



A handwritten signature in black ink, which appears to read "Jed Muhlestein". The signature is fluid and cursive, with a long horizontal stroke extending to the right.

Jed Muhlestein
Alpine City Engineer

CONSTRUCTION STANDARD SPECIFICATIONS AND DETAILS

Adopted September 26, 2023



ALPINE CITY CONSTRUCTION STANDARDS

- Section 100. General Provisions.**
- Section 200. Improvement and Design Requirements.**
- Section 250. Inspection and Testing.**
- Section 300. Contractor Requirements.**
- Section 350. Earthwork and Trenches.**
- Section 400. Drinking Water.**
- Section 450. Pressurized Irrigation.**
- Section 500. Sanitary Sewer**
- Section 550. Storm, Land and Groundwater Drains.**
- Section 600. Streets and Pavements.**
- Section 650. Portland Cement Concrete and Masonry Work.**
- Section 700. Conduit.**
- Section 750. Reserved.**
- Section 850. Surface Irrigation Systems.**
- Section 900. Landscaping.**
- Section 950. Irrigation Sprinkler Systems.**
- Section 1000. Standard Details**
- Section 1050. Division of Drinking Water Rules**

Section 100. General Provisions.

SECTION INDEX

100.010. Improvement Requirements.

- A. General.
- B. Improvements Made Before Recording.
- C. Variations, Substitutions, Exceptions and Changes.
- D. Protection of Existing Improvements.
- E. Maintaining Existing Road Surfaces.
- F. New Materials.
- G. City Furnished Products.
- H. Product Delivery and Handling.
- I. Product Storage and Protection.
- J. Building Permits.
- K. Other Specifications and Standards.

100.020. Definitions.

100.010. Improvement Requirements.

- A. General. This policy defines the general requirements for improvements to be built by the Developer, sub-divider, owner, or Contractor for all types of construction, (to include residential, commercial, industrial, institutional, governmental and professional office). All improvements which are in areas that are or will become public rights-of-way and/or easements, or that will be under the responsibility of a homeowner's association shall meet the requirements of these specifications.

The improvements shall include all street improvements in front of all lots and along all dedicated streets to a connection with existing improvements of the same kind and to the boundaries of the development. Layout must provide for future extension to adjacent development and to be compatible with the contour of the ground for proper drainage. All drinking water, sanitary sewer, pressurized irrigation, electric, communication, storm, land or groundwater drains and any other buried utilities or conduits shall be installed to the boundary lines of the Subdivision or development.

- B. Improvements Made Before Recording. No improvements shall be commenced until a final plat is approved and inspection fees paid.
- C. Variations, Substitutions, Exceptions and Changes. Any variation, substitution or exception from the standards in this policy must be authorized in writing by the City Engineer or his/her designee. Product options and substitutions must meet the requirements of APWA 01 25 00 (Product Options and Substitutions). Any item of construction not covered in these standards must have plans and specifications approved by the City Engineer or his/her designee. Requests for changes to the Construction Standards shall be made in writing to the City Engineer. These requests will be reviewed during revision process conducted in conjunction with the APWA revisions.
- D. Protection of Existing Improvements. The Contractor shall be responsible for the protection of any existing improvements on public or private property at the start of work or placed there during the progress of the work. Existing improvements shall include but are not limited to permanent surfacing, curbs, ditches, driveways, culverts, fences, walls and landscaping. Any surface improvements damaged as a result of construction shall be restored or replaced to an equal or better condition than before. This shall be accomplished in a timely manner.
- E. Maintaining Existing Road Surfaces. The Contractor shall be responsible for maintaining existing road surfaces suitable for travel by the public. The Contractor shall be responsible for all dust and mud control and all claims and damages resulting from failure to maintain the construction area.
- F. New Materials. Only new materials may be used during construction unless otherwise authorized by the City Engineer or his/her designee. In such a case where used materials are proposed, only materials of similar use may be installed in a new system with the same use. Example: Only previously used storm drain pipe can be evaluated for use in a new storm drain system or only previously used culinary main line may be evaluated for use in a new culinary system. If approved, the used materials must meet all applicable standards, thoroughly cleaned, and be restored to their original condition prior to installation.
- G. City Furnished Products. If the City furnishes any products the Contractor shall conform to requirements and specifications of APWA 01 64 00 (Owner-furnished Products).
- H. Product Delivery and Handling. The Contractor shall conform to requirements and specifications of APWA 01 65 00 (Product Delivery and Handling).
- I. Product Storage and Protection. The Contractor shall conform to requirements and specifications of APWA 01 66 00 (Product Storage and Protection).
- J. Building Permits. The City may issue a building permit upon application, in compliance with all laws, ordinances, rules, and regulations. No building permit will be issued until all the improvements essential to meet the building code and fire code are installed, accepted, and in service and all building permit and impact fees are paid.

When asphalt pavement plants are closed for the winter, building permits may be issued before paving if there is eight inches of compacted road base in all areas to be paved and adequate fire protection is available.

The City Engineer or his/her designee is hereby designated as the responsible official to accept the improvements.

- K. Other Specifications and Standards. City standards and ordinances shall supersede all other Standards whenever they conflict. Alpine City hereby adopts 2017 APWA (American Public Works Association). If not covered in these specifications and details, 2017 APWA specifications shall be used. Utah Division of Drinking Water has some standards that override 2017 APWA specifications. An addendum to the 2017 APWA specifications has been prepared to highlight the differences and is included as part of these standards as section 1050.

100.020. Definitions.

- A. AASHTO. The American Association of State Highway and Transportation Officials, is a standards setting body which publishes specifications, test protocols and guidelines which are used in highway design and construction throughout the United States.
- B. APWA. The Utah Section, American Public Works Association Manual of Standard Specifications, latest edition with all approved supplements. These standard specifications can be obtained at <http://utah.apwa.net/>. When sections of the APWA manual are referred to in these standards, the Contractor shall also adhere to the requirements and specifications of all related sections referred to by the section of the APWA manual.
- C. AWWA. The American Water Works Association Standards, latest edition.
- D. City. The City of Alpine, Utah.
- E. City Engineer. The person appointed by the City to be the City Engineer.
- F. City Planner. The person appointed by the City to be the City Planner.
- G. Civil Engineer. A person-licensed with the State of Utah to practice as a professional engineer.
- H. County. Utah County, Utah.
- I. Construction Plans. Construction plans include drawings showing all required improvements for a development showing their location, size, grade, and elevations.
- J. Customer. A person or company receiving service from any City utilities
- K. Contractor. A person or company hired by the City or a Developer to perform construction in or for the City, having appropriate state licenses to perform said work.
- L. Council or City Council. The governing body of the City.
- M. Cul-de-sac. A permanent dead-end street.
- N. Developer. Person, persons, partnership or corporation developing residential, commercial or industrial property.
- O. Development Code. The Alpine City Development Code as currently adopted by the City Council.
- P. Final Plat. An original recordable plat drawn on mylar in a form approved by the City and County, showing all lots, streets, utility easements, etc.
- Q. Flood Plain. That area designated on the most recent Flood Insurance Rate Map for the City of Alpine, prepared by the Federal Emergency Management Agency, as a flood plain as amended.
- R. General Plan. The general plan document as approved by the City Council.
- S. Improved Lot. A lot which has all the improvements required in the Alpine City Development Code.

- T. Improvements. Includes roads, streets, curb, gutters, sidewalks, grading, landscaping, water and sanitary sewer systems, irrigation systems, drainage systems, power and communication systems, fences, public facilities, trees or other requirements by this Section or by the City.
- U. Land Surveyor. A person licensed with the State of Utah to practice as a licensed land surveyor.
- V. Lot. A parcel or tract of land within a subdivision which is or may be occupied by a building or structure and the accessory buildings, structures or uses customarily incident thereto, including such open spaces as are arranged and designed to be used in connection with the building according to the zone within which the lot is located.
- W. LID. Low Impact Development is an approach to land development that works with nature to manage storm water as close to its source as possible. LID employs principles such as preserving and creating natural landscape features, minimizing effective imperviousness to create functional and appealing site drainage that treats storm water as a resource rather than a waste product.
- X. MUTCD. The Manual on Uniform Traffic Control Devices defines the standards used by road managers nationwide to install and maintain traffic control devices on all public streets, highways, bikeways, and private roads open to public traffic.
- Y. NEC. The National Electrical Code is a United States standard for the safe installation of electrical wiring and equipment.
- Z. NESC. The National Electrical Safety Code establishes rules which govern: a) methods of grounding; b) installation and maintenance of electric-supply stations and equipment, of overhead supply and communication lines, and of underground and electric-supply and communication lines; and c) operation of electric-supply and communication lines and equipment.
- AA. Offsite Facilities. Facilities outside of the boundaries of the subdivision or development site which are designated and located to serve the needs of the subdivision or development or adjacent property, usually lying between a development and existing facilities.
- BB. Onsite Facilities. Facilities installed within or on the perimeter of the subdivision or development site.
- CC. OSHA. The Occupational Safety and Health Administration is the main federal agency charged with the enforcement of safety and health legislation.
- DD. Parcel of Land. A contiguous area of land in the possession or ownership of one person with one tax identification number.
- EE. Planning Commission. The Planning Commission of Alpine City.
- FF. Preliminary Plat. A map or plat of a proposed subdivision or development with accompanying supplementary documents.
- GG. Public Utility Easements. The easements required to place public utilities across any privately owned property.
- HH. ROW. A public Right of Way is a strip of land that is granted, through an easement or other mechanism, for transportation purposes, such as for a trail, driveway, rail line or highway. A right-of-way is reserved for the purposes of maintenance or expansion of existing services with the right-of-way.
- II. Site Plan. A plan for a commercial, industrial, institutional, governmental or planned residential development in the City.
- JJ. Streets. A thoroughfare which has been dedicated and accepted by the City Council, which the City has acquired by prescriptive right or which the City owns, or is offered for dedication on an approved recorded final plat. For further explanation see the streets section.
- KK. Subdivision. Any parcel of land that is divided, re-subdivided or proposed to be divided into two or more lots, parcels, sites, units, plots, or other division of land for the purpose, whether immediate or future, for offer, sale, lease, or development either on the installment plan or upon any and all other plans, terms,

and conditions. A subdivision includes (1) the division or development of land whether by deed, metes and bounds description, devise and testacia, lease, map, plat, or other recorded instrument; and (2) divisions of land for all land for all residential and nonresidential uses, including land used or to be used for commercial, agricultural, and industrial purposes.

- LL. Utilities. Includes drinking water lines; irrigation lines; sanitary sewer; storm, land and groundwater drains; gas lines; electric power lines; cable television and telephone lines; underground conduits; and junction boxes and all appurtenances to the above.

Section 200. Improvement and Design Requirements.

SECTION INDEX

200.010. General.

- A. Easement.
- B. Traffic Control.
- C. Survey.
- D. Temporary Controls.
- E. Landfill, Construction Debris, or Garbage.

200.015. Specialized Engineering.

- A. General
- B. Geotechnical Engineering

200.020. Construction Plans.

- A. General.
- B. Plan Sheets.
- C. Electric and Communication Plans.
- D. Street, Parking Lot and Driveway Plans.
- E. Sanitary Sewer, Storm, Land and Groundwater Drain Plans.
- F. Drinking Water and Pressurized Irrigation Plans.
- G. Landscaping Plans.
- H. Irrigation Canal and Pipe Plans.

200.030. Street Improvements.

- A. General.
- B. Access
- C. Cul-de-sacs.
- D. Curbs, Gutters, and Sidewalks.
- E. Partial-Streets Widths.
- F. Driveway and Intersection Location.
- G. Parking.
- H. Reverse Frontage Lots.
- I. Temporary Turn-Arounds.
- J. Allowable Grades.
- K. Stamped Concrete or Pavers.
- L. Precast Concrete or Block Walls.
- M. Pedestrian Ramps.
- N. Horizontal and Vertical Curve.

200.040. Utility Improvements.

- A. General.
- B. Communication.
- C. Electric.
- D. Pressurized Irrigation.
- E. Sanitary Sewer.
- F. Storm Drain.
- G. Drinking Water.

200.010. General.

A. Easements. Developer shall provide easements for all utility extensions through private property. Developer shall also provide a 10 foot public utility easement along public right-of-ways or streets, along all exterior property boundaries of the development, and 5 foot public utility easements along all interior property lines of the development. If setbacks are less than 10 feet then public utility easements shall be the extent of the setback.

B. Traffic Control. A traffic control plan shall be submitted to the City prior to construction in or along public streets. All traffic control shall comply with APWA 01 55 26 (Traffic Control) and the MUTCD.

C. Survey. The alignment of the side property lines for each lot in a subdivision shall be marked in the top back of curb with a lot line witness marker that meets the requirements and specifications of APWA 31 05 10 (Boundary Markers and Survey Monuments). Developer shall provide survey bench marks and monuments as required by the City Engineer or his/her designee.

All property corners shall be marked with a rebar corner marker that meets the requirements and specifications of APWA 31 05 10 (Boundary Markers and Survey Monuments). Corners must be marked before acceptance of a subdivision's improvements by the City. The rebar must be offset 2 to 4 inches by a steel tee post four feet out of the ground on the property line alignment.

D. Temporary Controls. Temporary controls such as noise, dust, mud, surface water, ground water, pollution and erosion controls shall be made. Controls shall meet the requirements and specifications of APWA 01 57 00 (Temporary Controls). The pumping of groundwater across sidewalks, into gutters or into the sanitary sewer system is prohibited.

E. Landfill, Construction Debris or Garbage. No buildings, paved parking lots, paved roads, curb, gutter, or sidewalks are allowed to be located over landfills, construction debris, or garbage.

200.015. Specialized Engineering.

A. General. Any specialized engineering beyond the expertise of city staff such as, but not limited to, geotechnical, traffic, environmental, hillside, floodplain, bank stabilization and erosion control will require the review of qualified consultants. All review costs shall be paid by the property owner/developer.

B. Geotechnical Engineering. All Major subdivisions, as outlined in the Development Code, shall be required to submit a site specific geotechnical report. The geotechnical report shall include sufficient subsurface exploration, laboratory testing and geotechnical engineering analysis to render design level geotechnical recommendations and opinions regarding slope stability and required mitigation to protect planned or future development above and below the slope(s) from earth deformations and other adverse soil or geologic conditions.

All work completed in connection with the site specific geotechnical report shall be performed by an experienced geotechnical engineering firm and under the direct supervision and direction of a professional geotechnical engineer properly licensed in the state of Utah.

The scope of work described below is considered the minimum requirement for the geotechnical investigation. The geotechnical firm (Consultant) shall use their experience and engineering judgment in conjunction with the minimum requirements outlined below to develop an appropriate site-specific geotechnical scope of work and report.

- 1. Field Explorations. Prior to commencing field explorations the geotechnical engineer shall review available geologic maps, aerial photographs and other pertinent literature to develop an understanding of the site and its geologic setting.

Locate utilities within areas of explorations by notifying the appropriate local one-call state utility locate service. Independent private utility locates may be required for utilities not identified by the local one-call service. Complete subsurface explorations, as many as needed to obtain a representative sample of all soil conditions for the entire site, but specifically shall be obtained for proposed roadway locations and residential building.

Boring (s) shall be located within close proximity to slope crests so as to render a representative soil profile of the slope for analysis. The boring(s) shall extend to a minimum depth of 15 feet

below the top of the slope. For example, if a 30-foot tall slope is being evaluated the boring shall extend at least 45 feet below the top of the slope. Borings shall extend through existing fill materials so that at least one sample is collected in native soil. Adjust boring depths for anticipated site development cuts and fills and for known soil conditions.

The geotechnical shall consider past property use and location. Additional soil borings shall be planned for sites located in areas that are known or suspected to have had previous slope deformations or seeps, springs or other adverse features. Special attentions shall be given to identifying, to the extent practical, the presence and extent of existing fill.

Collect a minimum of four (4) soil samples in the upper ten (10) feet of the profile and at intervals of five (5) feet thereafter. Adjust sampling intervals to include major changes in soil layering. Collect a sufficient number of undisturbed samples in fine-grained soils to properly assess strength and consolidation properties. Perform split barrel sampling in granular soils. Field blow counts should be corrected for energy and depth and presented as Standard Penetration Test (SPT) blow counts on the soil boring logs.

Field classify encountered soil in accordance with the American Standard for Testing and Materials (ASTM) and Unified Classification System (USCS).

Borings encountering bedrock shall be extended a minimum of 5 feet into the bedrock. Rock coring equipment shall be used where practical to aid in assessing rock properties. Where cores are collected, Rock Quality Designator (RQD) values should be presented on the boring logs.

2. Laboratory Testing. Samples collected in the field shall be properly packaged to avoid disturbance or freezing and transported to an accredited geotechnical and materials testing laboratory for further observation and testing. Laboratory testing shall be performed under the direction of a Utah licensed professional geotechnical engineer and in accordance with appropriate ASTM standards. At a minimum laboratory testing shall include the following:
 - a. Sieve analysis – determine grain size distribution and percent fines (minus 200 sieve)
 - b. Atterberg tests – classification, indexing, shrinkage and expansiveness
 - c. In-place density
 - d. Natural moisture content
 - e. Shear strength – Direct Shear and/or Triaxial Shear

Additional laboratory testing may be required to address site conditions and provide necessary engineering properties for analysis. The geotechnical engineer shall use his professional judgment and local experience to determine an appropriate scope for laboratory testing.

Laboratory test results shall be presented in the Geotechnical Report, on individual summary sheets in the report appendix or on the boring logs.

3. Geotechnical Report Requirements. The results of the field and laboratory programs shall be evaluated by a Utah registered professional geotechnical engineer. Based on the results of their evaluation, an engineering report shall be prepared that details the results of the testing performed, provides logs of the borings and a diagram of the site/boring layout and provides geotechnical recommendations and information regarding following:
 - a. General suitability of the site for the planned development
 - b. Recommended precautions and limitations
 - c. Subsurface exploration procedures
 - d. Soil and rock conditions encountered
 - e. Groundwater depth during and after drilling
 - f. Geologic setting
 - g. Geologic hazards (ie – fault, slide, rock fall, etc.)
 - h. Slope stability including provisions, recommendations and designs to mitigate the effects of unstable slopes and other geologic hazards that may adversely impact planned developments above and below the slope(s)
 - i. Special design and construction provisions for footings or foundations near steep slopes, including type and depth of foundation system and set back distance from slopes
 - j. Surface water runoff control and drainage

- k. Subsurface drainage
- l. Site grading and earthwork requirements, as appropriate

Detailed individual boring logs and graphical cross sections summarizing soil / rock profiles and slope stability analysis and results shall be included in the geotechnical report. The logs shall contain sufficient detail to render a clear description of the soil stratigraphy, soil descriptions and classifications, SPT blow counts, sample locations and depths, ground water depths and appropriate laboratory test results. Individual boring logs shall include a description of the boring location, exploration equipment used, relative or actual elevation, date of exploration and other pertinent information relative to the field exploration. The cross sections shall contain sufficient detail to render a clear description of the slope stability analysis results and any mitigation measures required. The cross sections shall contain soil profile data and a summary of engineering properties and parameters used in the analysis for each significant soil / rock layer.

The final geotechnical report shall bear the geotechnical engineer's stamp and seal. One (1) electronically submitted PDF copy of the report shall be delivered to the City of Alpine within sufficient time for review and comment. The City will have the report reviewed by its own geotechnical engineer. The cost of that review will be borne by the applicant.

200.020. Construction Plans.

- A. General. The following instructions are for the purpose of standardizing the preparation of construction plans to obtain uniformity in appearance, clarity, size, and style. Plans and designs shall meet the standards defined in the specifications and drawings hereinafter outlined. All drawings and/or prints shall be clear and legible and conform to good engineering and drafting room practice.

Include the following in construction plans for all developments:

- 1. A copy of the proposed final plat or site plan;
- 2. A plan view of the entire project showing all utilities, roads, and appurtenances;
- 3. Plan and profiles of all storm, land and groundwater drains, sanitary sewer, curb, gutter, and irrigation;
- 4. Detail drawings of street cross sections according to the standard drawings and other detail drawings only for items not found in the City standard drawings. Detail drawings shall be to scale and completely dimensioned and described. All items shall be designed in accordance with minimum requirements established by the City Construction Standards;
- 5. Complete plans for all off-site work to be done in conjunction with the project;
- 6. A stamp and signature of a Civil Engineer licensed in the state of Utah on each plan sheet, detail drawing, and design sheet;
- 7. Engineer's take off quantities and cost estimate for all construction work related to the project;

- B. Plan Sheets. Include the following on each plan sheet:

- 1. North Arrow;
- 2. A standard engineering scale between 1 inch equals 10 feet and 60 feet. A scale of 1 inch equals 100 feet may be used on the plan view of the entire project if necessary to fit project on one sheet;
- 3. Title block along right side of sheet with title of drawing in lower right corner. Include in title block:
 - a. Name of subdivision and plat or site plan;
 - b. Name of city;
 - c. Specific type of drawing (construction drawings, plan view, plan and profiles, off-site construction, detail drawings);
 - d. Name of engineer, surveyor, or firm preparing drawings;
 - e. Drawing number of total number of drawings;
- 4. Also include the following with profile drawings:
 - a. Vertical scale of 1 inch equals 1, 2, 3, 4, 5, or 6 feet;
 - b. Reference to the vertical datum. The 1929 or 1988 North American Vertical Datum (NAVD29 or NAVD88) shall be used for all elevation data;
 - c. Benchmark location and elevation for checking construction;
 - d. Stationing aligned from plan view with the profile view;
 - e. Existing ground, ditch, and utility lines;
 - f. A sheet index on each sheet showing profiled area in relation to the overall project.

- C. Electric and Communication Plans. Construction plans must include the location of all existing poles, transformers, secondary junction boxes, gas lines, sectionalizers, overhead electrical wire and overhead

communication cable. Developers will be required to work separately with owners of these companies to obtain the necessary approvals from them.

- D. Street, Parking Lot, and Driveway Plans. Include the following for curb, gutter, storm, land and groundwater drains, drainage structures, sidewalks, and street surfacing plans:
 1. Plan and profile for top back of curb for each side of the street. Label profile line as top back of curb for both sides of street if it is the same;
 2. Stationing and top back of curb elevations with curve data for curb returns;
 3. Flow direction and type of cross drainage structures at intersections with adequate flow line elevations;
 4. Type of curb and gutter if other than the standard twenty-four inch curb and gutter in the standard drawings;
 5. Location and width of driveways;
 6. Street cross sections with all proposed and existing utilities and base sections as per soils report and Construction and Development Standards;

- E. Sanitary Sewer, Storm, Land and Groundwater Drain Plans. Include the following for sanitary sewer, storm, land and groundwater drain plans:
 1. Plan and profile of all new and existing mains and manholes;
 2. Box and manhole size, location, and elevations of flow lines and rim;
 3. Location, size, grade, and type of pipe of new and existing mains;
 4. Location of each lateral with distance stubbed back into property clearly drawn and dimensioned;
 5. Storm water calculations per the Alpine City Storm Water Drainage Design Manual and Appendicies;
 6. Storm inlet boxes shall be located on street corners and or property lines.

- F. Drinking Water and Pressurized Irrigation Plans. Include the following for drinking water and pressurized irrigation plans:
 1. Location, size, and type of pipe of new and existing water mains;
 2. Location of valves, fittings, hydrants, boxes, meters, and appurtenances;
 3. Minimum cover;
 4. Location of each lateral with distance stubbed back into property clearly drawn and dimensioned;
 5. Looping of the drinking waterline will be required at the discretion of the City Engineer or his/her designee to provide adequate fire flows and redundancy.

- G. Landscaping Plans. For landscaping that will be maintained by the City, developments with landscaping restrictions (Three Falls, Summit Pointe, etc.), or a homeowner's association submit one copy of the landscaping plans including all irrigation system layouts, details, legends, and drawings. These project plans shall meet the requirements of the Section 900. Landscaping and Section 950. Irrigation Sprinkler Systems, as well as the specific requirements of the development in which they are located.

- H. Irrigation Canal and Pipe Plans. Plans that affect canals or irrigation pipes must be stamped approved by those responsible for their maintenance before they will be approved by the City.

200.030. Street Improvements.

- A. General. The Developer shall construct all streets and appurtenances required for the development as specified by the City Council in accordance with the City Construction and Development Standards and/or other codes adopted by the City. The design and all street work shall be done as directed and under the supervision of the City Engineer or his/her designee.

- B. Access. Access requirements shall be in accordance with the Development Code.

- C. Cul-de-sacs. The maximum length of a cul-de-sac is 450 feet measured from the nearest right-of-way line of the adjoining street to the center of the cul-de-sac. The minimum radius of the cul-de-sac is 60 feet at the property line.

- D. Curbs, Gutters and Sidewalks. Curbs, gutters, and sidewalks shall be built along all public streets according to the standard drawings. All curbs, gutters, and sidewalks shall connect to existing curbs, gutters, and sidewalks within a reasonable area as determined by the City Engineer or his/her designee.

- E. Partial-Streets Widths. Per Alpine City Development Code

- F. Driveway and Intersection Location. Driveways and street intersection locations shall be designed according to Alpine City Transportation Master Plan. No driveway shall be constructed within 40 feet from an adjoining street. The distance is measured from the adjoining street's Top Back Curb (TBC) to the edge of driveway for access.

Curb cuts shall only be allowed for driveways. Driveways shall be a minimum of 3 feet away from any utility fixture (including, but not limited to, power pole, fire hydrant, mailbox, phone/cable box, electric box, etc.) or utility box (culinary meter, pressurized irrigation meter, etc.) and curb cuts for driveways must be a minimum of 6-inches away from the property line. All accesses and streets onto arterials must be approved by the City Engineer or his/her designee.

- G. Parking. Per Alpine City Development Code.
- H. Reverse or Double Frontage Lots. Per Alpine City Development Code
- I. Temporary Turn-Arounds. Per Alpine City Development Code.
- J. Allowable Grades. Per Alpine City Development Code
- K. Stamped Concrete or Pavers. Alpine City does not allow colored/stamped concrete or pavers on city owned concrete flatwork unless recommended by the Planning Commission and approved by the City Council.
- L. Precast Concrete or Block Walls. The design of all walls greater than four feet of exposed height must be approved through the Building Department. Design must be stamped and signed by a licensed professional civil engineer registered in the state of Utah.
- M. Pedestrian Ramps. Pedestrian ramps shall be placed at all corners of intersections and at all other locations of regular pedestrian traffic across roads as determined by the City Engineer or his/her designee. All ramps shall conform to the requirements of the Americans with Disabilities Act and City standards.
- N. Horizontal and Vertical Curve. Per Alpine City Development Code

200.040. Utility Improvements.

- A. General. It shall be the responsibility of the Developer to connect to existing utilities or improvements wherever they are located and extend those improvements to and through the development. Workmanship and details of construction shall be in accordance with the City Construction Standards and/or other codes adopted by the City. All work shall be done under the supervision of the City Engineer or his/her designee.
- B. Communication. Communication lines shall be underground except when the City Engineer or his/her designee feels that such underground lines are not in the best interest of the City.
- C. Electric. Electrical lines shall be underground except when the City Engineer or his/her designee feels that such underground lines are not in the best interest of the City. Lines shall be located opposite of water and pressurized irrigation lines.
- D. Pressurized Irrigation. The Developer shall connect the development with the city pressurized irrigation system with all appurtenances and shall make such pressurized irrigation available to each lot or unit within the development. Adequacy of supply and sizes of pressurized irrigation mains shall be established by the City Engineer or his/her designee. Meter boxes shall be located per Alpine City Standard Details.
- E. Sanitary Sewer. The Developer shall provide each lot with a sanitary sewer system in accordance with the ordinances of the City. All measures should be taken to utilize a gravity sewer system before the City will consider a pumped system. All said work shall be done as directed and under the supervision of the City Engineer or his/her designee.
- F. Storm Drain. The Developer shall provide on-site storm drainage facilities according to the storm water Drainage Design manual and in accordance with the ordinances of the City. Storm drainage systems shall incorporate Low Impact Development (LID) systems. The maximum allowable storm water discharge from any commercial and industrial development will be limited to 0.07 cfs/acre of development. Individual lots shall retain the 80th Percentile Storm.

- G. Drinking Water. The Developer shall connect the development with the city drinking water system with all appurtenances and shall make such drinking water is available to each lot or unit within the development. Adequacy of supply and sizes of drinking water mains shall be established by the City Engineer or his/her designee. Pipes shall be located opposite from electrical lines. Looping of the drinking waterline will be required at the discretion of the City Engineer or his/her designee to provide adequate fire flows and redundancy. Meter locations shall be per Alpine City Standard Details.

Section 250. Inspection and Testing.**SECTION INDEX****250.010. General.**

- A. Quality Assurance.
- B. Submittals.
- C. Preconstruction Meeting.
- D. Inspection and Testing Notification.
- E. Testing and Sampling.
- F. Testing Agency.
- G. Work without Required Inspection and Testing.
- H. Inspection and Testing Fees.
- I. Sub-standard Work and Pay Factors.
- J. Weekly Progress Meetings.
- K. Road Construction.
- L. As-Built Survey.
- M. Acceptance and Payment of Improvements.

250.020. Earthwork.

- A. Compaction and Moisture Content Tests.
- B. Red-head Inspection.
- C. Proof Roll Inspection.
- D. Thickness Test.

250.030. Landscaping and Irrigation Sprinkler Systems.

- A. Plant Material Inspection.
- B. Sprinkler System Assembly Inspection.
- C. Fall Sprinkler Winterizing Test
- D. Spring Sprinkler Energizing Test.
- E. Final Acceptance Inspection.

250.040. Portland Cement Concrete Work.

- A. General.
- B. Slump, Temperature, and Air Entrainment Test.
- C. Compression Test.
- D. Forms and String Line Inspection.
- E. Gutter Drainage Inspection.
- F. Thickness Test.
- G. Curing Inspection.

250.050. Pressurized Irrigation.

- A. General.
- B. Main Line Inspection.
- C. Pressurized Irrigation Service Inspection.
- D. Pressure Test.
- E. Leakage Test.

250.060. Sanitary Sewer.

- A. General.
- B. Main Line Inspection.
- C. Service Inspection.
- D. Air Pressure Test.
- E. Video Inspection.
- F. Deflection Test.

250.070. Storm, Land and Groundwater Drains.

- A. General.
- B. Main Line Inspection.
- C. Air Pressure Test.
- D. Video Inspection.
- E. Deflection Test.

250.080. Streets.

- A. Asphalt Pavement Material Tests.
- B. Compaction Tests.
- C. Grading Inspection.
- D. Thickness Test.
- E. Profile Tolerance Inspection.
- F. Asphalt Concrete Temperature Test.
- G. Asphalt Paving Limitations.
- H. Pavement Cut Moratorium Standard

250.090. Drinking Water.

- A. General.
- B. Main Line Inspection.
- C. Drinking Water Service Inspection.
- D. High Chlorine Test.
- E. Pressure Test.
- F. Leakage Test.
- G. Bacteria Test.

250.010. General.

- A. Quality Assurance. The following work shall be subject to the inspection and testing requirements of this Section:
1. Work on existing or proposed City property;
 2. Work on property that will be owned by a property owners association;
 3. Work on existing or proposed streets, easements, or right-of-ways;
 4. Work on existing or proposed City utilities.

The Contractor must ensure that all inspection and testing required by these standards is performed and accepted by the City Engineer or his/her designee. The Contractor must also ensure that any additional inspection and testing required by the City or a testing company is performed and accepted by the City. In projects other than those bid out by the City, the Developer is ultimately responsible for the work of the Contractor.

- B. Submittals. Contractor shall turn in submittals for all testing not performed by the City.
1. *Field Test Report.* Contractor must submit original field test report immediately to City whenever possible. Reports may not be submitted later than the end of the current day.
 2. *Laboratory Test Report.* Submit original report to the City within 48 hours after test results are determined.

Material and Equipment Specifications. One copy of the manufacturer's specifications and manuals for equipment and materials used must be submitted to the City 7 days before the pre-construction meeting.

- C. Preconstruction Meeting. The Contractor must schedule a preconstruction meeting with the City's engineering department before any work on a new development or City project may begin.

The Contractor, Developer, project engineer, and all sub-contractors must be present at the preconstruction meeting. Any sub-contractor not attending the preconstruction meeting must schedule an additional preconstruction meeting with the City before beginning work. Work must begin within 4 weeks of the preconstruction meeting or a new preconstruction meeting must be scheduled by the Contractor at the discretion of the City Engineer.

- D. Inspection and Testing Notification. The City may contract with a private company to conduct any inspections or testing specified to be performed by the City. All inspections and tests must be scheduled with the City or company contracted by the City a minimum of 1 full business day before needed. Requests for inspection on work requiring continuous inspection shall be made 3 full business days prior to commencing the work.

- E. Testing and Sampling. The City Engineer or City Inspector may require that sampling be performed in their presence, in which case the Developer or Contractor shall be notified of this requirement in writing at the time the building permit is issued, or at the preconstruction meeting, or when construction drawings are released by the City for construction, as applicable.

Each sample or test shall be accompanied by the following written data, which shall be reported to the City with test results:

1. Name of Project.
2. Name of Developer/Contractor.
3. Project Street Address.
4. Appropriate Test Name.
5. Date of Sampling.
6. Sample Number (if more than one sample per day).
7. Name of technician who performed the testing.
8. Location of sample.

- F. Testing Agency. All materials testing, whether in a laboratory or in the field, shall be conducted by a testing agency approved by the City Engineer or his/her designee.

- G. Work without Required Inspection and Testing. Any work performed without required inspection or testing will give the City the option to call the bond covering that portion of the improvements in violation, or, require the removal and replacement of the un-inspected work. For City projects, the City Engineer may also accept the work at a reduced price if the lowest pay factor is applied.

- H. Inspection and Testing Fees. Inspection fees and/or connection fees shall be paid and permits required shall be obtained prior to commencement of construction.
- I. Sub-standard Work and Pay Factors. If any inspection or test indicates that work does not meet City standards the City Engineer will require that the work be redone for new development.

For City contracted work, if the sub-standard work has a pay factor option in the standards, the City Engineer may or may not accept the work at a reduced price upon condition that the pay factors outlined in the City standards apply. Payment reduction amounts shall be applied against payments to Contractors. When any work is done to a lower standard than allowed for in the pay factor tables the work shall be redone until it meets City standards.

- J. Weekly Progress Meetings. At the pre-construction meeting it will be determined if weekly construction meetings are required. The City Engineer or his/her designee, City inspectors, the Contractor, and sub-contractors shall be in attendance.
- K. Road Construction. Road construction may not commence until all underground utilities (both City and privately owned) are installed and pass all the inspections and tests required by these standards.
- L. As-Built Survey. The Contractor shall notify the City to survey all underground utilities either installed or uncovered in the course of construction. Contractor shall give the City 24 hour's notice to survey utilities.
- M. Acceptance and Payment of Improvements. Inspections made by the City or a company hired by the City to determine compliance with the specifications do not imply final acceptance of the work. The City requires the completion of all facilities before any are paid for and accepted for maintenance. The following inspections must be scheduled and passed before final acceptance and payment of any improvements:
 1. *End of Construction Inspection.* The Contractor must notify the city at least 3 days prior of the need for an End of Construction Inspection. Upon notification, the Contractor and City will schedule an end of construction inspection, not to occur within 3 business days of the City being noticed and, once all the improvements in a development or project are completed according to the Construction and Development Standards Re-inspections of an End of Construction Inspection require the same 3-day notification and scheduling procedure.
 2. *Final Acceptance Inspection.* One year after the Contractor or Developer passes the end of construction inspection, he or she must schedule a final acceptance inspection 1 month prior to the expiration date of the warranty period.

If the Contractor or Developer does not pass one of these inspections a punch list of work items necessary to pass the inspection will be given to the Contractor or Developer within 2 business days of the inspection. The Contractor or Developer must reschedule inspections with the City until the project or development passes the inspection.

All improvements shall be free from defects, damage, or debris at the time of these inspections. The Contractor or Developer shall not be responsible for debris or damage not caused as a result of his or her work or quality of work.

Any faulty or defective work shall be corrected by the Contractor within 30 days of the failed inspection or according to the contract the City has with the Contractor.

If the Contractor or Developer fails to do so, the City Engineer or his/her designee shall have such repairs made, and the cost of such repairs shall be paid by the Developer together with 25% in addition thereto for stipulated damages for such failure on the part of the Developer to make the repairs.

At the discretion of the City Engineer or his/her designee, full payment for constructed infrastructure will not come until after all listed inspections and testing have been completed with passing results. Example: Culinary water main and services installation will not be paid in full until the Main Line Inspection, Drinking Water Service Inspection, High Chlorine Test, and Bacteria tests have been inspected and passed. Partial Payments are acceptable for items that meet this requirement.

250.020. Earthwork.

- A. Compaction and Moisture Content Tests. The Contractor will test all sub-grade and fill material for compaction and moisture content and will provide these tests to the city within 48 hours of testing. Test locations shall be determined by the City.

1. *Trenches.* Tests will generally be taken 1 per 200 lineal foot of trench per 8 inch lift.
 2. *Streets.* Tests will generally be taken 3 per 200 lineal foot of street per 8 inch lift.
 3. *Other Cuts and Fills.* Tests will generally be taken 1 per 2,000 square feet of compacted area.
- B. Red-head Inspection. The project engineer must provide red-heads for all grade work when brought to within 3 inches of finish grade. The City must inspect and accept finished grading to the engineered red-heads.
- C. Proof Roll Inspection. Prior to placing fill material for roadbed backfills, proof roll sub-grade using gross weight of 18,000 pounds per tandem axle, with a tire pressure at least 90 psi, unless otherwise specified by the soils report. Contractor shall proof roll under the supervision of the City according to the following conditions:
1. *Passes.* All proof roll passes will traverse the sub-grade parallel to the roadbed centerline. All subsequent passes will be offset half the vehicle width until the entire sub-grade is tested.
 2. *Mitigation.* The City will analyze, determine, designate, and measure the areas, if any, requiring additional compaction or reconstruction.
 3. *Sub-grade Protection.* Once sub-grade passes the proof rolling test, protect the surface from construction operations and traffic damage. Repair all cuts, ruts, and breaks. Keep surface in a satisfactory condition until geotextile fabric or base course has been placed.
- D. Thickness Test. Material thickness tests will be conducted by the City when the City Engineer or his/her designee considers it necessary. The total depth shall be reasonably close to that shown on the typical section. Depth analysis shall be made on at least four holes for each section. Base thickness shall be accepted if 75% of the test holes are less than 1/4" below the specified thickness and no individual hole shall be more than 3/4" below the specified thickness.

250.030. Landscaping and Irrigation Sprinkler Systems.

- A. Plant Material Inspection. All plant materials are to be inspected and approved by the City at the time of delivery on site. This approval does not constitute final acceptance of any plant material by the City Parks Department Representative. All plant materials will be inspected again at time of final inspection and once again at the end of the warranty period. Any plant found to be unacceptable at any of these inspections shall be immediately removed and replaced.
- B. Sprinkler System Assembly Inspection. An on-site inspection shall be conducted by the City after the entire sprinkler system is assembled and prior to backfilling the trenches. During this inspection all fittings, bends, sweeps, valves, sprinkler heads and any other appurtenance on the system shall be surveyed by the City.
- C. Fall Sprinkler Winterizing Test. In the fall of the year during the installation and guarantee period, the Contractor shall meet with the City on the project site. The Contractor shall winterize the system by draining all the water and doing everything necessary to insure the protection of the system until spring. Blowing out the lines by compression shall be permitted during the 1 year guarantee. The individuals involved from both parties shall exchange all information necessary for the eventual takeover of the system by the Alpine City Maintenance Personnel.
- D. Spring Sprinkler Energizing Test. The Contractor with the City Maintenance Personnel in attendance shall energize the sprinkler irrigation system the spring following the fall winterizing test. Contractor shall repair all defects found as a result of winter damage, improper installation, improper maintenance, defective materials or inadequate sprinkler drainage.
- E. Final Acceptance Inspection. At the end of the guarantee period, all landscaping and irrigation sprinkler systems must then be inspected and tested by the City. As-built drawings shall be furnished to the City at the time of the final inspection.

Irrigation sprinkler systems must operate in a satisfactory manner, with a full uniform coverage of the areas that are indicated to be sprinkled. Sprinkler heads shall be adjusted to proper level.

Landscape and irrigation sprinkler systems will not be inspected for acceptance in parts. Where inspected work does not comply with requirements, Contractor shall replace rejected work and continue specified maintenance until reinspected by the City and found to be acceptable. Remove rejected plants and materials promptly from the project site.

250.040. Portland Cement Concrete Work.

- A. General. All materials and processes involved in concrete work shall be subject to inspection and testing as detailed in the various paragraphs of this section and in general compliance with ASTM E105-54T. Results of tests performed by laboratories approved by the City to the satisfaction of the City Engineer or his/her designee shall be accepted by the supplier as a basis for acceptance or rejection of any and all materials.

The latest appropriate ASTM tests and methods shall be considered to be standard, and will include but not be limited to concrete, cement, aggregates additives, curing compounds, parting compounds and jointing materials. A copy of all batch tickets for concrete placed shall be submitted to the City.

- B. Slump, Temperature and Air Entrainment Test. The Contractor shall test slump, temperature, and air entrainment on every fifty cubic yards or less of concrete placed each day. Tests shall be taken after ½ to 1 yard has been poured from the mixer. Once a sample is taken the concrete pour shall be stopped until tests show that the concrete meets City standards. Concrete that does not meet mix design requirements for slump, temperature, and air entrainment shall not be used. Any that may already have been poured shall be removed before hardening.
- C. Compression Test. The Contractor shall test compression on every fifty cubic yards or less of concrete placed each day according to ASTM C143, C231, C1064, C172, and C31. Three cylinder specimens shall be taken for each test, one shall be broken at 7 days, one at 28 days and the third held for 45 days after submittal in case further testing is required.

Specimens shall attain the specified strength at 28 days. One lot is 1 day's production. A lot with sub-standard compressive strength may be accepted at reduced price if the appropriate pay factor is applied to the whole lot. The following table outlines the pay factors for sub-standard Portland cement concrete strength:

PORTLAND CEMENT CONCRETE
COMPRESSIVE STRENGTH PAY FACTORS

Pay Factor	Tolerance (psi below 28 day specified strength)
0.98	1 to 100
0.94	101 to 200
0.88	201 to 300
0.80	301 to 400
0.50	401 to 500
Replace	More than 500

These pay factors may not be applied toward concrete in structures.

- D. Forms and String Line Inspection. The City shall inspect all forms and string lines before concrete may be placed.
- E. Gutter Drainage Inspection. The City shall inspect all gutters for drainage prior to paving. Water shall be let into all gutters and any gutters with standing water in excess of 1/4 inch after runoff shall be replaced. Contractor must supply water truck for gutter drainage inspection.
- F. Thickness Test. The City shall determine the number, if any, and location of core tests necessary to ensure the proper thickness of Portland cement concrete. Tests shall be taken at equal intervals in a test area. A test area shall be defined as a total area placed at the same time and by the same process. The average thickness shall then be determined from all the cores taken. Tests shall be taken and verified by a certified testing lab, paid for by the Contractor.

When the average thickness is more than 0.25 inches below the specified thickness, a minimum of 1 core per 1,500 square feet of pavement shall be taken. Work with sub-standard thickness may be accepted at reduced price if the appropriate pay factor for the lowest tested thickness is applied to all of the sub-standard work. The following table outlines the pay factors for sub-standard Portland cement concrete thickness:

PORTLAND CEMENT CONCRETE THICKNESS PAY FACTORS

Pay Factor	Tolerance (inches below specified thickness)
1.00	0.00 to 0.25
0.90	0.26 to 0.50
0.70	0.51 to 0.75
0.50	0.76 to 1.00
Replace	More than 1.00

- G. Curing Inspection. The City shall inspect the curing of all Portland cement concrete work within 24 hours of pouring the concrete.

250.050. Pressurized Irrigation.

- A. General. The inspections and tests in this section are required for all pressurized irrigation construction in the City boundaries and on all construction relating to the City pressurized irrigation system outside the city boundaries.
- B. Main Line Inspection. The City must inspect all pressurized irrigation main line installation on an ongoing basis. Inspection notification must be given before any construction of the main line may begin. All crosses, tees, bends, valves, and drains must be inspected and surveyed by the City before they are backfilled.
- C. Pressurized Irrigation Service Inspection. The City must inspect all pressurized irrigation services before service trenches are backfilled. The City must be able to survey services at the main during the inspection.
- D. Pressure Test. The Contractor must pressure test all pressurized irrigation systems, system extensions and service laterals to the setter in the presence of the City Engineer or his/her designee or have tests documented and submitted by a certified testing company approved by the City. Pressure tests must meet the requirements and specifications of APWA 33 08 00 (Commissioning of Water Utilities). Provide a 210 psi test pressure for 2 hours unless specified otherwise. The pressure of 210 psi must be provided at the highest point in the section of pipe being tested unless elevations are such that this would create pressures over 250 psi at the lowest point in the section of pipe tested. In such a case, consultation with the City Engineer is required and AWWA standards will be considered.
- E. Leakage Test. For test lengths of pipe greater than 1,500 feet, a leakage allowance may be considered. There will be no allowance for leakage on test sections less than 1,500 feet. When allowed, leakage tests shall be conducted concurrently with the pressure tests. Leakage shall be defined as the quantity of water that must be supplied into the newly laid pipe, or any valved section thereof, to maintain pressure within 5 psi of the specified test pressure after the air in the pipeline has been expelled and the pipe has been filled with water.

No pipe installation will be accepted if the leakage is greater than that determined by the following formula:

$$Q \equiv \frac{LD * \sqrt{P}}{133,200}$$

In which Q is the allowable leakage, in gallons per hour; L is the length of pipeline tested in feet; P is the average test pressure, in pounds per square inch (gage) and D is the nominal diameter of the pipe in inches.

If any test of pipe laid discloses leakage greater than specified, the Contractor shall, at their own expense, locate and repair the defective material until the leakage is within the specified allowance. All visible leaks are to be repaired regardless of the amount of leakage.

250.060. Sanitary Sewer.

- A. General. The inspections and tests in this section are required for all sanitary sewer construction in the City boundaries and on all construction relating to the City sanitary sewer system outside the city boundaries.
- B. Main Line Inspection. The City must inspect all sanitary sewer main line installation on an ongoing basis. Inspection notification must be given before any construction of the main may begin.
- C. Service Inspection. The City must inspect all sanitary sewer services before service trenches are backfilled. The City must be able to survey services at each end during the inspection.
- D. Air Pressure Test. Contractor shall conduct a low pressure air test by the following method under the direction of the City Engineer or his/her designee with equipment equal to Cherne Industrial, Inc., or provide proof that test was conducted by a certified testing company. Sanitary sewer pipes with inside diameters of 30 inches or larger shall be leak tested according to manufacturer’s specifications.

All wyes, tees, or ends of lateral stubs shall be suitably capped and braced to withstand the internal test pressures. Caps shall be easily removable for future lateral connections or extensions. After a manhole to manhole section of line has been backfilled and cleaned, it shall be plugged at each manhole with pneumatic plugs.

Low pressure air shall be introduced into the sealed line until the internal air pressure reaches 4 psi-G greater than the average back pressure of any ground water that may be over the pipe. At least 2 minutes shall be allowed for the air pressure to stabilize.

The portion of line being tested shall be accepted if the portion under test does not lose air at a rate greater than 0.003 cubic feet per minute per square foot of internal pipe surface or 2.0 cubic feet per minute minimum when tested at an average 3.0 psi-G greater than any back pressure exerted by ground water that may be over the pipe at the time of the test.

The pipe and joints shall also be considered acceptable when the time required in minutes for pressure to decrease from 3.5 To 2.5 psi-G (greater than the average back pressure of any ground water that may be over the pipe) shall not be less than the time shown for the given diameters in the following table:

PRESSURE REDUCTION TIME LIMITS

Pipe Diameter (inches)	Time (minutes)
4	2.0
6	3.0
8	4.0
10	5.0
12	5.5
15	7.5
18	8.5
21	10.0
24	11.5

If the installation fails to meet this requirement, the Contractor shall determine at his/her own expense the source of leakage. He shall repair or replace all defective materials and/or workmanship. All sanitary sewer mains shall be tested, cleaned and accepted by Alpine City before laying the street surface.

- E. Video Inspection. Contractor shall clean and provide the City with video inspection of all sanitary sewer main lines **prior to paving**. The City must approve video inspection company.

Cleaning shall be done using a high pressure jet cleaning machine, producing a minimum of 800 psi. Waste water and debris shall not be permitted to enter the City sanitary sewer system, but shall be removed at the lowest manhole of the extension.

Video Inspection shall be done by the Contractor. A digital video disk (DVD or thumb drive) of video inspection and log report shall be submitted by the inspection company to the City Engineer or his/her designee.

Main line determined to be defective by the City Engineer or his/her designee shall be remedied by the Contractor. Contractor shall then clean and video inspect the main lines again.

- F. Deflection Test. Contractor shall perform a displacement test on all sewer lines after video inspection. Deflections tests must be conducted in the presence of the City Engineer or his/her designee or be documented and submitted by a certified testing company approved by the City. In no case shall pipe be accepted that has a deflection of more than 5% after it has been backfilled. The Mandrel must be pulled by hand or air. A pipe deflection test shall be required of the Developer/Contractor after backfilling and compaction of the trench.

250.070. Storm, Land and Groundwater Drains.

- A. General. The inspections and tests in this section are required for all storm, land and groundwater drain construction in the City boundaries and on all construction relating to the City storm, land and groundwater drain system outside the city boundaries.
- B. Main Line Inspection. The City must inspect all storm, land and groundwater drain main lines during installation on an ongoing basis. Inspection notification must be given before any construction of the pipe may begin. All groundwater drains shall be pre-approved by the City Engineer or his/her designee.
- C. Air Pressure Test. Contractor shall conduct a low pressure air test for all sealed drains by the following method under the direction of the City Engineer or his/her designee with equipment equal to Cherne Industrial, Inc., or provide proof that test was conducted by a certified testing company. Storm drain pipes with inside diameters of 30 inches or larger shall be leak tested according to manufacturer’s specifications. Air pressure tests shall be completed prior to paving.

All wyes, tees, or ends of lateral stubs shall be suitably capped and braced to withstand the internal test pressures. Caps shall be easily removable for future lateral connections or extensions. After a manhole to manhole section of line has been backfilled and cleaned, it shall be plugged at each manhole with pneumatic plugs.

Low pressure air shall be introduced into the sealed line until the internal air pressure reaches 4 psi-G greater than the average back pressure of any ground water that may be over the pipe. At least 2 minutes shall be allowed for the air pressure to stabilize.

The portion of line being tested shall be accepted if the portion under test does not lose air at a rate greater than 0.003 cubic feet per minute per square foot of internal pipe surface or 2.0 cubic feet per minute minimum when tested at an average 3.0 psi-G greater than any back pressure exerted by ground water that may be over the pipe at the time of the test.

The pipe and joints shall also be considered acceptable when the time required in minutes for pressure to decrease from 3.5 To 2.5 psi-G (greater than the average back pressure of any ground water that may be over the pipe) shall not be less than the time shown for the given diameters in the following table:

PRESSURE REDUCTION TIME LIMITS	
Pipe Diameter (inches)	Time (minutes)
4	2.0
6	3.0
8	4.0
10	5.0
12	5.5
15	7.5

18	8.8
21	10.0
24	11.5

If the installation fails to meet this requirement, the Contractor shall determine at his/her own expense the source of leakage. He shall repair or replace all defective materials and/or workmanship. All storm drain lines shall be tested, cleaned and accepted by Alpine City before laying the street surface.

- D. **Video Inspection.** Contractor shall clean and then video inspect all storm, land and groundwater drain lines **prior to paving**. The City must approve video inspection company.

Cleaning shall be done using a high pressure jet cleaning machine, producing a minimum of 800 psi. Debris shall not be permitted to enter the City storm drain system.

Video inspection shall clearly show any debris, broken pipe, misaligned pipe, displaced pipe and defective joints for all sections of the main line. All defects and their location shall be detailed on a separate video log report. A digital video disk (DVD or thumb drive) of video inspection and log report shall be submitted by the inspection company to the City Engineer or his/her designee.

Log reports shall be submitted on the City video form or an approved equivalent. Log reports must be submitted with an 11x17 copy of the plans. All manholes in the log report must reference the labeled manholes numbers on the plans. Each manhole must also have a street address clearly shown on the log report.

- E. **Deflection Test.** Contractor shall perform a displacement test on all non-concrete storm drain lines after video inspection. Deflections tests must be conducted in the presence of the City Engineer or his/her designee or be documented and submitted by a certified testing company approved by the City. In no case shall pipe be accepted that has a deflection of more than 5% after it has been backfilled. The Mandrel must be pulled by hand or air. A pipe deflection test shall be required of the Developer/Contractor after backfilling and compaction of the trench.

250.080. Streets.

- A. **Asphalt Pavement Material Tests.** Material tests will be conducted by the Developer for development projects and by the City for City contracts. Tests are taken once per day or once per every 500 tons of material placed. Sampling and testing per APWA 32 12 05.
- B. **Compaction Tests.** The Contractor will test all bituminous pavement for compaction and moisture content. Test locations shall be determined by the City but will generally be taken 3 per 200 lineal foot of street or 1 per 2,000 square foot of paved area. Pay factors as per APWA 32 12 16 (Plant-Mix Bituminous Paving) shall apply.
- C. **Grading Inspection.** The sub-grade, sub-base, and road base shall all be graded to an engineered red-head and accepted by Alpine City. Red-heads shall be placed every 50 feet at the crown of the road. If the distance between red-heads and edge of pavement exceeds 25 feet additional redheads shall be installed half way between the crown and edge of pavement. Red-heads shall also be placed every 50 feet at the edge of pavement where there is no curb and gutter.
- D. **Thickness Test.** Material depth tests will be conducted by the City when the City Engineer or his/her designee considers it necessary. The total depth shall be reasonably close to that shown on the typical section.

For City projects, depth analysis shall be made on at least four holes for each section. Base thickness shall be accepted if 75% of the test holes are less than 1/4" below the specified thickness and no individual hole shall be more than 1/2" below the specified thickness. Work with sub-standard thickness may be accepted at reduced price if the appropriate pay factor for the lowest tested thickness is applied to all of the sub-standard work. The following table outlines the pay factors for sub-standard asphalt pavement thickness:

PAVEMENT DEPTH PAY FACTORS FOR CITY PROJECTS

Pay Factor	Tolerance (inches below specified thickness)
0.95	0.00 to 0.25
0.90	0.26 to 0.50
Replace	More than 0.5

For new development, the City will accept nothing less than what the plans call for. Depth analysis shall be made on at least four holes for each section. Base thickness shall be accepted if 75% of the test holes are less than 1/8" below the specified thickness and no individual hole shall be more than 1/4" below the specified thickness. Work with sub-standard thickness will be rejected, removed, and replaced.

- E. Profile Tolerance Inspection. Profile tolerance inspections may be required by the City any time within a year of paving. Collector and arterial streets shall meet the "Tolerances" requirements of APWA 32 12 16 (Plant-Mix Asphalt Paving). For local streets profiling, the maximum vertical distance from the pavement surface to a straight edge is:
 - a. 1/4-inch in 10-feet parallel to centerline.
 - b. 3/8-inch in 10-feet perpendicular to centerline except at cross section grade breaks.

- F. Asphalt Concrete Temperature Test. This test shall be conducted on the first three loads of asphalt concrete installed, and on one in four of all future loads as required by the City. Testing shall be conducted according to the requirements and specifications of APWA 32 12 16 (Plant-Mix Asphalt Concrete Paving). Temperature gauge shall be allowed to stabilize for 1 minute before taking reading if using probe type. If using infra-red "gun" type, reading shall consist of an average of a minimum of 3 readings, where reading is taken immediately after displacing a minimum of 2 inches of material from the surface being tested and the "gun" is within 18" of the surface being tested.

- G. Asphalt Paving Limitations.
 - A. Paving between April 15th to October 15th to follow APWA 32 12 16.13 (must have 50 degrees and rising temperature in the shade and on the roadway surface).
 - B. Paving between November 15th and March 1st is not allowed.
 - C. In the event the City Engineer approves a paving plan proposed between October 15th and November 15th or between March 1st and April 15th, and if temperatures never rise above 60 degrees during the paving process, an overlay in the spring will be required as outlined in the table below. Do not place HMA on frozen base or during adverse climatic conditions such as precipitation or when roadway surface is icy or wet. Use a release agent that does not dissolve asphalt and is acceptable to the City Engineer or his/her designee for all equipment and hand tools used to mix, haul, and pace the HMA. Placement of HMA between October 15th and November 15th or between March 1st and April 15th may be allowed when the air temperature in the shade and the roadway surface temperature are above 45 degrees Fahrenheit and rising. Paving that occurs between October 15th and November 15th or between March 1st and April 15th, which requires a spring overlay, shall be finished 1.5 inches below lip of curb to accept the required 2-inch overlay in the spring. Paving cannot occur when rain is present.

PAVEMENT DEPTH AFTER OCTOBER 15TH / BEFORE NOVEMBER 15TH
 OR AFTER MARCH 1ST / BEFORE APRIL 15TH
 TEMPERATURES ARE BETWEEN 45-60 DEGREES FAHRENHEIT*

Street	Typical	Base Asphalt	Spring Overlay	Total Asphalt
Local / Secondary Access / Parking Lots / Driveway	3"	3"	2"	5"
Collector / Arterial	4"	3"	2"	5"

*See 2017 APWA 32-12-16.13. If temperatures are between 45-50 degrees, the minimum lift to be placed at a time must be 3 inches to retain heat and obtain compaction. 50-59 degrees, 2 inches minimum lift. 60-69, 1.5 inches minimum lift.

PAVEMENT DEPTH AFTER OCTOBER 15TH / BEFORE NOVEMBER 15TH
 OR AFTER MARCH 1ST / BEFORE APRIL 15TH
 TEMPERATURES ARE ABOVE 60 DEGREES FAHRENHEIT*

Street	Typical	Base Asphalt	Spring Overlay	Total Asphalt
Local / Secondary Access / Parking Lots / Driveway	3"	3"	n/a	3"
Collector / Arterial	4"	3"	n/a	4"

*See 2017 APWA 32-12-16.13. If temperatures are between 45-50 degrees, the minimum lift to be placed at a time must be 3 inches to retain heat and obtain compaction. 50-59 degrees, 2 inches minimum lift. 60-69, 1.5 inches minimum lift.

