SECTION 100 - INTRODUCTION
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SECTION 100 - INTRODUCTION

101 GENERAL PROVISIONS

These regulations shall be known as the City of Thornton Standards and Specifications for the Design and Construction of Public and Private Improvements, 2012 Edition, as may be amended from time to time by the City, and may be cited as such and shall be referred to herein as the Standards and Specifications. They were adopted by the City of Thornton City Council on October 23, 2012.

101.1 Purpose

The purpose of these Standards and Specifications is to provide minimum standards for safety, health, and the general welfare of the City by regulating the design of, construction of, choice of materials used for, location of, maintenance and use of all Public and Private Improvements. These include, but are not limited to, sanitary sewer systems, water supply systems, private utility service lines for water and sewer, public and private storm drainage systems, public and private streets, landscape areas, open space, parks and recreation facilities, traffic signals and devices, public and private parking lots and appurtenances thereto. All equipment and material used in the construction of all public and private improvements shall be new unless approved by the City.

These Standards and Specifications represent minimum requirements and design values. Additional requirements or higher design values, commensurate with conditions, may be required by Development Engineering when they are in the best interest of the City.

101.2 Scope

The provisions of these Standards and Specifications shall apply to the planning, design, construction, enlargement, alteration, moving, removal, conversion, demolition, repair, and excavation of any Public or Private Improvements specifically regulated herein. These Standards and Specifications present the minimum standards for construction of Public and Private Improvements completed by Responsible Parties. These Standards and Specifications do not relate to the City's capital improvement projects, unless specifically noted in the contract documents. With the exception of maintenance practices, the City shall follow these Standards and Specifications where practicable.

In the case of those improvements that are required by the City, and are not specifically covered in these Standards and Specifications, the City will require the Responsible Party to follow applicable local, state, and federal guidelines, or standards promulgated by professional organizations. Development Engineering shall be consulted for guidance on proper references.

102 DEFINITIONS AND ABBREVIATIONS

102.1 Definitions

Whenever the following terms are used in these Standards and Specifications, they shall be defined as follows:

Accessory dwelling unit - a second dwelling unit that is either located within a single-family detached dwelling or in an attached or detached structure on the same lot as the single-family detached dwelling.

Approved Construction Drawings – Plans that were reviewed for compliance with City Codes. The Engineer of record is responsible for adequacy of design and ensuring that the Improvements meet all City Codes and these Standards and Specifications.

As-Built Plans – A modified version of the full set of the approved construction drawings with actual physical documentation of any changes based on field measurements and certified by a Professional Engineer (PE) or Professional Land Surveyor (LS).

Balled and Burlapped - Plant material established in the ground that is dug for transplanting with an undisturbed ball of earth containing the roots of the plant wrapped in burlap or other similar fabric.

Caliper - The diameter of the tree trunk measured six (6) inches above the ground for trees up to and including four (4) inch caliper size and 12 inches above the ground for larger sizes.

Certified Arborist - An individual holding certification by the International Society of Arboriculture who is engaged in the profession of arboriculture and who, through experience, education and related training, possesses the competence to provide for, or supervise the management of, trees and other woody ornamentals.

City - City of Thornton, Colorado, a municipal corporation, organized pursuant to Article XX, Colorado Constitution as a home rule municipality and shall include the City Manager or his designee or other official, body or agency designated by Charter or Ordinance to act on behalf of the City.

City Code - The latest, officially adopted version of the Thornton City Code.

Clear Zone - The minimum width area adjacent to a pedestrian pathway or fire hydrant or other utility structure.

Contractor - A person, partnership, corporation, subcontractor or other legally formed entity or organization that undertakes to construct, install, alter, move, demolish, repair, replace, excavate or add to any Public or Private Improvements covered by these Standards and Specifications.

Days - Calendar days, unless otherwise specified.

Deciduous - A plant with foliage that is shed annually.

Developer - Any and all owners of the Property, and shall include any owner acting through a duly executed power of attorney granting the attorney-in-fact full authority to act in the stead of the owner.

Developer's Agreement - An agreement between a developer and the City which clearly establishes the developer's responsibility regarding project phasing, the provision of Public and Private improvements and any other mutually agreed to terms and requirements adopted by the City.

Development Code - Chapter 18 of the City Code established in accordance with the Comprehensive Plan for the purpose of promoting the health, safety, morals, and the general welfare of the City in connection with development.

Development Engineering Manager –The City of Thornton Development Engineering Manager or an authorized designee. Herein after also referred to as Development Engineering.

Dripline - A vertical line extending downward from the tips of the outermost branches of a tree or shrub to the ground.

Evapotranspiration - A measure of water depletion from the soil due to evaporation from the soil surface and transpiration through plant foliage.

Evergreen - A plant with foliage that persists and remains green year-round.

Final Acceptance – The acknowledgement by the City that the warranty period has expired and there are no outstanding items to be corrected under provisions of the guaranty.

Fire hydrant branch main – The public 6" DIP waterline that connects to the 8" or larger public main.

Grade - The average of the finished ground surface elevations measured at the highest and lowest exterior corners of a structure; or the slope of a road, street or other public way, or the slope of the ground surface elevations.

Grading - The act of excavating or filling or combination thereof and which changes the existing topography.

Ground cover - Living plant material, other than turf grass, normally reaching an average maximum height of not more than 24 inches at maturity and which grows or spreads in such a manner as to provide continuous plant coverage. Annuals, herbaceous perennials, weeds, mulches and deciduous tree canopies are not ground cover.

Ground Cover, Woody - Evergreen perennial and sub-shrub plant material as Mahonia repens, Vinca minor, and Euonymous fortunei 'Coloratus' that satisfies Tree Equivalent requirements.

Hardscape - Non-living site improvements at the ground plane such as pavement, walkways, parking areas, and other similar improvements as determined by the City.

High Water Demand Landscape – Landscape areas that require approximately 75-100% of Reference Evapotranspiration, or 15-20 gallons per square foot per average year.

Hydrozone - A portion of a landscape area having plants with similar water needs.

Improvements – Is intended to define both public and private improvements as defined herein.

Initial Acceptance – An acknowledgement by the City that, to the best of the City's knowledge, all Improvements have been completed in accordance with the approved plans and these Standards and Specifications.

Inspector - The authorized representative of the Development Engineering Manager assigned to make detailed inspection of construction work to assure compliance with these Standards and Specifications and the plans as approved by the City.

Irrigation Controller - A fully automatic, electrically operated mechanism used to regulate the timing of irrigation valve operations.

Irrigation System - An artificial watering system designed to transport and distribute water to landscape plant material.

Landscape - Any combination of living plant material, such as trees, shrubs, vines, ground covers, flowers, vegetables, turf, or grass as categorized as follows:.

Landscape Area - The land area within a lot or property not comprised of buildings and hardscape and that is planted with cultivated vegetation at the ground plane. Landscape area does not include bare dirt or weeds. Areas dedicated to edible plants such as orchards or vegetable gardens may be included in the calculation of landscape area as approved by the City.

Landscape Area, Private Common - A landscape area within a development owned and maintained by an owners association or Metropolitan District.

Landscape Canopy - The upper vegetative cover of a tree or plant material grouping, and may also be referred to as “overstory”.

Landscape Fabric - A porous geotextile fabric installed below mulch.

Landscape Mitigation Plan - A plan for the replacement of plant material that is removed, destroyed or otherwise negatively affected by the development of a property.

Landscape Plan - A plan drawn to scale that shows the layout of all landscape components and their specifications for a site.

Letter of Completion – Letter notifying the Responsible Party that the Private Improvements were constructed in accordance with the approved plans, and these Standards and Specifications.

Low Water Demand Landscape – Landscape areas that require approximately 25-50% of Reference Evapotranspiration, or 5-9 gallons per square foot per average year.

May - Permissive.

Moderate Water Demand Landscape – Landscape areas that require approximately 50-75% of Reference Evapotranspiration, or 10-14 gallons per square foot per average year.

Mulch - Nonliving organic wood, rock or stone materials used in the landscape industry to cover bare ground, to provide a protective covering around plants and to retard erosion, retain soil moisture, reduce weed growth, and maintain even soil temperatures.

Normal Work Hours - 8:00 a.m. - 5:00 p.m., Monday through Friday, except holidays, as defined in the City Code.

Open Space - An area of land that is kept in or returned to its natural state to protect or preserve wildlife habitat, to protect, preserve, or enhance wetlands, or to provide, preserve, or support view, vista, or wildlife corridors. Open space may include agricultural uses and natural features located on a site, including, but not limited to, meadows, forested areas, steep slopes, floodplains, hazard areas, unique geological features, ridgelines, unique vegetation, and critical plant communities, stream corridors, wetlands, and riparian areas, wildlife habitat and migration corridors, areas containing threatened or endangered species and archeological, historical, and cultural resources.

Owner - Any individual, corporation, partnership, or other legal entity holding title to real property which is the subject of improvements covered by these Standards and Specifications or which are intended to come under the ownership or control of the City.

Plant Material Protection Zone - An area fenced off from use during construction work designated to protect plant material from potential damage.

Person – an individual firm, organization, corporation, partnership or other legal entity including contractors or subcontractors authorized to act on behalf of an owner

Practical Turf Areas - A landscape design and management concept promoting high water-demand turf only in those areas of a property that are functional for recreation and the efficient management of supplemental irrigation required for those areas.

Private Improvements - Improvements under the private ownership or control and/or maintained by the private owners, including but not limited to, portions of water systems, sewer systems, street systems and storm drainage systems, the construction of which are governed by these Standards and Specifications.

Public Improvements - Improvements under the ownership or control of the City and maintained by the City including but not limited to the components of the water system, sewer system, street system, park and open space system, and storm drainage system covered by these Standards and Specifications. The term also includes similar improvements being built in connection with a subdivision which are intended to be dedicated to the City.

Rain Sensor or Rain Shutoff Device - A device connected to an irrigation controller that overrides scheduled irrigation when significant precipitation has been detected.

Reference Evapotranspiration – The combined water losses of transpiration and evaporation experienced by a 5-inch stand of cool-season, pasture-type grasses.

Responsible Party - Any individual, corporation, partnership, or other legal entity involved in developing improvements covered by these Standards and Specifications. Includes subcontractors, contractors, developers, and owners, as applicable in the development process.

Right-of-way – Real property dedicated to public use including, but not limited to, pedestrian, equestrian, or vehicular movement; railroads; public utilities; and water and sanitary sewer facilities.

Service Area - An area, whether inside or outside city limits, that receives water and/or sanitary sewer utility service from the City of Thornton.

Shall - Mandatory.

Soil Amendment - Organic and inorganic materials added to soil to improve texture, nutrients, moisture holding capacity, and infiltration rates.

Stop Work Order – Official written notice from the City to cease any and all construction or development activities on a site or lot due to a violation of, including but not limited to, the approved plans, the City Code, the Standards and Specifications, building codes, storm water runoff regulations. This notice will also include, but not be limited to, the restriction on issuance of building permits, certificates of occupancy, and additional provisions of utility services until the identified violations are corrected and approved by the City.

Street Tree - A tree planted within the street right-of-way between the curb or edge of road and the adjoining property line to provide shade and spatial definition, and to enhance the street environment.

Surety - Performance, labor and material payment bonds, irrevocable letters of credit, cash, and other instruments of security furnished to the City by the Responsible Party.

Tree Equivalent – One (1) balled and burlapped two (2) inch caliper or six (6) foot tall clump deciduous tree or six (6) foot tall evergreen tree or 10 No. 5 container size evergreen or deciduous shrubs or 20 No. 1 container size woody, evergreen perennial ground covers or ornamental grasses or other substitutions as may be allowed in the Development Permit process.

Turfgrass (Turf) – A continuous ground cover of improved grass plants growing intimately with an upper soil stratum of intermingled roots and stems.

Ultra-Low Water Demand Landscape – Landscape areas that require approximately 0-25% of Reference Evapotranspiration, or 0-4 gallons per square foot per average year.

Vegetation - Plants in general or the sum total of plant life in an area.

Warranty Period - Shall be the time frame during which the Responsible Party is held liable for all work performed and materials utilized prior to final acceptance by the City of Thornton.

Water-Wise Landscape - A water efficient landscape adapted to the local environment.

Wetland – An area defined and controlled by the Army Corps of Engineers that is inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support vegetation, and that under normal circumstances, will support a prevalence of vegetation typically adapted for life in saturated soil conditions.

102.2 Abbreviations

AASHTO American Association of State Highway and Transportation Officials

AC	Asphalt Content
AC	Alternating Current
ACI	American Concrete Institute
ADA	Americans with Disabilities Act
ADT	Average Daily Traffic
AISC	American Institute of Steel Construction
ALCC	Associated Landscape Contractors of Colorado
ANSI	American National Standards Institute
ASTM	American Society for Testing and Materials
ATSSA	American Traffic Safety Services Association
AWWA	American Water Works Association
AWG	American Wire Gauge
BMP	Best Management Practice
CBR	California Bearing Ratio
CDOT	Colorado Department of Transportation
CDPHE	Colorado Department of Public Health and Environment
CDPS	Colorado Discharge Permit System
cfs	cubic feet per second
CP	Colorado Testing Procedures
CP-L	Colorado Lab Testing Procedures
CPSC	Consumer Product Safety Commission
CRS	Colorado Revised Statute
CUHP	Colorado Urban Hydrograph Procedure
DIP	Ductile Iron Pipe
DRC	Dry-Rodded Condition
DU/Ac	Dwelling Units per Acre
EDLA	Equivalent Daily Load Application
ESAL	Equivalent Single Axel Load
ET	Evapotranspiration
FAA	Federal Aviation Administration
fps	Feet per second
Gal	gallons
gpd	Gallons per day.
gpm	Gallons per minute.
GRC	Galvanized Rigid Conduit.

GVW	Gross Volume Weight
HDPE	High Density Polyethylene
HGL	Hydraulic Grade Line
HMA	Hot Mix Asphalt
IMSA	International Municipal Signal Association
IPC	International Plumbing Code
IPEMA	International Play Equipment Manufactures Association
ISA	International Society of Arboriculture
ITE	Institute of Transportation Engineers
ITS	Intelligent Transportation System
LABCAT	Laboratory for Certification of Asphalt Technicians
Lbs	pounds
LS	Land Surveyor
MAPC	Manual of Accident Prevention in Construction
MGD	Million gallons per day
MS4	Municipal Separate Strom Sewer System
MUTCD	Manual on Uniform Traffic Control Devices
NEC	National Electrical Code
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
OSHA	Occupational Safety and Health Administration
PC	Point of Curvature
PCC	Portland Cement Concrete
PE	Professional Engineer
PG	Performance Grade
PI	Point of Intersection
PRV	Pressure Reducing Valve
psi	Pounds per square inch
PT	Point of Tangency
PVC	Polyvinyl Chloride
RAP	Reclaimed Asphalt Pavement
RCP	Reinforced Concrete Pipe
ROW	Right-of-way
RPS	Roller Pass Study
SDR	Standard Dimension Ratio

sf	Square Foot
SZFL	School Zone Flashing Light
SMA	Stone Mastic Asphalt
SN	Structural Number
SWMP	Stormwater Management Plan
UL	Underwriters Laboratories, Inc.
UDFCD	Urban Drainage and Flood Control District
USGS	United States Geological Survey
VCA	Voids in the Coarse Aggregate
VFA	Void Filled Asphalt
VMA	Voids in the Mineral Aggregate
VTM	Voids in the Total Mix
WMA	Warm Mix Asphalt
WQCD	Water Quality Control Division

102.3 Terms

A. Whenever, in these Standards and Specifications, the words "as ordered", "as directed", "as required", "as permitted", "as allowed", or words or phrases of like meaning are used, it shall be understood that the order, direction, requirement, permission, or allowance of the City is intended.

