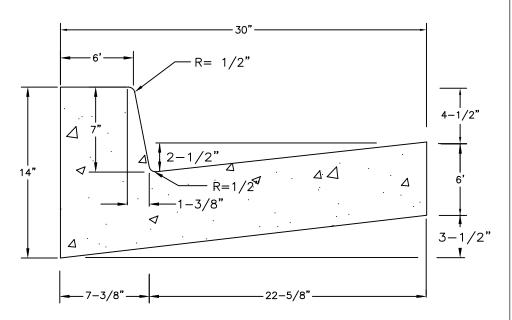
Miscellaneous

Plan No. 880 Bus stop pad (p323)

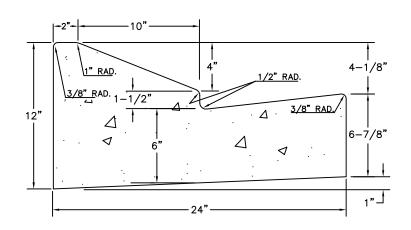
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CONSTRUCTION NOTES:

- SUBGRADE: Compact per geotechnical recommendations.
- 1.a. May require overexcavation.
- As a minimum, scarify 8 inches, moisture recondition and recompact per APWA Section 32 05 10.
- 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.
- Provide ½ 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.
- EXPANSION JOINT: Make expansion joints vertical, full depth, ½ 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.
- PROTECTION AND REPAIR:
- 7.a. Fill flow-line with water. Repair construction that does not drain.



30" HIGHBACK CURB & GUTTER

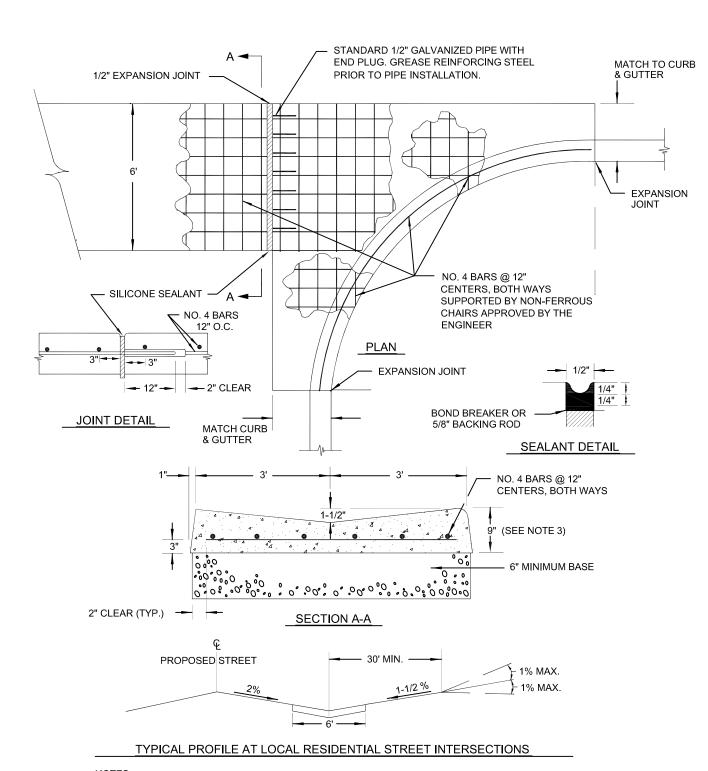


24" MODIFIED CURB & GUTTER
(NOT TO SCALE)

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CURB AND GUTTER



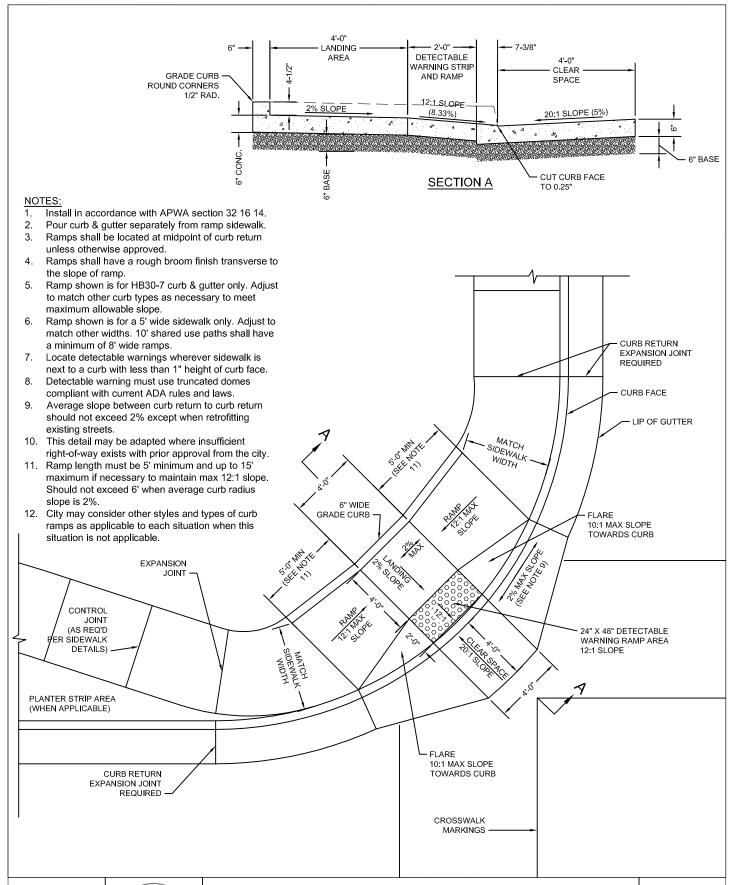
NOTES:

- 1. FINISHED ASPHALT CONCRETE SURFACE TO BE FLUSH WITH CROSS GUTTER LIP.
- CONSTRUCTION OF CROSS GUTTER IS NOT ALLOWED ACROSS MAJOR COLLECTOR OR ARTERIAL STREETS.
- 3. ADJACENT SPANDREL SHALL BE 9" THICK.

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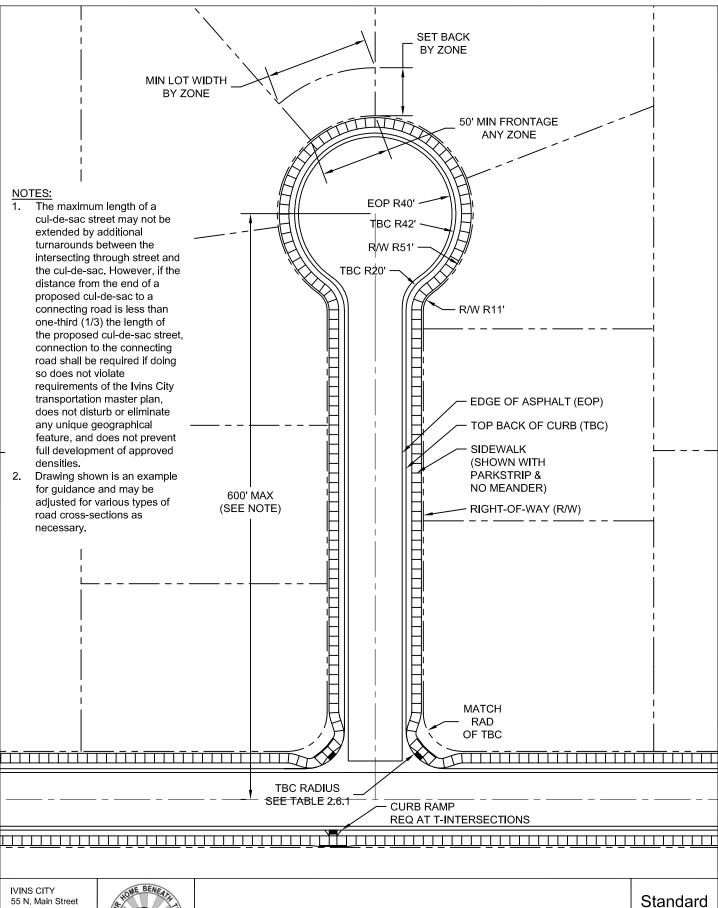


CROSS GUTTER





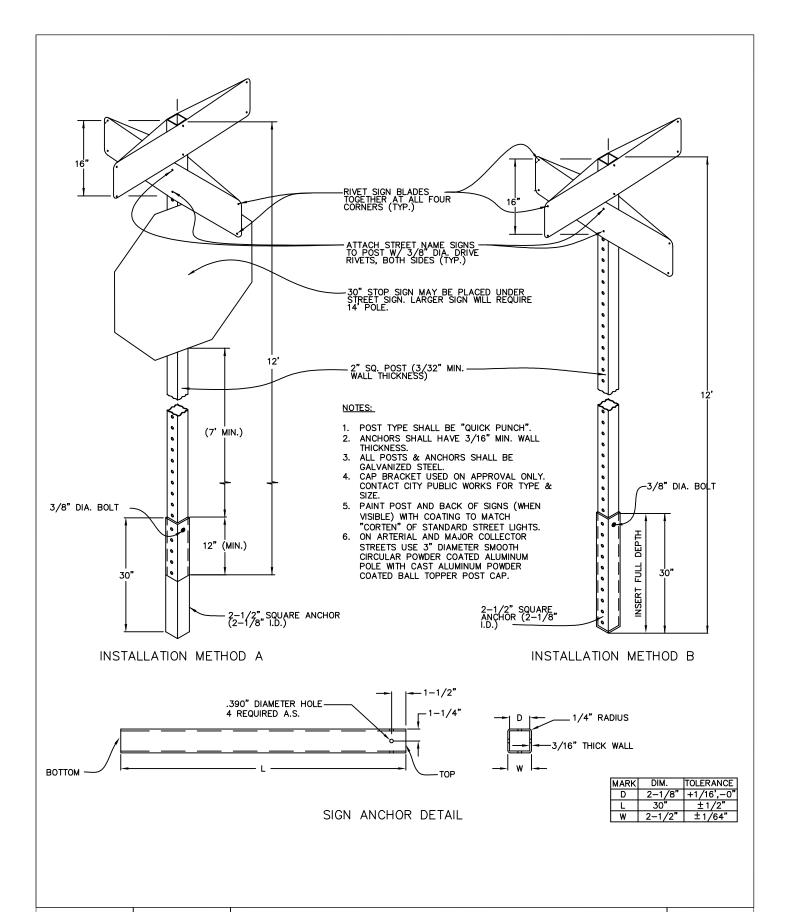
SIDEWALK CURB RAMP



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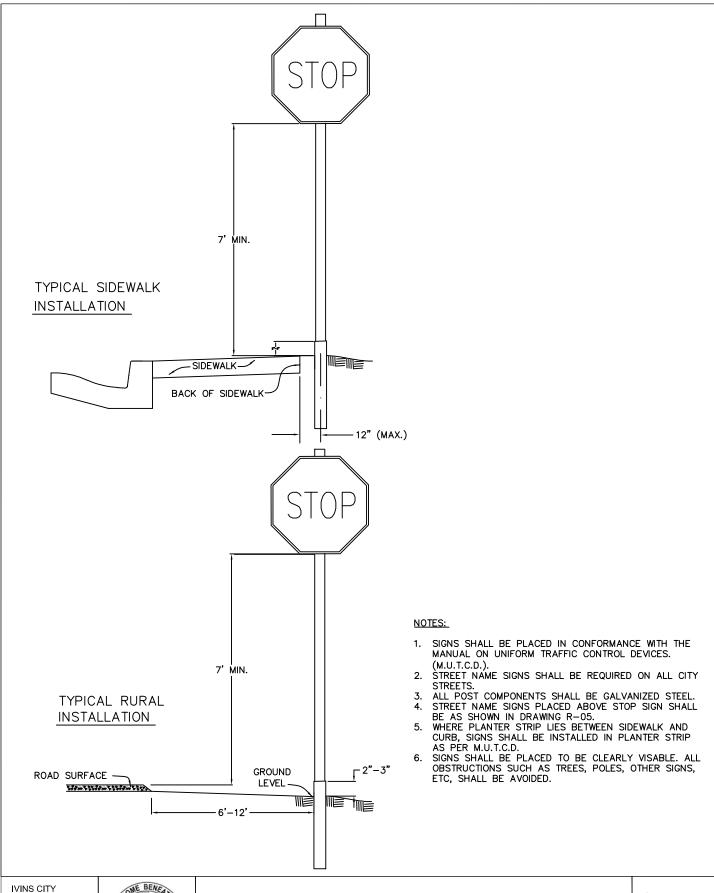
RESIDENTIAL CUL-DE-SAC



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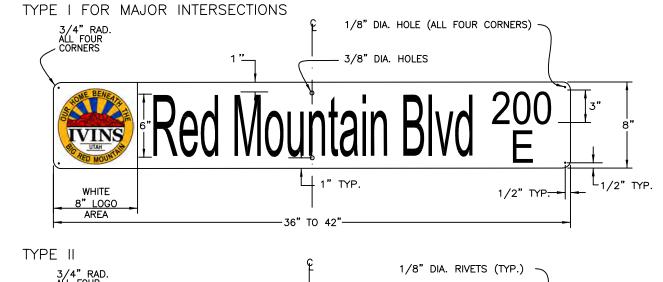
SIGN POST MATERIALS

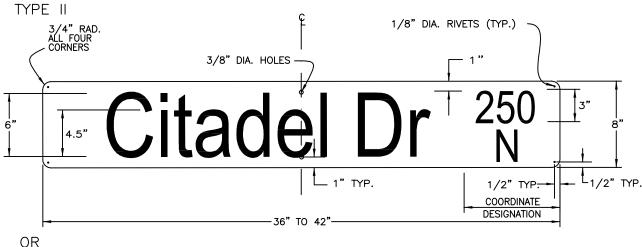


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SIGN POST INSTALLATION





NOTES:

- 1. BACKGROUND SHALL BE GREEN, LEGEND AND LETTERS SHALL BE WHITE.
- ALL SHEETING SHALL BE HIGH INTENSITY REFLECTIVE SHEETING. (FP-85 TYPE III A)
- SIGNS SHOULD BE MADE BY THE "REVERSE OUT" PROCESS. NO STICK ON LETTERS.
- SIGN BLANK SHALL BE 6061-T6 HEAT TREATED HIGH TENSILE DEGREASED ALUMINUM WITH ALODINE 1200 FINISH. MIN. THICKNESS SHALL BE 0.080".

 EACH SIGN SHALL CONSIST OF TWO PLATES RIVETED TOGETHER AND MOUNTED AS REQUIRED.

 SIGNS ON PRIVATE ROADS ARE REQUIRED AND SHOULD MEET SAME SPECIFICATIONS OF STANDARD
- SIGNS EXCEPT FOR BACKGROUND COLOR.
- 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.
- 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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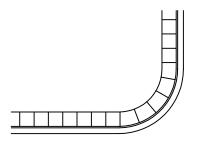
STANDARD STREET SIGN

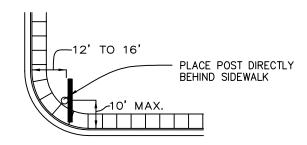
SIGN DESIGNATION FORM PROJECT NAME 1/8" DIA. RIVETS (TYP.) 3/4" RAD. ALL FOUR CORNERS 3/8" DIA. HOLES DATE BY NOTES: SEE DRAWING NO. R-07 FOR SIGN SPECIFICATIONS. SIGNS ON PRIVATE ROADS WHEN REQUIRED BY THE CITY ENGINEER SHALL MEET ALL SPECIFICATIONS OF STANDARD L 1" TYP. L_{1/2" TYP.} 1/2" TYP--36" TO 42"-SIGNS EXCEPT BACKGROUND SHALL BE BLUE. 3. ADDRESS COORDINATOR MUST BE STANDARD IVINS CITY SIGN CONTACTED PRIOR TO MAKING SIGNS TO VERIFY PROPER NAMES AND THIS FORM TO BE COMPLETED BY THE CITY COORDINATES. ADDRESS COORDINATOR PRIOR TO ORDERING 4. ALL STREETS WITH NAMES WILL ALSO OF STREET SIGNS BY DEVELOPER. HAVE COORDINATES DESIGNATED ON SIGN. LOCATION **GUIDE**

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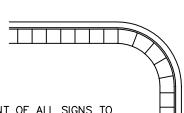


SIGN DESIGNATION FORM





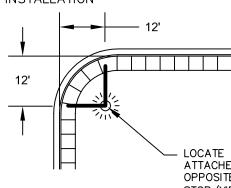
TYPICAL URBAN INSTALLATION



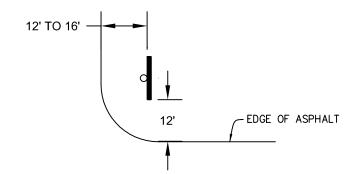
 PLACEMENT OF ALL SIGNS TO CONFORM TO THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.

NOTES:

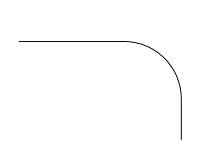
- 2. IF PLACEMENT STANDARDS CANNOT BE MET, CONTACT CITY ENGINEERING DEPARTMENT.
- IF INSTALLATION ACCORDING TO STANDARDS CAUSES THE SIGN TO BE OBSTRUCTED OR ITS VISIBILITY IMPAIRED IN ANY WAY, MODIFICATIONS MAY BE NECESSARY. CALL CITY FOR ASSISTANCE.
- 4. WHEN STREET SIGN IS ATTACHED TO STREET LIGHT, ORIENT SIGN TO STREET SIDE OF POLE.