- H. Pavement Cut Moratorium Standard. Alpine City enforces a pavement cut moratorium on all newly paved, reconstructed, or otherwise maintained streets as defined below:
 - a. New/reconstructed/overlayed streets. Street cuts made on these streets, within 5 (five) years from the date of construction, shall follow the restoration standards set forth below in section 250.080.H.c.
 - b. Chip sealed, high density mineral bonded, seal coat (onyx), slurry/micro surfaced streets. Street cuts made on these streets, or any other similarly surface treated street, within 3 (three) years from the date of surface treatment application, shall follow the restoration standards set forth below in section 250.080.H.c.
 - c. Restoration standards for cuts on streets within the moratorium period. If a street is cut during its moratorium period, the restoration standard shall be to trench patch per APWA Plan 255, with the exception that the top 2-inch overlay shall extend fifty (50) feet on either side of the trench. This patch shall span the entire width of the roadway. If the street has a surface treatment as defined in 250.080.H.b, that surface treatment shall be reapplied on the disturbed area plus five (5) feet in each direction from the edges of the street cut to make the street appear and function as if it was never cut. If any cracking occurs within the street cut area within one (1) year from the time of construction, the cracks shall be crack-sealed by the street cut permit applicant. Concrete valve/manhole collars within the overlay area shall be removed and restored per these standard specifications. This restoration standard does not apply to companies operating under a franchise agreement with the City AND who will not disturb more than thirty (30) square feet of asphalt.

250.090. Drinking Water.

- A. General. The inspections and tests in this section are required for all drinking water construction in the City boundaries and on all construction relating to the City drinking water system outside the city boundaries.
- B. Main Line Inspection. The City must inspect all drinking water main line installations on an ongoing basis. Inspection notification must be given before any construction of main line may begin. All crosses, tees, bends, valves and hydrants must be inspected and surveyed by the City before they are backfilled.
- C. Drinking Water Service Inspection. The City must inspect all drinking water services before service trenches are backfilled. The City must be able to survey services at the main during the inspection.
- D. High Chlorine Test. High Chlorine tests shall meet the requirements and specifications of APWA 33 13 00 (Disinfection). The Contractor must conduct a high chlorine test at every hydrant on a new drinking water main installation. If a hydrant does not exist on the test section, tests must be taken at the end of each line. The chlorine residual shall be at least 25 mg/L.
- E. Pressure Test. Pressure test must be conducted after the successful completion of the bacteria test. The Contractor must pressure test all drinking water systems, system extensions and service laterals to the setter in the presence of the City Engineer or his/her designee or have tests documented and submitted by a certified testing company approved by the City. Pressure tests must meet the requirements and specifications of APWA 33 08 00 (Commissioning of Water Utilities). Provide a 210 psi test pressure for 2

hours unless specified otherwise. The pressure of 210 psi must be provided at the highest point in the section of pipe being tested unless elevations are such that this would create pressures over 250 psi at the lowest point in the section of pipe tested. In such a case, consultation with the City Engineer is required and AWWA standards will be considered.

- F. Leakage Test. For test lengths of pipe greater than 1,500 feet, a leakage allowance may be considered. There will be no allowance for leakage on test sections less than 1,500 feet. When allowed, leakage tests shall be conducted concurrently with the pressure tests. Leakage shall be defined as the quantity of water that must be supplied into the newly laid pipe, or any valved section thereof, to maintain pressure within 5 psi of the specified test pressure after the air in the pipeline has been expelled and the pipe has been filled with water.

No pipe installation will be accepted determined by the following formula:

$$Q \equiv \frac{LD * \sqrt{P}}{133,200}$$

if the leakage is greater than that

In which Q is the allowable leakage, in gallons per hour; L is the length of pipeline tested in feet; P is the average test pressure, in pounds per square inch (gage) and D is the nominal diameter of the pipe in inches.

If any test of pipe laid discloses leakage greater than specified, the Contractor shall, at their own expense, locate and repair the defective material until the leakage is within the specified allowance. All visible leaks are to be repaired regardless of the amount of leakage.

- G. Bacteria Test. Bacteria tests shall meet the requirements and specifications of APWA 33 13 00 (Disinfection). Tests may only be scheduled at certain regular times set by the City. The Contractor shall be present and open all hydrants or other locations to be tested from. The City shall submit samples to a certified lab to be tested according to state drinking water regulations.

If any sample point fails on the first test, the line will be flushed and re-tested at all sample points. If any sample point fails a second time, the complete line will be re-disinfected and re-tested at all sample points. If any samples come back marked "presence", which means coliform bacteria is present, the line will be re-disinfected and re-tested at all sample sites. Contractor is responsible to pay for all bacteria tests and retests.

Drinking water services will not be installed until bacteria sample results have been approved by the City Engineer or his/her designee. All testing lab fees shall be paid for by the Contractor.

Section 300. Contractor Requirements.

SECTION INDEX

300.010. General.

- A. Contractors Working for a Developer.
- B. Contractors Working for the City.
- C. Status Verification System.

300.020. Insurance.

- A. General.
- B. Workers' Compensation.
- C. Commercial General Liability Insurance.
- D. Automobile Liability Insurance.

300.030. Bonding.

- A. General.

300.040. Excavation Permits.

- A. General.
- B. Contractors.
- C. Property Owners.

300.050. Inspection Fees.

- A. General.

300.060. Materials Submittals.

- A. General.

300.070. Quality Control.

- A. General.
- B. Materials Production.
- C. Testing and Inspection.

300.010. General.

- A. Contractors Working for a Developer. Contractors and Sub-Contractors working for a Developer must prequalify before doing any work in existing or proposed City property, streets, easements, or right-of-way and for any work on existing or proposed City utilities. To prequalify the following must be on file in the City Engineer’s office:
 - 1. A current Contractor’s license specified for project type according to Utah State Code;
 - 2. Insurance information;
 - 3. Contractor information sheet;
 - 4. Project Bond;
 - 5. Excavation Permit;
 - 6. UDOT Permit for construction in state right-of-way; and

Failure to pre-qualify before doing any construction shall constitute grounds for legal action.

- B. Contractors Working for the City. Bids for City projects will only be awarded to the lowest responsible bidder with current contractor’s license specified for the project type according to the Utah State Code. The City’s contractor qualifications and experience forms shall be completely filled out and submitted with bid. Failure to do so is basis to reject the bid. Alpine City reserves the right to determine a non-responsible bidder based upon these forms or any other research conducted by the city.
- C. Status Verification System. Contractor agrees that it, and its subcontractors, will register with and use a Status Verification System to verify the federal employment authorization status of all employees hired after July 1, 2009. Contractor, and its subcontractors, will comply, in all respects, with Utah Code Annotated §63g-11-103, as it may be amended from time to time.

300.020. Insurance.

- A. General. A Contractor must acquire the insurance stipulated in this section to prequalify to do construction work. The city must receive and accept proof of the insurance before any work may begin. The submittal of said evidence to the City shall not relieve or decrease the liability of the Contractor hereunder.
- B. Workers’ Compensation. Contractor shall obtain workers compensation insurance as required by State law.
- C. Commercial General Liability Insurance. The following commercial general liability insurance must be obtained and submitted on ISO Form CG 00 01 (11/85) or equivalent, occurrence policy, with limits not less than:
 - 1. General Aggregate \$1,000,000
 - 2. Products - Comp/OPS Aggregate \$1,000,000
 - 3. Personal and Advertising Injury \$ 500,000
 - 4. Each Occurrence \$ 500,000
 - 5. Fire Damage (any one fire) \$ 50,000
 - 6. Medical Expense (any one person) \$ 5,000

Also include the follow endorsements or their equivalents attached thereto:

- 1. ISO Form CG 25 03 (11/85), Amendment of Limits of Insurance (Designated Project or Premises), describing the subject contract and specifying limits as shown above.
- 2. ISO Form CG 20 10 (11/85), Additional Insured -- Alpine City, Lessees, or Contractors (Form B), naming the City as additional insured and containing the following statement, “This Endorsement Also Constitutes Primary Coverage in the Event of any Occurrence, Claim, or Suit”.
- D. Automobile Liability Insurance. Contractor shall obtain automobile liability insurance with limits of not less than \$500,000 Combined Single Limit per accident. Coverage shall apply to any auto.

300.030. Bonding.

- A. General. The owners and/or developers of property shall deposit security with the City prior to recording the final plat to guarantee proper installation of all required improvements in accordance with the plans, specifications, time limitations, and conditions relating thereto as meets with the approval of the City Council or such personnel as the City Council shall designate. Security shall be in the form of cash, surety bond, financial institution bond, or an escrow bond. The amount of the security shall be 110% of the City’s estimated costs of the improvements plus the estimated asphalt preservation coat costs.

Escrow bonds shall be executed by financial institutions acceptable to the City and authorized to conduct business in the State of Utah, and must be in the form approved by the City. The bond, as required by this section, must be posted prior to recording. Upon completion of the punch list for the end of construction inspection, the security, less 10%, shall be released to the Developer. Ten percent (10%) of the security amount shall be held for a period of one (1) year following final inspection and acceptance to warrant improvements for this time period. The ten percent retained shall be the amount required as the minimum security.

The amount estimated for the asphalt preservation coat shall be deposited to the City in the form of cash and held in escrow prior to recording. These funds will be held until used for the asphalt preservation coat for the applicable development either by the developer or City (see 600.020).

300.040. Excavation Permits. (aka – Street Cut Permit)

- A. General. Contractors are required to qualify before obtaining an excavation permit to do construction work unless a project is already approved, bonded and insured. The permit must be approved 48 hours prior to construction. The permittee is given a copy of the permit and plan after the City Engineer or his/her designee has approved and signed them.

The City may stipulate time limits for completion of work and suspend permits for non-compliance. A copy of the excavation permit shall be on site during construction. For fees related to Excavation Permits, please refer to the Alpine City Consolidated Fee Schedule.

- B. Contractors. Contractors are required to submit the following information to obtain an excavation permit:
 - 1. Copy of Contractors license;
 - 2. Certificate of Insurance;
 - 3. License and permit bond;
 - 4. Detailed drawing of proposed work and traffic control.
- C. Property Owners. Individual property owners doing his/her own work for drive approaches and other similar, minor concrete work in the City right-of-way are required to submit the following information to obtain an excavation permit:
 - 1. Proof of homeowners or similar insurance;
 - 2. Detailed drawings of the proposed work, including safety, barricades, traffic and pedestrian control.

Any cuts or changes to the curb shall be performed by a licensed contractor who has obtained an excavation permit or building permit.

300.050. Inspection Fee.

- A. General. For bonded developments, an inspection fee will be collected. The fee will be for city costs relating to the construction. These costs include but are not limited to survey, inspection, testing and administration. The fee will be estimated based upon previous projects. Portions of the fee not used shall be refunded to the Developer after the punch list of the final acceptance inspection is completed.

If City costs relating to inspection exceed the inspection fee, these costs will be paid for by the developer or they will be deducted from the 10% warranty portion of the bond.

300.060. Materials Submittals.

- A. General. Contractors are required to provide materials submittals for all materials to be used to the City for review and approval.
 - 1. For pre-manufactured items, documentation must be submitted a minimum of 2 weeks before installation and must include sufficient information, including shop drawings, if applicable, to establish models, colors, sizes, installation requirements, etc. that will be used.
 - 2. For on-site manufactured items, such as asphalt, concrete or base courses, submit mix designs, hot/cold weather installation plans, and materials certifications a minimum of 5 working days prior to planned installation.
 - 3. Submittals for the following, at a minimum, should be submitted:
 - a. All pre-manufactured items meeting city standards such as light fixtures, electrical components, utility fixtures and piping, precast concrete structures, landscaping, etc.
 - b. Hot Mix Asphalt Mix Designs
 - c. Portland Cement Concrete Mix Designs
 - d. Treated Base Course Mix Designs
 - e. Untreated Base Course Job Mix Formulas

- f. Tack and Prime Coats
- g. Concrete Curing Compounds
- 4. Submit copies of all Quality Control testing and inspection reports within 48 hours of placement of materials.

300.070. Quality Control.

- A. General. Perform Quality Control work in accordance with applicable materials sections of the APWA Standard Specifications unless otherwise directed.

The contractor is responsible for performing quality control work sufficient to meet requirements of APWA Standard Specifications and to demonstrate compliance with acceptance criteria. The City will perform assurance functions at their discretion and inform the contractor of acceptance or rejection.

- B. Materials Production. Use UDOT certified facilities for asphalt, Portland cement concrete, and precast concrete pipe and structures. Lists of UDOT certified facilities can be found at: <https://udot.utah.gov/connect/business/materials-qualified-suppliers/>
 - 1. Submit verification of UDOT certified plant certifications with mix designs.
 - 2. Submit verification of UDOT certified plant for construction of precast concrete pipe and structures
- C. Testing and Inspection. Use UDOT certified laboratories and personnel.
 - 1. Submit names, certificate levels and years of experience of testing agency's Field Technician that are assigned to work. Laboratory must comply with ASTM Standards. Use AMRL certified laboratory and WAQTC/UDOT TTQP certified technicians.
 - 2. Submit verification of lab and personnel with mix designs.

Section 350. Earthwork and Trenches.**SECTION INDEX****350.010. Excavation.**

- A. General.
- B. Safety.
- C. In Gravel and Paved Surface Areas.
- D. In Areas with Concrete.
- E. Rock Excavations.
- F. Site Clearing and the Disposal of Excess Materials.

350.020. Sub-surface Pipe Installation.

- A. General.
- B. Boring or Jacking.
- C. Tunneling.

350.030. Sub-grade.

- A. Preparation.
- B. Soft and Yielding Areas.
- C. Trenches.
- D. Roads.
- E. Structures.

350.040. Fill Material.

- A. General.
- B. Bedding Material.
- C. Engineered Fill.
- D. Untreated Base Course.
- E. Cement Treated Fill.
- F. Defective Fill.

350.050. Slopes, Embankments, Fills and Open Channels.

- A. Preparation.
- B. Material.
- C. Grading.
- D. Slope Safety.
- E. Erosion and Sedimentation Control.
- F. Gabions.
- G. Rip Rap and Rock Lining.

350.060. Installation and Compaction of Earth Materials.

- A. General.
- B. Streets.
- C. Soft and Yielding Spots.
- D. Backfill in Trenches.
- E. Pipe Zone.

350.070. Geotextiles, Geogrids and Geocomposites.

- A. General.

350.080. Working around Existing Utilities.

- A. Purpose and Scope.
- B. Regulations and Permits.
- C. Utility Identification.
- D. Safety Precautions.
- E. Excavation Techniques.
- F. Backfill and Compaction.
- G. Restoration.
- H. Inspection and Testing.
- I. Record Keeping.
- J. Quality Control.
- K. Submittals.

- L. Deviations.
- M. Cast Iron Pipe.

350.010. Excavation.

- A. General. Excavation shall meet the requirements and specifications of APWA 31 23 16 (Excavation) unless otherwise indicated.
- B. Safety. All construction shall be done in accordance with the provisions of the Utah State Industrial Commission, OSHA regulations and APWA 31 23 16 (Excavation). No trenches deeper than 4 feet shall be left open at any time unless construction is in process. When construction is in process only 200 feet of trench may be open at one time and must be completely backfilled before proceeding. No trenches shall be left open at any time unless guarded with adequate barricades, warning lamps and signs.

Any injury or damage resulting from lack of adequate bracing and shoring shall be the responsibility of the Developer/Contractor and the Developer/Contractor shall, at his/her own expense, effect all necessary repairs or reconstruction resulting from such damage. No inspections will be done in unsafe trenches and will be the cause for immediate shutdown at the project until the trench is deemed to be safe by the City Engineer or his/her designee.

- C. In Gravel and Paved Surface Areas. Where any excavation occurs in a gravel or paved surface area such as a road, driveway or parking area, the surface shall be restored according to the requirements and specifications of APWA 33 05 25 (Pavement Restoration, requires t-patching on trenches) and the following conditions:
1. *Base.* Only Engineered Fill (Section 350.040.C) may be used as backfill or sub-base material under gravel and paved surfaces. A minimum of 8 inches of untreated base course shall be placed over backfill or sub-base. All fill material shall be placed and compacted to City standards. Flowable fill shall not be allowed for backfill unless authorized by the City.
 2. *Surface Maintenance.* The surface shall be maintained by blading, sprinkling, rolling, adding gravel, etc., to maintain a safe uniform surface satisfactory to the City.
 3. *Cutting of Pavement.* Before any excavation in a paved area, the surface along the entire excavation shall be cut to provide a vertical joint in the surface. Cut shall be made 6 inches from the edge of excavation in straight lines parallel or perpendicular to the trench or edge of pavement. A pavement saw shall be used for all pavement cutting. If excavation damages the cut pavement, pavement shall be cut again before t-patching. A roto-milled edge shall be acceptable as a cut.
 4. *Time Limitation.* All road cuts shall be repaired within 2 working days of excavation unless otherwise authorized by the City Engineer or his/her designee.
 5. *Cold Weather Patching.* Trenches cut during winter months or when roadbed temperatures and temperatures in the shade are less than 40 degrees (APWA 33 05 25) or when asphalt plants are not operating, shall be patched the same day of the cut with a good quality cold mix according to the requirements and specifications of APWA 32 12 17 (Cold-Mix Asphalt Paving). These trenches shall be maintained until asphalt plants open. When asphalt plants open, the temporary cold patch shall be removed and a new t-patch (per APWA Plan 255) of hot mix asphalt shall be placed. All cold mix patches shall be replaced with hot mix patches within 30 days of the opening of the hot mix plant.
 6. *Adjust Incidental Structures to Grade.* Adjust incidental structures to grade according to APWA 33 05 14 (Utility Grade Adjustment). City standard concrete collars around valves and manholes shall be installed within 1 year from the time that pavement is placed or at the time of an overlay.
 7. *Residential vs Non-residential streets.* APWA 33 05 25 mentions "*Match existing pavement thickness plus 1 inch, but not less than four (4) inches. Maximum thickness is six (6) inches in residential areas and eight (8) inches in non-residential areas.*" Residential areas are to be defined as Local, Secondary Access, or Parking Lots per the most currently adopted Alpine City Transportation Master Plan. Non-residential is to be defined as Collector or Arterial Class streets per the most currently adopted Alpine City Transportation Master Plan.
 8. *Extents of Pavement Replacement.* APWA Detail 255 calls for six (6) feet of t-patch beyond the edges of the trench, this includes the ends of the trench as well as the sides. If the t-patch is within three (3) feet of an existing curb, the patch shall extend to the curb. If the t-patch is within three (3) feet of any other edge of pavement or patch, the patch shall extend to the edge of pavement or patch. It will not be allowed to leave any existing or new section of pavement less than three (3) feet wide. Trenches perpendicular to the roadway that extend past the centerline of the roadway will require a t-patch that covers the entire roadway width. When multiple trenches are present, the t-patch width will be determined by the outer trench locations and shall extend the full width of the pavement if any of the trenches cross the centerline.
- D. In Areas with Concrete. When damaged, existing concrete improvements shall be removed and replaced to the next joint or scoring line beyond the damaged or broken sections. In the event that joints or scoring lines

do not exist or are three or more feet from the removed or damaged section, the damaged portions shall be removed and reconstructed to neat, plane faces. All concrete work shall meet the requirements and specifications of Section 650. Portland Cement Concrete Work and APWA 33 05 25 (Pavement Restoration).

- E. Rock Excavations. Rock excavations shall meet the requirements and specifications of APWA 31 23 17 (Rock Removal).
- F. Site Clearing and the Disposal of Excess Materials. Site clearing shall be conducted according to APWA 31 11 00 (Site Clearing). All excavation material, which is not required for construction or is unsuitable for fill material, shall be immediately disposed of by the Contractor. All roads, sidewalks, curbs, gutters and ditches shall be kept clean of excavated material except as outlined in Title 14.08.05 (Clean Streets) of the Alpine City Municipal Code.

All demolition work shall meet the requirements and specifications of APWA 02 41 13 (Selective Site Demolition), APWA 02 41 14 (Pavement Removal) and APWA 02 41 15 (Pavement Pulverizing).

Removal and disposal of Asbestos Cement Pipe shall be per the Utah Department of Environmental Quality (DEQ) Division of Air Quality (DAQ) guidance document, *How to Handle Non-friable Asbestos Cement Pipe, A Guide for Meeting Utah Department of Environmental Quality/Division of Air Quality Rules* ("Guidance").

350.020. Sub-surface Pipe Installation.

- A. General. Pipes, conduits or casings, 4 inches in diameter or less, may be bored, jacked, augured or jetted under sidewalk, curb, gutter if authorized by the City Engineer or his/her designee. The resulting hole diameter shall not exceed 1 inch plus the outside diameter of the pipe or sleeve installed.
- B. Boring or Jacking. Boring or jacking work shall meet the requirements and specifications of APWA 33 05 23 (Trenchless Utility Installation).
- C. Tunneling. Where sidewalk, curb, and gutter exists, excavation may be made by tunneling provided the following requirements are met:
 - 1. Excavation shall be vertical and as near to the curb or sidewalk as possible;
 - 2. The length of the tunnel shall not exceed the width of the sidewalk, curb, and gutter;
 - 3. Where a separate sidewalk and curb exist, an excavation shall be made between the sidewalk and the curb;
 - 4. At least three feet of undisturbed earth shall be left under the sidewalk or curb; and
 - 5. Where the sidewalk has been tunneled, the hole shall be filled from each end with flowable fill. Where the excavation cannot meet these requirements, a section of sidewalk, curb, or gutter, from joint to joint shall be removed and replaced.

350.030. Sub-grade.

- A. Preparation. All sub-grade shall be shaped and compacted in reasonably close conformity with lines, grades and typical cross section as established by the City Engineer or his/her designee. All grading shall be based on an engineered survey, accepted by Alpine City.

In trenches and cut or fill areas the subgrade shall be scarified to a depth of 8 inches and compacted according to the compaction standards of this chapter. No rocks larger than 4 inches in diameter, organic material, soft clay, spongy material, or other deleterious material will be permitted in this scarified sub-grade layer.

- B. Soft and Yielding Areas. Soft and yielding areas which do not compact to City standards shall be removed and replaced with enough compacted engineered fill to bridge the area. Trenches excavated within 10 feet of the lip of gutter shall be removed and replaced as part of the trench asphalt pavement repair, or otherwise approved by the City Engineer and/or his/her designee.
- C. Trenches. When the sub-grade material does not afford a sufficiently solid foundation to support the pipe and superimposed load, the trench shall be over-excavated to a sufficient depth and backfilled with enough compacted fill as approved by the City to bridge the area.
- D. Roads. Road sub-grades shall be shaped and graded to within a tolerance of 0.15 feet of design grade. Drainage shall be maintained at all times.

- E. Structures. Sub-grade material for all concrete structures, regardless of type or location, shall be firm, dense, thoroughly compacted and consolidated; shall be free from mud and muck; and shall be sufficiently stable to remain firm and intact under the feet of the workmen engaged in sub-grade surfacing, laying reinforcing steel, and depositing concrete.

Coarse gravel or crushed stone may be used for subsoil reinforcement if results are satisfactory to the City Engineer or his/her designee. Such material shall be applied in layers, not exceeding 6 inches in thickness, each layer being embedded in the sub-soil by thorough tamping. All excess soil shall be removed to compensate for the displacement of the gravel or crushed stone and the finished elevation of any subsoil reinforced in this manner and shall not be above the specified sub-grade.

The City Engineer may require a soil analysis and design for any area.

350.040. Fill Material.

- A. General. All fill material shall be placed on sub-grade prepared according to the specifications of this chapter. All fill material shall be compacted according to the specifications of this chapter.

Only engineered fill or untreated base course may be used as fill material under and within a foot of streets, future street areas, driveways, and concrete unless otherwise specified. All fill material under and within a foot of electrical and communications boxes shall be untreated base course. In other areas native excavated material may normally be used unless such material cannot be properly compacted according to specifications in this chapter. All fill material, including native fill material, must be free from debris, organic material, and rocks larger than 4 inches in diameter and have a liquid limit not to exceed 35 and plastic limit not to exceed 15.

- B. Bedding Material. Use APWA No. 4 sewer rock for gravity pipe bedding material. Use sand as a bedding material for pressure pipe and electrical and communication conduit. Bedding sand must compact sufficiently to support the pipe and shall meet the following gradation:

SAND GRADATION

Sieve/Screen Size	% Passing
No. 4	100
No. 200	10 to 20

- C. Engineered Fill. Engineered fill shall be used for all imported material unless otherwise specified. Engineered fill shall be granular and well graded meeting the following gradation:

ENGINEERED FILL GRADATION

Sieve/Screen Size	% Passing
4"	100
¾"	70 to 100
No. 200	0 to 15

On that portion of the aggregate passing the No. 40 sieve, the liquid limit shall not exceed 30, nor shall the plasticity index exceed 15 when tested in accordance with AASHTO T89 and T90. Imported material under city streets shall have a minimum CBR of 25.

Reclaimed asphalt pavement (RAP) may NOT be used as engineered fill.

- D. Untreated Base Course. All untreated base course shall meet the requirements and specifications of APWA 32 11 23 (Crushed Aggregate Base) for untreated base course. The use of slag as an untreated base course shall not be permitted.

- E. Cement Treated Fill. Cement treated fill shall meet the requirements and specifications of APWA 31 05 15 (Cement Treated Fill). Cement treated fill includes following fill materials:
 1. Controlled low-strength material (CLSM) (flowable fill),
 2. Lime treated fill,
 3. Asphalt treated fill.
- F. Defective Fill. Fill not conforming to the requirements of this specification shall be reworked to the requirements or removed and replaced with acceptable fill.

350.050. Slopes, Embankments, Fills and Open Channels.

- A. Preparation. Unsuitable materials that occur in the foundation for slopes, embankments, and fills shall be removed by clearing, stripping, and/or grubbing. Where suitable materials occur, after stripping, the foundation shall be scarified to a depth of not less than 8 inches. All materials in slopes, embankments, and fills, including the scarified foundation layer, shall be placed, moistened, and compacted according to the compaction standards in this chapter.
- B. Material. When the slope, embankment, or fill exceeds the amount of excavation, sufficient additional material shall be obtained from borrow pits provided by the Contractor. All material proposed to be imported shall be subject to the review and approval of the City Engineer or his/her designee prior any hauling operations.

The materials used for slope, embankment and fill construction shall be free from sod, grass, trash, rocks larger than 6 inches in diameter and all other material unsuitable for construction of compacted fills.

- C. Grading. Grading of completed slope, embankment, or fill shall bring the surfaces to a smooth, uniform condition with final grades being within 0.1 foot of the design grade. All grading shall be done to an engineered red-head.
- D. Slope Safety. All slope construction shall be in accordance with all City, State and Federal regulations. Plans and Specifications for structures must be approved by the City if the excavation is greater than five (5) feet. Cut slopes greater than 3:1 may be allowed per geotechnical report recommendation and approval of the City Engineer. Under no circumstance will a permanent slope steeper than 2:1 be allowed without a retaining structure unless otherwise approved in writing by the City Engineer or his/her designee. The width of the excavation shall be increased if necessary to provide space for sheeting, bracing, shoring and/or other supporting installations. Unsafe slopes will be the cause for immediate shutdown of the project.
- E. Erosion and Sedimentation Control. Erosion and sedimentation control shall meet the requirements and specifications of APWA 31 25 00 (Erosion and Sedimentation Control).
- F. Gabions. Gabions shall meet the requirements and specifications of APWA 31 36 00 (Gabions)
- G. Rip Rap and Rock Lining. Rip rap and rock lining work shall meet the requirements and specifications of APWA 31 37 00 (Riprap or Rock Lining).

350.060. Installation and Compaction of Earth Materials.

- A. General. The installation of all fill material shall meet the requirements and specifications of APWA 33 05 20 (Backfilling Trenches), APWA 31 23 23 (Backfilling Structures), APWA 32 05 10 (Backfilling Roadways) and APWA 31 23 26 (Compaction). Fill material outside of pavement areas, as defined by APWA 32 05 10 (Backfilling Roadways), and more than 24 inches from any utility box shall be compacted to not less than 90% of the maximum dry density.
- B. Streets. Sub-base and road-base shall be graded to an engineered red head. Loose rock, roots, brush, and other materials that may be encountered in shaping the sub-base must be removed.
- C. Soft and Yielding Spots. Any soft and yielding spots in the fill or sub-grade which do not compact to the specified density shall be removed and replaced with Engineered Fill installed and compacted to City standards.
- D. Backfill in Trenches. Backfill shall be carefully placed around and over pipes and shall not be permitted to fall directly on a pipe from such a height or in such a manner as to cause damage.

- E. Pipe Zone. The pipe zone includes the full width of trench from 3 inches below the pipe to 6 inches above the pipe for all pipes except for large reinforced concrete pipe (RCP). Large RCP includes RCP with internal diameters larger than 24 inches. The pipe zone for large RCP shall include the full width of trench from 6 inches below the pipe to 6 inches above the pipe. The pipe zone shall extend horizontally a minimum of 6 inches from either side of the pipe except for electrical and communication conduit. Electrical and communication conduit may be placed against the sides of trenches. Trenches shall be wide enough to compact fill material according to the specifications in this chapter.

The pipe zone for all pipes shall be filled with compacted bedding material. Pipe zone materials shall be placed and compacted under and around the pipe in horizontal layers not to exceed 8 inches and tamped by hand or pneumatic tampers.

350.070. Geotextiles, Geogrids and Geocomposites.

- A. General. All geotextile work shall meet the requirements and specifications of APWA 31 05 19 (Geotextiles). Geogrid and geocomposite work shall meet the requirements and specifications of APWA 31 05 21 (Geogrids/Geocomposites). Geotextile, geogrid and geocomposite work includes but is not limited to the following geotextile applications:
 1. Stabilization-separation,
 2. Silt fence,
 3. Erosion control,
 4. Roadway pavements,
 5. Drainage,
 6. Weed barrier
 7. Granular base reinforcement,
 8. Asphalt concrete reinforcement, and
 9. Soil reinforcement.

350.080. Working around Existing Utilities.

- A. Purpose & Scope: The purpose of this specification is to provide guidance and requirements for the excavation and trenching work in the vicinity of existing utilities. This specification applies to all excavation and trenching work within the project site that involves digging or disturbing the soil within the vicinity of existing utilities, including but not limited to gas, water, sewage, communication, and power lines.
- B. Regulations and Permits: The contractor shall obtain all necessary permits and comply with all applicable regulations and guidelines from local, state, and federal agencies regarding excavation and trenching work.
- C. Utility Identification: Prior to excavation, the contractor shall verify the location and depth of all existing utilities within the work area using the most current and accurate information available. The contractor shall call Blue Stakes, who will visually mark the location of each utility using colored flags, paint, or other suitable markers.
- D. Safety Precautions: The contractor shall implement and maintain all necessary safety precautions to protect workers, equipment, utilities, and the public from harm during excavation and trench work. This may include barricading the work area, providing and installing a traffic plan, providing proper ventilation, using proper excavation techniques, and following confined space procedures.
- E. Excavation Techniques: The contractor shall use hand tools or vacuum excavation equipment to expose the existing utility to the depth required by the project design. The excavation shall be done carefully and gradually to avoid damaging the utility.
- F. Backfill and Compaction: The contractor shall backfill the excavation with suitable material as specified in the project design, taking care to avoid damaging the utility. The backfill shall be compacted in layers per section 350.060 (Installation and Compaction of Earth Materials).
- G. Restoration: The contractor shall restore the work area to its original condition as specified in the project design, including replacing any disturbed pavement, landscaping, or other features.
- H. Inspection and Testing: The contractor shall allow the utility owner or its representative to inspect and test the utility before and after excavation to ensure that it remains in good working condition.
- I. Record Keeping: The contractor shall maintain detailed records of all excavation and trenching work, including the location and depth of utilities, excavation techniques used, backfill material and compaction,

and restoration activities.

- J. Quality Control: The contractor shall implement a quality control program to ensure that all excavation and trenching work meets the requirements of this specification and the project design.
- K. Submittals: The contractor shall submit all required submittals, including permits, utility location information, excavation and backfill materials, and compaction test results, to the project owner or engineer for review and approval prior to commencing work.
- L. Deviations: Any deviations from this specification or the project design shall be documented and approved by the project owner or engineer prior to proceeding with the work.
- M. Cast Iron Pipe: Special care shall be taken when working around Cast Iron Pipe (CIP). CIP can be susceptible to cracking or breaking when under excavated. If CIP is encountered in a trench the exposed section of CIP shall be removed and replaced with Ductile Iron Pipe (DIP). Sleeves shall be used to connect the new piece of DIP to the existing CIP. See Standard Detail 39.

Section 400. Drinking Water.**SECTION INDEX****400.010. General.**

- A. Specifications.
- B. Pipe.
- C. Size.
- D. Location.
- E. Unusual Piping and Plumbing.
- F. Dead Ends.
- G. Drains.
- H. Surface Water Crossings.
- I. Cross Connections Prohibited

400.020. Installation.

- A. General.
- B. Pipe Cleanliness.
- C. Identification Tape.
- D. Lateral Displacement.
- E. Restraining.
- F. Connections to Existing Drinking Water Lines.
- G. Bedding.

400.030. Pipe and Fittings.

- A. Polyvinyl Chloride Pipe (PVC).
- B. Ductile Iron Pipe.
- C. Polyethylene Pipe.
- D. Steel Pipe - Lined and Coated.
- E. Copper Tubing.
- F. Fittings.

400.040. Valves and Couplings.

- A. General.
- B. Resilient Seated Gate Valve.
- C. Butterfly Valve.
- D. Valve Boxes.
- E. Couplings.
- F. Pressure Regulation Valves.
- G. Tapping Valves.
- H. Air Vacuum and Release Valves.
- I. Isolation Valves.
- J. Backflow Devices.

400.050. Fire Hydrants.

- A. General.
- B. Placement and Location.

400.060. Meters and Services.

- A. General.
- B. Placement and Location.
- C. Meters.

400.070. Flushing.

- A. General.
- B. Velocity.

400.080. Disinfection of Drinking Water Lines.

- A. Cleaning.
- B. Methods.

400.010. General.

- A. Specifications. These specifications cover the installation of drinking water lines. See Section 200 for improvement and design requirements, Section 250 for inspection and testing requirements, and Section 350 for earthwork and trench requirements. See standard drawings related to water.
- B. Pipe. PVC or polyethylene pipe shall be used for all culinary drinking water mains unless otherwise authorized by the City Engineer or his/her designee. Polyethylene pipe shall be used for the service lateral in conjunction with PVC main lines. Where ductile main line exists, copper pipe is to be used for the service lateral. Special precautions shall be taken in areas of contamination. Pipe and joint materials which are not susceptible to contamination, such as permeation by organic compounds, shall be used. Non-permeable materials shall be used for all portions of the system including water mains, service connections, and hydrant leads. The Division of Drinking Water shall be contacted to establish specific design requirements in areas of contamination or potential contamination such as sewer treatment plants, septic systems, or industrial sites.
- C. Size. The City Engineer or his/her designee must approve the sizes of all proposed drinking water lines. It is required to have the design hydraulically modeled by the City's designated Hydraulic Engineer, the Hydraulic Engineer must confirm that the design meets Utah Division of Drinking Water Standards. The minimum size of drinking water pipe is 8 inch diameter for main lines and 1 inch diameter for services unless otherwise authorized by the City Engineer or his/her designee.
- D. Location. Drinking water mains shall be located on either the north or east sides of a street 4 feet from the edge of curb. All drinking water appurtenances shall conform to the minimum separation standards from sanitary sewer systems as outlined in Utah Code R309-550-7 and R309-550-12. See standard drawings for utility locations.
- E. Unusual Piping and Plumbing. Special and unusual piping and plumbing for equipment or structures are treated as separate items and are not included in these standards. They shall be approved by the City Engineer or his/her designee.
- F. Dead Ends. To provide increased reliability of service and reduce head loss, dead ends shall be minimized by making appropriate tie-ins whenever practical. Where dead-end mains occur, they shall be provided with a fire hydrant or with an approved flushing hydrant or blow-off for flushing purposes. See section 400.070 for flushing specifications.
- G. Drains. No drain within the culinary water system or other such appurtenances to the distribution system can be connected to the sanitary sewer or storm drain system. Where drains cannot be drained to daylight, underground gravel-filled absorption pits may be used if the site is not subject to flooding and conditions will assure adequate drainage. Sump pumps may also be considered if a drain to daylight or absorption pit is not feasible.
- H. Surface Water Crossings. Surface water crossings, whether over or under water, require Division of Drinking Water approval and shall conform to Utah Code R309-550-8 (8).
- I. Cross Connections Prohibited. Per Alpine City Municipal Code 14.06, "It shall be unlawful for any person to connect any part of the Secondary Irrigation System to any part of any culinary water system so as to create a potential cross-connection whereby irrigation water could be introduced into any system that provides culinary water. The use of swing connections will not be permitted."

400.020. Installation.

- A. General. Drinking water distribution and transmission systems shall be installed according to the Utah State-adopted plumbing code as well as the requirements and specifications of APWA 33 11 00, 33 05 05, 33 05 06, 33 05 07, AWWA M23; 2003, and AWWA M55; 2006. (Water Distribution and Transmission).
- B. Pipe Cleanliness. All foreign matter or dirt shall be removed from the inside of the pipe before it is placed and it shall be kept clean during and after laying. No debris, tools, or other materials shall be placed in the pipe during laying operations. When laying of pipe is not in progress, the pipe shall be closed by a water-tight plug.
- C. Identification Tape. All drinking water mains shall be installed with identification tape that meets the requirements and specifications of APWA 33 05 20 (Backfilling Trenches). Tape shall be buried 12 inches above the pipe.

- D. Lateral Displacement. All pipes shall be protected from lateral displacement resulting from impact or unbalanced loading during backfilling operations.
- E. Restraining. Either thrust blocks or mechanical restraining devices shall be used for all tees, valves, plugs, caps and bends. Restraining shall be accomplished according to the most recent APWA standards.
- F. Connections to Existing Drinking Water Lines. The Contractor will be responsible to verify actual size, type of material and location of existing utilities in the field. The fittings and materials required for construction must be approved by the City Engineer or his/her designee.

Where fitting sizes, such as tees and crosses, are shown on the plans, those sizes will be used. However, no attempt has been made to show all needed fittings or materials.

Tapping tees may only be installed when authorized by the City Engineer or his/her designee and when the existing main is at least one size larger than the proposed intersecting line.

- G. Bedding. A continuous and uniform bedding shall be provided in the trench for all buried pipe. Stones larger than 3/4" for plastic pipe or 2-inch minus for ductile iron pipe shall be removed for a depth of at least 6 inches below the bottom of the pipe. Bedding materials shall otherwise be installed per APWA standards

400.030. Pipe and Fittings.

- A. Polyvinyl Chloride Pipe (PVC). PVC pipe shall meet the standards and specifications of APWA 33 05 07 (Polyvinyl Chloride Pipe), AWWA C900 and C905. Only blue, DR-18 pressure class 150 psi or higher rated PVC pipe may be used for drinking water mains.
- B. Ductile Iron Pipe. Ductile iron pipe shall meet the standards and specifications of APWA 33 05 05 (Ductile Iron Pipe). Only a pressure class of 150 psi or larger may be used. A tubular black polyethylene encasement must be installed according to AWWA C105 over all ductile iron pipe and fittings. Flanges, when required, shall meet the requirements and specifications of AWWA C115.
- C. Polyethylene Pipe. Polyethylene pipe shall meet the standards and specifications of APWA 33 05 06 (Polyethylene Pipe) and AWWA C906 which includes NSF-61 certification.
- D. Steel Pipe - Lined and Coated. Steel pipe shall meet the standards and specifications of APWA 33 05 09 (Steel Pipe - Lined and Coated).
- E. Copper Tubing. Copper tubing shall be "soft annealed" and shall conform to the standards for "Type K," prescribed in ANSI/AWWA C800-89 Section A.2 for "Copper Water Tubing" and to ASTM, designation B42 and B88-99, and current revisions thereof. It shall be free from grooving cracks, indentations, flaws or other defects. At intervals of not greater than one and one-half feet, the tubing shall bear clear, permanent markings indicating the type and manufacturer.
- F. Fittings. Use Ductile Iron fittings that conform to the provisions of ANSI/AWWA C110/A21.10 or C153/A21.53 unless otherwise recommended by the manufacturer and authorized by the City Engineer or his/her designee. All PVC pipe being inserted into fittings shall have the bevel end removed. All the bolts and nuts of all fittings shall be greased. All fittings shall have an 8 mil vinyl wrap plastic cover.

Minimum pressure Class will be 250 for pipes larger than 12 inch diameter. Pipes of 12 inch diameter and smaller shall be pressure Class 350.

FLOW REQUIREMENTS FOR FLUSHING

Pipe Diameter	Flow in Gallons Per Minute
4 inch	100
6 inch	220
8 inch	390
10 inch	610
12 inch	880
16 inch	1,567

18 inch	1,980
20 inch	2,450
24 inch	3,525
30 inch	5,507

400.040. Valves and Couplings.

- A. General. All valves shall meet the requirements of APWA 33 11 00 (Water Distribution and Transmission) and APWA 33 12 16 (Water Valves).
- B. Resilient Seated Gate Valve. All valves on 4 inch to 12 inch drinking water mains shall be resilient seated gate valves. Valves shall also be of iron body have non-rising bronze stems and meet the following specifications:
 - 1. Mechanical Joint. When valves are Mechanical Joint, they shall be furnished with all necessary glands, followers, and bolts and nuts to complete installation.
 - 2. Valve Stems. Bronze valve stems shall be interchangeable with stems of the double disc valves of the same size, direction of opening and manufacture.
- C. Butterfly Valve. All valves 14 inches and larger shall be butterfly valves which meet the requirements and specifications of APWA 33 11 00 (Water Distribution and Transmission) and APWA 33 12 16 (Water Valves) and the following specifications:
 - 1. General. Valve bodies shall be cast iron, ASTM A-126 Class B. Body ends shall be flanged with facing and drilling in accordance with ANSI B16.1, Class 125; or mechanical joint in accordance with AWWA C111. All mechanical joint end valves shall be furnished complete with joint accessories (bolts, nuts, gaskets, and glands). All valves shall conform to AWWA Standard C-504, Table 3, Laying Lengths for Flanged Valves and Minimum Body Shell Thickness for all Body Types.
 - 2. Disc. Valve disc shall be ductile iron ASTM A-536, grade 65-45-12. Valve disc shall be of the offset design providing 360 degree uninterrupted seating.
 - 3. Shaft Bearings. Shaft bearings shall be contained in the integral hubs of the valve body and shall be self-lubricated sleeve type.
 - 4. Coating. All valves shall be coated with epoxy in conformance to AWWA Standard C-550, latest revision. Interior wetted ferrous surfaces shall be coated a nominal 10 mils thick for long life; and body exterior shall have a minimum of 3 to 4 mils coating thickness in order to provide superior base for field-applied finish coats.
- D. Valve Boxes. Valves shall be bolted to the cross in the intersection of streets as a cluster valve set. Earth fill shall be carefully tamped around the valve box to a distance of 4 feet on all sides of the box, or to the undisturbed trench face if less than 4 feet.

All top of valve boxes located in streets shall be installed 1/2 inch below grade. When an overlay is required, the pavement surrounding the valve box shall be neatly cut to form a 30 inch round opening with the valve box centered, and a concrete collar shall be cast around the box 1/2 inch below grade and the valve box set 1/2 inch below grade. Valve boxes in off-road areas shall extend 6 inches above grade. Lid detail shall be similar to Comco C-6517.
- E. Couplings. Couplings shall be equal to the product of Smith-Blair or Dresser with cast iron couplings being used on all cast iron and PVC pipe. Couplings shall be of the straight, transition, or reducing style as required by the specific installation. All steel fittings and bolts shall be coated with a non-oxide coating and wrapped with polyethylene.
- F. Pressure Regulation Valves. Pressure regulation valves (PRV) which are required in a development when static pressures exceed 150 psi and shall be designed by the Developers engineer, the design shall be submitted to the City Engineer or his/her designee for review and approval prior to starting construction. All PRV's shall be Cla-Val with a 4" bypass or approved by the City Engineer, be placed in a concrete vault, have isolation valves on each side, and have telemetry included.
- G. Tapping Valves. Tapping valves may only be used when approved by the City Engineer or his/her designee. Tapping saddles with an "O" ring may be used if the drinking water main line to be tapped is larger than the new drinking water main line. Where the tap is the same size as the existing main, cast iron or stainless steel tapping sleeves shall be used, which encase the full perimeter of the pipe. The valve shall

be a tapping valve with a guide lip on the flanged side. The opposite side of the valve shall have a mechanical joint connection.

- H. Air, Vacuum and Release Valves. Combination air, vacuum and release valves shall be installed according to the standard drawings at high points in the system as required by the City Engineer or his/her designee.
- I. Isolation Valves. A sufficient number of valves shall be provided on water mains so that inconvenience and sanitary hazards will be minimized during repairs. Valves shall be located at every roadway intersection or block on all segments of pipe. Where a proposed system may serve widely scattered customers and where future development is not expected, the valve spacing shall not exceed two thousand (2,000) feet.
- J. Backflow Assemblies. Installation of backflow assembly shall conform to City ordinances and the State-adopted plumbing code. Alpine City has strict guidelines regarding cross connections. In the event a cross connection is allowed, a reduced pressure zone (RPZ) backflow assembly is the only allowed style of backflow prevention assembly. A RPZ may be required in other circumstances, each situation will be evaluated on an individual basis.

400.050. Fire Hydrants.

- A. General. Fire hydrants shall meet the requirements and specifications of APWA 33 12 19 (Hydrants). All fire hydrants shall be Mueller Super Centurion 250 or approved equivalent and red in color. They shall have a 5 ¼ inch barrel diameter and 6-inch mechanical joint connection. The 6-inch gate valve will be mechanical joint by flange connected to the tee joint at the main line in the street. Hydrants shall be frost proof. The threads shall be National Standard Fire Hose Thread. Spacing of fire hydrants shall be according to the Uniform Fire Code but more specifically, hydrants are required to be located within 250' of any structure, typically located on property lines. The fire flow level of service Alpine City has established is 1,750 gpm for 2 hours at every hydrant, this will be verified when the proposed plan is submitted and reviewed by the City's designated Hydraulic Engineer.
- B. Placement and Location. In general, fire hydrants should be located on property lines to minimize conflicts with driveways. Fire hydrant location to be approved by the City Engineer or his/her designee. Fire hydrants shall be set vertical and held in place by adequate concrete blocking which shall be left in the trench. Hydrants shall be set at a height that will allow 2 inches minimum and 7 inches maximum exposed between the finished ground and the sidewalk flange. A gravel filled drip area shall be provided. Hydrant drains shall not be connected to or located within 10 feet of sanitary sewers. Where possible hydrant drain shall not be located within 10 feet of storm drains. Fire hydrants require 3 feet of clear space around them for operational purposes. See standard drawing for fire hydrants.

The relocation of fire hydrants shall meet the requirements and specifications of APWA 33 11 11 (Relocate Water Meters and Fire Hydrants) and related sections.

400.060. Meters and Services.

- A. General. Alpine City owns and maintains the water system up to and including the water meter. Between the water meter and home is the responsibility of the homeowner. See Standard Drawings for drinking water services. The minimum size of new drinking water service lines is 1 inch, while the standard meter size is 3/4 -inch. All drinking water services shall have dual check valves. Drinking water services shall extend 20 feet beyond the back of curb and shall be capped until connected to a building. Meter and service line installation shall conform to the State-adopted plumbing code and conform to the standard meter installation detail as noted in the Alpine City Standard Details.
- B. Placement and Location. All meter boxes shall have their location and grade staked prior to installation. No meter boxes shall be set in sidewalks, driveways, or encased in concrete in any way. Service taps shall be a minimum of 36 inches apart. No taps will be allowed within 36 inches of the end of the pipe. All meter boxes require 3 feet of clear space around them for operational purposes. Meter lid height to be set 0.1' above curb (must be within 0.1' of this requirement).

Service laterals shall extend perpendicular from the main to the meter box. If a meter must be coordination with the City Engineer is required. When a new service line is installed the old corporation stop shall be shut off at the main and the old service line cut two feet from the main.

Drinking water service lines shall meet the separation from sanitary sewer requirements in this Section. Drinking water services shall extend 20 feet beyond the back of curb and capped until connected to a building.

The relocations of drinking water meters shall meet the requirements and specifications of APWA 33 11 11 (Relocate Water Meters and Fire Hydrants) and related sections. Services 3/4 – 2 inch shall be copper tubing shall be "soft annealed" and shall conform to the standards for "Type K," prescribed in ANSI/AWWA C800-89 Section A.2 for "Copper Water Tubing" and to ASTM, designation B42 and B88-99, and current revisions thereof. Pipe damaged by scratches, cuts, kinks, or buckled areas shall not be installed. PVC, as mentioned in section 400.010 (B) shall be used in conjunction with PVC mains where corrosive soils exist and shall conform to the requirements and specifications of APWA 33 05 06 (Polyethylene Pipe), only CTS SDR9 200 psi blue polyethylene pipe shall be used for service lines. Deflection in joints shall meet manufacturer's specifications and shall be approved by the City Engineer or his/her designee or shall be replaced with the proper fitting.

- C. Meters. The standard meter size is 3/4-inch. All meters shall be paid for by the Contractor and supplied by the City. Meter boxes shall be in good repair. They shall not be set at an angle, crushed, or dented. The inside of boxes must be free from obstructions such as dirt, rocks or debris.

400.070. Flushing.

- A. General. All drinking water lines shall be flushed after the high chlorine test and prior to the pressure test. See Section 250. Testing and Inspection for testing information. Flushing shall be accomplished through hydrants and at the end each line. No flushing device shall be directly connected to a sewer or storm drain.
- B. Velocity. The Contractor shall install a tap sufficient in size to provide for 2½ foot per second flushing velocity in the line. The following is the flow quantity required to provide a 2½ foot per second flushing velocity.

FLOW REQUIREMENTS FOR FLUSHING

Pipe Diameter in Inches	Flow in Gallons per Minute
4 inch	100
6 inch	220
8 inch	390
10 inch	610
12 inch	880
16 inch	1,567
18 inch	1,980
20 inch	2,450
24 inch	3,525
30 inch	5,507

400.080. Disinfection of Drinking Water Lines.

- A. Cleaning. The pipe shall be clean prior to disinfection. If in the opinion of the City, contamination is such that it cannot be removed by flushing, the pipe shall be cleaned by mechanical means and then swabbed with a 1% hypochlorite disinfection solution.
- B. Methods. All drinking water pipeline shall be disinfected as outlined in AWWA C651 by one of the following methods:
 - 1. Tablet Method. The tablet method shall consist of placing calcium hypochlorite tablets at the specified rate in the main during construction at the upstream end of each section of pipe. The tablet shall be attached with an adhesive, such as Permatex No. 1 or equivalent as approved by the City Engineer or his/her designee. The line shall then be filled slowly (velocities less than 1 ft/sec), expelling all air pockets and maintaining the disinfection solution in the line for at least 24

hours, 48 hours if the water temperature is less than 41° F. The disinfection solution shall have a concentration of at least 25 mg/l of available chlorine.

2. *Continuous Feed Method.* The continuous feed shall be done exactly as outlined in AWWA C651 and shall have a twenty-five mg/l available Chlorine after 24 hours.

Under both methods the Contractor shall not be allowed to flush the line until the chlorine residual test has been passed by the City. If necessary drinking water lines shall be re-chlorinated until satisfactory bacteriological testing is obtained. See Section 250. Testing and Inspection for testing information.

Section 450. Pressurized Irrigation.**SECTION INDEX****450.010. General.**

- A. Specifications.
- B. Pipe.
- C. Size.
- D. Location.
- E. Unusual Piping and Plumbing.
- F. Cross Connections Prohibited.

450.020. Installation.

- A. General.
- B. Pipe Cleanliness.
- C. Minimum Cover.
- D. Identification Tape.
- E. Lateral Displacement.
- F. Restraining.
- G. Connections to Existing Pressurized Irrigation Lines.

450.030. Pipe and Fittings.

- A. Polyvinyl Chloride Pipe (PVC).
- B. Ductile Iron Pipe.
- C. Polyethylene Pipe.
- D. Steel Pipe - Lined and Coated.
- E. Fittings.

450.040. Valves and Couplings.

- A. General.
- B. Resilient Seated Gate Valve.
- C. Butterfly Valve.
- D. Valve Boxes.
- E. Couplings.
- F. Pressure Regulation Valves.
- G. Tapping Valves.
- H. Air, Vacuum and Release Valves.

450.050. Meters, Boxes and Services.

- A. General.
- B. Placement and Location.
- C. Meters and Boxes.
- D. Polyethylene Pipe.

450.060. Flushing.

- A. General.
- B. Velocity.

450.010. General.

- A. Specifications. These specifications cover the installation of pressurized irrigation lines. See Section 200 for improvement and design requirements, Section 250 for inspection and testing requirements, and Section 350 for earthwork and trench requirements. See standard drawings related to pressurized irrigation.
- B. Pipe. Polyvinyl Chloride (PVC) pipe shall be used for all pressurized irrigation mains 12 inches in diameter and smaller unless otherwise authorized by the City Engineer or his/her designee. Ductile iron, PVC, or polyethylene pipe shall be used for pressurized irrigation mains larger than 12 inches in diameter as approved by the City Engineer or his/her designee. Only PVC or polyethylene pipe may be used in corrosive soils.
- C. Size. The City Engineer or his/her designee must approve the sizes of all proposed pressurized irrigation lines. The minimum size of pressurized irrigation pipe in thru streets is 6 inch diameter for main lines, 4 inch diameter for cul-de-sacs unless otherwise specified in the Pressurized Irrigation System Master Plan. 1 inch diameter for services are required for each lot. A dual service shall be 1½" to the service tee.
- D. Location. Pressurized irrigation mains shall be located on either the south or west sides of a street 3 feet from the edge of curb. See standard drawings for utility locations.
- E. Unusual Piping and Plumbing. Special and unusual piping and plumbing for equipment or structures are treated as separate items and are not included in these standards.

Tapping tees may only be installed when authorized by the City Engineer or his/her designee and when the existing main is at least one size smaller than the proposed main.

- F. Cross Connections Prohibited. Per Alpine City Municipal Code 14.06, "It shall be unlawful for any person to connect any part of the Secondary Irrigation System to any part of any culinary water system so as to create a potential cross-connection whereby irrigation water could be introduced into any system that provides culinary water. The use of swing connections will not be permitted."

450.020. Installation.

- A. General. Pressurized irrigation distribution and transmission systems shall be installed according to the requirements and specifications of APWA 33 11 00 (Water Distribution and Transmission). PVC pipe shall also be installed according to the requirements and specifications of AWWA C605.
- B. Pipe Cleanliness. All foreign matter or dirt shall be removed from the inside of the pipe before it is placed and it shall be kept clean during and after laying. No debris, tools, or other materials shall be placed in the pipe during laying operations. When laying of pipe is not in progress, the pipe shall be closed by a water-tight plug.
- C. Minimum Cover. All pressurized irrigation mains shall have a minimum cover of 2 feet to the top of the pipe.
- D. Identification Tape. All pressurized irrigation mains shall be installed with identification tape that meets the requirements and specifications of APWA 33 05 20 (Backfilling Trenches). Tape shall be buried 12 inches above the pipe.
- E. Lateral Displacement. All pipes shall be protected from lateral displacement resulting from impact or unbalanced loading during backfilling operations.
- F. Restraining. Either thrust blocks or mechanical restraining devices shall be used for all tees, valves, plugs, caps and bends. Restraining shall be accomplished according to the standard drawings.
- G. Connections to Existing Pressurized Irrigation Lines. The Contractor will be responsible to verify actual size, type of material and location of existing utilities in the field. The fittings and materials required for construction must be approved by the City Engineer or his/her designee.

Where fitting sizes, such as tees and crosses, are shown on the plans, those sizes will be used. However, no attempt has been made to show all needed fittings or materials.

450.030. Pipe and Fittings.

- A. Polyvinyl Chloride Pipe (PVC). PVC pipe shall meet the requirements and specifications of APWA 33 05 07 (Polyvinyl Chloride Pipe) and AWWA C900 and C905. Only purple, SDR-18 pressure class 150 psi pipe may be used for pressurized irrigation mains.
- B. Ductile Iron Pipe. Ductile iron pipe shall meet the standards and specifications of APWA 33 05 05 (Ductile Iron Pipe). Only a pressure class of 150 psi or larger may be used. A tubular purple polyethylene encasement must be installed according to AWWA C105 over all ductile iron pipe and fittings. Flanges, when required, shall meet the requirements and specifications of AWWA C115. Ductile iron may be directed tapped for the use of corporation stops.
- C. Polyethylene Pipe. Polyethylene pipe shall meet the standards and specifications of APWA 33 05 06 (Polyethylene Pipe).
- D. Steel Pipe - Lined and Coated. Steel pipe shall meet the standards and specifications of APWA 33 05 09 (Steel Pipe - Lined and Coated).
- E. Fittings. Use Ductile Iron fittings that conform to the provisions of ANSI/AWWA C110/A21.10 or C153/A21.53 unless otherwise recommended by the manufacturer and authorized by the City Engineer or his/her designee. All PVC pipe being inserted into fittings shall have the bevel end removed. All the bolts and nuts of all fittings shall be greased. All fittings shall have an 8 mil vinyl wrap plastic cover.