B. Similarly, the words "approved", "reasonable", "suitable", "acceptable", "properly", "satisfactory", or words of like meaning, unless otherwise specified herein, shall mean approved, reasonable, suitable, acceptable, proper, or satisfactory in the judgment of the City.

C. Whenever, in these Standards and Specifications, the words “Development Engineering Manager” are used, it shall be understood that the City employee named therein shall be whoever is designated by the City Manager.

103 GENERAL CONDITIONS

103.1 Authority of the City

A. Engineering and Landscaping Services

The Responsible Party shall procure at its sole expense all engineering and landscaping services necessary and appropriate in conjunction with the development of the property, which shall fully conform to the City's applicable ordinances, and these Standards and Specifications. Professional services shall be performed by engineers, surveyors, landscape architects, or other professionals duly licensed by the State of Colorado as may be appropriate.

B. Public Utility Fees

The Responsible Party shall pay all installation charges for lighting, electric, and/or gas services required by Public Service Company (Xcel Energy) or United Power for the property/project. Payment for street lights shall be made in a timely fashion to assure that street lights within and adjacent to residential lots are installed prior to the certificate of occupancy of the adjacent lots. At the discretion of the Development Engineering Manager the City may withhold inspections and/or initial acceptance if the street lights have not been installed prior to certificate of occupancy.

C. Variances

Whenever there are practical difficulties involved in carrying out the provisions of these Standards and Specifications, Development Engineering may grant variances for individual cases, provided that Development Engineering shall first determine that a specific reason exists making these procedures impractical and that the variance is in conformance with the intent and purpose of these Standards and Specifications, and providing that such variance does not lessen any design requirement or any degree of

integrity and shall result in a level of safety, service and quality equal to or greater than that intended by the application of the Standards and Specifications minimum requirements. The Responsible Party shall provide a written request for variance, and if approved by the City, a variance will be issued in writing by the Development Engineering Manager, stating what the variance is and why it is being granted.

D. Alternate Materials and Methods of Construction

1. The provisions of these Standards and Specifications are not intended to prevent the use of any material or method of construction not specifically prescribed by these procedures, provided any alternate in the Standards and Specifications is approved in writing by the Development Engineering Manager, and thus authorized by the City.

2. The Development Engineering Manager shall require that sufficient evidence or proof be submitted to substantiate any request that may be made regarding the alternate method or material. The details of any action granting approval of an alternate shall be recorded and filed with the City.

E. Tests

1. The Responsible Party shall employ at its sole expense a professionally qualified, independent testing company to perform all testing of materials or construction that may be required by the City to ensure compliance with these Standards and Specifications. The Responsible Party shall furnish the City with certified copies of test results, and agrees to release and authorize full access to the City and its designated representatives to all work-up materials, procedures, and documents used in preparing the test results.

2. Whenever there is insufficient evidence of compliance with any of the provisions of these Standards and Specifications or evidence that any material or construction does not conform to the requirements herein, Development Engineering may require that the Responsible Party, at its expense, shall provide test results to establish compliance. Such tests shall be as specified by these Standards and Specifications or by other recognized test standards approved by Development Engineering. If there are no recognized and accepted test methods for the proposed alternate, Development Engineering shall determine test procedures. All tests shall be made by an agency approved prior to testing by Development Engineering.

F. Organization and Enforcement

The Development Engineering Manager shall have the power to enforce all provisions of these Standards and Specifications The Development Engineering Manager may appoint a project manager, construction inspector, landscape architect, or other related technical officer or inspector, or other employee to act as an authorized representative.

Whenever any work is being done contrary to the provisions of these Standards and Specifications or approved plans, the Development Engineering Manager may order the work stopped by a written notice which shall be served on any persons engaged in the doing or causing of such work to be done, and any such persons shall forthwith stop such work until authorized by the Development Engineering Manager to proceed.

G. No Waiver of Legal Rights

The City shall not be precluded or estopped by any measurement, estimate, or certificate made either before or after the completion and acceptance of the work from showing the true amount and character of the work performed and materials furnished by the Responsible Party, or from showing that any such measurement, estimate or certificate is untrue or incorrectly made, or that the work or materials do not conform in fact to these Standards and Specifications.

H. Control of Work

1. Authority of Development Engineering Manager

The Development Engineering Manager shall have the authority to stop the work whenever such stoppage is deemed reasonably necessary to protect public's health, safety and welfare. The Development Engineering Manager shall resolve all questions which arise as to the quality and acceptability of materials furnished, work performed, interpretation of the plans and specifications, and acceptable fulfillment of the requirements of these Standards and Specifications.

2. Authority and Duties of Inspector

a. Inspectors are authorized to inspect all work completed and all material furnished. Inspections may extend to all or any part of the work and to the preparation, fabrication, or manufacture of the materials to be used. The Inspector is not authorized to revoke, alter, or waive any

requirements of these Standards and Specifications. The Inspector shall notify the Responsible Party of any failure of the work or materials nonconformity of these Standards and Specifications. The Inspector shall have the authority to reject materials until any questions at issue can be resolved by Development Engineering.

b. The Inspector shall, in no case, act as foreman or perform other duties for the Responsible Party, or interfere with the management of the work done by the Responsible Party. Any "advice" which the Inspector may give the Responsible Party shall not be construed as binding upon the City in any way, or release the Responsible Party from fulfilling all of the terms of these Standards and Specifications.

c. The presence or absence of the Inspector shall not relieve, in any degree, the responsibility or the obligation of the Responsible Party to follow these Standards and Specifications.

d. The Development Engineering Manager, or an authorized designee, shall, at all times, be provided reasonable and safe access to inspect the work whenever it is in preparation or progress.

3. Responsible Party's Responsibility for Work

In case of suspension of work for any cause whatsoever, the Responsible Party, before leaving the job site, shall take such precautions as may be necessary to prevent damage to the work, provide for proper drainage and erect any necessary barricades, signs, or other facilities, at the Responsible Party's expense, as required by applicable standards.

4. Removal of Unacceptable Work

Work which does not conform to the plans and these Standards and Specifications, and which results in an inferior or unsatisfactory product, shall be considered unacceptable work. Unacceptable work, whether the result of poor workmanship, poor design, use of defective materials, damage through carelessness, or any other cause found to exist prior to the final acceptance of the work, shall be immediately removed and replaced or corrected by, and at the expense of, the Responsible Party. This expense includes total and complete restoration of any disturbed surface to original or better than the original condition which existed before the repairs or replacement, regardless of improvements on lands where the repairs or replacement are required.

5. Requirements of Other Jurisdictions

Where proposed construction will affect other agencies such as the CDOT, adjacent cities and counties, railroads, ditch companies, etc, said construction shall be subject to the review and approval of said agencies. Generally, where more than one requirement is imposed, the more restrictive requirement shall govern. Exceptions must be authorized by the Development Engineering Manager in writing.

104 CONSTRUCTION PLANS

In addition to any other requirements for the issuance of a construction permit pursuant to the Thornton City Code, the developer shall submit to the Development Engineering Manager, prior to or contemporaneously with the application for construction permit, plans, engineering calculations, traffic reports, drainage reports, utility reports, geotechnical reports and other data as required to allow the Development Engineering Manager to determine compliance with these Standards and Specifications. All such reports, plans, computations, and specifications shall be prepared and designed by a professional engineer licensed in the State of Colorado, in accordance with the rules and laws of the Colorado Board of Registration of Professional Engineers. All park construction plans shall be prepared and designed by a professional landscape architect.

The Development Engineering Manager may waive the submission of plans, calculations, or other analysis, if in the Development Engineering Manager's judgment. The nature of the work applied for is such that reviewing of plans is not necessary to obtain compliance with these Standards and Specifications.

104.1 Construction Plan Requirements

Construction plans shall be checked for conformance with City minimum design standards prior to approval by the City. This approval shall be for conformance to City design standards and other requirements; engineering and landscaping design or needs shall remain the responsibility of the professional design engineer or landscape professional. Construction plans and all required reports shall be submitted in an electronic format to the Development Engineering Manager for review. The drawings shall be submitted in “pdf” format. Once all review comments have been addressed and the plans are final, four (4) sets of plans, signed and sealed by a professional engineer, or as appropriate by a landscape architect, shall be submitted and retained. One (1) set of construction plans shall be 22" x 34" in size and three (3) sets shall be 11”x17” in size. The approval of all required reports and construction plans is valid for one (1) year.

A. General Requirements

1. Plans and specifications shall be drawn to scale and shall have sufficient clarity to indicate the location, nature, and extent of the work proposed and show in detail that it shall conform to the provisions of these Standards and Specifications and all relevant laws, ordinance, rules and regulations.

2. The following items shall be shown on all plans:

   a. Cover Sheet, including Title Block (lower right-hand corner preferred).

   b. Scale (1"=50' horizontal and 1"=5' vertical for plans and profiles are a minimum).

   c. Legend including all line types and symbols

   d. Revision number and date.

   e. Name of professional engineer or landscape architect and firm.

   f. Professional engineer's (PE) number, signature, landscape architect as applicable, and stamp

   g. Drawing number(s)

   h. Statement: "Work shall be constructed to City of Thornton Standards and Specifications. This approval is for conformance to these Standards and Specifications and other City requirements. The design and concept remains the responsibility of the professional engineer or landscape professional."

B. General Notes:

The contractor shall be solely and completely responsible for conditions at and adjacent to the job site; including, safety of persons and property during the performance of work. This requirement shall apply continuously and not be limited to normal working hours. The City construction review of the contractor's performance is not intended to include review of the adequacy of the contractor's safety measures in, on, or near the construction site.

The type, size, location, and number of all known underground utilities are approximate when shown on the drawings. It shall be the responsibility of the contractor to verify the existence and location of all underground utilities along the route of the work. Location of existing utilities shall be verified by contractor prior to date of construction. For information contact: Utility Notification Center of Colorado (UNCC) – 1-800-922-1987. It is the Contractor’s responsibility to field verify size and horizontal and vertical locations of existing facilities prior to construction and notify the City of any discrepancies.

Materials and workmanship shall conform to the City of Thornton Standards and Specifications for the Design and Construction of Public and Private Improvements and work shall be subject to inspection and approval by authorized City of Thornton personnel.

All trenches shall be adequately supported and the safety of workers provided for as required by the most recent Occupational Safety and Health Administration (OSHA) "Safety and Health Regulations for Construction." These regulations are described in Subpart P, Part 1926 of the Code of Federal Regulations. Sheeting and shoring shall be utilized where necessary to prevent any excessive widening or sloughing of the trench which may be detrimental to human safety, to the pipe being placed, to trees, or to any existing structure where excavations are made under severe water conditions. The contractor may be required to use an approved piling instead of sheeting and shoring.

The Contractor shall furnish the engineer the "as constructed" locations of facilities installed and, this in turn, shall be submitted to the City of Thornton on as-built mylar drawings and electronic files prepared by the Engineer.

The Contractor shall be responsible for cleaning nearby public streets of mud or debris due to construction activity initiated by said contractor on a daily basis or as otherwise directed by authorized City personnel.

Prior to the beginning of work, a preconstruction conference shall be held between the City, the Responsible Party who is scheduled to perform the work, the designated on-site field representative, the consulting engineer or landscape professional, and any other entities involved in the construction.

Development phasing of any project must be shown on the construction plans and made a part of the application procedure. No phasing shall be permitted unless this requirement has been adhered to.

No work shall begin until the installing Responsible Party is in possession of an approved set of plans and the City of Thornton Standards and Specifications for the Design and Construction of Public and Private Improvements, and all necessary permits for the Improvements has been issued by the City. Development Engineering's approval shall be for general conformity to the utility specifications and shall not constitute blanket approval of all dimensions, quantities and details of the material or equipment shown. Nor shall such approval relieve the Responsible Party, consulting engineer, or landscape architect of their responsibility for errors contained in the drawings. A copy of the approved plans and all permits shall be onsite at all times.

The Responsible Party shall furnish reasonable aid and assistance required by Development Engineering for the proper examination of the materials and work. Work shall be performed in accordance with accepted workmanship practices and the City of Thornton Standards and Specifications for the Design and Construction of Public and Private Improvements. Any work not accepted by Development Engineering shall be redone until compliance with these standards is achieved. Instructions given by Development Engineering relating to quality of materials and workmanship must be obeyed at once by the Responsible Party. Development Engineering shall not supervise set out work, or give line and grade stakes.

The materials used in projects shall be new and subject to the inspection and approval of the Inspector at all times. The Inspector has the right to perform any testing deemed necessary to ensure compliance of the material with these standards. No material shall be used before being inspected and approved by the Inspector. Failure or neglect on the part of the Inspector to condemn or reject inferior materials or work shall not be construed to imply their acceptance should their inferiority become evident at any time prior to final acceptance of the work. Inspectors have the authority to reject defective or inferior materials and/or defective workmanship and to suspend work until such time as the Responsible Party shall correct the discrepancies in question.

Whenever defective materials and work are rejected, the Responsible Party shall promptly remove such defective materials and construction from the job site and replace all defective portions to the satisfaction of Development Engineering. In the event the Responsible Party fails to remove rejected items from the job site within a reasonable length of time, Development Engineering may arrange for such removal at the expense of the Responsible Party.

Inspection shall not relieve the Responsible Party from any obligation to perform the work strictly in accordance with the plans and specifications or any modifications thereof. Work not so constructed shall be removed and corrected by the Responsible Party at his sole expense, whenever so ordered by Development Engineering, without reference to any previous error or oversight in inspection.

Except in cases of emergency, maintenance, or protection of work already completed, no work shall be allowed between the hours of 7 p.m. and 7 a.m.; nor on Saturday, Sunday, or legal holidays unless approved by Development Engineering in each case. When any inspector is required to work outside the hours of 7 a.m. to 4 p.m. on regular City business days, overtime shall be charged to the Responsible Party. However, such Inspectors shall remain employees of the City for all purposes. Requests for overtime shall be made to Development Engineering at least 48 hours in advance. Payment for such overtime work shall be made to the City prior to final acceptance.

In the event one or more inspectors representing private consulting engineering firms are also inspecting a project along with Development Engineering, the instructions given by Development Engineering shall prevail in the event of conflicting instructions.

The work shall be surveyed and staked under the supervision of a licensed Land Surveyor in accordance with the approved plans.

If irrigation ditches are involved, an approval block for the ditch company shall be provided.

If a foundation underdrain system is installed in the public right-of-way, the following statement shall be included in the as-built drawings:

> "The foundation underdrain system is the responsibility of the owner/developer or its assigns. The City is not responsible for the maintenance or repair of said system."

Construction shall adhere to the following sequence unless otherwise specified by the Development Engineering Manager: Sanitary sewer installation, water main installation, curb and gutter installation, water service installation.

Compaction of all trenches must be attained and compaction test results submitted to the engineer and the City of Thornton prior to final acceptance.

All work, including correction work, shall be inspected by a City Representative who shall have the authority to halt construction when standard construction practices are not being adhered to.

Developer and builder shall regularly patrol the public lands adjacent to the development to remove construction debris and keep the site clean and safe.

All site grading (excavation, embankment, and compaction) shall conform to the recommendations of the latest soils investigation for this property and shall further be in conformance with the City of Thornton Standards and Specifications for the Design and Construction of Public and Private Improvements", latest edition. A CDPS General Permit for stormwater discharges associated with construction activities shall be obtained prior to any grading being performed on sites one (1) acre or larger in size. These permits can be obtained from the State Water Quality Control Division.

Natural vegetation shall be retained and protected wherever possible. Exposure of soil to erosion by removal or disturbance of vegetation shall be limited to the area required for immediate construction operation and for the shortest practical period of time.

Topsoil shall be stockpiled to the extent practicable on the site for use on areas to be revegetated. Any and all stockpiles shall be located and and proper measures taken to control erosion and sediment movement.