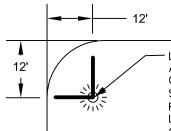


LOCATE STREETLIGHT WITH ATTACHED STREET SIGNS OPPOSITE SIDE OF STOP/YIELD SIGN WHERE POSSIBLE. (SEE DRAWING L-01 AND SECTION 2.10.2 OF STANDARDS)



TYPICAL RURAL INSTALLATION



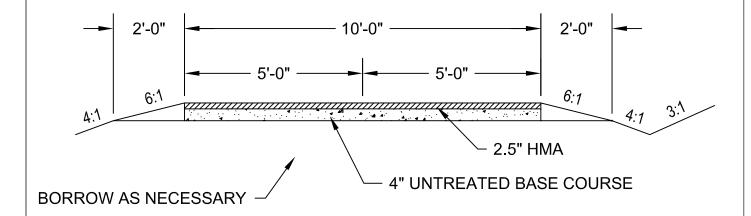


LOCATE STREETLIGHT WITH ATTACHED STREET SIGNS OPPOSITE SIDE OF STOP/YIELD SIGN WHERE POSSIBLE. (SEE DRAWING L-01 AND SECTION 2.10.2 OF STANDARDS)

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TYPICAL INTERSECTION SIGN PLACEMENT

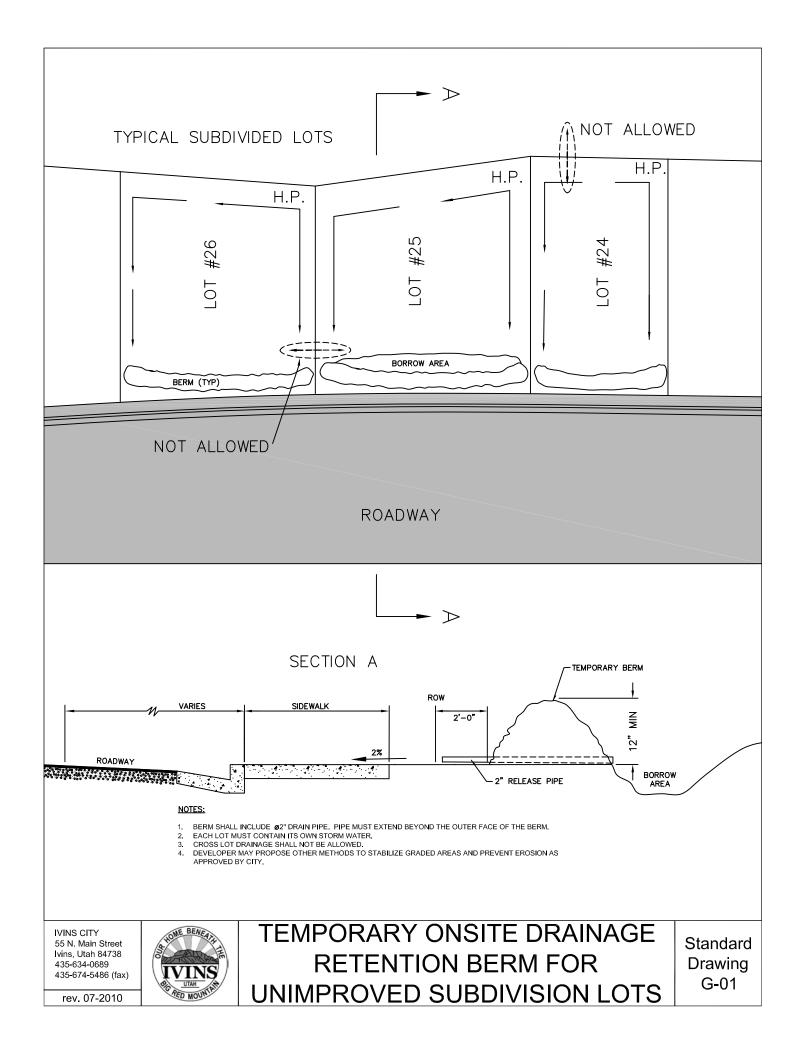


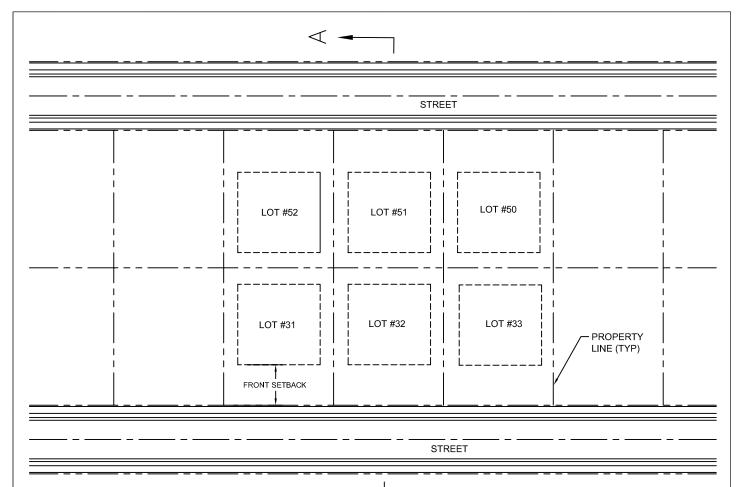
TYPICAL SECTION

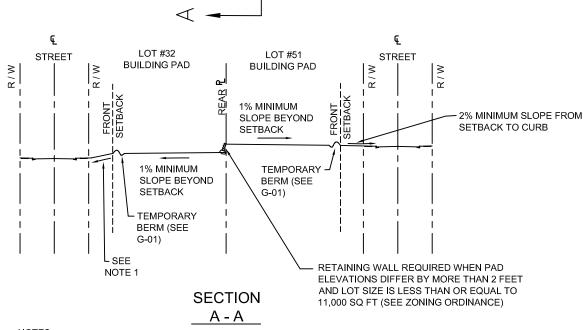
NOTE: TRAIL TO MEET AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO) "GUIDE FOR DEVELOPMENT OF BICYCLE FACILITIES" DESIGN STANDARDS.

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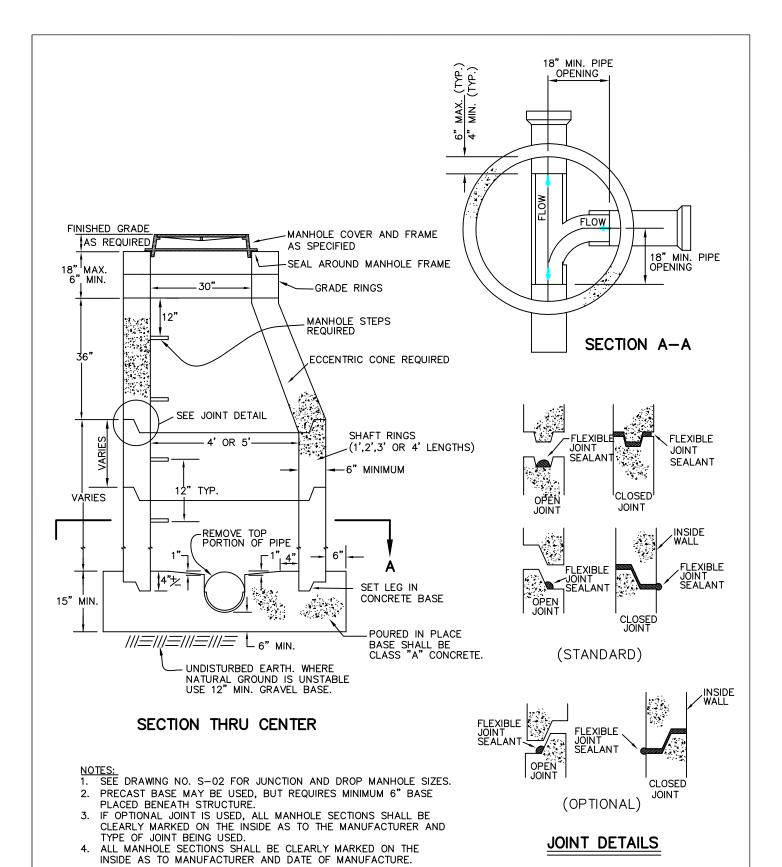
NOTES:

- 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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SUBDIVISION LOT GRADING DETAILS



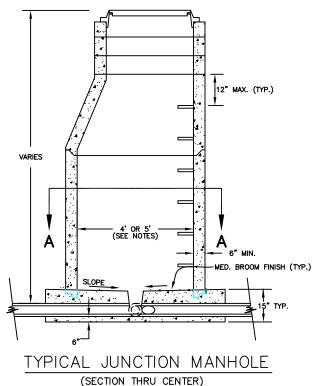
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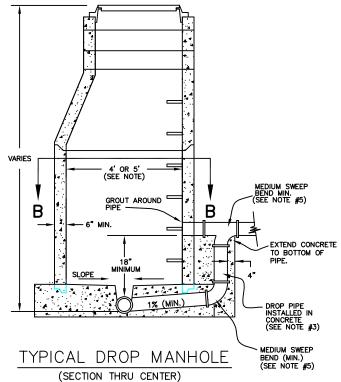


STANDARD MANHOLE

Standard Drawing S-01

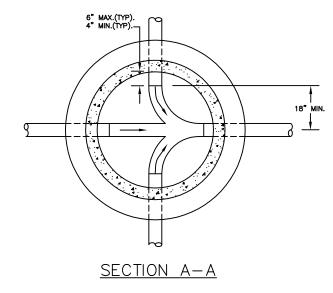
STANDA

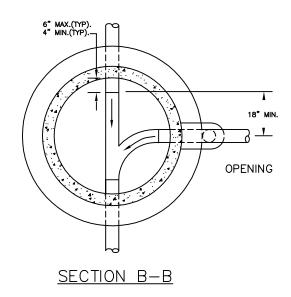




NOTES:

- 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.
- NO LATERALS SHALL BE INSTALLED DIRECTLY INTO MANHOLES UNLESS PRIOR APPROVAL BY CITY REPRESENTATIVE.
- BENDS CAN BE 45° OR 90° (90° IS SHOWN). ALL OTHER REQUIREMENTS ARE THE SAME.
- FLOW LINES OF JUNCTION LINES OR BEND LINES GREATER THAN 10° SHALL ENTER MANHOLE AT 0.2' HIGHER THAN OUTFLOWING LINE.





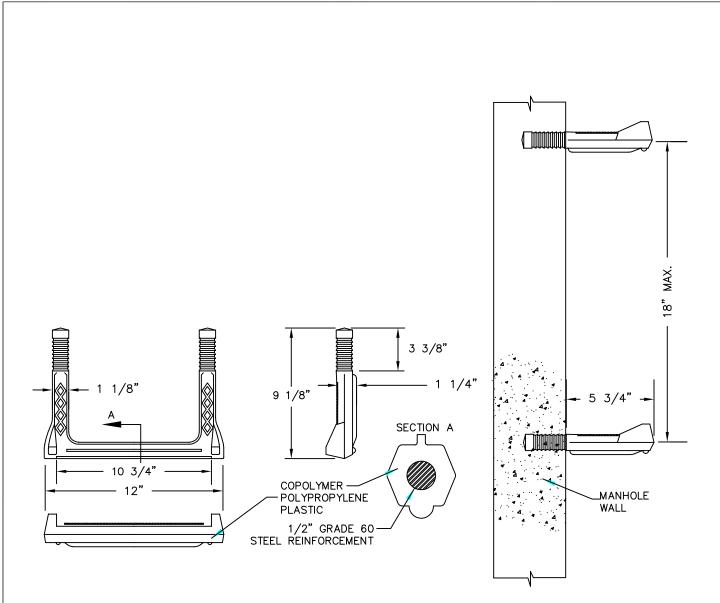
NO SCALE

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JUNCTION & DROP MANHOLE



MANHOLE STEPS

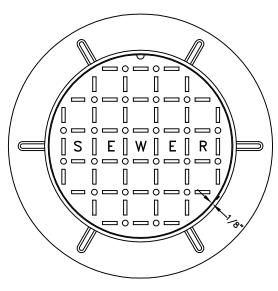
NOTES:

- INSTALL STEPS PER MANUFACTURERS RECOMMENDATIONS.
 STEPS SHALL BE ALIGNED VERTICALLY.

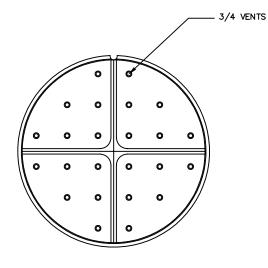
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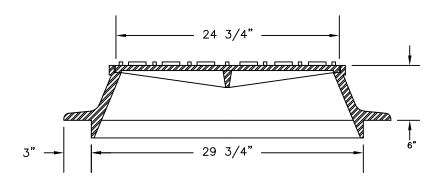
MANHOLE STEP DETAIL

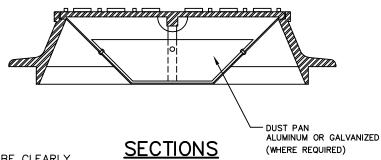






BOTTOM VIEW OF COVER





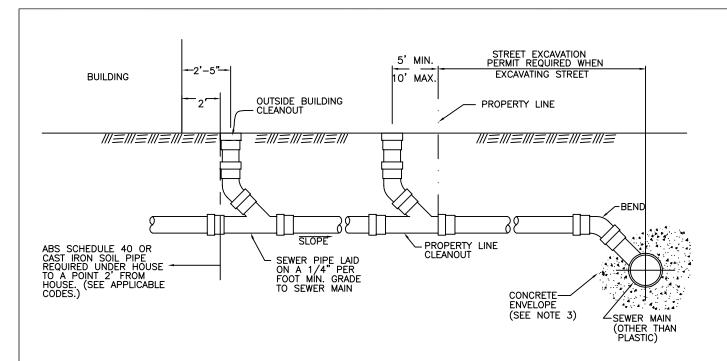
NOTES:

- USE OF MANHOLE TO BE CLEARLY MARKED ON EACH LID (I.E. "SEWER", "STORM").
- 2. MUST MEET HS-20 LOADING.
- A LOW PROFILE RING MAY NOT BE USED WHEN ADJUSTING TO GRADE IF A MANHOLE SECTION IS REMOVABLE.

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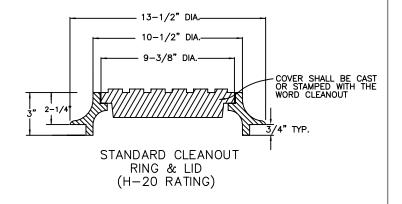


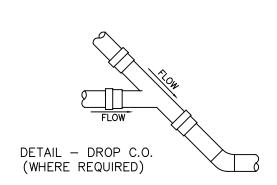
MANHOLE FRAME & COVER

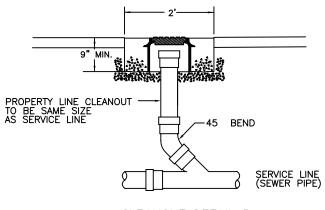


NOTES:

- PROPERTY LINE AND OUTSIDE BUILDING CLEANOUTS ARE REQUIRED AS SHOWN.
- CLEANOUT REQUIRED AT 100' MAX. SPACING (STRAIGHT RUNS) AND FOR EACH AGGREGATE CHANGE IN DIRECTION, WHERE TOTAL AGGREGATE CHANGE EXCEEDS 135'.
- 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.
- FOR COMMERCIAL APPLICATION CONTACT WASTE WATER DIVISION.





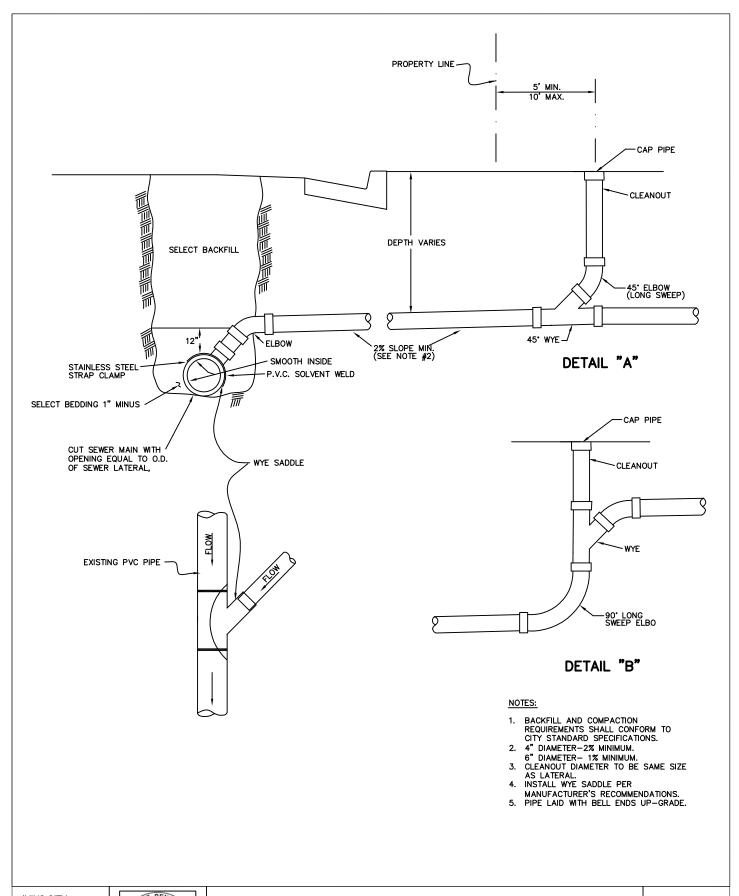


CLEANOUT DETAIL B

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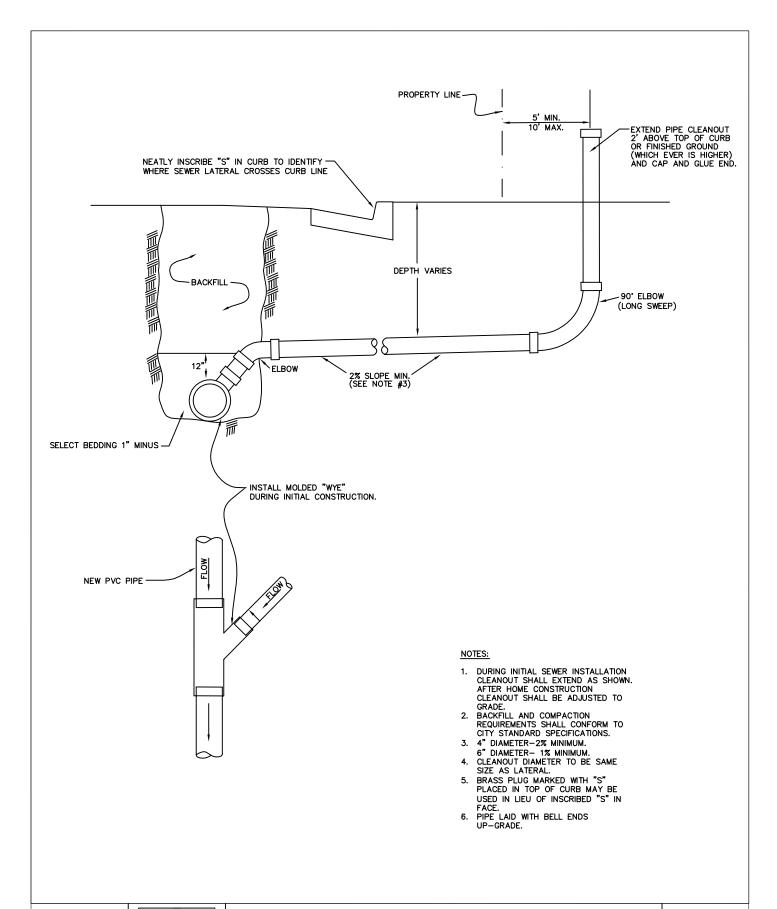