450.040. Valves and Couplings.

- A. General. All valves shall meet the requirements of APWA 33 11 00 (Water Distribution and Transmission) and APWA 33 12 16 (Water Valves).
- B. Resilient Seated Gate Valve. All valves on 4 inch to 12 inch water mains shall be resilient seated gate valves. Valves shall also be of iron body have non-rising bronze stems and meet the following specifications:
 - 1. *Mechanical Joint.* When valves are Mechanical Joint, they shall be furnished with all necessary glands, followers, and bolts and nuts to complete installation.
 - 2. *Valve Stems.* Bronze valve stems shall be interchangeable with stems of the double disc valves of the same size, direction of opening and manufacture.
- C. Butterfly Valve. All valves 14 inches and larger shall be butterfly valves which meet the requirements and specifications of APWA 33 11 00 (Water Distribution and Transmission) and APWA 33 12 16 (Water Valves) and the following specifications:
 - 1. *General.* Valve bodies shall be cast iron, ASTM A-126 Class B. Body ends shall be flanged with facing and drilling in accordance with ANSI B16.1, Class 125; or mechanical joint in accordance with AWWA C111. All mechanical joint end valves shall be furnished complete with joint accessories (bolts, nuts, gaskets, and glands). All valves shall conform to AWWA Standard C-504, Table 3, Laying Lengths for Flanged Valves and Minimum Body Shell Thickness for all Body Types.
 - 2. *Disc.* Valve disc shall be ductile iron ASTM A-536, grade 65-45-12. Valve disc shall be of the offset design providing 360 degree uninterrupted seating.
 - 3. *Shaft Bearings.* Shaft bearings shall be contained in the integral hubs of the valve body and shall be self-lubricated sleeve type.
 - 4. *Coating.* All valves shall be coated with epoxy in conformance to AWWA Standard C-550, latest revision. Interior wetted ferrous surfaces shall be coated a nominal 10 mils thick for long life; and body exterior shall have a minimum of 3 to 4 mils coating thickness in order to provide superior base for field-applied finish coats.
- D. Valve Boxes. All buried valves shall be installed complete with two-piece, cast iron, slip type, 5-1/4-inch shaft valve box with drop lid. The lid shall have the word "IRRIGATION" or "DRAIN" according to the standard drawing cast in the metal.

Valves and valve boxes shall be installed where shown on the drawings. Valves and valve boxes shall be set plumb. Valve boxes shall be centered directly over the valve. Valves shall be aligned with property lines where possible. Earth fill shall be carefully tamped around the valve box to a distance of 4 feet on all sides of the box, or to the undisturbed trench face if less than 4 feet. Valves shall have the interiors cleaned of all foreign matter before installation.

All top of valve boxes located in streets shall be installed 1/2 inch below grade. The pavement surrounding the valve box shall be neatly cut to form a 30 inch round opening with the valve box centered, and a concrete collar shall be cast around the box. Valve boxes in off-road areas shall extend 6 inches above grade unless otherwise specified by the City Engineer or his/her designee. Lid detail shall be similar to Comco C-6517.

- E. Couplings. Couplings shall be equal to the product of Smith-Blair or Dresser with cast iron couplings being used on all cast iron and PVC pipe. Couplings shall be of the straight, transition, or reducing style as required by the specific installation. All steel fittings and bolts shall be coated with a non-oxide coating and wrapped with polyethylene.
- F. Pressure Regulation Valves. Pressure regulation valves (PRV) which are required in a development shall be designed by the Developers engineer and the design shall be submitted to the City Engineer or his/her designee for review and approval prior to starting construction. All PRV's shall be Cla-Val with a 4" bypass or as specified by design, be placed in a concrete vault and have telemetry included.
- G. Tapping Valves. Tapping valves may only be used when approved by the City Engineer or his/her designee. Tapping saddles with an "O" ring may be used if the water main line to be tapped is larger than the new water main line. Where the tap is the same size as the existing main, cast iron or stainless steel tapping sleeves shall be used, which encase the full perimeter of the pipe. The valve shall be a tapping valve with a guide lip on the flanged side. The opposite side of the valve shall have a mechanical joint connection.
- H. Air, Vacuum and Release Valves. Combination air, vacuum and release valves shall be installed according to the standard drawings at high points in the system as required by the City.

450.050. Meters, Boxes and Services.

- A. General. See the standard drawings for pressurized irrigation services. The minimum size of new pressurized irrigation service lines is 1 inch for single service and 1 1/2" for dual service.
- B. Placement and Location. All meters and boxes shall have their location and grade staked prior to installation. No meters or boxes shall be set in sidewalks or driveways. Meters and boxes are to be set 5 feet uphill from the water meter, 1 foot behind the sidewalk or 10 feet behind the curb. For new development, box to be set within +/- 0.1' sidewalk elevation. Service taps shall be a minimum of 36 inches apart. No taps will be allowed within 36 inches of the end of the pipe.

Service laterals shall extend perpendicular from the main to the meter or box. For dual pressurized irrigation services, laterals shall extend perpendicular from the main to the tee.

If a meter must be moved coordination with the City Engineer is required. When a new service line is installed the old corporation stop shall be shut off at the main and the old service line cut two feet from the main.

- C. Meters and Boxes. All meters shall be paid for by the developer and ordered by the City. Meter boxes and pressurized irrigation boxes shall be in good repair. They shall not be set at an angle, crushed, or dented. The inside of boxes must be free from obstructions such as dirt, rocks or debris. Meters shall be installed by the Developer or Contractor.
- D. Polyethylene Pipe. Only CTS SDR9 200 psi purple polyethylene pipe shall be used for pressurized irrigation service lines. Pipe damaged by scratches, cuts, kinks or buckled areas shall not be installed.

The bottom of trench shall be flat with no hollows, no lumps and no rock. If these conditions do not occur pipe must be bedded in coarse sand. No rocks shall be allowed within six inches of pipe.

Pipe shall be cut with either a wheel or scissor type tubing cutter with a blade specifically designed for plastic. Cuts shall be square and clean. Cutter manufacturer instructions shall be followed when cutting pipe. All connections shall have stainless steel stiffeners.

There shall be no unnecessary bending of pipe. Taps shall be exactly horizontal to the pressurized irrigation main. If bending cannot be avoided maximum bending radius shall be 25 times the pipe diameter as measured in inches (i.e.: a 16 inch pipe cannot bend on a curvature having a radius less than 16 x 25= 400 feet). There shall be no bending within 3 feet of a fixed point and no "S" shape curves.

450.060. Flushing.

- A. General. All pressurized irrigation lines shall be flushed before placed in service. Flushing shall be accomplished through the end of each line.
- B. Velocity. The Contractor shall install a tap sufficient in size to provide for 2 ½ feet per second flushing velocity in the line. The following is the flow quantity required to provide a 2 ½ foot per second flushing velocity.

FLOW REQUIREMENTS FOR FLUSHING

Pipe Diameter	Flow in Gallons Per Minute
4 inch	100
6 inch	220
8 inch	390
10 inch	610
12 inch	880
16 inch	1,567
18 inch	1,980
20 inch	2,450
24 inch	3,525
30 inch	5,507

Section 500. Sanitary Sewer.**SECTION INDEX****500.010. General.**

- A. Specifications.
- B. Pipe.
- C. Size.
- D. Locations.
- E. Minimum Slopes.
- F. Sanitary Sewer Lift Stations.
- G. Unusual Piping and Plumbing.

500.020. Pipe and Fittings.

- A. General.
- B. Polyvinyl Chloride Pipe (PVC).
- C. ADS Sanitite HP Pipe.

500.030. Services.

- A. General.
- B. Clean-outs.
- C. Replacement of Service Lines

500.010. General.

- A. Specifications. Sanitary sewer facilities shall meet the requirements and specifications of APWA 33 31 00 (Sanitary Sewerage Systems). These specifications cover the installation of sanitary sewer lines. See Section 200 for improvement and design requirements, Section 250 for inspection and testing requirements, and Section 350 for earthwork and trench requirements. See standard drawings related to sanitary sewers.
- B. Pipe. All sanitary sewer pipe 18 inches in diameter and larger shall be ADS Sanitite HP pipe or approved equivalent unless otherwise approved by City Engineer or his/her designee. All other sanitary sewer pipe shall be constructed with polyvinyl chloride (PVC) pipe.
- C. Size. The City Engineer or his/her designee must approve the sizes of all proposed sanitary sewer lines. Minimum size of pipe is 8 inch diameter for main lines and 4 inch diameter for services.
- D. Location. Sanitary Sewer mains shall be located on either the south or west sides of a street 7 feet from the centerline. A maximum of 400 feet of pipe shall be allowed between manholes unless otherwise approved by the City Engineer and/or his/her designee.
- E. Minimum Slopes. Slopes shall be designed to have a 2 foot per second velocity unless otherwise approved by the City Engineer and/or his/her designee. The following table lists minimum slopes for sanitary sewer for each size of pipe:

MINIMUM SANITARY SEWER SLOPES

Pipe Diameter (inches)	Minimum Slope (%)
4	2.000
6	1.000
8	0.334
10	0.248
12	0.194
14	0.158
15	0.144
16	0.132
18	0.113
21	0.092
24	0.077
27	0.066
30	0.057
36	0.045
48	0.031
54	0.027
60	0.023

- F. Sanitary Sewer Lift Stations. Sanitary sewer lifts stations require prior approval. All possible options for a gravity flow system shall be considered prior to requesting approval of a sanitary sewer lift station or equivalent system. Sanitary sewer lift stations or equivalent systems which are approved to be used in a development shall be designed by the Developer’s engineer; the design shall be submitted to the City Engineer or his/her designee for review prior to Preliminary Approval of the development. Lift stations will be the wet well / dry well type, will have standby power, proper ventilation, telemetry, and will be designed for large areas, not individual subdivisions.
- G. Unusual Piping and Plumbing. Special and unusual piping and plumbing for equipment or structures are treated as separate items and are not included in these standards.

500.020. Pipe and Fittings.

- A. General. ADS Sanitite HP pipe or approved equivalent shall be used for all sanitary sewer lines larger than 18 inches in diameter. All other sanitary sewer lines shall be constructed with polyvinyl chloride (PVC) pipe.

Pipe buried more than 12 feet deep shall require manufacturing and engineering specifications to be submitted to the City Engineer or his/her designee for written approval.
- B. Polyvinyl Chloride Pipe (PVC). PVC pipe shall meet the requirements and specifications of APWA 33 05 07 (Polyvinyl Chloride Pipe) and shall have a minimum rating of SDR-35.

- C. ADS Sanitite HP Pipe. Sanitite HP pipe with sizes up to 30 inches shall meet the requirements and specifications of ASTM F2732. Sanitite HP pipe with sizes over 30 inches shall meet the requirements of ASTM F2764.

500.030. Services.

- A. General. All sanitary sewer services shall be connected to existing sanitary sewer mains by use of an Inline Y or approved equivalent Insert-a-Tee type connection, and shall be approved by the City Engineer and/or his/her designee. Sewer services shall extend 10 feet beyond the back of sidewalk and plugged until connected to a building. The minimum cover of sewer laterals is at 3' 6" at the property line.
- B. Clean-outs. Clean-outs, per City details, shall be installed every 100 feet on all service lines.
- C. Replacement of service lines. When an existing lot/parcel has a sewer service lateral that meets current City Code, a Street Cut Permit will not be issued for a new service line without approval from the City Engineer.

Section 550 Storm, Land and Groundwater Drains.**SECTION INDEX****550.010. General.**

- A. Specifications.
- B. Size.
- C. Location.
- D. Minimum Slopes.
- E. Unusual Piping and Plumbing.
- F. Groundwater Drains.

550.020. Pipe and Fittings.

- A. General.
- B. Concrete Pipe.
- C. Polyethylene Pipe.
- D. Polyvinyl Chloride Pipe.
- E. Corrugated Metal Pipe.

550.030. Sumps and Appurtenances.

- A. Connecting to Existing Drains Lines.
- B. Sumps.
- C. Inlet and Clean Out Structures.
- D. Headwalls.

550.040. Retention/Detention Basins.

- A. General.
- B. Retention Basins.
- C. Detention Basins.

550.050. Low Impact Development.

- A. General.

550.010. General.

- A. Specifications. Storm, land and groundwater drain facilities shall meet the requirements and specifications of APWA 33 41 00 (Storm Drainage Systems). These specifications cover the installation of storm, land and groundwater lines. See Section 200 for improvement and design requirements, Section 250 for inspection and testing requirements, and Section 350 for earthwork and trench requirements. See standard drawings related to storm, land and groundwater drains. Land and groundwater drains shall be approved by the City Engineer and shall be installed lower in elevation than the sewer mainline.
- B. Size. The City Engineer or his/her designee must approve the sizes of all proposed drain lines. The minimum size of pipe is 15" diameter for all lines, both mains and laterals.
- C. Location. Drain lines shall be located along the centerline of the street, typically below water mains to reduce conflicts. Unless approved otherwise, a maximum of 400 feet of pipe shall be allowed between manholes.
- D. Minimum Slopes. Slopes shall be designed to have a 2 foot per second velocity unless otherwise approved by the City Engineer and/or his/her designee. The following table lists minimum slopes for drain lines for each size of pipe:

MINIMUM DRAIN LINE SLOPES

Pipe Diameter (inches)	Minimum Slope (%)
12	0.194
14	0.158
15	0.144
16	0.132
18	0.113
21	0.092
24	0.077
27	0.066
30	0.057
36	0.045
48	0.031
54	0.027
60	0.023

- E. Unusual Piping and Plumbing. Special and unusual piping and plumbing for equipment or structures are treated as separate items and are not included in these standards.
- F. Groundwater Drains. All plans for groundwater drains must be designed and stamped by a licensed professional civil engineer in the State of Utah. Only rigid pipe may be used.

550.020. Pipe and Fittings.

- A. General. Reinforced concrete pipe shall be used for all lines with less than 2 feet of cover or more than 8 feet of cover. Corrugated metal pipe (CMP) may only be used when authorized by the City Engineer or his/her designee.
- B. Concrete Pipe. Concrete pipe shall meet the requirements and specifications of APWA 33 05 02 (Concrete Pipe and Culvert). Reinforced concrete pipe (RCP) shall be Class III. Only new pipe may be used unless otherwise authorized by the City Engineer or his/her designee.
- C. Polyethylene Pipe. Polyethylene pipe shall meet the requirements and specifications of APWA 33 05 06 (Polyethylene Pipe) Type S for storm drains and Type SP for land or groundwater drains.
- D. Polyvinyl Chloride Pipe (PVC). PVC pipe shall meet the requirements and specifications of APWA 33 05 07 (Polyvinyl Chloride Pipe).
- E. Corrugated Metal Pipe (CMP). CMP shall meet the requirements and specifications of APWA 33 05 04 (Corrugated Metal Pipe).

550.030. Sumps, and Appurtenances.

- A. Connecting to Existing Drain Lines. Manholes and sumps used to connect proposed storm drain to existing storm drain shall be plumb and centered on the existing storm drain. The new pipe shall be placed against the existing pipe at the elevation designated by the project engineer and the base poured as specified above. Care shall be taken not to disturb the alignment of the existing storm drain during the excavation procedure. Any damage to the existing storm drain shall be repaired.
- B. Sumps. Sumps may only be constructed of reinforced concrete, precast sections and shall meet the requirements of ASTM C478-73. Sumps shall have eccentric lids to ensure adjustments in alignment.
- C. Inlet and Clean Out Structures. Surface water must enter the City storm drain system through standard City inlet boxes. In no case may water inlet directly into storm manholes, clean-outs, or sumps. Inlets and clean out structures shall not exceed 400 ft spacing unless approved otherwise by the City Engineer.

All inlet and clean out structures shall be reinforced concrete boxes. They may be precast or cast-in-place. Grate and Frame Material. All castings shall be of ASTM A-48, Class 35 iron free from blowholes and shrinkage defects. Castings shall be free from fins and burrs and shall be shot-blasted to remove sand and other foreign matter. Freedom from cracks and defects shall be ascertained by the engineer prior to installation.

- D. Headwalls. A headwall shall be installed at all ditch to pipe transitions. Headwall designs must be stamped by a licensed professional civil engineer in the State of Utah and approved by the City Engineer or his/her designee.

550.040. Retention/Detention Basins.

- A. General. Basin designs shall be designed with the following side slopes:

Basin Finish	Min. Side Slope
Non-landscaped	3:1
Landscaped	4:1

- B. Retention Basins. All retention basins shall have a freeboard of 12 inches. Design of retention basins shall be according to the Storm Water Drainage Design Manual. All retention basins shall have a series of interconnected sumps connected to curb inlet boxes or storm drain main lines.

All retention basins shall be constructed for drainage areas designated in the Storm Drain Master Plan. Basins for smaller areas may be allowed only with prior written approval of the City Engineer or his/her designee.

- C. Detention Basins. All detention basins shall have 12 inches of freeboard. Design of detention basins shall be according to the Storm Water Drainage Design Manual. Detention basins may be constructed in landscape or parking areas. Each detention basin shall incorporate LID storm drain principles and have an overflow to the City storm drain system.

550.050. Low Impact Development.

General. All new development and roadways shall incorporate LID storm drain in the form of bioretention swales, underground retention cells and other methods as approved by the City Engineer or his/her designee. LID systems shall be designed in accordance with the Stormwater Design Manual.

Section 600. Streets and Pavements.**SECTION INDEX****600.010. General.**

- A. Street Designations.
- B. Time Limitation after Curb and Gutter.
- C. Geotextiles, Geogrids and Geocomposites.
- D. Pavers.
- E. Painted Traffic Lines and Markings.
- F. Traffic Barriers.
- G. Vehicle Delineators.

600.020. Street Section.

- A. Soils Investigation.
- B. Pavement Section.
- C. Road-base Section.
- D. Sub-base Section.
- E. Grading.

600.030. Trail Section.

- A. General.
- B. Survey.
- C. Weed Abatement.
- D. Geotextile Fence.
- E. Sub-grade.
- F. Weed Barrier.
- G. Limestone Crusher Fines.
- H. Trail Markings.
- I. Clean-up.

600.040. Bituminous Surface Course.

- A. Bituminous Concrete Material Specification.
- B. Bituminous Concrete Placement.
- C. Prime Coat.
- D. Tack Coat.
- E. Overlays and Patches.
- F. Slurry Seal.
- G. Chip Seal.
- H. Micro-Surfacing.
- I. Pavement Crack Seal.
- J. High Density Mineral Bond Seal

600.010. General.

- A. Street Designations. Street designations include: local streets, secondary access, collector streets and arterial streets. Designations shall be assigned by the City in compliance with the Alpine City Transportation Master Plan.
- B. Time Limitation after Curb and Gutter is Placed. Road base shall be placed between 7 to 30 days of placement of curb and gutter. Pavement shall be placed before 45 days after the placement of curb and gutter unless an extension is granted by the City Engineer or his/her designee. If an extension is granted by the City Engineer or his/her designee, and to protect the curb and gutter, the road base shall be graded to the lip of curb elevation extending at least three (3) feet into the roadway at that same elevation until paving can occur; at which point, it shall be re-graded for paving.
- C. Geotextiles, Geogrids and Geocomposites. All geotextile work shall meet the requirements and specifications of APWA 31 05 19 (Geotextiles) and APWA 32 12 16 (Plant-Mix Asphalt Paving). Geogrid and geocomposite work shall meet the requirements and specifications of APWA 31 05 21 (Geogrids/Geocomposites) and APWA 32 12 16 (Plant-Mix Asphalt Paving).
- D. Pavers. Pavers and installation shall meet the requirements and specifications of APWA 32 14 13 (Precast Concrete Unit Paving) and APWA 32 14 16 (Brick Unit Paving).
- E. Painted Traffic Lines and Markings. Painted traffic lines and markings shall meet the requirements and specifications of APWA 32 17 23 (Pavement Markings) and the MUTCD.
- F. Traffic Barriers. Vehicle barriers shall meet the requirements and specifications of APWA 34 71 13 (Vehicle Barriers) and the MUTCD.
- G. Vehicle Delineators. Vehicle delineators shall meet the requirements and specifications of APWA 34 71 19 (Vehicle Delineators) and the MUTCD.

600.020. Street Section.

- A. Soils Investigation. A soils investigation shall be performed for all new roads and those roads for which work will be performed. The results of this investigation and a design of the road cross section shall be submitted to and accepted by the City Engineer or his/her designee.

The following guidelines shall be used as a minimum requirement for street cross sections. They should be used unless the soils investigation indicates they are not adequate. Any variations from these standards must be approved by the City Engineer or his/her designee.

- B. Pavement Section. All roads shall be paved with asphalt concrete according to City standards unless authorized by the City Engineer or his/her designee. The following table shall be used for minimum asphalt pavement surfacing depths:

ASPHALT PAVEMENT COURSE THICKNESS	
Application	Minimum Pavement
Parking Lots and Driveways	3 inch
Local Streets	3 inch + preservation coat after 1 year
Secondary Access Roads	3 inch + preservation coat after 1 year (if pavement is required)
Collector/Arterial Streets	4 inch + preservation coat after 1 year

Streets shall have an approved preservation coat installed 1 year after the end of construction inspection, pending amenable conditions for installation. At the City’s discretion, the contractor may arrange to have the City install the preservation coat at the Contractor’s expense. The funds for a preservation coat shall be provided in escrow prior to recording the subdivision plat.

- C. Road-base Section. All roads shall have a minimum 8 inches of road-base under the pavement section. Road-base shall be an untreated base course installed according to City standards. See Section 350. Earthwork and Trenching. Road-base shall be finished to a smooth uniform line and grade and shall extend

a minimum of 12” beyond the pavement surface for placements without curb and gutter. For placements with curb and gutter it shall extend 12” beyond the back of curb. Road-base shall not be placed and compacted against new curb for a minimum of seven (7) days after curb is poured.

- D. Sub-base Section. All sub-base shall be an engineered fill that meets and is installed according to City standards. See Section 350. Earthwork and Trenching. Sub-base shall be finished to a smooth uniform line and grade and shall extend a minimum of 12” beyond the pavement surface for placements without curb and gutter. For placements with curb and gutter it shall extend 12” beyond the back of curb. The thicker section shall be used in the case where CBR may be in conflict. The following table shall be used for minimum sub-base course thicknesses for the following California Bearing Ratio (CBR) values of sub-grade:

PARKING LOTS AND DRIVEWAYS
MINIMUM SUB-BASE COURSE THICKNESSES

Sub-grade CBR	Minimum Sub-base Thickness (inches)
Less than 2	12
2.1 to 8.0	8
More than 8	No Sub-base Required

LOCAL STREET / SECONDARY ACCESS
MINIMUM SUB-BASE COURSE THICKNESS

Sub-grade CBR	Minimum Sub-base Thickness (inches)
Less than 2	15
2.1 to 3.0	12
3.1 to 10.0	8
More than 10	No Sub-base Required

COLLECTOR / ARTERIAL STREET
MINIMUM SUB- BASE COURSE THICKNESS

Sub-grade CBR	Minimum Sub-base Thickness (inches)
Less than 2.0	18
2.1 to 3.0	15
3.1 to 5.0	12
5.1 to 15.0	8
More than 15	No Sub-base Required

- E. Grading. The sub-grade, sub-base, and road base shall all be graded to an engineered red-head and accepted by the City. Red-heads shall be placed every 50 feet at the crown of the road. If the distance between red-heads and edge of pavement exceeds 25 feet additional redheads shall be installed halfway between the crown and edge of pavement.

600.030. Trail Section.

- A. General. A pavement and soils investigation shall be performed for Class A and B trails. The results of this investigation and a design of the trail section shall be submitted to and accepted by the City Engineer or his/her designee.

The following guidelines shall be used as a minimum requirement for Class A thru D trail cross sections. They should be used unless the soils investigation indicates they are not adequate. Any variations from these standards must be approved by the City Engineer or his/her designee. All trail materials shall be placed according to City standards.

1. Engineered Fill. Compacted engineered fill shall be placed in all areas where fills are required to meet grade or the requirements of the soils investigation.

2. Untreated Base Course. 6 inches of compacted untreated base course shall be placed under the surface course of Class A thru D trails.
3. Bituminous Surface Course. A minimum of 3 inches of APWA DM-1/2, PG 58-28, 50 Blow or SP-3/8, PG58-28, 75Nd bituminous surface course shall be placed across 8 feet of the trail section.
 - a. A maximum of 15% RAP or 15% Recycled Binder Replacement, whichever is less, will be allowed.
- B. Survey. Both sides of a trail shall be laid out by a survey and approved by the City before construction. Lath shall be placed at 100 foot intervals and at bends and obstacles the trail comes near.
- C. Weed Abatement. All weeds shall be sprayed and killed with Roundup or an approved equivalent one week before any work may be performed, and within 3 weeks of the placement of untreated base course.
- D. Geotextile Fence. An APWA 31 05 19 (Geotextiles) silt fence shall be installed along the limits of the trail construction at hillsides, river embankments, or by or through City Open Space.
- E. Sub-grade. The sub-grade shall be grubbed of all trees, bushes and other organic matter. Sub-grade shall be graded to meet the following ADA requirements for walkways when required on ADA accessible pathways:
 1. Maximum Slope. Sub-grade shall not have a slope greater than 8.33%.
 2. Maximum Run for Steep Slopes. For slopes between 5.00% and 6.25% the maximum run shall be 40 feet. For slopes between 6.25% and 8.33% the maximum run shall be 30 feet.
- F. Weed Barrier. Weed barrier geotextile shall meet the requirements and specifications of APWA 31 05 19 (Geotextiles).
- G. Trail Markings. Trail lanes shall be delineated by a center single dashed yellow line. Painted traffic lines and markings shall meet the requirements and specifications of APWA 32 17 23 (Pavement Markings) and the MUTCD.
- H. Clean-up. Upon completion of the trail section all windrows, survey and construction debris shall be removed from along the edges of the trail.

600.040. Bituminous Surface Course.

- A. Bituminous Concrete Material Specification. Bituminous Concrete material (aka: asphalt material) shall meet the requirements and specifications of APWA 32 12 05 (Bituminous Concrete).

For all streets, parking lots, trails, and repairs; use APWA DM-1/2, PG 58-28, 50 Blow or SP-3/8 PG58-28, 75Nd. Recycled Asphalt Pavement (RAP) or Recycled Asphalt Binder (RAB) content may not exceed 15% in any mix design.

- B. Bituminous Concrete Placement. Placement of bituminous concrete (asphalt) shall meet the requirements of APWA 32 12 16.13 (Plant-Mix Asphalt Paving) and APWA 32 12 17 (Cold-Mix Asphalt Paving).

For all new construction, paving shall not occur until gas and power utilities are installed. Other dry utility crossings shall be installed and approved by the dry utility company representative and the City Engineer or his/her designee. Crossings shall be surveyed and included on the asbuilt drawings.

Required testing for culinary water, pressurized irrigation, sewer, and storm drain shall be completed and approved by the City Engineer or his/her designee prior to paving.

For paving limitations, see Asphalt Paving Limitations, Section 250.

Cold-mix asphalt concrete shall only be installed when allowed by the City Engineer or his/her designee. All cold-mix asphalt concrete shall be replaced with hot-mix within 30 days of when it becomes available.

- C. Prime Coat. Prime coat only as required by the plans or the City. Prime coat shall meet the requirements and specifications of APWA 32 12 13 (Prime Coat).
- D. Tack Coat. Install tack coat as required and according to APWA 32 12 13 (Tack Coat). Use CSS-1 or CSS-1h tack emulsion diluted 2:1 (concentrate to water).

- E. Thin Overlays and Patches. Use binder and bituminous concrete as defined in Article A based on paver or hand applications. Apply tack coat to all horizontal and vertical surfaces sufficient to achieve minimum 95% coverage prior to placement of overlay or patch.
- F. Slurry Seal. Slurry seals shall meet the requirements and specifications of APWA 32 01 13 (Slurry Seal). The type of slurry seal applied to a City street shall be approved and specified by the City Engineer.
- G. Chip Seal. Chip seals shall meet the requirements and specifications of APWA 32 01 13 (Chip Seal).
- H. Micro-Surfacing. Micro-surfacing shall meet the requirements and specifications of APWA 32 01 15 (Micro-Surface Seal).
- I. Pavement Crack Seal. Pavement crack seals shall meet the requirements and specifications of APWA 32 01 17 (Pavement Crack Seal).
- J. High Density Mineral Bond Seal. High density mineral bond seals shall meet the requirements and specifications of 2017 APWA 32 01 13 (High Density Mineral Bond Seal).

Section 650. Portland Cement Concrete and Masonry Work.**SECTION INDEX****650.010. General.**

- A. Specifications.
- B. Allowable Grades.
- C. American Disabilities Act (ADA) Requirements.
- D. Combination Curb, Gutter, and Sidewalk.
- E. Cold Weather Concrete.
- F. Debris in Gutters.
- G. Sidewalk.
- H. Drive Approaches.
- I. Protection of Wet Concrete.
- J. Repair.

650.020. Installation.

- A. Cutting Pavement.
- B. Forms and Joints.
- C. Base Material.
- D. Mixing and Conveying.
- E. Finishing.
- F. Curing.

650.030. Materials.

- A. Coarse Aggregate.
- B. Fine Aggregate.
- C. Cement.
- D. Water.

650.040. Concrete Mixes.

- A. Mix Design.
- B. Proportioning.
- C. Control.
- D. Water Adjustments.

650.050. Masonry.

- A. General.

650.010. General.

- A. Specifications. These specifications cover the installation of concrete work including but not limited to curbs, gutters, sidewalks, boxes, and thrust blocks. All concrete work shall meet the requirements and specifications of APWA Division 03 Concrete and related sections. Concrete driveway, sidewalk, curb and gutter work shall meet the requirements and specifications of APWA 32 16 13 (Driveway, Sidewalk, Curb, Gutter). See Section 200 for improvement and design requirements, Section 250 for inspection and testing requirements, and Section 350 for earthwork and trench requirements. Also, see standard drawings related to concrete work.

All concrete work shall be constructed where indicated on the plans or as directed by the project engineer and shall conform in all respects to the specified lines, grades, and dimensions and City standards.

- B. Allowable Grades. The minimum grade allowed for any gutter is 0.50%. See Alpine City Development Code for maximum allowable grades of City streets.
- C. American Disabilities Act (ADA) Requirements. All pedestrian facilities will conform to the current federal ADA standards.
- D. Combination Curb, Gutter, and Sidewalk. Combination curb, gutter, and sidewalk will not be allowed unless authorized by the City Engineer or his/her designee.
- E. Cold Weather Concrete. Concrete shall not be placed when a descending air temperature in the shade and away from artificial heat falls below 35°F. Concrete shall not be poured on frozen ground. Where temperatures are projected to descend below 32°F within 72 hours after placement, concrete shall be covered or otherwise protected against freezing. No calcium based add mixtures may be used. Any other add mixtures must be approved by the City Engineer or his/her designee.

If concrete is not protected by insulation blankets for 72 hours following installation and the temperature drops below 45 degrees a pay factor of 0.50 shall apply.

Per APWA Division 03, concrete placed between October 1 and March 1 requires an increase in mix design strength by 1 class, i.e. Class 3000 becomes Class 4000, Class 4000 becomes Class 5000, etc.

- F. Debris in Gutters. Once curb and gutter and surface course is in place they shall be kept as clean as possible. Dirt and gravel shall not be placed in gutter or on street. Gutter shall flow freely at all times.
- G. Sidewalk. Sidewalk shall be 5 inches thick with 6 inches of compacted road base. To protect the structural integrity of new sidewalk, all dry utilities shall be installed prior to installing sidewalk. When equipment is required to cross over sidewalk, bridging must be provided to protect concrete.
- H. Drive Approaches. All City owned drive approaches shall be 5 inches thick with 6 inches of compacted road base. Commercially owned drive approaches are recommended to be 6 inches thick.
- I. Protection of Wet Concrete. The Contractor shall be responsible to protect wet concrete. Any concrete that is vandalized before setting up shall be replaced at the contractor's expense.
- J. Repair. When authorized by the City Engineer or his/her designee, Contractor may repair concrete damage with Concrete Solution's Ultra Surface Concrete Polymer installed to manufacturer's specifications or an equivalent that is approved by the City Engineer or his/her designee. Repair of concrete sidewalk shall include the entire panel that was damaged with a minimum of five (5) foot length panel replaced.

650.020. Installation.

- A. Cutting Pavement. When replacing gutter, the pavement shall be cut along the entire excavation to provide a vertical joint in the surface. Cut shall be a minimum of 12 inches from lip of gutter. A pavement saw shall be used for all pavement cutting. If excavation damages the cut pavement, pavement shall be cut again before patching. All road cuts shall be repaired within 2 working days.
- B. Forms and Joints. When pouring concrete along a curve, flexible forms with enough stakes to hold the forms at an even curve shall be used.

Curb and gutter contraction joints shall be constructed every 10 feet by using steel templates 1/8 inch in thickness. Sidewalk contraction joints shall meet APWA requirements with the minimum distance between joints being 5 feet.

- C. Base Material. A minimum of 6 inches of untreated base course shall be installed under all concrete and shall extend out 1 foot in all directions from concrete unless otherwise specified. Untreated base course shall be compacted and installed according to City standards. See Section 350. Earthwork and Trenches.
- D. Mixing and Conveying. Concrete transported in a truck mixer, agitator, or other transportation device shall be discharged at the job and placed in its final position in the forms within 1 hour after the introduction of the mixing water to the cement and the aggregate, or the cement to the aggregate, except that in hot weather or under other conditions contributing to quick stiffening of the concrete, the maximum allowable time may be reduced by the City Engineer or his/her designee. The maximum volume of mixed concrete transported in an agitator shall be in accordance with the specified rating. During adverse weather conditions the City Engineer or his/her designee may deem it necessary for the use of a concrete pump truck.
- E. Finishing. As soon as the concrete has set sufficiently to retain its shape without support of the face form, the clamps, spreaders and face forms shall be removed. While the concrete is still green, the surface shall be thoroughly floated with a magnesium or moist wooden float to provide an even smooth surface, then broomed lightly.
- F. Curing. As soon as possible after final finishing, the finished surface shall be coated with a curing compound. The compound shall be an ASTM C-1315 Type 2 curing compound that meets the APWA 03 39 00 (Concrete Curing) specifications. The compound shall be applied in accordance with the manufacturer's recommendations. During the months of October through February exposed concrete shall be covered with an insulated curing blanket that meets the ACI 306 specification for 3 days when temperatures remain at 15 degrees Fahrenheit or higher and for 7 days for temperatures below 15 degrees Fahrenheit. Insulated curing blankets shall only be removed during the warmest parts of the day. The curing compound shall then be applied within 24 hours of the blankets being removed.

650.030. Materials.

- A. Coarse Aggregate. A coarse aggregate shall consist of hard durable particles of a mixture of crushed and natural gravel possessing at least 50% of broken surface area. The coarse aggregate shall be free from substances which are chemically active relative to hydrated cement and shall be subject to particularly the following:
 - 1. Loss on abrasion by Los Angeles Abrasion Test not more than 40% by weight.
 - 2. Loss on exposure to 5 cycles of sodium sulfate soundness test, not more than 8% by weight.
 - 3. Deleterious substances shall not exceed the values in the following table:

PORTLAND CEMENT CONCRETE
COURSE AGGREGATE DELETERIOUS SUBSTANCES

Substance	Maximum % by Weight
Soft Fragments	3.0
Coal Lumps	1.0
Clay Lumps	0.5
Material passing 39 100 Sieve	1.5
Organic Material	0.1
Total for All of the Above	3.0

The maximum size of aggregate to be used shall not exceed 1 1/2 inches in terms of this size definition contained in ASTM Standards except that the maximum size shall not exceed 1/4 of the least dimension of the finished concrete in which the aggregate is to be used.

Coarse aggregate shall be uniformly graded within the following range:

PORTLAND CEMENT CONCRETE
COARSE AGGREGATE GRADATION

Sieve Size	Minimum Retained (%)	Maximum Retained (%)
1 1/2 inch	0	10
3/4 inch	30	70
1/4 inch	75	100
No. 4	95	100

- B. Fine Aggregate. Fine aggregate shall consist of clean, hard durable particles of natural sands, subject to the following limitations:
1. Organic Calorimetric Test using sodium hydroxide shall result in a color not darker than Number 2 in the acceptance range.
 2. Loss on exposure to 5 cycles of the sodium sulfate soundness tests shall not exceed 8% by weight.
 3. Deleterious substances shall not exceed the values in the following table:

PORTLAND CEMENT CONCRETE
FINE AGGREGATE DELETERIOUS SUBSTANCES

Substance	Maximum % by Weight
Soft Fragments	3.0
Coal Lumps	1.0
Material passing 39 100 Sieve	3.0
Micaceous or Flaky Particles	3.0
Total for All of the Above	5.0

Fine aggregate shall be uniformly graded within the following range:

PORTLAND CEMENT CONCRETE
FINE AGGREGATE GRADATION

Sieve Size	Minimum Retained (%)	Maximum Retained (%)
No. 4	0	5
No. 8	0	20
No. 16	20	50
No. 30	50	75
No. 50	75	90
No. 100	95	100

- C. Cement. All cement used shall be Type II unless otherwise allowed by the City Engineer or his/her designee. All cement and dry additives shall be stored in damp-proof conditions. Shipments of cement shall be marked and stored in such a manner as to provide positive identification. The supplier shall keep and have available for inspection at all times an accurate record of supplies and use of cement of the various types and shipments. No cement shall be used which has been subject to dampness or exposure.
- D. Water. Water used for concrete shall be potable and free from excess salts, organic material, or other deleterious substances. Addition of water to the mixed concrete after specified workability has been obtained will not be allowed, nor shall any concrete be re-tempered or re-mixed.

650.040. Concrete Mixes.

A. Mix Design. Concrete mix designs shall meet the following requirements:

PORTLAND CEMENT CONCRETE MIX DESIGN REQUIREMENTS

Property	Standard Requirement	Thrust Block Material
Cement Content	6.5 Bags per Cubic Yard (Minimum)	3.5 Bags per Cubic Yard (Minimum)
28 Day Compressive Strength	4000 psi (Minimum)*	2000 psi (Minimum)*
Slump Range	1 to 3 inches	1 to 6 inches
Flatwork Slump Range	3 to 4 inches	NA
Air Content	5% to 7%	NA

* Per APWA 03 30 04, increase cement content in the mix design by 1 class between **October 1 and March 1**, i.e. Class 4000 becomes Class 5000.

B. Proportioning. The supplier shall determine proportions by weight of aggregates, cement, additives, and water required to comply with strength, workability, and other requirements detailed herein. Such proportions shall be submitted to the City Engineer or his/her designee in three copies annually along with the following tests on materials and shall be subject to his/her approval.

1. Coarse aggregate
 - a. Source
 - b. Deleterious substances
 - c. Los Angeles Abrasion Test
 - d. Sodium Sulfate Soundness Test
 - e. Sieve
2. Fine aggregate
 - a. Source
 - b. Deleterious substances
 - c. Calorimetric Test for Organics
 - d. Sodium Sulfate Soundness Test
 - e. Sieve and fineness modulus
3. Cement
 - a. Type
 - b. Supplier
 - c. Analysis

Upon approval, all concrete shall be prepared in terms of the proportions so approved unless variation becomes necessary by reason of materials or conditions to achieve the requirements of these specifications, in which case such variation shall be approved in writing by the City Engineer or his/her designee. Approval by the engineer of mix proportions shall not relieve the supplier from the responsibility for obtaining the concrete strengths specified or complying will all other provisions of this specification.

C. Control. Measurements of materials except water shall be by weight. Equipment used shall be capable of controlling weight within 1% of each ingredient. Water may be measured either by volume or weight provided that an accuracy of 1% is maintained. Cement may be assumed to weigh 94 pounds per sack but proportioning aggregates for fractional sacks of cement will not be permitted unless the fractional amount is weighed for each batch.

D. Water Adjustments. Compensation for the water contained in the aggregates shall be made at least once daily or as often as inspection of the concrete may indicate that variation from this cause has occurred. The Pycnometer Method of assessing water in aggregate may be used for its determination for the purposes of this paragraph.

650.050. Masonry.

A. General. All masonry work shall meet the requirements and specifications of APWA Division 04 Masonry and related sections.

Section 700. Conduit

SECTION INDEX

700.010. General.

700.020. Utility Conduit

- A. Responsibility to install
- B. Materials
- C. Location
- D. Magnetic

700.030. Installation

- A. Cutting
- B. Dewatering
- C. Laying
- D. Bedding

700.010. General.

- A. This Division covers furnishing and installing telecommunications conduit.

700.020. Utility Conduit.

- A. Responsibility to install. Developers shall be responsible to install utility conduits for placement of public utilities and street lighting: Two – two-inch (2") (initially empty) communications conduits shall be installed parallel and congruent to all primary and secondary power conduits such that communication lines can serve all lots individually. Communications service boxes labeled "Communications" shall be installed above the communications conduits directly adjacent to all power boxes (i.e.: ground sleeves, transformers, etc.).
- B. Materials. The conduit and junction/pull boxes shall be of the material specified by each utility company. Junction/pull box locations shall be specified by the utility company.
- C. Location. Conduits shall be installed at locations established by utility company engineers and approved by the City, outside of the roadway (see Standard Detail 1). Excavation shall be at depth and standards of utility companies. Conduits shall have bends attached to each end and placed vertically out of the ground for location verification. Conduits crossing street rights-of-way shall have a minimum of 18" cover below finished street grade. Conduit clusters shall be installed at all intersections. The cluster shall consist of four (4) 4 inch conduits and one 6 inch conduit spaced 3' away.
- D. Magnetic Locator Tape. All utility conduits shall include a 3" magnetic locator tape installed in the pipeline trench approximately 12" below the ground surface, with appropriate cautionary wording printing on the tape to identify the type of utility present.

700.030. Installation.

- A. Cutting. Cutting of conduit for closure pieces or for other reasons shall be done in a neat and workmanlike manner by a method recommended by the manufacturer.
- B. Dewatering of Trench. Where water is encountered in the trench, it shall be removed during conduit laying operations and the trench so maintained until the ends of the conduits are sealed. See "Temporary Controls" in Section 200.010.
- C. Laying of Conduit. The conduit shall be inspected for defects before installation. Any defects shall be repaired or the conduit shall be replaced, whichever is deemed necessary by the Engineer or his/her designee. All conduits shall be laid and maintained to the required lines and grades. The Contractor shall be responsible to install the conduit line to the alignment set by the Engineer or as shown on the Drawings. The Contractor shall take the necessary precautions such that foreign materials do not enter into the conduit. No debris, tools, or other materials shall be placed in the conduit during laying operations. When laying of conduit is not in progress, the conduit shall be closed by a watertight plug. Maximum vertical or horizontal deflections of conduit are not to exceed a ratio of 10:1 along its length (e.g. no more than 4" deflection per 40" length.) Install all conduit bends to have a radius that is: 1. Not less than 10 times the inside diameter of the conduit. 2. Not less than the minimum bend radius called out on the plans. At no time shall the conduit be deformed to make a bend. The minimum separation between conduits shall be 3". The minimum separation between the conduit and trench wall shall be 1.5". Once bend locations have been verified to meet the Utility Company requirements, junction/pull boxes shall be installed at each bend location.
- D. Bedding. All conduits shall be protected from lateral displacement and possible damage resulting from impact or unbalanced loading during backfilling operations by being adequately bedded. In the event trench materials are not, in the judgment of the Engineer or his/her designee, satisfactory for conduit bedding, imported granular bedding will be required. See "Bedding Material" in Section 350.040.

Section 850. Surface Irrigation Systems.

SECTION INDEX

850.010. General.

- A. Specifications.
- B. Size.
- C. Location.
- D. Minimum Slopes.
- E. Unusual Piping and Plumbing.

850.020. Pipe and Fittings.

- A. General.
- B. Concrete Pipe.
- C. Polyethylene Pipe.
- D. Corrugated Metal Pipe.

850.010. General.

- A. Specifications. Piped irrigation facilities shall be required per Alpine City Development Code. Facilities shall meet the requirements and specifications of APWA 33 41 00 (Storm Drainage Systems). These specifications cover the installation of storm/irrigation lines. See Section 200 for improvement and design requirements, Section 250 for inspection and testing requirements, and Section 350 for earthwork and trench requirements. See standard drawings related to storm/irrigation lines.
- B. Size. The City Engineer or his/her designee must approve the sizes of all proposed drain lines. The minimum size shall be determined based on Alpine Irrigation Company and Alpine City needs.
- C. Location. Piped irrigation systems shall be located as close to the original ditch system as possible. Variations in location must be approved by the City Engineer or his designee and the Alpine Irrigation Company. A maximum of 400 feet of pipe shall be allowed between manholes.
- D. Minimum Slopes. Slopes shall be designed to have a 2 foot per second velocity unless otherwise approved by the City Engineer and/or his/her designee. The following table lists minimum slopes for irrigation lines for each size of pipe:

MINIMUM IRRIGATION PIPE SLOPES

Pipe Diameter (inches)	Minimum Slope (%)
24	0.077
30	0.057
36	0.045
48	0.031
54	0.027
60	0.023

- E. Unusual Piping and Plumbing. Special and unusual piping and plumbing for equipment or structures are treated as separate items and are not included in these standards.

850.020. Pipe and Fittings.

- A. General. Reinforced concrete pipe shall be used for all lines with less than 2 feet of cover or more than 8 feet of cover. Corrugated metal pipe (CMP) may only be used when authorized by the City Engineer or his/her designee.
- B. Concrete Pipe. Concrete pipe shall meet the requirements and specifications of APWA 33 05 02 (Concrete Pipe and Culvert). Reinforced concrete pipe (RCP) shall be Class III. Only new pipe may be used unless otherwise authorized by the City Engineer or his/her designee.
- C. Polyethylene Pipe. Polyethylene pipe shall meet the requirements and specifications of APWA 33 05 06 (Polyethylene Pipe) Type S for storm drains and Type SP for land or groundwater drains.
- D. Corrugated Metal Pipe (CMP). CMP shall meet the requirements and specifications of APWA 33 05 04 (Corrugated Metal Pipe).

Section 900. Landscaping.

SECTION INDEX

900.010. General.

- A. Specifications.
- B. Appurtenances.
- C. As-Built Drawings.
- D. Government Regulations.
- E. Source.
- F. Fences and Walls.
- G. Tree Grates.
- H. Vegetation Control.

900.020. Lawns and Grasses.

- A. General.
- B. Grading.

900.030. Ground Cover.

- A. General.

900.040. Trees.

- A. General.
- B. Tree Sizes.
- C. Labels.

900.010. General.

- A. Specifications. These specifications are for landscape work completed on public property or private property that will become public property.
- B. Appurtenances. Any minor items of labor or materials not specifically noted on the drawings or specifications; but obviously necessary for the proper completion of the work, are to be considered as incidental to and are to be included in the contract.
- C. As-Built Drawings. The contractor must furnish as-built drawings to the City. These drawings should be updated whenever a change from the design is made to assure accuracy. The drawings must show a record of all departures from the contract drawings that occur during construction. These shall be kept on a clean set of prints of the contract drawings.

The Project Manager/Owner will review the "as-built drawings" to verify that changes are being recorded as construction occurs. These drawings and maintenance manuals must be submitted at the time of final inspection or in accordance to the general conditions.

- D. Government Regulations. Ship landscape materials with certificates of inspection as required by governmental authorities. Comply with governing regulations applicable to landscape materials.
- E. Source. Provide trees and shrubs, and other plants grown in a recognized nursery in accordance with good horticultural practice. Provide healthy, vigorous stock grown under climatic conditions similar to the locality of the project and free of disease, insects, eggs, larvae, and defects such as knots, sun-scale, injuries, abrasions, or disagreement.

Plant Materials and other landscape items will be evaluated according to compliance with drawings, schedules, and specifications; as well as overall aesthetic quality, grower or supplier reputation, physical inspection, and American Association of Nurseryman Standards (AANS). Select plants that will not be adversely affected by the existing soil chemistry at the planting location.

The source or supplier for all plant materials shall be furnished to the City prior to the delivery of any plant materials on site or stored elsewhere.

- F. Fences and Walls. All fences and walls must be approved by the City. Chain link and field wire fencing shall meet the requirements and specifications of APWA 32 31 13 (Chain Link Fences and Gates) and APWA 32 31 16 (Welded Wire Fences and Gates) respectively. The relocation of fences and gates shall meet the requirements and specifications of APWA 32 01 10 (Relocate Fences and Gates) and related sections.
- G. Tree Grates. Only 4 foot square D&L O-8644 or approved equivalent grates shall be used. Grates shall be set to grade with the top back of curb and sidewalk. Grates shall be set in metal frame manufactured specifically for grate. Frame shall be set in concrete extending a minimum of 6 inches from sides of frame. Concrete shall be installed to City standards for Portland Cement Concrete.
- H. Vegetation Control. Vegetation control shall meet the requirements and specifications of APWA 31 31 19 (Vegetation Control).

900.020. Lawns and Grasses.

- A. General. Lawns and grasses shall meet the requirements and specifications of APWA 32 92 00 (Turf and Grasses).
- B. Grading. Till soil to a depth of 4 inches and remove rocks and debris over 1 inch in diameter. The elevation of top soil relative to walks, hard surfaces or edges shall be:
 - 1. Seeded Areas. 1/2 inches below.
 - 2. Sodded Areas. 1 1/2 inches below.
- C. Slopes. For lawn and grassed areas, which will be maintained by lawnmowing equipment, the maximum grade shall be 6:1 (6 horizontal to 1 vertical).

900.030. Ground Cover.

- A. General. Ground cover shall meet the requirements and specifications of APWA 32 93 13 (Ground Cover) and APWA 32 01 90 (Plant Maintenance). Install according to APWA plan number 683.

900.040. Trees.

- A. General. Tree and work relating to trees shall meet the requirements and specifications of APWA 32 93 43 (Tree), APWA 32 01 91 (Tree Root Cutting), APWA 32 01 93 (Pruning Trees) and 32 01 90 (Plant Maintenance). Install according to APWA plan number 681. Use 6 foot posts for any tree staking. Trees may be planted without a certified arborist when authorized by the City Engineer or his/her designee.
- B. Tree Sizes. Follow Alpine City Tree Guidebook
- C. Labels. Label at least one plant of each variety with a securely attached waterproof tag bearing legible designation of botanical and common name.

Section 950. Irrigation Sprinkler Systems.**SECTION INDEX****950.010. General.**

- A. Specifications.
- B. Appurtenances.
- C. Pressure Verification.
- D. Plan Modifications.
- E. As-Built Drawings.
- F. Final Inspection.

950.020. Pipe and Fittings.

- A. Pipe.
- B. Main Line Fittings.
- C. Circuit Pipe Fittings.
- D. Sleeves.
- E. Conduit for Control Wires.

950.030. Sprinkler Heads.

- A. General.
- B. Spray Heads.
- C. Rotary Heads.

950.040. Controller, Valves and Flow Meters.

- A. Controller.
- B. Manual Main Line Isolation Valve.
- C. Manual Circuit Isolation Valve.
- D. Automatic Valves.
- E. Master Valves and Flow Meters.
- F. Automatic Drain Valves.
- G. Back Flow Preventer.
- H. Stop and Waste Valves.
- I. Quick Coupler Valves.
- J. Valve Boxes.
- K. Control Wire.

950.050. Installation.

- A. Schedule.
- B. Depth and Location.
- C. Trench Backfill Material.
- D. Thrust Blocks.
- E. Flushing.
- F. Gluing.
- G. Marking Zones.

950.010. General.

- A. Specifications. These specifications are for landscape work completed on private property that will become public property. All underground irrigation systems shall meet the requirements and specifications of APWA 32 84 23 (Underground Irrigation Systems).
- B. Appurtenances. Any minor items of labor or materials not specifically noted on the drawings or specifications; but obviously necessary for the proper completion of the work, are to be considered as incidental to and are to be included in the contract.
- C. Pressure Verification. The Contractor, prior to installing the system, must verify existing water pressure. If there is a failure to obtain the needed pressure or if an excess of pressure exists for normal operation, the Contractor shall contact the City for any adjustments to the system. Failure to report any discrepancies in pressure due to whatever reason, and installation done prior to notification of City Parks Department shall be done at the expense of the Contractor.
- D. Plan Modifications. The plans show the general arrangement of all piping. Should local conditions necessitate the rearrangement of some, or if piping can be run to better advantage, the contractor, before proceeding with the work, shall prepare and submit drawings of such to the office of the Alpine City Parks Department Representative and obtain written approval before commencing work shown by these drawings.
- E. As-Built Drawings. Before the final inspection is complete, the contractor must furnish as-build drawings. These drawings should be updated on a daily basis to assure accuracy. The drawings must show the location of all valves, pipe, heads, controller control lines, and drain valves used on the job. These drawings and maintenance manuals must be submitted at the time of final inspection or in accordance to the general conditions.
- F. Final Inspection. The Contractor shall operate, maintain, and guarantee the irrigation sprinkler system until all landscaping on the project is approved by the Alpine City Parks Department at a final inspection. Contractor shall submit manufacturer's technical product maintenance data and installation instructions for irrigation sprinkler system materials and products to the City before final inspection.

950.020. Pipe and Fittings.

- A. Pipe. Use solvent weld schedule 40 PVC for main line pipe 3 inches in diameter and smaller. Use Class 200 PVC for main line pipe larger than 3 inches in diameter.
- B. Main Line Fittings. Use solvent weld schedule 40 PVC fittings for pipe smaller than 3 inches in diameter. All fittings for pipe 3 inch and larger pipe shall be ductile iron, grade 65-45-12 in accordance with ASTM A-536.

Fittings shall have deep bell push on joints with gaskets meeting ASTM F977. Fittings shall be Harco Deep Bell as manufactured by the Hanington Corporation of Lynchburg, VA or approved equivalent. Transition gaskets are not allowed.
- C. Circuit Pipe Fittings. Use solvent weld schedule 40 PVC fittings for pipe sizes 2.5 inches or less.
- D. Sleeves. Pipe and control wiring and tubing under walks, roads and other hard surfaces shall be installed in solvent weld schedule 40 PVC sleeves of adequate size. Sleeves for pipes shall be a minimum of 3 inches in diameter or one and a half times the size of the pipes, whichever is greater. Sleeves shall be straight and level or less than 2% grade.
- E. Conduit for Control Wires. All wiring shall be placed in its own conduit. Sleeves are not required for control wire conduit under hard surface areas. Conduit for control wires shall have minimum inside diameters according to the following chart:

MINIMUM CONDUIT SIZES	
Number of 14 Gauge Wires	Conduit I.D.
1 to 7	1 inch
8 to 11	1 ½ inch
12 to 22	2 inch
23 to 31	2 ½ inch
32 to 36	3 inch

950.030. Sprinkler Heads.

- A. General. Install according to APWA plan number 621 and 622, but do not install PVC elbow and riser.
- B. Spray Heads. All spray type sprinkler heads shall be Rainbird "1804" PRS (pressure reducing spray) series or approved equivalent. All lawn spray heads shall be installed on swing pipe with two spiral barbed ells.
- C. Rotary Heads. All rotary type sprinkler heads shall be Rainbird Falcon 6500 or RS5000 series or approved equivalent. All stream rotary and impact heads capable of distributing 10 gallons per minute or more shall be installed on pre-assembled swing joint by Spears or an approved equivalent.

950.040. Controller, Valves and Flow Meters.

- A. Controller. Controller and pedestal shall be the same type as those used in the City central control system. The controller shall be as described in the irrigation legend on the drawings.
- B. Manual Main Line Isolation Valve. See standard drawing for pressure pipe main line valves.
- C. Manual Circuit Isolation Valve. Brass ball valve with handle.
- D. Automatic Valves. Automatic valves shall be Rainbird PEB electric remote control valves or an approved equivalent. A manual circuit isolation valve shall be installed on the supply side of each automatic valve. Install according to APWA plan number 633, but do not install schedule 80 PVC union.
- E. Master Valves and Flow Meters. Master valves and flow meters must be installed on main supply line and/or according to design and must be compatible with the City central control system.
- F. Automatic Drain Valves. Install according to APWA plan number 632.
- G. Back Flow Preventer. Shall be required on connections to the drinking water system. See section 400.040, Backflow Assemblies.
- H. Stop and Waste Valves. Stop and waste valves shall be Mueller H - 10288 Oraseal or an approved equivalent. Stop and Waste valve shall be of manual type for operation by handle key. Stop and waste valves shall be installed in a typical water meter can, see Standard Details.
- I. Quick Coupler Valves. Quick coupler valves shall be installed with brass riser and pre-manufactured swing joint. At least 2 quick coupler valves shall be installed, one at each end of main line. Valves shall be 1 inch standard.
- J. Valve Boxes. Valves shall be located in lawn or planted areas. Avoid locating valves in areas of high pedestrian and vehicular circulation. Valve boxes shall be at finished grade with valve stems 4 inches minimum and 12 inches maximum below top of box and with 3 inches of pea gravel or 3/4 inch minus crushed gravel under the valve. Valve boxes shall be rectangular, heavy duty and green in color. Valve boxes for automatic valves shall be large enough to enclose manual circuit isolation valve and automatic valve.
- K. Control Wire. Minimum size to be 14 gauge. Install wire according to APWA plan number 651. Add two extra blue control wires per controller to the longest run for emergency use and mark it in the control box as an extra wire. A two-wire system may be required.

950.050. Installation.

- A. Schedule. Contractor shall submit a construction schedule of anticipated work time to facilitate timely visits for review of work. Schedule must be submitted to the City before any landscaping may begin
- B. Depth and Location. Lines bordering curbs or sidewalks shall be 6 inches away to allow for maintenance and access to the lines. Control wires must be buried in appropriately sized conduit for the job (determined by design), one (1) inch minimum, at least 12 inches below finished grade and bundled with a plastic tape every 20 feet.
- C. Trench Backfill Material. All trenches shall be backfilled in 12 inch lifts and tamped sufficiently to insure no settling of the surface. No rocks larger than 1 inch shall be allowed within 3 inches of the pipe. The Contractor, in placing the irrigation lines, and appurtenances, may uncover material not suitable for finished

grading. This material shall be removed from the site. After the installation of the lines, the finished grading shall be smoothed over and restored to its original condition, using additional topsoil where necessary.

- D. Thrust Blocks. All mainlines greater than 2 inches in size shall be installed with thrust blocks wherever a change of direction occurs. Thrust blocks shall be installed as follows:
 - 1. Bearing area of concrete thrust-block based on 200-PSI pressure and safe soil bearing load of 2,000 pounds per square foot.
 - 2. Concrete blocking shall be cast in place and have a minimum of 1/4 square foot bearing against the fittings.
 - 3. Block shall bear against fittings only and shall be clear of joints.
 - 4. Contractor shall install block adequate to withstand full test pressure as well as to continuously withstand operation pressure under all conditions of service.
- E. Flushing. When the pipe lines are connected and the sprinkler risers in place but before any heads are installed, the control valves shall be opened and flushed with a full head of water to clean out the system.
- F. Gluing. Gluing of PVC pipes shall be done with gray "Weld-on 711" and "Weld-on P70" primer.
- G. Marking Zones. Valves must be tagged with labels indicating which zone they operate.