At all times, the property shall be maintained and/or watered to prevent wind-caused erosion. Earthwork operations shall be discontinued when dust significantly impacts adjacent property. If earthwork is complete or discontinued and dust from the site continues to create problems, the owner/developer shall immediately institute mitigative measures and shall correct damage to adjacent property.

Permanent slopes shall not exceed 4:1 (H:V) in areas to be seeded or sodded. Retaining walls shall be reviewed and approved by separate application to the Development Engineering Division.

This erosion and sediment control plan has been submitted to the City of Thornton and is in general conformance with the City's erosion control standards. Additional erosion and sediment control measure may be required of the owner and his or her agents due to unforeseen erosion problem or if the proposed erosion control measures do not function as intended. The requirements of this erosion control plan and the obligation of the landowner shall run with the land until such time as the erosion control plan is properly completed, officially modified, or voided.

Installation of water mains shall not be permitted until all compaction results for sanitary sewers have been submitted to and approved by the City, all design slopes for sanitary sewer installations have been verified and approved by the City, and all applicable testing procedures have been conducted and approved in writing.

New water mains 12 inches or less shall be AWWA Standard C-900-07 PVC DR -25 pressure pipe. Water mains larger than 12 inches shall meet AWWA C-905 PVC DR-21 or DR-18 as determined by the Development Engineering Manager. Hydrant leads shall only be DIP.

Water mains shall be laid in conformance with the latest edition of the City of Thornton Standards and Specifications for the Design and Construction of Public and Private Improvements and shall be subject to City inspection and approval.

Fire hydrants shall be limited to the following manufacturers only and shall be painted according to the latest edition of the City of Thornton Standards and Specifications for the Design and Construction of Public and Private Improvements prior to acceptance.

Mueller Company – 5-1/4" Super Centurion
Waterous Company - Model WB-250-Pacer

There shall be a minimum of four and one half (4.5) feet of cover from finished grade to the top of waterlines.

Bedding and backfill materials for both water and sewer shall conform to the latest edition of the City of Thornton Standards and Specifications for the Design and Construction of Public and Private Improvements.

Thrustblocks shall be placed at fittings, tees, bends, crosses, plugs, etc., in accordance with the latest edition of the City of Thornton Standards and Specifications for the Design and Construction of Public and Private Improvements.

In all cases, 10 feet of horizontal distance, as measured from edge of pipe to edge of pipe, shall be maintained between water and any sanitary or storm sewer.

Contractor shall notify all residents and/or businesses in writing 48 hours prior to any shut-off in service. The notices must have contractor's phone number and name of contact person, and emergency phone

number for after hours calls. All shut-off's must be approved by the City's Infrastructure Department, and City valves and appurtenances shall be operated by City personnel, unless written permission is given otherwise.

Rim elevations of manhole shown on the plan and profile sheets are approximate only and are not to be taken as final elevations. The pipeline contractor should allow approximately the top one (1) foot of rim elevation to be adjusted either up or down in order to match final pavement elevation. The maximum adjustment to final grade is 12 inches with concrete rings.

During construction, care must be taken to avoid any ground water, storm water, construction debris, soil, or any other foreign materials from entering any active City of Thornton sewer. The use of the sanitary sewer system for the purposes of dewatering is strictly prohibited.

All construction activities dewatering must comply with the State of Colorado permitting process for "Stormwater Discharges Associated With Construction Activity." For information, please contact Colorado Department of Health, Water Quality Control Division.

After any overlay of an existing roadway, where City utilities are present, the Developer shall open all manholes and valve boxes following the paving operation to ensure that manhole and valves were not paved over nor filled with asphalt.

When an existing asphalt street is cut, the street must be restored to a condition equal to or better than its original condition. The existing street condition shall be documented by the City of Thornton's Construction Inspector before any cuts are made. Patching shall be done in conformance with the City of Thornton Standards and Specifications for the Design and Construction of Public and Private Improvements. The finished patch shall blend smoothly into the existing surface. All large patches shall be paved with an asphalt lay-down machine. In streets where more than one cut is made, an overlay of the entire street width, including the patched areas, may be required. The determination of need for a complete overlay shall be made by the Development Engineering Manager.

Paving shall not start until a Geotechnical Report and Pavement Design have been approved by the City of Thornton's Development Engineering Division and Subgrade Compaction Test and Proof Roll have been performed and the results have met with the approval of the City of Thornton. The pavement design report must be submitted three (3) weeks prior to the anticipated date of paving.

All damaged existing curb, gutter, and sidewalk shall be repaired prior to acceptance of completed improvements.

All curb returns within public right-of-way shall be constructed with sidewalk ramps in accordance with the City of Thornton Standards and Specifications for the Design and Construction of Public and Private Improvements. All sidewalk ramps shall include a truncated dome detectable warning pattern as shown on the detail sheets.

The contractor shall provide, erect and maintain proper traffic control devices until the site is open to traffic. The Contractor shall submit a traffic control plan to the City of Thornton for approval prior to construction.

Repair of any damage to existing improvements or landscaping is the responsibility of the contractor.

C. Plan Details

1. Key Map
2. Legend of symbols
3. North arrow, pointed to the top of the page, or to the right side of the page
4. Property lines - Indicate lots with lot number and block number to be served by solid lines
5. Survey monuments
6. Ownership or subdivision information
7. Street names, ROW, and easements with width dimensions
8. The location of existing utility lines - water, gas, telephone, storm drain, irrigation ditches, sanitary sewers, and other pertinent details, such as houses, curbs, water courses, cable television, etc.
9. Vicinity map
10. All bench marks

D. Profile Details

1. Vertical and horizontal grids with scales and stationing.
2. Ground surface existing (dashed) and proposed (solid)
    a. Existing utility lines
    b. Bench marks (City of Thornton 88 datum) and project bench mark noted
    c. Existing manhole inverts and rim elevations

E. Overall Utility Plan (Single Sheet)

F. Water Supply Construction Plan

In addition to the above general plan and profile details, all water supply construction plans shall include the following items:

1. Proposed water mains (Include Profile):
    a. Size
    b. Length
    c. Materials, types of joints, and proposed depth
    d. Location dimensions. Other information including elevation top of valve nut, rim elevation of valve box, meter box, etc. may be required.
2. Fittings (size and type), for example:
    a. Tees
    b. Crosses
    c. Reducers
    d. Bends
    e. Plugs
    f. Blow-offs
    g. Kickblocks
3. Valves (size and type)

4. Fire Hydrants
5. Irrigation tap locations and meter sizes with spot elevations.
6. Plan, profile, and complete details for off site transmission mains, pump stations, valves, vaults, tanks, service locations, etc.
7. Complete material list included in drawings
8. Crossings (clearance, show sleeving, if needed) Details
9. Detail Sheets with all pertinent City of Thornton Details

G. Sanitary Sewer Construction Plan

In addition to the general plan and profile details, sanitary sewer construction plans shall include the following:

1. Proposed sanitary sewers (Profile Sheets):
   a. Diameters
   b. Materials and types of joints
   c. Gradients
   d. Length between manholes
2. Proposed manholes and cleanouts:
   a. Stationing and other number designation
   b. Elevation of inverts in and out of manhole
   c. Elevation of manhole rim
3. Location control dimension
4. Manhole stub-outs
5. Proposed future extensions
6. Proposed wye and riser connection for services
7. Proposed service connections or stub-ins
8. Proposed underdrain
9. Proposed concrete encasement
10. Proposed cutoff walls

H. Storm Drainage Construction Plan

In addition to the above general plan and profile details, storm drainage construction plans shall include the following:

1. Drainage area plan; an overall plan of the area under study showing:
   a. North arrow
   b. Contours (maximum two (2) foot intervals) on site and off site
   c. Location and elevation of City or USGS bench marks
   d. USGS datum
   e. Property lines

f. Boundary lines (counties, districts, tributary area, etc.)

g. Streets and street names and approximate grades

h. Subdivision (name and location by section)

i. Existing irrigation ditches

j. Existing drainage ways including gutter flow directions

k. Drainage sub-area boundaries

l. Easements required

m. Proposed curbs and gutters and gutter flow directions

n. Proposed cross pans and flow directions

o. Proposed piping and open drainage ways

p. Flow volumes for the five (5) year and 100 year storm runoff conditions. (Identify at inlets and outfalls)

q. Path of 100 year storm runoff flows delineated

r. Critical minimum finished floor elevations for protection from 100 year runoff

s. Proposed inlet locations and inlet sizes

t. Floodplain information, indicating land in floodplain, and land not in floodplain

u. Path of the emergency overflow spillway

v. High water line and overland flow path for all inlets in sags and for all culverts under inlet control conditions

w. Area grading plans for final stage

x. Plant material protection plan

2. Proposed pipes

   a. Plan showing stationing

   b. Profile (include 5 and 100 year HGLs)

   c. Size, lengths between manholes, and type material

   d. Grades, capacity

   e. Inlet and outlet details

   f. Manhole details (station number and invert elevations)

   g. Typical bedding detail

3. Proposed open channels and detention facilities

   a. Plan showing stationing

   b. Profile (include the 5 and 100 year HGLs)

   c. Grades and capacities

   d. Typical cross sections for both channels and ponds

   e. Lining details

4. Proposed special structures (manholes, headwalls, trash racks, etc.)

a. Plan

b. Elevation

c. Details of design and appurtenances

5. Retaining Walls

a. Retaining walls equal to or greater than four (4) feet are required to be designed and stamped by a registered professional engineer and must be approved and permitted through the City.

b. Retaining walls must have sufficient resistance against overturning and sliding, and they must possess adequate structural strength against bending outward.

c. The retaining wall submittal package shall be in accordance with the following outline and contain the applicable information listed:

i. Plans

ii. Spot elevations

iii. All proposed retaining walls should show top and bottom of wall elevations every 10 feet or on both sides of a step

iv. Sections

v. Details to include geofabric, drainage, foundation, etc.

vi. Calculations

vii. A Geotechnical Report – type of soils, specific weight, allowable bearing pressure, etc.

viii. Loading diagram - include surcharge loads and slopes

ix. Factor of Safety against overturning shall be a minimum of 1.5 for granular soils (i.e. sand) and 2 for cohesive soils (i.e. clay)

x. Factor of Safety against sliding shall be a minimum of 2 which includes the passive resultant.

xi. For multiple tiered walls loads from upper wall need to be applied to the lower wall. In addition, the walls need to be analyzed as a single unit for bearing failure and slope stability.

I. Storm Water Management Plan (SWMP)

1. Pursuant to City's authority through Ordinance No. 2935 and the MS4 permit from the CDPHE, WQCD, through the MS4 permit issued to the City, requires the City to control and reduce the discharge of pollutants to protect stormwater quality and to satisfy the appropriate water quality requirements of the Colorado Water Quality Control Act and the Colorado Discharge Permit Regulations (Colorado Regulation 61). The MS4 permit requires the implementation of a program to reduce the discharge from public and private construction sites.

2. All new development and redevelopment projects are required to develop and implement a SWMP to reduce and ensure that BMP's are in place to prevent or minimize pollutants in stormwater runoff from construction activities that disturb one or more acres; or less than one acre if part of a larger common plan of development or sale that discharge storm water into the City's storm water system.
3. Stormwater Management analysis and design shall meet or exceed these Standards and Specifications which were developed to support and supplement the policies and standards set forth by the Colorado Department of Public Health and Environment (CDPHE) and Urban Drainage Flood Control District (UDFCD). Policies and technical criteria not specifically addressed in this document shall follow the provisions of the CDPHE Colorado Water Quality Control Division (CWQCD) and the Criteria Manual (UDFCD Manual). The Responsible Party is also referred to the Colorado Department of Transportation's Standard Plans ("M-Standards") for additional design details not covered in these Standards and Specifications or the UDFCD Manual.

4. Development or redevelopment projects which disturb one (1) or more acres will require both sediment and erosion control plans and a CDPS General Permit for stormwater discharges associated with construction activities at least 10 calendar days prior to the commencement of

construction activities. In fill lots or sites less than one acre of disturbance will require a sediment and erosion control plan.

5. The SWMP shall follow all the applicable requirements defined in the CDPS General Permit for Stormwater Discharges Associated with Construction Activity (Permit No. COR-30000) section "C. Stormwater Management Plan (SWMP) – Contents".

    1. Site Description
    2. Site Map
    3. Stormwater Management Controls
    4. Final Stabilization and Long-term Stormwater Management
    5. Inspection and Maintenance

6. The SWMP shall contain a bar scale schedule of the earth disturbing activities for the construction site (in monthly increments). Major earth-disturbing activities and stabilization measures should be included.

7. The SWMP shall delineate the limits of disturbance for the project site including all earth disturbing activities, staging areas, and construction exits.

8. The SWMP shall be shown in a minimum of two (2) phases. Phase I shall show the existing conditions of the site with the initial BMP's required for construction. Phase II shall show the proposed conditions of the site with the BMP's required for stabilization. For complex projects, additional phases may be added to properly manage the stormwater.

9. Permit Coverage

    A. The Owner/Contractor is responsible for obtaining a permit from the CDPHE at least 10 calendar days prior to the commencement of construction activities for any earth disturbance of one (1) acre or greater. The Owner/Contractor shall provide the City with a copy of permit prior to receiving a grading/construction permit. The Owner/Contractor is responsible for all fees associated with the permit.

    B. If the Owner/Contractor transfers responsibility for stormwater discharges to another entity, a notice of transfer and acceptance of terms form shall be submitted to the CDPHE and a copy to the City.

    C. If the Owner/Contractor no longer has control of a specific portion of a permitted site and wishes to transfer coverage of that portion of site to another, the Owner/Contractor shall submit a notice of reassignment of permit coverage form to the CDPHE and a copy to the City.

    D. The Owner/Contractor is responsible for submitting an inactivation notice form to the CDPHE when the site has been finally stabilized in accordance with the SWMP. A copy of the inactivation notice shall also be submitted to the City.

J. Erosion Control Plans

1. The erosion control plans shall complement the phases described in the SWMP. At a minimum the erosion control plan phase I shall show the existing conditions of the site with the initial BMPs required before site disturbance begins. Phase II shall show the proposed conditions of the site with the BMP's required for final stabilization. For complex projects, additional phases may be added to properly manage stormwater runoff.

2. All erosion control BMP details shall conform to the latest edition of the City of Thornton Standards and Specifications, UDFCD Volume III or CDOT M-Standards.

3. BMPs shall be installed before any earth disturbing activities commence.

4. Stormwater discharges from construction activities shall not cause, have the reasonable potential to cause, or measurably contribute to an exceedance of any water quality standard.

5. Construction shall be phased in a manner to limit earth disturbing activities (i.e. the entire project site should not be disturbed if construction will only be occurring in one particular section).

6. Sediment caused by accelerated soil erosion shall be removed from runoff water before it leaves the construction site.

7. Bulk storage structures for petroleum products and any other chemicals shall have secondary containment or equivalent protection to contain all spills and prevent any spilled material from entering State waters.

8. A copy of the SWMP and site maps must be available at all times on the construction site unless otherwise approved by CDPHE or the City.

9. The SWMP and site maps shall be continuously updated to reflect new or revised BMPs due to changes in design, construction, operation, or maintenance of the construction site. Updates must be made within 72 hours following the change in BMPs.

10. The Responsible Party shall inspect the construction site (including all BMPs, storage containers, and construction equipment) a minimum of every 14 calendar days and within 24 hours after a precipitation event or snow melt that cause's surface erosion. Inspections shall continue until an Inactivation Notice is filed with CDPHE and copied to the City.

11. The Responsible Party shall keep a record of all inspections on site and available for review by CDPHE or City staff. Inspection reports must identify any incidents of noncompliance with the terms and conditions of the Permit.