TYPICAL SEWER CONNECTION DETAILS



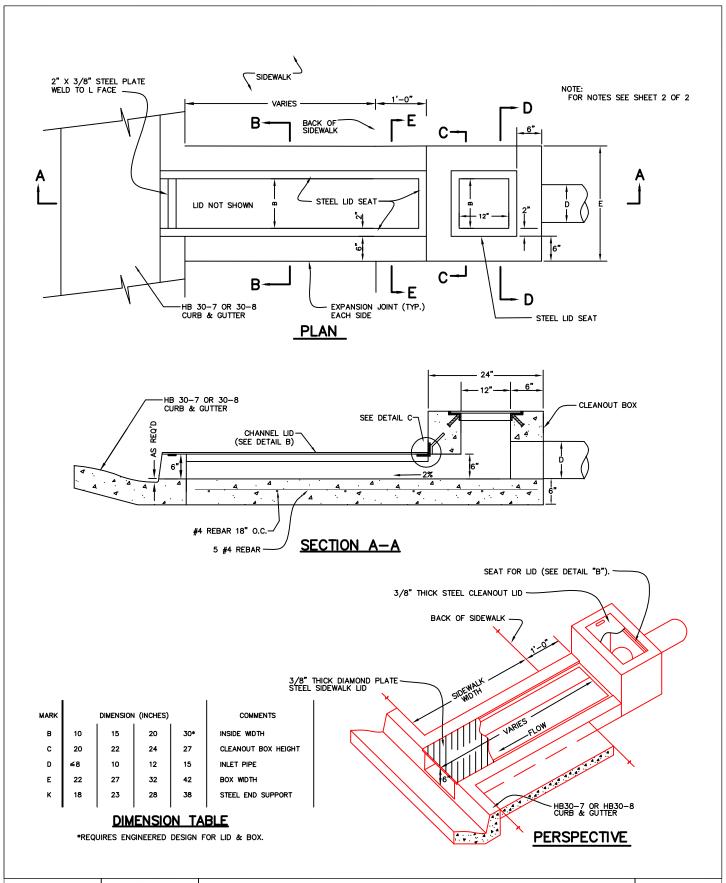


PVC SERVICE CONNECTION TO EXISTING PVC MAIN





PVC SERVICE CONNECTION TO NEW PVC SEWER MAIN

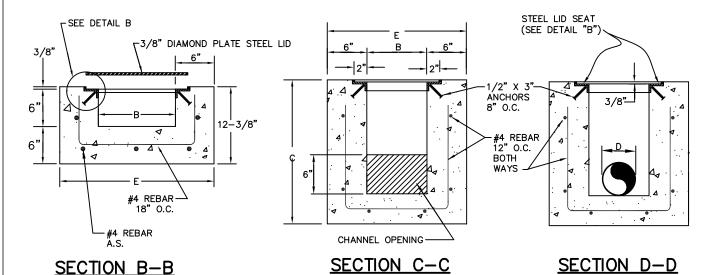


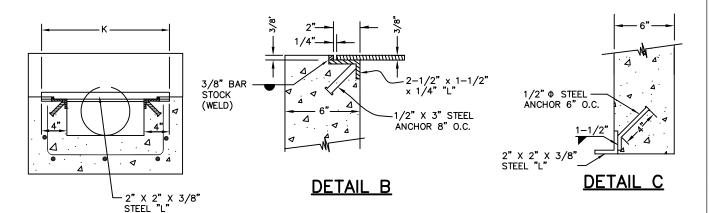
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SIDEWALK DRAINAGE STRUCTURE

NOTE: STEEL LID TO BE FLUSH WITH CONCRETE SIDEWALK.





SECTION E-E

| MARK | | DIMENSION | (INCHES) | | COMMENTS |
|------|------------|-----------|----------|-----|---------------------|
| В | 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 |
| ĸ | 18 | 23 | 28 | 38 | STEEL END SUPPORT |

DIMENSION TABLE

*REQUIRES ENGINEERED DESIGN FOR LID & BOX.

NOTES:

- DTES:
 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".
- 3- BOX DIMENSIONS BASED UPON INLET PIPE SIZE '
 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.

- ALL EXTERIOR EDGES OF CLEANOUT BOX TO HAVE 3/4" TO 1" CHAMFER (NOT SHOWN IN DETAILS FOR CLARITY).
 STEEL LIDS AND SEAT TO BE PAINTED GREY IN ACCORDANCE WITH CITY STANDARDS.

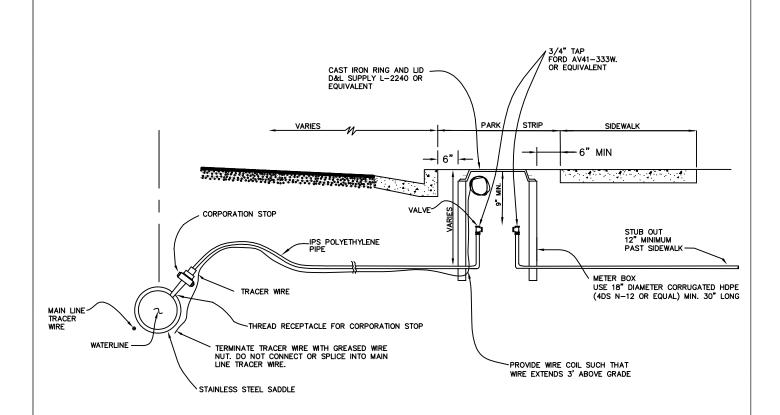
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SIDEWALK DRAINAGE STRUCTURE DETAILS

Standard Drawing SD-02

rev. 07-2010



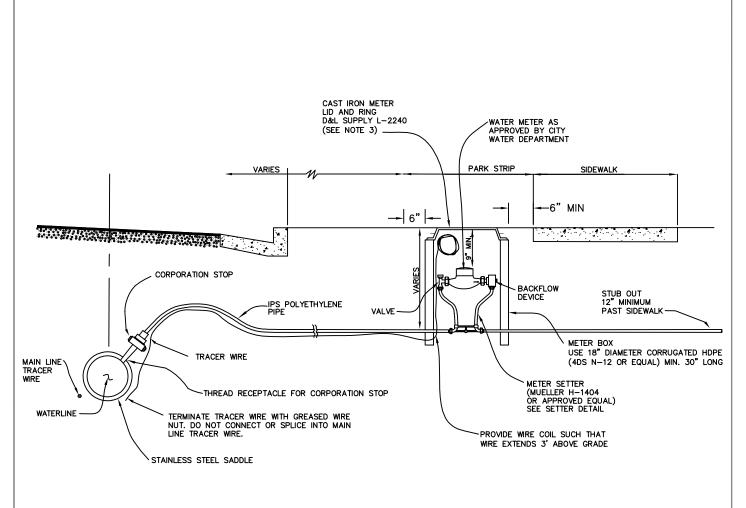
NOTES:

- 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



NOTES:

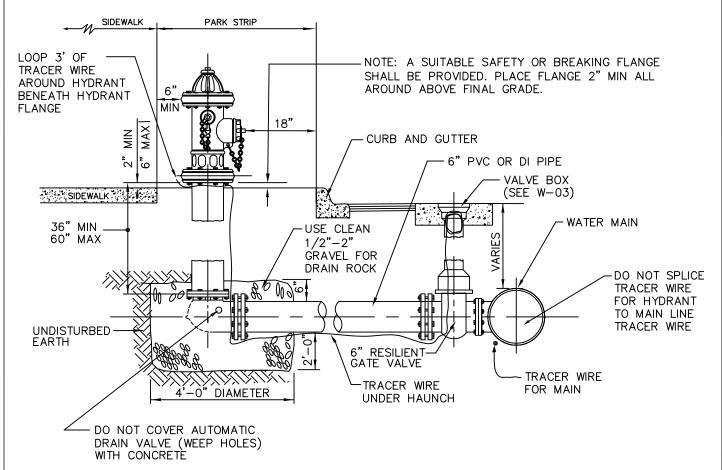
- 1. ALL TRENCH EXCAVATION AND COMPACTION SHALL BE IN ACCORDANCE WITH STANDARD SPECIFICATIONS.
 2. CORPORATION STOP AND SERVICE PIPE SHALL MATCH SIZE OF METER.
 3. METER LID SHALL HAVE 1-3/4" HOLE IN CENTER OF LID.
 4. IF PARK STRIP IS LESS THAN 3 FEET, THEN MOVE TO BEHIND SIDEWALK.
 5. EACH SERVICE 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

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.

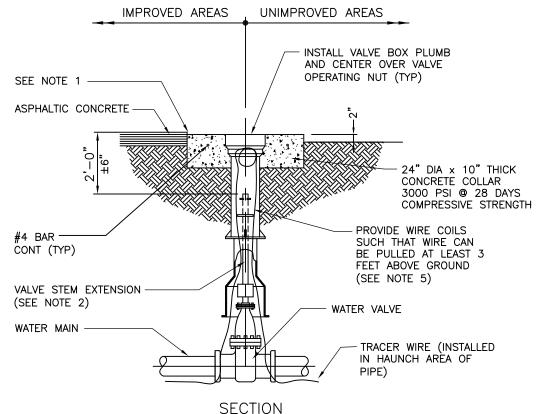
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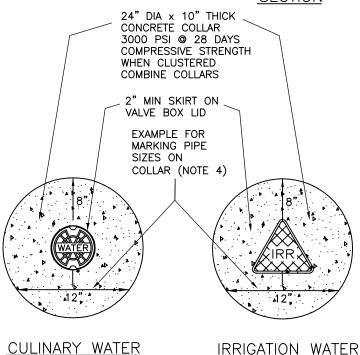
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FIRE HYDRANT INSTALLATION

UNIFORM DESIGN STANDARDS FOR WATER DISTRIBUTION SYSTEMS





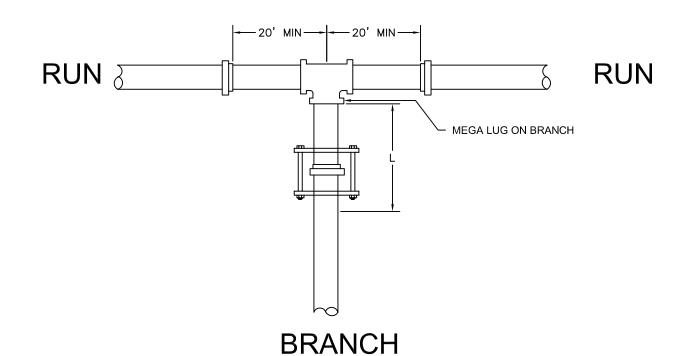
NOTES:

- 1. FINAL RIM ELEVATION TO BE 1/8" BELOW FINAL STREET GRADE.
- A VALVE STEM EXTENSION SHALL BE PROVIDED TO WITHIN 2' OF FINISHED GRADE WHERE THE DEPTH TO THE OPERATING NUT EXCEEDS 5'.
- 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



RUN SIZE DIAMETER

| œ, | | 4 | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 20 | 24 |
|----------|----|---------------|-------------------|-------------------|--------------|------------|------------|-----|----|----|-----|
| 쁘ㅣ | 4 | * | * | * | * | * | * | * | * | * | * |
| DIAME | 6 | $\overline{}$ | * | * | * | * | * | * | * | * | * |
| ₹ | 8 | | > < | * | * | * | * | * | * | * | * |
| | 10 | | | \nearrow | 10 | * | * | * | * | * | * |
| SIZE | 12 | | > < | $\supset \subset$ | \mathbb{X} | 28 | 12 | 4 | * | * | * |
| | 14 | | $\supset \subset$ | \searrow | \searrow | \nearrow | 45 | 31 | 17 | 3 | * |
| BRANCH | 16 | \searrow | > | \times | \times | \nearrow | \times | 62 | 49 | 37 | 11 |
| ₹ | 18 | | >> | \searrow | \mathbb{N} | >> | > | > < | 78 | 67 | 44 |
| <u> </u> | 20 | \searrow | \nearrow | \bigvee | \bigvee | \nearrow | \nearrow | > | >< | 95 | 74 |
| | 24 | | >> | >> | \times | >> | > | > | >< | >< | 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

MEGA LUG ON JOINT BEND ANGLE SIZE DIAMETER

HORIZONTAL BEND

- ALL JOINTS WITHIN LENGTH "L" MUST BE RESTRAINED. USE RETAINER GLAND AT MECHANICAL JOINTS AND HARNESS WITH PUSH-ON PIPE PER CITY SPECIFICATION.
- FOR TEST PRESSURES AND LAYING CONDITIONS SEE SECTION ON GENERAL NOTES FOR USE OF RESTRAINED JOINT LENGTHS.

| | | 4 | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 20 |
|-----|-------|----|----|----|----|----|----|----|----|----|
| Ш | 11.25 | 2 | 3 | 4 | 4 | 5 | 6 | 7 | 7 | 8 |
| ANG | 22.5 | 4 | 6 | 7 | 9 | 10 | 12 | 13 | 15 | 16 |
| D / | 45 | 8 | 12 | 15 | 18 | 21 | 24 | 28 | 30 | 33 |
| 3EN | 90 | 20 | 28 | 37 | 44 | 52 | 59 | 67 | 73 | 81 |

RESTRAINED LENGTHS, "L" (IN FEET)

MEGA LUG ON JOINT BEND ANGLE

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.

SIZE DIAMETER

| | | 4 | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 20 |
|-----|-------|----|----|----|----|----|----|----|----|----|
| GLE | 11.25 | 6 | 8 | 10 | 12 | 14 | 15 | 17 | 20 | 20 |
| A | 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)

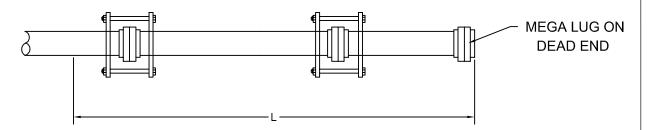
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STANDARD BENDS FOR PVC RESTRAININGSYSTEM DETAIL

Standard Drawing W-05

rev. 07-2010



- 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.

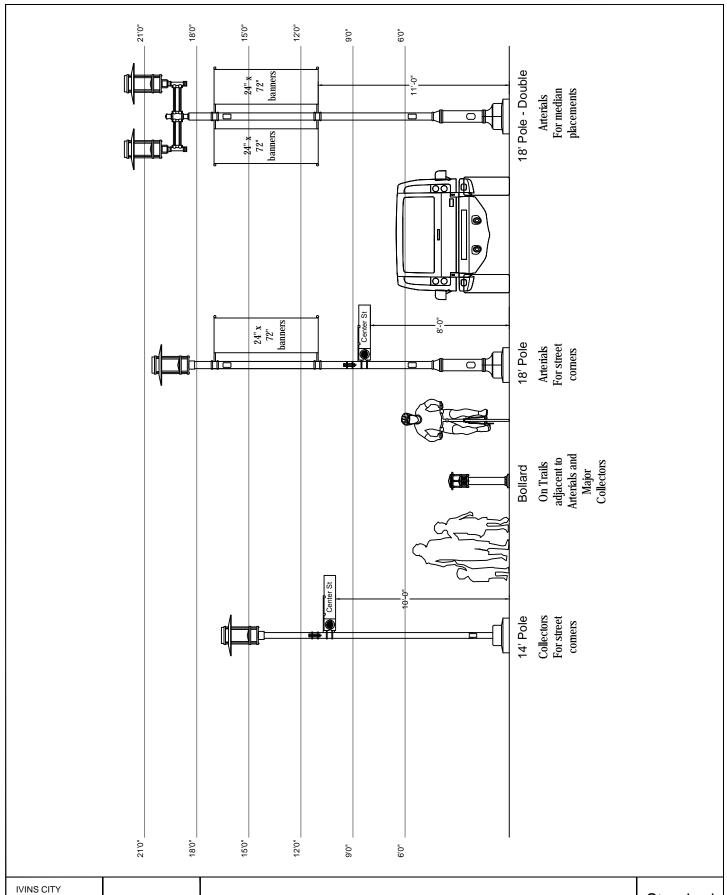
- THREE (3) FEET MINIMUM DEPTH OF COVER.
- 2. A SAFETY FACTOR OF 1.5
- 3. SOIL TYPE SANDY CLAY
- 4. TYPE 5 TRENCH COMPACTION FROM FOUR (4) INCHES MINIMUM UNDER THE PIPE TO THE CENTER LINE OF THE PIPE, AND COMPACTED GRANULAR OR SELECTED MATERIAL FROM THE CENTER LINE OF THE PIPE TO THE TOP OF THE PIPE (90 PERCENT STANDARD PROCTOR DENSITY, AASHTO T-99).
- 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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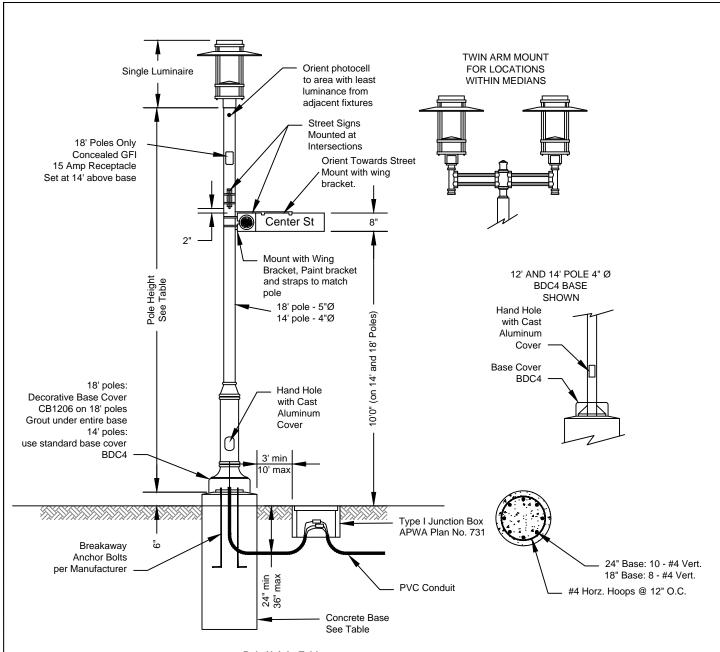