Section 1000. Standard Details



A handwritten signature in black ink, which appears to read "Jed Muhlestein". The signature is written in a cursive style and is positioned above a horizontal line.

Jed Muhlestein
Alpine City Engineer



CONSTRUCTION DETAILS

Adopted September 26, 2023



ALPINE CITY STANDARD DETAILS

ALPINE CITY ADOPTS 2017 APWA STANDARD SPECIFICATIONS AND DETAILS. FOR CITY SPECIFIC DETAILS, PLEASE SEE THE FOLLOWING:

STREETS

1. Street Cross-Sections
2. Alternate Street Cross-Sections
3. Street Cross-Sections Unequal Elevations
4. Sidewalk, Curb & Gutter, Waterway
5. Class A & B Trail Cross-Sections
6. Class C, D, & E Trail Cross-Sections
7. Cul-de-sac Detail
8. Knuckle Detail
9. Standard Setbacks
10. Temporary Turn-a-round

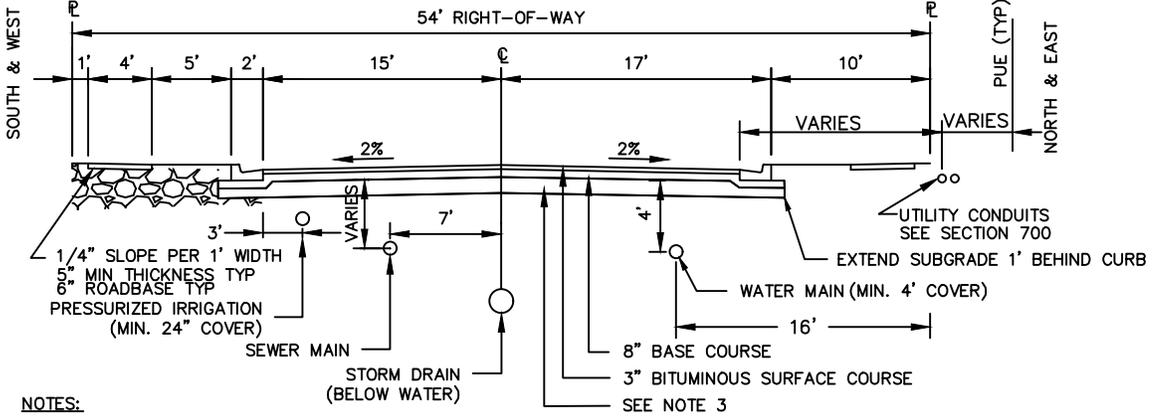
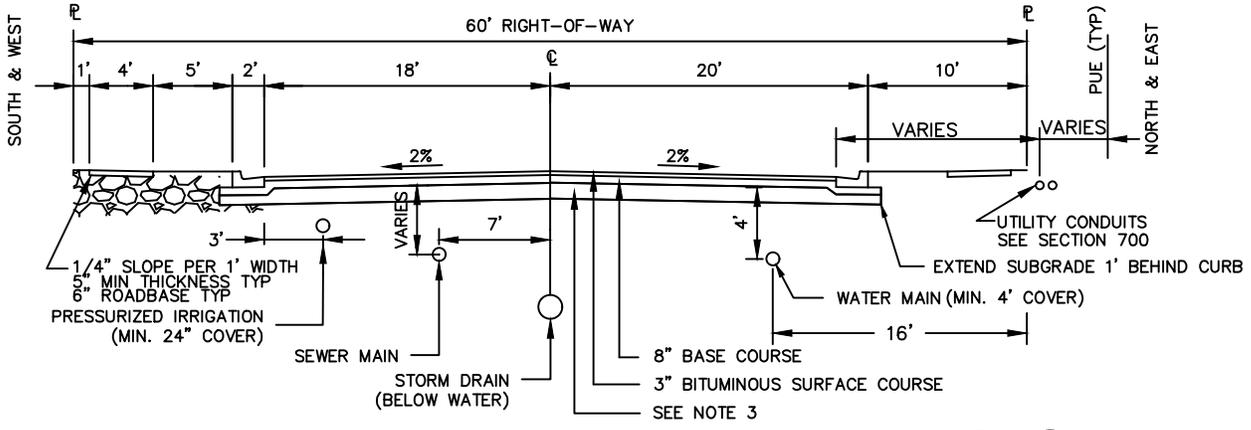
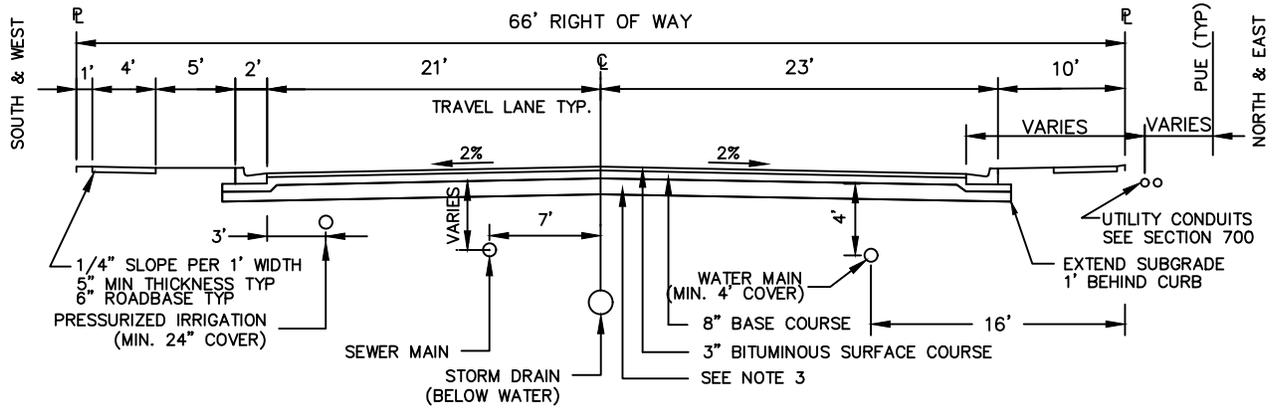
UTILITIES

11. Standard Street Intersection and Utility Location
12. Standard Lot Utility Locations
13. Utility Conflict
14. City Utilities in Common Trench
15. Ditch Crossing
16. Manhole Ring & Cover (typical)
17. Sewer Manhole & Service Connection (typical)
18. Storm Drain Sump (typical)
19. Sump Disposal & Snout (typical)
20. Curb Face Drop Inlet Box (typical)
21. Dipstone Outlet
22. Flush Valve (typical)
23. Fire Hydrant
24. Pressurized Irrigation Service
25. Pressurized Irrigation Service w/ PRV
26. Pressurized Irrigation Airvac
27. Water Connection & Valve Box Details
28. Temporary Sewer Main Cleanout

MISC

29. Public Open Space Fencing
30. Fencing Regulations
31. Street Lights

32. Sight Triangle
33. Standard Seed Mixtures
34. Irrigation Company Ditches
35. Roadway Tree Trimming
36. Parking Dimensions
37. 2-Inch Pressurized Irrigation Drain
38. Irrigation Inlet (typical)
39. Trenching Under Cast Iron Pipe



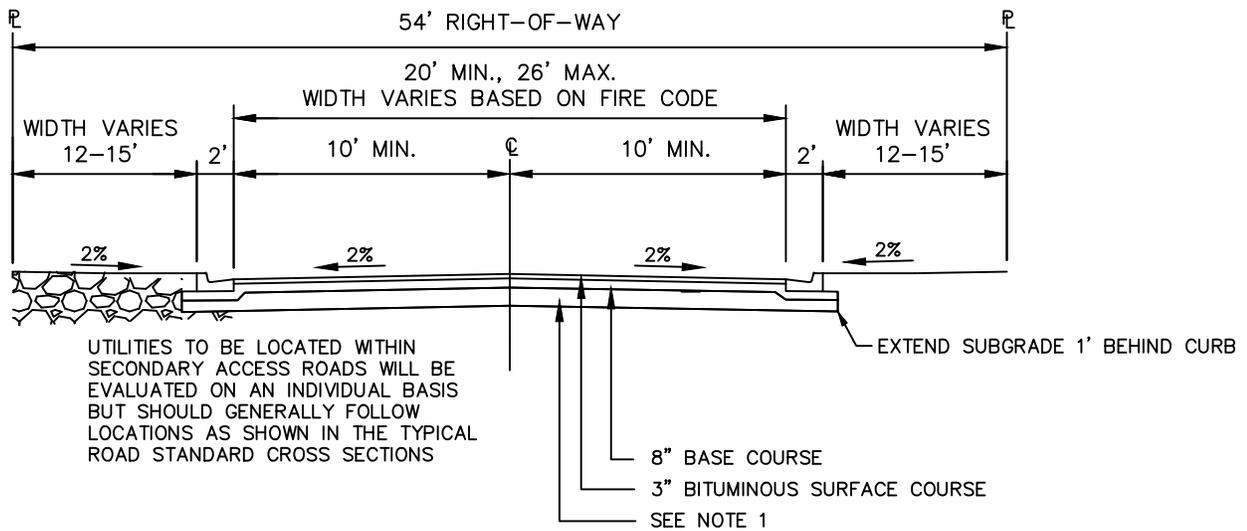
NOTES:

1. WATER VALVES AND 5-INCH VALVE OPENING MUELLER FIRE HYDRANTS SHALL BE LOCATED AS APPROVED.
2. NO WATER LINE SMALLER THAN 8-INCH DIA. SHALL BE INSTALLED WITHOUT APPROVAL OF CITY COUNCIL.
3. SUBGRADE DEPTHS VARY DEPENDING ON CBR VALUE OF THE AREA, SEE ALPINE CITY STANDARD SPECIFICATIONS
4. CULINARY WATER MAINS SHALL BE ON THE NORTH AND EAST SIDES OF THE STREET.
PRESSURIZED IRRIGATION AND SEWER LINES SHALL BE ON THE SOUTH AND WEST SIDES OF THE STREET.

STREET CROSS-SECTIONS & UTILITY LOCATIONS

N.T.S.

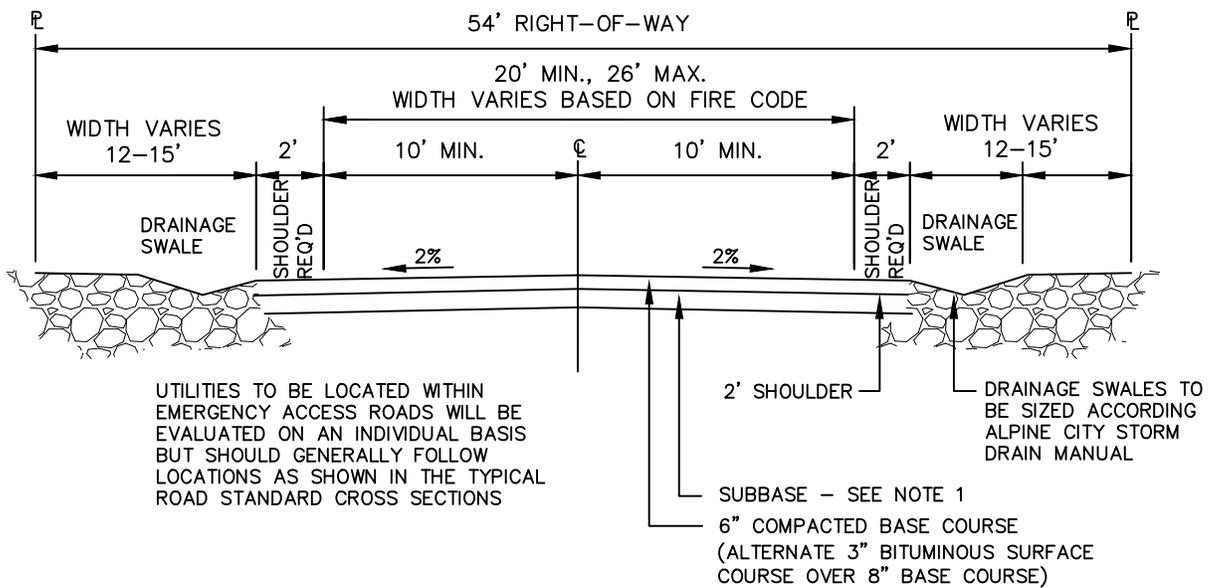
<p>STATEMENT OF USE</p> <p>THIS DOCUMENT AND ANY ILLUSTRATIONS HEREON ARE PROVIDED AS STANDARD CONSTRUCTION DETAILS WITHIN ALPINE CITY. DEVIATION FROM THIS DOCUMENT REQUIRES APPROVAL OF ALPINE CITY. ALPINE CITY CORPORATION CAN NOT BE HELD LIABLE FOR MISUSE OR CHANGES REGARDING THIS DOCUMENT.</p>		<h1 style="margin: 0;">STREET CROSS-SECTIONS</h1>	<p>STANDARD DRAWING NUMBER:</p> <h1 style="font-size: 2em; margin: 0;">1</h1>									
<p>REVISION</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 5%;">NO.</td> <td style="width: 15%;">BY</td> <td style="width: 15%;">APRIL</td> <td style="width: 15%;">DATE</td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </table>	NO.	BY	APRIL	DATE					<p>ALPINE CITY 20 NORTH MAIN ALPINE, UT 84004</p>			<p>PLOT SCALE: N.T.S.</p> <p>DRAWN BY: B.D.B.</p> <p>DESIGN BY:</p> <p>CHECKED BY:</p> <p>ADOPTED DATE: 10/13/05</p>
NO.	BY	APRIL	DATE									
<p>CAD FILE: E:\ENGINEERING\CODES & STANDARD SPECS\STANDARD SPECIFICATIONS AND DRAWINGS\2023 CITY SPEC & DETAILS\DETAILS\ STREET CROSS-SECTIONS</p>												



NOTES:

1. SUBGRADE DEPTHS VARY DEPENDING ON CBR VALUE OF THE AREA, SEE ALPINE CITY STANDARD SPECIFICATIONS
2. FIRE CODE REQUIRES AN "ALL WEATHER" SURFACE FOR SECONDARY ACCESS ROUTES. IT IS AT THE DISCRETION OF THE CITY COUNCIL WHETHER SECONDARY ACCESS ROADS WILL BE ASPHALT OR GRAVEL. SEE GRAVEL OPTION BELOW.

SECONDARY ACCESS



NOTES:

1. SUBGRADE DEPTHS VARY DEPENDING ON CBR VALUE OF THE AREA, SEE ALPINE CITY STANDARD SPECIFICATIONS
2. CURB AND GUTTER MAY OR MAY NOT BE REQUIRED AT THE DISCRETION OF THE CITY COUNCIL

SECONDARY ACCESS OPTION

STREET CROSS-SECTIONS

N.T.S.

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STREET CROSS-SECTIONS

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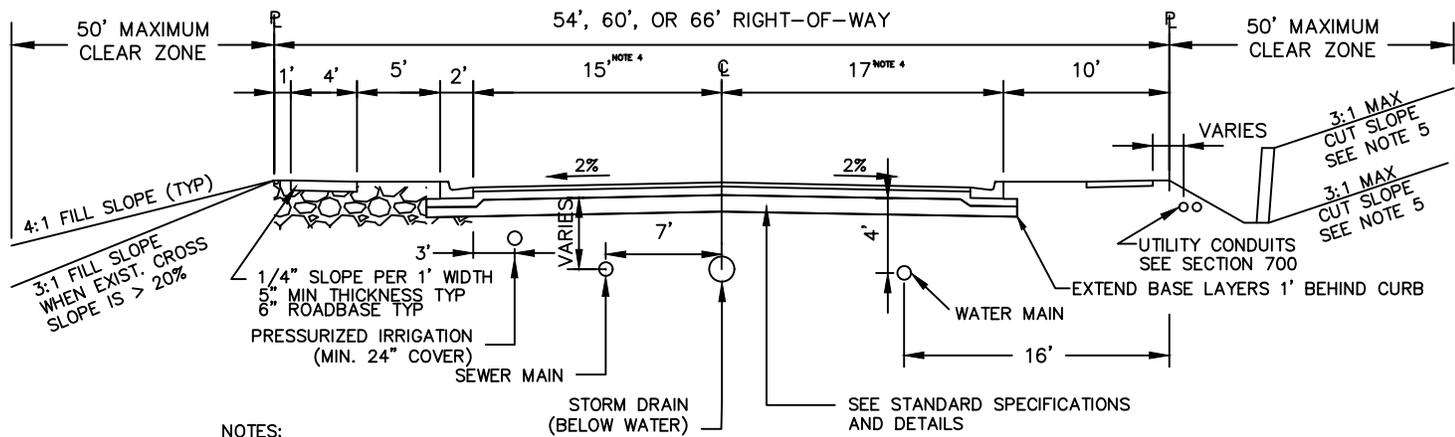
CHECKED BY:

ADOPTED DATE: 10/13/05

REVISION

NO.	DATE	BY	APRIL	DATE

ALPINE CITY
20 NORTH MAIN
ALPINE, UT 84004



NOTES:

1. CLEAR ZONE DEFINES THE MAXIMUM HORIZONTAL DISTANCE PERPENDICULAR TO ROAD THAT CAN BE DISTURBED TO CONSTRUCT STREET SECTION.
2. ENGINEERED RETAINING WALLS ARE ALLOWED PER DEVELOPMENT CODE SECTION 3.32
3. BORROW DITCH AND CROSS DRAIN PIPES SHALL BE DESIGNED SUCH THAT SILTS AND MATERIAL WILL NOT ENTER STREET CROSS SECTION. POND ON CUT SIDE OF ROAD, AND / OR DRAIN TO APPROPRIATE COLLECTION / DETENTION SYSTEM ON FILL SIDE OF ROAD. REFER TO ALPINE CITY STORM DRAIN DESIGN MANUAL.
4. WIDTH VARIES PER RIGHT OF WAY, SEE STANDARD DETAILS.
5. CUT SLOPES GREATER THAN 3:1 (UP TO 2:1) MAY BE ALLOWED PER GEOTECHNICAL REPORT RECOMMENDATION. CUT SLOPES STEEPER THAN 2:1 MUST BE ACCOMPANIED BY A RETAINING WALL UNLESS APPROVED OTHERWISE IN WRITING BY THE CITY ENGINEER OR HIS/HER DESIGNEE (350.050.D).

STREET CROSS-SECTIONS WITH REQUIRED CUT AND FILL SLOPES

N.T.S.

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STREET CROSS-SECTIONS

ALPINE CITY
20 NORTH MAIN
ALPINE, UT 84004

STANDARD DRAWING NUMBER:

1b

PLOT SCALE: N.T.S.

DRAWN BY: WJM

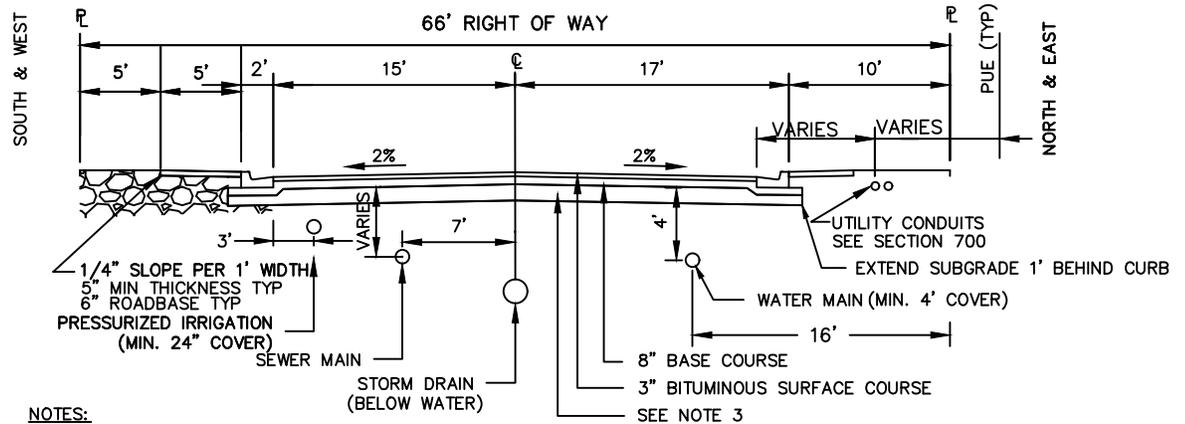
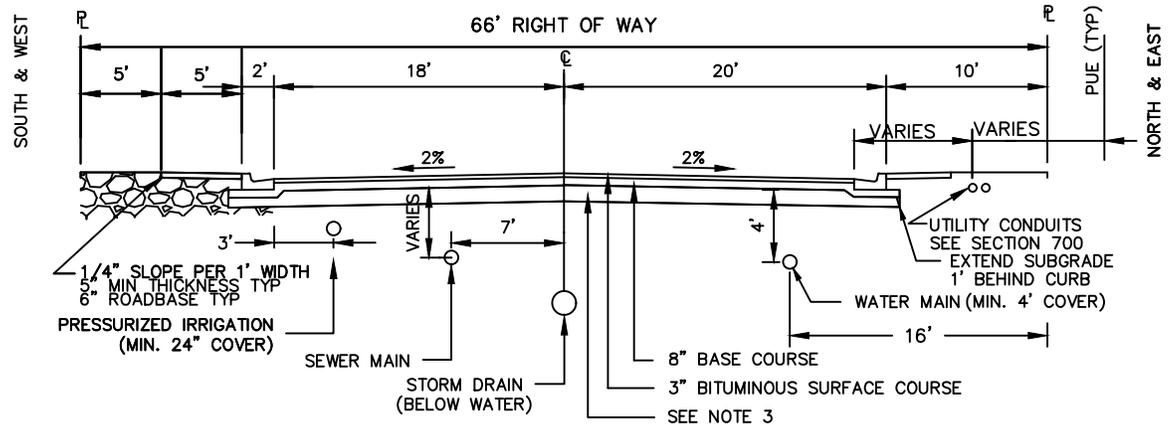
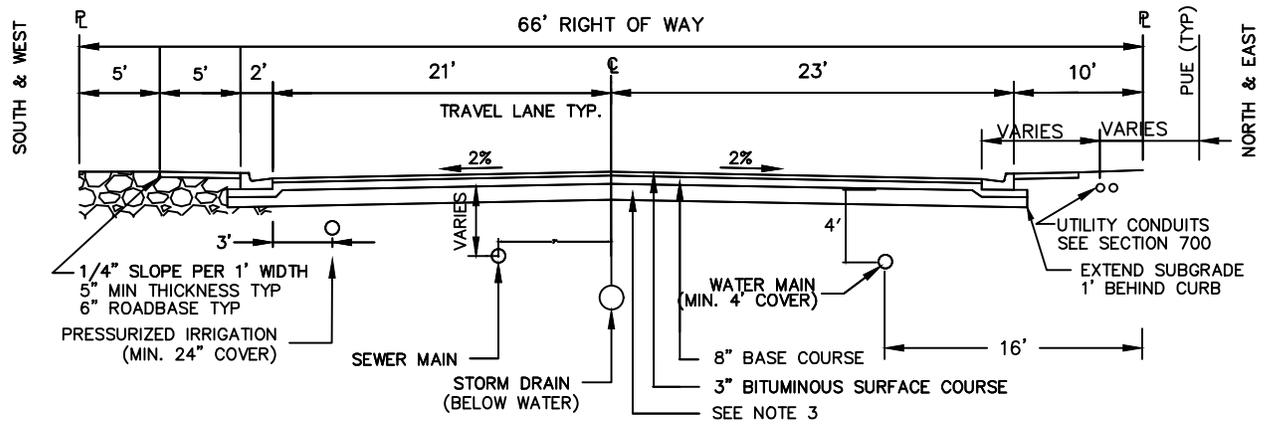
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CHECKED BY:

ADOPTED DATE: 10/13/05

REVISION

NO.	BY	APPL.	DATE



NOTES:

1. WATER VALVES AND 5-INCH VALVE OPENING MUELLER FIRE HYDRANTS SHALL BE LOCATED AS APPROVED.
2. NO WATER LINE SMALLER THAN 8-INCH DIA. SHALL BE INSTALLED WITHOUT APPROVAL OF CITY COUNCIL.
3. SUBGRADE DEPTHS VARY DEPENDING ON CBR VALUE OF THE AREA, SEE ALPINE CITY STANDARD SPECIFICATIONS.
4. CULINARY WATER MAINS SHALL BE ON THE NORTH AND EAST SIDES OF THE STREET. PRESSURIZED IRRIGATION AND SEWER LINES SHALL BE ON THE SOUTH AND WEST SIDES OF THE STREET.
5. USE OF ALTERNATE STREET CROSS-SECTIONS REQUIRES APPROVAL BY ALPINE CITY.

ALTERNATE STREET CROSS-SECTIONS & UTILITY LOCATIONS

N.T.S.

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ALTERNATE STREET CROSS-SECTIONS

ALPINE CITY
20 NORTH MAIN
ALPINE, UT 84004

STANDARD DRAWING NUMBER:

2

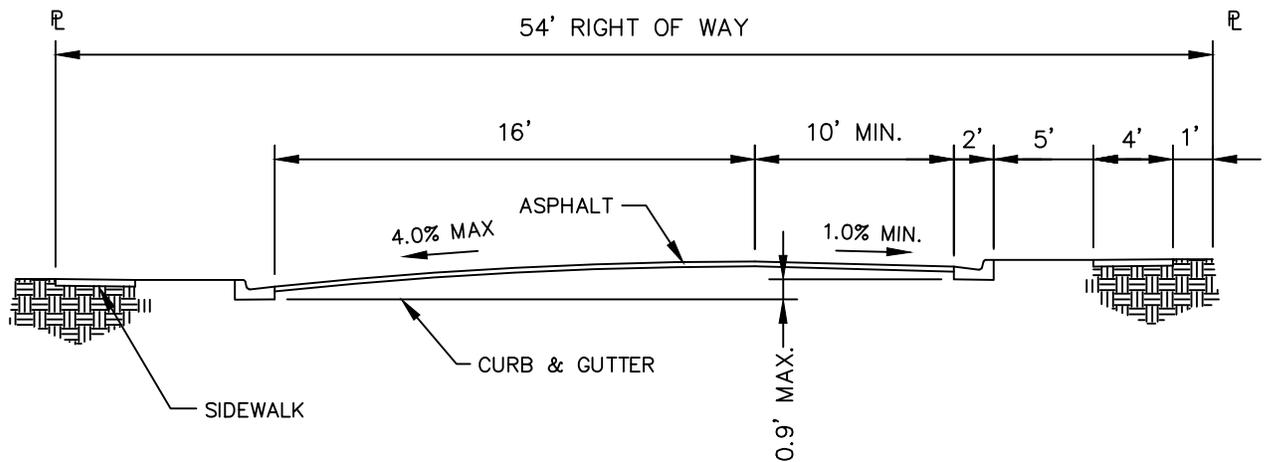
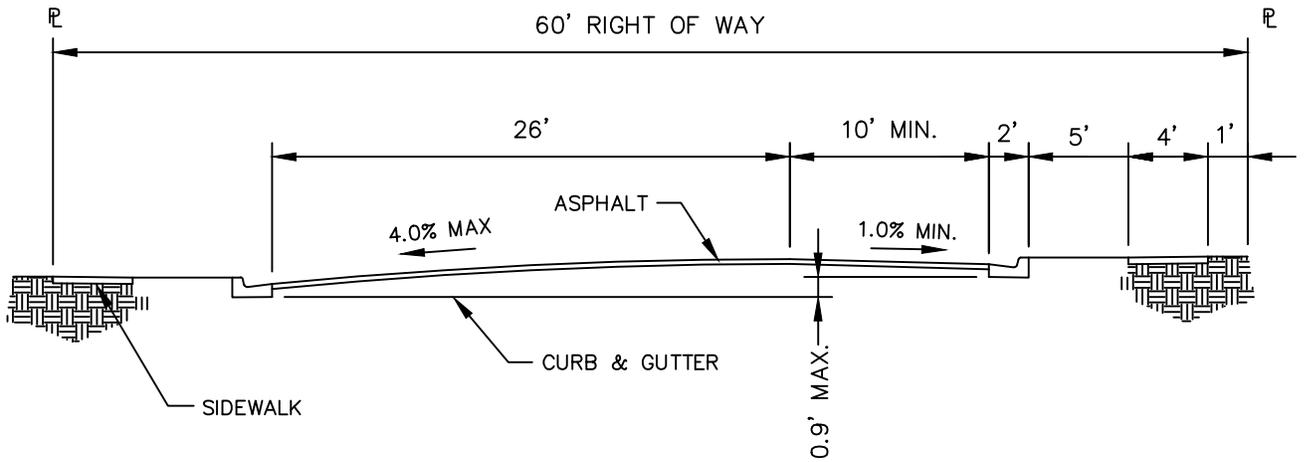
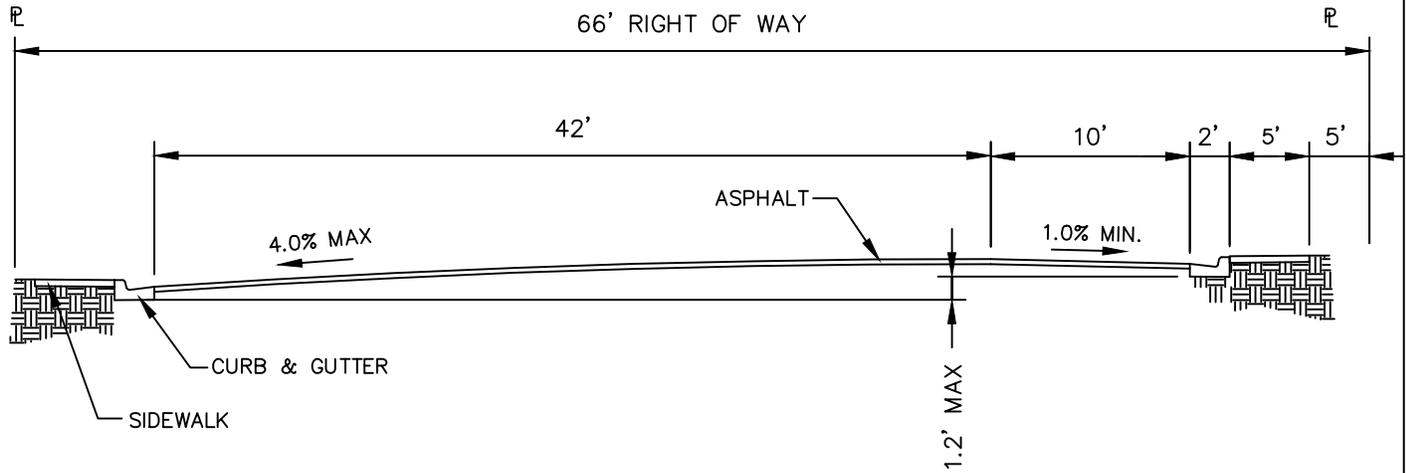
PLOT SCALE: N.T.S.

DRAWN BY: WJM

DESIGN BY:

CHECKED BY:

ADOPTED DATE: 2015



STREET CROSS-SECTIONS
 (CURBS AT UNEQUAL ELEVATIONS)
 N.T.S.

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**STREET CROSS-SECTIONS
 UNEQUAL ELEVATIONS**

STANDARD DRAWING NUMBER: **3**

PLOT SCALE: N.T.S.

DRAWN BY: WJM

DESIGN BY:

CHECKED BY:

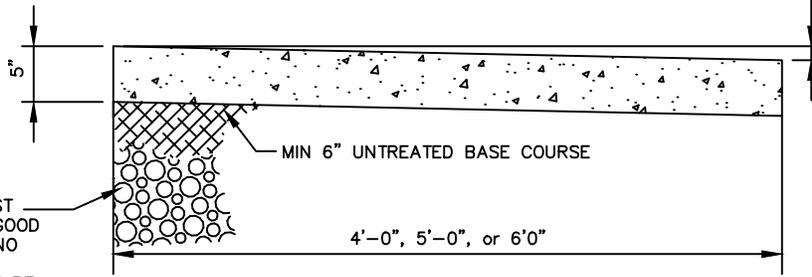
ADOPTED DATE: 4/14/04

REVISION

NO.	BY	APRIL	DATE

ALPINE CITY
 20 NORTH MAIN
 ALPINE, UT 84004

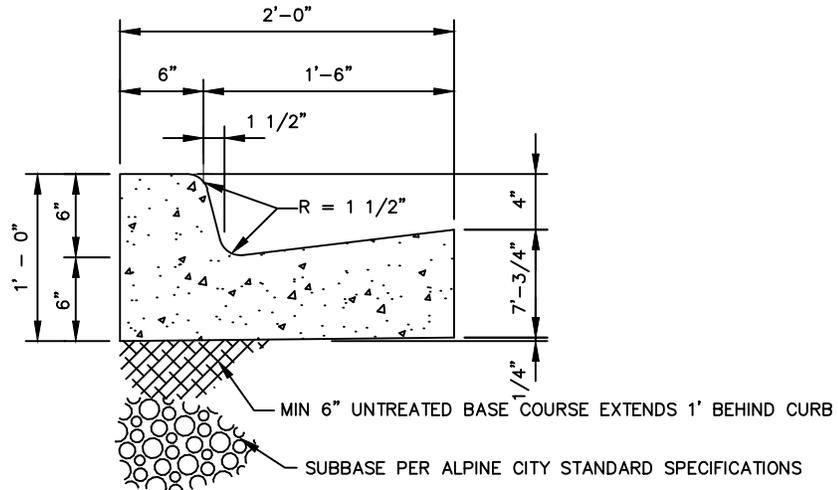
SLOPE TOWARD STREET 1/4" PER 1'



SIDEWALK SUBBASE MUST GENERALLY CONSIST OF GOOD SOLID GROUND. UNDER NO CIRCUMSTANCES SHALL SIDEWALK AND ROADBASE BE PLACED ON COLLAPSIBLE SOILS, TOPSOIL, NON-ENGINEERED FILLS, LOOSE OR DISTURBED SOILS, SOD, RUBBISH, CONSTRUCTION DEBRIS, FROZEN GROUND, DELETERIOUS MATERIALS, OR WITHIN PONDED WATER. IF SIDEWALK IS PLACED ON FILL, THE FILL MUST BE ENGINEERED FILL, COMPACTED AND TESTED, PER ALPINE CITY STANDARD SPECIFICATIONS.

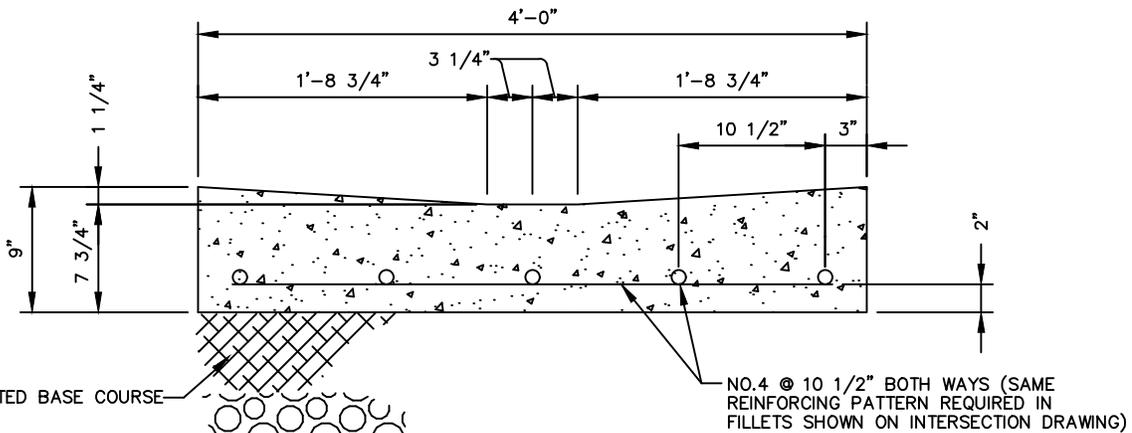
SIDEWALK

NTS



HIGH BACK CURB & GUTTER

NTS



NOTE: WATER WAYS WILL ONLY BE ALLOWED WHERE NO OTHER ALTERNATIVE IS POSSIBLE AND WILL REQUIRE APPROVAL BY CITY ENGINEER AND PUBLIC WORKS DIRECTOR

WATER WAY

NTS

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SIDEWALK, CURB & GUTTER, WATER WAY

STANDARD DRAWING NUMBER: **4**

PLOT SCALE: N.T.S.

DRAWN BY: WJM

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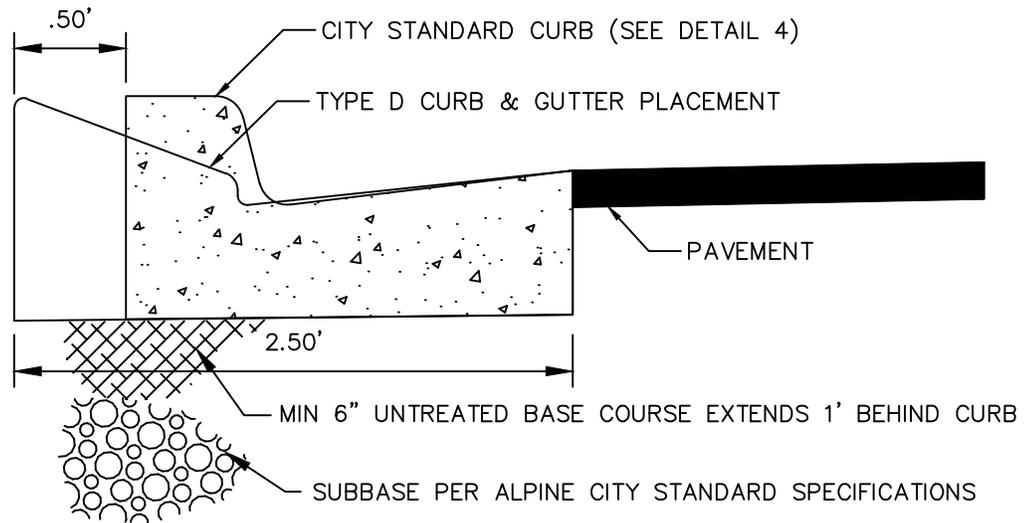
ADOPTED DATE: 4/14/04

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NO.	BY	APRIL	DATE

ALPINE CITY
20 NORTH MAIN
ALPINE, UT 84004

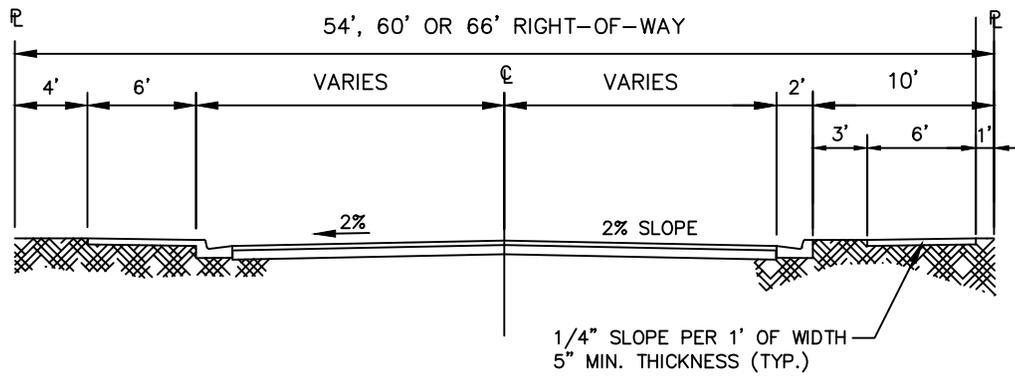
NOTE:
 ON A CASE-BY-CASE BASIS TYPE D CURB & GUTTER MAY BE APPROPRIATE. IF APPROVED BY THE CITY ENGINEER AND/OR BY HIS/HER DESIGNEE, TYPE D CURB MUST BE PLACE SUCH THAT THE FRONT FACE ALIGNS WITH THE ASPHALT EDGE AND EXISTING CURB AND GUTTER.



OPTION: TYPE D CURB & GUTTER PLACEMENT

NTS

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NO.	BY	APRIL	DATE								
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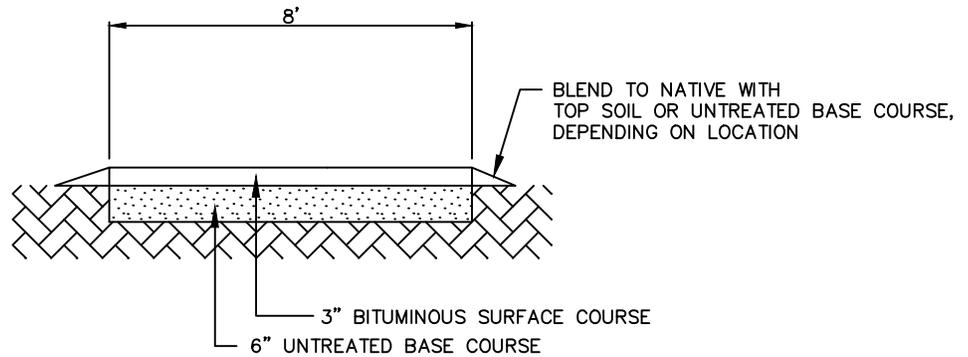


NOTES:

1. ALPINE CITY RESERVES THE RIGHT TO DETERMINE WHETHER THE COMBINATION OR PLANTER STRIP OPTION WILL BE CONSTRUCTED ON A CASE-BY-CASE BASIS.
2. IN SOME CASES, A 5' SIDEWALK WILL BE SUBSTITUTED. IF THE 5' SIDEWALK IS CONSTRUCTED, THE PLANTER STRIP WIDTH WILL BE INCREASED TO 4'.
3. ALL DEVELOPER BUILT TRAILS (NEW OR REFURBISHED) MUST BE BUILT TO INDUSTRY RECOGNIZED STANDARDS AND BE APPROVED BY THE ALPINE CITY TRAIL COMMITTEE. IF TRAILS ARE BUILT ON FILL, THE FILL MUST BE ENGINEERED FILL, COMPACTED AND TESTED, PER ALPINE CITY STANDARD SPECIFICATIONS.

CLASS A (6' SIDEWALK) TRAIL CROSS-SECTION

N.T.S.

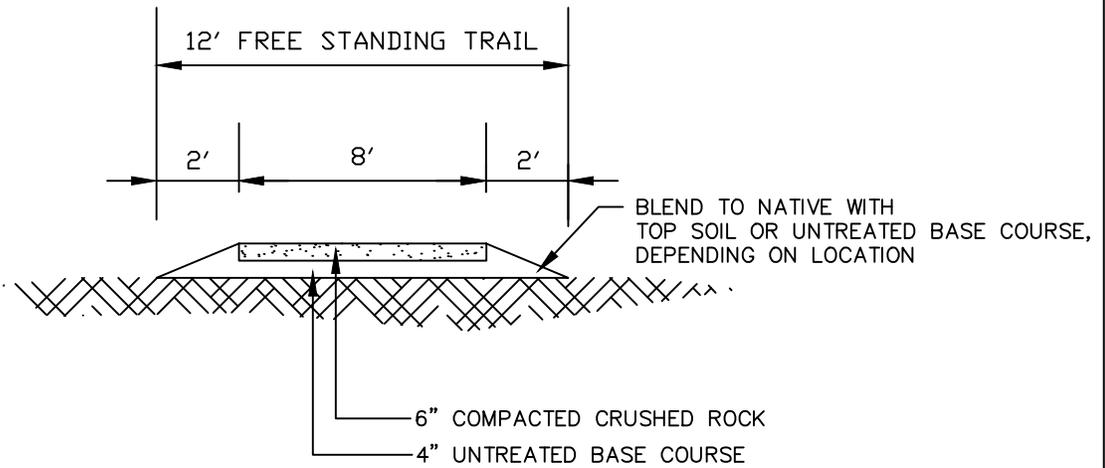


CLASS B (ASPHALT) TRAIL CROSS-SECTION

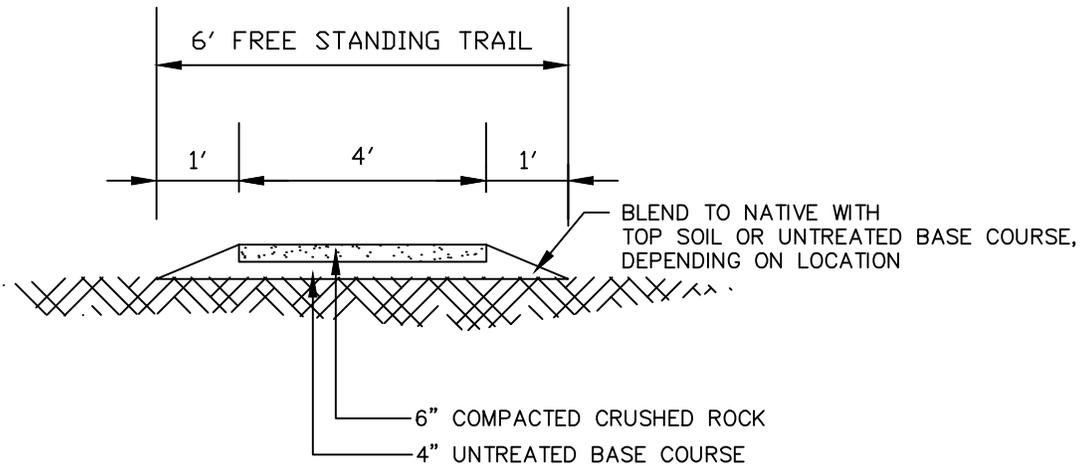
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NO.	BY	APRIL	DATE								

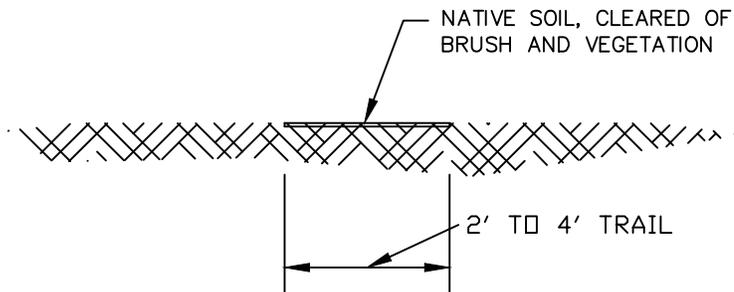
NOTE:
 ALL DEVELOPER BUILT TRAILS
 (NEW OR REFURBISHED) MUST
 BE BUILT TO INDUSTRY
 RECOGNIZED STANDARDS AND
 BE APPROVED BY THE ALPINE
 CITY TRAIL COMMITTEE. IF
 TRAILS ARE PLACED ON FILL,
 THE FILL MUST BE ENGINEERED
 FILL, COMPACTED AND TESTED,
 PER ALPINE CITY STANDARD
 SPECIFICATIONS.



CLASS C 8' CRUSHED ROCK TRAIL CROSS-SECTION
 N.T.S.



CLASS D 4' CRUSHED ROCK TRAIL CROSS-SECTION
 N.T.S.



CLASS E (DIRT) TRAIL CROSS-SECTION
 N.T.S.

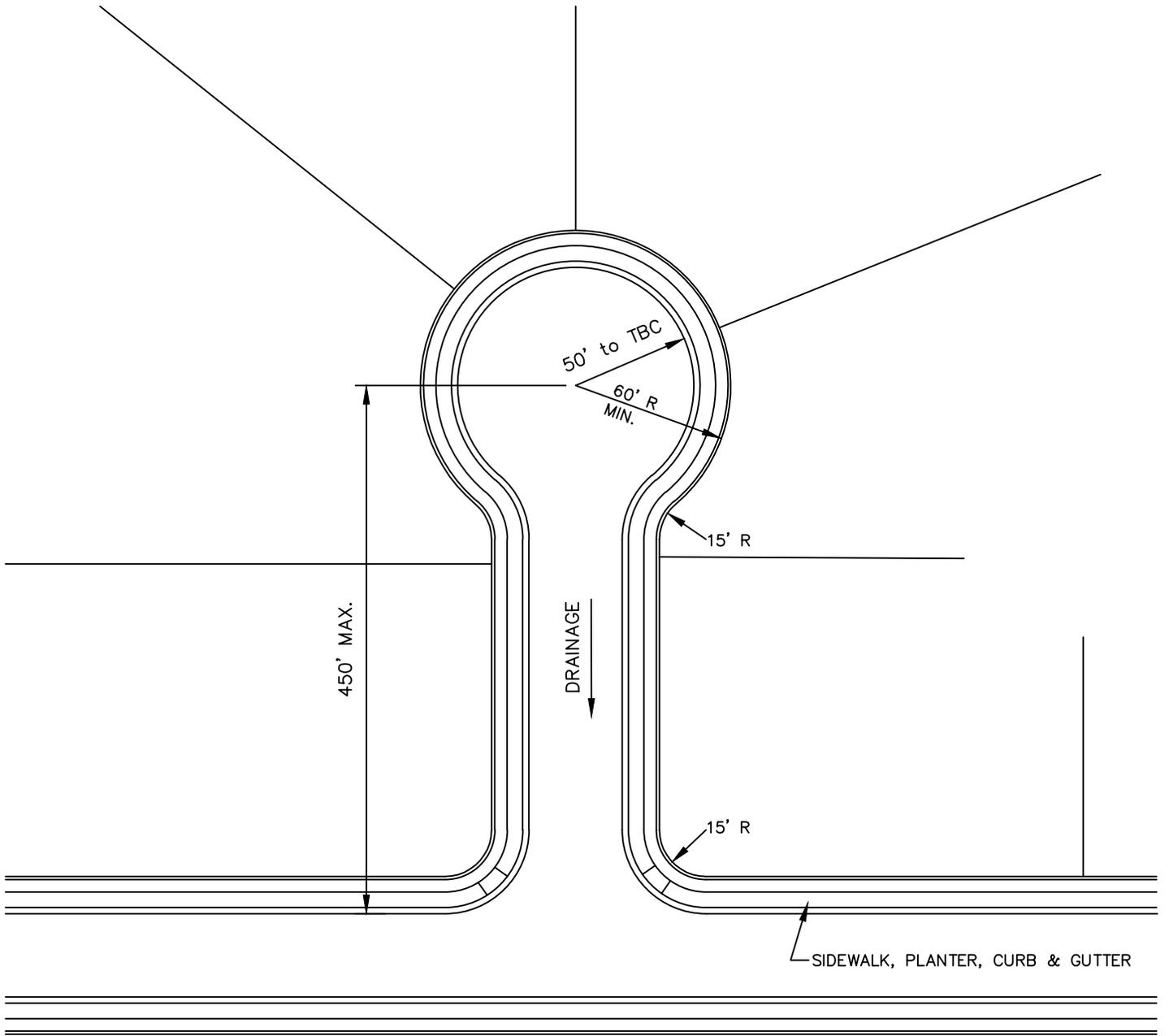
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REVISION			
NO.	BY	APRIL	DATE



CLASS C, D, & E TRAIL CROSS-SECTIONS

ALPINE CITY
 20 NORTH MAIN
 ALPINE, UT 84004

STANDARD DRAWING NUMBER:	6
PLOT SCALE:	N.T.S.
DRAWN BY:	WJM
DESIGN BY:	
CHECKED BY:	
ADOPTED DATE:	10/13/05



CUL-DE-SAC DETAIL

N.T.S.

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CUL-DE-SAC DETAIL

ALPINE CITY
20 NORTH MAIN
ALPINE, UT 84004

STANDARD DRAWING NUMBER:

7

PLOT SCALE: N.T.S.

DRAWN BY: BDB

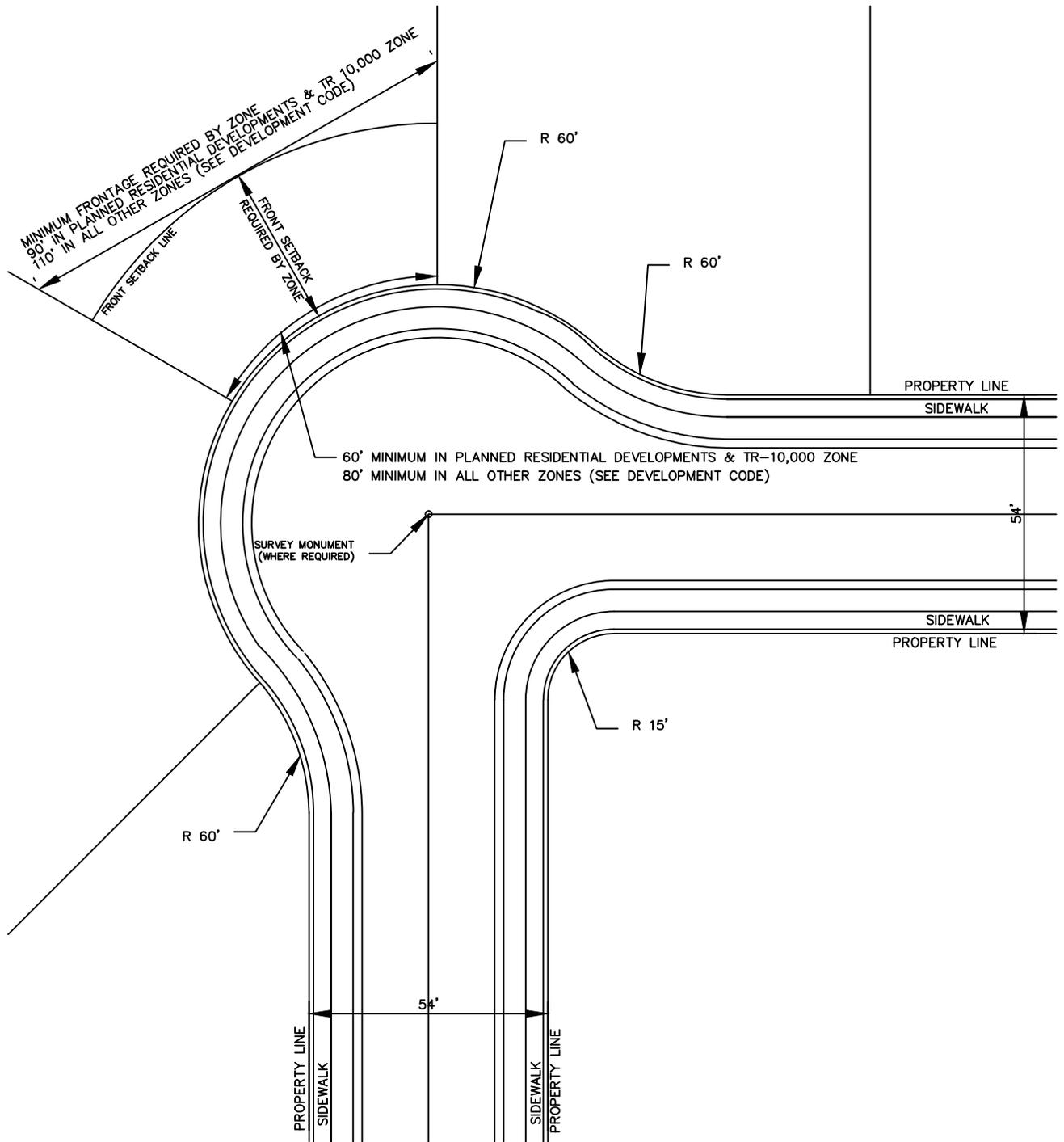
DESIGN BY:

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ADOPTED DATE: 10/13/05

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NO.	BY	APRIL	DATE



KNUCKLE DETAIL

N.T.S.

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KNUCKLE DETAIL

ALPINE CITY
20 NORTH MAIN
ALPINE, UT 84004

STANDARD DRAWING NUMBER: **8**

PLOT SCALE: N.T.S.

DRAWN BY: BDB

DESIGN BY:

CHECKED BY:

ADOPTED DATE: 10/11/05

REVISION

NO.	BY	APRIL	DATE

FRONT, REAR, AND SIDE YARDS

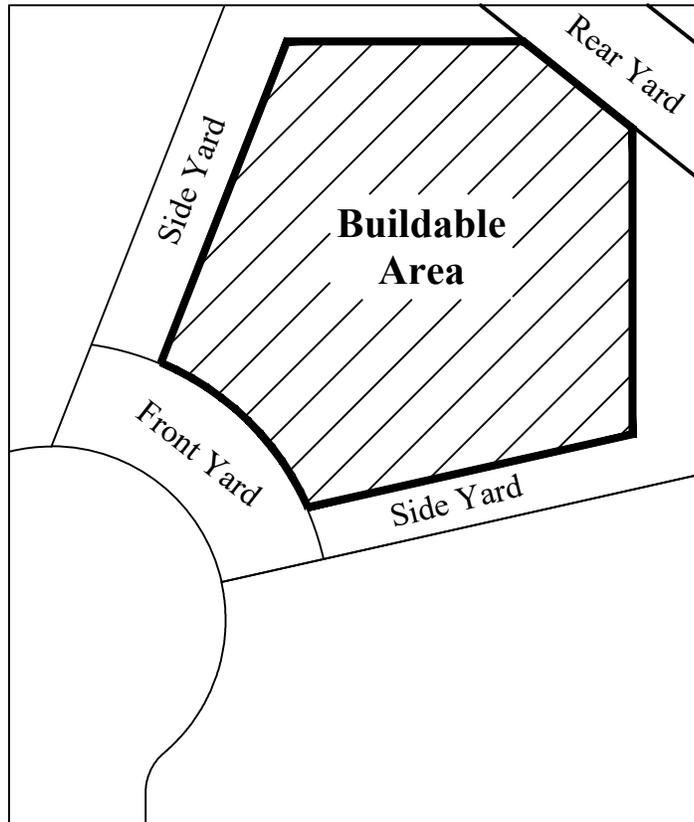


Figure A:
Cul-de-Sac
or
Irregular Shaped
Lot

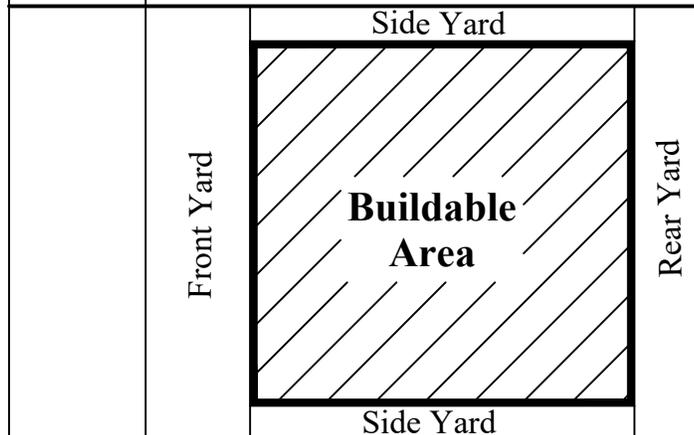


Figure B:
Interior Lot
(Typical)

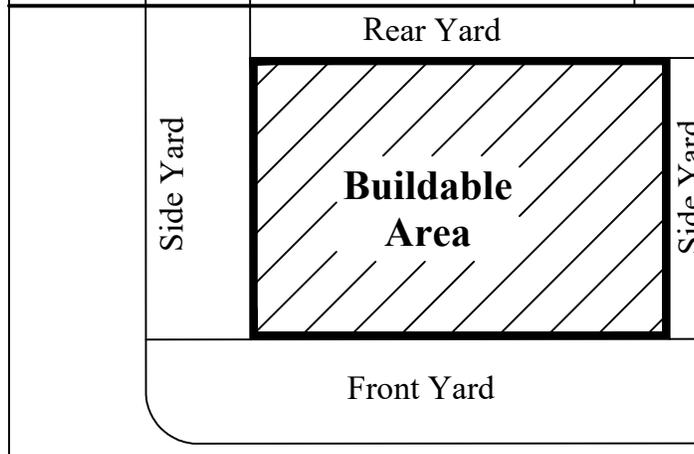


Figure C:
Corner Lot
(Typical)

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Standard Setbacks

STANDARD DRAWING NUMBER: **9**

PLOT SCALE: N.T.S.