12. BMPs requiring maintenance or adjustment shall be repaired immediately after observation of the failing BMP.

13. For all instances of noncompliance based on environmental hazards and chemical spills and releases, all needed information must be provided orally to CDPHE spill reporting line (24-hour number for environmental hazards and chemical spills and releases: 1-877-518-5608) within 24 hours from the time the Owner/Contractor comes aware of the circumstances.

14. Straw bales shall not be used for primary erosion or sediment control (i.e. straw bales may be used for reinforcement behind another BMP such as silt fence).

15. BMPs intended for sheet flow sediment runoff shall be placed parallel to the slope.

16. All BMPs shall be cleaned when sediment levels accumulate to half the design of the BMP unless otherwise specified.

17. A vehicle tracking pad shall be placed at all exits from the site to prevent track-out onto City streets. If track-out does occur, the Owner/Contractor shall immediately sweep the street of debris. Recycled crushed concrete or asphalt shall not be used for vehicle tracking pads.

18. All sediment collected in BMPs shall be removed upon at the reques of the Development Engineering Manager and prior to initial acceptance.

19. Permanent erosion control measures for slopes, channels, ditches, or any disturbed land area shall be completed within 14 calendar days after final grading or the final earth disturbance has been completed. When it is not possible to permanently stabilize a disturbed area after an earth disturbance has been completed or where significant earth disturbance activity ceases, temporary soil erosion control measures shall be implemented within 14 calendar days. Temporary erosion control measures shall be maintained until permanent soil erosion measures are implemented.

20. Final stabilization has been achieved when all earth disturbing activities at the site have been completed, and uniform vegetative cover has been established with an individual plant density of at least 70 % of pre-disturbance levels, or equivalent permanent, physical erosion reduction methods have been employed.

21. All temporary BMPs shall be removed from the site upon final stabilization and submitting the Inactivation Notice.

22. All site wastes (including trash and building materials) must be properly managed to prevent potential pollution of State waters.

K. Street Construction Plan

In addition to the above general plan and profile details, all street construction plans shall include the following:

1. Existing irrigation ditches to be relocated, removed or piped.

2. Proposed curb, gutter, and sidewalk.

3. Proposed cross pans including flow direction.

4. Storm drainage facilities.

5. Location and elevation of City bench marks.
6. Horizontal curve data, with radii, tangents, PC, PI, and PT.
7. Typical section of street construction showing structure and dimensions.
8. Stations and elevations of radius points (back of curb).
9. Proposed profile of center lines, top of curb, flow lines, or back of sidewalk.
10. Stations, lengths, and elevations of vertical curve PC, PI, and PT.
11. % slope of tangent lines.
12. Limits of construction.
13. Show sufficient existing or future construction to assure continuity of construction.
14. Stations, details, and elevations of drainage facilities and other structures.
15. Street, park and trail lights, and underground service cable locations.
16. Complete material list.
17. High point, low point, K factor, and design speed for curve.
18. Medians.
19. Street, park, and trail signage and pavement marking plan.
20. Underpasses.
22. Intersection detail drawings may be required by the Development Engineering Manager.
23. Traffic Signal Modification Plans at 1" = 20' or larger scale.
24. Traffic Signal design plans, if required by the City, at 1" = 20' or larger scale.

L. Irrigation Plan

1. Existing irrigation, graphically distinguished from proposed irrigation.
2. Improvements or site conditions that will materially affect the successful operation of the system, such as buildings, sidewalks, slopes, swales, plant groupings, ditches, etc.
3. Point of connection and size of tap and meter.
4. Irrigation material schedule including pipe type and size, head type, arc and nozzle, valve type and size, etc.
5. Trench depth schedule from top of pipe.
6. Standard City meter detail.
7. Label size of all pipe on plan.
8. Indication at each zone valve of zone number, valve size, and gpm.
9. All miscellaneous details required to construct the system.
10. Irrigation schedule on plans demonstrating ability of system to comply with these Standards and Specifications.
11. Plan and details for a physical delineation between privately maintained landscaping and City maintained landscaping. The delineation may be a fence, wall, mow strip, or planter as approved by the Development Engineering Manager.
12. Existing and design water pressure.

13. Confirmation that system provides head to head coverage.

14. Turf and planting beds irrigated with different zones.

15. Pressure loss calculation sheet.

M. Park Construction and City-Maintained Landscape Plan

1. Scale 1"=30' minimum.

2. Existing and proposed (design) contours maximum of two (2) foot intervals, including spot elevations.

3. Existing plant material, including material to be removed and plant material protection zone, if applicable, noting methods of protection. Indicate size and species.

4. Plant material schedule indicating graphic representation, alphabetized common name and botanical name including: genus, species, variety or cultivar, size, quantity, and plant material totals.

5. Proposed plant material shown at mature size. Plants with one (1) irrigation zone shall have similar water demand requirements.

6. All miscellaneous improvements and appurtenances including playgrounds, sidewalks, drives, curbs, manholes, parking lots, etc.

7. All existing and proposed miscellaneous improvements and appurtenances including playgrounds, sidewalks, hardscape play areas, trails, pavilions, site furniture, lighting including trail and street lights, signage, drives, curbs, manholes, parking lots, berms, water features, etc.

8. Graphic representation of all groundcover types (sod, seed, bedding plants, mulch, rock, etc.).

9. All proposed retaining walls or slope retention methods.

10. Seed blend, amendment required, and application rate for all seeded areas.

11. Amount and type of soil amendment required for landscape areas not seeded.

12. Existing and proposed utility easements.

13. Sight triangles.

14. Recreation athletic facilities (such as softball, baseball, soccer, football, tennis, basketball, playground equipment, etc,) shall be reviewed on a case by case basis and be approved by the City prior to beginning any construction on the site. At a minimum, all such facilities plans shall meet the requirements of section 800 of these Standards and Specifications.

15. Regional trail profiles and cross sections.

16. Listing of total linear footage of sidewalks and trail, square footage of all planting beds, square footage of sod, and square footage of seeded areas.

17. Natural features relevant to the site.

18. All appropriate details.

104.2 Final Drainage Report

The purpose of the Final Drainage Report is to provide a detailed study and analysis of the proposed development. It shall include calculations for all runoff and for all drainage structures of facilities within the development. Also, any change to the Preliminary concept shall be presented.

The Final Drainage Report shall be submitted with the civil construction drawings for the site. The Final Report (which updates the Preliminary Drainage Study) shall be reviewed with the submittal of the construction plans and approved by the Development Engineering Manager prior to issuance of construction permit.

Reports shall be typed on 8-½ " x 11" paper and bound. The drawings, figures, charts, plates and/or tables shall be bound with the report or included in a folder/pocket attached at the back of the report.

The report shall include a cover letter presenting the final design for review and shall be prepared by or under the direction of an engineer licensed in Colorado. The report also shall contain a Responsible Party certification sheet as follows:

"*(Name of Responsible Party)* hereby certifies that the drainage facilities for *(Name of Development)* will be constructed according to the design presented in this report. I understand that the City of Thornton does not and shall not assume liability for the drainage facilities designed and/or certified by my engineer. I understand that the City of Thornton reviews drainage plans but cannot, on behalf of *(Name of Development),* guarantee that final drainage design review will absolve *(Name of Responsible Party)* and/or their successors and/or assigns of future liability for improper design. I further understand that approval of the Plat and/or Development Permit does not imply approval of my engineer's drainage design."

Attest: _____
Name of Responsible Party

_____ _____
Notary Public Authorized Signature

"I hereby certify that this report (plan) for the final drainage design of *(Name of Development)* was prepared by me (or under my direct supervision) in accordance with the provisions of the City of Thornton Standards and Specifications for the Design and Construction of Public and Private Improvements for the Responsible Parties thereof. I understand that the City of Thornton does not and shall not assume liability for drainage facilities designed by others."

_____
Registered Professional Engineer
State of Colorado No. _____
(Affix Seal)

The Final Drainage Report shall be prepared in accordance with the following outline. The report drawings shall include the following:

A. Report Contents

The Report shall be in accordance with the following outline and contains the applicable information listed:

1. General Location and Description

   a. Location

      i. Township, range, section, one-quarter (¼) section.

      ii. Streets within and adjacent to the subdivision with ROW width shown.

      iii. Major drainageways, facilities, and easements within and adjacent to the site.

      iv. Names of surrounding developments.

   b. Description of Property

      i. Area in acres.

      ii. Ground cover (type of trees, shrubs, vegetation, general soil conditions, topography, and slope).

      iii. Major drainageways.

      iv. General project description.

      v. Irrigation facilities.

      vi. Proposed land use.

2. Drainage Basins and Sub-basins

   a. Major Basin Description

      i. (Reference to major drainageway planning studies such as flood hazard delineation reports, major drainageway planning reports, and flood insurance rate maps.

      ii. Major basin drainage characteristics, existing, and planned land uses.

iii. Identification of irrigation facilities within the basin which will influence or be influenced by the local drainage.

b. Sub-Basin Description

i. Discussion of historic drainage patterns of the property in question.

ii. Discussion of off-site drainage flow patterns and impact on development under existing and fully developed basin conditions.

3. Drainage Design Criteria

a. Regulations: Discussion of the optional provisions selected or the deviation from the criteria, if any, and its justification.

b. Development Criteria Reference and Constraints

i. Discussion of previous drainage studies (i.e., project master plans) for the site in question that influence or are influenced by the drainage design and how the plan will affect drainage design for the site.

ii. Discussion of the effects of adjacent drainage studies.

iii. Discussion of the drainage impact of site constraints such as streets, utilities, existing structures, and development or site plan.

c. Hydrological Criteria

i. Identify design rainfall.

ii. Identify runoff calculation method.

iii. Identify detention discharge and storage calculation method.

iv. Identify design storm recurrence intervals.

v. Discussion and justification of other criteria or calculation methods used that are not presented in or referenced by the criteria.

d. Hydraulic Criteria

i. Identify various capacity references.

ii. Discussion of other drainage facility design criteria used that are not presented in the criteria.

e. Variances from Criteria

i. Identify provisions by section number for which a variance is requested.

ii. Provide justification for each variance requested.

4. Wetland Mitigation and Preservation

5. Drainage Facility Design

a. General Concept

i. Discussion of concept and typical drainage patterns.

ii. Discussion of compliance with off-site runoff considerations.

iii. Discussion of the content of tables, charts, figures, plates, or drawings presented in the report.

iv. Discussion of anticipated and proposed drainage patterns.

v. Rip Rap Details and Design

b. Specific Details

i. Discussion of drainage problems encountered and solutions at specific design points.

ii. Discussion of detention storage.

iii. Discussion of maintenance access and aspects of the design.

iv. Discussion of easements and tracts for drainage purposes, including the conditions and limitations for use.

6. Conclusions

a. Compliance with Standards

i. "Criteria".

ii. "Major Drainageway Planning Studies".

iii. "UDFCD Manual".

b. Drainage Concept

i. Effectiveness of drainage design to control damage from storm runoff.

ii. Influence of proposed development on the Major Drainageway Planning Studies recommendation(s).

7. References

Reference criteria and technical information used.

8. Appendices

a. Hydrologic Computations

i. Land use assumptions regarding adjacent properties.

ii. Initial and major storm runoff at specific design points.

iii. Historic and fully developed runoff computations at specific design points.

iv. Time of concentration and runoff coefficients for each basin.

b. Hydraulic Computations

i. Detention area/volume capacity and outlet capacity.

ii. Downstream/outfall system capacity to the Major Drainageway System.

iii. Culvert capacities.

iv. Storm sewer capacities including hydraulic grade lines (HGL), both 5 year and 100 year, for culverts 18 inches and larger.

v. Gutter capacity, including depth of flow during the major storm, as compared to allowable.

vi. Storm inlet capacity, including inlet control rating, at connection to storm sewer.

vii. Rip Rap design.

viii. Open channel design.

ix. Check and/or channel drop design.

Two (2) copies of the Final Drainage Report including the Final Drainage Plan shall be submitted to the Development Engineering Manager for review.

104.3 Final Utility Report

The purpose of the Final Utility Report is to provide a detailed study and analysis of the proposed development. It shall include calculations for all sanitary sewage flows and all water systems demands and for all appurtenances within the development. Also, any change to the Preliminary concept shall be presented.

The Final Utility Report shall be submitted with the civil construction drawings for the site. The Final Report (which updates the Preliminary Utility Study) shall be reviewed with the submittal of the construction plans and approved by the Development Engineering Manager prior to issuance of construction permit.

Reports shall be typed on 8-½ " x 11" paper and bound. The drawings, figures, charts, plates, and/or tables shall be bound with the report or included in a folder/pocket attached at the back of the report.

The report shall include a cover letter presenting the final design for review and shall be prepared by or under the direction of an engineer licensed in Colorado. The report also shall contain a Responsible Party certification sheet as follows:

"(Name of Responsible Party) hereby certifies that the sewer and water system for (Name of Development) will be constructed according to the design presented in this report. I understand that the City of Thornton does not and shall not assume liability for the sewer and water system designed and/or certified by my engineer. I understand that the City of Thornton reviews utility plans but cannot, on behalf of (Name of Development), guarantee that final utility design review will absolve (Name of Responsible Party) and/or their successors and/or assigns of future liability for improper design. I further understand that approval of the Plat and/or Development Permit does not imply approval of my engineer's utility design."

Attest: _____
Name of Responsible Party

_____ _____
Notary Public Authorized Signature

"I hereby certify that this report (plan) for the Final Utility Design of *(Name of Development)* was prepared by me (or under my direct supervision) in accordance with the provisions of the City of Thornton Standards and Specifications for the Design and Construction of Public and Private Improvements for the Responsible Parties thereof. I understand that the City of Thornton does not and shall not assume liability for utilities designed by others."

_____
Registered Professional Engineer
State of Colorado No. _____
(Affix Seal)

The Final Utility Report shall be prepared in accordance with the following outline. The report drawings shall include the following:

A. Report Contents

The Report shall be in accordance with the following outline and contains the applicable information listed:

1. General Location and Description

a. Location

i. Township, range, section, one-quarter (¼) section.

ii. Streets within and adjacent to the subdivision with ROW width shown.

iii. Major facilities and easements within and adjacent to the site.

iv. Names of surrounding developments.

b. Description of Property

i. Area in acres.

ii. Ground cover (trees, shrubs, vegetation, general soil conditions, topography, and slope).

iii. Major drainage ways.

iv. General project description.

v. Proposed land use.

2. Basins and Pressure Zones

a. Major Basin Description

i. Reference to sewer master plan studies,reports for adjacent subdivisions, and the City Utility Masterplan.

ii. Major basin characteristics, and existing and planned land uses.

3. Design Criteria

a. Regulations: Discussion of the optional provisions selected or the deviation from the criteria, if any, and its justification.

b. Development Criteria Reference and Constraints

i. Discussion of previous utility studies (i.e., utility reports, project master plans, etc) for the site in question that influence or are influenced by the design.

ii. Discussion of the effects of adjacent utility studies.

iii. Discussion of the impact of site constraints such as streets, other utilities, existing structures, and development or site plan.

c. System Design Criteria

i. Refer to Section 200 and 300 for water and sanitary sewer design criteria.

ii. Provide all supporting calculations and information.

iii. Discussion and justification of other criteria or calculation methods used that are not presented in or referenced by the criteria.

5. Conclusions

a. Compliance with Standards

6. References

Reference criteria and technical information used.

Two (2) copies of the Final Utility Report including the Final Utility Plan shall be submitted to the Development Engineering Manager for review.

104.4 Traffic Impact and Access Study

A. Submittal Format

All reports shall be bound in an 8-½" x 11" folder and shall include the seal and signature of the Professional Engineer registered in the State of Colorado who is responsible for the report contents. In addition, all reports shall include the following statement:

"We acknowledge that the City of Thornton's review of this study is only for general conformance with submittal requirements, current design criteria, and standard engineering principles and practices. We are also aware of the provisions of Section 18 of the City Code of the City of Thornton."