IN LINE / DEAD END ON PVC PIPF DETAIL





STREET LIGHTING PERSPECTIVE



Pole Height Table

| 1 016 11 | eigiit i | abic | | |
|------------------------------|----------|-----------|-----------------|-------------|
| Road | R/W | Pole Heig | ht Fixture | Pole |
| Major Arterial | 100' | 18' | LA160 | 5" (BD5S18) |
| Minor Arterial | 80/85' | 18' | LA160 | 5" (BD5S18) |
| Major Collector (200 E) | 66' | 18' | LA160 | 5" (BD5S18) |
| Major Collector (All others) | 66' | 14' | LA160 | 4" (BD4S14) |
| Minor Collector | 60' | 14' | LA160 | 4" (BD4S14) |
| Residential Collector | 55' | 14' | LA160 | 4" (BD4S14) |
| Residential | 50' | 14' | LA160 | 4" (BD4S14) |
| Residential Entrance | n/a | 14' | LA160 | 4" (BD4S14) |
| Rural Section | n/a | Т | o be Determined | |

Mfg: ANP Lighting www.anplighting.com

Concrete Base Table

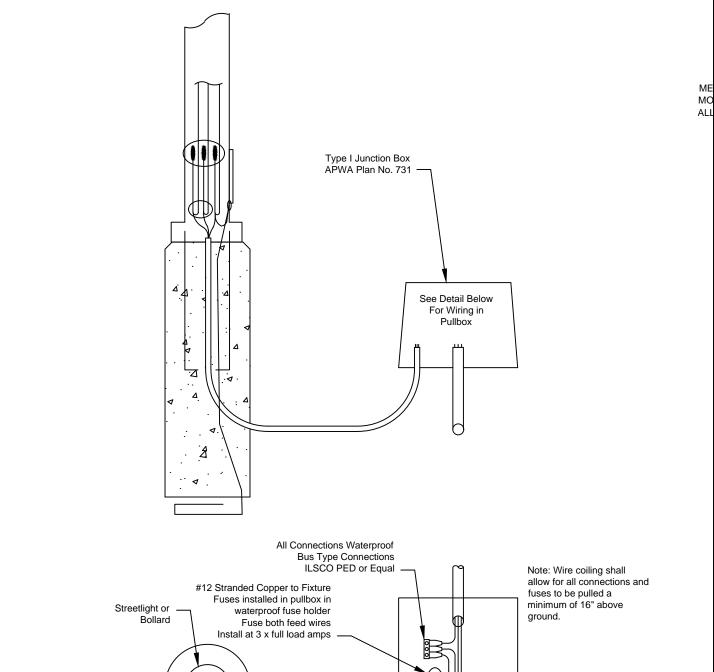
| Pole | Base | Base |
|--------|-------|----------|
| Height | Depth | Diameter |
| 18' | 6' | 24" |
| 14' | 4' | 18" |

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STREET LIGHTING



#12 Stranded Copper to Fixture
Fuses installed in pullbox in
waterproof fuse holder
Fuse both feed wires
Install at 3 x full load amps

1.5" Conduit on
Branch lines

Wire size per plan
Minimum #12
stranded copper

PULL BOX CONNECTION

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STREET LIGHT WIRING DETAIL

DETAILS

Notes:

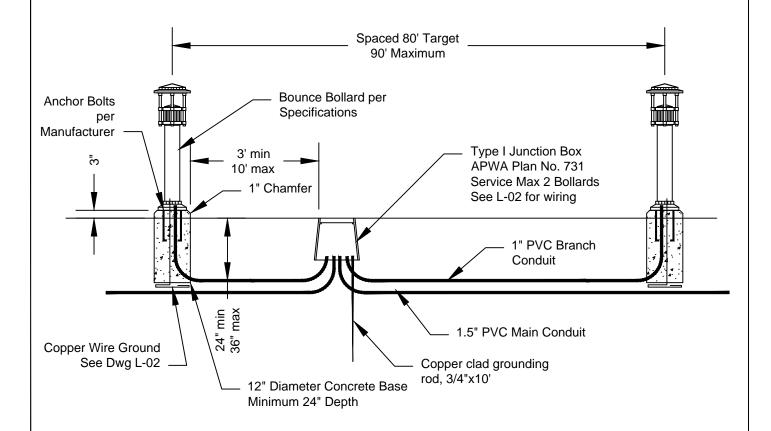
- Junction Box shall be plastic when in landscape areas and polymer concrete when in paved areas.
- 2. APWA Section 26 56 19, Roadway Lighting.
- 3. Bollard Specifications:

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.



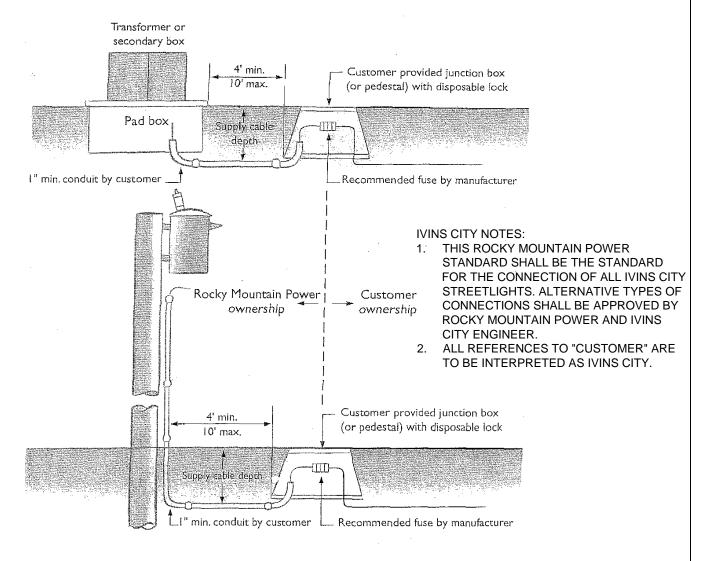
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BOLLARD DETAIL

Streetlight Point-of-Disconnect Diagram



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:

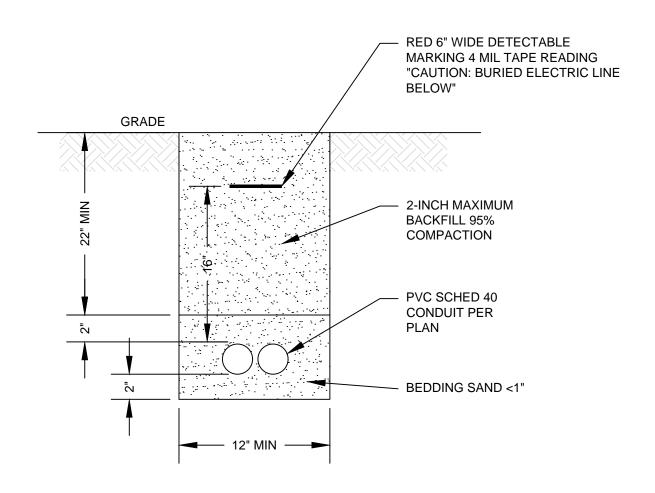
■ Making the connection within Rocky Mountain Power facilities (transformer or secondary box)



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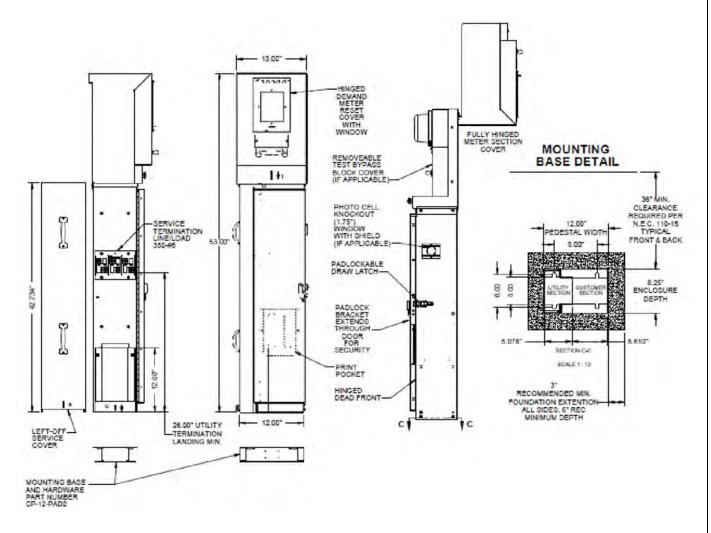


STREET LIGHT CONNECTION TO ROCKY MOUNTAIN POWER





"A" STYLE SLIMLINE METERED COMMERCIAL PEDESTAL



NOTES:

- 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
- 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

APPENDIX A

Minimum Field Testing

| INS CITY - MIN | | | | | lot size or other information from | | | Contractor: | | |
|---|--------------|------------------|-------------------|--------------------|------------------------------------|--|---|----------------------------------|---------|--------|
| A FIELD TESTING | APWA Spec | Lot | Sublot | Samples /sublot | Ref Test | the Arwa standard specification. Standard | | Use Testing Firm Test Date | Passed? | Ī |
| Roadway Proof Rolling Prior to Fill | 22.05.10 | 1/2 veh width | | | | 18,000 pounds/tandem axle, verify no deflections | | | | Ļ |
| Roadway Proof Rolling Subgrade | | 1/2 veh width | | | | 18,000 pounds/tandem axle, verify no deflections | Ivins City Compaction Standards (APWA | | | + |
| Roadway Subgrade Field Moisture/Density | 32 05 10* | | <u> </u> | 1 | ASTM D1557 Method A or D | Meet Compaction Standards | Section 31 23 26 as modified): | x | | + |
| Pavement Area Fill Field Moisture/Density | 32 05 10* | | _ | 1 | ASTM D1557 Method A or D | Meet Compaction Standards Meet Compaction Standards | Under Landscaped Areas: 90% | x | | + |
| Driveway Area Fill Field Moisture/Density | 32 05 10* | | - | 1 | ASTM D1557 Method A or D | Meet Compaction Standards | Under Roadways: 95% | x | | + |
| Sidewalk Area Fill Field Moisture/Density | 32 05 10* | | - | 1 | ASTM D1557 Method A or D | Meet Compaction Standards Meet Compaction Standards | - Under Footings: 95% | X | | + |
| Embankment Fill Field Moisture/Density | 31 23 23* | | _ | 1 | ASTM D1557 Method A or D | Meet Compaction Standards Meet Compaction Standards | Under Sidewalks/Trails: 95% | x | | + |
| Strip Footing Subgrade Field Moisture/Density | | 200 lf | _ | 1 | ASTM D1557 Method A or D | Meet Compaction Standards | Exception for fine grained soils | x | | + |
| Footing (not strip) Subgrade Field Moisture/Density | | 225 sf | - | 1 | ASTM D1557 Method A or D | Meet Compaction Standards Meet Compaction Standards | compaction requirements are 91%. | x | | + |
| Trench Subgrade Field Moisture/Density | | | ired by Ivins Cit | | | | Per 31 23 26 as modified, use modified | X | | + |
| Trench Fill Field Moisture/Density | | 200 lf / 2 lifts | | 1 | ASTM D1557 Method A or D | Meet Compaction Standards | proctor (ASTM D1557) for all compaction | x | | + |
| Trench Fill Field Moisture/Density beneath footing | | 25 sf / lift | - | 1 | ASTM D1557 Method A or D | Meet Compaction Standards Meet Compaction Standards | tests. | x | | + |
| Misc. Small Structures Subgrade Field Moisture/Density | | | ired by Ivins Cit | | . S. W DISS MELIOU A OI D | ect compaction standards | Compact in lifts 6" thick compacted for | X | | + |
| Misc. Small Structures Backfill Field Moisture/Density | | Every 2 lifts | - | 1 | ASTM D1557 Method A or D | Meet Compaction Standards | Roadbase and 8" thick uncompacted for | X | | + |
| initial of detailed backfill i feld initiated C/ Delisity | 31 23 23 | every 2 mits | | _ | | meet compaction standards | all other fills. | ^ | | b |
| Flowable Fill Trench - Compressive | 31 05 15 | 1 d | 100 cy | 3cvl | ASTM D4832 | 28 d strength is 60 psi or less | Moisture must be Optimum +/- 2 % | х | | 7 |
| Flowable Fill Roadway - Compressive | 31 05 15 | | 250 cy | 3cyl | ASTM D4832 | 28 d strength is 60 psi or less | - | x | | + |
| - Towasie I III Nodaway Compressive | 31 03 13 | - u | | Jeyr | | 20 a salengaria do par di 1635 | ** Test haunches and top of pipe zone | ^ | | |
| Gradation (Lab) | 02 41 15* | 15000 sf | _ | 1 | ASTM C136 | Verify with engineer that meets requirements of de | sign | х | | ٣ |
| Depth | 02 41 15* | | - | 1 | 75111 0250 | Average thickness >= design thickness, no single loc | | ^ | | + |
| Field Moisture/Density Testing | 02 41 15* | | - | 1 | ASTM D558/ASTM D2922 | Meet Compaction Standards | action deviation of more than 1 men | x | | + |
| California Bearing Ratio or R-Value (Lab) | 02 11 15 | 15000 sf | - | 1 | ASTM D1883/ASTM D2844 | Verify with engineer that meets requirements of de | sign. | ^ | | + |
| | | | | = | , | , | | | | ė |
| Field Sample Gradation (Lab) | 32 11 23* | 15000 sf | - | 1 | ASTM C136 | See 32 11 23 Table 3 (2007 Supplement) | | х | | т |
| Field Moisture/Density Tests - Pavement Area | 32 05 10* | - | 7000sf/ 2 lifts | 1 | ASTM D2922 | Meet Compaction Standards | | x | | + |
| Field Moisture/Density Tests - Curb & Gutter, Waterways | 32 05 10* | _ | 300lf/ 2 lifts | 1 | ASTM D2922 | Meet Compaction Standards | | x | | + |
| Field Moisture/Density Tests - Sidewalk | 32 05 10* | - | 300lf/ 2 lifts | 1 | ASTM D2922 | Meet Compaction Standards | | х | | t |
| Field Moisture/Density Tests - Driveway Approach | 32 05 10* | - | 1500sf/ 2 lifts | 1 | ASTM D2922 | Meet Compaction Standards | | х | | t |
| Grade, Cross-slope | 32 11 23* | 1000 sf | - | 2 minimum | | 3/8" per 10 ft in any direction | | | | t |
| Field Moisture/Density - Trench | | 200 lf/ 2 lifts | _ | 1 | ASTM D2922 | Meet Compaction Standards | | х | | t |
| Field Moisture/Density - Trench under footing | | 25 sf/lift | - | 1 | ASTM D2922 | Meet Compaction Standards | | х | | \top |
| Thickness | 32 11 23* | 5000 sf | - | 2 minimum | | Average thickness >= design thickness, no single loc | ation deviation of more than 1-inch | | | Ť |
| Strip Footing Field Moisture/Density Test | 31 23 23 | 200lf/lift | - | 1 | ASTM D2922 | Meet Compaction Standards | | x | | t |
| Footing (not strip) Field Moisture/Density Test | | 225sf/lift | - | 1 | ASTM D2922 | Meet Compaction Standards | | X | | + |
| Misc. Small Structures Field Moisture/Density Test | 31 23 23 | | - | 1 | ASTM D2922 | Meet Compaction Standards | | X | | $^{+}$ |
| | | | | | | Processing and the second seco | | | | æ |
| Mix design verification | 32 12 05 | Per Type/Sou | rce | | | Matches approved mix design | | | | Т |
| Air Voids (Lab) | | 1 day | 500 tons | 1 | ASTM D5581 | 3 - 5 percent (32 12 05 Table 3) | | x | | T |
| Dust to Asphalt Ratio (Lab) | | 1 day | 500 tons | 1 | ASTM D6307 | See 32 12 05 Table 1 | | x | | T |
| Gradation by extraction (Lab) | | 1 day | 500 tons | 1 | ASTM D5444 | See 32 12 05 Table 1 | | x | | T |
| Asphalt Content (Lab) | 32 12 05 | | 500 tons | 1 | ASTM D5581 | 3 - 5 percent (32 12 05 Table 3) | | x | | Ť |
| Asphalt Field Temperature | 32 12 16 | Each Transpo | rt Vehicle | 1 | | 325 deg F Maximum | | | | T |
| Asphalt Surface Temperature | 32 12 16* | - | - | Continuous | | 325 def F. Maximum, See Table 3 for Minimum Tem | perature 10ft behind paver | | | Ť |
| Marshall Density | 32 12 16* | 1 day | 7000 sf | 1 | | See Table 1.5 | | x | | T |
| Core Rice Density (Lab) | 32 12 16* | | - | 2 cores min | ASTM D2041 | Avg 92 to 96% Density, Lowest 89% or greater (See | 32 12 16 Table 1 in supplement) | х | | T |
| Core Thickness | 32 12 16* | | - | | ASTM D3549 | 3/8" deficiency limit avg | , | x | | Ť |
| Grade | 32 12 16 | - | - | - | | Verify within tolerance. 1/8" in 10 ft parallel to cent | erline | | | T |
| Cross-Slope | 32 12 16 | - | - | - | | Verify within tolerance. 1/4" in 10 ft perpendicular t | | | | T |
| Roughness | | 0.1 Lane mi | - | Continuous | ASTM E950 & ASTM E1274 | Verify (See 32 12 16 Table 4) - Only required on Arte | | ? | | Ī |
| | | | | | | | | | | S |
| Mix design verification | 03 30 04 | Per Type/Sou | rce | | | Matches approved mix design | | | | ╝ |
| Compressive Strength | 03 30 05 | 50cy or 1d | - | 4cyl/lot | ASTM C39 | See 03 30 04 Table 3 - 1 break at 7days, 3 breaks at | 28days, avg must meet strength | х | | Τ |
| Temperature | | 50cy or 1d | - | 1 | ASTM C1064 | 60 deg F to 90 deg F (03 30 10 p. 208) | | | | T |
| Air Entrainment | 03 30 05 | 50cy or 1d | - | 1 | ASTM C231 | See 03 30 04 Table 3 | | х | | T |
| Slump Tests | 03 30 05 | 50cy or 1d | - | 1 | ASTM C143 | Specific to exposure conditions and finishing need | | x | | T |
| Line | | All curbs and | gutters | | | Less than 1/2" in 10 ft | | | | Ť |
| Grade & Flood gutters | 32 16 13 | | | | | No more than 1/4" in 10 ft, Remove & replace wher | e ponding is found | | | T |
| Curb Ramps | 32 16 14 | | | | | , , , , , , , , , , , , , , , , , , , | | | | + |