DRAWN BY: WJM

DESIGN BY:

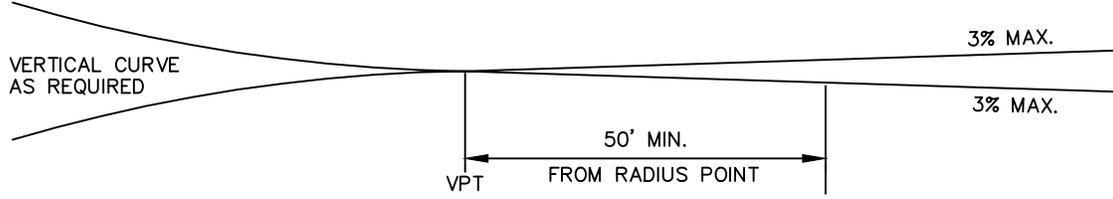
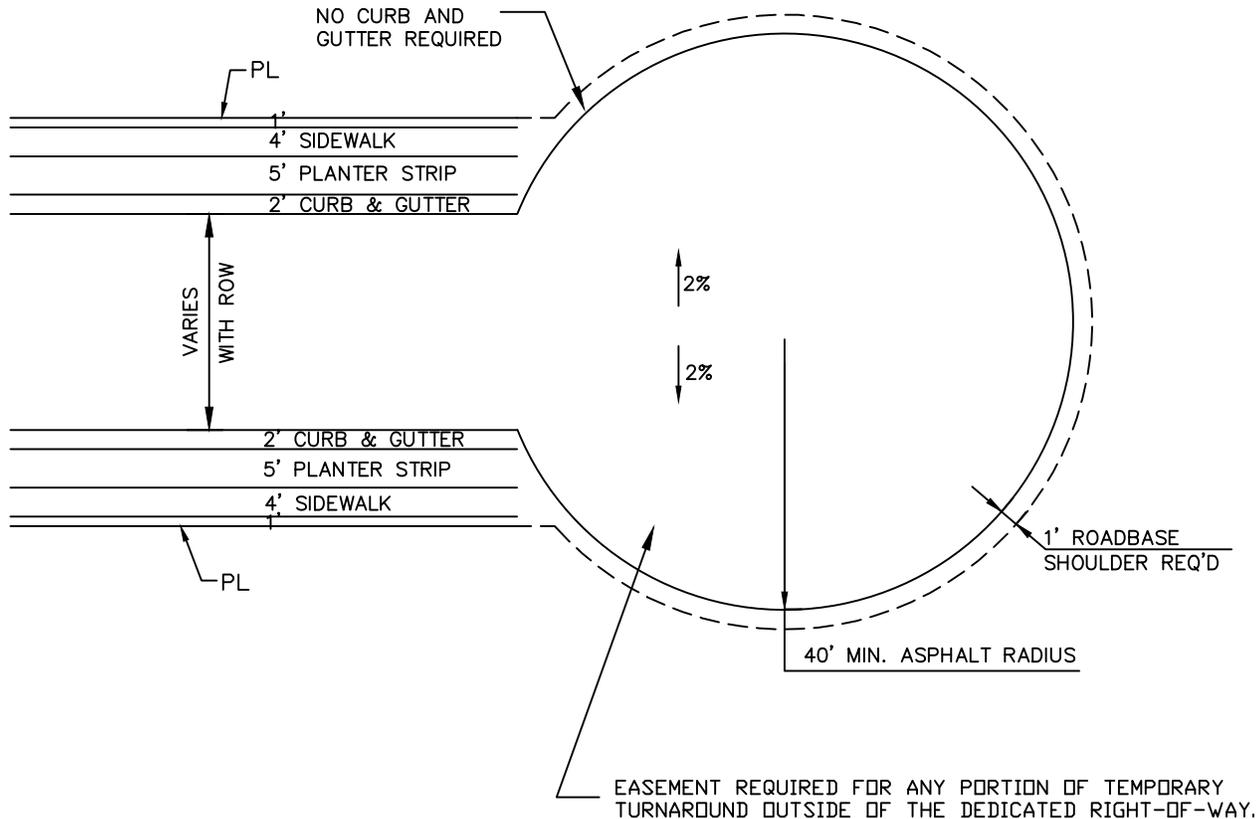
CHECKED BY:

ADOPTED DATE: 4/14/04

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NO.	BY	APRIL	DATE

ALPINE CITY
20 NORTH MAIN
ALPINE, UT 84004



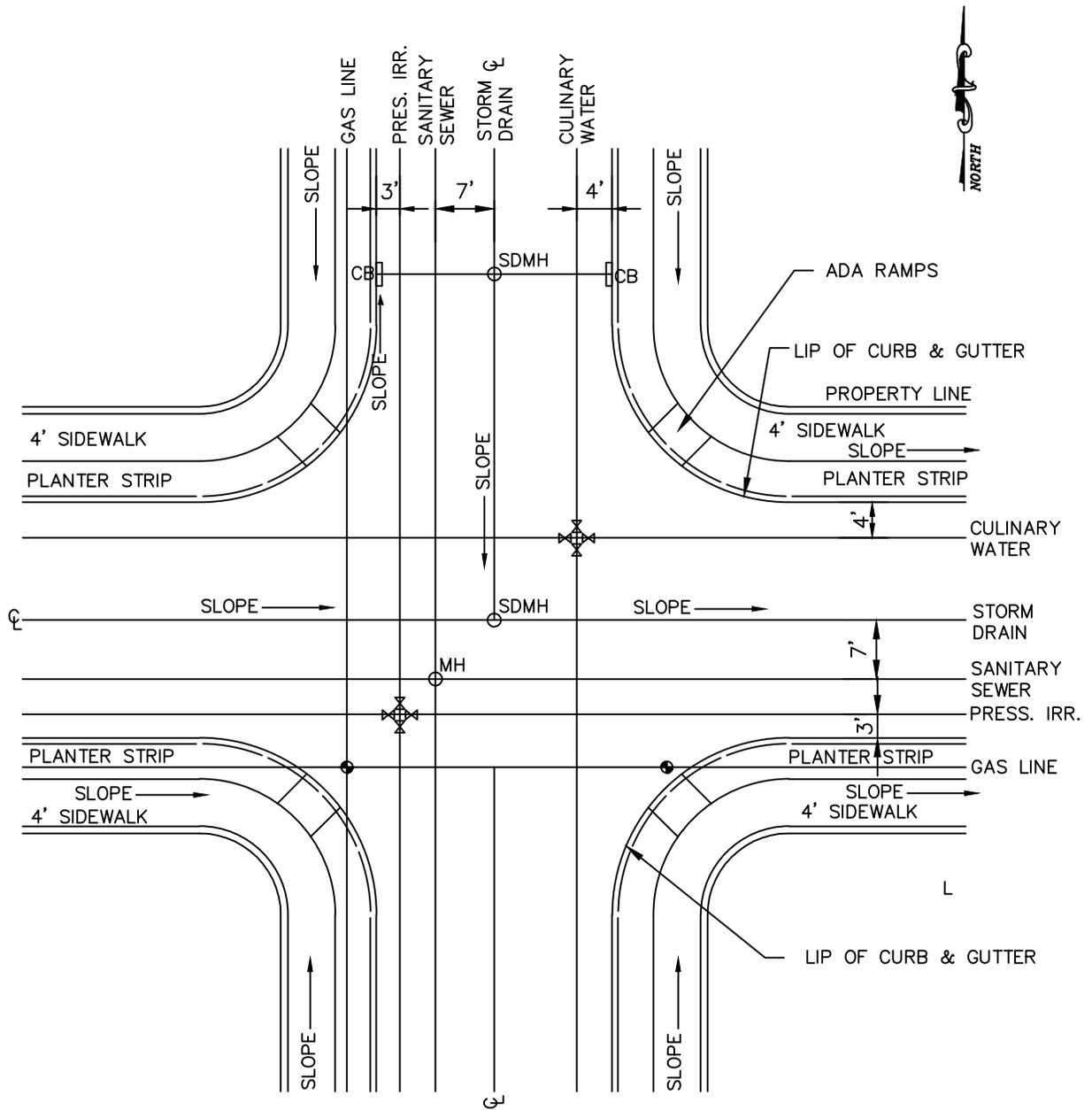
GENERAL CONSTRUCTION NOTES:

1. SUBGRADE SHALL CONFORM TO CITY CONSTRUCTION STANDARDS, SEE STREET CROSS SECTION DETAIL 1.
2. 8" MIN. CRUSHED GRAVEL BASE COURSE.
3. 3" MIN. COMPACTED PLANT MIX ASPHALT SURFACING.

TEMPORARY TURNAROUND

NTS

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<p>REVISION</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 5%;">NO.</td> <td style="width: 15%;">BY</td> <td style="width: 15%;">APRIL</td> <td style="width: 15%;">DATE</td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </table>	NO.	BY	APRIL	DATE					<p>CAD FILE: E:\ENGINEERING\CODES & STANDARD SPECS\STANDARD SPECIFICATIONS AND DRAWINGS\2023 CITY SPEC & DETAILS_DETAILS\10 TEMPORARY TURNAROUND</p>	<p>ALPINE CITY 20 NORTH MAIN ALPINE, UT 84004</p>	<p>PLOT SCALE: N.T.S.</p> <p>DRAWN BY: BDB</p> <p>DESIGN BY:</p> <p>CHECKED BY:</p> <p>ADOPTED DATE: 10/18/05</p>
NO.	BY	APRIL	DATE								



STANDARD STREET INTERSECTION AND UTILITY LOCATION

N.T.S.

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STANDARD STREET INTERSECTION AND UTILITY LOCATION

ALPINE CITY
20 NORTH MAIN
ALPINE, UT 84004

STANDARD
DRAWING
NUMBER:

11

PLOT SCALE: N.T.S.

DRAWN BY: BDB

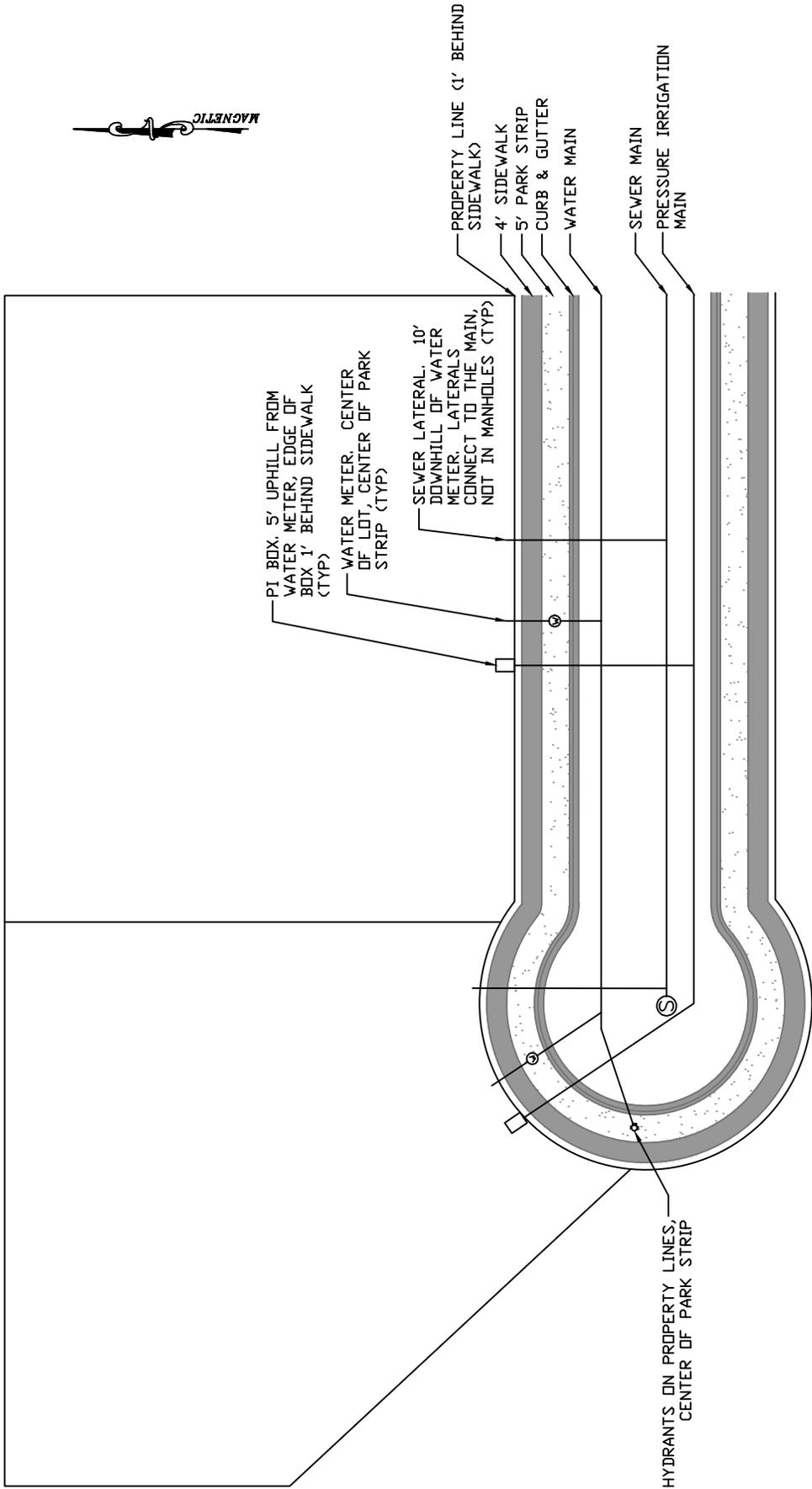
DESIGN BY:

CHECKED BY:

ADOPTED DATE: 10/13/05

REVISION

NO.	BY	APRIL	DATE



NOTE: THE STANDARD LOCATIONS ARE SHOWN FOR SERVICE LATERALS, ADJUSTMENTS LATERALLY CAN BE MADE UNDER CERTAIN CIRCUMSTANCES, CITY ENGINEER APPROVAL REQUIRED.

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STANDARD UTILITY SERVICE LOCATIONS

ALPINE CITY
20 NORTH MAIN
ALPINE, UT 84004

STANDARD DRAWING NUMBER: **12a**

PLOT SCALE: N.T.S.

DRAWN BY: BDB

DESIGN BY:

CHECKED BY:

ADOPTED DATE: 10/13/05

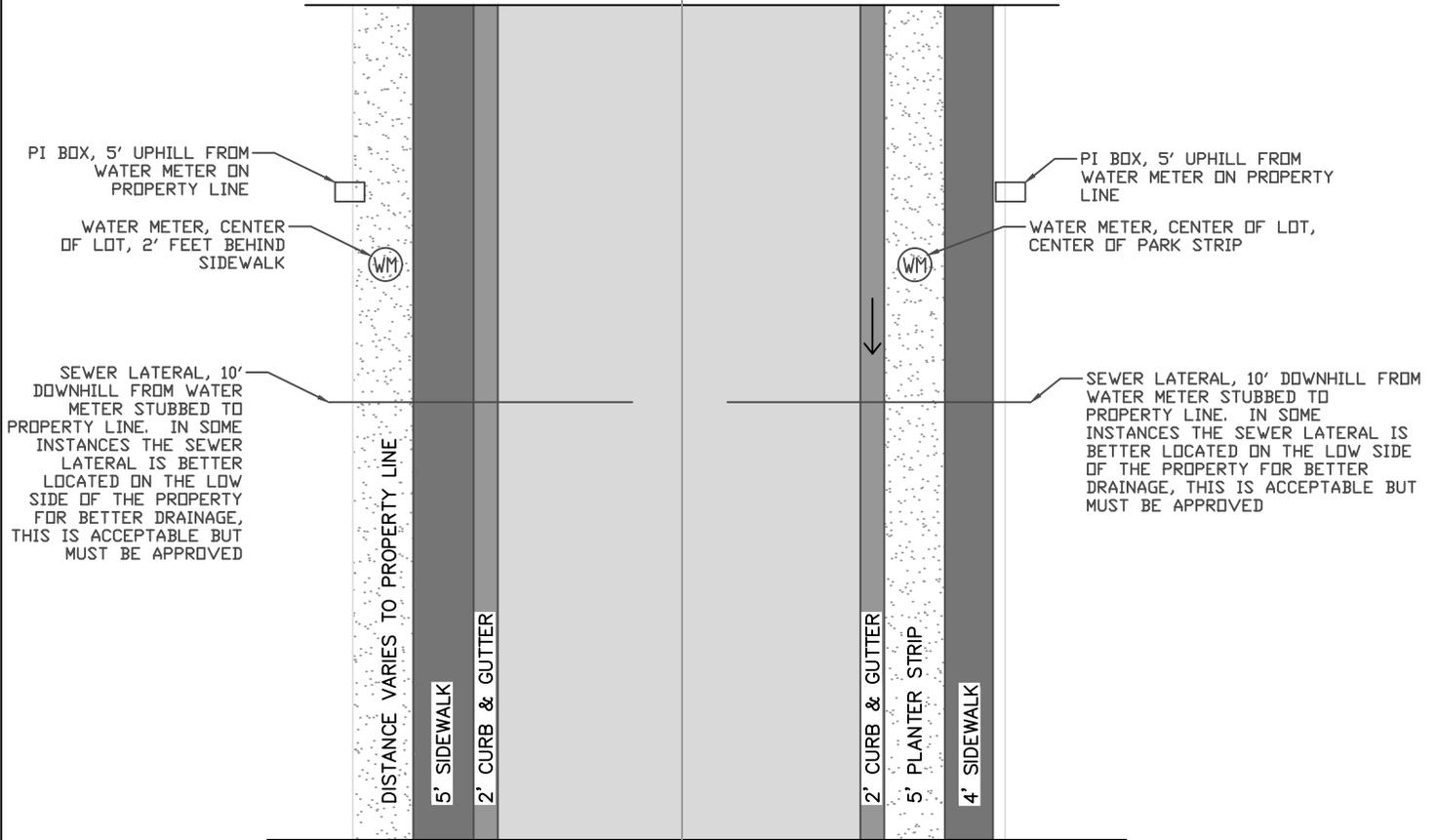
REVISION

NO.	BY	APRIL	DATE



ROADWAYS WITH NO PARK STRIP

ROADWAYS WITH PARK STRIP



STANDARD LOT UTILITY LOCATIONS

N.T.S.

STATEMENT OF USE

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STANDARD LOT UTILITY LOCATIONS

ALPINE CITY
20 NORTH MAIN
ALPINE, UT 84004

STANDARD DRAWING NUMBER: **12**

PLOT SCALE: N.T.S.

DRAWN BY: BDB

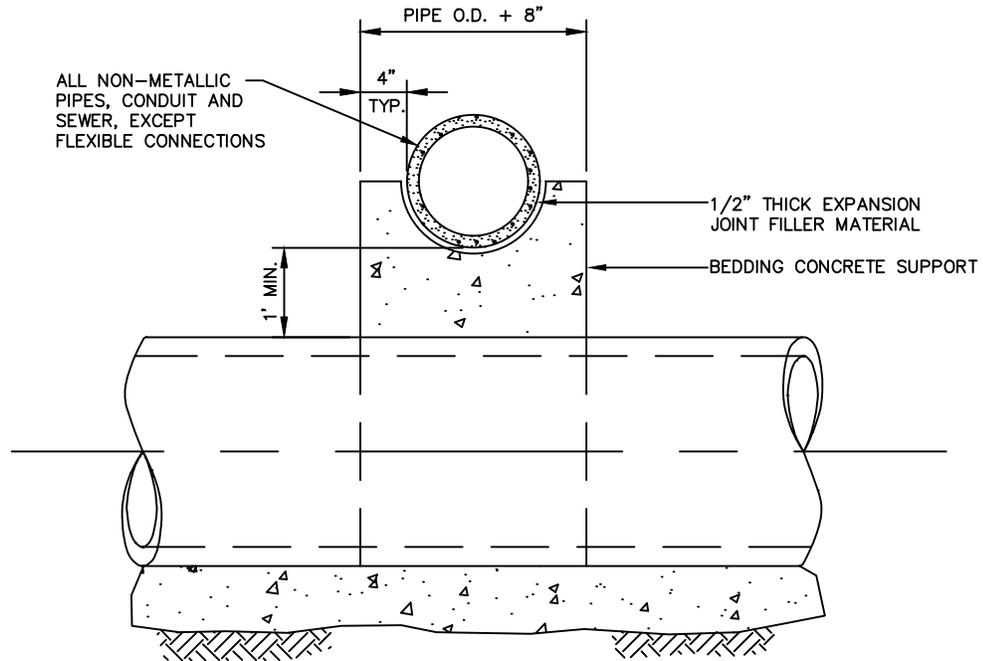
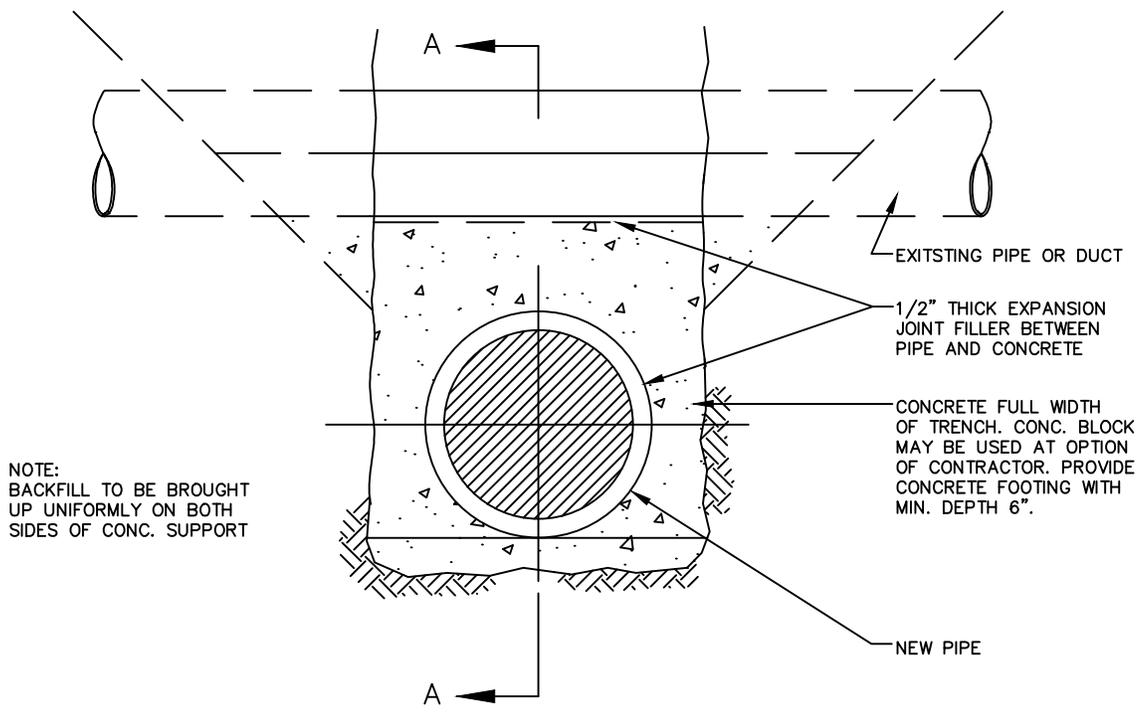
DESIGN BY:

CHECKED BY:

ADOPTED DATE: 10/13/05

REVISION

NO.	BY	APRIL	DATE



SECTION A-A

UTILITY CONFLICT

N.T.S.

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UTILITY CONFLICT

ALPINE CITY
20 NORTH MAIN
ALPINE, UT 84004

STANDARD DRAWING NUMBER: **13**

PLOT SCALE: N.T.S.

DRAWN BY: WJM

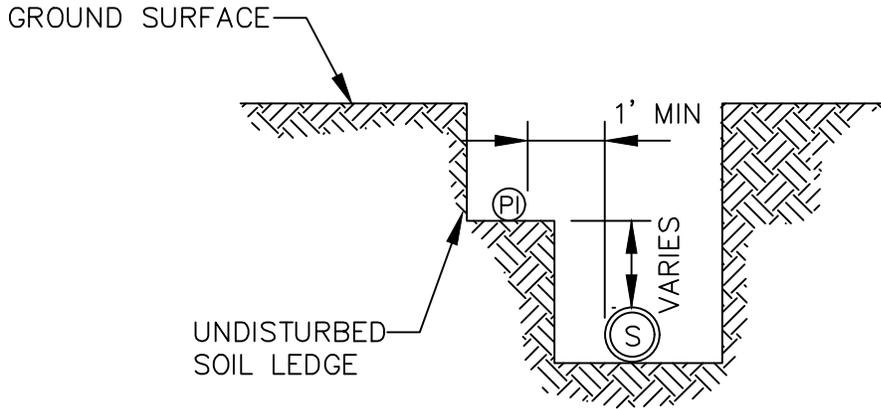
DESIGN BY:

CHECKED BY:

ADOPTED DATE: 4/14/04

REVISION

NO.	BY	APR.	DATE

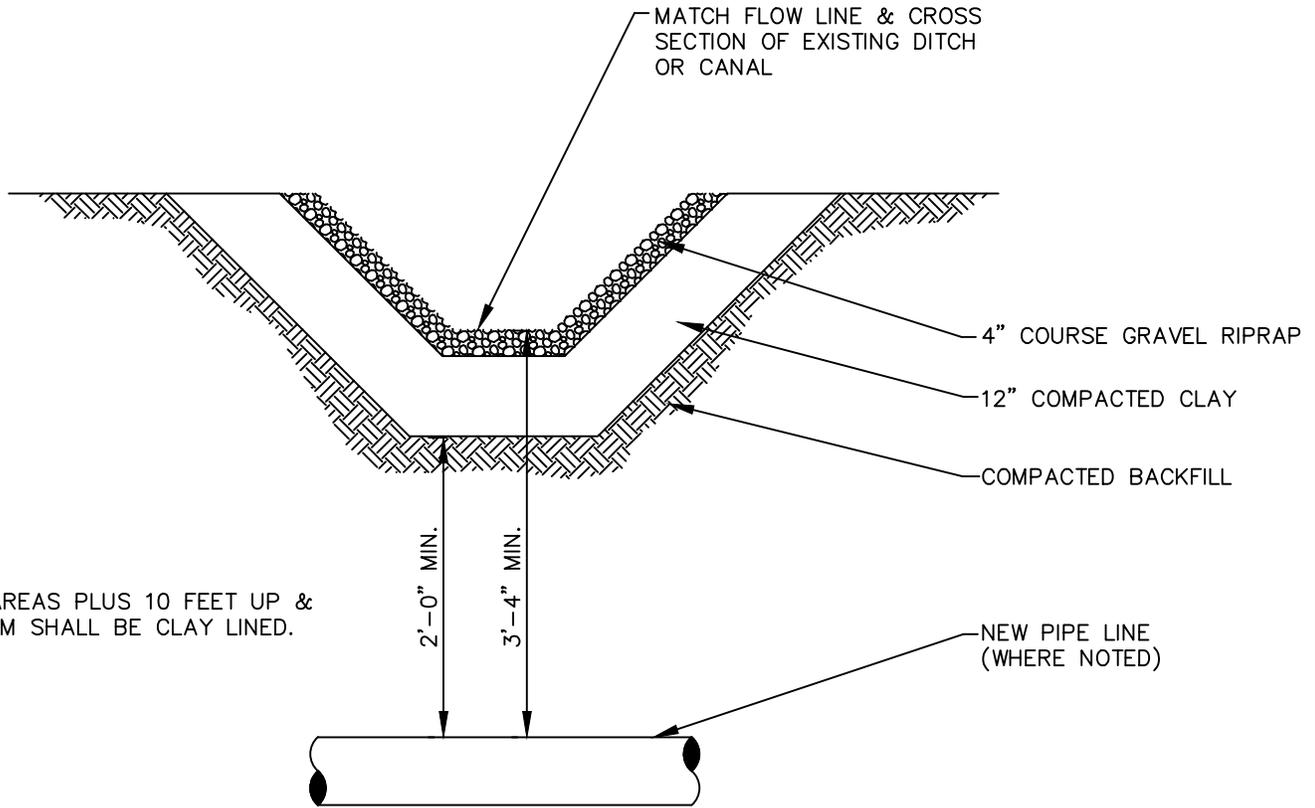


NOTE:
 ALL PLUMBING PRACTICES SHALL CONFORM
 TO THE PLUMBING CODE ADOPTED BY
 ALPINE CITY

SEWER & PI LATERALS IN COMMON TRENCH

N.T.S.

<p>STATEMENT OF USE</p> <p>THIS DOCUMENT AND ANY ILLUSTRATIONS HEREON ARE PROVIDED AS STANDARD CONSTRUCTION DETAILS WITHIN ALPINE CITY. DEVIATION FROM THIS DOCUMENT REQUIRES APPROVAL OF ALPINE CITY. ALPINE CITY CORPORATION CAN NOT BE HELD LIABLE FOR MISUSE OR CHANGES REGARDING THIS DOCUMENT.</p>		<p>CITY UTILITY LATERALS IN SAME TRENCH</p>	<p>STANDARD DRAWING NUMBER: 14</p>								
<p>REVISION</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 5%;">NO.</td> <td style="width: 15%;">BY</td> <td style="width: 15%;">APRIL</td> <td style="width: 15%;">DATE</td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </table>	NO.	BY	APRIL	DATE					<p>ALPINE CITY 20 NORTH MAIN ALPINE, UT 84004</p>	<p>PLOT SCALE: N.T.S.</p> <p>DRAWN BY: WJM</p> <p>DESIGN BY:</p> <p>CHECKED BY:</p> <p>ADOPTED DATE: 4/14/04</p>	
NO.	BY	APRIL	DATE								
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NOTE:
DISTURBED AREAS PLUS 10 FEET UP &
DOWN STREAM SHALL BE CLAY LINED.

DITCH CROSSING

N.T.S.

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DITCH CROSSING

ALPINE CITY
20 NORTH MAIN
ALPINE, UT 84004

STANDARD
DRAWING
NUMBER:

15

PLOT SCALE: N.T.S.

DRAWN BY: WJM

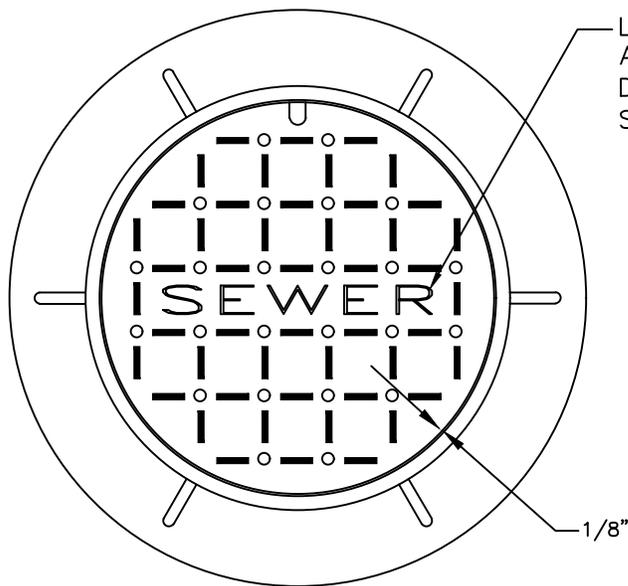
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CHECKED BY:

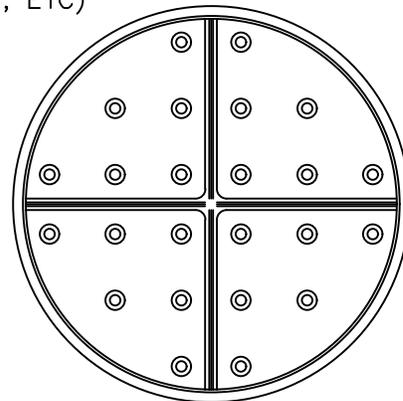
ADOPTED DATE: 4/14/04

REVISION

NO.	BY	APR.	DATE

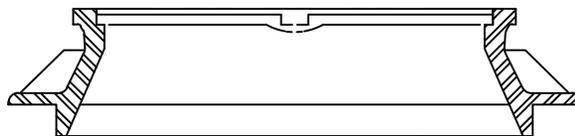


LID TO BE STAMPED WITH APPROPRIATE UTILITY DESIGNATION (SEWER, WATER, STORM DRAIN, ETC)



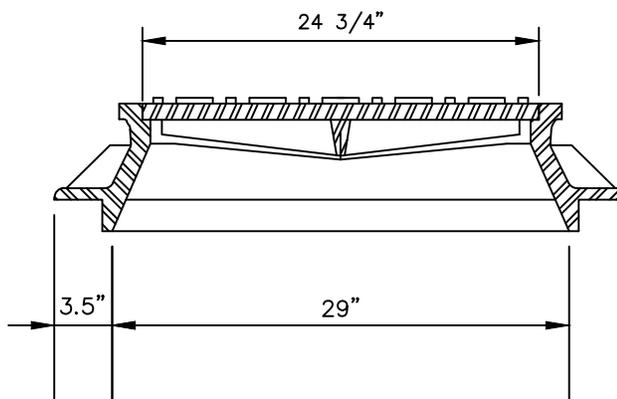
BOTTOM VIEW OF COVER

PLAN OF COVER AND RING



SECTIONS

D&L A-1180 OR APPROVED EQUAL



**HEAVY DUTY, 400 LB. MINIMUM,
MANHOLE RING AND COVER**

N.T.S.

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MANHOLE RING & COVER (typical)

STANDARD DRAWING NUMBER: **16**

PLOT SCALE: N.T.S.

DRAWN BY: WJM

DESIGN BY:

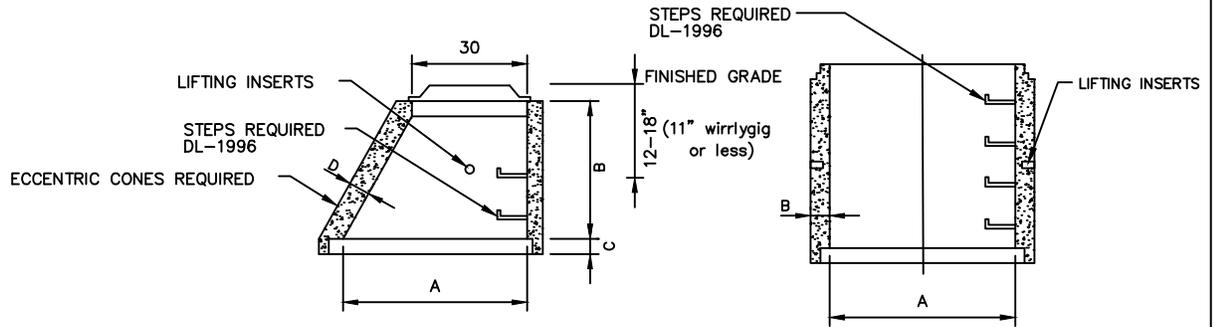
CHECKED BY:

ADOPTED DATE: 4/14/04

ALPINE CITY
20 NORTH MAIN
ALPINE, UT 84004

REVISION

NO.	BY	APR.	DATE



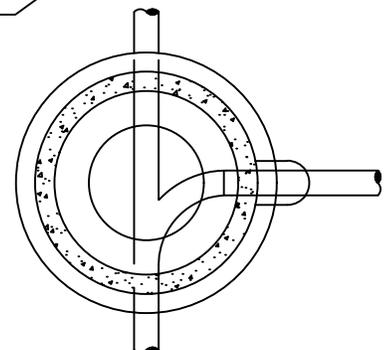
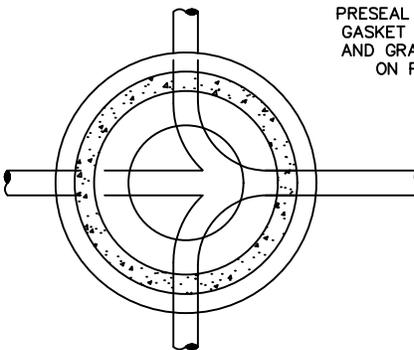
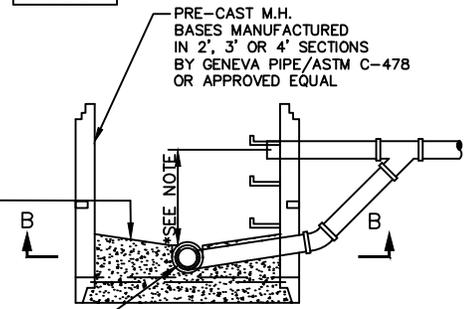
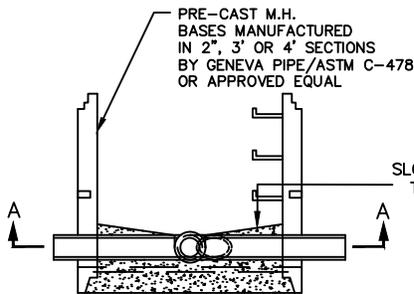
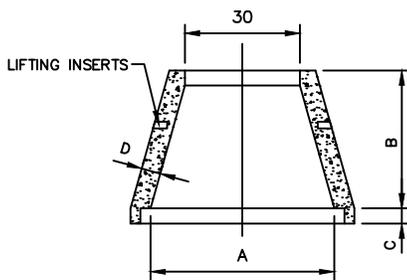
SIZE A (INCHES)	HEIGHT B (INCHES)	FLANGE C (INCHES)	WALL D (INCHES)	WEIGHT (LBS. EA.)
48	36	4	5	2720
60	39	6	6	4300

SIZE A (INCHES)	WALL B (INCHES)	WEIGHT (LBS. EA.)
48	5	900
60	6	1380

USE 5' DIA. MIN. FOR ALL PIPE 14" & LARGER USE 4' MIN. DIA. FOR ALL PIPE UP TO AND INCLUDING 12" DIA. UNLESS 3 OR ENTER THE MANHOLE. FOR ALL MANHOLES 15" OR DEPTH FROM RIM TO INV., USE 5' DIA. MANHOLE.

DROP PIPE INSTALLED IN CONCRETE

*NOTE: MINIMUM AS DIRECTED BY CITY ENGINEER



SECTION A-A

SECTION B-B

TYPICAL JUNCTION MANHOLE

N.T.S.

TYPICAL DROP MANHOLE

N.T.S.

NOTE: USE OF DROP MANHOLES REQUIRES APPROVAL OF CITY ENGINEER AND PUBLIC WORKS DIRECTOR. FOR ALL OTHER SPECIFICATIONS, SEE APWA.

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SEWER MANHOLE (TYPICAL)

STANDARD DRAWING NUMBER: **17**

PLOT SCALE: N.T.S.

DRAWN BY: WJM

DESIGN BY:

CHECKED BY:

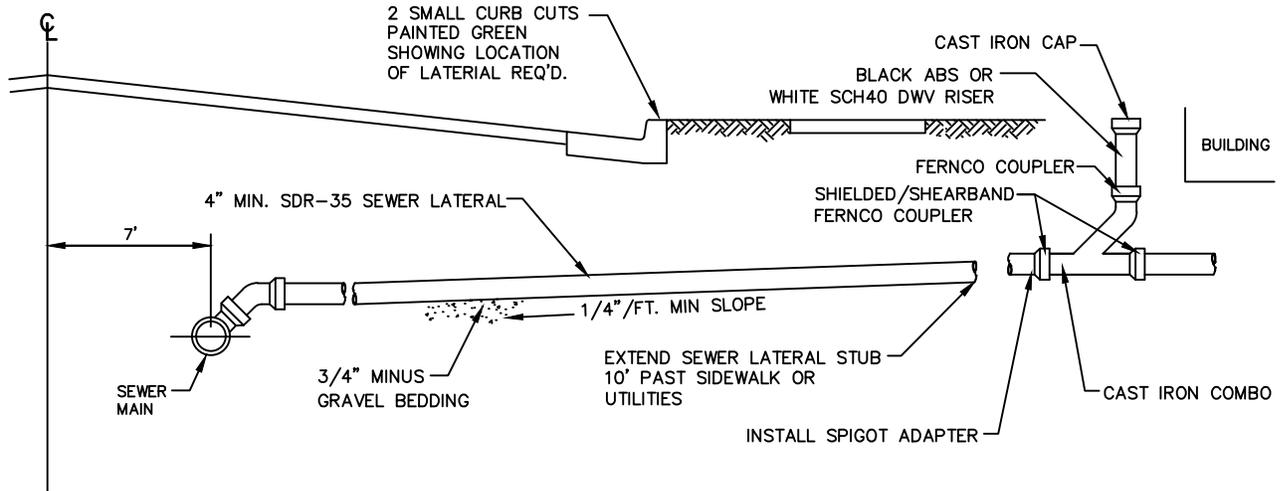
ADOPTED DATE: 4/14/04

ALPINE CITY
20 NORTH MAIN
ALPINE, UT 84004

REVISION			
NO.	BY	APRIL	DATE

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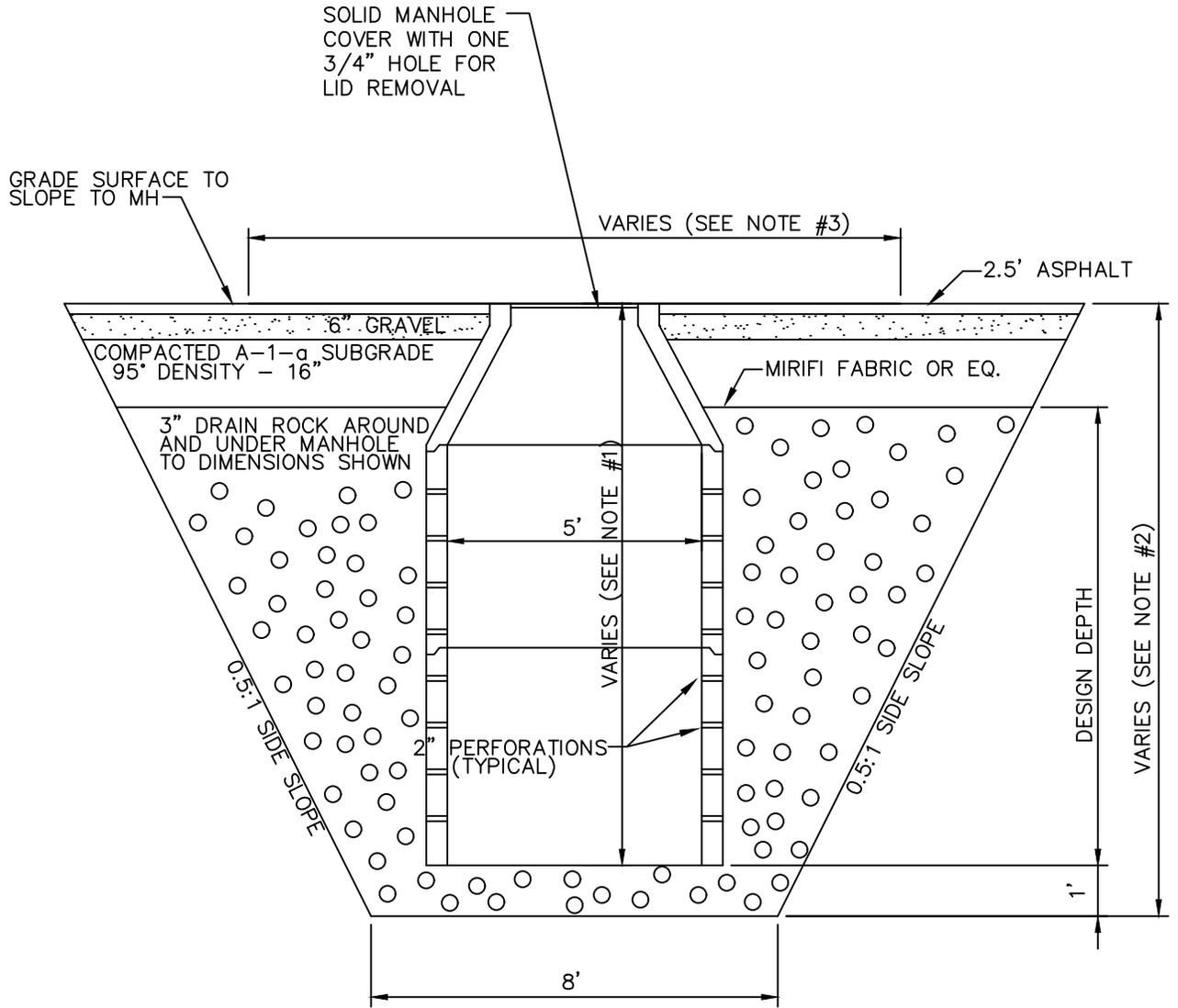
1. A CLEANOUT IS REQUIRED NEXT TO THE BUILDING.
2. ADDITIONAL CLEANOUTS REQUIRED BETWEEN THE BUILDING AND SEWER MAIN AT MAXIMUM 100 FOOT INTERVALS.
3. THE COMBO SHALL CONSIST OF CAST IRON, ABS MATERIAL (OR WHITE SCH40 DWV) FOR RISER.
4. FERNCO COUPLERS (AS SHOWN) SHALL BE USED WHEN CONNECTING CAST IRON TO RISER OR SDR-35 LATERAL PIPE.
5. ALL CLEANOUTS SHALL HAVE CAST IRON CAPS.
6. ALL SEWER LATERALS SHALL BE SDR-35 PIPE, BEING LAID WITH THE BELL END OF THE PIPE IN THE UP HILL DIRECTION.
7. ALL SEWER LATERALS SHALL BE BEDDED WITH 3/4" MINUS GRAVEL.
8. BACKFILL MATERIAL SHALL BE ENGINEERED FILL WITHIN CITY RIGHT OF WAYS, AS CLASSIFIED IN ALPINE CITY STANDARDS AND SPECIFICATIONS.
9. BACKFILL MATERIAL AROUND PIPE SHALL BE COMPACTED TO 95% OF DENSITY AS MEASURED BY AASHTO T-99.
10. SEWER LATERAL MUST BE INSPECTED BY AN AUTHORIZED REPRESENTATIVE OF THE CITY PRIOR TO BACKFILLING TRENCH.
11. A TIE SKETCH SHOWING THE LOCATION OF ALL SEWER LATERALS MUST BE SUBMITTED TO THE CITY.
12. THE CITY SHALL BE NOTIFIED 24 HOURS PRIOR TO WHEN A SEWER LATERAL INSPECTION IS NEEDED.
13. ALL APPROPRIATE EXCAVATION PERMITS MUST BE OBTAINED FROM THE CITY AND OTHER AGENCY PRIOR TO ANY EXCAVATION.
14. ALL APPROPRIATE IMPACT FEES MUST BE PAID PRIOR TO CONNECTING TO THE SEWER.
15. MARK END OF LATERAL STUB WITH 2x4 POST PAINTED GREEN. ALL OTHER MARKERS MUST BE PRE-APPROVED PRIOR TO USE.



TYPICAL SEWER SERVICE CONN.

N.T.S.

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<p>REVISION</p> <table border="1"> <tr> <td>NO.</td> <td>BY</td> <td>APRIL</td> <td>DATE</td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </table>				NO.	BY	APRIL	DATE			
NO.	BY	APRIL	DATE							
<p>CAD FILE: E:\ENGINEERING\CODES & STANDARD SPECS\STANDARD SPECIFICATIONS AND DRAWINGS\2023 CITY SPEC & DETAILS\DETAILS\17A SEWER CONNECTION</p>		<p>ALPINE CITY 20 NORTH MAIN ALPINE, UT 84004</p>								

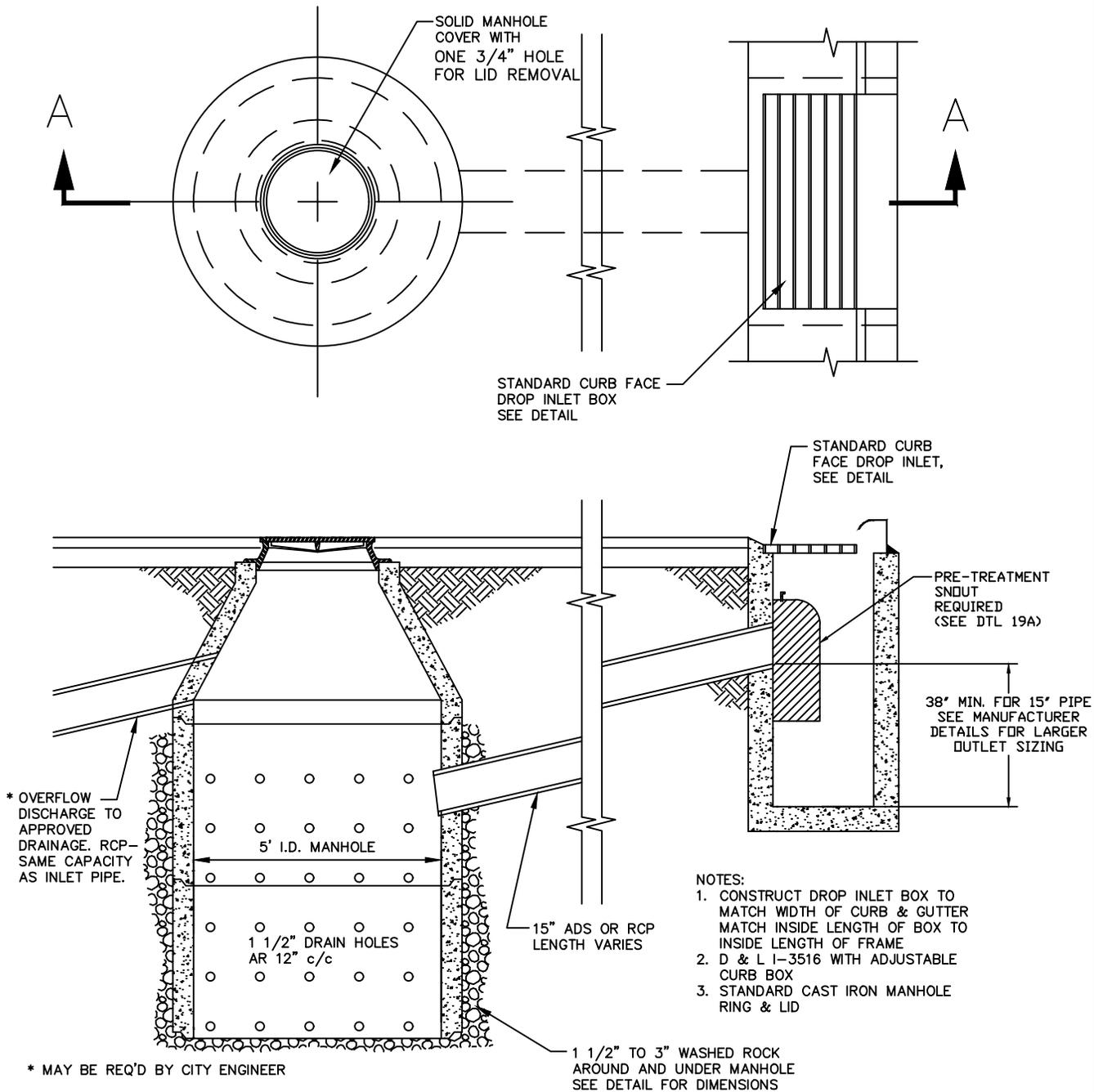


- NOTES:
 #1. DESIGN DEPTH + 2'
 #2. DESIGN DEPTH + 3'
 #3. DESIGN DEPTH + 11'

STORM DRAINAGE SUMP

N.T.S.

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<p>REVISION</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 5%;">NO.</td> <td style="width: 15%;">BY</td> <td style="width: 15%;">APRIL</td> <td style="width: 15%;">DATE</td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </table>	NO.	BY	APRIL	DATE					CAD FILE: E:\ENGINEERING\CODES & STANDARD SPECS\STANDARD SPECIFICATIONS AND DRAWINGS\2023 CITY SPEC & DETAILS_DETAILS\18 STMSUMP		
NO.	BY	APRIL	DATE								



SECTION A-A
SUMP DISPOSAL

N.T.S.

NOTE: ONLY ALLOWED IN CERTAIN CIRCUMSTANCES. PRE-TREATMENT REQ'D

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SUMP DISPOSAL
 (Typical)

STANDARD DRAWING NUMBER: **19**

PLOT SCALE: N.T.S.

DRAWN BY: WJM

DESIGN BY:

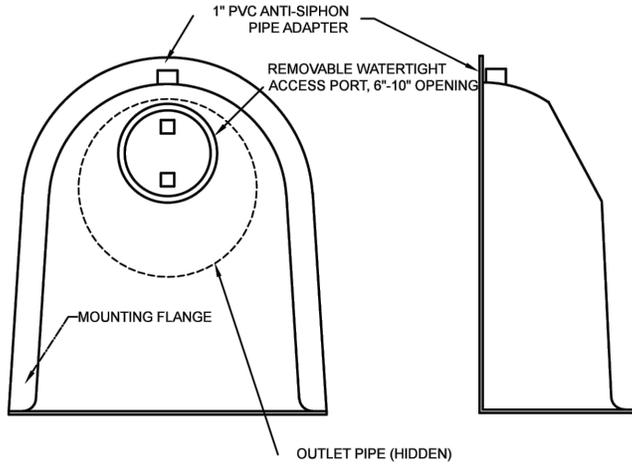
CHECKED BY:

ADOPTED DATE: 4/14/04

REVISION			
NO.	BY	APRIL	DATE

ALPINE CITY
 20 NORTH MAIN
 ALPINE, UT 84004

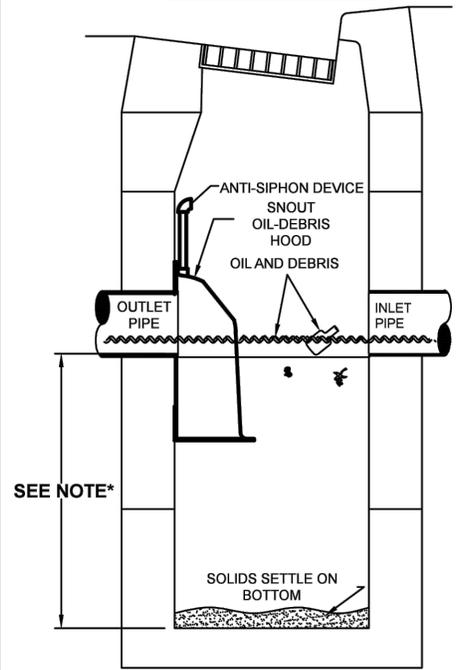
CONFIGURATION DETAIL



FRONT VIEW SIDE VIEW

SNOUT OIL-WATER-DEBRIS SEPARATOR

TYPICAL INSTALLATION



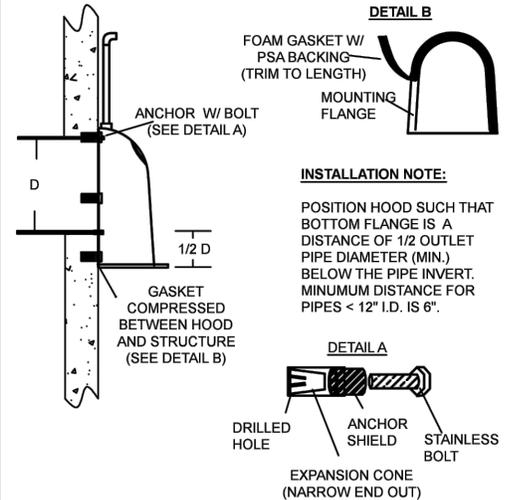
*NOTE- SUMP DEPTH OF 38" MIN. FOR UP TO 12" ID PIPE. OUTLET. FOR PIPES 15" ID AND ABOVE SUMP DEPTH OF 2.5 TO 3 TIMES PIPE ID RECOMMENDED (E.G. 5" DEEP FOR 24" PIPE)

NOTES:

- ALL HOODS AND TRAPS FOR CATCH BASINS AND WATER QUALITY STRUCTURES SHALL BE AS MANUFACTURED BY:
BEST MANAGEMENT PRODUCTS, INC.
9 MATHEWS DRIVE, UNIT A1-A2.
EAST HADDAM, CT 06423
TOLL FREE: (800) 504-8008 OR (888) 434-0277, FAX: (877) 434-3197
WEB SITE: www.bmpinc.com
OR PRE-APPROVED EQUAL
- ALL HOODS SHALL BE CONSTRUCTED OF A GLASS REINFORCED RESIN COMPOSITE WITH ISO GEL COAT EXTERIOR FINISH WITH A MINIMUM 0.125" LAMINATE THICKNESS.
- ALL HOODS SHALL BE EQUIPPED WITH A WATERTIGHT ACCESS PORT, A MOUNTING FLANGE, AND AN ANTI-SIPHON VENT PIPE AND ELBOW AS DRAWN. (SEE CONFIGURATION DETAIL)
- THE SIZE AND POSITION OF THE HOOD SHALL BE DETERMINED BY OUTLET PIPE SIZE AS PER MANUFACTURER'S RECOMMENDATION (SNOUT SIZE ALWAYS LARGER THAN PIPE SIZE).
- THE BOTTOM OF THE HOOD SHALL EXTEND DOWNWARD A MINIMUM DISTANCE EQUAL TO 1/2 THE OUTLET PIPE DIAMETER WITH A MINIMUM DISTANCE OF 6" FOR PIPES <12" I.D.
- THE ANTI-SIPHON VENT SHALL EXTEND ABOVE HOOD BY MINIMUM OF 3" AND A MAXIMUM OF 12" ACCORDING TO STRUCTURE CONFIGURATION.
- THE SURFACE OF THE STRUCTURE WHERE THE HOOD IS MOUNTED SHALL BE FINISHED SMOOTH AND FREE OF LOOSE MATERIAL AND PIPE SHALL BE FINISHED FLUSH TO WALL.
- ALL STRUCTURE JOINTS SHALL BE WATERTIGHT.
- THE HOOD SHALL BE SECURELY ATTACHED TO STRUCTURE WALL WITH 3/8" STAINLESS STEEL BOLTS AND OIL-RESISTANT GASKET AS SUPPLIED BY MANUFACTURER. (SEE INSTALLATION DETAIL)
- INSTALLATION INSTRUCTIONS SHALL BE FURNISHED WITH MANUFACTURER SUPPLIED INSTALLATION KIT.
INSTALLATION KIT SHALL INCLUDE:
A. INSTALLATION INSTRUCTIONS
B. PVC ANTI-SIPHON VENT PIPE AND ADAPTER
C. OIL-RESISTANT CRUSHED CELL FOAM GASKET WITH PSA BACKING
D. 3/8" STAINLESS STEEL BOLTS
E. ANCHOR SHIELDS

US Patent # 6126817, 7951294, 7857966, 8512556
Canada Patent # 2285146, 2690156, 2690156 others pending

INSTALLATION DETAIL



HOOD SPECIFICATION FOR CATCH BASINS AND WATER QUALITY STRUCTURES

DESCRIPTION	DATE	SCALE
OIL- DEBRIS HOOD SPECIFICATION AND INSTALLATION (TYPICAL)	09/08/18	NONE
DRAWING NUMBER SP-SN		

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SNOUT DETAIL (Typical)

ALPINE CITY
20 NORTH MAIN
ALPINE, UT 84004

STANDARD DRAWING NUMBER: **19a**

PLOT SCALE: N.T.S.