B. Content

The following is the information that is required in a Traffic Impact and Access Study for each development.

1. A cover letter identifying the traffic engineering consultant who completed the report and for what development.

2. Background information

    a. Description of development location with adjacent roadway characteristics (i.e. speed limit, cross section, exiting accesses, level of service, etc). Provide site drawing as part of report.

    b. Copy of the applicable sections of Transportation Plan with development location shown. The engineer shall include a comparison of the transportation plan to the report's projections.

    c. Proposed types of development land use for the site.

    d. The building site layout with square footage for each type of proposed land use.

3. General existing traffic conditions

    a. Include roadway classifications.

    b. Existing traffic volumes on adjacent streets. Include 24-hour count data in appendix of report. Count data shall be reported in 15-minute increments.

    c. If appropriate, turning movement counts during the morning, noon, and evening peak hours.

    d. Description of the existing roadway and intersection configurations including number of lanes, existing speed limit, and lane designations.

    e. If appropriate, data on the gaps in traffic for pedestrians and the number of pedestrians in the peak hour.

    f. Level-of-service analysis of existing conditions per the Highway Capacity Manual, latest edition.

4. Development site characteristic

    a. Location of all existing and proposed accesses, including geometric layout.

    b. Trip generation rates, both daily and peak hour, used per I.T.E. Trip Generation Manual or other sources identified and provided as backup.

    c. Distribution of generated traffic, both daily and peak hour on, to the adjacent streets. Distribution method(s) used. Recommend discussing distribution with Development Engineering prior to submitting Traffic Study.

    d. List all assumptions used in the distribution of generated traffic loading.

    e. Also to be included for review is the parking layout, loading area location, and all proposed fire lanes.

    f. A comparison of trip generation rates, both daily and peak hour in existing and proposed zoning or land use (if applicable).

5. Traffic Assignments and Off-Site Traffic Analysis

    a. Analysis of traffic assignments and assumptions made.

    b. Tables of existing peak hour traffic on adjacent streets, traffic developed by site during the streets' peak hour, and resulting peak hour with development. This is to include any development that is currently under review by the City or construction within one (1) mile radius of the proposed development.

    c. List all intersections that will need to be or could be signalized with the proposed development at the first phase or in the future. Supporting analysis, per the latest edition of the MUTCD, shall be included.

    d. If appropriate, traffic signal progression by analysis of existing streets and the impact by the proposed access(es). Existing signal timing shall be utilized as a base for the analysis.

    e. City of Thornton is the local authority for the Colorado Department of Transportation Access Code and Permitting process.

    f. Critical lanes and intersection analysis for all intersections adjacent to the development that are major collectors and arterials.

g. Level-of-service analysis per the Highway Capacity Manual, latest edition, of all adjacent intersections based on existing volumes combined with volumes generated by the development and anticipated future volumes at intersections combined with anticipated future volumes generated by the development.

6. Additional Study Requirements

a. Conduct all analysis as outlined by the City for inclusion in the report.

7. Summary of Report Findings and Recommendations

a. List all intersections that will need to be or could be signalized with this development currently or within 20 years from the start of the development.

b. List all proposed intersection configurations for existing intersections to be modified and for proposed new intersections.

c. List all proposed lanes for existing streets to be modified and for proposed new streets.

d. If any of the requirements of the traffic report are more stringent than these Standards and Specifications, the report shall govern.

105 PERMITS AND INSPECTIONS

105.1 Construction Permits

A. Application for Permit

1. Applicants shall complete an application for a construction permit. Each application shall:

a. Describe the land on which the proposed work is to be done, by legal description, street address, or similar description that shall readily identify and definitely locate the proposed work location.

b. Be accompanied by approved construction plans, diagrams, computations, and specifications, and other data as required by these Standards and Specifications.

c. State the valuation of the work to be performed.

d. Be signed by the applicant, or an authorized agent, who may be required to submit evidence to indicate such authority. The permit shall not be changed, modified, or altered without authorization from Development Engineering, and all work shall be done in conformance with the approved plans.

e. Provide a plan for removal of prairie dogs that currently inhabit the site. The plan shall conform to the policies adopted by the City of Thornton.

f. Provide a copy of the approved State discharge permit, proof of application for a State Discharge Permit, or proof that a permit is not required.

B. Construction Permit Issuance

1. The issuing and granting of a construction permit shall not be construed to be a permit for, or an approval of, any violation of any of the provisions of these Standards and Specifications or of any regulations of the City. No permit presuming to give authority to violate or cancel the provisions of these Standards and Specifications shall be valid.

2. The issuing of a construction permit based on approved construction plans, specifications, or other data shall not prevent the Development Engineering Manager from requiring the correction of errors in said plans, specifications, and other data, or from stopping construction operations which are in violation of these Standards and Specifications or any other regulations of this jurisdiction.

C. Permit Expiration

1. Every construction permit issued by the City under the provisions of this section shall expire if the work authorized by such a permit is not substantially begun within one (1) year from the date of the permit or if the construction of work authorized by the permit is suspended or abandoned for a period of 180 days at any time after the work is begun. Before such work can be resumed, a new construction permit shall be issued and full permit fees shall be paid, unless no changes have been made or required by the Development Engineering Manager from the originally approved plans. In

this case, permit fees shall only be paid to cover the difference in the cost of the improvements from the original date of the permit compared to the new permit.

2. Any permitee holding an unexpired construction permit may apply for an extension of the time within which work may begin under that permit if the permitee is unable to begin work within the time required by this section for good cause, and that the cause is acceptable to the Development Engineering Manager. The Development Engineering Manager may extend the time for action by the permitee for a period not exceeding one (1) year upon written request by the permitee, showing that circumstances beyond the control of the permitee have prevented action from being taken. No permit shall be extended more than one (1) time. In order to renew action on an expired construction permit the permitee shall pay a new, full permit fee.

D. Construction Permit Suspension or Revocation

The Development Engineering Manager may suspend or revoke any permit, in writing, issued under the provisions of these Standards and Specifications whenever the permit is issued in error or on the basis of incorrect information supplied by the applicant or whenever such permit may have been issued in violation of any ordinance or regulation of any of the provisions of these Standards and Specifications. In the event a permit is suspended or revoked, no refund of permit fees shall be made.

105.2 Fees, and Material Sales and Use Tax

A. Plan Review, Inspection Fees, and Material Sales and Use Tax

Plan review, inspection fees, and material sales and use tax shall be paid in full prior to the issuance of a construction permit by Development Engineering. The fees and taxes shall be in accordance with the City's Code.

B. Investigation Fees (Working without a Permit)

1. Whenever any work for which a permit is required by these Standards and Specifications has begun without the required permit having been obtained, a special investigation shall be made before a permit may be issued for such work. All work shall cease immediately upon written notice by the Development Engineering Manager.

2. An investigation fee shall be collected whether or not a permit is then or subsequently issued. The investigation fee shall be as determined by the City. The payment of such investigation fees shall not exempt any person from compliance with all other provisions of these Standards and Specifications nor from any penalty prescribed by law.

C. Fee Refunds

1. The Development Engineering Manager may authorize the refunding of any fee which was erroneously paid, collected, or when no work has been done under a public improvement permit issued in accordance with these procedures.

2. The Development Engineering Manager shall not refund any fee except upon written application filed by the original permitee. The written application must be filed not later than 180 days after the date of the fee payment.

105.3 Improvements Required and Security

A. Improvements

The Responsible Party shall provide applicable performance surety requirements as set forth in these Standards and Specifications and/or any other applicable agreement for construction of all improvements, both public and private governed by these Standards and Specifications. The construction and installation of the improvements shall be in accordance with the standard construction plans for construction of all improvements and these Standards and Specifications. A schedule of the estimated costs of the improvements, as approved by the City, shall be provided for establishing surety estimates. The construction plans are intended to represent the improvements set forth in the cost estimate. If there is a conflict between the cost estimate and the construction plans stamped as approved by the City, the construction plans shall govern. It shall be the responsibility of the responsible party at its sole cost and expense to design, construct and install such improvements for initial acceptance by the City and repair and maintain such improvements until final acceptance by the City. The responsible party shall, at all times, promptly make payments in all amounts due to persons supplying labor, materials and services in connection with construction of the improvements identified in the approved construction plans, and to persons who may otherwise be entitled to assert a lien against the property by virtue of state law.

B. Security for Improvements

The Responsible Party's obligation to provide the Improvements as identified in the approved construction drawings and as required by any applicable agreements shall be secured by a Performance Guarantee or Building Permit Restriction as identified herein.

C. Performance Guarantee

1. The Responsible Party shall obtain a Performance Guarantee which shall be furnished to the City prior to the issuance of any construction permit by payment of cash, a cashier's check, an irrevocable letter of credit, assignment of funds, or a performance bond, or approved equivalent as determined by the Development Engineering Manager.

2. The type of performance guarantee chosen by the Responsible Party shall be in a form and substance acceptable to the City ,but in no event shall it be less than 100% of the total estimated costs of the Improvements except as provided in paragraphs 3 and 4 of this Subsection. In addition, any Improvements within existing improved rights-of-way require a security deposit in accordance with Section 2-272.IV (c) of the Code.

3. The performance guarantee for commercial development under 20 acres shall be furnished to the City, prior to the issuance of a construction permit, as cash, a cashier's check, a performance bond or an irrevocable letter of credit in an amount equal to $25,000 + $1,000 per acre or a letter of credit for 100% of the value of proposed Public Improvements within City right-of-way, whichever is greater.

4. If, at any time prior to the City's acceptance of the Improvements, the Performance Guarantee expires or the entity issuing the Performance Guarantee becomes non-qualifying, or the estimated cost of Improvements is reasonably determined by the City to be greater than the amount of the security provided, then the City shall furnish the Responsible Party with written notice of such condition, and within 15 days of receipt of such notice the Responsible Party shall provide the City with a substituted qualifying Performance Guarantee, or augment the deficient security to achieve 100% of the estimated cost of Improvements other than Landscaping Improvements. If such Performance Guarantee is not timely furnished, then a Stop Work Order shall be issued,

5. The Responsible Party providing the Performance Guarantee shall have no direct or indirect ownership interest in or managerial control over an entity issuing any type of Performance Guarantee.

D. Licensing of Contractors and/or Subcontractors

The Responsible Party shall ensure that all contractors and/or subcontractors employed by the Responsible Party shall be licensed by the City before any work on the Improvements is commenced.

105.4 Construction Procedure

Following final approval of the plans and obtaining necessary permits, the Responsible Party may proceed with construction. In addition to construction requirements contained in other portions of these Standards and Specifications, the Responsible Party shall observe the following:

A. Prior to the beginning of work, a preconstruction conference shall be held between the City, the Responsible Party who is scheduled to perform the work, the designated on-site field representative, the consulting engineer or landscape professional, and any other entities involved in the construction.

B. Development phasing of any project must be shown on the construction plans and made a part of the application procedure. No phasing shall be permitted unless this requirement has been adhered to.

C. The work shall be surveyed and staked under the supervision of a licensed Land Surveyor in accordance with the approved plans.

D. Construction shall adhere to the following sequence unless otherwise specified by the Development Engineering Manager: Sanitary sewer installation, water main installation, curb and gutter installation, water service installation

E. Installation of water mains shall not be permitted until all compaction results for sanitary sewers have been submitted to and approved by the City, all design slopes for sanitary sewer installations have been verified and approved by the City, and all applicable testing procedures have been conducted and approved in writing.

F. Work relating to water and sanitary sewer utilities shall be inspected by the City. Water mains shall be tapped only after having been installed to the satisfaction of the Inspector, chlorinated, pressure tested, and clearwater tested and approved by the City for tapping. Service lines, from the main to the meter pit as well as the water meter pit, and hole must be installed prior to tapping. No tapping of dry mains shall be made or allowed.

G. Mains shall be chlorinated and hydrostatically tested in accordance with Subsection 206 of these Standards and Specifications.

H. Paving shall not be permitted until manhole, valve box, and water meter pit installations have been verified in the field through a pre-paving walk-through and design slopes on all sanitary sewer lines have been verified by the City.

I. A geotechnical report for pavement design is required for all new Public and Private street and parking lot construction prior to paving.

J. A phase I Environmental Report is required for all developments that are dedicating rights-of-way and/or exclusive easements to the City. Additional information may be required as a result of the findings of this report.

K. Excavation & Embankment

1. Excavations shall be made to the lines and grades as established by the approved drawings in open cut, through whatever material encountered. Pipe trenches shall be excavated to a minimum depth of six (6) inches below the bottom of the pipe, and shall be excavated in such a manner as will afford adequate drainage. Where material encountered within the limits of the work is considered unsuitable by the Development Engineering Manager, such material shall be excavated below the grade shown on the drawings to a depth necessary to ensure a stable, firm foundation and refilled with one and one-half (1½) inch crushed rock uniformly graded to provide a firm foundation, and shall be backfilled per these Standards and Specifications. Then polyethylene (8 mils) shall be installed prior to normal bedding installation. Excavated materials which are considered unsuitable and any surplus of excavated material shall be disposed of by the Responsible Party.

2. The construction of embankments by deposition, placing, and compacting materials of acceptable quality above the natural ground or other surface shall be in accordance with the lines, grades, and cross sections shown on the approved plans and/or as required by the Development Engineering Manager. Each lift of the embankment material shall not exceed eight (8) inches in loose depth. The Responsible Party shall thoroughly mix the different materials to secure a uniform moisture content and to ensure uniform density and proper compaction. Each layer shall be thoroughly compacted by roller or vibratory equipment which is suitable for the type of embankment material, to the densities specified in these Standards and Specifications.

3. Existing asphalt or concrete surfacing shall be cut vertically in a straight line as specified in this section and removed from the job site prior to starting the trench excavation. This material shall not be used in any fill or backfill.

4. The trench shall be excavated so that a minimum clearance of six (6) inches is maintained on each side of the pipe for proper placement and compaction of the bedding or backfill material. The maximum trench width measured at the top of the pipe shall be the outside diameter of pipe plus 24 inches.

5. The trench shall be adequately supported and the safety of workers provided for as required by the most recent standards adopted by OSHA.

6. If the Development Engineering Manager is of the opinion that at any point the trench walls are not properly supported, the Development Engineering Manager may require the placement of additional supports by and at the expense of the Responsible Party, and compliance with OSHA Standards is the responsibility of the Responsible Party for the safety of work being conducted. The City is not responsible for the safety of any party constructing the utility project.

7. Trench excavation shall not advance more than 400 lineal feet ahead of pipe laying and backfilling work.

8. Excavation for structures shall be of such dimensions as to allow for the proper installation and to permit the construction of the necessary pipe connections.

L. Subgrade

1. The bottom of the excavation for the pavement, or top of the fill, shall be known as the pavement subgrade and shall conform to the lines, grades, and cross sections shown on the approved plans.

2. Prior to the street being excavated, service cuts shall be tested to see if the backfill meets density requirements. If deficient, they shall be recompacted and brought up to the density specified.

3. After excavation and embankment is completed and the subgrade brought to final grade, it shall be rolled with a rubber-tired or sheep foot roller which is a minimum size of eight (8) to 12 tons and other compaction equipment as required to bring the subgrade to the required density and stability. Soils shall be compacted to a minimum of 95% of maximum dry density as determined by AASHTO T-99. The minimum moisture content shall not be less than two (2)% below "Standard Optimum" or as required to comply with the approved geotechnical report. Additional wetting may be required when the minimum water requirement is not sufficient to produce a stable condition in the subgrade soil.