| IMUM FIELD TESTING | Asterisk (* | *) indicates tha | t Ivins City has | modified the | lot size or other information from the | APWA standard specification. | | | | |
|--|-------------|------------------|------------------|--------------|--|---|---------|-----------|---------|------|
| | | | | | | | Use | | | |
| | APWA | | | Samples | | | Testing | | 1 | Rete |
| | Spec | Lot | Sublot | /sublot | Ref Test | Standard | Firm | Test Date | Passed? | Dat |
| Materials verification prior to installation | | All materials | | | | Matches approved materials, free from visual defects | | | | |
| Alignment and Grade | 33 08 00 | | | | | 1/2" in 10 ft, 1" max variance from true line, when grade is 1% or less, variances must be 50% less | | | | |
| Obstruction and Deflection Test (Mandrel) | 33 08 00 | | | | | 3 to 7.5 % depending on pipe type, 1-inch max protuberance | | | | |
| Inflitration Test | 33 08 00 | | | | | max 50 gal per inch dia per mile per 24 hrs | | | | |
| Pressure Testing - for force mains | 33 08 00 | | | | | 225 psi for 2 hrs, check allowable leakage | | | | |
| Video Inspection | 33 08 00 | | | | | Free from visual defects, submit video electronic files and video log | х | | | |
| Air Test | 33 08 00 | | | | UNI-B-6, ASTM F1417, ASTM C924 | Per manufacturer's recommendations | | | | |
| Cleaning | 33 41 00 | | | | , | remove all debris after testing | | | | |
| | | | | | | · | | | | |
| Materials verification prior to installation | | All materials | | | | Matches approved materials, free from visual defects | | | | |
| Alignment and Grade | 33 08 00 | All mains and | laterals | | | 1/2" in 10 ft, 1" max variance from true line, when grade is 1% or less, variances must be 50% less | | | | |
| Obstruction and Deflection Test (Mandrel) | 33 08 00 | All mains | | | | 3 to 7.5 % depending on pipe type, 1-inch max protuberance | | | | |
| Inflitration Test | 33 08 00 | All mains and | laterals | | | max 50 gal per inch dia per mile per 24 hrs | | | | |
| Pressure Testing - for force mains | 33 08 00 | All mains | | | | 225 psi for 2 hrs, check allowable leakage | | | | |
| Video Inspection | 33 08 00 | All mains | | | | Free from visual defects, submit video electronic files and video log | х | | | |
| Air Test | 33 08 00 | All mains and | laterals | | UNI-B-6, ASTM F1417, ASTM C924 | Per manufacturer's recommendations | | | | |
| Cleaning | 33 31 00 | All mains and | laterals | | | remove all debris after testing | | | | |
| 5 | | | | | | · | | | | |
| Materials verification prior to installation | | All materials | | | | Matches approved materials, free from visual defects | | | | |
| Pressure Testing | 33 08 00 | All pipe | | | | 225 psi for 2 hrs, check allowable leakage | | | | |
| Obstruction and Deflection Test (Mandrel) | 33 08 00 | All pipe | | | | 3 to 7.5 % depending on pipe type, 1-inch max protuberance | | | | |
| Disinfection, Flushing & Bacteria Testing | 33 13 00 | All pipe | | | | Negative Bacteria sample | | | | |
| Operational Inspection | | All pipe | | | | All equipment is operating as designed | | | | |
| Tracer Wire Continuity Test | 33 08 00* | All wire | | | | All wire provides a continuous signal | | | | |
| | | | | | | | | | | |
| Materials verification prior to installation | | All materials | | | | Matches approved materials, free from visual defects | | | | |
| Alignment and Grade | 33 08 00 | | | | | 1/2" in 10 ft, 1" max variance from true line, when grade is 1% or less, variances must be 50% less | | | | |
| Pressure Testing | 33 08 00 | | | | | 225 psi for 2 hrs, check allowable leakage | | | | |
| Flushing | 33 13 00 | All pipe | | | | 2.5 fps flush | | | | |
| Operational Inspection | | All pipe | | | | For Irrigation Equipment | | | L | |
| Tracer Wire Continuity Test | 33 08 00* | All wire | | | | All wire provides a continuous signal | | | | |
| Materials verification prior to installation | | All materials | | | | Matches approved materials, free from visual defects | | | | |
| Continuity | 26 56 19 | Circuit | - | 1 | | Pass/Fail | | | | |
| Grounding | 26 56 19 | Circuit | - | 1 | | Pass/Fail | | | | |
| Megger Test at 500 V DC | 26 56 19 | Circuit | - | 1 | | Insulation Resistance to Ground not less than 10 megaohms | | | | |
| Voltage | 26 56 19 | Circuit | - | 1 | | Record voltage measured | | | | |
| Current | 26 56 19 | Circuit | - | 1 | | Record current measured | | | | |
| Functional Test | 26 56 19 | Function | | 5days | | Continuous satisfactory operation | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |

APPENDIX B

List of APWA Required Submittals

| | | II. | | |
|--------|---|----------------------------------|-----------------|--|
| C | Submittal Description | Section | Timing | Notes |
| Subm | nittals Contractor Information & Qualifications | | | |
| | Subcontractor Information & Qualifications | 01 43 00 | | |
| | Testing Firm Information & Qualifications | 01 45 00 | | Shouldn't be required if City does all testing. |
| | Schedule | 01 32 16 | | |
| | SWPPP | | | |
| | NOI | | | |
| | Construction Permit Product Option List & Substitutions | 01 25 00 | | |
| | Traffic Control Plans | 01 55 26 | | |
| | Preliminary Draft or Outline of O&M Manuals | 01 78 23 | | Only required for specialized equipment like pumps |
| | Pre-construction photographs | 01 78 39 | | when within 100 feet of improved private property |
| Cons | struction | <u> </u> | · | |
| | Monthly Schedule Updates | 01 32 16 | | |
| DIVIS | ION 02 EXISTING CONDITIONS | | | |
| | Pavement Pulverizing submittals | 02 41 15 | | |
| DIVISI | ION 03 CONCRETE | 03.11.00 | | Not fort micel DW project |
| | Concrete Forming Shop Drawings & Submittals Concrete Reinforcing: Material Certification | 03 11 00 03 20 00 | | Not for typical PW project |
| | Concrete Reinforcing: Walterial Certification | 03 20 00 | | Not for typical PW project |
| | Concrete Reinforcing: Weider's Cermication Concrete Reinforcing: Shop Drawings | 03 20 00 | | Not for typical PW project |
| | Concrete: Mix Design | 03 30 04 | | F 22.11 |
| | Concrete Testing: Supplier QC | 03 30 05 | Upon Request | |
| | Concrete Testing: Lab results | 03 30 05 | After Install | Shouldn't be required if City does all testing. |
| | Concrete Placement: Batch Delivery Tickets | 03 30 10 | Upon Delivery | |
| | Concrete Placement: Records | 03 30 10 | After Install | |
| | Concrete Placement: Bonding Compound | 03 30 10 | | Not for the deal DW and the |
| | Concrete Finishing: Liquid Chemical Hardener Concrete Curing: Curing Agent Cert. & Plan | 03 35 00 03 39 00 | | Not for typical PW project |
| | Precast Concrete: Shop Drawings | 03 40 00 | | |
| | Cementitious Grouting: Grout Mix & Cert. | 03 61 00 | | |
| DIVIS | ION 04 MASONRY | 03 01 00 | | |
| | Masonry Mortar & Grout: Grout Mix & Cert. | 04 05 16 | | Not for typical PW project |
| | Clay Unit Masonry: Samples & Cert. | 04 21 00 | | Not for typical PW project |
| | Concrete Unit Masonry: Samples, Certs, Shop Dwgs | 04 22 00 | | Not for typical PW project |
| DIVIS | ION 05 METALS | | | |
| | Structural Steel Framing: Certs. | 05 12 00 | | Not for typical PW project |
| | Metal Stairs: Shop Drawings & Samples | 05 51 00 | | Not for typical PW project |
| | Gratings & Floor Plates: Shop Drawings | 05 53 00 | | |
| DIVIS | Metal Castings: Shop Dwgs and Certs ION 06 WOOOD, PLASTICS AND COMPOSITES | 05 56 00 | | |
| DIVISI | Rough Carpentry: Certs. | 06 61 00 | | Not for typical PW project |
| DIVIS | ION 07 THERMAL AND MOISTURE PROTECTION | | | , , , , , , , , , , , , , , , , , , , |
| | Water Repellant: Data sheets & install instr. | 07 19 00 | | Not for typical PW project |
| | Insulation: Data sheets & install instr. | 07 21 00 | | Not for typical PW project |
| DIVIS | ION 09 FINISHES | | | |
| | Painting: Color Selection Chart & Data sheets | 09 91 00 | | Not for typical PW project |
| | Painting: Samples | 09 91 00 | | Not for typical PW project |
| | Graffiti Resistant Coating: Perf. Data & Install Instr. | 09 96 23 | | Not for typical PW project |
| DIVIE | Coatings for Steel Water Storage Tank: Product Data | 09 97 15 | | Not for typical PW project |
| וכועוט | Metal Building: Dwgs and Certs. | 13 34 19 | | Not for typical PW project |
| DIVIS | ION 22 PLUMBING | 13 34 13 | | TOUR CYPICALL W PROJECT |
| | Mechanical General Requirements: dwgs | 22 05 00 | | Not for typical PW project |
| | Water Pump: dwgs, specs | 22 11 23 | | Not for typical PW project |
| | Water Pump: Start Up Cert. | 22 11 23 | After Install | Not for typical PW project |
| | Water Storage Tank: QA, Certs, designs | 22 12 19 | | Not for typical PW project |
| | Submersible Pump: dwgs, curves | 22 13 33 | | Not for typical PW project |
| | Submersible Pump: Start Up Cert. | 22 13 33 | After Install | Not for typical PW project |
| DIVISI | ION 26 ELECTRICAL | 20.05.05 | | |
| | Electrical General Requirements: Wiring Layout | 26 05 00 | After In the II | |
| | Electrical General Requirements: Inspection Cert. | 26 05 00 | After Install | |
| | Conductors and Cables: Field Test Data, no data sheets? Panelboard: Data sheets, shop dwgs | 26 05 13 26 09 26 | | Not for typical PW project |
| | Circuit Breaker: Data Sheets, shop dwgs | 26 13 13 | | Not for typical PW project |
| | Motor Controller: Data Sheets, dwgs | 26 29 13 | | Not for typical PW project |
| | Motor Controller: Voltage Current Report | 26 29 13 | After Install | Not for typical PW project |
| | Roadway Lighting: Data sheets, Shop Dwgs, Testing | 26 56 19 | | 7 F - 7 - 7 |
| DIVIS | ION 31 EARTHWORK | | | |
| | Markers & Monuments: Survey Notes & Dwgs, Plat | 31 05 10 | After Install | |
| | Common Fill: Source & Gradation | 31 05 13 | | |
| | Cement Treated Fill: Material Analysis, design calcs? | 31 05 15 | | |
| | Geotextiles: Cert. & Sample | 31 05 19 | | |
| | Geogrids/composites: Warranties & Samples | 31 05 21 | | |
| | Rock Removal: Pre-blast Photos, Blast Plan | 31 23 17 | | |
| | Backfilling for Structures: Soil Proctor for Subgrades | 31 23 23 | | |
| | Backfilling for Structures: Soil Proctor for each type of fill | 31 23 23 | Upon Parent | Shouldn't be required if City does all testing. |
| | Deal-filling for Characters Coults Court 12 | | | Is a summary to a required it faith door all tecting |
| | Backfilling for Structures: Quality Control Reprot | 31 23 23 | Upon Request | Shouldn't be required if City does all testing. |
| | Backfilling for Structures: Quality Control Reprot Erosion & Sediment Control: samples, data, certs, install Vegetation Control: herbicide data sheet | 31 23 23 31 25 00 31 31 19 | if used | Shouldn't be required it City does all testing. |

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| Concrete Paving Joint Sealants: Certs, Data, Install, Safety 32 13 73 Not for typical PW project | | | | Linea Beguest | ,, , , , |
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| Brick Unit Paving: Samples, Test Reports 32 14 16 | | | | | |
| Driveway, Sidewalk, Curb, Gutter: Quality Control Report 32 16 13 Upon Request | | | | | |
| Curb Ramp: Detectable Warning Data Sheet 32 16 14 | | | | Haran Barrant | ,, , , , |
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APPENDIX C

Cost Estimation Approved Unit Prices

Ivins City Cost Estimation Approved Unit Prices

| Category General | Item No. | Item Description | Units | | / Approved Init Price | Warranty? |
|---------------------|------------|---|----------|----------|--------------------------|-----------|
| Scheral | 10 | Mobilization | | | 5% | |
| | 20 | Storm Water Pollution Prevention | AC | \$ | 500.00 | |
| | 30 | Dust Control | AC | \$ | 200.00 | |
| | 40 | Survey | | | varies | |
| 21. 14. 1 | 50 | Soil Testing | | | varies | |
| Site Work | 100 | Clear & Grub | AC | \$ | 500.00 | |
| | 105 | Remove Existing Asphalt | SF | ۶ \$ | 0.25 | |
| | 110 | Onsite Cut and Fill | CY | \$ | 2.50 | |
| | 115 | Overexcavation & Recompaction | CY | \$ | 2.50 | |
| | 116 | Subgrading of Roads (inlc scarify and compact) | SF | \$ | 0.20 | Υ |
| | 120 | Export | CY | \$ | 5.00 | |
| | 130 | Import | CY | \$ | 7.00 | |
| | 140 | Masonry Wall - >5' High | LF | \$ | 50.00 | γ* |
| | 150 | Masonry Wall - <5' High | LF | \$ | 40.00 | γ* |
| | 160 | Masonry Retaining Wall | SF | \$ | 12.00 | Υ* |
| No. of a | 170 | Natural Rock Retaining Wall | SF | \$ | 12.00 | γ* |
| treets | 200 | Sidewalk: 4" Concrete over 4" Base | SF | \$ | 3.25 | Υ |
| | 205 | Sidewalk: 6" Concrete over 6" Base | SF | \$ | 4.50 | Ϋ́ |
| | 210 | Trail: 2.5" Asphalt over 4" Base | SF | \$ | 4.00 | Y |
| | 220 | 24" Modified Curb & Gutter and Base (See Note 4) | LF | \$ | 11.00 | Y |
| | 225 | 30" High Back Curb & Gutter and Base (See Note 4) | LF | \$ | 12.00 | Υ |
| | 230 | 2.5" Thick Asphalt | SF | \$ | 1.20 | Υ |
| | 235 | 3" Thick Asphalt | SF | \$ | 1.40 | Υ |
| | 240 | 4" Thick Asphalt | SF | \$ | 1.90 | Υ |
| | 250 | 6" Thick Roadbase | SF | \$ | 0.75 | Υ |
| | 255 | 8" Thick Roadbase | SF | \$ | 0.90 | Υ |
| | 260 | Fog Seal over Asphalt | SF | \$ | 0.07 | Υ |
| | 270 | Disabled Accessible Curb Ramp (See Note 3) | LS | \$ | 600.00 | Υ |
| | 280 | Cross Gutter (See Note 4) | SF | \$ | 9.00 | Y |
| | 290 | Street Signs | EA | \$ | 250.00 | Y |
| | 295 | Street Monuments Class I | EA | \$ | 500.00 | Y Y |
| | 296 300 | Street Monuments Class II Pavement Markings | EA LF | \$ \$ | 100.00 0.12 | Ϋ́Υ |
| | 310 | Landscape Buffer - landscaping | SF | \$ | 2.50 | Y |
| Water Syste | | | | | | |
| , , | 400 | C900 (or C909) PVC - 4" Pipe (incl. fittings) | LF | \$ | 15.00 | Υ |
| | 401 | C900 (or C909) PVC - 6" Pipe (incl. fittings) | LF | \$ | 17.00 | Υ |
| | 402 | C900 (or C909) PVC - 8" Pipe (incl. fittings) | LF | \$ | 20.00 | Υ |
| | 404 | C900 (or C909) PVC - 12" Pipe (incl. fittings) | LF | \$ | 30.00 | Υ |
| | 420 | Gate Valve & Valve Box - 4" | LS | \$ | 600.00 | Υ |
| | 421 | Gate Valve & Valve Box - 6" | LS | \$ | 750.00 | Υ |
| | 422 | Gate Valve & Valve Box - 8" | LS | \$ | 1,500.00 | Υ |
| | 424 | Gate Valve & Valve Box - 12" | LS | \$ | 2,200.00 | Υ |
| | 440 | 8" Hot Tap Assembly | LS | \$ | 2,000.00 | Y |
| | 450 | 3/4" Meter Service | LS | \$ | 600.00 | Y |
| | 460 | Fire Hydrant 6" Lateral, Valve & Assembly 2" Flush Valve Assembly | LS | \$ | 3,750.00 | Y |
| | 470 480 | Raise/Collar Valve | LS EA | \$ \$ | 500.00 100.00 | Y Y |
| ewer Syste | | Raise/Collai Valve | EA | ş | 100.00 | ı |
| CWC1 Jystc | 600 | SDR35 PVC - 8" Main Pipe | LF | \$ | 20.00 | Υ |
| | 620 | 4" SDR35 PVC Sewer Lateral | LS | \$ | 500.00 | Y |
| | 630 | Concrete Manhole - 48" Diameter < 12 ft depth | LS | \$ | 1,800.00 | Υ |
| | 640 | Concrete Manhole - 60" Diameter < 12 ft depth | LS | \$ | 2,500.00 | Υ |
| | 641 | Concrete Manhole - 60" Diameter > 12 ft depth | LS | \$ | 3,000.00 | Υ |
| | 650 | Raise/Collar Manhole | EA | \$ | 300.00 | Υ |
| torm Drain | | | | | | |
| | 700 | Storm Drain Pipe - 12" HDPE or NRCP | LF | \$ | 20.00 | Y |
| | 710 | Storm Drain Pipe - 15" HDPE or NRCP | LF | \$ | 25.00 | Y |
| | 720 720 | Storm Drain Pipe - 18" NRCP | LF | \$ | 30.00 | Y |
| | 730 740 | Storm Drain Pipe - 24" NRCP | LF IS | \$ | 40.00 | Y |
| | 740 741 | Storm Drain Single Inlet < 6 ft depth | LS LS | \$ \$ | 1,800.00 | Y Y |
| | 741 750 | Storm Drain Inlet (Single) > 6 ft depth Storm Drain Double Inlet < 6 ft depth | LS | \$ \$ | 2,200.00 3,000.00 | Υ Υ |
| | 750 751 | Storm Drain Double Inlet < 6 ft depth | LS | \$ \$ | 3,750.00 | Ϋ́ |
| treetLights | | Storm Stant Bouble milet 2 of Eucephi | | ب | 3,730.00 | ' |
| | 800 | 2" Buried Streetlight Conduit | LF | \$ | 8.00 | Υ |
| | 810 | Streetlight Pull Box | LS | \$ | 500.00 | Y |
| | 820 | 14' Streetlight | LS | \$ | 2,800.00 | Y |
| | 830 | 18' Streetlight | LS | \$ | 3,300.00 | Υ |
| | 840 | 18' Streetlight - Dual Luminaire | LS | \$ | 5,200.00 | Υ |
| | 850 | Bollard Light | LS | \$ | 1,350.00 | Υ |
| oint Utilitie | | | | | | |
| | 000 | Latina Datte, Toronch | | 4 | 40.00 | Υ |
| | 900 910 | Joint Utility Trench Gas Utility Line | LF LF | \$ \$ | 10.00 10.00 | Ϋ́ |