DRAWN BY: WJM

DESIGN BY:

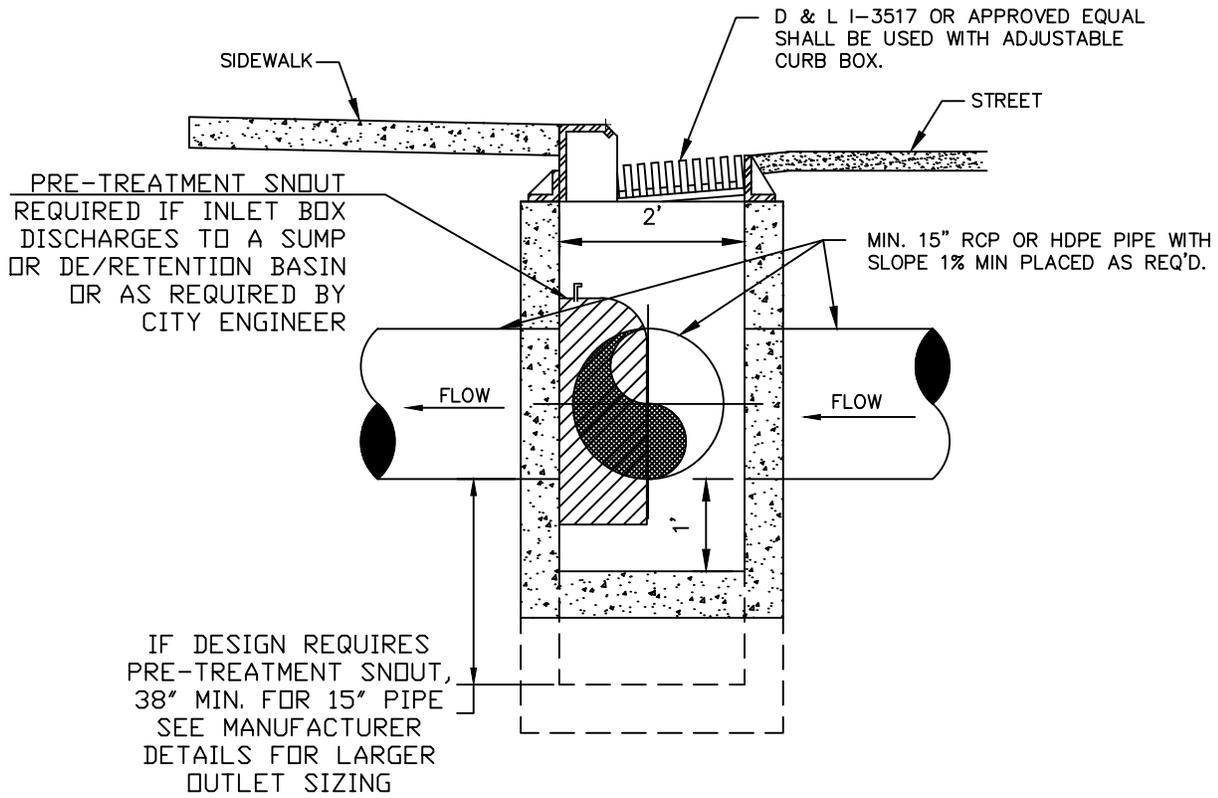
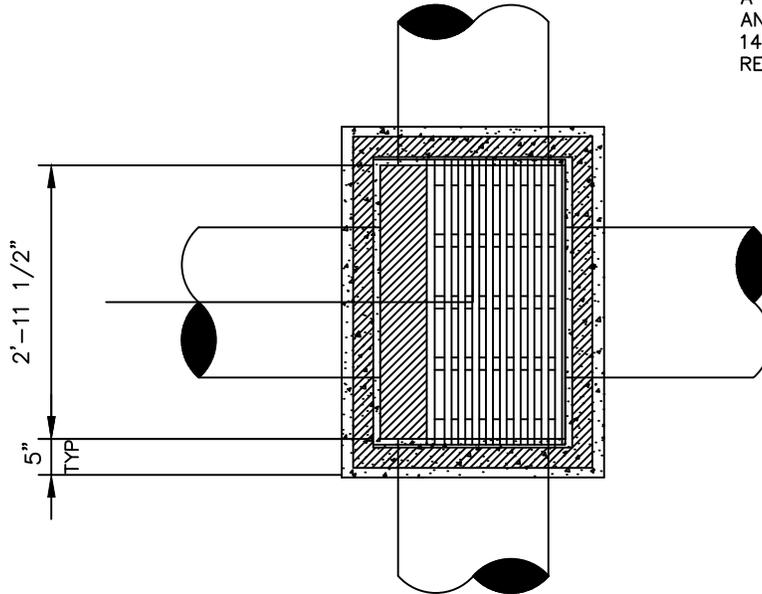
CHECKED BY:

ADOPTED DATE: 4/14/04

REVISION

NO.	BY	APPL.	DATE

NOTE:
 #4 REBAR SPACED AT
 A MINIMUM OF 12" O.C. HORIZ.
 AND 8" O.C. VERTICAL.
 14" OVERLAP OR REBAR
 REQUIRED.



CURB FACE DROP INLET BOX

N.T.S.

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CURB FACE DROP INLET BOX (Typical)

STANDARD DRAWING NUMBER: **20**

PLOT SCALE: N.T.S.

DRAWN BY: WJM

DESIGN BY:

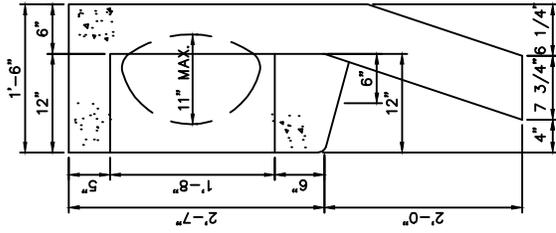
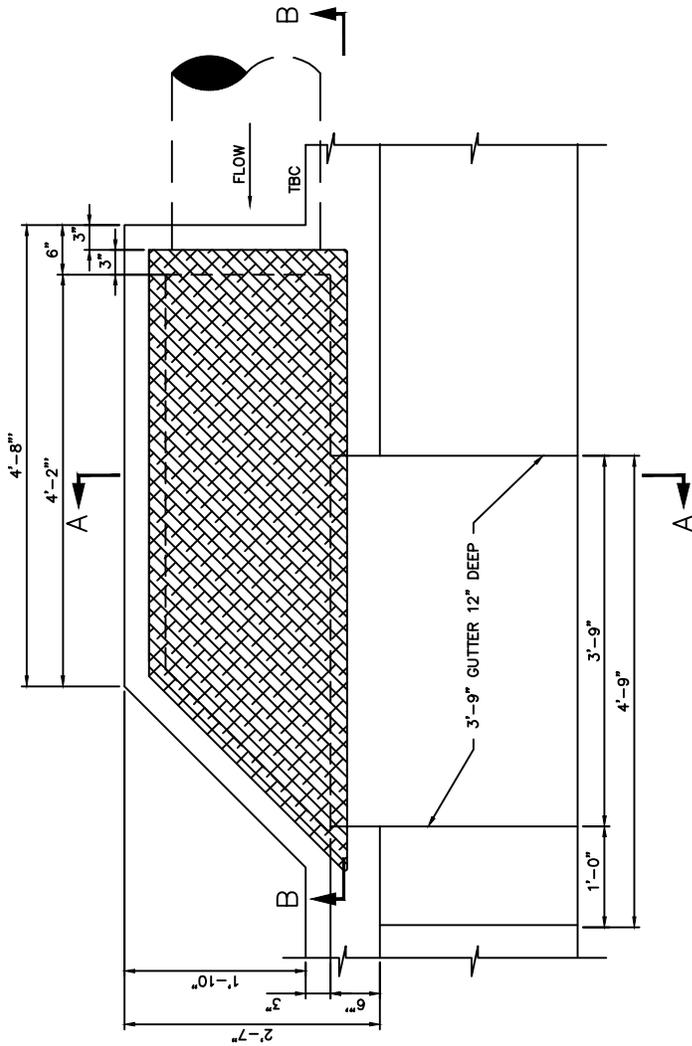
CHECKED BY:

ADOPTED DATE: 4/14/04

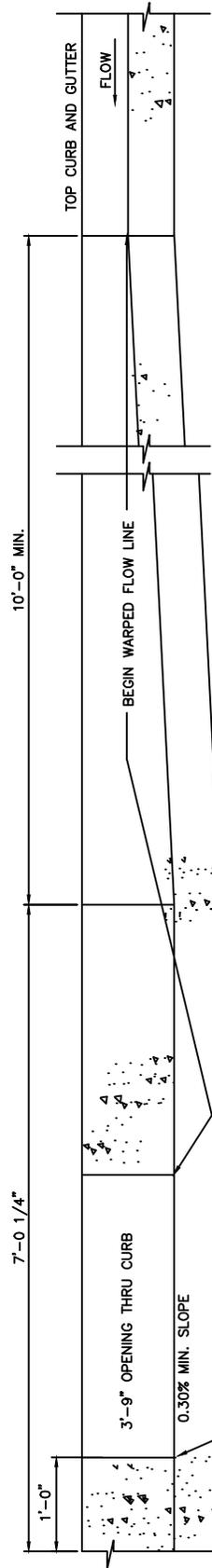
REVISION

NO.	BY	APR.	DATE

ALPINE CITY
 20 NORTH MAIN
 ALPINE, UT 84004



SECTION A-A



SECTION B-B

GENERAL NOTES

1. ALL MATERIALS, CONSTRUCTION, AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH ALPINE CITY SPECIFICATIONS AND AS DIRECTED BY THE ALPINE CITY ENGINEER OR HIS REPRESENT.
2. ALL CONCRETE TO BE 4000 P.S.I. @ 28 DAYS.
3. UNDER CONDITIONS WHERE PIPE SIZE, PIPE TYPE, OR EARTH COVER IS CRITICAL USE MODIFIED OUTLET BOX.
4. 1/4" PLATE SHALL BE PLACED ON THE OULET AS A COVER. THE PLAT SHALL BE PAINTED GREY

DIPSTONE OUTLET
N.T.S.

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DIPSTONE OUTLET

STANDARD DRAWING NUMBER:

21

PLOT SCALE: N.T.S.

DRAWN BY: WJM

DESIGN BY:

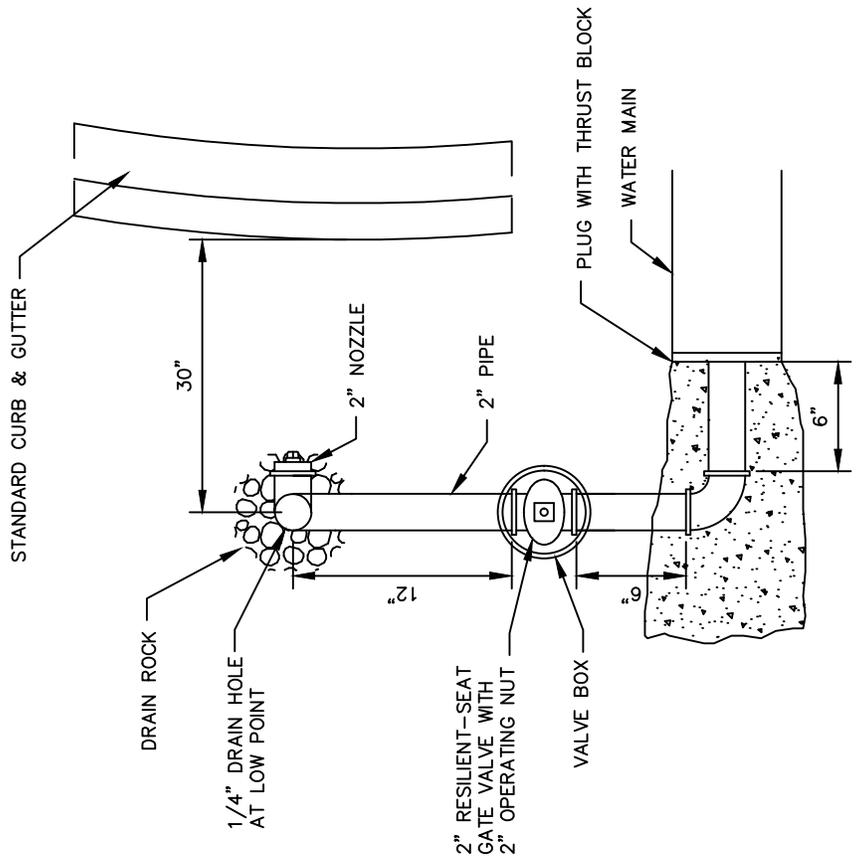
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ADOPTED DATE: 4/14/04

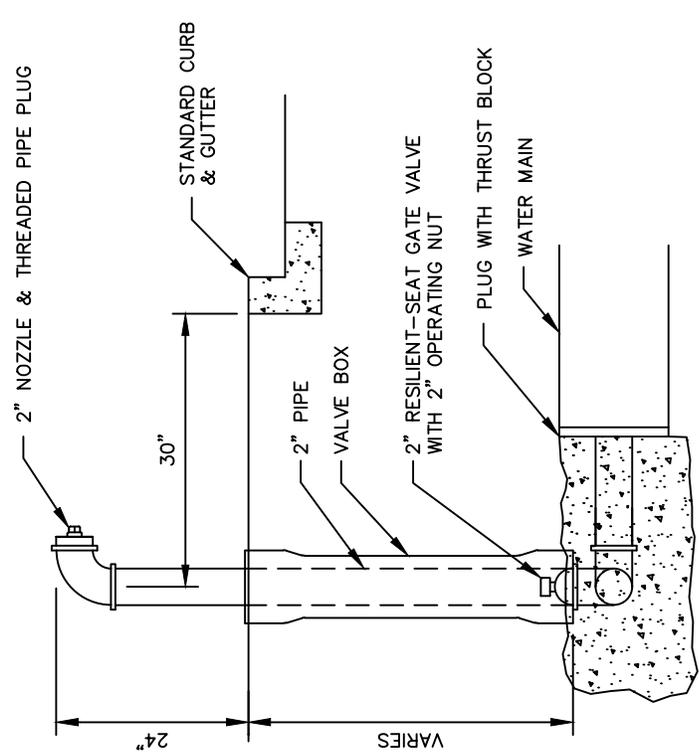
ALPINE CITY
20 NORTH MAIN
ALPINE, UT 84004

REVISION

NO.	BY	APRIL	DATE



PLAN VIEW



PROFILE

FLUSH VALVE

N.T.S.

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FLUSH VALVE (Typical)

ALPINE CITY
20 NORTH MAIN
ALPINE, UT 84004

STANDARD DRAWING NUMBER: **22**

PLOT SCALE: N.T.S.

DRAWN BY: WJM

DESIGN BY:

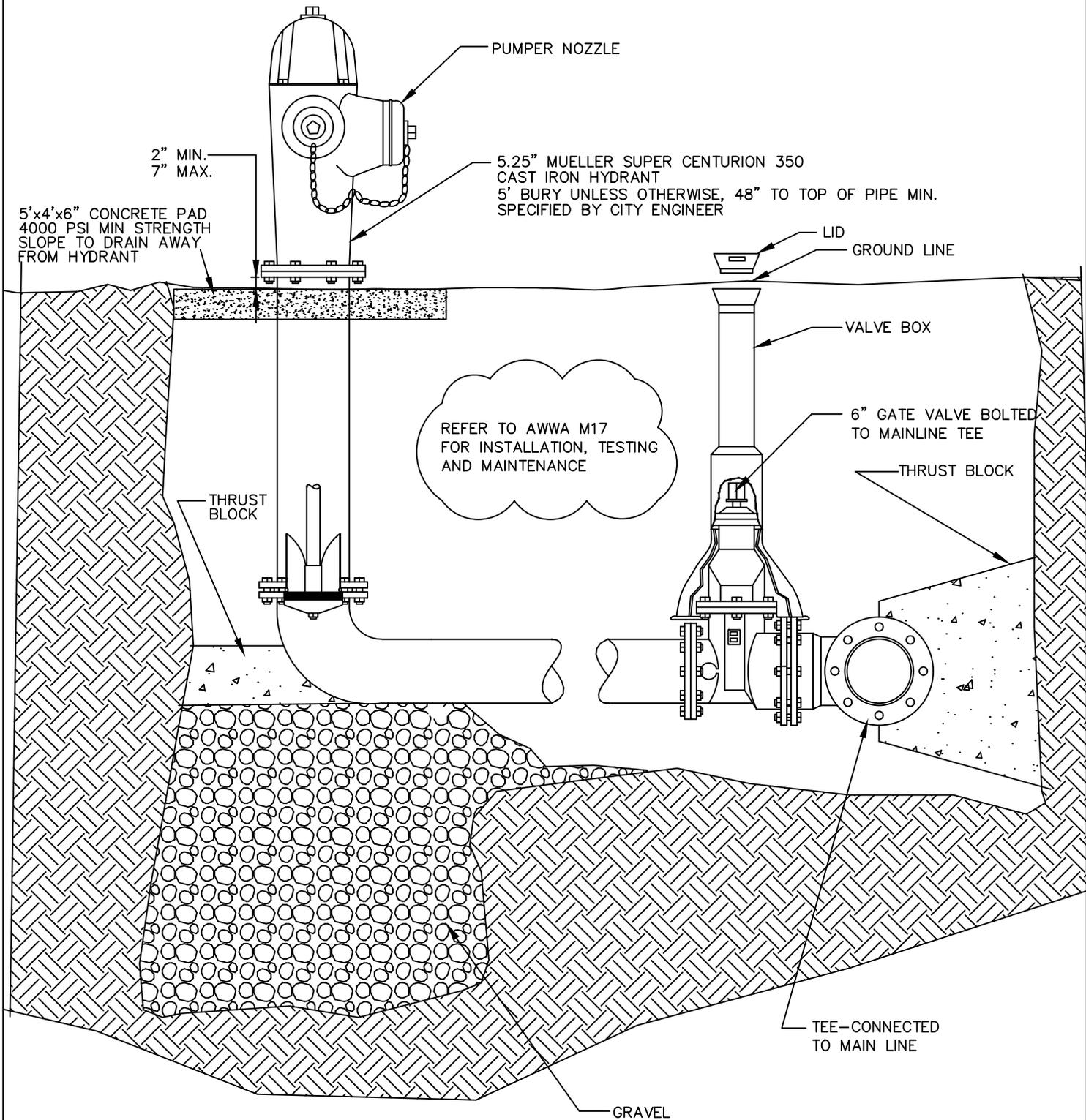
CHECKED BY:

ADOPTED DATE: 4/14/04

REVISION

NO.	BY	APRIL	DATE

****FIRE HYDRANTS REQUIRE 3- FEET MINIMUM CLEARANCE FOR OPERATION, THIS INCLUDES DRIVEWAYS****



STANDARD FIRE HYDRANT DETAIL

N.T.S.

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TYPICAL FIRE HYDRANT

ALPINE CITY
20 NORTH MAIN
ALPINE, UT 84004

STANDARD DRAWING NUMBER:

23

PLOT SCALE: N.T.S.

DRAWN BY: WJM

DESIGN BY:

CHECKED BY:

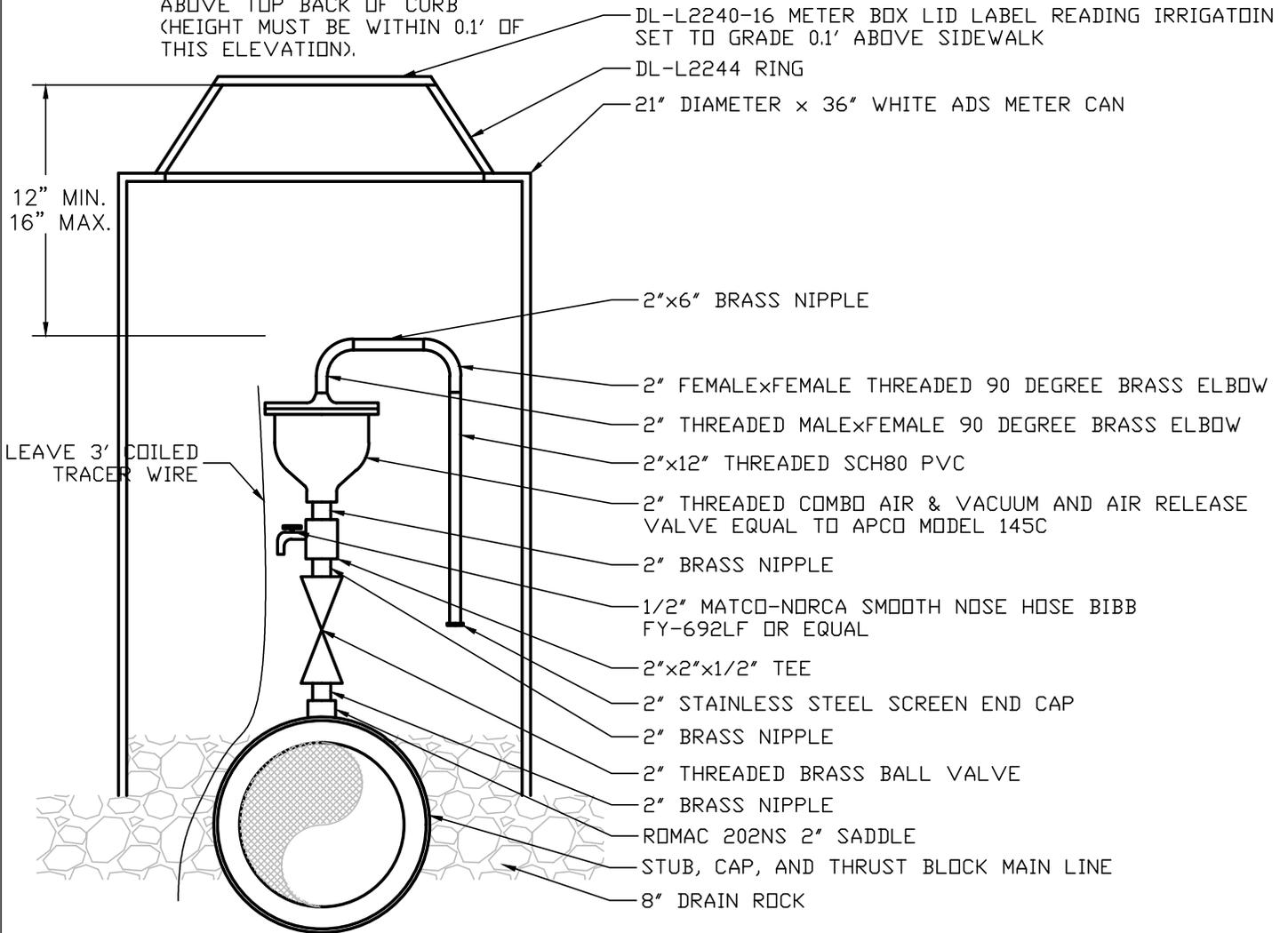
ADOPTED DATE: 4/14/04

REVISION

NO.	BY	APR.	DATE

CAD FILE: E:\ENGINEERING\CODES & STANDARD SPECS\STANDARD SPECIFICATIONS AND DRAWINGS\2003 CITY SPEC & DETAILS\DETAILS\23 FHYD

"AIR-VAC" ASSEMBLY TO BE PLACED IN CENTER OF PARK STRIP. SET HEIGHT AT 0.1' ABOVE TOP BACK OF CURB (HEIGHT MUST BE WITHIN 0.1' OF THIS ELEVATION).



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SECONDARY WATER AIR-VAC ASSEMBLY

STANDARD DRAWING NUMBER: **26**

PLOT SCALE: N.T.S.

DRAWN BY: WJM

DESIGN BY:

CHECKED BY:

ADOPTED DATE: 12/7/18

REVISION

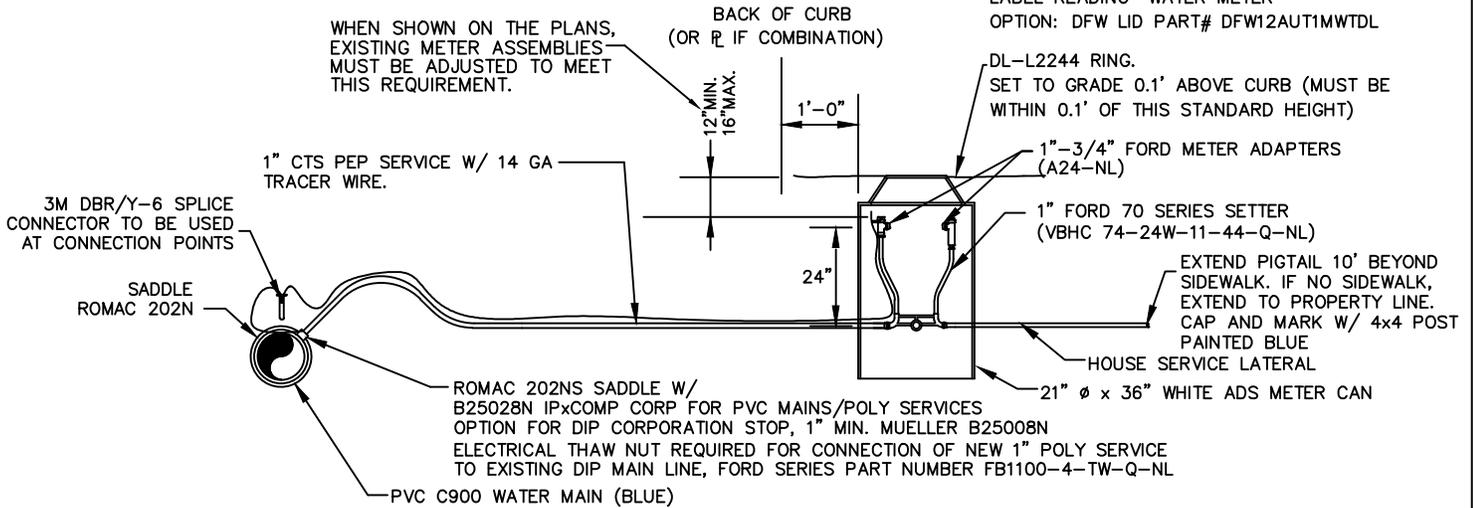
NO.	BY	APR.	DATE

ALPINE CITY
20 NORTH MAIN
ALPINE, UT 84004

CULINARY WATER METERS REQUIRE 3- FEET MINIMUM CLEARANCE FOR O&M. THIS INCLUDES CLEARANCE FROM DRIVEWAYS AND LANDSCAPING.

NOTE: METER BOX, COVER, COPPERSETTER, CORPORATION STOP, & SERVICE LINES TO BE FURNISHED AND INSTALLED BY DEVELOPER.

NICOR READ-RITE POLYMER METER BOX LID FOR TYPE O/X, MODEL NUMBER 12.25PBLKWAMTHO TYPE X W/ THRU HOLE FOR BADGER ORION RECESS LABEL READING "WATER METER" OPTION: DFW LID PART# DFW12AUT1MWDTL



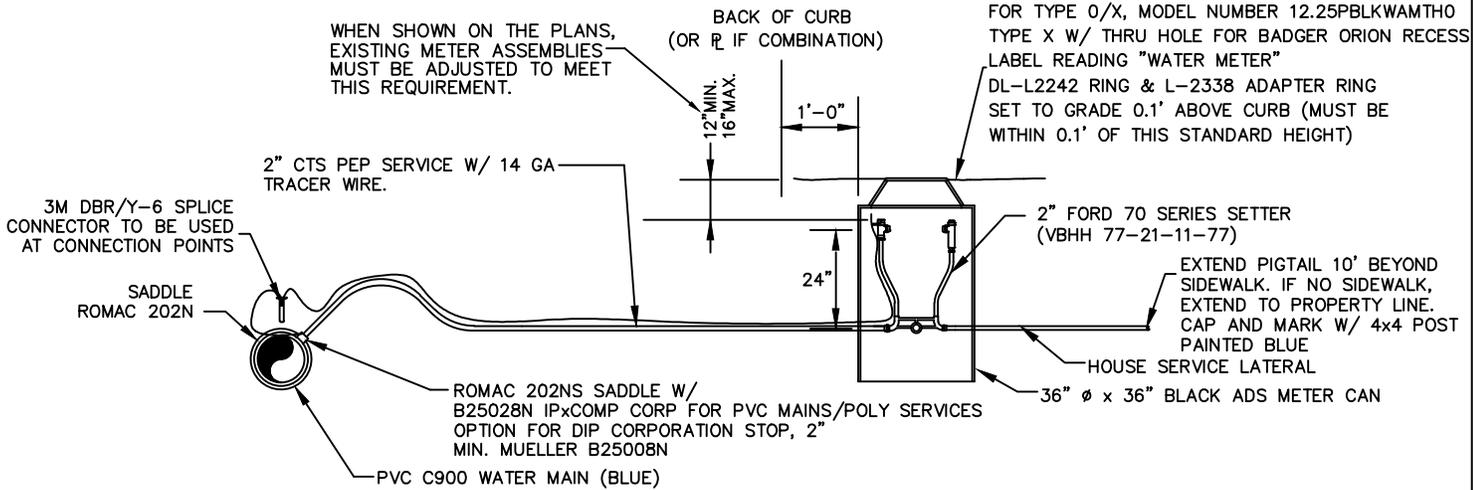
NOTE: 1" SERVICES ARE STANDARD FOR ALL NEW DEVELOPMENT, AS SHOWN. REPLACEMENT PARTS FOR EXISTING 3/4" SERVICES CONSISTS OF: 3/4" FORD SERIES SETTER - VBHC72-24W-11-33-NL CORPS ARE THE SAME PART NUMBERS, SPECIFIED AS 3/4" INSTEAD OF 1"

3/4" & 1" WATER SERVICE CONNECTIONS

N.T.S.

NOTE: METER BOX, COVER, COPPERSETTER, CORPORATION STOP, & SERVICE LINES TO BE FURNISHED AND INSTALLED BY DEVELOPER.

NICOR READ-RITE POLYMER METER BOX LID FOR TYPE O/X, MODEL NUMBER 12.25PBLKWAMTHO TYPE X W/ THRU HOLE FOR BADGER ORION RECESS LABEL READING "WATER METER" DL-L2242 RING & L-2338 ADAPTER RING SET TO GRADE 0.1' ABOVE CURB (MUST BE WITHIN 0.1' OF THIS STANDARD HEIGHT)



NOTE: FOR 1.5" SERVICES: ALL PARTS SHOWN ABOVE ARE THE SAME EXCEPT THE SERVICE LINE AND SETTER, WHICH WOULD BOTH BE CHANGED TO 1.5"

1.5" & 2" WATER SERVICE CONNECTIONS

N.T.S.

STATEMENT OF USE

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WATER SERVICE CONNECTION DETAIL

STANDARD DRAWING NUMBER: **27**

PLOT SCALE: N.T.S.

DRAWN BY: WJM

DESIGN BY:

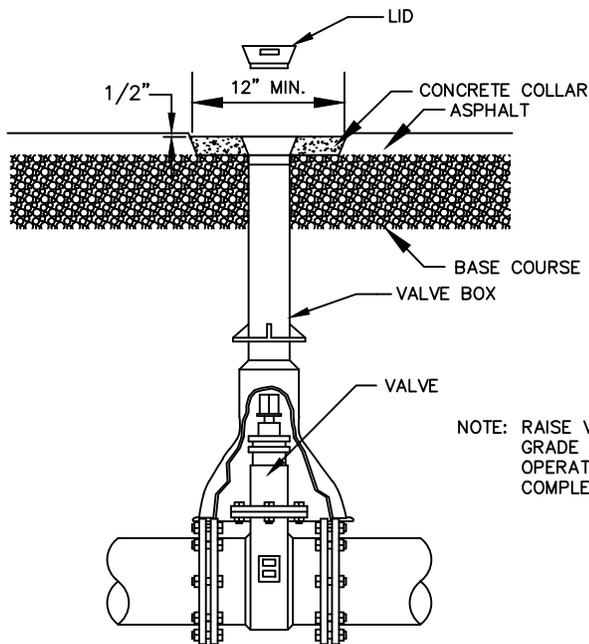
CHECKED BY:

ADOPTED DATE: 4/14/04

REVISION

NO.	BY	APRIL	DATE

ALPINE CITY
20 NORTH MAIN
ALPINE, UT 84004



NOTE: RAISE VALVE BOX TO GRADE AFTER PAVING OPERATIONS ARE COMPLETED.

VALVE BOX COLLAR DETAIL

N.T.S.

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VALVE BOX DETAIL

ALPINE CITY
20 NORTH MAIN
ALPINE, UT 84004

STANDARD DRAWING NUMBER: **27a**

PLOT SCALE: N.T.S.

DRAWN BY: WJM

DESIGN BY:

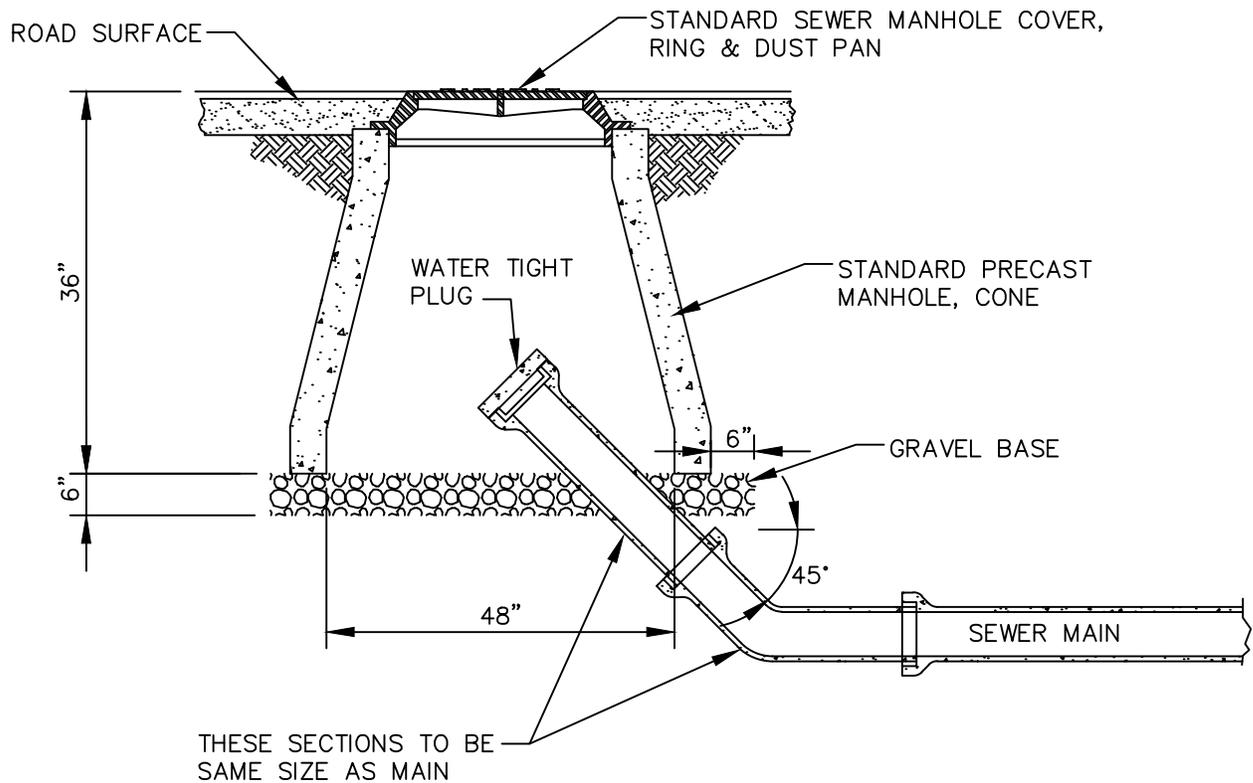
CHECKED BY:

ADOPTED DATE: 4/14/04

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NO.	BY	APR.	DATE

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TEMPORARY SEWER MAIN CLEANOUT

N.T.S.

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TEMPORARY SEWER MAIN CLEANOUT

STANDARD DRAWING NUMBER:

28

PLOT SCALE: N.T.S.

DRAWN BY: WJM

DESIGN BY:

CHECKED BY:

ADOPTED DATE: 4/14/04

REVISION

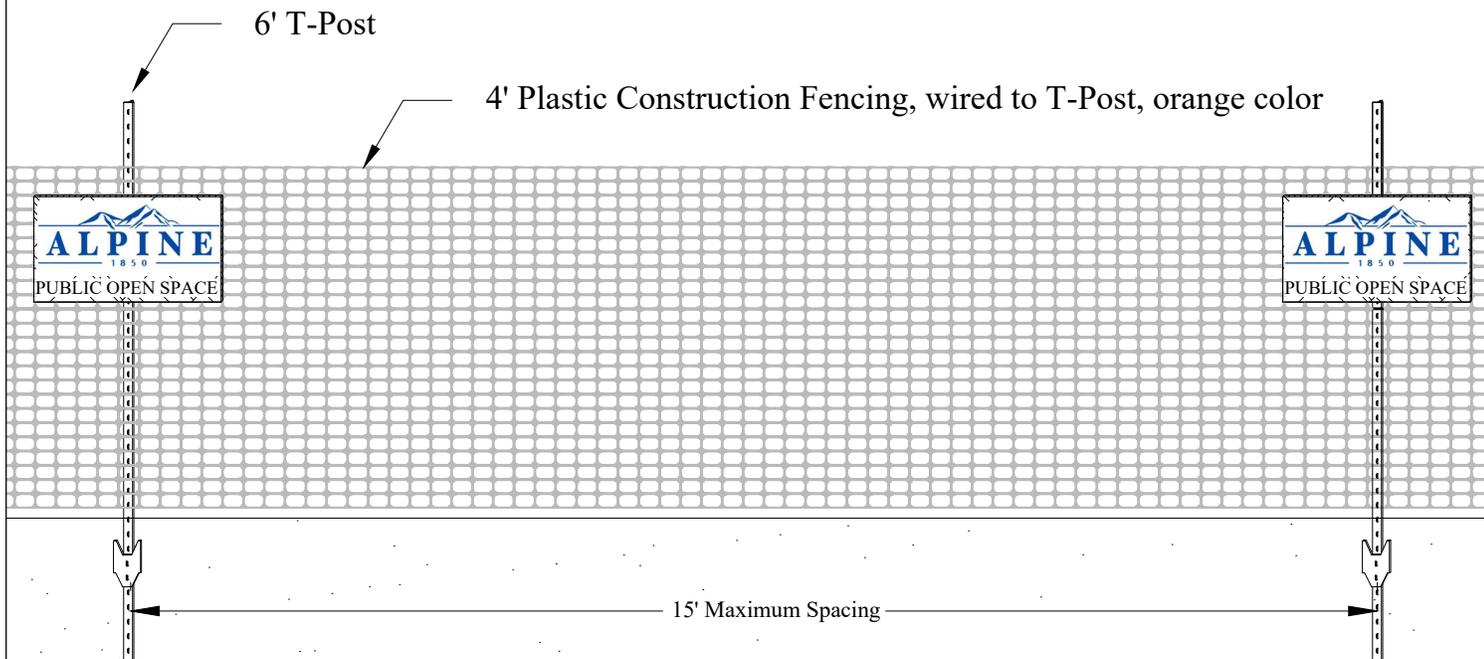
NO.	BY	APRIL	DATE

ALPINE CITY
20 NORTH MAIN
ALPINE, UT 84004



SIGN SPECIFICATIONS

- SIGN TO BE 18"x24"
- PRINTED WITH BLACK LETTERS, WHITE BACKGROUND
- LAMINATED AND STAPLED TO PLYWOOD
- WIRED TO T-POSTS
- SPACED ONE PER JOB SITE IN A VISIBLE LOCATION
IF MORE THAN 300' OF FENCING REQ'D, ONE SIGN TO
BE PLACED EVERY 300'



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PUBLIC OPEN SPACE FENCING

ALPINE CITY
20 NORTH MAIN
ALPINE, UT 84004

STANDARD DRAWING NUMBER: **29**

PLOT SCALE: N.T.S.

DRAWN BY: WJM

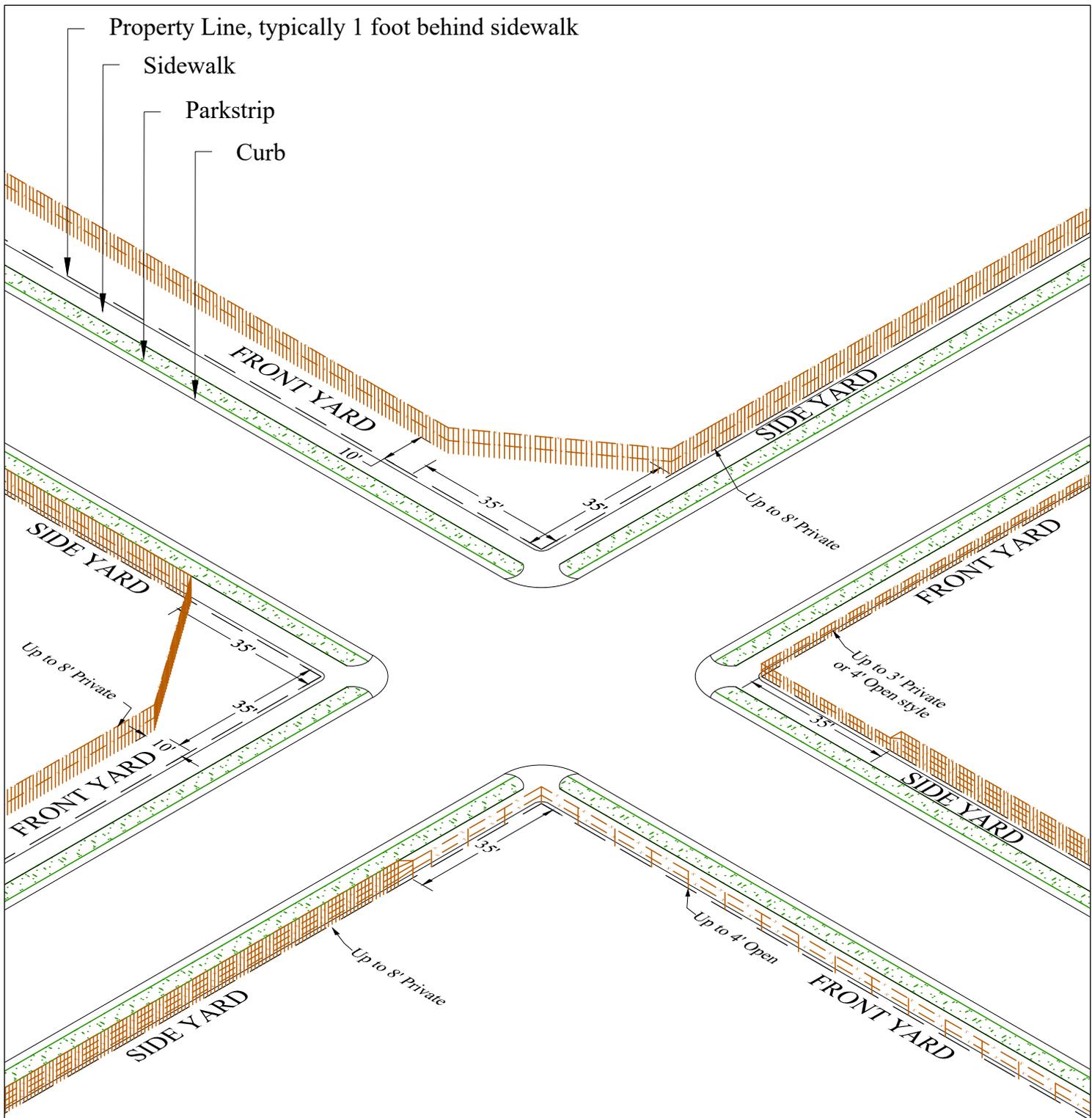
DESIGN BY:

CHECKED BY:

ADOPTED DATE: 4/14/04

REVISION

NO.	BY	APR.	DATE



NOTE: SEE DEVELOPMENT CODE SECTION 3.21.060
 ALL PARTS OF THE FENCE TO BE PLACED NO CLOSER THAN
 1 FOOT BEHIND SIDEWALK (OR ON PROPERTY LINES) WITH
 HEIGHTS AS SHOWN. FREE FENCE PERMIT
 REQUIRED.

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FENCING REGULATIONS

ALPINE CITY
 20 NORTH MAIN
 ALPINE, UT 84004

STANDARD DRAWING NUMBER: **30**

PLOT SCALE: N.T.S.

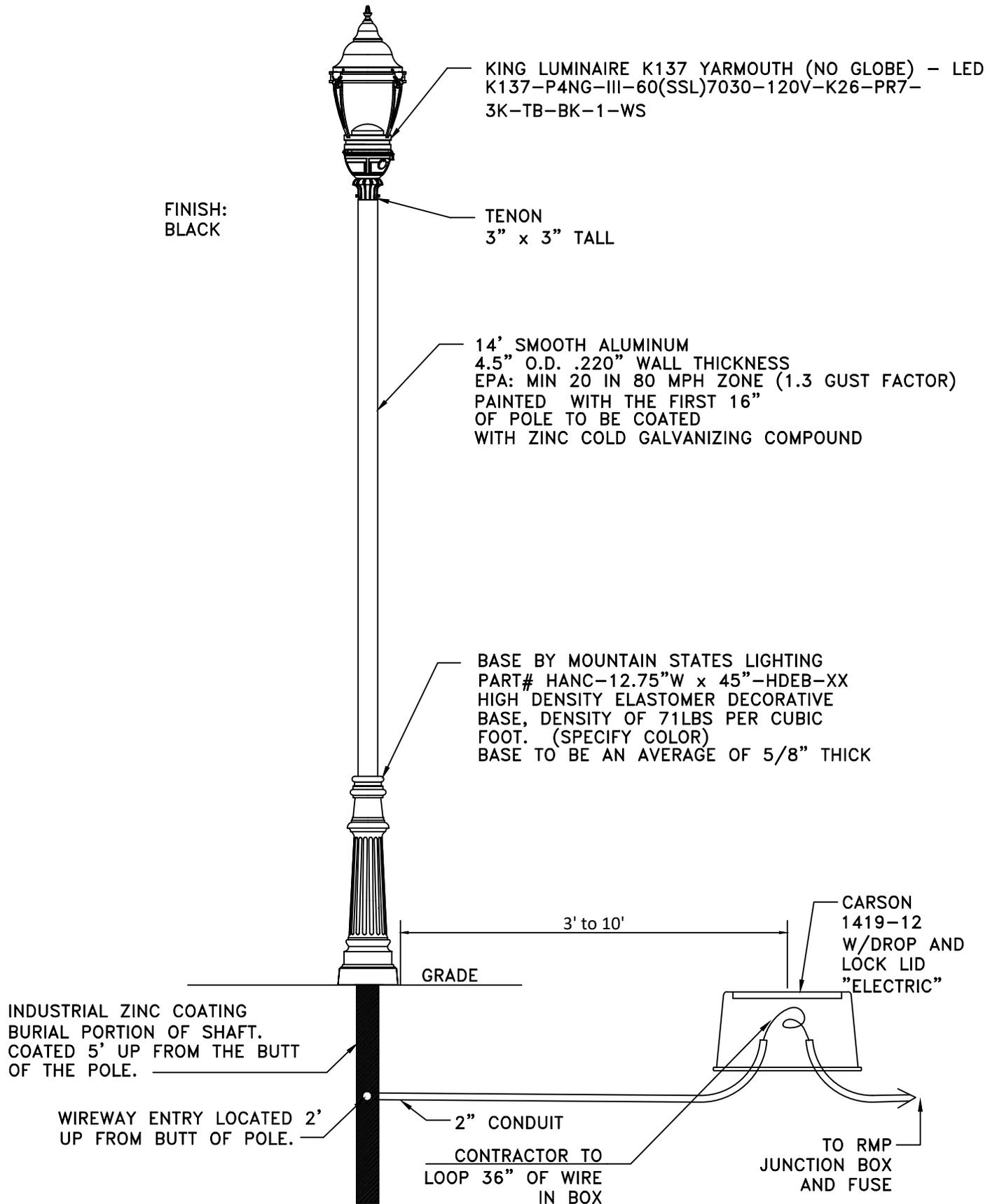
DRAWN BY: WJM

DESIGN BY:

CHECKED BY:

ADOPTED DATE: 4/14/04

STREETLIGHTS REQUIRE 3-FEET MINIMUM CLEARANCE FOR O&M. THIS INCLUDES CLEARANCE FROM DRIVEWAYS AND LANDSCAPING.



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RESIDENTIAL STREET LIGHT

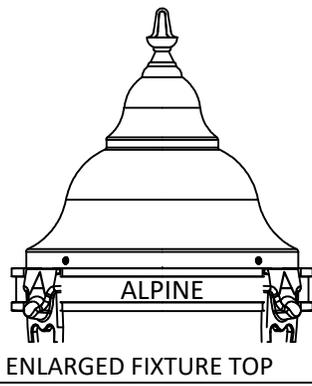
ALPINE CITY
 20 NORTH MAIN
 ALPINE, UT 84004

STANDARD DRAWING NUMBER: **31**

PLOT SCALE:	N.T.S.
DRAWN BY:	WJM
DESIGN BY:	
CHECKED BY:	
ADOPTED DATE:	DRAFT

REVISION

NO.	BY	APR	DATE

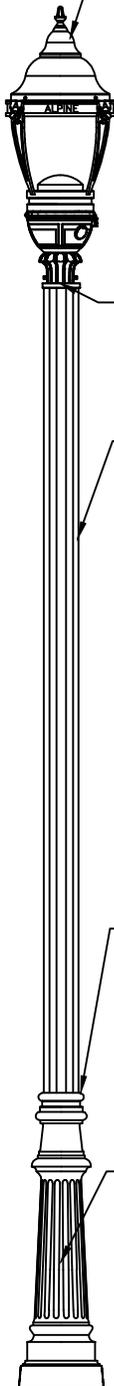


ENLARGED FIXTURE TOP

NOTE!!
IF DEPTH CANNOT BE
MET MASS MUST BE
EQUIVALENT TO MASS
SHOWN

FINISH;
BLACK

KING LUMINAIRE K137 YARMOUTH (NO GLOBE) - LED
K137-P4NG-III-100(SSL)7030-120V-K26-PR7-
3K-TB-BK-1-WS



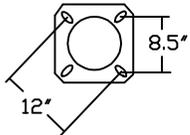
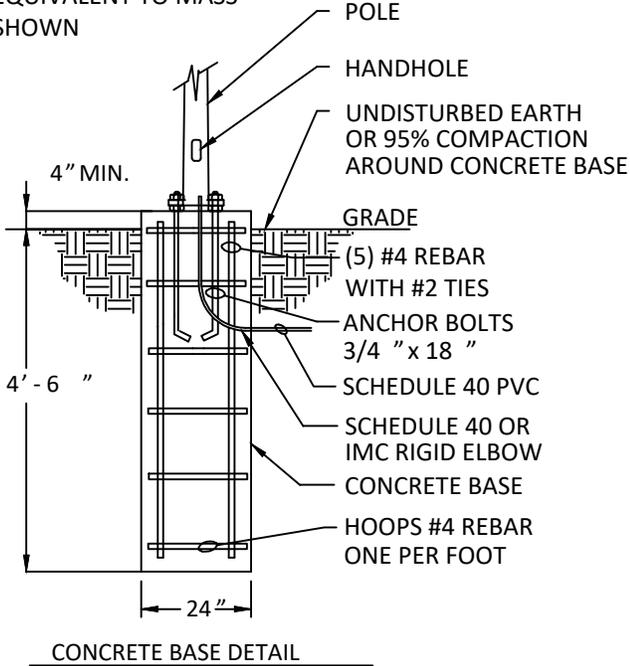
TENON 3"X3" TALL

14' EXTRUDED FLUTED ALUMINUM
5.0" O.D. .250" WALL THICKNESS
EPA MIN 20 IN 80 MPH ZONE (1.3 GUST FACTOR)
PAINTED WITH THE FIRST 16"
OF POLE TO BE COATED
WITH ZINC COLD GALVANIZING COMPOUND

BASE BY MOUNTAIN STATES
PART# HANC-12.75"W x 45"-HDEB-BK
HIGH DENSITY ELASTOMER DECORATIVE
BASE, DENSITY OF 71LBS PER CUBIC
FOOT. DENSITY: 71LBS PER CUBIC FOOT.
BASE TO BE AN AVERAGE OF 5/8" THICK

HANDHOLE LOCATED 12" ABOVE GRADE
BEHIND TWO-PIECE DECORATIVE BASE.

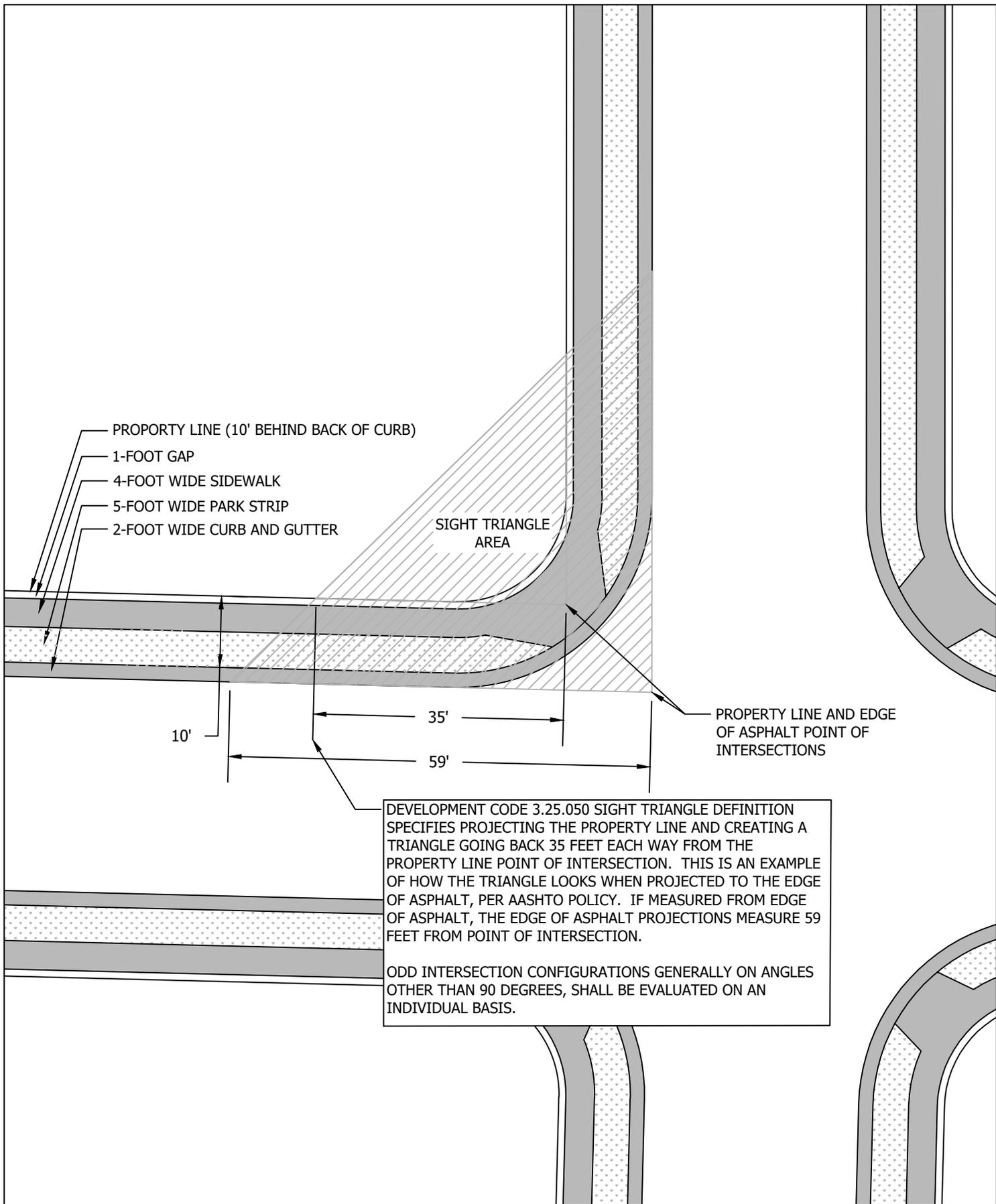
** SEE DETAIL 31 **
FOR REQUIRED
JUNCTION BOX
AT BASE



ANCHOR BASE DETAIL
12" BOLT CIRCLE
ANCHOR BOLTS: 3/4" x 18"

STREETLIGHTS REQUIRE 3- FEET MINIMUM CLEARANCE FOR O&M. THIS INCLUDES CLEARANCE FROM DRIVEWAYS AND LANDSCAPING.