4. No paving, subgrade, or base shall be placed on soft, spongy, frozen, or unstable subgrade which is considered unsuitable by the Development Engineering Manager.

5. Heavy construction equipment or loaded trucks (over 50,000 pounds tandem) shall be driven over the finished subgrade and deflections noted. Soft and yielding material and portions of the subgrade which show deflection shall be scarified and re-rolled or shall be removed and replaced with approved course subgrade material, then placed and compacted as specified herein. Subgrade shall not be approved for base course construction until it is uniformly stable and unyielding.

M. Subgrade Construction

1. Materials

Subgrade material shall be composed of granular material consisting, essentially, of sand, gravel, rock, slag, disintegrated granite or a combination of such materials. The coarse portions of the material shall be sound fragments of the crushed or uncrushed materials enumerated above. Supplied material shall be a well-graded mixture containing sufficient soil mortar, crusher dust, or other proper quality binding material which, when placed and compacted in the roadway structure, shall result in a firm, stable foundation. Material composed of uniform size particles, or which contains pockets of excessively fine or excessively coarse material, shall not be acceptable for use.

This material need not be crushed, but shall be graded within the following limits:

Standard Size of Sieve	% By Weight Passing Sieve
2½ inch	100
2 inch	95 - 100
No. 4	30 - 60
No. 200	5 - 15
Liquid Limit	35 Maximum
Plasticity Index	6 Maximum

2. The construction of subgrade shall consist of furnishing and placing approved subgrade material to form a stable foundation on which to construct base course, in conformity with the lines, grades, and typical cross sections shown on the plans, and as staked by a Colorado registered surveyor. In addition, subgrade material shall be used to replace unsuitable foundation materials at locations shown on the plans, or as directed by the Development Engineering Manager.

3. Each layer of material shall be placed and spread so that after compaction it shall conform to the width and crown of the typical cross sections. The wetting of subgrade layers shall be done with sprinkling equipment of a type which ensures uniform and controlled distribution of the water. Wetting shall be done by uniformly sprinkling each layer of material being placed with only that amount of water needed to obtain maximum density of the material.

4. Travel may be allowed over subgrade to assist in compaction of the material. Mixing and blading of the subgrade material on the street shall be required if the material is spotty and non-uniform. However, blading shall be held to a minimum in order to avoid the floating of the heavier rock particles to the surface.

5. Concurrently with the wetting operations, the material shall be uniformly compacted by rolling. Rolling equipment shall consist of one (1) or more of the following: rubber tired roller, sheep foot roller, and flat wheel steel roller.

N. Dewatering

Pipe trenches or structure excavation shall be kept free from water during pipe laying and other related work. The method of dewatering shall provide for a completely dry foundation at the final lines and grades of the excavation. Water shall be disposed of in accordance with the requirements specified by the CDPS General Permit for Construction Dewatering Activities. The dewatering operation shall continue until such time as it is safe to allow the water table to rise in the excavations. Pipe trenches shall contain enough backfill to prevent pipe flotation. The use of sanitary sewer system for the purposes of dewatering is strictly prohibited.

O. Pipe Bedding

After completion of the trench excavation and proper preparation of the foundation, a minimum of six (6) inches and maximum of 12 inches of bedding material shall be placed on the trench bottom for support under the pipe. Bell holes shall be dug deep enough to provide a minimum of two (2) inches of clearance between the bell and the bedding material according to the pipe manufacturer's recommended bedding practices. Pipe shall be installed in such a manner as to ensure full support of the pipe barrel over its entire length. After the pipe is adjusted for line and grade and the joint is made, the bedding material shall be carefully placed and tamped under the haunches of the pipe up to spring line and in the previously dug bell holes. The bedding shall then be installed to a minimum of six (6) inches and a maximum of 12 inches above the top of the pipe, no matter what type of pipe is being installed. The bedding material shall be squeegee, non-fractured, rounded, and shall conform to the following limits when tested by means of laboratory sieves:

Sieve Size	Total % Passing by Weight
3/8-inch	100
No. 200	0-5

P. Backfill

1. It is expected that the trench excavation shall provide suitable backfill material. Wet, soft, or frozen material, pieces of asphalt or concrete or other undesirable substances shall not be used for backfill. The backfill material shall be free from rubbish, stones larger than five (5) inches in diameter, clods, and frozen lumps of soil. If the excavated material is not suitable for backfill as determined by the Development Engineering Manager, suitable material shall be hauled in and utilized and the rejected material hauled away and disposed of. Snow shall be removed from the trench prior to proceeding with backfill operations.

2. Backfilling shall be conducted in a manner to prevent damage to the pipe or its coating and shall be kept as close to the pipe laying operation as possible.

3. Backfill around structures shall be consolidated by mechanical tamping.

4. In areas where existing pavement is to be cut and replaced, backfill, and compaction shall be done as specified in these Standards and Specifications. Excess material shall be removed prior to surfacing. Squeegee shall not be considered backfill material and shall not extend more than 12 inches above the top of the pipe.

Q. Compaction

1. Compaction method shall be by means of a mechanized "REX" or approved equal, and in such a manner that the backfill material is uniformly compacted throughout the depth of the trench to at least 95% of the maximum density obtainable using standard proctor. The minimum moisture content shall not deviate above or below the standard optimum by more than two (2)%. Equipment mounted sheep's foot compactors may not be utilized unless specifically approved by the Development Engineering Manager.

2. If, in the judgment of the Development Engineering Manager, the trench shows signs of being improperly backfilled or if settlement occurs, the trenches shall be reopened to a depth required for proper compaction, refilled and recompacted, in accordance with these specifications.

3. Compaction tests, taken by an independent commercial laboratory, shall be taken every 200 feet, or at the discretion of the Development Engineering Manager, while construction is proceeding. The Development Engineering Manager shall pick the location and depths at which compaction tests shall be taken. Compaction tests shall be taken at depths below finish subgrade ranging from one (1) foot above the top of squeegee to one (1) foot below grade at an interval not exceeding two (2) feet. The City Inspector shall be present when each test is taken and the results shall be forwarded to the City. The Responsible Party shall bear the costs of compaction tests.

R. Trench Maintenance

For a period of one (1) year after initiation of the warranty period, the Responsible Party shall maintain and repair any trench settlement which may occur and shall make suitable repairs to any pipe, fitting, valve, valve box, pavement, sidewalks, or other structures which may be damaged as a result of backfill settlement as determined by the Development Engineering Manager. The Responsible Party is also responsible for material defects.

S. Traffic Control

1. The flow of vehicular, pedestrian, and bicycle traffic on public streets and roadways shall be maintained at all times during construction in accordance with the rules, regulations, and conditions as set forth in the traffic control permit issued by the Development Engineering Manager. Signs, barricades, lights, and warning devices shall be constructed and used in accordance with the MUTCD and the Colorado supplement. The ATSSA Guide shall be strictly followed by the Responsible Party during the progress of the work.

2. The Responsible Party shall be responsible for the provision of a safe travel way on all streets, roadways sidewalks, and trails on and adjacent to the job site. The Responsible Party shall erect or cause erection of proper traffic control warning devices around all excavations, embankments, and obstructions and shall be responsible for the proper maintenance of said erected devices, in accordance with the traffic control permit and the MUTCD.

3. The Responsible Party shall cause suitable warning lights to be provided and kept lighted at night or other times when visibility is limited. The Responsible Party shall provide flaggers and/or off-duty police protection as may be determined by the Development Engineering Manager for the protection of the public, as well as workers on the job site.

4. The Responsible Party shall coordinate with the Development Engineering Manager so that arrangements may be made by the Responsible Party for detours, parking, and access to property adjacent to work, etc., 48 hours prior to their need. A minimum notification of one (1) week is required when detouring a street.

5. The Responsible Party shall not work within any portion of a street without receiving a Traffic Control Permit from the Development Engineering Managerprior to such work. Full roadway closures will be reviewed on a case by case basis. The City reserves the right to refuse to allow full road closures. Requirements for such closures will be determined at the time of issuance of permit. The responsible party will be responsible for all public notices, public meetings, and requirements as outlined in the Traffic Control Permit.

6. No work shall be allowed at signalized intersections or on arterial roadways which impedes normal traffic flow from 5:00 a.m. to 9:00 a.m., and 3:30 p.m. to 7:00 p.m., except during emergencies or with prior approval of the Development Engineering Manager. Failure to complete work within the traffic control permit may result in a “stop work” order.

7. The Responsible Party shall be responsible for all damages to the work due to failure to place barricades, signs, lights, flaggers, and other workers to protect it. Whenever evidence of such damage is found prior to acceptance, the Development Engineering Manager may order the damaged portion immediately removed and replaced by the Responsible Party.

T. Street Cuts

1. The City shall specify minimum pavement sections for replacement on the basis of standards developed by the City and the classification of the street cut for utility installation.

2. The removal of pavement, sidewalks, driveways, or curb and gutter shall be performed in a neat and workmanlike manner. Where utilities must cross these facilities, the exact width of the cut shall exceed the width of the trench at the subgrade by at least 12 inches on both sides of the cut. Portland Cement concrete or asphaltic concrete surfaces shall be cut with a pavement saw to a depth of four (4) inches, or more than one-half (½) existing thickness, whichever is greater as requested by the Development Engineering Manager, prior to breaking. Cutting shall be limited to straight lines and acute angles shall be avoided. Concrete removed shall be replaced to the next contraction joint in full stone increments only. No partial stone replacement shall be permitted.

3. Within street pavement (public and private), parking lots, drive aisles, driveways, or curb, gutter and sidewalk, the native material shall be removed from the site and the trench shall be backfilled with flow/flash fill and the material shall be vibrated into place. The replacement of Portland Cement concrete sidewalks, driveways, or curb and gutter shall be to the same horizontal dimensions as that removed for the utility installation. Portland Cement concrete driveways and sidewalks shall have a minimum thickness of six (6) inches. Portland Cement concrete design mix shall conform to any and all applicable City standards regarding streets, curb and gutter, and sidewalks.

U. Clearing and Grubbing

1. Work shall consist of clearing, grubbing, removing, and disposing of the vegetation and debris within the limits of the project and such other areas as may be indicated on the plans or required by the work, except such objects as are designated to remain or are to be removed in accordance with other sections of these specifications. This work shall also include the preservation from injury or defacement of vegetation and objects designated to remain.

2. The City shall approve construction areas that are to remain. The Responsible Party shall preserve things designated to remain.

3. Surface objects and trees, stumps, roots, and other protruding obstructions not designated to remain shall be cleared and/or grubbed as required, to ensure complete removal; however, nonperishable, non-toxic objects which shall be a minimum of two (2) feet below subgrade may remain when such objects will not impede other subsurface operations.

4. Except in areas to be excavated, stump holes, and other holes from which obstructions are removed shall be backfilled with suitable material and compacted in accordance with these Standards and Specifications. Materials and debris shall be disposed of in a manner acceptable to the Development Engineering Manager.

5. Burning of any materials shall not be permitted without prior written approval of the Development Engineering Manager, the County Health Department, and Fire Department.

6. The Responsible Party shall make necessary arrangements for obtaining suitable disposal locations. If disposal will be at other than established dump sites, the Development Engineering Manager may require the Responsible Party to furnish written permission from the property owner on whose property the materials and debris will be placed.

7. Branches of trees or shrubs shall be removed as directed by the Development Engineering Manager. Branches on trees extending over the road bed shall be trimmed to give a clear height of 16 feet above the road bed surface. Trimming shall be done by skilled workmen and in accordance with good tree pruning practices.

8. The Responsible Party shall strip areas where construction is to occur. Scalping shall include the removal of material such as brush, roots, sod, grass, residue of agricultural crops, sawdust, and other vegetative matter from the surface of the ground.

9. Hedges shall be pulled or grubbed in such a manner as to assure complete and permanent removal. Sod not required to be removed shall be thoroughly disked before construction of embankment.

105.5 Removal of Miscellaneous Materials

A. General

1. The Responsible Party shall raze, remove, and dispose of foundations, signs, structures, fences, pavements, utilities, traffic signal materials, and other obstructions, which are designated for demolition within the project limits, except for utilities and for materials which are to be preserved.

2. Pedestals and bases from sign posts and similar structures shall be removed to one (1) foot below the proposed subgrade.

3. Where portions of structures are to be removed, the remaining portions shall be prepared to fit new construction. The work shall be done in accordance with plan details and in such a manner that materials to be left in place shall be protected from damage. Damage to portions of structures which are to remain in place shall be repaired at the expense of the Responsible Party. Reinforcing steel, projecting from the remaining structure, shall be cleaned and aligned to provide bond with new extension. Dowels shall be securely grouted with City-approved grout. Remaining structures are to be delineated in the as-built drawings.

B. Pavements, Sidewalks, Curbs, Etc.

1. Portland Cement Concrete (PCC) or asphaltic concrete that is to remain shall be cut in a straight, true line with a vertical face. PCC or asphaltic concrete may be cut with a cutting wheel, jackhammer (demolition of structure following surrounding clean cuts), or saw, or may be broken to the directed point of removal. The Responsible Party shall be responsible for the cost of removal and replacement of overbreak as identified on the construction plans.

2. If the Responsible Party cannot maintain a straight, true break line by other means, the Development Engineering Manager shall order sawing. The sawing shall be done carefully, and damages to PCC or asphaltic concrete to remain in place, which are caused by the Responsible Party's operations, shall be repaired by the Responsible Party at his expense. The minimum depth of saw cuts in concrete shall be two-thirds (2/3) of the thickness of the concrete section.

105.6 Protection of Existing Facilities

A. The Responsible Party shall notify the Utility Notification Center of Colorado (UNCC) prior to beginning work in accordance with state statutes and shall have the City's utilities, irrigations systems, electric, gas, telephone, cable television, and all other underground facilities staked and located in the field in order to ensure that there shall not be interruptions of these services during progress of the work

B. The Responsible Party shall preserve intact any underground pipes or other utilities encountered during construction. The Responsible Party shall be liable for all damages done to such existing facilities and structures and shall hold the City harmless from any liability or expense for injuries, damages or repairs to such facilities. The type, size, approximate location, and number of all known underground utilities shall be shown on all drawings. It shall be the responsibility of the Responsible Party to verify the existence and location of all underground utilities along the route of the work.

C. The Responsible Party shall be required to take reasonable and proper precautions to insure against damage to all existing power lines, telephone lines, water mains and services, gas mains and services, sanitary and sewer mains and services, roadways, curbs, gutters, sidewalks, trails, electrical pipes and conduits, drainage ways, irrigation ditches, railroad tracks, buildings, structures, walls, fences, trees, shrubbery and other landscaping, wetlands, or other properties and/or structures in the vicinity of any work or which may be damaged during the excavation work. In addition, the Responsible Party shall take further precautions to insure against injury or damage to property, persons, animals, and vehicles. Wherever necessary, fencing or railing shall be placed around any excavation and a sufficient number of amber lights shall be on from twilight until sunrise. One (1) or more guards shall be employed as additional security wherever they are needed or required by the Development Engineering Manager.

D. In the event that it is determined during construction, through potholing or other appropriate method, that any underground utility conduit, including sewers, water mains, gas mains, and drainage structures or any above ground utility facilities are required to be relocated, the Responsible Party shall notify the utility owner well in advance of approaching such utility so that arrangements with the City and/or owners of the affected utility can be made without delay to the work. All relocations shall be done at the Responsible Party's expense and upon approval by the Development Engineering Manager.

E. Should potholing be performed, the hole shall be filled with flow/flash-fill within 24-hours of the operation.

F. Fire hydrants shall be visible and accessible to the fire department from the street at all times. No permanent or temporary obstructions (including, but not limited to, fencing, street lighting, landscaping, and mailboxes) shall be placed within three (3) feet of a fire hydrant.