Notes:

- The City Engineer shall modify this document as necessary as evidence of market changes presents.
- All bond estimates and calculation of construction permit fee shall be based on these unit prices regardless of actual construction costs.
- This curb ramp cost item is an additive cost to sidewalk surface area and curb and gutter that should already be included in Item Nos. 200-240.
- 4. The cross gutter area is calculated by the concrete area that is not included in the area enclosed by a line projection of the lip of the gutter around the radius of the street corner. (The curb and gutter quantities should include the curb radius areas of the corners.)
- 5. All estimates shall be prepared and stamped by a Utah professional engineer.
- 6. This list may not contain all of the items required for a construction site development. The professional engineer preparing the estimate shall use market information to determine prices of other required construction items.
- Asterisk (*) indicates that warranty only required when the improvement is a requirement of development.
- Warranty shall be 25% the required improvements as indicated in this chart.
 Warranty bonds shall be held for a period of 2 years. See Section 1.6.8 for additional information.

APPENDIX D

Final Inspection Checklist

IVINS CITY SUBDIVISION IMPROVEMENTS FINAL INSPECTION CHECKLIST

| | Dev | | |
|--------------|------------------------|------------------------|----------------------|
| Date | $\mathbf{B}\mathbf{y}$ | | |
| Approved | (initials) | Description | Comments |
| | | Sanitary sewer | |
| | | Storm sewer | |
| | | Culinary water | |
| | | Secondary water | |
| | | Natural gas | |
| | | Electrical power | |
| | | Telephone | |
| | | Cable television | |
| | | Curb & gutter | |
| | | Sidewalk | |
| | | Road subgrade | |
| | | Road base | |
| | | Road pavement | |
| | | Street lights | |
| | | Parks, trail system | |
| | | Fire hydrants | |
| | | Street signs | |
| | | Monuments | |
| | | Final grading report | |
| | | & test location map | |
| | | Final cleanup | |
| | | "As Built" drawings | |
| | | _ | ace of improvements |
| | | | - |
| | | Guarantee satisfied (2 | 2 years from date of |
| | | conditional acceptance | re) |
| Notes coveri | ng guarantee p | period: | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

APPENDIX E

Geotechnical Report Checklist

IVINS CITY GEOTECHNICAL REPORT CHECK LIST SUBMIT WITH PRELIMINARY PLAN

Overview:

The geotechnical report is to be submitted with the preliminary plan. It is to be prepared by and stamped by a licensed geotechnical engineer. The purpose of the report is to evaluate the existing soil conditions of the project site prior to new development

Required Extent of Exploration:

| Size of Area | Minimum Number of Explorations | |
|-----------------------|--|--|
| Less than 3 acres | 2 | |
| Less than 5 acres | 3 | |
| Less than 20 acres | 3 plus 1 for each 3 acres more than 5 acres | |
| Greater than 20 acres | 8 plus 1 for each 5 acres more than 20 acres | |

Required Depth of Exploration:

- Minimum 25 feet depth for basement foundations
- Minimum 20 feet depth for slab on grade foundations, at least one test hole must be 25 feet depth for every 5 acres.
- If explorations determine that a portion of the site has expansive soils then the geotechnical firm must make additional explorations on each proposed lot between location with expansive soils and any location without until the geotechnical firm can precisely determine which lots are impacted.

Required Minimum Testing:

| Test | Frequency | |
|--|---|--|
| Sieve Analysis, Atterberg Limits, and Soil Classification in Unified and AASHTO systems | Each Soil Type | |
| Modified Soil Proctor identifying Maximum Dry Density and Optimum Water Moisture Content | Each Soil Type | |
| Natural Dry Density and Water Moisture Content | Each Stratum in Each Hole | |
| "R" Value or "CBR" Value | Each Soil Proctor | |
| Swell and Consolidation Tests | As recommended by geotechnical engineer to provide adequate representation of each soil type. | |

| Site Area:acres Expansive Soils Present?yesno | | | | |
|---|--|--|--|--|
| Groundwater present? | | | | |
| No. of holes with 20' min depth: No. of holes with 25' min depth: | | | | |
| Report should include the following: | | | | |
| Descriptions of: | | | | |
| Generalized site conditions | | | | |
| □ Surface and subsurface conditions | | | | |
| Recommendations for: | | | | |
| ☐ Site preparation | | | | |
| ☐ Excavation (Identify suitability of native material for trench backfill) | | | | |
| □ Grading | | | | |
| □ Structural fill | | | | |
| □ Foundation design | | | | |
| □ Seismic considerations | | | | |
| Pavement design for all categories of roads using the Traffic Index as given below: | | | | |
| Appendix E | | | | |

| Classification | Traffic Index | Classification | Traffic Index |
|-----------------------|---------------|------------------|---------------|
| Residential Standard | 5 | Minor Arterial | 7 |
| Residential Collector | 5 | Major Arterial | 8 |
| Minor Collector | 5.5 | Commercial Local | 10 |
| Major Collector | 6 | Industrial Local | 10 |

- Soil moisture control

 Exhibits and appendices showing:

 Vicinity map
 Site plan showing boring locations
 Boring logs

 Text morelles

 - ☐ Test results

APPENDIX F

Water Usage Form



55 N. Main St. Ivins, UT 84738 Tel. 435-628-0606 Fax 435-656-2286

www.ivins.com

WATER USAGE FORM SUBMIT WITH PRELIMINARY PLAN

| SUBDI | IVISION NAME: | | |
|-----------------------|--|------------|-------------|
| Number of Equivale | ent Residential Units (ERUs) | | |
| Total Subdivision A | creage:acres Estimated Irrigated | d Acreage: | acres |
| Annual Water Usag | e: | | |
| Indoor: | 0.45 AF/ERU X ERUs | = | acre-feet |
| Outdoor: | 3.26 AF/Irr. Ac. X Irrigated Acreage | = | acre-feet |
| Total: | Indoor + Outdoor | = | acre-feet |
| Peak Day Demand: | | | |
| Indoor: | 0.56 gpm/ERU X ERUs | = | gpm |
| Outdoor: | 4.9 gpm/Irr. Ac. X Irrigated Acreage | = | gpm |
| Total: | Indoor + Outdoor | | gpm |
| Peak Instantaneous | | | |
| Indoor: | $10.8 \text{ x (ERUs)}^{0.64}$ | = | gpm |
| Outdoor: | | | gpm |
| Total: | Indoor + Outdoor | = | gpm |
| Storage Requiremen | nt: | | |
| Indoor: | 400 gal/ERU X ERUs | = | gallons |
| Outdoor: | 4,964 gal/Irr. Ac. X Irrigated Acreage | | gallons |
| Total: | Indoor + Outdoor | = | gallons |
| Fire Flow Calculation | on (IFC Appendix B): | | |
| Building Ty | pe (See IBC) | | |
| Maximum B | Building Area | | square feet |
| Fire Flow R | equirement (see IFC Table B105.1) | | _ gpm |
| Fire Flow D | | | |
| Fire Storage | | | |
| | | | |

Notes:

- 1. Refer to Utah Administrative Rules R309-510
- 2. If irrigated acreage is less than 0.125 acres per lot, then provide justification.

Abbreviations:

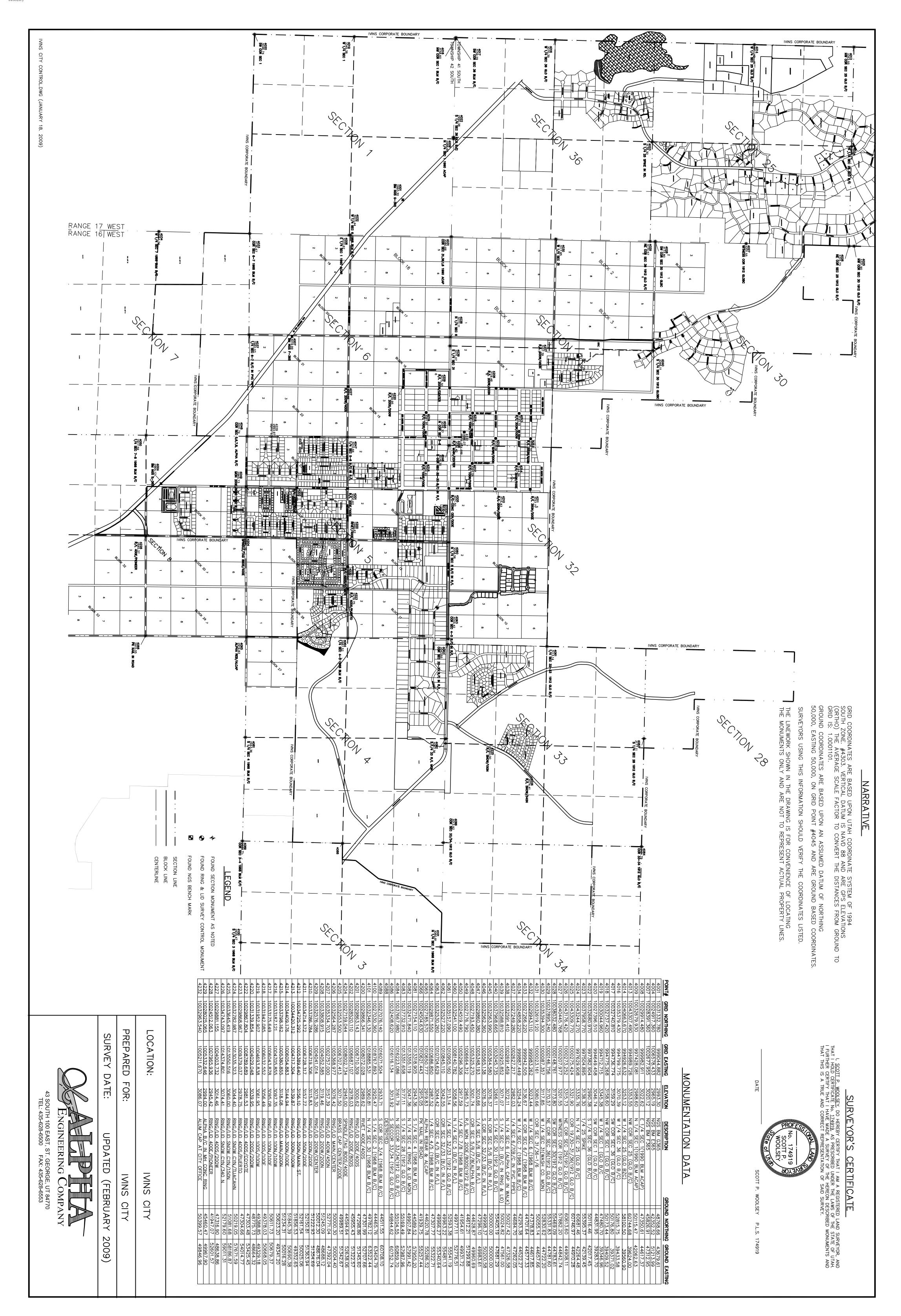
ERU: Equivalent Residential Unit

Irr. Ac.: Irrigated Acres gpm: gallons per minute

IFC: 2003 International Fire Code IBC: 2003 International Building Code

APPENDIX G

Ivins City Control Record Survey



APPENDIX H

Preliminary & Final Drainage Report Checklist



Public Works Department

55 North Main Street Ivins, Utah 84738 (435) 634-0689

Preliminary/Final Drainage Report Checklist

This sheet shall be provided with each drainage report. All items should be checked off.

| Name of Development: | | | | |
|----------------------------|----------|--|--|--|
| Size of Development: acres | | | | |
| Name of Profe | ssional | Engineer: | | |
| Name of Engin | eering | Compan y : | | |
| Phone: Email: | | | | |
| Check off each s | submitte | ed item: | | |
| Drainage R | eport | ; : | | |
| Preliminary | Final | | | |
| | | Title page showing project name, date, preparers name, seal and signature. | | |
| | | Description of property, area, existing site conditions including all existing drainage facilities such as ditches, canals, washes, structures, etc. | | |
| | | Description of off-site drainage upstream and downstream. | | |
| | | Description of on-site drainage. | | |
| | | Description of master planned drainage and how development conforms to the Ivins City Drainage Master Plan. | | |
| | | Description of FEMA floodplain, if applicable. | | |
| | | Description of other drainage studies that affect the site. | | |
| | | Description of proposed drainage facilities. | | |
| | | Description of design runoff computations and methods. | | |
| | | Description of drainage facility design computations. | | |
| | | Results of percolation tests for any retention/detention ponds. | | |

| | | Description of all easements and rights-of-way required. |
|-----------------|---------|--|
| | | Description of FEMA floodway and floodplain calculations, if applicable. |
| | | Conclusions stating compliance with drainage requirements and opinion of effectiveness of proposed drainage facilities and accuracy of calculations. |
| | | Appendices showing all applicable reference information, including all model input and output files and results with appropriate explanations. |
| Drainage F | Plan | |
| | | Submitted on separate 11"x 17" sheets |
| | | Submitted on separate 24"x 36" sheets |
| A separate drai | nage pl | an for the following scenarios: |
| | | Existing off-site and on-site conditions. |
| | | Existing off-site and developed on-site conditions. |
| | | Developed off-site and on-site conditions. |
| Shows the follo | wing in | formation: |
| | | Existing and proposed property lines. |
| | | Existing and proposed 2' contours. |
| | | Existing and proposed streets, easements, and rights-of-way. |
| | | Existing drainage facilities. |
| | | FEMA floodplain, floodway and meander boundaries. |
| | | Drainage basin boundaries and subbasin boundaries. |
| | | Existing flow patterns and paths. |
| | | Proposed flow patterns and paths. |
| | | Location of proposed drainage facilities. |
| | | Size of proposed drainage facilities. |
| | | Details of proposed drainage facilities. |

| | | Location of drainage easements required. |
|----------|---------|---|
| | | Scale, north arrow, legend, title block showing project name, date, preparers name, seal and signature. |
| Hydrolog | y and I | Hydraulic Calculations |
| | | Rainfall data (i.e. sources for rainfall depth and durations used). |
| | | Landuse data (i.e. sources for curve numbers on other landuse coefficients). |
| | | Time of concentration calculations. |
| | | Hydrology calculations (or if a computer model is used, provide all input and output). |
| | | Ditch/channel capacity calculations. |
| | | Culvert capacity calculations. |
| | | Street flow capacity calculations. |
| | | Inlet capacity calculations. |
| | | Detention and outlet design calculations (area/storage/discharge rating curves). |
| | | Pipe capacity calculations. |
| | | |
| | | |
| | | |
| | | |
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| | | |
| | | |

Engineer stamp & signature here.