<p>STATEMENT OF USE THIS DOCUMENT AND ANY ILLUSTRATIONS HEREON ARE PROVIDED AS STANDARD CONSTRUCTION DETAILS WITHIN ALPINE CITY. DEVIATION FROM THIS DOCUMENT REQUIRES APPROVAL OF ALPINE CITY. ALPINE CITY CORPORATION CAN NOT BE HELD LIABLE FOR MISUSE OR CHANGES REGARDING THIS DOCUMENT.</p>			<p>DOWNTOWN STREET LIGHT</p>		<p>STANDARD DRAWING NUMBER: 31a</p>							
<p>REVISION</p> <table border="1"> <tr> <td>NO.</td> <td>BY</td> <td>APRIL</td> <td>DATE</td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </table>			NO.	BY	APRIL	DATE					<p>ALPINE CITY 20 NORTH MAIN ALPINE, UT 84004</p>	
NO.	BY	APRIL	DATE									
<p>CAD FILE: E:\ENGINEERING\CODES & STANDARD SPECS\STANDARD SPECIFICATIONS AND DRAWINGS\2023 CITY SPEC & DETAILS\DETAILS\31A STREET LIGHT - DOWNTOWN BOLT DOWN</p>												



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NO.	BY	APR.	DATE



SIGHT TRIANGLE

ALPINE CITY
20 NORTH MAIN
ALPINE, UT 84004

STANDARD DRAWING NUMBER:	32
PLOT SCALE:	N.T.S.
DRAWN BY:	J.M.
DESIGN BY:	
CHECKED BY:	
ADOPTED DATE:	10/13/11

PASTURE GRASS MIX

20 lbs CABIN BLEND and 5 lbs ROCKY MOUNTAIN WILDFLOWER mix per acre

CABIN BLEND	
SPECIES	% BY WEIGHT
MOUNTAIN BROME	30
SLENDER WHEATGRASS	25
SANDBERG BLUEGRASS	5
BIG BLUEGRASS	5
SHEEP FESCUE	5
WESTERN WHEATGRASS	20
BEARDLESS BLUEBUNCH WHEATGRASS	10

ROCKY MOUNTAIN WILDFLOWER MIX	
SPECIES	% BY WEIGHT
BLUE FLAX	9
PURPLE CONEFLOWER	10
BLACKEYED SUSAN	2
CALIFORNIA POPPY	1
WALLFLOWER	6
FIREWHEEL	7
WILD LUPINE	10
LANCE-LEAVED COREOPSIS	8
PRAIRIE CONEFLOWER	2
MEXICAN HAT	2
FLANDERS POPPY	2
YELLOW COSMOS	5
BACHELOR BUTTON	6
PLAINS COREOPSIS	2
MOUNTAIN PHLOX	1
ROCKY MOUNTAIN IRIS	3
MOUNTAIN LUPINE	6
SHOWY GLODENEYE	3
BLANKET FLOWER	6

WETLANDS/STREAM BANK GRASS MIX 15 LBS PER ACRE

WETLAND/STREAMBANK MIX	
SPECIES	% BY WEIGHT
INLAND SALTGRASS	13.3
WESTERN WHEATGRASS	13.3
STREAMBANK WHEATGRASS	13.3
NEBRASKA SEDGE	20
BLUEJOINT REEDGRASS	1.67
BEAKED SEDGE	20
BALTIC RUSH	1.67
MEADOW SEDGE	16.67

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REVISION

NO.	BY	APRL	DATE



STANDARD SEED MIXTURES

ALPINE CITY
20 NORTH MAIN
ALPINE, UT 84004

STANDARD DRAWING NUMBER:

33

PLOT SCALE: N.T.S.

DRAWN BY: WJM

DESIGN BY:

CHECKED BY:

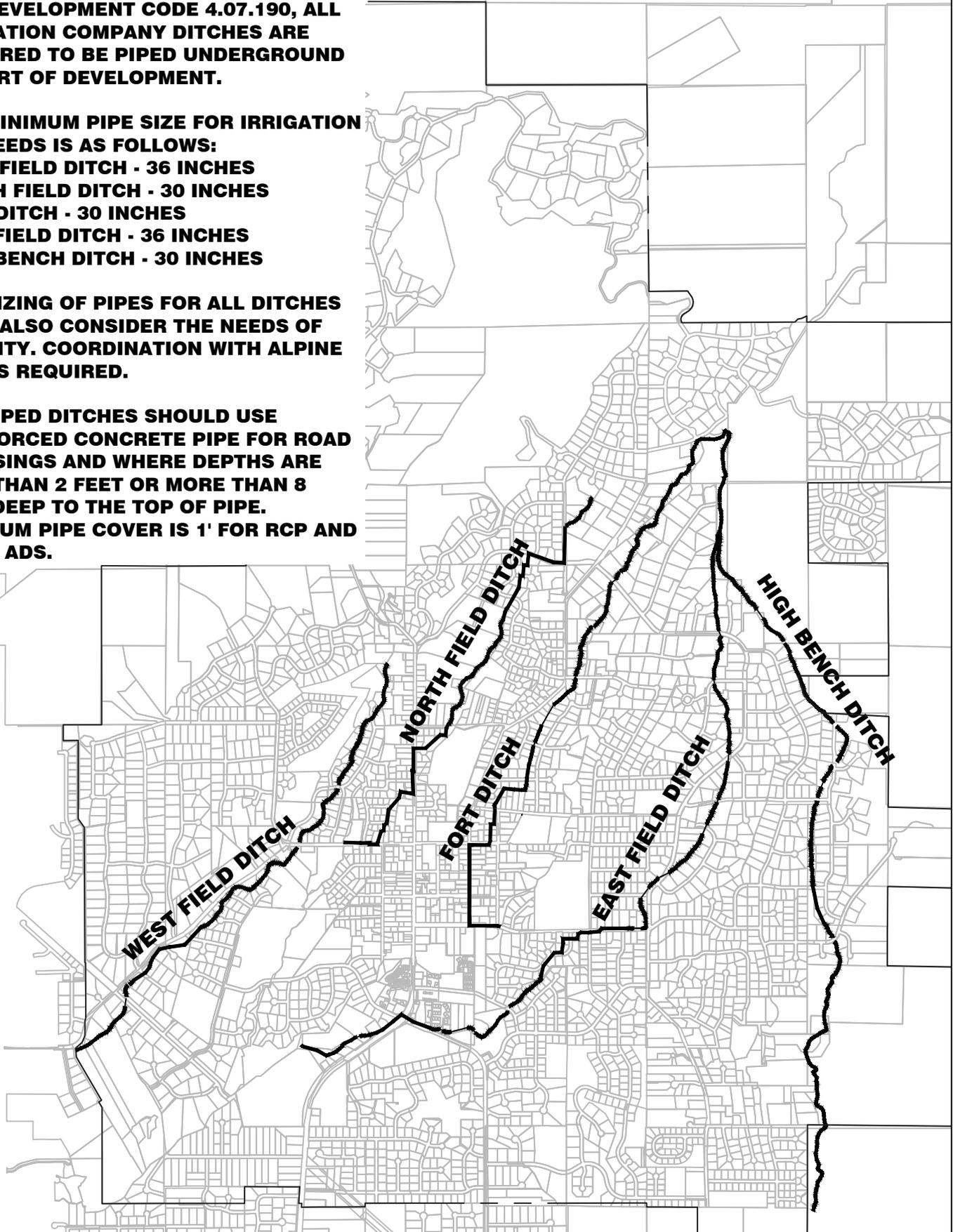
ADOPTED DATE: 12/7/18

PER DEVELOPMENT CODE 4.07.190, ALL IRRIGATION COMPANY DITCHES ARE REQUIRED TO BE PIPED UNDERGROUND AS PART OF DEVELOPMENT.

THE MINIMUM PIPE SIZE FOR IRRIGATION CO. NEEDS IS AS FOLLOWS:
WEST FIELD DITCH - 36 INCHES
NORTH FIELD DITCH - 30 INCHES
FORT DITCH - 30 INCHES
EAST FIELD DITCH - 36 INCHES
HIGH BENCH DITCH - 30 INCHES

THE SIZING OF PIPES FOR ALL DITCHES MUST ALSO CONSIDER THE NEEDS OF THE CITY. COORDINATION WITH ALPINE CITY IS REQUIRED.

ALL PIPED DITCHES SHOULD USE REINFORCED CONCRETE PIPE FOR ROAD CROSSINGS AND WHERE DEPTHS ARE LESS THAN 2 FEET OR MORE THAN 8 FEET DEEP TO THE TOP OF PIPE. MINIMUM PIPE COVER IS 1' FOR RCP AND 2' FOR ADS.



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IRRIGATION CO. DITCHES

ALPINE CITY
 20 NORTH MAIN
 ALPINE, UT 84004

STANDARD DRAWING NUMBER: **34**

PLOT SCALE: N.T.S.

DRAWN BY: WJM

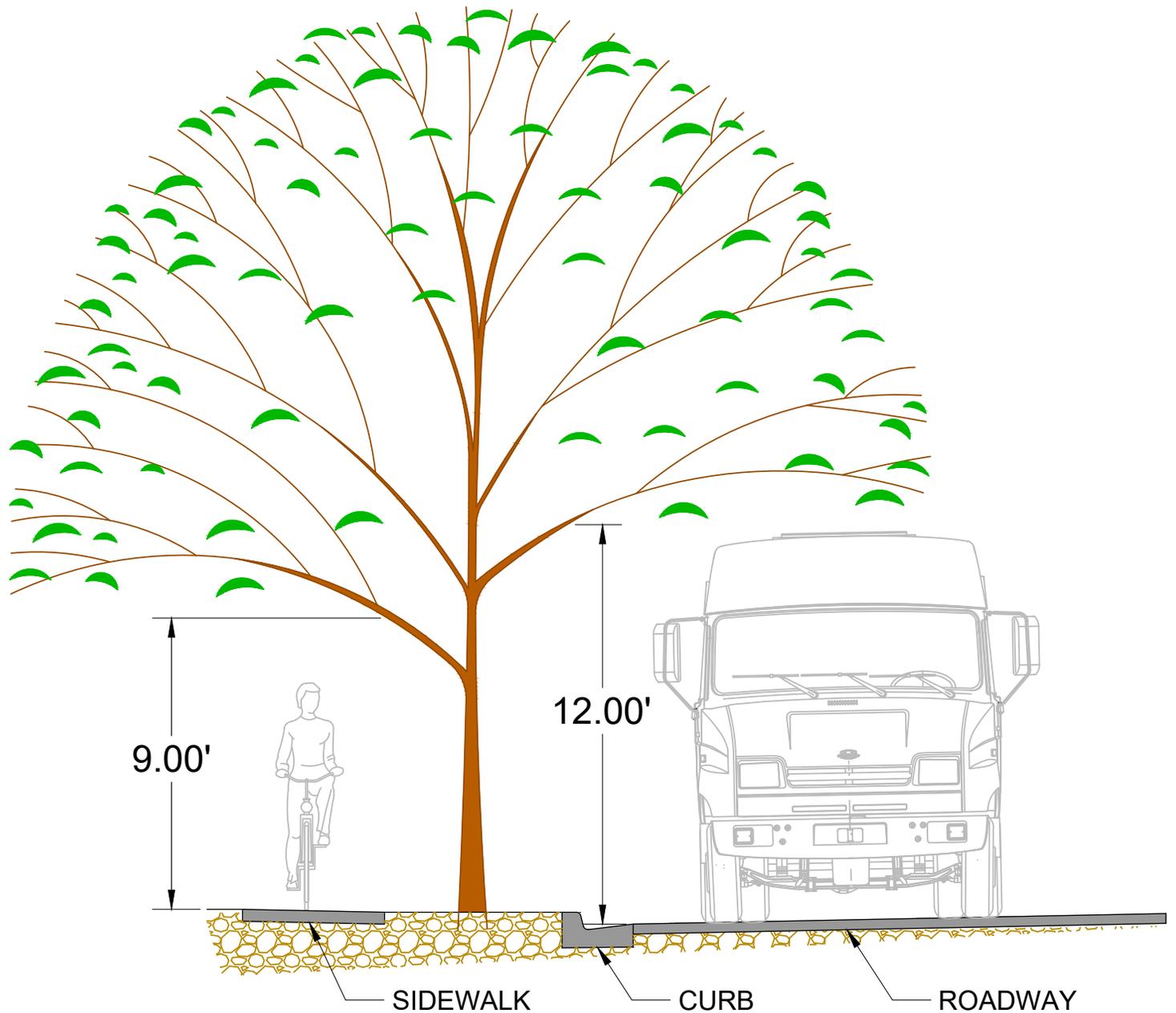
DESIGN BY:

CHECKED BY:

ADOPTED DATE: 12/7/18

REVISION

NO.	BY	APRIL	DATE



Roadway and Sidewalk Tree Trimming Guide
 Branches of trees near roadways or sidewalks shall be trimmed to a minimum height of 12' above the edge of asphalt/lip of curb and 9' above the sidewalk as shown

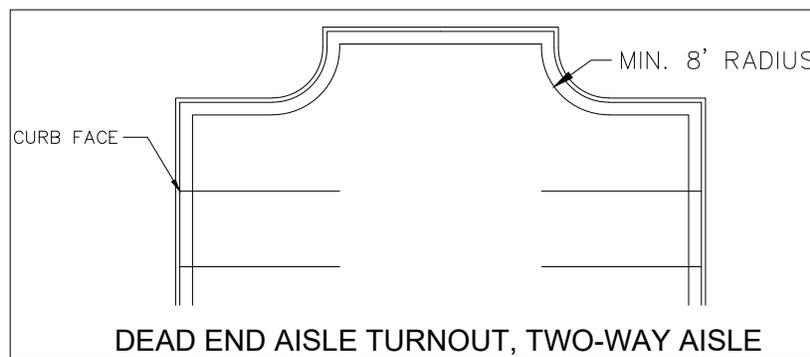
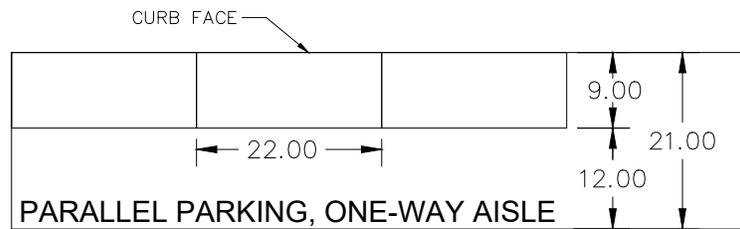
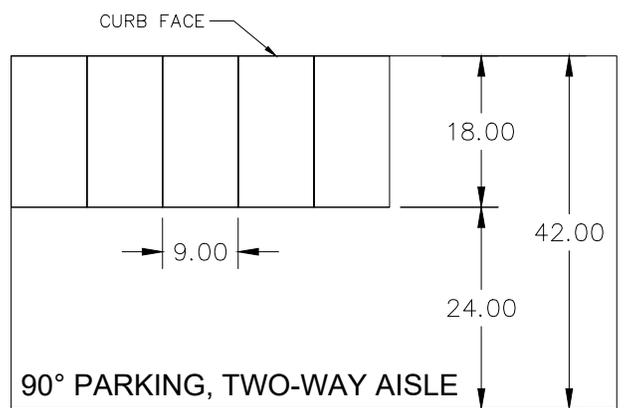
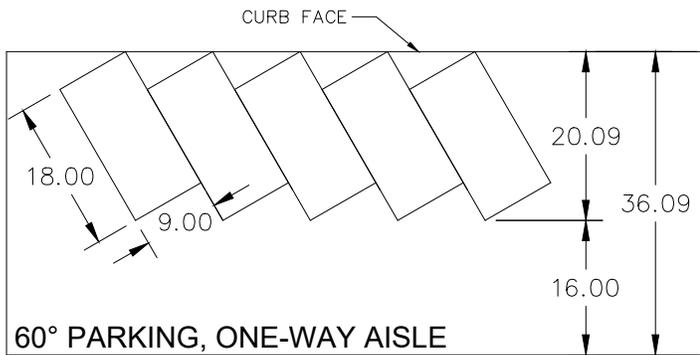
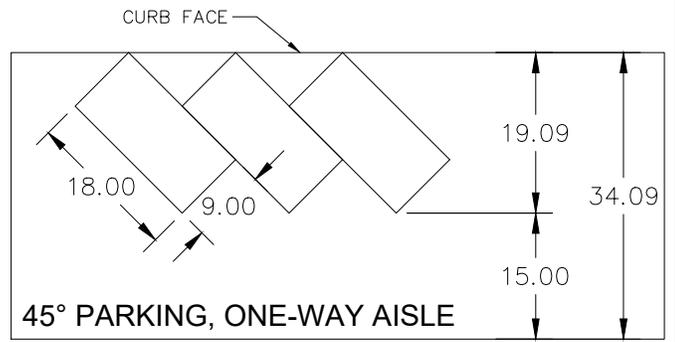
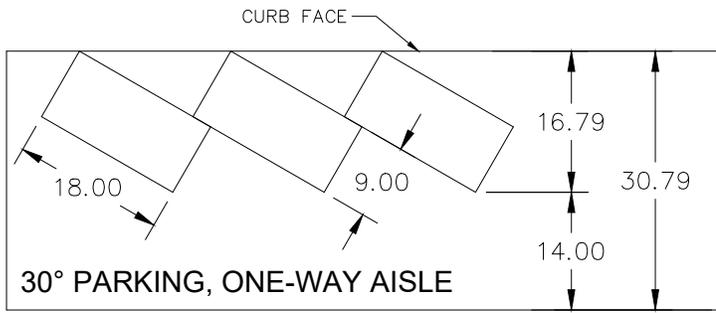
STATEMENT OF USE			
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REVISION			
NO.	BY	APRIL	DATE



ROADWAY TREE TRIMMING

ALPINE CITY
 20 NORTH MAIN
 ALPINE, UT 84004

STANDARD DRAWING NUMBER:	35
PLOT SCALE:	N.T.S.
DRAWN BY:	J.M.
DESIGN BY:	
CHECKED BY:	
ADOPTED DATE:	11/13/2018



STATEMENT OF USE

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REVISION

NO.	BY	APRIL	DATE



PARKING DIMENSIONS

ALPINE CITY
20 NORTH MAIN
ALPINE, UT 84004

STANDARD DRAWING NUMBER: **36**

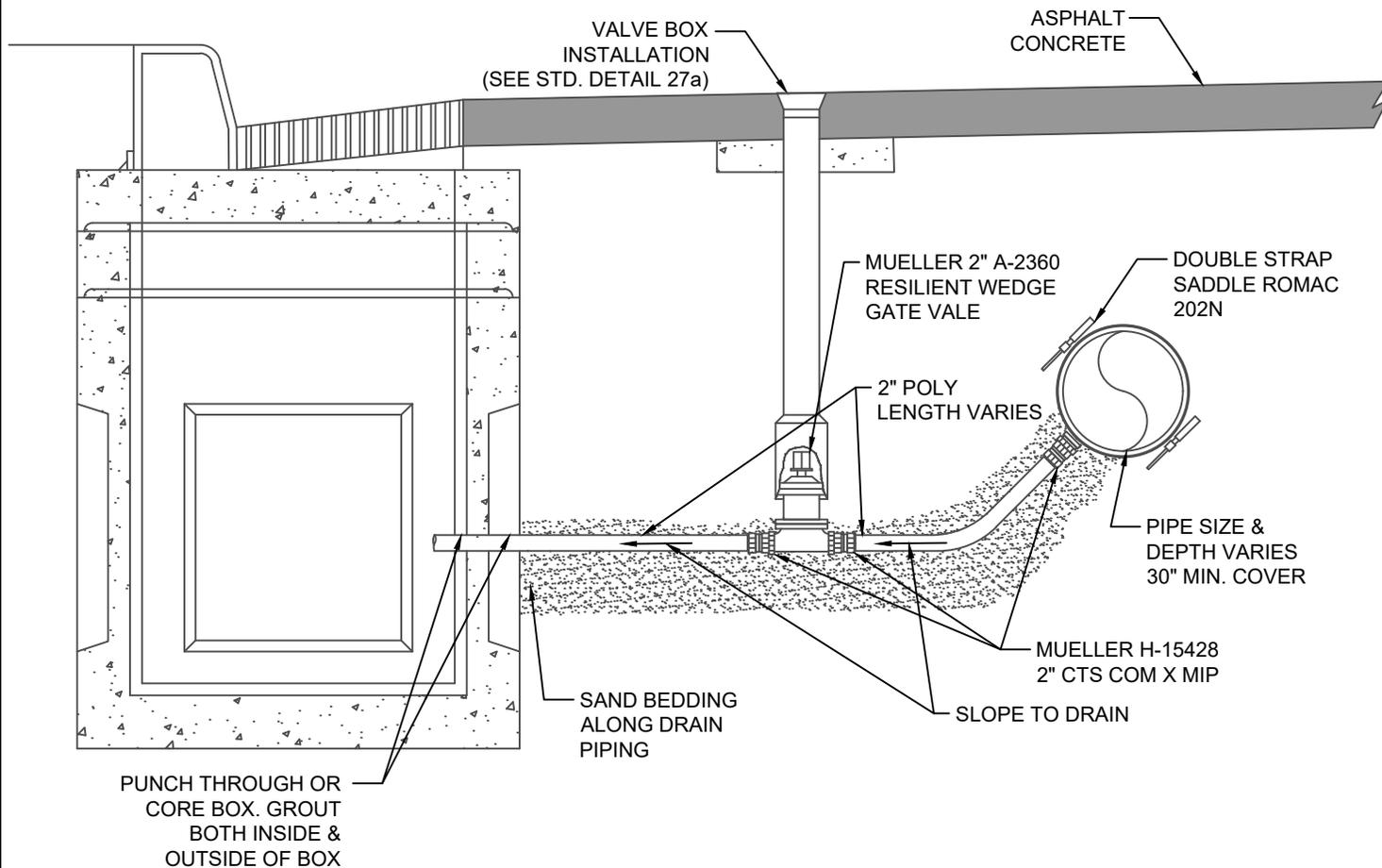
PLOT SCALE: N.T.S.

DRAWN BY: J.M.

DESIGN BY:

CHECKED BY:

ADOPTED DATE: 11/13/2018



NOTES:

1. PROPOSED DRAIN LINE CAN TIE INTO CATCH BASIN BOX (SHOWN) OR SUMP MANHOLE (NOT SHOWN) OR BOX CULVERT (NOT SHOWN)
2. ALL COMPRESSION FITTINGS SHALL INCLUDE A MUELLER 2" CTS PE LINER PART NO. 506141

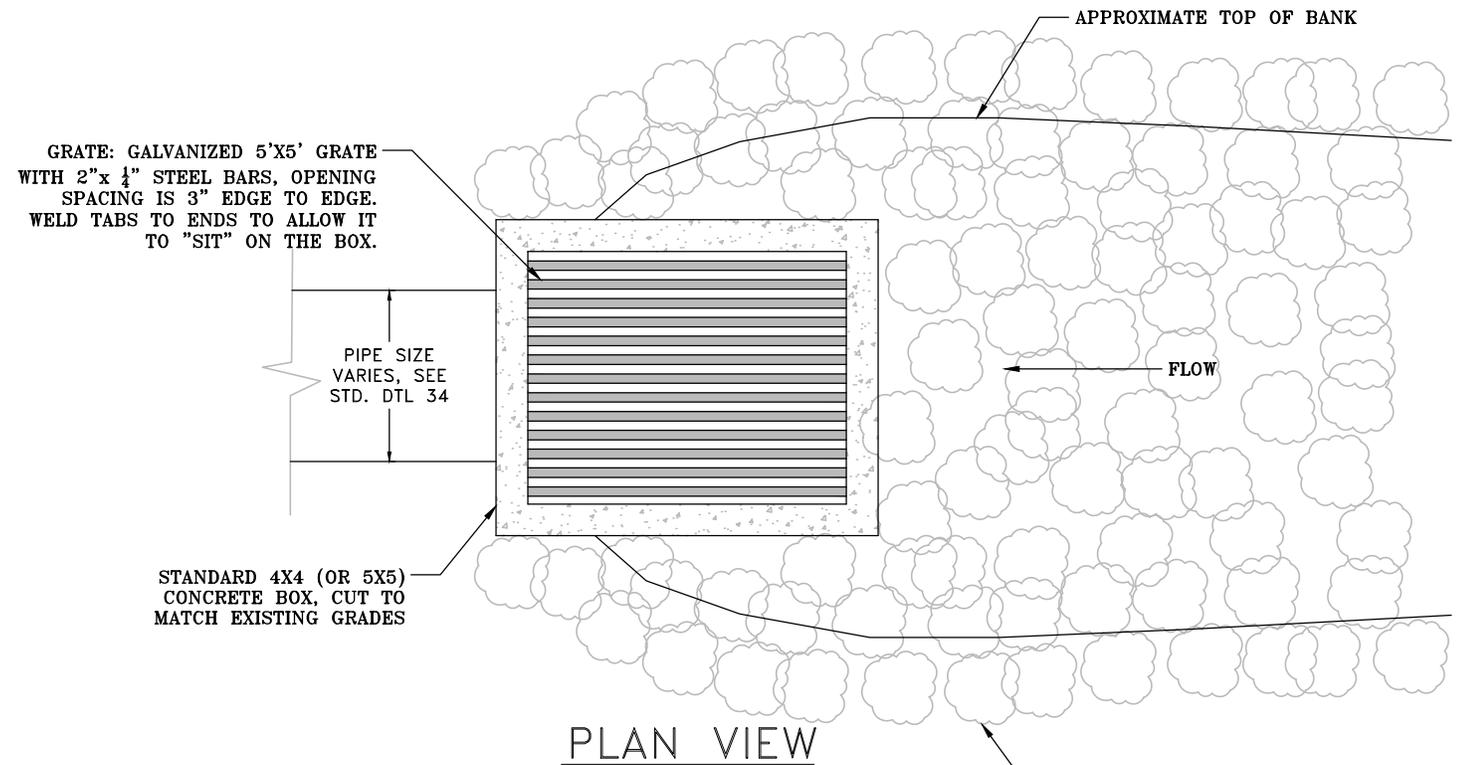
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NO.	BY	APRIL	DATE



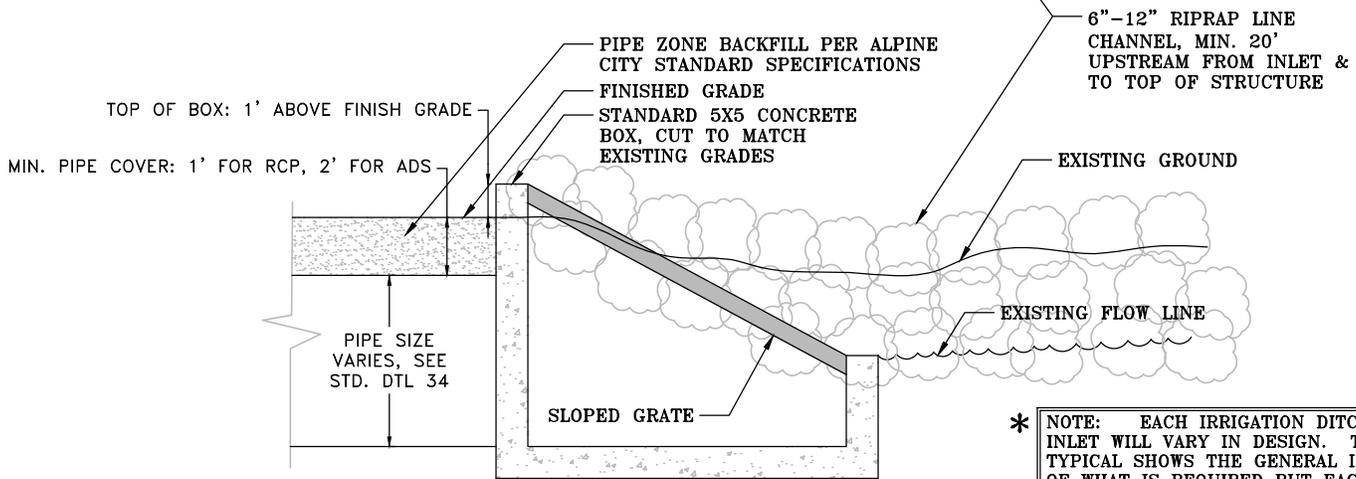
2-INCH PRESSURIZED IRRIGATION DRAIN

ALPINE CITY
20 NORTH MAIN
ALPINE, UT 84004

STANDARD DRAWING NUMBER:	37
PLOT SCALE:	N.T.S.
DRAWN BY:	J.M.
DESIGN BY:	
CHECKED BY:	
ADOPTED DATE:	



PLAN VIEW



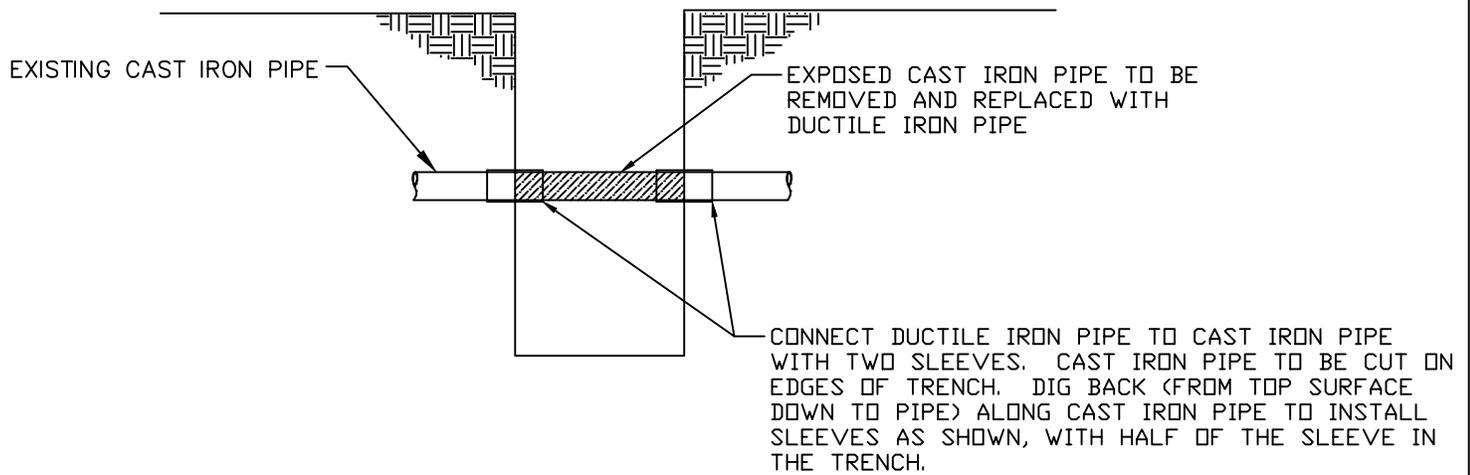
PROFILE

* NOTE: EACH IRRIGATION DITCH INLET WILL VARY IN DESIGN. THIS TYPICAL SHOWS THE GENERAL IDEA OF WHAT IS REQUIRED BUT EACH DESIGN WILL BE DIFFERENT BASED ON ELEVATIONS, MINIMUM DITCH PIPE SIZE REQUIREMENTS (DTL 34), AND OTHER VARIABLES. CITY STAFF WILL WORK WITH THE DESIGN ENGINEER IN EACH SCENARIO.

IRRIGATION DITCH INLET (TYPICAL)*

N.T.S.

<p>STATEMENT OF USE THIS DOCUMENT AND ANY ILLUSTRATIONS HEREON ARE PROVIDED AS STANDARD CONSTRUCTION DETAILS WITHIN ALPINE CITY. DEVIATION FROM THIS DOCUMENT REQUIRES APPROVAL OF ALPINE CITY. ALPINE CITY CORPRTATION CAN NOT BE HELD LIABLE FOR MISSUSE OR CHANGES REGARDING THIS DOCUMENT.</p>			<p>IRRIGATION INLET (Typical)</p>	<p>STANDARD DRAWING NUMBER: 38</p>						
<p>REVISION</p> <table border="1"> <tr> <td>NO.</td> <td>BY</td> <td>APRL</td> <td>DATE</td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </table>				NO.	BY	APRL	DATE			
NO.	BY	APRL	DATE							
<p>CAD FILE: E:\ENGINEERING\CODES & STANDARD SPECS\STANDARD SPECIFICATIONS AND DRAWINGS\2023 CITY SPEC & DETAILS\DETAILS\38 IRRIGATION INLET</p>		<p>ALPINE CITY 20 NORTH MAIN ALPINE, UT 84004</p>								



TRENCHING UNDER C.I.P.

N.T.S.

<p>STATEMENT OF USE THIS DOCUMENT AND ANY ILLUSTRATIONS HEREON ARE PROVIDED AS STANDARD CONSTRUCTION DETAILS WITHIN ALPINE CITY. DEVIATION FROM THIS DOCUMENT REQUIRES APPROVAL OF ALPINE CITY. ALPINE CITY CORPRTATION CAN NOT BE HELD LIABLE FOR MISSUSE OR CHANGES REGARDING THIS DOCUMENT.</p>		<p>TRENCHING UNDER CAST IRON PIPE</p>	<p>STANDARD DRAWING NUMBER: 39</p>								
<p>REVISION</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 5%;">NO.</th> <th style="width: 15%;">BY</th> <th style="width: 15%;">APRIL</th> <th style="width: 15%;">DATE</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table>	NO.	BY	APRIL	DATE					<p>ALPINE CITY 20 NORTH MAIN ALPINE, UT 84004</p>		<p>PLOT SCALE: N.T.S.</p> <p>DRAWN BY: WJM</p> <p>DESIGN BY:</p> <p>CHECKED BY:</p> <p>ADOPTED DATE: 4/14/04</p>
NO.	BY	APRIL	DATE								
<p>CAD FILE: E:\ENGINEERING\CODES & STANDARD SPECS\STANDARD SPECIFICATIONS AND DRAWINGS\2023 CITY SPEC & DETAILS_DETAILS\39 TRENCHING UNDER CIP</p>											

Section 1050. Division of Drinking Water Rules

Sections of 2017 APWA specifications have been noted where they differ from Utah Division of Drinking Water Standards and are included herewith as part of these standards.

Trench backfill

1. GENERAL

A. The drawing applies to backfilling a trench (and embankment) above the pipe zone.

2. PRODUCTS

A. Backfill: Common fill, APWA Section 31 05 13. Maximum particle size 3-inches.

B. Flowable Fill: APWA Section 31 05 15. Target is 60 psi in 28 days with 90 psi maximum in 28 days, It must flow easily requiring no vibration for consolidation.

3. EXECUTION

A. Trench Backfill Above the Pipe Zone: Follow requirement indicated in APWA Section 33 05 20 and the following provisions. See Standard Plan 382 for backfilling the pipe zone.

1) DO NOT USE sewer rock, pea gravel, or recycled RAP aggregate as trench backfill.

2) Maximum lift thickness is 8-inches before compaction. Compaction is 95 percent or greater relative to a standard proctor density, APWA Section 31 23 26.

3) Water jetting is NOT allowed.

B. Flowable Fill: If controlled low strength material is placed in the trench. Cure the material before placing surface restorations.

C. Embankment Backfill: When trench sides are sloped proceed as follows.

1) Maximum lift thickness is 8-inches before compaction.

2) Compact per APWA Section 31 23 26 to 95 percent or greater relative to a standard proctor density.

3) Submission of quality control compaction test result data may be requested by ENGINEER at any time. Provide results of tests immediately upon request.

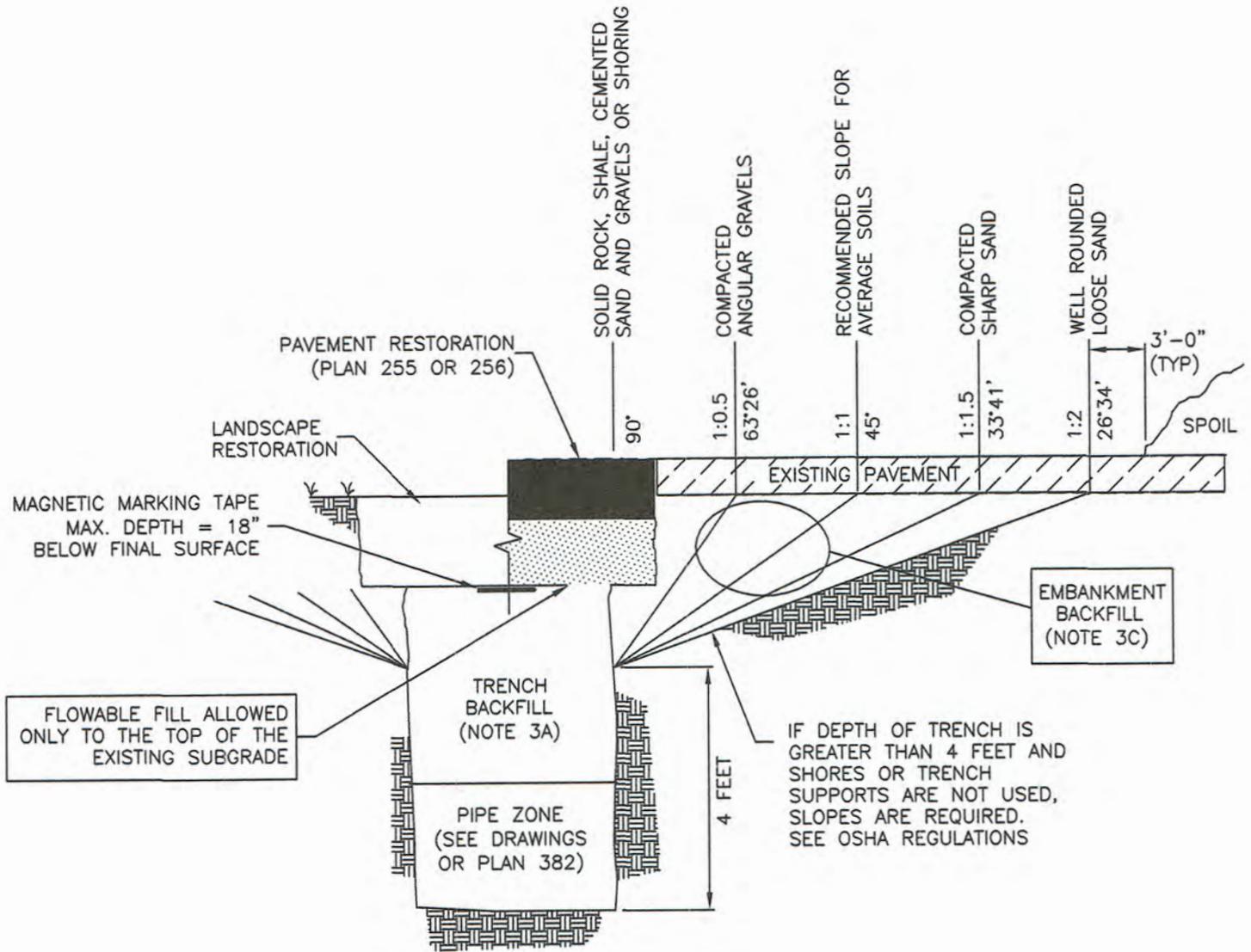
D. Surface Restoration:

1) Landscaped Surface: Follow APWA Section 32 92 00 (turf or grass) or APWA Section 32 93 13 (ground cover) requirements. Rake to match existing grade. Replace vegetation to match pre-construction conditions.

2) Paved Surface: Follow APWA Section 33 05 25 (bituminous pavement surfacing), or APWA Section 33 05 25 (concrete pavement surfacing). Do not install surfacing until compaction density is acceptable to ENGINEER. .

APWA directs users to the Storm Drain section for Pipe Zone specifications. These same standards apply to culinary which must meet R390-550-8

NARRATIVE: THIS PLAN SHOWS VARIOUS SLOPES RECOMMENDED FOR VARIOUS TYPES OF SLOPE STABILITY PROBLEMS. THE VERTICAL TEXT INDICATES VARIOUS MATERIALS THAT MAY BE ENCOUNTERED. THE SERVICES OF A PROFESSIONAL SOILS ENGINEER SHOULD BE USED TO VERIFY SLOPE STABILITY.



APWA directs users to the Storm Drain section for Pipe Zone specifications. Pipe Zone for culinary is 6-inch, see R309-550-8(2)

APWA directs users to the Storm Drain section for Pipe Zone specifications. These same standards apply to culinary which must meet R390-550-8

Pipe zone backfill

1. GENERAL

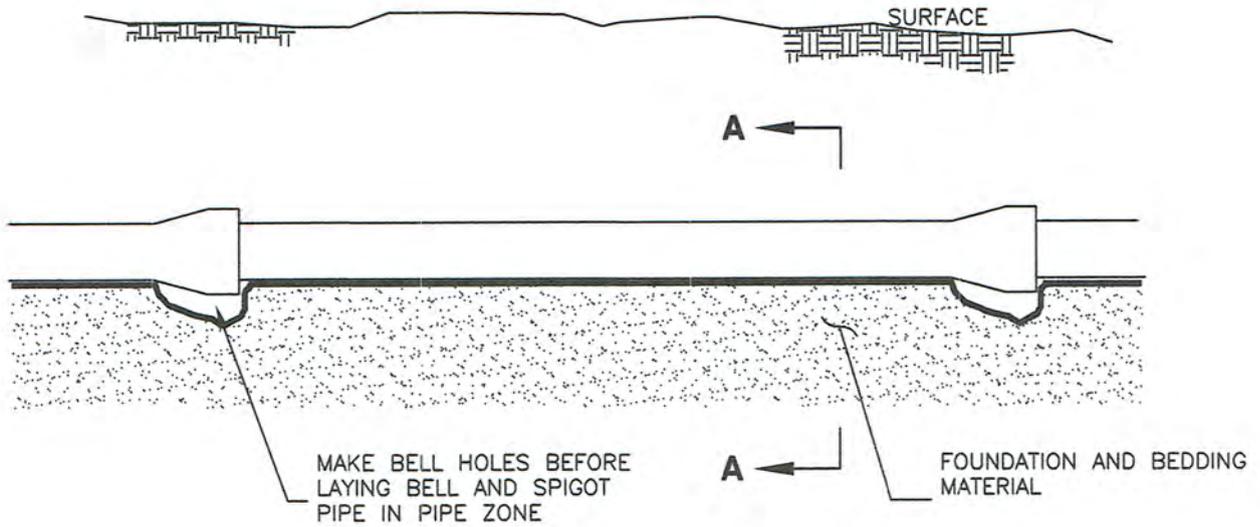
- A. Install the pipe in the center of the trench or no closer than 6-inches from the wall of the pipe to the wall of the trench.

2. PRODUCTS

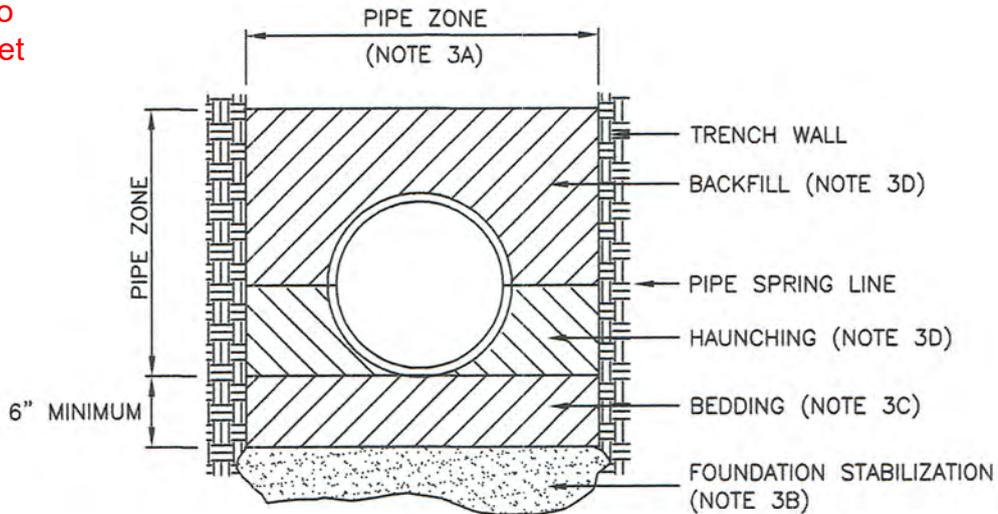
- A. Base Course: Untreated base course, APWA Section 32 11 23. Do not use gravel as a base course without ENGINEER's permission.
- B. Backfill: Common fill, APWA Section 31 05 13. Maximum particle size 2-inches.
- C. Concrete: APWA Section 03 30 04.
- D. Flowable Fill: Target is 60 psi in 28 days with 90 psi maximum in 28 days, APWA Section 31 05 15. It must flow easily requiring no vibration for consolidation.
- E. Stabilization-Separation Geotextile: Moderate or high at CONTRACTOR's choice, APWA Section 31 05 19.

3. EXECUTION

- A. Excavate the Pipe Zone: Width is measured at the pipe spring line and includes any necessary sheathing. Provide width recommended by pipe manufacturer. Follow manufacturer's recommendations when using trench boxes.
- B. Foundation Stabilization: Get ENGINEER's permission before installing common fill. Vibrate to stabilize. Installation of stabilization-separation geotextile will be required to separate backfill material and native subgrade materials if common fill cannot provide a working surface or prevent soils migration.
- C. Bedding: Follow APWA Section 33 05 20 requirements and the following provisions.
 - 1) Furnish untreated base course material unless specified otherwise by pipe manufacturer.
 - 2) Maximum lift thickness is 8-inches.
 - 3) Bedding immediately under the pipe should not be compacted, but loosely placed.
 - 4) Compaction is 95 percent or greater relative to a modified proctor density, APWA Section 31 23 26.
 - 5) When using concrete, provide at least Class 2,000, APWA Section 03 30 04.
- D. Pipe Zone: DO NOT USE sewer rock, pea gravel, or recycled RAP aggregate in the pipe zone. Water jetting is NOT allowed.
 - 1) Maximum lift thickness is 8-inches before compaction. Compaction is 95 percent or greater relative to a modified proctor density, APWA Section 31 23 26 unless pipe manufacturer requires more stringent installation.
 - 2) Submission of quality control compaction test result data developed for the haunch zone may be requested by ENGINEER at any time. CONTRACTOR is to provide results of tests immediately upon request.
- E. Flowable Fill (when required and if allowed by pipe manufacturer):
 - 1) Place the controlled low strength material, APWA Section 31 05 15.
 - 2) Prevent pipe flotation by installing in lifts and providing pipe restraints as required by pipe manufacturer.
 - 3) Reset pipe to line and grade if pipe "floats" out of position.



ELEVATION VIEW



SECTION A-A

INSTALLATION

CONCRETE PIPE: FOLLOW ASTM C 1479

"STANDARD PRACTICE FOR INSTALLATION OF PRECAST CONCRETE SEWER, STORM DRAIN, AND CULVERT PIPE USING STANDARD INSTALLATIONS.

PLASTIC PIPE: FOLLOW ASTM D 2321

"STANDARD PRACTICE FOR UNDERGROUND INSTALLATION OF THERMOPLASTIC PIPE FOR SEWERS AND OTHER GRAVITY-FLOW APPLICATIONS"

CORRUGATED METAL PIPE: FOLLOW ASTM A 798

"STANDARD PRACTICE FOR INSTALLING FACOTRY-MADE CORRUGATED STEEL PIPE FOR SEWERS AND OTHER APPLICATIONS.

VITRIFIED CLAY PIPE: FOLLOW ASTM C 12.

"STANDARD RECOMMENDED PRACTICE FOR INSTALLING VITRIFIED CLAY PIPE LINES.

Fire hydrant with valve

1. GENERAL

- A. Before backfilling, secure inspection of installation by ENGINEER.
- B. Additional requirements are specified in APWA Section 33 11 00.

2. PRODUCTS

- A. Hydrant: Dry barrel, AWWA C502.
- B. Thrust Blocks: Concrete Class 4000, APWA Section 03 30 04.
- C. Reinforcement: Deformed, 60 ksi yield grade steel, ASTM A615.
- D. Backfill: APWA Section 31 05 13. Maximum particle size 2-inches.
 - 1) Sewer Rock: ASTM Size No. 3 (2" to 1") or larger.
 - 2) Other Type of Common Fill: CONTRACTOR's choice,.
- E. Geotextile: Stabilization-separation fabric, APWA Section 31 05 19.

3. EXECUTION

- A. Installation:
 - 1) Provide at least 1 cubic yard of sewer rock around drain hole at base of hydrant spool. Wrap geotextile around sewer rock and tape geotextile to hydrant spool to prevent silting of sewer rock.
 - 2) Paint fire hydrant to agency's fire hydrant paint code.
 - 3) Apply non-oxide grease to all buried metal surfaces. Wrap with polyethylene sheet and tape wrap.
 - 4) Notify fire department as soon as hydrant is placed in service.
- B. Thrust Blocks:
 - 1) Before pouring concrete, wrap pipe system with polyethylene sheet to prevent bonding of concrete to pipe system.
 - 2) Not required for flange or welded pipe systems.
- C. Backfill: Maximum lift thickness is 8-inches before compaction. Compaction is 95 percent or greater relative to a modified proctor density, APWA Section 31 23 26.

Utah Division of Drinking Water Rules

R309-550-5. Water Main Design

(5) Fire Protection.

- d) Fire hydrant laterals shall be a minimum of 6 inches in diameter**

R309-550-6. Component Materials and Design

(5) Fire Hydrants.

- a) Hydrant drains shall not be connected to, or located within, 10 feet of sanitary sewers. Where possible, hydrant drains shall not be located within 10 feet of storm drains.**
- b) Auxiliary valves shall be installed in all hydrant leads.**
- c) Hydrant drains shall be installed with a gravel packet or dry well unless the natural soils will provide adequate drainage.**

3/4" and 1" meter

1. GENERAL

- A. In street surfaces or other vehicular traffic areas (like driveway approaches), Install the same type of meter box as required for 1 1/2" and 2" service meters. See Plan 522.
- B. Before backfilling, secure inspection of installation by ENGINEER.

2. PRODUCTS

- A. Base Course: Untreated base course, APWA Section 32 11 23. Do not use gravel as a base course without ENGINEER's permission.
- B. Backfill: Common fill, APWA Section 31 05 13. Maximum particle size 2-inches.
- C. Castings: Grey iron class 35 minimum per ASTM A48, coated with asphalt based paint or better.

3. EXECUTION

- A. Meter Placement:
 - 1) All meters are to be installed in the park strip or within 7 feet of the property line (street side).
 - 2) Do not install meters under driveway approaches, sidewalks, or curb and gutter.
- B. Meter Box: Set box so grade of the frame and cover matches the grade of the surrounding surface.
- C. Pipe Outside of Right-of-Way: Coordinate with utility agency or adjacent property owner for type of pipe to be used outside of right-of-way.
- D. Inspection: Before backfilling around meter box, secure inspection of installation by ENGINEER.
- E. Base Course and Backfill Placement: Compaction is 95 percent or greater relative to a modified proctor density, APWA Section 31 23 26. Maximum lift thickness before compaction is 8-inches.

Utah Division of Drinking Water Rules

R309-550-11. Service Connections and Plumbing

(4) Service Lines.

- a) Service Lines shall be capped until connected for service.

R309-550-6. Component Materials and Design.

(7) Chamber Designs

- a) Chambers, pits, or manholes containing valves, blow-offs, meters, or other such appurtenances to a distribution system, shall not be connected directly to a storm drain or sanitary sewer.
- b) Chambers shall be provided with a drain to daylight, if possible. Where this is not possible, underground gravel-filled absorption pits may be used if the site is not subject to flooding and conditions will assure adequate drainage. Sump pumps may also be considered if a drain to daylight or absorption pit is not feasible.

1 1/2" and 2" meter

1. GENERAL

- A. Turbine meters are required on all systems used exclusively for irrigation or fire protection.
- B. Where domestic use is applicable, use a standard meter.
- C. Before backfilling, secure inspection of installation by ENGINEER.

2. PRODUCTS

- A. Base Course: Untreated base course, APWA Section 32 11 23. Do not use gravel as a base course without ENGINEER's permission.
- B. Backfill: Common fill, APWA Section 31 05 13. Maximum particle size 2-inches.
- C. Castings: Grey iron class 35 minimum per ASTM A48, coated with asphalt based paint or better.

3. EXECUTION

- A. Meter Placement:
 - 1) All meters are to be installed in the park strip or within 7 feet of the property line (street side).
 - 2) Do not install meters under driveway approaches, sidewalks, or curb and gutter.
 - 3) In new construction, install meter at center of lot or per agency requirements.
- B. Meter Box: Set box so grade of the frame and cover matches the grade of the surrounding surface.
- C. Bypass Valve: Lock in off position.
- D. Blocking: Use clay brick or concrete block.
- E. Concrete Box:
 - 1) Center frame and cover over water meter.
 - 2) Allow 1-inch clearance around waterline where water line passes through concrete box wall. Seal opening with compressible seal.
- F. Pipe Outside of Right-of-Way: Coordinate with utility agency or adjacent property owner for type of pipe to be used outside of right-of-way.
- G. Base Course and Backfill Placement: Maximum lift thickness before compaction is 8-inches. Compaction is 95 percent or greater relative to a modified proctor density, APWA Section 31 23 26.

Utah Division of Drinking Water Rules

R309-550-11. Service Connections and Plumbing

(4) Service Lines.

- a) Service Lines shall be capped until connected for service.

R309-550-6. Component Materials and Design.

(7) Chamber Designs

- a) Chambers, pits, or manholes containing valves, blow-offs, meters, or other such appurtenances to a distribution system, shall not be connected directly to a storm drain or sanitary sewer.
- b) Chambers shall be provided with a drain to daylight, if possible. Where this is not possible, underground gravel-filled absorption pits may be used if the site is not subject to flooding and conditions will assure adequate drainage. Sump pumps may also be considered if a drain to daylight or absorption pit is not feasible.

3" and 4" Compound meter with 2" bypass

1. GENERAL

- A. Configuration may be changed at ENGINEER's discretion.
- B. Additional requirements are specified in APWA Section 33 12 16.

2 PRODUCTS

- A. Small Fittings: Brass. Do not use galvanized materials.
- B. Blocking: Clay brick or concrete block.
- C. Drain Gravel: Sewer rock, ASTM size no. 3 (2" to 1") or equal, APWA Section 31 05 13.

3. EXECUTION

- A. Control Valve: Install valve with valve box adjacent to main.
- B. Center frame and cover over water meter.
- C. Allow 1-inch clearance around waterline where water line passes through concrete box wall. Seal opening with compressible seal.

R309-550-6. Component Materials and Design.

(7) Chamber Designs

- a) Chambers, pits, or manholes containing valves, blow-offs, meters, or other such appurtenances to a distribution system, shall not be connected directly to a storm drain or sanitary sewer.
- b) Chambers shall be provided with a drain to daylight, if possible. Where this is not possible, underground gravel-filled absorption pits may be used if the site is not subject to flooding and conditions will assure adequate drainage. Sump pumps may also be considered if a drain to daylight or absorption pit is not feasible.

6" Compound meter with 2" bypass

1. GENERAL

- A. Configuration may be changed at ENGINEER's discretion.
- B. Additional requirements are specified in APWA Section 33 12 16.

2 PRODUCTS

- A. Small Fittings: Brass. Do not use galvanized materials.
- B. Blocking: Clay brick or concrete block.
- C. Drain Gravel: Sewer rock, ASTM size no. 3 (2" to 1") or equal, APWA Section 31 05 13.

3. EXECUTION

- A. Control Valve: Install valve with valve box adjacent to main.
- B. Center frame and cover over water meter.
- C. Allow 1-inch clearance around waterline where water line passes through concrete box wall. Seal opening with compressible seal.

R309-550-6. Component Materials and Design.

(7) Chamber Designs

- a) Chambers, pits, or manholes containing valves, blow-offs, meters, or other such appurtenances to a distribution system, shall not be connected directly to a storm drain or sanitary sewer.
- b) Chambers shall be provided with a drain to daylight, if possible. Where this is not possible, underground gravel-filled absorption pits may be used if the site is not subject to flooding and conditions will assure adequate drainage. Sump pumps may also be considered if a drain to daylight or absorption pit is not feasible.

8" Compound meter with 2" bypass

1. GENERAL

- A. Configuration may be changed at ENGINEER's discretion.
- B. Additional requirements are specified in APWA Section 33 12 16.

2. PRODUCTS

- A. Small Fittings: Brass. Do not use galvanized materials.
- B. Blocking: Clay brick or concrete block.
- C. Drain Gravel: Sewer rock, ASTM size no. 3 (2" to 1") or equal, APWA Section 31 05 13.

3. EXECUTION

- A. Control Valve: Install valve with valve box adjacent to main.
- B. Center frame and cover over water meter.
- C. Allow 1-inch clearance around waterline where water line passes through concrete box wall. Seal opening with compressible seal.

R309-550-6. Component Materials and Design.

(7) Chamber Designs

- a) Chambers, pits, or manholes containing valves, blow-offs, meters, or other such appurtenances to a distribution system, shall not be connected directly to a storm drain or sanitary sewer.
- b) Chambers shall be provided with a drain to daylight, if possible. Where this is not possible, underground gravel-filled absorption pits may be used if the site is not subject to flooding and conditions will assure adequate drainage. Sump pumps may also be considered if a drain to daylight or absorption pit is not feasible.

10" Turbo meter with 6" turbo meter and 2" bypass

1. GENERAL

- A. Configuration may be changed at ENGINEER's discretion.
- B. Additional requirements are specified in APWA Section 33 12 16.