G. The Responsible Party shall not hinder or interfere with any person in the protection of such property, or with the operation of utilities at any time, except with permission of the owner of the utility. The Responsible Party must obtain all necessary information in regard to existing utilities, protect such utilities from damage, and avoid unnecessary exposure so that they shall not cause harm to the public.

H. The Responsible Party shall obtain all necessary information in regard to the planned installation of new utilities, cables, conduits, and transformers, make proper provision and give proper notification so that new utilities and electrical equipment can be installed at the proper time without delay to the Responsible Party or unnecessary inconvenience to the Responsible Party.

I. When the work involves excavation adjacent to any properties or structures along the work site, the Responsible Party shall give such property owners written notice a minimum of 48 hours thereof, and shall furnish a copy of such notice to the City.

J. The Responsible Party shall protect and carefully preserve all land boundary and all survey control monuments until the Responsible Party or an authorized surveyor has referenced their location for relocation. All monuments disturbed or removed by the Responsible Party or subcontractors, shall be replaced by a licensed surveyor at the Responsible Party's expense.

K. The Responsible Party shall be liable for the damage or destruction of property resulting from neglect, misconduct, or omission in the manner or method of execution or non-execution of the work, or caused by defective work or the use of unsatisfactory materials. It shall restore such property to a condition similar to or better than that existing before such damage or injury was done, by repairing, rebuilding, or replacing it as may be directed.

L. The Responsible Party shall take all necessary precautions to prevent pollution of streams, lakes, reservoirs, and irrigation ditches with fuels, oils, bitumens, sodium chloride, calcium chloride, or other harmful materials. The operations shall be conducted and scheduled to avoid or minimize siltation of streams, lakes, and reservoirs. A plan for erosion protection, as referenced herein, shall be submitted to the Development Engineering Manager.

M. A plant material protection zone shall be identified on a plan and be submitted with the approved construction drawings.

1. The existing condition of all plant material in the construction area shall be reviewed by a third party ISA Certified Arborist or City Staff at the discretion of the Senior Landscape Architect.

2. Any activity determined to be injurious to existing plant material shall not be permitted within the plant material protection zone. These activities include grading, rototilling, equipment storage, vehicle parking, stockpiling of soil, or other activities which may cause soil compaction or disruption. Plant material damaged during construction and not included on the approved mitigation plan shall be valued toward additional replacement plant material in accordance with City policy.

3. One of the following methods shall be used to determine the plant material protection zone:

   a. Dripline Method: Protect the area within the tree's dripline for broad-canopied trees, or up to 1.5 times the tree's dripline for narrow-canopied trees.

   b. Tree Height Method: Protect a circular area around the tree with the radius being equal to the height of the tree. This is the preferred method and should be used if there is enough space available. This method should also be used for narrow-canopied trees that have root systems extending beyond the tree's dripline.

   c. Trunk diameter Method: for every inch of trunk diameter at 4.5 feet above the grade, allow for 1-1.5 feet of circle radius from the trunk.

N. The plant material protection zone on a site shall be enclosed with protective fencing. Protective fencing shall be orange plastic or metal chain link, a minimum four (4) feet in height, secured with metal posts and signed to indicate that the area is set aside for the protection of plant material. Absolutely no grading shall be permitted within the plant material protection zone. Supplemental irrigation may be required for protected plant materials from May-October.

O. Pruning shall be required for all plant material to be saved in the work area to the extent required to permit clean and workmanlike finish grading, seeding, or sodding operation under and around plant material.

P. If authorization has been granted to excavate within the dripline of plant material, do so in a manner that will cause minimum damage to root systems. Prune the injured roots cleanly and backfill as soon as possible. Do not leave surface roots exposed. To minimize damage to the roots, boring may be required within the dripline, as directed by the Senior Landscape Architect.

   1. Do not cut any root over two (2) inches in diameter within the dripline except when authorized by the Senior Landscape Architect.

   2. Do not use trees for any purpose such as crane stays, guy anchors, shaded material storage, etc.

Q. No paint, oil, volatile materials, or any substance that might cause damage to existing or future vegetation shall be spilled or buried in the vicinity of the construction area. Any spillage shall be immediately removed and properly disposed of at the direction of the Development Engineering Manager.

105.7 Outages

In the event loss of service is necessary, the Responsible Party shall notify the City at least 48 hours in advance. Such services shall in no case be interrupted for more than four (4) hours. Outages for schools, medical clinics, and various commercial businesses must be conducted at approved times as specified by the owner or chief administrator of each establishment and upon approval by the Development Engineering Manager. If outages for more than four (4) hours are necessary, they must be conducted at times to cause the least inconvenience to the customers and upon the approval of the Development Engineering Manager. Under all circumstances, the work must continue until such affected services are resumed. If, in the process of installing a connection, there exists an industry or building that must have water at all times, as designated by the Development Engineering Manager, such as a hospital, appropriate temporary means shall be taken to provide and deliver water to such industry or building. The method of delivery of the water shall be approved by the Development Engineering Manager and at the expense of the Responsible Party.

105.8 Safety

Machinery, equipment, materials, and all hazards shall be guarded or eliminated in accordance with the MAPC and all applicable federal regulations, including OSHA, state, county, and municipal laws and regulations. No blasting shall be done without the prior approval of the City. Safety equipment, devices and clothing shall be utilized by personnel where required by federal, state, and local laws. The Responsible Party shall strictly comply with MUTCD.

105.9 Work Conditions

A. Emergency Conditions

1. When, in the opinion of the Development Engineering Manager, the Responsible Party has not taken sufficient precautions for the safety of the public or the protection of the work to be constructed, or of adjacent structures or property which may be damaged by processes of construction on account of such insufficient precautions, and an emergency may arise and immediate action is considered necessary in order to protect public or private, personal or public interests, the Development Engineering Manager, with or without notice to the Responsible Party, may provide suitable protection by causing such work to be done and material to be furnished and placed as the Development Engineering Manager may consider necessary and adequate. The cost and expense of such work and material so furnished shall be borne by the Responsible Party and shall be paid within 30 calendar days upon presentation of the invoice by the City.

2. The performance of such emergency work under the direction of the Development Engineering Manager shall in no way relieve the Responsible Party of responsibility for damages which may occur during or after such precaution has been taken.

3. In an emergency threatening loss of life or extensive damage to the work or to adjoining property, and where the Responsible Party is unable to obtain special instructions or authorization from the Development Engineering Manager, the Development Engineering Manager shall be notified of such emergency work within four (4) hours of the action. After diligent attempts to obtain such special instruction or authorization in sufficient time to take the necessary action, the Responsible Party is hereby permitted to act to prevent such threatening loss or damage.

B. Cleanup

1. The Responsible Party shall be responsible for daily cleanup on the project area and shall remove and properly dispose of all surplus and discarded materials, rubbish, and temporary structures from the project area and adjacent areas, and where appropriate leave the project area swept and in a neat and clean condition. The Responsible Party shall restore all work areas which have been damaged by the operations, to general conformity with the specifications for the area or areas involved, and to the original condition.

2. The Responsible Party's work shall conform to the requirements set by the SWMP and sediment and erosion control drawings as described in the statutes, ordinances, and regulations. The Responsible Party shall be responsible, at its own expense, for keeping the site and adjacent areas affected by the construction activity in conformance with these Standards and Specifications and the state discharge permit. The Responsible Party shall, within 24 hours of the City's notification of noncompliance with this section, commence clean-up operations and shall diligently pursue completion of said operations to the satisfaction of the City. If the Responsible Party fails to respond within 24 hours, or the City is unable to contact the Responsible Party after reasonable effort, or the Responsible Party fails to complete clean-up operations to the satisfaction of the City, the Development Engineering Manager may issue to the Responsible Party a "stop work" order which would be in effect until clean-up operations by the Responsible Party are completed to the satisfaction of the Development Engineering Manager. The Development Engineering Manager may also, at its discretion, choose to have the streets and rights-of-way cleaned by City crews or an outside contracted firm and invoice the Responsible Party for all costs incurred by the City.

3. If the City, in its sole discretion, determines a violation to these Standards and Specifications exists, the City may immediately issue a "stop work" order to the Responsible Party and take corrective action to clear the affected area and invoice the Responsible Party for all costs incurred by the City. A "stop work" order issued by the City stops all ongoing work within the subdivision in question and includes the stoppage of building permit inspections. The Responsible Party shall pay the City's invoice for remedy within 30 days of receipt of the invoice. Failure to pay the invoice within said 30 days will result in another "stop work" order being issued, to be in effect until the invoice is paid.

105.10 Use of City Water

A. If the Responsible Party requires City water for any part of the project, the following steps must be taken:

1. Obtain and complete a fire hydrant meter permit form. (a water use permit may be required prior to issuance of a hydrant meter permit in times of drought as referenced in the City Code.)

2. Pay a refundable deposit, all monthly rental and water usage charges, and all damages other than normal wear and tear to the hydrant, meter, street, or other public improvements that may result from the hydrant use.

3. Return the hydrant meter immediately when no longer required.

4. The hydrant meter may only be used at the approved fire hydrant location noted on the permit. Use of a hydrant at another location must receive prior approval from the City.

105.11 Phasing

In the event that phasing is permitted and undertaken by the Responsible Party, no building permits may be issued for buildings within any subsequent phase, as determined by the Developer's Agreement. The receipt of a performance guarantee by the City does not satisfy the condition of Initial Acceptance as defined in this section.

105.12 Inspections

A. All construction work for which a site construction permit is required shall be subject to inspection by the City and certain types of construction shall have continuous inspection.

B. At all times during construction of the Improvements, and until final acceptance thereof by the City, the City shall have the right, however, not the duty, to inspect materials and workmanship in order to ascertain conformance with the approved plans and City standards and specifications.

C. The Responsible Party shall notify the City that such work is ready for inspection at least 48 hours before such inspection is desired. Such request may be in writing or by telephone, at the option of Development Engineering.

D. The Responsible Party shall reasonably cooperate and assist the City to gain appropriate access to the areas designated for inspection.

E. It shall also be the duty of the Responsible Party to notify the City upon discovery of any non-conformance with the said plans and these Standards and Specifications.

F. Inspection of work by the City shall not relieve the Responsible Party of any responsibility for construction of Improvements in accordance of these Standards and Specifications or other applicable agreements.

G. Additional Inspections and Reinspections

1. Development Engineering may make or require additional inspections of any work as deemed necessary to ascertain compliance with the provisions of these Standards and Specifications and other provisions of the City Code.

2. This subsection is not to be interpreted as requiring reinspection fees the first time a job is rejected for failure to comply with the requirements of these Standards and Specifications, but rather as controlling the practice of calling for inspections before a job is ready for such inspection or reinspection. Reinspection fees may be assessed when the permit is not in the possession of the permit holder, or an authorized agent, at the work site, when the approved plans are not readily available to the Inspector, for failure to provide access on the date for which inspection is requested or for deviating from plans approved by Development Engineering.

3. To obtain a reinspection, the applicant must pay a fee as determined by the City. In instances where reinspection fees have been assessed, no additional inspection of the work shall be performed until the required fees have been paid.

105.13 Initial Acceptance

In situations where the City does not require a Developer's Agreement for construction/installation of Public Improvements due to the scope and nature of the construction/installation as determined by the Development Engineering Manager, the procedures outlined in sections 105.13, 105.14, 105.15, 105.16, and 105.17 shall apply.

A. Conveyance to the City

1. Prior to initial acceptance of Public Improvements, and unless such conveyance has not been previously made to the City, the Responsible Party by good and sufficient documents of conveyance shall dedicate and/or convey to the City in perpetuity all easements, rights-of-way, and fee title to real property, without expense to the City, and free and clear of all encumbrances as may be reasonably required to construct, place and maintain the Improvements. Said instruments of conveyance shall be in a form acceptable to the City Attorney and shall be furnished to the City.

2. In the event that the Responsible Party is not record title owner of a property interest which Responsible Party is required to convey or dedicate to the City pursuant to these Standards and Specifications, it shall be the sole obligation of Responsible Party to acquire title to such property.

3. As to any conveyance required by the City pursuant to these Standards and Specifications, the Responsible Party shall at its sole expense provide the City with a policy of title insurance insuring the title to the Property conveyed to the City to be free of liens and encumbrances superior to the City's interest in the Property unless otherwise approved by the City.

4. The Responsible Party shall be solely responsible to pay all general taxes attributable to the Property, as applicable, interests conveyed to the City until the date of conveyance, and at the request of the City shall submit such estimated taxes, prorated to the date of conveyance, in conjunction with the conveyance.

5. At the time of acceptance of any Public Improvements listed in the Developer's Agreement, such Public Improvements shall be deemed to be conveyed to the City.

B. The Responsible Party shall submit a written request for initial acceptance of all Public Improvements for a phase or the entire project a minimum of seven (7) days before the estimated completion date of the Improvements identified in the request for initial acceptance. The City shall inspect the Improvements within 10 working days of the City's receipt of the Responsible Party's written request for initial acceptance. Upon inspection, the City will either issue a letter of initial acceptance or issue a punch list of items needing correction before an initial acceptance letter will be issued. The Responsible Party will have 60 calendar days to complete the punch list. If the items on the punch list are not completed within 60 calendar days, the City reserves the right to stop building permits or routine inspections, issue additional punch lists, and call on the Performance Guarantee until all punch list items have been completed and a letter of acceptance has been issued.

C. Upon a finding of satisfactory completion of the Public Improvements in compliance herewith and all applicable ordinances and standards of the City, the City shall issue a letter of initial acceptance to the Responsible Party, which shall constitute the date of commencement of the warranty period. Upon the issuance of the letter of initial acceptance the City shall require the Responsible Party to obtain and deliver to the City a warranty guarantee, and provide the City all applicable mechanics lien statements with respect to the project. The City will issue a letter of completion for all Private Improvements, as there is no warranty period for these improvements.

D. The City shall, within 30 days of issuance of the letter of initial acceptance, return the surety to the appropriate party, by a letter of transmittal from the City to the appropriate party, subject to these Standards and Specifications.

105.14 As-Built Drawings Requirements

A. Certification Statement

It is the duty of the Responsible Party to record and document the physical dimensions and any changes on a set of as-built drawings and to certify as to their accuracy. The as-built drawings will be a modified version of the full set (including cover page, detail sheets, plan and profile sheets, and sheets without record information) of the approved construction drawings, with actual physical dimensions and documentation of any changes from approved construction drawings based on field measurements and certified by a Professional Land Surveyor (LS) or Professional Engineer (PE) duly licensed in the State of Colorado. The certification shall also have the date of certification by the LS or PE. All as-builts will have a PE or LS stamp on mylar only.

Certification Statement:

"These drawings are a correct as-built of the final construction of improvements shown on these plans, as per the Standards and Specifications for the City of Thornton."

_____	_____	_____
LS or PE Name	LS/PE Number	DATE

B. As-Built Information

An LS or PE shall document the following information to certify the construction plans as being as-built:

1. Streets

a. Elevation check at maximum 150 foot intervals in each flow line along street, at the point of curb return of each radius, and at the center of each cross pan.

b. Elevation at flowline on each side of storm inlets.

c. Elevations at all points shown on the cul-de-sac detail, and at the center and high points in the flowline.

d. Traffic Signals

2. Sanitary and Storm Sewers

   a. Elevation, size, and material of all in and out inverts at manholes, inlets, and outlets.

   b. Pipe lengths, pipe diameters, pipe material, and stationing from manholes. Sanitary sewer service connection location information is to be supplied by the contractor to the Responsible Party.

   c. Rim elevations on all manholes and drainage inlet structures.

   d. Elevation checks every 100 feet in the thalweg of drainage channels, including elevation at drop structures.

   e. Final detention pond volume from cross sections, detailed as constructed topographic map of the detention pond (including the overflow weir and the circumference of the top of the pond), and the final release rates per drainage criteria (PE certification only). This survey shall be completed after all landscaping and irrigation lines have been installed.

   f. Overland flow path from the detention pond's emergency overflow to the receiving stream.