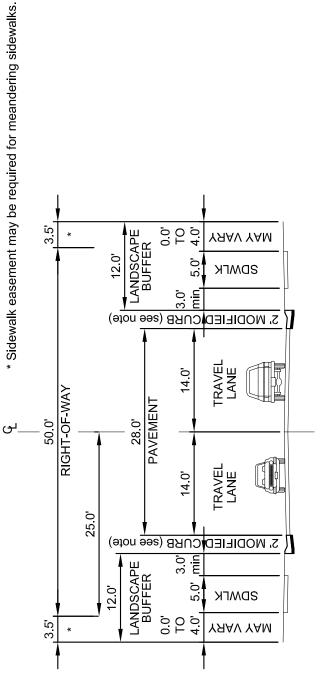
APPENDIX I

Street Cross-Sections

- Meandering sidewalk recommended where possible. Meander sidewalk through landscape buffer area.
- Sidewalk may undulate but must meet clear zone requirements.

Ö 3

- The City may require that the 2' modified curb be substituted by a 2.5' high back curb when
- road is curvilinear and grade has portions steeper than 2 percent,
- road is recieving water from an intersecting road or other drainage feature that has an apparent risk of storm water jumping the curb due to high velocities, or a substantive drainage benefit is determined per approved drainage studies.



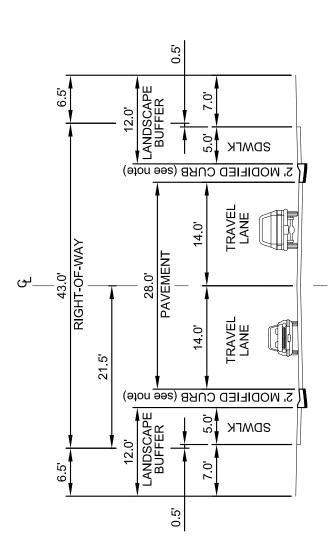
STANDARD 50' RESIDENTIAL



Ivins City

RESIDENTIAL STANDARD 50'

- The City may require that the 2' modified curb be substituted by a 2.5' high back curb when
- road is curvilinear and grade has portions steeper than 2
- road is recieving water from an intersecting road or other drainage feature that has an apparent risk of storm water jumping the curb due to high velocities, or a substantive drainage benefit is determined per approved drainage studies.
- Where a 2.5' high back curb is required, the sidewalk may be reduced to 4.5' width. 2



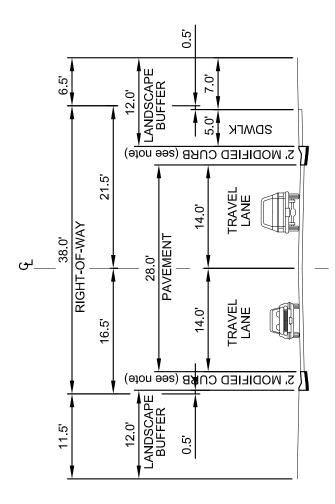
ALTERNATIVE 43' RESIDENTIAL



Ivins City

RESIDENTIAL ALTERNATIVE 43'

- The City may require that the 2' modified curb be substituted by a 2.5' high back curb when
- road is curvilinear and grade has portions steeper than 2
- read is recieving water from an intersecting road or other drainage feature that has an apparent risk of storm water jumping the curb due to high velocities, or a substantive drainage benefit is determined per approved drainage studies.
- Where a 2.5' high back curb is required, the sidewalk may be reduced to 4.5' width. ς.



ALTERNATIVE 38' RESIDENTIAL



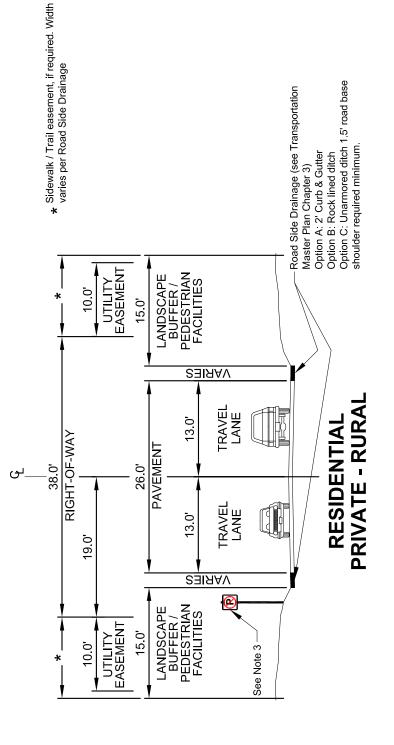
Ivins City

RESIDENTIAL ALTERNATIVE 38'

- Pedestrian facilities required on rural streets per the Transportation Master Plan Chapter 3. Sidewalk/trail shall be located within landscape buffer area, meandering where possible
- Residential driveways shall be constructed to keep drainage within the roadway or natural drainage to prevent flooding of private property.

ď

- When driveable surface width (asphalt + shoulders) is 32 feet or less, "No Parking" signs shall be installed on one side of the road per adopted fire code. Driveable surface shall not be less than 29 feet. က
- Pedestrian facilities are not required when traffic studies show a road has a volume of less than 200 vehicles per day. Otherwise, an 8' wide asphalt path on one side, or a 5' concrete sidewalk on both sides shall be installed. 4

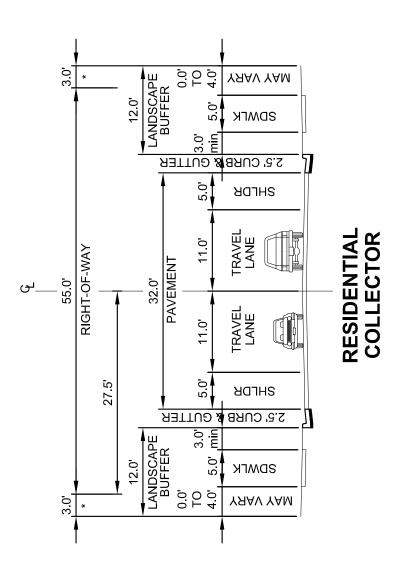




2

- Meandering sidewalk recommended where possible. Meander sidewalk through landscape buffer area.
- 2. Sidewalk may undulate but must meet clear zone requirements.

* Sidewalk easement may be required for meandering sidewalks.

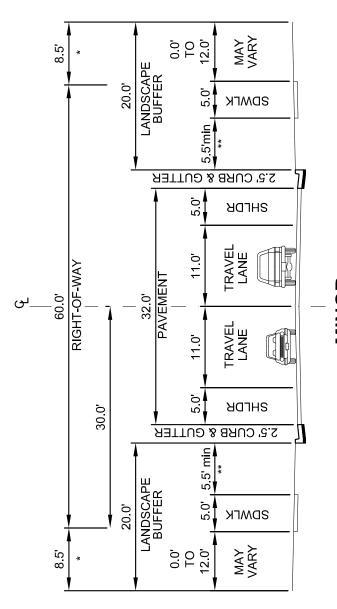




- Meandering sidewalk recommended where possible. Meander sidewalk through landscape buffer area.
- Sidewalk may undulate but must meet clear zone requirements.

ď

- 3. 5' Shoulder may be striped for a bicycle lane where indicated.
- Sidewalk easement may be required for meandering sidewalks.
- For meandering sidewalks, parkstrip width will vary with a required minimum width at closest point to be 3.0'.



MINOR COLLECTOR



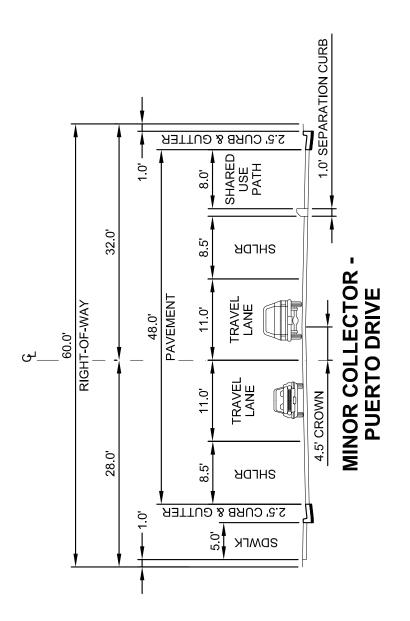
Ivins City

MINOR COLLECTOR

4



1. 1' separation curb shall not be continuous through residential drive ways.





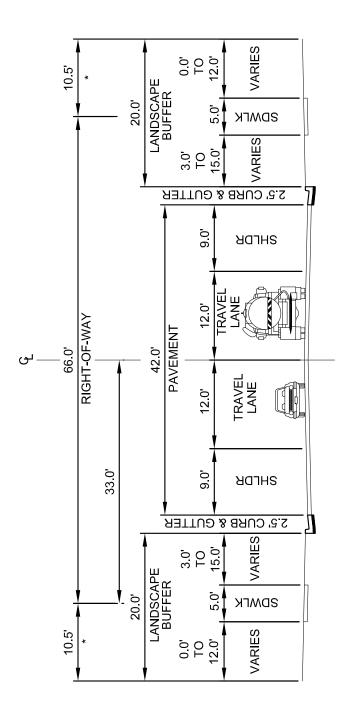
5



- Meandering sidewalk/trail required. Meander sidewalk through landscape buffer area.
- Sidewalk may undulate but must meet clear zone requirements. Ö
- 9' shoulder with 2' of gutter pan may be separated into a 4' bike lane and 7' parking where indicated on the Ivins City Bike Lane Plan.

က

Where homes or commericial sites do not front street, landscape buffer must be dedicated to City.



MAJOR COLLECTOR (STREET PARKING)

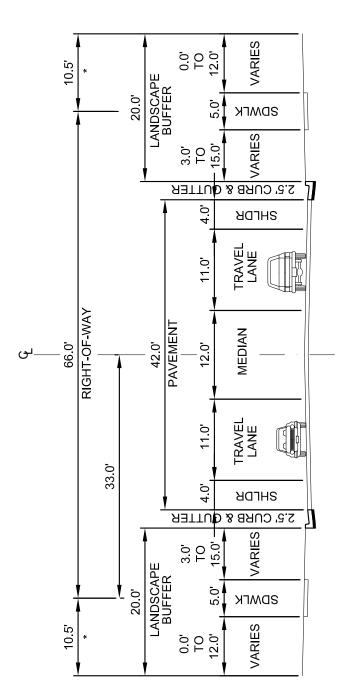


CROSS SECTION NO.

9



- Meandering sidewalk required. Meander sidewalk through landscape buffer area.
- Sidewalk may undulate but must meet clear zone requirements. 2
- 4' Shoulder may be striped for a bicycle lane where indicated. ი
- Where homes or commericial sites do not front street, landscape buffer must be dedicated to City.



MAJOR COLLECTOR (CENTER LANE STRIPING)



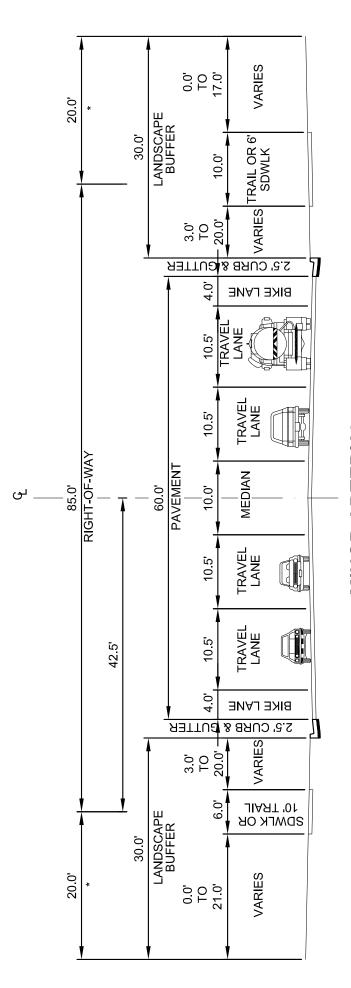
Ivins City



- Meandering sidewalk required. Meander sidewalk through landscape buffer area.
- 2. Sidewalk may undulate but must meet clear zone requirements.
- See city Trail Map for trail locations.

က

- Additional width will be required at intersections for a 12-foot right turn lane as approved by the City Engineer.
- Where homes or commericial sites do not front street, landscape buffer must be dedicated to City.



MINOR ARTERIAL - CENTER STREET



Ivins City

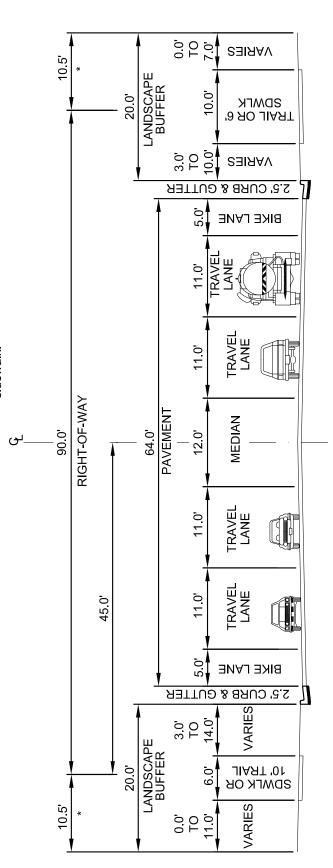
 ∞

CROSS SECTION NO.

MINOR ARTERIAL - CENTER STREET

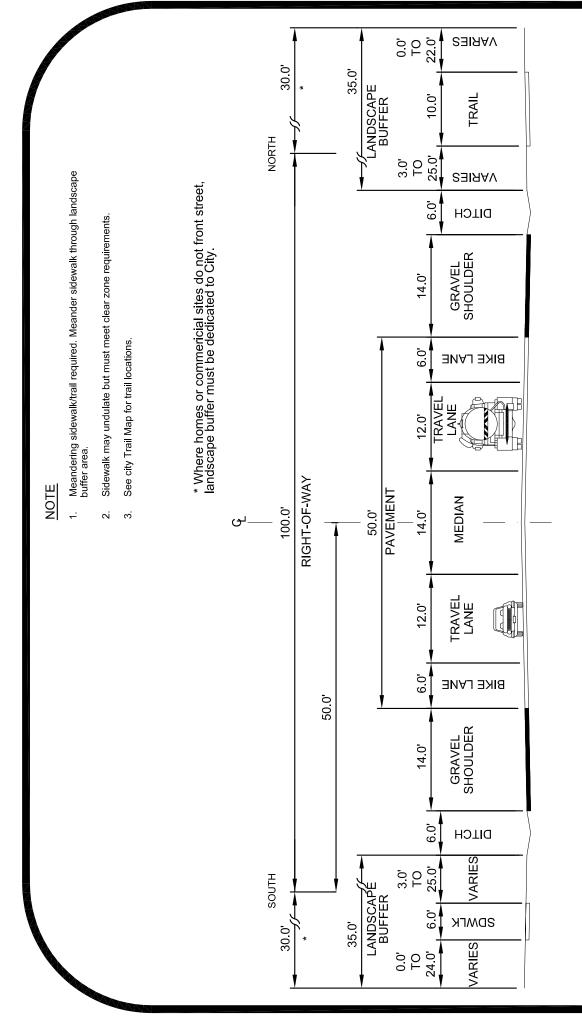


- See city Trail Map for trail locations.
- Where homes or commericial sites do not front street, landscape buffer must be dedicated to City.
- Parkstrip minimum width may be 3.0' for a meandering sidewalk.

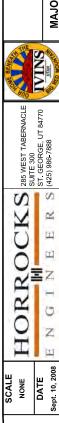


WESTERN CORRIDOR MINOR ARTERIAL -





MAJOR ARTERIAL -OLD HIGHWAY 91 (3-LANE)

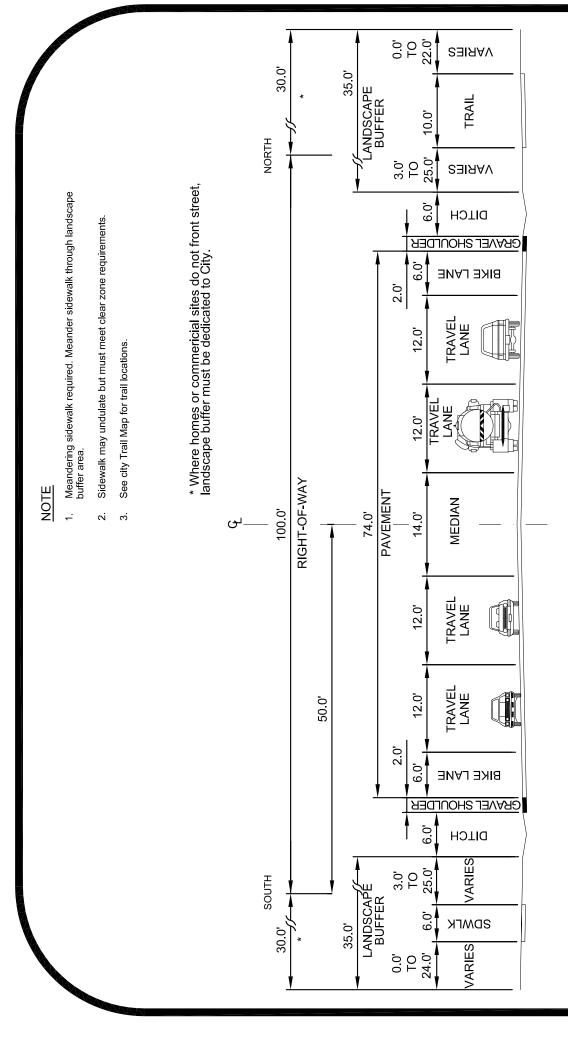


CROSS SECTION NO.

MAJOR ARTERIAL - OLD HIGHWAY 91 (3-LANE)

Ivins City

10



MAJOR ARTERIAL -OLD HIGHWAY 91 (5-LANE)



CROSS SECTION NO.

MAJOR ARTERIAL - OLD HIGHWAY 91 (5-LANE)

Ivins City

7

- Trails and sidewalks may undulate but must meet clear zone requirements.
- See city Trail Map for trail locations.
- Where possible meander sidewalk through landscape buffer area.