2 PRODUCTS

- A. Small Fittings: Brass. Do not use galvanized materials.
- B. Blocking: Clay brick or concrete block.
- C. Drain Gravel: Sewer rock, ASTM size no. 3 (2" to 1") or equal, APWA Section 31 05 13.

3. EXECUTION

- A. Control Valve: Install valve with valve box adjacent to main.
- B. Center frame and cover over water meter.
- C. Allow 1-inch clearance around waterline where water line passes through concrete box wall. Seal opening with compressible seal.

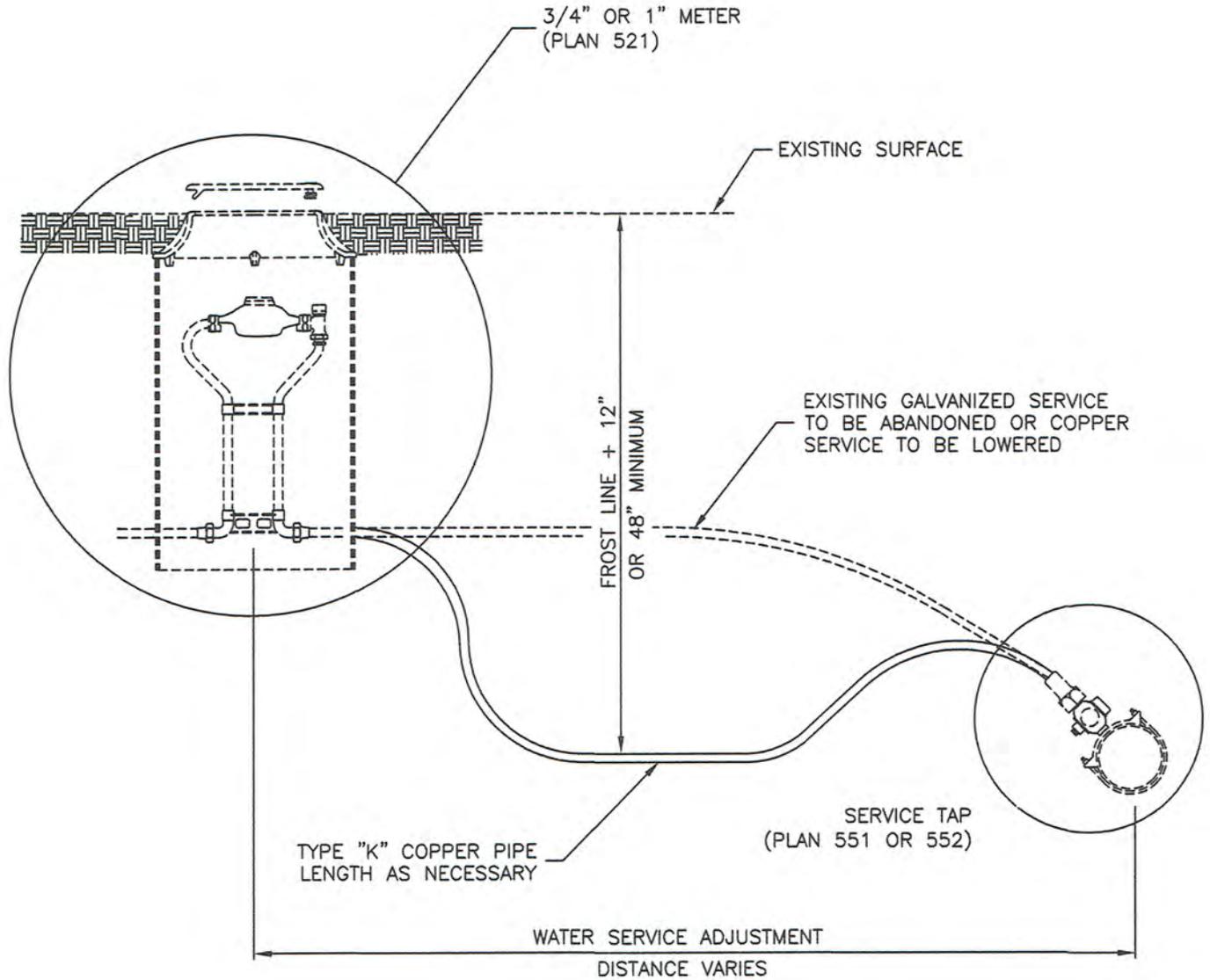
R309-550-6. Component Materials and Design.

(7) Chamber Designs

- a) Chambers, pits, or manholes containing valves, blow-offs, meters, or other such appurtenances to a distribution system, shall not be connected directly to a storm drain or sanitary sewer.
- b) Chambers shall be provided with a drain to daylight, if possible. Where this is not possible, underground gravel-filled absorption pits may be used if the site is not subject to flooding and conditions will assure adequate drainage. Sump pumps may also be considered if a drain to daylight or absorption pit is not feasible.

Utah Division of Drinking Water Rules
R309-550-11. Service Connections and Plumbing
(4) Service Lines.

a) Service Lines shall be capped until connected for service.



Water main line loop

1. GENERAL

A. Before backfilling, secure inspection of installation by ENGINEER.

2. PRODUCTS

- A. Base Course: Untreated base course, APWA Section 32 11 23. Do not use gravel as a base course without ENGINEER's permission.
- B. Piping: Match existing pipe, fittings, coupling sizes and materials.
- C. Thrust Blocks: Concrete Class 4000, APWA Section 03 30 04.
- D. Reinforcement: Deformed, 60 ksi yield grade steel, ASTM A 615.
- E. Backfill: Common fill, APWA Section 31 05 13. Maximum particle size 2-inches.
- F. Grease: Non-oxide poly-FM.
- G. Couplings: Brass.

3. EXECUTION

- A. Thrust Blocks: Not required for flanged or welded pipe systems. Before pouring thrust block concrete, wrap pipe system in plastic sheet to prevent bonding of concrete to pipe system.
- B. Fittings: Use copper to copper flare fittings or copper to iron pack joint coupling with locking split clamp on iron pipe side and flare on copper side.
- C. Grease: Apply grease to all buried metal surfaces. Wrap with polyethylene sheet and tape wrap.
- D. Steel Spool: Weld in place and provide slip on flange except when fitting in pipe system could move. Epoxy line per AWWA C210, C213, and coated per AWWA C208, or C214.
- E. Location: Loop water mains over top of sewer lines.
- F. Base Course and Backfill Placement: Maximum lift thickness is 8-inches before compaction. Compaction is 95 percent or greater relative to a modified proctor density, APWA Section 31 23 26.

R309-550-7. Separation of Water Mains and Transmission Lines from Sewers.

(1) Basic Separation Standards.

(a) The horizontal distance between water lines and sanitary sewer lines shall be at least 10 feet. Where a water main and a sewer line must cross, the water main shall be at least 18 inches above the sewer line. Separation distances shall be measured edge-to-edge (i.e., from the nearest edges of the facilities).

(b) Water mains and sewer lines shall not be installed in the same trench.

(c) Where local conditions make it impossible to install water or sewer lines at separation distances required by subsection (a), the sewer pipes are in good condition, and there is not high groundwater in the area, it may be acceptable if the design includes a minimum horizontal separation of 6 feet and a minimum vertical clearance of 18 inches with the waterline being above. In order to determine whether the design is acceptable, the following information shall be submitted as part of the plans for review:

- (i) reason for not meeting the minimum separation standard;
- (ii) location where the water and sewer line separation is not being met;
- (iii) horizontal and vertical clearance that will be achieved;
- (iv) sewer line information including pipe material, condition, size, age, type of joints, thickness or pressure class, whether the pipe is pressurized or not, etc.;
- (v) water line information including pipe material, condition, size, age, type of joints, thickness or pressure class, etc.;
- (vi) ground water and soil conditions; and,
- (vii) any mitigation efforts.

(d) If the basic separation standards as outlined in subsections (a) through (c) above cannot be met, an exception to the rule can be applied for with additional mitigation measures to protect public health, in accordance with R309-105-6(2)(b).

STYLE A

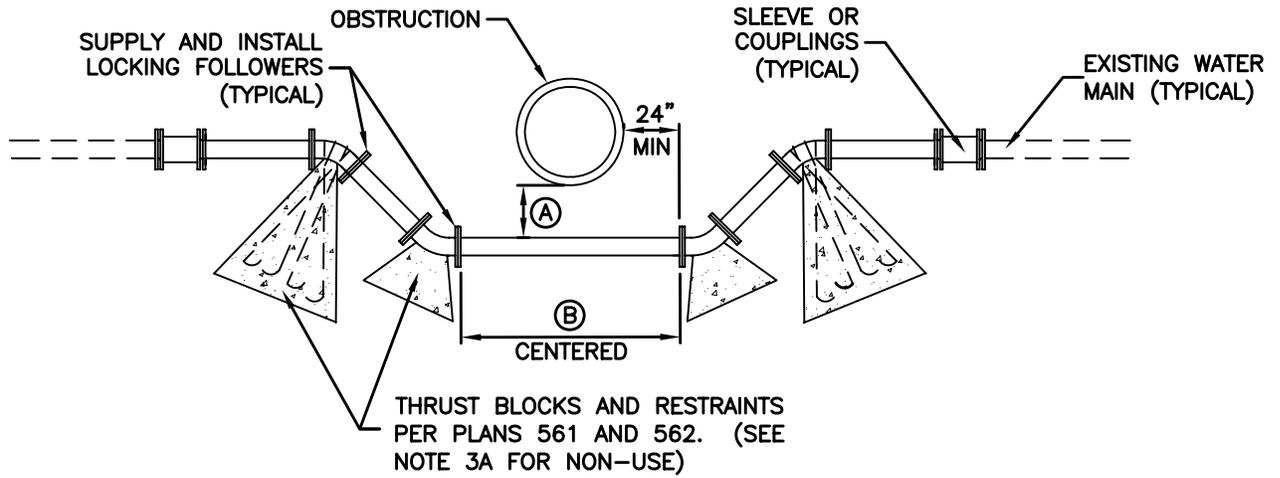


TABLE OF DIMENSIONS		
OBSTRUCTION	(A)	(B)
SEWER	18" MIN	20' MIN
OTHER	12" MIN	O.D. + 48"

Not allowed under sewer w/o an exception
granted from UDDW R309-550-7(1)(d)

Water main line loop

1. GENERAL

A. Before backfilling, secure inspection of installation by ENGINEER.

2. PRODUCTS

A. Base Course: Untreated base course, APWA Section 32 11 23. Do not use gravel as a base course without ENGINEER's permission.

B. Piping: Match existing pipe, fittings, coupling sizes and materials.

C. Thrust Blocks: Concrete Class 4000, APWA Section 03 30 04.

D. Reinforcement: Deformed, 60 ksi yield grade steel, ASTM A 615.

E. Backfill: Common fill, APWA Section 31 05 13. Maximum particle size 2-inches.

F. Grease: Non-oxide poly-FM.

3. EXECUTION

A. Thrust Blocks: Not required for flange or welded pipe systems. Before pouring thrust block concrete, wrap pipe system with plastic sheet to prevent bonding of concrete to pipe system.

B. Fittings: Use copper to copper flare fittings or copper to iron pack joint coupling with locking split clamp on iron pipe side and flare on copper side. All couplings to be brass.

C. Grease: Apply grease to all buried metal surfaces. Wrap with polyethylene sheet and tape wrap.

D. Steel Spool: Weld in place and provide slip on flange except when fitting in pipe system could move. Epoxy line per AWWA C210, C213, and coated per AWWA C208, or C214.

E. Location: Loop water mains over top of sewer lines.

F. Base Course and Backfill Placement: Maximum lift thickness is 8-inches before compaction. Compaction is 95 percent or greater relative to a modified proctor density, APWA Section 31 23 26.

R309-550-7. Separation of Water Mains and Transmission Lines from Sewers.

(1) Basic Separation Standards.

(a) The horizontal distance between water lines and sanitary sewer lines shall be at least 10 feet. Where a water main and a sewer line must cross, the water main shall be at least 18 inches above the sewer line. Separation distances shall be measured edge-to-edge (i.e., from the nearest edges of the facilities).

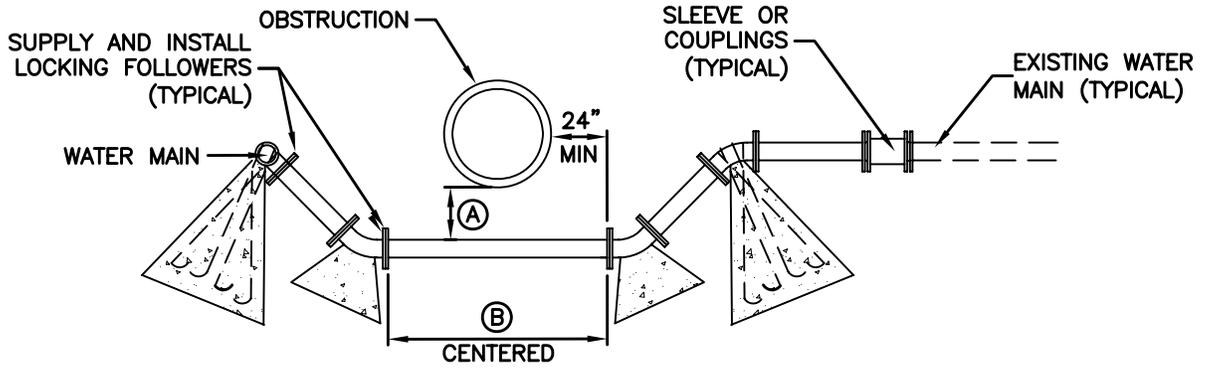
(b) Water mains and sewer lines shall not be installed in the same trench.

(c) Where local conditions make it impossible to install water or sewer lines at separation distances required by subsection (a), the sewer pipes are in good condition, and there is not high groundwater in the area, it may be acceptable if the design includes a minimum horizontal separation of 6 feet and a minimum vertical clearance of 18 inches with the waterline being above. In order to determine whether the design is acceptable, the following information shall be submitted as part of the plans for review:

- (i) reason for not meeting the minimum separation standard;
- (ii) location where the water and sewer line separation is not being met;
- (iii) horizontal and vertical clearance that will be achieved;
- (iv) sewer line information including pipe material, condition, size, age, type of joints, thickness or pressure class, whether the pipe is pressurized or not, etc.;
- (v) water line information including pipe material, condition, size, age, type of joints, thickness or pressure class, etc.;
- (vi) ground water and soil conditions; and,
- (vii) any mitigation efforts.

(d) If the basic separation standards as outlined in subsections (a) through (c) above cannot be met, an exception to the rule can be applied for with additional mitigation measures to protect public health, in accordance with R309-105-6(2)(b).

STYLE B AND C

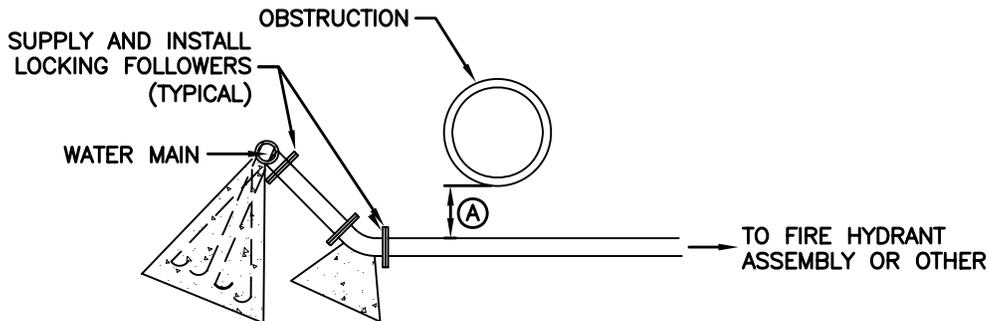


THRUST BLOCKS AND RESTRAINTS PER PLANS 561 AND 562. (SEE NOTE 3A FOR NON-USE)

Not allowed under sewer w/o exception granted from UDDW R309-550-7(1)(d)

TABLE OF DIMENSIONS		
OBSTRUCTION	A	B
SEWER	18" MIN	20' MIN
OTHER	12" MIN	O.D. + 48"

STYLE B



THRUST BLOCKS AND RESTRAINTS PER PLANS 561 AND 562. (SEE NOTE 3A FOR NON-USE)

Not allowed under sewer w/o exception granted from UDDW R309-550-7(1)(d)

TABLE OF DIMENSIONS	
OBSTRUCTION	A
SEWER	18" MIN
OTHER	12" MIN

STYLE C

Water main line loop

3/4" and 1" Service taps

1. GENERAL

A. Before backfilling around taps, secure inspection of installation by ENGINEER.

2. PRODUCTS

A. Base Course: Untreated base course, APWA Section 32 11 23. Do not use gravel as a base course without ENGINEER's permission.

B. Backfill: Common fill, APWA Section 31 05 13. Maximum particle size 2-inches.

C. Tape: Teflon tape is required on all taps.

3. EXECUTION

A. Tapping: Place taps a minimum of 36-inches apart. Use a tapping tool which is sized corresponding to the size of the service line to be installed. No taps within 36-inches of end of pipe.

B. PVC or AC Pipe: A service saddle clamp is required on all PVC and AC pipe taps unless specified otherwise.

C. Base Course and Backfill Placement: Maximum lift thickness is 8-inches before compaction. Compaction is 95 percent or greater relative to a modified proctor density, APWA Section 31 23 26.

R309-550-11. Service Connections and Plumbing

(4) Service Lines.

(a) Service lines shall be capped until connected for service.

1 1/2" and 2" Service taps

1. GENERAL

A. Before backfilling around taps, secure inspection of installation by ENGINEER.

2. PRODUCTS

A. Base Course: Untreated base course, APWA Section 32 11 23. Do not use gravel as a base course without ENGINEER's permission.

B. Backfill: Common fill, APWA Section 31 05 13. Maximum particle size 2-inches.

C. Tape: Teflon tape is required on all taps.

3. EXECUTION

A. Tapping: Place taps a minimum of 36-inches apart. Use a tapping tool that is sized corresponding to the size of the service line to be installed. No taps within 36-inches of end of pipe.

B. PVC or AC Pipe: A service saddle clamp is required on all PVC and AC pipe taps unless specified otherwise.

C. Backfill: Maximum lift thickness is 8-inches before compaction. Compaction is 95 percent or greater relative to a modified proctor density, APWA Section 31 23 26.

D. Blocks: Clay brick or concrete block required under valve box to assure a 1" or greater space between the box and the corporation stop and pipe assembly.

R309-550-11. Service Connections and Plumbing

(4) Service Lines.

(a) Service lines shall be capped until connected for service.

Detector check valve with 3/4" bypass meter

1. GENERAL

- A. Configuration may be changed at ENGINEER's discretion.
- B. Additional requirements are specified in APWA Section 33 12 16.

2. PRODUCTS

- A. Blocking: Clay brick or concrete block.
- B. Small Fittings: Brass. Do not use galvanized materials.
- C. Grade Ring: 6-inch concrete grade ring required in roadways, Plan 361.
- D. Spools: Length of flange x plain end spool vary.

SPOOLS	
Pipe Size	Pipe Length
6"	10"
8"	8 1/4"
10"	6"

3. EXECUTION

- A. Install control valve with valve box adjacent to main.
- B. Concrete Box: Allow 1-inch clearance around waterline where water line passes through concrete box wall. Seal opening with compressible seal. Center frame and cover over water meter.
- C. Valve Option: The valve in the box (item B legend) closest to the main, and the top section of the valve box (item J legend) may be eliminated at the discretion of the ENGINEER.

R309-550-6. Component Materials and Design.

(7) Chamber Drainage

(a) Chambers, pits, or manholes containing valves, blow-offs, meters, or other such appurtenances to a distribution system, shall not be connected directly to a storm drain or sanitary sewer.

(b) Chambers shall be provided with a drain to daylight, if possible. Where this is not possible, underground gravel-filled absorption pits may be used if the site is not subject to flooding and conditions will assure adequate drainage. Sump pumps may also be considered if a drain to daylight or absorption pit is not feasible.

6" Pressure reducing valve with 2" bypass

1. GENERAL

- A. Configuration may be changed at ENGINEER's discretion.
- B. Additional requirements are specified in APWA Section 33 12 16.

2. PRODUCTS

- A. Small Fillings: Brass. Do not use galvanized materials.
- B. Blocking: Clay brick or concrete block.
- C. Taps: Provide two 3/4" I.P. taps with plugs for pressure gages.
- D. Drain Gravel: Sewer rock, ASTM size no. 3 (2" to 1") or equal, APWA Section 31 05 13.

3. EXECUTION

- A. Center frame and cover over water meter.
- B. Apply tape wrap to the exterior of all galvanized pipe per AWWA C209.
- C. Allow 1-inch clearance around waterline where water line passes through concrete box wall. Seal opening with compressible seal.

R309-550-6. Component Materials and Design.

(7) Chamber Drainage

(a) Chambers, pits, or manholes containing valves, blow-offs, meters, or other such appurtenances to a distribution system, shall not be connected directly to a storm drain or sanitary sewer.

(b) Chambers shall be provided with a drain to daylight, if possible. Where this is not possible, underground gravel-filled absorption pits may be used if the site is not subject to flooding and conditions will assure adequate drainage. Sump pumps may also be considered if a drain to daylight or absorption pit is not feasible.

Air release assembly

1. GENERAL

- A. This drawing detail is applicable to water main piping less than 16-inches diameter.
- B. PCCP, steel, MLAC and other water main pipe materials will require special detail or design drawings. Submit the design and detail drawings and materials to the ENGINEER for review before installation.
- C. Installation in areas of high ground water or potential for water entering the vent pipe will require a special design to be provided by the ENGINEER.
- D. Before backfilling around the assembly, secure inspection of installation by ENGINEER.

2. PRODUCTS

- A. Base Course: Untreated base course, APWA Section 32 11 23. Do not use gravel as a base course without ENGINEER's permission.
- B. Drain Gravel: Sewer rock, ASTM size no. 3 (2" to 1") or equal, APWA Section 31 05 13.
- C. Backfill: Common fill, APWA Section 31 05 13. Maximum particle size 2-inches.
- D. Concrete: Class 4000, APWA Section 03 30 04.
- E. Manhole: Riser, ASTM C 478.
- F. Reinforcement: Deformed, steel, ASTM A 615. Give bars an epoxy coating at least 15 mils thick. Minimum stress yield strength of steel tie-down bars is 70,000 ksi.
- G. Small Fittings: Brass. Do not use galvanized materials.
- H. PVC Pipe and Fittings: Schedule 40, APWA Section 33 05 07.
- I. Water Tight Wall Seal: Waterproof, compressible.

3. EXECUTION

- A. Base Course and Backfill Placement: Maximum lift thickness is 8-inches before compaction. Compaction is 95 percent or greater relative to a modified proctor density, APWA Section 31 23 26.
- B. Apply tape wrap to the exterior of all buried steel pipe per AWWA C209.
- C. Concrete Placement: APWA Section 03 30 10. Provide 1/2-inch radius edges. Apply a broom finish. Apply a curing agent.
- D. Service saddle is required on all PVC and AC pipe taps unless specified otherwise. Ductile iron and cast iron pipe may be direct tapped.
- E. Seal manhole joints water-tight and ground flush with interior wall.
- F. Follow applicable AWWA and NSF standards when connecting piping.
- G. If diameter of air relief valve is greater than 2-inches, provide piping to match its diameter from water main connection to open to air.

R309-550-6. Component Materials and Design.

(7) Chamber Drainage

(a) Chambers, pits, or manholes containing valves, blow-offs, meters, or other such appurtenances to a distribution system, shall not be connected directly to a storm drain or sanitary sewer.

(b) Chambers shall be provided with a drain to daylight, if possible. Where this is not possible, underground gravel-filled absorption pits may be used if the site is not subject to flooding and conditions will assure adequate drainage. Sump pumps may also be considered if a drain to daylight or absorption pit is not feasible.

R309-550-6. Component Materials and Design.

(6) Air Relief Valves and Blow-offs.

(a) At high points in water mains where air can accumulate, provisions shall be made to remove air by means of hydrants or air relief valves.

(b) The open end of the air relief vent pipe from automatic valves shall be provided with a #14 mesh, non-corrodible screen and a downward elbow, and where possible, be extended to at least one foot above grade. Alternatively, the open end of the pipe may be extended to as little as one foot above the top of the pipe if the valve's chamber is not subject to flooding, or if it meets the requirements of (7) Chamber Drainage.

(c) Blow-offs or air relief valves shall not be connected directly to a sewer.

(d) Adequate number of hydrants or blow-offs shall be provided to allow periodic flushing and cleaning of water lines.

(e) The air relief valve shall be installed in a manner to prevent it from freezing. A shut-off valve shall be provided to permit servicing of an air relief valve.

Pressurized irrigation water and potable water interface

1. GENERAL

- A. There may be up to 20 psi loss of head through the reduced pressure backflow preventer (RPBP) device. This is normal and the agency should expect a decrease in area coverage. Agency should design or modify the system for the lower pressure.

2. PRODUCTS

- A. Piping Materials.
 - 1) All above ground parts are to be copper or galvanized iron only.
 - 2) Below ground parts on the non-potable water system may be made of PVC or polyethylene at the agency's discretion.
- B. Cam Lock Fittings: Provide 3/4" long male insert attached to the flexible hose.

3. EXECUTION

- A. Separate Systems: Connect hose to only one system at a time. The other system is to remain separate. Do not direct connect potable and non-potable water systems with or without backflow prevention devices.
- B. Stop and Waste Valve: Locate the valve in an area where subsurface ground water will not accumulate, or attach a drain pipe to the drain hole and drain to daylight with a non-corrodible #14 mesh screen over the end.
- C. Testing: The RPBP device requires testing within 10 days of initial installation by a licensed backflow device tester and annually thereafter or more frequently at agency's option and expense.
- D. Backflow Preventer: Install the RPBP device above ground per the plumbing code. It must not be susceptible to flooding and must be accessible at all times for testing, repair, inspection, etc.
- E. Stand Pipes: Provide draining and freeze protection.
- F. Galvanized Pipe: Apply tape wrap to the exterior of all galvanized pipe per AWWA C209.

Should be evaluated by UDDW Cross Connection Control Manager
prior to instillation

SECTION 33 05 05 DUCTILE IRON PIPE

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Ductile iron pipe, couplings, fittings, and joint materials.

1.2 REFERENCES

A. AWWA Standards:

- C104 Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water.
- C110 Ductile-Iron and Gray Iron Fittings, 3 In. Through 48 In., for Water and Other Liquids.
- C111 Rubber-Gasket Joints for Ductile-Iron and Gray-Iron Pressure Pipe and Fittings.
- C115 Flanged Ductile-Iron and Gray Iron Pipe with Threaded Flanges.
- C151 Ductile-Iron Pipe, Centrifugally Cast in Metal Molds or Sand-Lined Molds, for Water or Other Liquids.
- C600 Installation of Ductile-Iron Water Mains and Their Appurtenances.

For culinary:

R309-550-6. Component Materials and Design.

(1) ANSI/NSF Standard for Health Effects.

All materials that may come in contact with drinking water, including pipes, gaskets, lubricants and O-Rings, shall be ANSI-certified as meeting the requirements of ANSI/NSF Standard 61, Drinking Water System Components - Health Effects. To permit field-verification of this certification, all components shall be appropriately stamped with the NSF logo.

(3) Standards for Mechanical Properties.

Pipe, joints, fittings, valves, and fire hydrants shall conform to ANSI/NSF Standard 61, and applicable sections of AWWA Standards C104-A21.4-08 through C550-05 and C900-07 through C950-07.

PART 2 PRODUCTS

2.1 PIPE AND FITTINGS

A. Buried Applications:

1. Class 52 or pressure class 350 psi ductile iron pipe, AWWA C151 with push-on joints, AWWA C111.
2. Cement lining for all pipe and fittings, AWWA C104.
3. Class 250 fittings with AWWA C110 joints.
4. Coupler with mechanical joint fittings, AWWA C104, C110, and C111.
5. Rubber gasket slip-on pipe joints, AWWA C111 with gasket lubricant.

**SECTION 33 05 06
POLYETHYLENE PIPE**

For culinary

R309-550-6. Component Materials and Design.

(1) ANSI/NSF Standard for Health Effects.

All materials that may come in contact with drinking water, including pipes, gaskets, lubricants and O-Rings, shall be ANSI-certified as meeting the requirements of ANSI/NSF Standard 61, Drinking Water System Components - Health Effects. To permit field-verification of this certification, all components shall be appropriately stamped with the NSF logo.

(3) Standards for Mechanical Properties.

Pipe, joints, fittings, valves, and fire hydrants shall conform to ANSI/NSF Standard 61, and applicable sections of AWWA Standards C104-A21.4-08 through C550-05 and C900-07 through C950-07.

PART 1 GENERAL

1.1. SECTION INCLUDES

- A. Polyethylene pipe, couplings, fittings and joint materials.

1.2 REFERENCES

A. AASHTO Standards:

- M 252 Corrugated Polyethylene Drainage Pipe.
- M-294 Corrugated Polyethylene Drainage Pipe 300-1200 mm Diameter.
- MP7-97 Corrugated Polyethylene Pipe – 1350 and 1500 mm Diameter.

B. ASME Standards:

- B1.1 Unified Inch Screw Threads (UN and UNR Thread Form), Supplement.

C. ASTM Standards:

- A 307 Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength.
- D 2239 Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Controlled Inside Diameter.
- D 2321 Underground Installation of Flexible Thermoplastic Sewer Pipe.
- D 2657 Heat Joining of Thermoplastic Pipe and Fittings.
- D 2774 Underground Installation of Thermoplastic Pressure Piping.
- D 3261 Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing.
- D 3350 Polyethylene Plastics Pipe and Fittings Materials.
- F 477 Elastomeric Seals (Gaskets) for Joining Plastic Pipe.
- F 1055 Electofusion Type Polyethylene Fittings for Outside Diameter Controlled Polyethylene Pipe and Tubing.

SECTION 33 05 07
POLYVINYL CHLORIDE PIPE
for Culinary

R309-550-6, Component Materials and Design.

(1) ANSI/NSF Standard for Health Effects.

All materials that may come in contact with drinking water, including pipes, gaskets, lubricants and O-Rings, shall be ANSI-certified as meeting the requirements of ANSI/NSF Standard 61, Drinking Water System Components- Health Effects. To permit field-verification of this certification, all components shall be appropriately stamped with the NSF logo.

(3) Standards for Mechanical Properties.

Pipe, joints, fittings, valves, and fire hydrants shall conform to ANSI/NSF Standard 61, and applicable sections of AWWA Standards C104-A21.4-08 through C550-05 and C900-07 through C950-07.

PART 1 GENERAL

1.1. SECTION INCLUDES

- A. Polyvinyl chloride pipe, couplings, fittings and joint materials.

1.2 REFERENCES

A. ASTM Standards:

- D 1784 Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds.
- D 2241 Poly (Vinyl Chloride) (PVC) Pressure Rated Pipe (SDR - Series).
- D 2321 Underground Installation of Flexible Thermoplastic Sewer Pipe.
- D 2412 Determination of External Loading Characteristics of Plastic Pipe by Parallel-Plate Loading.
- D 2564 Solvent Cement for Poly(Vinyl Chloride) (PVC) Plastic Pipe and Fittings.
- D 2729 Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
- D 2774 Underground Installation of Thermoplastic Pressure Piping.
- D 2855 Making Solvent Cemented Joints with Poly(Vinyl Chloride) (PVC) Pipe and Fittings.
- D 3034 Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
- D 3139 Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals.
- D 3212 Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals.
- F 656 Primers for Use in Solvent Cement Joints of Poly(Vinyl Chloride) (PVC) Plastic Pipe and Fittings.
- F 679 Poly(Vinyl Chloride) (PVC) Large-Diameter Plastic Gravity Sewer Pipe and Fittings.
- F 949 Poly(vinyl Chloride) (PVC) Corrugated sewer Pipe with a Smooth Interior and Fittings.

SECTION 33 05 09
STEEL PIPE - LINED AND COATED
For culinary

R309-550-6. Component Materials and Design.

(1) ANSI/NSF Standard for Health Effects.

All materials that may come in contact with drinking water, including pipes, gaskets, lubricants and O-Rings, shall be ANSI-certified as meeting the requirements of ANSI/NSF Standard 61, Drinking Water System Components - Health Effects. To permit field-verification of this certification, all components shall be appropriately stamped with the NSF logo.

(3) Standards for Mechanical Properties.

Pipe, joints, fittings, valves, and fire hydrants shall conform to ANSI/NSF Standard 61, and applicable sections of AWWA Standards C104-A21.4-08 through C550-05 and C900-07 through C950-07.

PART 1 GENERAL

1.1. SECTION INCLUDES

- A. Cement mortar lined and coated steel pipe, couplings, fittings, and joint materials in sizes four (4) inches through 120 inches.

1.2 REFERENCES

A. ASTM Standards:

- A 82 Steel Wire, Plain, for Concrete Reinforcement.
 A 283 Low and Intermediate Tensile Strength Carbon Steel Plates.
 A 370 Mechanical Testing of Steel Products.
 A 569 Steel, Carbon (0.15 Maximum, Percent), Hot-Rolled Sheet and Strip, Commercial Quality.
 A 570 Steel, Sheet and Strip, Carbon, Hot-Rolled, Structural Quality.
 C 33 Concrete Aggregates.
 C 150 Portland Cement.

R309-550-8. Installation of Water Mains.

(1) Standards.

The specifications shall incorporate the provisions of the manufacturer's recommended installation procedures or the following applicable standards:

B. AWWA Standards:

- C200 Steel Water Pipe 6 In. and Larger.
 C205 Cement-Mortar Protective Lining and Coating for Steel Water Pipe - 4 In. and Larger - Shop Applied.
 C208 Fabricated Steel Water Pipe Fittings.
 C303 Reinforced Concrete Pressure Pipe, Steel Cylinder Type, Pre-Tensioned, for Water and Other Liquids.

(3) For Steel pipe, AWWA Standard C604-11, Installation of Buried Steel Water Pipe- 4 inch and Larger

1.3 SUBMITTALS

- A. Design Summary: Before any fabrication, submit a design summary for each size and class of pipe and line layout drawings or line schedules that show the location of each section of pipe and each special fitting to be furnished.
- B. Shop Drawings of special fitting and outlets.

3.1 PREPARATION

- A. Implement the traffic control plan requirements, Section 01 55 26.
- B. Identify required line, levels, contours, and datum.
- C. Stake and flag locations of underground utilities.
- D. Verify:
 1. Backfill material meets gradation requirements.
 2. Foundation walls are braced to support surcharge forces imposed by backfilling operations, areas to be backfilled are free of debris, snow, ice or water.
 3. Trench bottom is not frozen.
- E. If ground water is in the intended backfill zone, dewater.

3.2 SUBGRADE

- A. Protect subgrade from desiccation, flooding, and freezing.
- B. Before backfilling over Subgrade, get ENGINEER's review of Subgrade surface preparations.
- C. If Subgrade is not readily compactable, get ENGINEER's permission to stabilize the subgrade:
 1. Excavation for Subgrade stabilization is incidental work, Section 31 23 16.
 2. Place geotextile fabric. Place acceptable fill in lifts. Compact.

3.3 PROTECTION

- A. During installation or repair, plug end of pipe or fitting except when installing next section of pipe or fitting.
- B. Movement of construction machinery over Work at any stage of construction is solely at CONTRACTOR's risk.

3.4 GENERAL BACKFILLING REQUIREMENTS

- A. Avoid injuring and displacement of conduit, pipe and structures while compacting soil or operating equipment next to pipeline.
- B. Place geotextile fabrics; Section 31 05 19.
- C. Do not damage corrosion protection on pipe.
- D. Repair or replace damaged pipe at no additional cost to OWNER.
- E. Withdraw sheathing, shoring, piles, and similar supports as backfilling progresses. Backfill and compact all holes left by removals.
- F. Provide sufficient water quality facilities to protect downstream fish and wildlife, and to meet State water quality requirements.
- G. Water settling of trench backfill is not permitted. "Jetting" of trench backfill is prohibited.

R309-550-B. Installation of Water Mains.

(2) Bedding.

A continuous and uniform bedding shall be provided in the trench for all buried pipe. Stones larger than the backfill materials described below shall be removed for a depth of at least 6 inches below the bottom of the pipe.

3.5 PIPE ZONE

- A. Maintain uniform foundation along barrel of pipe with sufficient relief for joint connections.
- B. Use backfill materials meeting pipe manufacturer's recommendations.

1.3 PERFORMANCE REQUIREMENTS

- A. Depth of Cover:
 - 1. Minimum as indicated in local building code from top of pipe to ground surface. 72 inches maximum unless ENGINEER authorizes otherwise.
 - 2. If less cover, provide additional protection to withstand frost and external loads.
- B. Remove any section of pipe already placed that is found to be defective or damaged. Relay or replace without additional cost to OWNER.

1.4 SUBMITTALS

- A. Product data: Submit manufacturer's technical product data and installation instructions.
- B. Commissioning: Submit testing data indicated in Section 33 08 00.
- C. Record Documents, Section 01 78 39: Include details of underground structures, connections, thrust blocks and anchors. Show interface and spatial relationship between piping and adjacent structures.
- D. Operating and Maintenance: Submit data, Section 01 78 23. Include maintenance data, parts list, product data and Shop Drawings.

1.5 SITE CONDITIONS

- A. Minimize neighborhood traffic interruptions. Barricade stockpiles.
- B. Secure acceptance of pipeline lateral tie-in work.
- C. Repair public and private facilities damaged by CONTRACTOR.
- D. Do not operate any currently active water valve until its owner and water company's permission is secured. R309-550-6. *Component Materials and Design.*

PART 2 PRODUCTS

2.1 PIPES AND FITTINGS

- A. Provide piping materials and factory fabricated piping products of sizes, types, pressure ratings, and capacities indicated. Use only NSF approved products in drinking water systems. All such products shall be appropriately stamped with the NSF logo. Just NSF isn't sufficient, NSF 61
- B. Where not indicated, provide proper selection as determined by installer and acceptable to ENGINEER to comply with installation requirements.
- C. Provide sizes and types of equipment connections for fittings of material that matches pipe material used in the piping system. Where more than one type of material or product option is indicated, selection is installer's choice.
- D. Provide pipe fittings and accessories of same material and weight or class as pipe, with joining method indicated or recommended by manufacturer.

2.2 VALVES

(1) ANSI/NSF Standard for Health Effects.

All materials that may come in contact with drinking water, including pipes, gaskets, lubricants and O-Rings, shall be ANSI-certified as meeting the requirements of ANSI/NSF Standard 61, Drinking Water System Components - Health Effects. To permit field-verification of this certification, all components shall be appropriately stamped with the NSF logo.

(3) Standards for Mechanical Properties.

Pipe, joints, fittings, valves, and fire hydrants shall conform to ANSI/NSF Standard 61, and applicable sections of AWWA Standards C104-A21.4-08 through C550-05 and C900-07 through C950-07.

2.8 ACCESSORIES

- A. Bolts, Nuts, Washers: Steel, Section 05 05 23.
- B. Anchorages: Provide anchorages for tees, wyes, crosses, plugs, caps, bends, valves, and hydrants. After installation, apply full coat of asphalt or other acceptable corrosion-retarding material to surfaces of ferrous anchorages.
- C. Corporation Stops: All bronze, straight threads, full port, ball valve.
- D. Hydrant and Valve: Dry barrel, Section 33 12 19.
- E. Water Meter and Valve: Section 33 12 19.
- F. Grease: Non-oxide food grade required where in contact with potable water. Non-oxide poly-fm for all exposed buried metal surfaces for bolts, nuts, washers, restraints, etc.
- G. Polyethylene Sheet: Six (6) mil thick minimum.
- H. Joint Restraints: Acceptable to ENGINEER prior to installation.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify trench excavation is ready to receive work, and dimensions, and elevations are as required.
- B. Commencing installation means acceptance of existing conditions.

3.2 PREPARATION

- A. Excavation, Section 31 23 16. Hand trim to required elevations. Correct over excavations.
- B. Remove stones or other hard matter that manufacturer stipulates may damage pipe during embedment or impede backfilling or compaction.
- C. Examine areas and conditions under which materials and products are to be installed. Do not proceed with system installation until unsatisfactory conditions have been corrected in manner acceptable to system installer.
- D. Clearly identify and promptly set aside defective or damaged pipe.
- E. Use pipe cutting tool acceptable to pipe manufacturer.

3.3 LAYOUT

- A. Comply with Utah administrative rules R309-550. As a minimum locate potable water pipe at least 18 inches vertical and 10 feet horizontal edge to edge between water and sewer lines. Place water lines above sewer line. **Requires UDDW Approval**
- B. Where potable water pipe crosses **under** gravity-flow sewer lines, fully encase sewer pipe in concrete for a distance at least 10 feet each side of the crossing:
 - 1. Do not locate any joint in the water line within 36 inches of the crossing.

R309-550-7. Separation of Water Mains and Transmission Lines from Sewers.

(1) Basic Separation Standards.

(a) The horizontal distance between water lines and sanitary sewer lines shall be at least 10 feet. Where a water main and a sewer line must cross, the water main shall be at least 18 inches **above** the sewer line. Separation distances shall be measured edge-to-edge (i.e., from the nearest edges of the facilities).

(b) Water mains and sewer lines shall not be installed in the same trench.

(c) Where local conditions make it impossible to install water or sewer lines at separation distances required by subsection (a), the sewer pipes are in good condition, and there is not high groundwater in the area, it may be acceptable if the design includes a minimum horizontal separation of 6 feet and a minimum vertical clearance of 18 inches with the waterline being above. In order to determine whether the design is acceptable, **the following information shall be submitted as part of the plans for review:**

- (i) reason for not meeting the minimum separation standard;
- (ii) location where the water and sewer line separation is not being met;
- (iii) horizontal and vertical clearance that will be achieved;
- (iv) sewer line information including pipe material, condition, size, age, type of joints, thickness or pressure class, whether the pipe is pressurized or not, etc.;
- (v) water line information including pipe material, condition, size, age, type of joints, thickness or pressure class, etc.;
- (vi) ground water and soil conditions; and,
- (vii) any mitigation efforts.

(d) If the basic separation standards as outlined in subsections (a) through (c) above cannot be met, an exception to the rule can be applied for with additional mitigation measures to protect public health, in accordance with R309-105-6(2)(b).

SECTION 33 12 16 WATER VALVES

PART 1 GENERAL

1.1. SECTION INCLUDES

- A. Gate, butterfly, plug, check, pressure reducing, pressure relief, control valves and their installation.

1.2 REFERENCES

A. AWWA Standards:

- C111 Rubber-Gasket Joints for Ductile-Iron and Gray-Iron Pressure Pipe and Fittings.
- C504 Rubber-Seated Butterfly Valves.
- C508 Swing-Check Valves for Waterworks Service, 2 In. Through 24 In. NPS.
- C509 Resilient-Seated Gate Valves for Water and Sewerage Systems.
- C550 Protective Interior Coatings for Valves and Hydrants.
- C600 Installation of Ductile-Iron Water Mains and Their Appurtenances.

1.3 SUBMITTALS

- A. Provide technical information for evaluating quality of valve. As a minimum include dimensions, weights, materials lists and operation charts.

R309-550-6. Component Materials and Design.

(1) ANSI/NSF Standard for Health Effects.

All materials that may come in contact with drinking water, including pipes, gaskets, lubricants and O-Rings, shall be ANSI-certified as meeting the requirements of ANSI/NSF Standard 61, Drinking Water System Components - Health Effects. To permit field-verification of this certification, all components shall be appropriately stamped with the NSF logo.

(3) Standards for Mechanical Properties.

Pipe, joints, fittings, valves, and fire hydrants shall conform to ANSI/NSF Standard 61, and applicable sections of AWWA Standards C104-A21.4-08 through C550-05 and C900-07 through C950-07.

PART 2 PRODUCTS

2.1 VALVES - GENERAL

A. Underground:

1. Less than three (3) inches: Screwed ends.
2. 3 inches and larger: Flanged or mechanical joint ends. Non-rising stem. Two inches square operating nut. Low alloy steel bolts, AWWA C111.

1.5 JOB CONDITIONS

- A. Notify appropriate fire department as soon as hydrant is removed or placed in service.

R309-550-5. Water Main Design.

PART 2 PRODUCTS

(5) Fire Protection.

d) Fire hydrant laterals shall be a minimum of 6 inches in diameter.

2.1 DRY-BARREL FIRE HYDRANT

- A. AWWA C502.
- B. Cast iron compression type, opening against pressure and closing with pressure, base valve design, 150 psi working pressure, with 1/4 inch diameter minimum tapping and bronze plug in standpipe:
 1. Size: 5-1/4 inch valve opening.
 2. Direction to Open Hydrant: Counterclockwise.
 3. Size and Shape of Operating and Cap Nuts: Pentagon. 1-1/2 inch point to flat.
 4. Hose Nozzles: Two 2-1/2 inch national standard thread, cap, gasket and chain.
 5. Pumper Nozzle: One 4-1/2 inch national standard thread, cap, gasket and chain.
 6. Depth of Burial: 48 inches or consistent with main depth.
 7. Connection to Main: Six (6) inches flanges or mechanical joint.
 8. Pressure: 150 psi working pressure and 300 psi hydrostatic pressure.
 9. Inlet Bottom Connection: Six (6) inches mechanical joint or flanged in accordance with AWWA C110 and AWWA C111, designed to allow separation at the sidewalk or ground level when hydrant is sheared off.
 10. Automatic Drain: Opens as the hydrant is closed.

2.2 PIPE AND FITTINGS

- A. Ductile Iron: Section 33 05 05. Standard drilling with joints per AWWA C110.
- B. PVC: Section 33 05 07.
- C. Steel: Section 33 05 09. Standard drilling, 150 lb.
- D. Spool: Schedule 40 steel, epoxy lined, exterior wrapped with minimum six (6) mil thick polyethylene sheet and tape wrap, AWWA C210 or C213 and C209 or C214 with two welded in place 150 lb. steel ANSI B 16.5 slip on flanges.

2.3 VALVES

- A. Gate Valve: Section 33 12 19.
- B. If indicated, furnish an auxiliary six (6) inch diameter valve with end connections as required.

2.3 SERVICE LINE, VALVES, AND FITTINGS

- A. Service Pipe: Copper, Section 33 05 03 or smooth wall polyethylene, Section 33 05 06. The service pipe between main and meter and to a point not less than 1 foot from the public way side of the property line cannot exceed the meter size.
- B. Service Valves and Fittings: AWWA C800.
- C. Meter Setters: Brass, with angle fittings, saddle nuts and gaskets.
- D. Corporation Stops and Angle Valves: Invert key design.
- E. Bypasses: Not allowed on any service installation without approval of ENGINEER.

2.4 METER BOXES

- A. Meters to 1" Service: Plastic or asphalt-dipped corrugated metal. Fiber meter boxes not acceptable.
- B. Meters 1-1/2" and Larger: Reinforced concrete with a minimum clearance of 12" from each side of meter plumbing.
- C. Cover: Ductile or cast iron with utility inscription

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install meter box, meter setters, valves, etc. at indicated locations. If not indicated, install in street right-of-way parking strip or at a location approved by ENGINEER.
- B. Install meter setters level and horizontal. Provide suitable pipe lengths to prevent stress.
- C. DO NOT operate utility agency's main line valves. Contact agency if valves are to be operated. If required by water utility agency notify affected water users, Section 01 31 13.
- D. OWNER Supplied Meters: Installed by CONTRACTOR unless indicated otherwise.

END OF SECTION

R309-550-11. Service Connections and Plumbing

(4) Service Lines.

- (a) Service lines shall be capped until connected for service.

SECTION 33 13 00
DISINFECTION

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Disinfection of potable water system.
- B. Test and report results.

1.2 REFERENCES

A. AWWA Standards:

- A100 Water Wells.
- B300 Hypochlorites.
- B301 Liquid Chlorine.
- C651 Disinfecting Water Mains.
- C652 Disinfection of Water-Storage Facilities.

B. State of Utah Standards:

Public Drinking Water Regulations, ~~Part 2, Section 12.~~

1.3 DEFINITIONS R309-520: Facility Design and Operation: Disinfection.

- A. **Disinfectant Residual:** The quantity of disinfectant in treated water.
- B. **ppm:** Parts per million.

1.4 SUBMITTALS

- A. CONTRACTOR's evidence of experience in disinfection.
- B. Bacteriological laboratory's certification.
- C. Disinfection Report: Three (3) copies containing:
 - 1. Date issued.
 - 2. Project name and location.
 - 3. Treatment contractor's name, address and phone number.
 - 4. Type and form of disinfectant used.
 - 5. Time and date of disinfectant injection started.
 - 6. Time and date of disinfectant injection completed.
 - 7. Test locations.
 - 8. Initial and follow-up disinfectant residuals in ppm for each outlet tested.
 - 9. Time and date of flushing start.
 - 10. Time and date of flushing completion.
 - 11. Disinfectant residual after flushing in ppm for each outlet tested.
 - 12. Flush water disposal location and acceptance by local agency.

PART 3 EXECUTION

3.1 PREPARATION

- A. Provide necessary signs, barricades, and notices to prevent accidental exposure to disinfecting materials, consuming disinfecting water, or disturbing system being disinfected.
- B. Make sure potable water system is complete, clean, and that the system to be disinfected is not connected to an existing system.

3.2 DISINFECTION OF WATER LINES

- A. Use one method defined under AWWA C651 that is acceptable to ENGINEER.
- B. After pressure testing per Section 33 08 00, flush system through hydrants or if a hydrant does not exist, install a tap of sufficient size to provide 2.5 feet per second flushing velocity in the line.
- C. Starting at outlet closest to water source, bleed water from each outlet until chlorine residual reaches outlet. Repeat process at each outlet throughout system.
- D. Collect a bacteriological water sample at end of line to be tested. If sample fails bacteriological test, flush system and retest. Continue flushing and retesting until a good sample is obtained.
- E. If flushing does not produce a passing bacteriological test disperse disinfectant throughout system to obtain 10 to 25 ppm of free chlorine residual.
- F. Flush the chlorinated water from the main until chlorine measurements show concentration in the water leaving the main is no higher than that generally prevailing in the system or is acceptable for domestic use.
- G. After a passing bacteriological test sample is obtained, let the system relax for 24 hours. Flush and collect a subsequent bacteriological sample for testing. If the subsequent test passes then water line is acceptable.

R309-515-6. Ground Water - Wells**(11) Well Disinfection.**

Every new, modified, or reconditioned well including pumping equipment shall be disinfected before being placed into service for drinking water use. These shall be disinfected according to AWWA Standards C654-03 and A100-06 as modified to incorporate the following as a minimum standard:

3.3 DISINFECTION OF CULINARY WELLS

- A. Use one method defined under AWWA A100 that is acceptable to ENGINEER.
- B. Do not start disinfection until well is thoroughly cleaned.
- C. Use a disinfecting solution containing a minimum of 50 ppm residual chlorine.
- D. Flush system after disinfection.

SECTION 33 16 13
WELDED STEEL WATER TANK

R309-545-20. Tank Standards

PART 1 GENERAL

(2) NSF International Standards.

(a) NSF 60, Drinking Water Treatment Chemicals - Health Effects.

(b) NSF 61, Drinking Water System Components - Health Effects.

1.1 SECTION INCLUDES

- A. On grade welded steel water storage tank.
- B. Foundation and ring wall construction.
- C. Testing requirements.

1.2 REFERENCES

A. ASME Standards:

Boiler and Pressure Vessel Code.

B. AWWA Standards:

D100 Welded Steel Tanks for Water Storage.

1.3 QUALITY ASSURANCE

- A. Workmanship, Section 01 43 00.
- B. Welder Certification:
 - 1. Use only welders qualified in all positions by ASME Boiler and Pressure Vessel Code.
 - 2. Maintain a record of welds and welders employed on each joint.
 - 3. Provide a welding supervisor independent of the tank erection foreman's jurisdiction.

1.4 SUBMITTALS

- A. List of five (5) tanks, including name of owner, size, location, and year completed.
- B. Certification of welders who will be performing welding.
- C. Within 30 days after award of contract, furnish two (2) sets of design calculations and four (4) sets of detail drawings of the tank. Furnish drawings prepared by a licensed design professional.

PART 2 PRODUCTS

2.1 GENERAL

- A. Furnish a steel tank that is fabricated and erected per AWWA D100 and governing Laws and Regulations.
- B. Furnish the tank per Appendix C of AWWA D100. Use a design temperature based on a low one (1) day mean temperature of -10 deg F if not indicated elsewhere.

2.2 TANK ACCESSORIES

- A. General: Furnish and install all tank accessories as indicated and as applicable below.
- B. Ladder: One fixed ladder with safety cable on the exterior of the tank conforming to OSHA. Extend ladder eight (8) feet above ground surfaces to roof.
- C. Shell Manholes: Two 24 inches diameter shell manholes equipped with davits or hinges located near base of tank. Furnish one manhole with a bolting flange for an exhaust fan for ventilation as indicated in AWWA D100.

R309-545-14. Access Openings.

Drinking water storage tanks shall be designed with reasonably convenient access to the interior for cleaning and maintenance.

(1) Height.

There shall be at least one opening above the level of the overflow, which shall be framed at least 4 inches above the surface of the roof at the opening; or if on a buried tank, shall be elevated at least 18 inches above any earthen cover over the tank. The frame shall be securely fastened and sealed to the tank roof to prevent any liquid contaminant entering the tank. Concrete drinking water storage tanks shall have raised curbs around access openings, formed and poured continuous with the pouring of the roof, and sloped to direct water away from the frame.

(2) Shoebox Lid.

The frame of any access opening shall be provided with a close-fitting, solid shoebox-type cover that extends down around the frame at least 2 inches and is furnished with a gasket(s) between the lid and frame. The horizontal surface of the tank lid shall not have any openings, cracks, or penetrations, such as a lock, key hole, or bolted handle that would allow contaminants to enter the tank.

(3) Locking Device.

The lid to any access opening shall have a locking device.

UDDW does not require "mushroom" vents

- D. Vent: Mushroom vent of adequate size to handle pressure differential cause by water entering or leaving the tank at the maximum rate indicated. Do not consider the open area of overflow as venting area. Provide a special screened vent to ensure fail-safe operation if screen frosts over or is otherwise clogged. Furnish a vent that is easily dismantled to remove screens for cleaning.

R309-545-15. Venting.

Drinking water storage tanks shall be vented. The air venting capacity shall exceed the water inflow and the water outflow of the tank. Overflows shall not be considered or used as vents.

Vents provided on drinking water storage tanks shall:

(1) Inverted Vent.

Be downturned a minimum of 2 inches below any opening and shielded to prevent the entrance of contaminants.

(2) Open Venting.

On buried structures, the end of the vent discharge shall be a minimum of 24 inches above the earthen covering.

Guidance: In areas of heavy snowfall, it is recommended that the vent discharge be raised.

(3) Blockage.

Be located and sized to avoid blockage during winter conditions.

(4) Screen.

Be fitted with No. 14 mesh or finer non-corrodible screen.

(5) Screen Protector.

Vents that are 6-inch diameter or greater shall be fitted with additional heavy gage screen or substantial covering, which will protect the No. 14 mesh screen against vandalism or damage.

- E. Roof Manholes: One 36 inch rainproof roof hatch with hinges and hasp for locking per AWWA D100 and a 24 inch diameter roof manhole with a removable cover.

R309-545-14. Access Openings.

Drinking water storage tanks shall be designed with reasonably convenient access to the interior for cleaning and maintenance.

(1) Height.

There shall be at least one opening above the level of the overflow, which shall be framed at least 4 inches above the surface of the roof at the opening; or if on a buried tank, shall be elevated at least 18 inches above any earthen cover over the tank. The frame shall be securely fastened and sealed to the tank roof to prevent any liquid contaminant entering the tank. Concrete drinking water storage tanks shall have raised curbs around access openings, formed and poured continuous with the pouring of the roof, and sloped to direct water away from the frame.

(2) Shoebox Lid.

The frame of any access opening shall be provided with a close-fitting, solid shoebox-type cover that extends down around the frame at least 2 inches and is furnished with a gasket(s) between the lid and frame. The horizontal surface of the tank lid shall not have any openings, cracks, or penetrations, such as a lock, key hole, or bolted handle that would allow contaminants to enter the tank.

(3) Locking Device.

The lid to any access opening shall have a locking device.

- F. Overflow: Provide tank overflow. Equip overflow with an anti-vortex entrance. Extend overflow down outside of tank.

R309-545-13. Tank Overflow.

All water storage tanks shall be provided with an overflow that discharges at an elevation between 12 and 24 inches above the ground surface or the rim of the receiving basin. The discharge shall be directed away from the tank and shall not cause erosion.

(1) Diameter.

Overflow pipes shall be of sufficient capacity to permit waste of water in excess of the filling rate.

(2) Slope.

Overflow pipes shall be sloped for complete drainage.

(3) Screen.

Overflow pipes shall be screened with No. 4 mesh non-corrodible screen installed at a location least susceptible to damage by vandalism.

(4) Visible Discharge.

Overflow pipes shall be located so that any discharge is visible.

(5) Cross Connections.

Overflow pipes shall not be connected to, or discharge into, any sanitary sewer system.

- G. Inlet Nozzle: Equip with a 125 psi working pressure flange connection.
- H. Bottom Drain: Weld drain to tank bottom and make required connections.
- I. Outlet Nozzle: Equip with a 125 psi working pressure flange connection.

R309-545-10. Internal Features.

The following shall apply to internal features of drinking water storage tanks:

(1) Drains.

- (a) A means shall be provided for the draining of drinking water storage tanks.
- (b) Where possible, the drain shall be separate from the outlet pipeline. If a tank drain line is provided, it shall be sloped for complete drainage.
- (c) The drain shall not discharge to a sanitary sewer.
- (d) If local authority allows discharge to a storm drain, the drain discharge shall have a physical clearance of at least 12 inches between the discharge end of the pipe and the overflow rim of the receiving basin.

(3) Inlet and Outlet.

- (a) To minimize potential sediment in the flow from the tank, the outlet pipes from all tanks shall be located in a manner to provide a silt trap prior to discharge into the distribution system.
- (b) Inlet and outlet pipes shall be configured to provide mixing and circulation.

(4) Tank Floor.

The floor of the storage tank shall be sloped to permit complete drainage of the structure.