3. Water Mains

   a. Pipe lengths, diameters, materials, standard depth of bury stationing of valves, and bends.

   b. Horizontal verification of all waterlines, water valves, fire hydrants, plugs, blow-offs, meter pits, and service connections.

   c. Horizontal and vertical verification of all lowered crossings showing extent of casing pipe or concrete encasement.

4. Public and Private Park, Landscape, and Irrigation Improvements

   a. Redraw to accurate scale of a minimum of 1"=30'. Noted dimensions on construction drawings shall not be accepted.

   b. List of all plant material installed including size and quantities.

   c. Vertical and horizontal verification of all sidewalks, trails, and hardscape play and gathering areas.

   d. Verification of all slopes shown on the construction plans.

   e. Horizontal verification of all physical features, including trees, back stops, goals, lights, signage, playground equipment, bleachers, site furniture, restrooms, fences, bike racks, pavilions, water features, etc.

   f. Irrigation as-builts shall include horizontal verification of all irrigation pipes, irrigation heads, valve boxes, wiring (24 volt and 110 volt), electrical boxes, controller, and backflow protection device. Noted information shall include all pipe size, zone number, valve location, head type, valve type and model number, controller type and model number, design operating pressure chart, and drip emitter chart. Irrigation as-builts shall show pertinent physical features, such as sidewalks, fences, ponds, buildings, parking lots and athletic fields. No contour lines shall be shown on irrigation as-builts unless required by the City. A color-coded, laminated reduced copy of the irrigation system sized to fit the controller is required.

5. Overlot Grading

6. A certification of quantity and cost for all infrastructure including, but not limited to streets, drainage, water, sanitary sewer, parks, etc that was constructed as a part of the development.

7. As-builts may be field verified by the City and shall be approved by the City prior to Initial Acceptance by the City.

105.15 Submittal of Certified As-Built Plans and Documents

It shall be the duty of the engineer, land surveyor, or preparer of the as-builts to record any and all changes on as-built drawings at the completion of the project as well as make corrections to the AutoCAD files in the plan

and profiles. Changing of the labels and stationing alone are not sufficient, the actual drawings should be adjusted to scale appropriately.

The LS or PE shall submit one (1) complete set of certified plans, 22" x 34" in size, to the Development Engineering Manager. Once those have been approved by the City, a scanned electronic copy of the certified and stamped as-built plans shall be provided in an electronic format (both in an AutoCAD compatible format as well as a copy in a .pdf format or approved equal).

The AutoCAD compatible as-built file shall be one file (no external references) that encompasses the entire project layout and the following information: boundary lines, lot lines, right-of-way lines, street centerlines, waterlines, valves, hydrants, plugs, blow-offs, meters, sanitary sewer lines, sanitary sewer manholes, storm sewer lines, storm sewer manholes, storm sewer inlets, detention ponds, outlet structures, landscaping, curb, gutter, and sidewalk. Said electronic drawing shall be constructed using the certified field measurement data with correct lengths and relative locations.105.16 Warranty

A. Responsible Party warrants that all proposed Public Improvements to be provided under the construction permit be free from defects, including, but not limited to, defects of materials, workmanship and design, and that the Improvements will otherwise fully comply with all applicable City Standards and Specifications for a period of no less than two (2) years.

B. A warranty guarantee shall be equal to 15% of the total estimated cost of the public Improvements, excluding landscape improvements. The warranty guarantee for public landscaping will be equal to 50% of the total estimated cost of landscape improvements in the public rights-of-way or on public tracts, including all vegetative materials, irrigation, and recreation facilities. The warranty guarantee shall be in the form of cash, a cashier's check, an irrevocable letter of credit, or a warranty bond. The entity issuing a warranty bond shall have at least an "A" rating from Moody's, or an equivalent rating as designated by a nationally recognized ratings firm, and shall additionally be included in the most recent listing of companies holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies, Department of Treasury, Circular 570. Warranty bonds shall be on the standard bond form as approved and provided by the City. An irrevocable letter of credit shall be on the standard letter of credit form as approved by the City and in accordance with finance directive 92-1. The warranty guarantee shall provide security for the costs which may be incurred in repairing and/or replacing Improvements during the warranty period of two (2) year following Initial Acceptance by the City.

C. In the event that any substantial repair or replacement is required to any of the Improvements during the warranty period and such repair or replacement is not timely made upon notice of defect or in any event before the expiration of the warranty period, the City may elect to:

    1. extend the warranty period for up to one (1) additional year following Initial Acceptance of the completed repair or replacement;

    2. adjust the amount or term of the warranty guarantee, as may be appropriate;

    3. call the warranty guarantee and secure repair or replacement of the nonconforming Improvements; or

    4. order the denial or suspension of building permits, utility services or certificates of occupancy outstanding until repair or replacement of any nonconforming Improvements have been performed and initially accepted by the City.

D. Landscape and Park Amentity Requirements for Public Improvements

    1. The Responsible Party shall guarantee all materials to be free from defects in workmanship and materials for a period of at least one (1) year from the date of Initial Acceptance. Defects shall include, but are not be limited to: edge unraveling, loss of resiliency in excess of specified limit, binder disintegration, and cracking, color fading, or inadequate bonding. The Warranty Period only applies to parks that will be owned and maintained by the City.

    2. In the event that the Responsible Party is unable to complete the Landscaping Improvements identified in the Developer's Agreement because of periods of adverse weather or for other similar reasons as approved by the City, the Responsible Party may submit to the City a performance guarantee for landscaping in the form of a cash payment, a cashier's check or an irrevocable letter of credit payable to the City in an amount equal to one and one-half times (1.5) the estimated cost of all uncompleted landscaping. Upon receipt of any performance guarantee for landscaping authorized by this paragraph, in a form acceptable to the City, the City may issue building permits. These landscape improvements shall be completed at a time agreeable to both parties; however, no later than eight (8) months from the date of approval of the request for a performance guarantee for landscaping by the City. The City shall release the performance guarantee for landscaping only upon completion of all landscaping obligations by the Responsible Party. In the event that the Responsible Party defaults upon the obligations specified in this paragraph, the City may retain and apply all those funds represented by the performance guarantee for landscaping toward completion of the

Responsible Party's landscape obligations. The method and manner in which the City elects to construct and install the landscaping obligations shall be within the discretion of the City provided, however, that nothing herein shall obligate the City to install or complete the Landscaping Improvements and nothing herein shall prevent, prohibit or limit the remedies available to the City to enforce the obligations of the Responsible Party requiring completion of landscaping improvements. Any remaining funds will be returned to the Developer after the City determines the construction has been completed. The City, however, shall not be deemed to have accepted any payment responsibility or liability in conjunction with any documents identified in this section.

3. The Responsible Party shall be responsible for all maintenance of the landscape project until Initial Acceptance; the City shall maintain the landscape project following Initial Acceptance.

   a. Maintenance shall include but may not be limited to repair and/or replacement of damaged or eroded hardscape or softscape areas, watering, mowing, weeding, trimming, fertilizing, trash removal, replanting, mulching, wrapping, spraying, tightening and repairing of guy wires, removal and replacement of dead materials, resetting of plants to proper grades and positions and reseeding. Contractor shall guarantee against settlement for one (1) full year after Initial Acceptance. Any corrections required to meet this specification, including repair/replacement of concrete, sod, irrigation, or other site improvements shall be at the Contractor's expense.

   b. For mowing operations, sound horticultural practices shall be followed so that no more than one-third (1/3) of the leaf surface is removed during mowing and that the height of the grass is at least three (3) inches after the final cut. For initial acceptance of irrigated areas, all areas shall have uniform dense growth in accordance to Section 800. Maintenance shall provide an even, fixed healthy growth of grass and stand of plant material. Any areas deemed by the City to be unacceptable shall be resodded and/or replanted according to these Standards and Specifications and shall be well-established prior to Initial Acceptance, which shall occur at the time of initial acceptance for the entire project. Damage to seeded areas during the warranty period which is caused by overuse shall be exempt from this warranty coverage.

4. The Responsible Party will erect suitable signs at appropriate points notifying the public to keep off sod and seed areas until the area is well established. Any traffic damage that may occur prior to initial acceptance of the work shall be repaired at the Responsible Party's expense.

5. Following initial acceptance, the City shall pay for all water use during the warranty period except for supplemental winter water. The Responsible Party shall supply all supplemental winter watering. However, during the warranty period, any excessive water consumption as determined by the Development Engineering Manager shall be paid for by the Responsible Party, at current market rates.

6. Trees, shrubs, groundcovers, and perennials shall be warranted for a period of one (1) year from the date of Initial Acceptance of the landscape improvements. Annuals shall be warranted during their normal period of growth. Any materials which must be replaced, as determined by the City, shall be replaced within 30 days upon notification from the City. Replacement of plant material before initial acceptance does not waive normal plant warranty.

7. The entire irrigation system (including materials and workmanship) shall be warranted for a period of one (1) year from date of initial acceptance for the system.

8. During the warranty period, the Responsible Party shall make all adjustments to the system and perform all work required to maintain the designed function of the system and to maintain the desired appearance of the landscape.

9. The Responsible Party shall properly winterize the system in the fall and start up the system in the spring during the warranty period, in response to local weather conditions or as directed by the Development Engineering Manager.

10. Excessively pruned trees and shrubs, which are no longer excellent representatives of their species, shall be replaced prior to Initial Acceptance.

105.16 Final Acceptance

A. No earlier than 60 days nor later than 45 days prior to the date of expiration of the warranty period, the Responsible Party shall submit a written request for final acceptance of Improvements, and within 10 days of such request the City shall conduct a final inspection of the Improvements, or authorized phase thereof. The Responsible Party shall certify to the City in connection with the request for Final Acceptance that all persons and entities having provided labor and/or services in the construction of the Improvements have been fully paid subject to such exceptions as may be disclosed to the City and which are acceptable to the City. If the Improvements, subject to the inspection request fully conform to the City's applicable Standards and Specifications, and/or all repairs (if any are needed), have been made to bring same into such conformance,

then the City shall issue a letter of Final Acceptance of the subject Improvements to the Responsible Party. After final acceptance, the Responsible Party may request, and the City shall release, the warranty.

B. If the Responsible Party fails to have Improvements Finally Accepted within 10 days prior to the date of expiration of the warranty period, then the Responsible Party shall be in default and the City may exercise its rights to secure performance as provided in this section. In the event that the Responsible Party has not requested Final Acceptance 45 days prior to the expiration of the warranty period, the warranty period shall be extended for 60 days, until such time as the responsible party can meet all of the conditions that may be required, if any, as a result of the final inspection, and the City shall have the right at any time thereafter to conduct a final inspection of the Improvements. If pursuant to final inspection requested by the Responsible Party or initiated by the City, any such Improvements are found to not conform to the applicable City Standards and Specifications, the City shall have the rights set forth in the section pertaining to Governing Law, enforcement, and remedies.

C. Nothing herein shall be construed or deemed as requiring the City to finally accept and release from warranty any Improvements that are defective or damaged.

D. Once the requirements of these Standards and Specifications are met for private improvements, the City will issue a letter of completion to the Responsible Party.

E. Street Acceptance Testing

1. A pavement evaluation shall be performed in accordance with good engineering practices prior to final acceptance. The report shall generally embody the following testing and pavement evaluation techniques:

   a. Environmental study (frost cycle, drainage, etc.)

   b. Pavement surface evaluation

   c. Soil borings in areas of high deflections

2. The report shall evaluate the existing condition of the base and binder course by performance of the deflection tests at 100 foot spacing per traffic lane. The report shall determine whether or not the pavement section shall meet a 20 year pavement life or greater.

3. If the pavement section is not projected to meet a life expectancy of 20 years or more, the report shall propose asphalt overlays in excess of the existing pavement section to bring the new pavement section to a 20 year life expectancy. The Development Engineering Manager shall evaluate the results of the report and inform the Responsible Party of the required pavement operation of the section.

F. Landscape Requirements for Private Improvements

1. In the event that the Responsible Party is unable to complete the Landscaping Improvements identified in the Developer's Agreement because of periods of adverse weather or for other similar reasons as approved by the City, the Responsible Party may submit to the City a performance guarantee for landscaping in the form of a cash payment, a cashier's check or an irrevocable letter of credit payable to the City in an amount equal to one and one-half times (1.5) the estimated cost of all uncompleted landscaping. Upon receipt of any performance guarantee for landscaping authorized by this paragraph, in a form acceptable to the City, the City may issue building permits. These landscape improvements shall be completed at a time agreeable to both parties; however, no later than eight (8) months from the date of approval of the request for a performance guarantee for landscaping by the City. The City shall release the performance guarantee for landscaping only upon completion of all landscaping obligations by the Responsible Party. In the event that the Responsible Party defaults upon the obligations specified in this paragraph, the City may retain and apply all those funds represented by the performance guarantee for landscaping toward completion of the Responsible Party's landscape obligations. The method and manner in which the City elects to construct and install the landscaping obligations shall be within the discretion of the City provided, however, that nothing herein shall obligate the City to install or complete the Landscaping Improvements and nothing herein shall prevent, prohibit or limit the remedies available to the City to enforce the obligations of the Responsible Party requiring completion of landscaping improvements. Any remaining funds will be returned to the Developer after the City determines the construction has been completed. The City, however, shall not be deemed to have accepted any payment responsibility or liability in conjunction with any documents identified in this section.

2. The Responsible Party shall be responsible for all maintenance of the landscape project. This maintenance shall include, as required, repair and/or replacement of damaged or eroded hardscape or softscape areas, mowing, fertilizing, trash removal, replanting, reseeding, watering, weeding, trimming, mulching, wrapping, spraying, tightening and repairing of guy wires, removal and

replacement of dead plant material, resetting of plants to proper grade and positions and removal of staking after trees have been staked for one (1) year.

2. The Responsible Party is responsible for maintaining the HOA and or Metro District common landscaping and irrigation systems until the City has inspected and verified that the landscaping and irrigation complies with the approved Development Permit and Irrigation Construction Drawings.

3. The Responsible Party shall provide as-builts per the requirements outlined in this section, irrigation controller schedules and any keys and manuals or tools associated with the irrigation system to the homeowners citizen board/metropolitan district board at the time the maintenance responsibility is transferred to the respective board.

4. Metropolitan district and HOA parks shall follow the as-built requirements outlined in these Standards and Specifications.

5. Areas of native or turf seeding shall be maintained by the Developer/Responsible Party until the City has inspected and verified that the stand of grass meets the uniform growth and density requirements outlined in Section 800.

6. Once the requirements of these Standards and Specifications are met for private landscaping improvements, the City will issue a letter of completion to the Responsible Party.

TABLE 100-1

RESPONSIBILITY FOR PUBLIC IMPROVEMENTS AND FACILITIES DURING WARRANTY

	Residential Development		Commercial/Industrial Development	
Utilities	Thornton	Maintenance	Thornton	Maintenance
	Responsible Party	Repairs and Replacement	Responsible Party	Repairs and Replacement
Roadway	Thornton	Maintenance	Thornton	Maintenance
	Responsible Party	Repairs and Replacement	Responsible Party	Repairs and Replacement
Irrigation	Thornton	Maintenance Except for First Winterization and Spring Turn-on	Thornton	Maintenance Except for First Winterization and Spring Turn-on
	Responsible Party	Repairs and Replacement, First Winterization and Spring Turn-on	Responsible Party	Repairs and Replacement, First Winterization and Spring Turn-on
Landscaping	Thornton	Maintenance	Thornton	Maintenance
	Responsible Party	Repairs and Replacement	Responsible Party	Repairs and Replacement

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