က

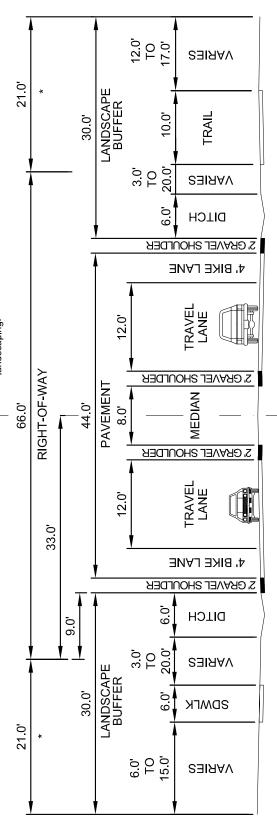
- A 2.5' high-back curb may be substituted for the roadside ditch and may be required if specified by a drainage study. 4
- Follow drainage requirements for roadside ditch design

5

- An alternate would be to omit 5' sidewalk on one side of the street if it is shown sidewalk would be rarely used to not warrant expense based on approval of the city engineer. Homes or other structures fronting a street exclude the possibility of this alternate. 9
- An alternate would be to replace the 5' sidewalk with a 10' trail as approved by the City 7

Sidewalk easement may be required for meandering sidewalks.

The landscaped median may be widened as proposed by the developer of the road such that the 30' wide landscape buffer on each side is reduced to maintain the same width of total landscaping. ω. لۍ



LANDSCAPED MEDIAN IN RURAL ZONE **MAJOR COLLECTOR -**



CROSS SECTION NO.

MAJOR COLLECTOR - LANDSCAPED MEDIAN

APPENDIX J

TIS Report Format



Public Works Department

55 North Main Street Ivins, Utah 84738 (435) 643-0689

TIS Report Format

I. INTRODUCTION AND SUMMARY

- 1. Purpose of Report and Study Objectives
- 2. Executive Summary
 - Site Location and Study Area
 - Development Description
 - Principal Findings
 - Conclusions
 - Recommendations

II. PROPOSED DEVELOPMENT

- 1. Off-Site Development
- 2. Description of On-Site Development
 - Land Use and Intensity
 - Location
 - Site Plan
 - Zoning
 - Development Phasing and Timing

III.STUDY AREA CONDITIONS

- 1. Study Area
 - Area of Significant Traffic Impact
 - Influence Area
- 2. Land Use
 - Existing Land Use and Zoning
 - Anticipated Future Development
- 3. Site Accessibility
 - Existing and Future Area Roadway System
 - Traffic Volumes and Conditions
 - Access Geometrics
 - Other as applicable

IV. ANALYSIS OF EXISTINC CONDITIONS

- 1. Physical Characteristics
 - Roadway Characteristics
 - Traffic Control Devices
 - Pedestrian/Bicycle Facilities
- 2. Traffic Volumes
 - Daily, Morning, Afternoon and Saturday Peak Periods (as applicable)
- 3. Level of Service
 - Morning, Afternoon and Saturday Peak Hour (as applicable)
- 4. Safety

V. PROJECTED TRAFFIC

- 1. Site Traffic Forecasts (each horizon year)
 - Trip Generation
 - Mode Split
 - Pass-by Traffic (if applicable)
 - Trip Distribution
 - Trip Assignment
- 2. Non-Site Traffic Forecasting (each horizon year)
 - Projections of Non-site (Background) Traffic (methodology for the projections shall receive prior approval of City)
- 3. Total Traffic (each horizon year)

VI. TRAFFIC AND IMPROVEMENT ANALYSIS

- 1. Site Access
- 2. Capacity and Level of Service Analysis
 - Without Project (for each horizon year including any programmed improvements)
 - With Project (for each horizon year, including any programmed improvements)
- 3. Roadway Improvements
 - Improvements Programmed to Accommodate Non-site (Background)
 Traffic
 - Additional Alternative Improvements to Accommodate Site Traffic
- 4. Traffic Safety
 - Sight Distance
 - Acceleration/Deceleration Lanes, Left-Turn Lanes
 - Adequacy of Location and Design of Driveway Access
- 5. Pedestrian Considerations
- 6. Speed Considerations
- 7. Traffic Control Needs
- 8. Traffic Signal Needs (base plus each year, in five-year horizon)
- 9. Site Circulation and Parking

VII. FINDINGS

- 1. Site Accessibility
- 2. Traffic Impacts
- 3. Need for Improvements
- 4. Compliance with Applicable Local Codes

VIII.RECOMMENDATIONS/CONCLUSIONS

- 1. Site Access/Circulation Plan
- 2. Roadway Improvements
 - On-Site
 - Off-Site
 - Phasing (as applicable)

- 3. Transportation System Management Actions (as applicable)
- 4. Other

IX. APPENDICES

- 1. Existing Traffic Volume Summary
- 2. Trip Generation/Trip Distribution Analysis
- 3. Capacity Analyses Worksheets
- 4. Traffic Signal Needs Studies

X. FIGURES AND TABLES

- 1. The following items shall be documented in the text or Appendices
 - Site Location
 - Site Plan
 - Existing Transportation System
 - Existing Peak Hour Turning Volumes
 - Estimated Site Traffic Generation
 - Directional Distribution of Site Traffic
 - Site Traffic
 - Non-Site Traffic
 - Total Future Traffic
 - Projected Levels of Service
 - Recommended Improvements

(For Category 1, many of the items may be documented within the text. For other categories the items shall be included in figures and/or tables that are legible.)

XI. DESIGN STANDARD REFERENCE

- 1. Design in accordance with current *Ivins City Standards*.
- 2. Conduct capacity analysis in accordance with the latest edition of the *Highway Capacity Manual*.

APPENDIX K

Construction Drawing Review Checklist



55 N. Main St. Ivins, UT 84738 Tel. 435-628-0606 Fax 435-656-2286

www.ivins.com

CONSTRUCTION DRAWING REVIEW REQUIREMENTS

General Overview:

- First Submittal:
 - Submit the attached Construction Drawing Checklist.
 - Submit three sets of construction drawings, copies or original, stamped by a professional engineer.
 - Submit Storm Water Pollution Prevention Plan per Utah Pollutant Discharge Elimination System (UPDES) requirements.
 - If drainage plan has changed since drainage study submitted with preliminary plan, submit a revised drainage plan or a drainage plan addendum.
 - The approximate review period for the first submittal is 14 days.
- Upon review, one set of construction drawings will be returned with markups for changes required for approval.
- Second Submittal:
 - Submit markup copy of construction drawings from previous submittal.
 - Submit one original set of construction drawings with all utility signatures and professional engineer signature. (Two or more original sets may be submitted if the developer or engineer needs an original set for their own records).
 - Submit construction cost estimate.
 - The approximate review period for the second submittal is 7 days.
- Upon review, if all marked changes were corrected in the second submittal, the original set of construction drawings will be returned with all of the city signatures.
- Final Submittal:
 - Submit the original set of construction drawings.
 - Submit two additional copies of the original construction drawings.
 - Submit an electronic version of the construction drawings and final plat as an Auto CAD file. Auto CAD 2006 or an older version is acceptable.

Appendix K Page 1 of 7 Rev. 07-2010

Construction Plans

General Standards:

- Drawing Size: 24"x 36"
- Title block is located on the right side of sheet and includes:
 - Project title
 - Sheet title
 - Sheet number
 - Name, address, and phone number of engineer
- The engineer's stamp is required on all sheets.
- Minimum text size is 0.08"

Construction Plans must include:

- □ Title sheet which includes:
 - Sheet index
 - Project title
 - Vicinity map
 - Engineer's certification
 - Project benchmark information
 - Basis of bearings
 - General project boundary and layout map
 - 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).
- □ Construction Notes Sheet
- □ Erosion Control Plan and Details
 - Shows the following:
 - 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
- □ Grading Plan and Cross Sections
 - Minimum scale is 1"=50"
 - Shows the following:
 - 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
 - Slopes
 - Building pad elevations
 - Cross sections
 - Top of wall and bottom of wall elevations on retaining walls
 - Drainage flow arrows
- Utility Plans
 - 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.

- Sewer manholes, cleanouts, and laterals
- Storm drain inlets, catch basins, manholes, headwalls, subdrains, and outfalls
- Power, natural gas, and cable television
- Street lights
- 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.
- Shows existing utilities
- □ Street and Project Entrance Lighting Plan
- □ Street Plan and Profiles
 - Minimum scale is 1"=50"
 - 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
 - Shows Pavement and Base thickness design per Geotechnical Evaluation (include in typical cross section).
 - Benchmark location and elevation
 - Street names
 - Tapers (10:1 required at all transitions)
- □ Landscaping Plan
 - Includes a Planting Plan (plant list).
 - Includes an Irrigation System Plan
 - Shows all valves, controllers, and trunklines
- □ Detail Sheets (as needed)

Construction Drawing Checklist

Street Design

□ All streets meet street design specifications for grades, centerline curve radii, rights-of-way, pavement, curb, gutter, and sidewalk dimensions shown the following table.

Street Design Standards

| Street | Right | Max. | Cul- | Centerline | Design | Pave- | Side-walk | Serpentine | Curb | Curb |
|-------------|--------|-----------------|--------|------------|--------|------------------|-----------|------------|---------------------|--------|
| Type | -of- | Grade | de-sac | Minimum | Speed | ment | (minimum | Sidewalk | Return | Type |
| | Way | (%) | Radius | Curvature | (mph) | (feet) | feet) | (minimum | Radius | Used |
| | (feet) | | (feet) | (feet) | | | | feet) | (feet) ¹ | |
| Private | 38 | 8% ² | 60 | 70 | 15 | | 4^3 | 5 | 15 | 24" |
| Residential | 50 | 8% ² | 60 | 100 | 25 | 27 | 5 | 5 | 20 | 24" |
| Standard | | | | | | | | | | |
| Residential | 55 | 8% ² | 60 | 200 | 25 | 32 | 5 | 6 | 25 | HB30-7 |
| Collector | | | | | | | | | | (30") |
| Minor | 60 | 8% | - | 200 | 30 | 30 | 5 | 6 | 25 | HB30-7 |
| Collector | | | | | | | | | | (30") |
| Major | 66 | 8% | - | 400 | 35 | 36 | 5 | 6 | 30 | HB30-7 |
| Collector | | | | | | min ⁴ | | | | (30") |
| Arterial | 80/85 | 8% | - | 700 | 45 | 55- | 5 | 6 | 35 | HB30-7 |
| Minor | | | | | | 60^{4} | | | | (30") |
| Arterial | 100 | 8% | - | 1000 | 55 | 4 | 5 | 6 | 40 | HB30-7 |
| Major | | | | | | | | | | (30") |
| Half Width | - | 8% | - | - | - | 27^{5} | - | - | - | - |
| Streets | | | | | | min. | | | | |

□ All streets meet intersection distance standards shown in the following table.

Access Distance From Corner According to Facility Type

| Facility Type | Upstream Distance (feet) | Downstream Distance (feet) |
|-----------------------|---------------------------------|-----------------------------------|
| Residential Access | 50 | 50 |
| Local Residential | 50 | 50 |
| Residential Standard | 50 | 50 |
| Residential Collector | 100 | 75 |
| Major Collector | 175 | 150 |
| Minor Arterial | 200 | 185 |
| Major Arterial | 250 | 230 |

□ All Street intersections are as close to 90° as possible

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¹ Curb Return Radius shall use the largest street type found at the intersection

² 12% if approved for sensitive lands

³ Private roads designed with sidewalk on one side only.

⁴ See Transportation Master Plan drawings

⁵ Minimum pavement to be 27 feet or to the centerline of the street type being constructed, whichever is greater

- □ Cul-de-sac streets are no more than 600' long, measured from the center of intersection to center of cul-de-sac.
- ☐ Minimum pavement across cul-de-sac is 96' with no parking posted. The radius is measured to property line.

Serpentine Sidewalks

- □ Maximum grade of 5%, or 2% greater than the existing/proposed street grade, whichever is less, along the length of the serpentine sidewalk.
- ☐ The sidewalk is no greater than 18" above the top back of curb with a maximum slope to the curb of 3:1.
- □ The centerline radius of the serpentine sidewalk is no less than 50'.
- □ Adequate pedestrian access to the sidewalks is provided meeting ADA standards.

Sanitary Sewer

Design Flows

□ All hydraulic slopes have a minimum slope as outlined in the following table.

| SEWER SIZE (inches) | MINIMUM SLOPE (ft/100 feet)=% |
|---------------------|----------------------------------|
| 8 | .5 |
| 10 | .5 |
| 12 | .5 |
| 15 | .45 |
| 18 | .45 |
| 21 | .45 |
| >24 | .4 |

Minimum Size and Depth

- □ No public sanitary sewer is less than 8" in diameter.
- □ No house connections are less than 4" in diameter.
- □ No restaurant connections are less than 6" in diameter.
- □ Each lateral connected to the public main serves only one residence, structure, or building.
- ☐ The depth of a sewer main, to top of pipe, is 36" or more below subgrade of roadway.

Alignment

□ All sanitary sewers are laid at least 10' horizontally, measured from edge to edge, from any culinary water main.

Service Connections

- □ Service connections to any public sanitary sewer are a minimum of 10' from any culinary water line or tapping.
- □ No roof drains, foundations drains, storm drains, or sub-drains are connected to sanitary sewer system.

Manholes

- □ Manholes are installed at all changes in grade, size and intersections and at distances no greater than 400' apart.
- □ Flow lines of junction-lines entering the manhole at an angle are 0.2' higher than through-line flow line.
- ☐ Manholes for sewer mains of 10" diameter or less have a minimum of 4' inside diameter.
- ☐ Manholes for sewer mains larger than 10", over 12' deep, or where three or more sewer lines intersect (including laterals), have a minimum 5' inside diameter.

□ Location and size of existing facilities are verified with city records.

Culinary Water

Minimum Size and Depth

- □ The minimum depth of cover (to top of pipe) for water mains is 36" below the final grade of the street.
- □ The minimum size of the water main is 4" in diameter.
- □ The minimum size of the water main serving any fire hydrant is 8" in diameter.

Valves and Hydrants

- □ The water system is looped and valves are spaced so that a break in any one length of main will put no more than 600' of main, and no more than two fire hydrants out of service.
- □ All distribution mains connecting to larger supply mains are valved near the connection.
- □ All fire hydrants are valved.

Fire Hydrant Spacing and Location

- □ Fire hydrants are located at each intersection.
- □ In residential areas, fire hydrant spacing is no greater than 500', and no house is greater than 250' from a hydrant.
- □ In industrial, business, or commercial areas, fire hydrant spacing is no more than 350' and no building is more than 175' from a hydrant.
- □ All hydrants are offset a minimum of 18" from the walkway.
- □ All hydrants are installed on dedicated easements or public rights-of-way.
- □ All hydrants have a 5' clearance on sides and front, and 3' on rear.

Miscellaneous Water System Design Criteria

- □ Water mains are within a right-of-way or easement.
- Dead end mains are avoided wherever possible and if installed are less than 600'.
- □ Each building is served by a separate meter.
- □ Service line requirements are met as outlined in the following table.

| Service Line | Maximum Units to be Served |
|--------------|----------------------------|
| 1" | 5 |
| 1 ½" | 12 |
| 2" | 20 |

- □ All water mains are laid at least 10', measured edge to edge, from any sewer main or manhole.
- □ When a water main crosses over a sewer main, the water main is laid high enough that the bottom of the water main is at least 18" above the top of the sewer pipe.
- □ Air release-vacuum assemblies and blow off valves are provided on all mains larger than 12".
- □ Location and size of existing facilities are verified with city records.

Secondary (Irrigation) Water

- □ The minimum depth of cover (to top of pipe) is 36" below finished grade.
- □ Irrigation lines are located in the roadway.
- □ Irrigation lines are a minimum of 3' separation from culinary water lines.
- □ Location and size of existing facilities are verified with city records.

Bike Path

- □ Bike paths are a minimum of 10' wide.
- □ Bike paths are built with a minimum of 2" of type II asphalt over 6" of base course, over prepared sub grade.

| Grading per International Building Code (IBC) Appendix J |
|---|
| ☐ The maximum slope of cut surfaces is 2H:1V. (IBC J106.1) |
| Benching is required where the existing slope is steeper than 5H:1V and the fill is deeper than 5'. |
| See IBC Figure J107.3. |
| □ Required □ Not required |
| ☐ If benching is required, Figure J107.3 from IBC is included as a detail in |
| construction plans. |
| □ Top of all cut or fill slopes is setback a minimum of 2' from property line (IBC J108.2) |
| □ Top of all cut or fill slopes higher than h=10' (see IBC Figure J 108.1) is setback at a |
| minimum of h/5 feet from property line. (Maximum set back is 10') |
| Terraces (IBC J109.2) |
| Terraces are required on all cut or fill slopes higher than 30 vertical feet to control surface |
| drainage and debris |
| ☐ Required ☐ Not required |
| If terraces are required, the following must be checked: |
| □ Minimum width of 6' |
| □ Where more than two terraces are required, one terrace, at approximately mid- |
| height, is at least 12' wide |
| Swales or ditches are provided on terraces and meet the following |
| requirements: |
| □ 5% minimum gradient. |
| □ Paved with a minimum of 3" thick concrete. |
| □ Minimum of 12" deep. |
| ☐ Minimum of 5' wide. |
| Interceptor drains are required along the top of cut slopes receiving drainage from a tributary |
| wider than 40' measured horizontally. |
| □ Required □ Not required |
| If interceptor drains are required, they must meet the following requirements: |
| ☐ Minimum of 1' deep. |
| ☐ Minimum of 3' wide. |
| ☐ Have a slope no less than 2%. |
| □ Paved with a minimum 3" thick concrete. |
| Other Grading Requirements |
| Grading Plan must match plan submitted in Preliminary Plan approval. |
| □ No grading off of property without written consent from adjacent property owner. |
| Roads match close to existing grade and are not filling in excess of one foot as measured at |
| centerline. |
| □ No cut and fill areas with a change in grade in excess of four feet within 10 feet of property |
| line. |

Erosion Control Plan

☐ Erosion Control Plan is in accordance with Storm Water Pollution Prevention Plan.

If any of the above requirements cannot be met, make note of the reasons in the margins.