



Development and Construction Standards

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ELK RIDGE CITY

Development and Construction Standards

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RESOLUTION NO. 97-5-13-10R

A RESOLUTION ADOPTING MINIMUM STANDARDS RELATING TO THE LAYOUT AND DESIGN OF SUBDIVISION DEVELOPMENTS, CONTENT OF MATERIALS SUBMITTED IN SUPPORT OF APPLICATIONS FOR APPROVAL OF SUBDIVISIONS, AND THE QUALITY OF MATERIALS AND CONSTRUCTION OF PUBLIC IMPROVEMENTS WITHIN THE TOWN OF ELK RIDGE, UTAH.

BE IT RESOLVED BY THE TOWN COUNCIL OF THE TOWN OF ELK RIDGE, UTAH:

Policy 01. General Requirements.

Chapter 01.01. Title & Intent - General Requirements - Adoption.

01.01.010. Title.

This Resolution shall be entitled, and know as, TOWN DEVELOPMENT AND CONSTRUCTION STANDARDS OF ELK RIDGE, UTAH, and may be so cited and pleaded.

This Resolution, shall be attached to and construed to be a part of the DEVELOPMENT CODE OF ELK RIDGE, UTAH.

01.01.020. Intent.

It is the intent and purpose of the Town Council of Elk Ridge, Utah, to establish minimum standards for the design and construction of public improvements and content and design of subdivision and similar development projects and the content of materials to be submitted in connection with applications for approval of such projects.

Chapter 01.02. General Provisions.

01.02.010. Conflicts.

Wherever the terms of this Resolution shall conflict with the terms of the any other applicable regulation, the more stringent shall apply, unless relief therefrom shall have been granted by the Town Council.

01.02.020. Appeals.

Appeals from the strict application of the requirements of this Resolution may be granted by action of the Town Council, subject to the prior receipt of a recommendation from the Planning Commission, and in the instance of an appeal of an engineering requirement, the Town Engineer, and upon a finding that:

1. The standard or requirement appealed from is unnecessary and unreasonable, in light of circumstances surrounding the condition and would result in an unreasonable hardship if adhered to.
2. The appeal may be granted without destroying the intent of the standard or the underlying code provision.

Chapter 01.03. Adoption - Effective Date.

The terms of this Resolution shall take effect upon its passage as required by law.

PASSED AND ORDERED POSTED BY THE TOWN COUNCIL OF ELK RIDGE,
UTAH, THIS _____ DAY OF _____, 1997.

Mayor

ATTEST:

Town Clerk

Policy 02. Development Standards.

Chapter 02.02. General Improvement Requirements.

02.02.010. General.

This section defines the general requirements for improvements to be built by the developer, subdivider, owner or contractor for all types of construction.

The improvements shall include all street improvements in front of all lots and along all dedicated streets to a connection with existing improvements of the same kind or to the boundary of the subdivision nearest existing improvements. Layout must provide for future extension to adjacent development and to be compatible with the contour of the ground for proper drainage. All water lines, and any other buried conduit shall be installed to the boundary lines of the subdivision or development.

Chapter 02.03

For conceptual plan requirements refer to the conceptual plan application and checklist located in the appendix of this title.

Chapter 02.04. Preliminary Plat

For preliminary plat requirements refer to the preliminary plat application and check list located in the appendix of this Title.

Chapter 02.06. Final Plat.

For final plat requirements refer to the final plat application and checklist located in the appendix of this Title.

Chapter 02.08. Improvement and Design Standards.

02.08.010. Improvement Installations.

All improvements shall be installed in accordance with the "Development Standards". The expense of all such improvements and installations, including but not limited to expenses for all of the foregoing items and for area-wide topographical drainage, engineering, ecological or other work or study, shall be borne by the owner or subdivider or developer subject to such terms and conditions as may be required by the Town Council by way of ordinance, resolution, contract or otherwise.

02.08.020. Fees.

Fees may be charged by the Mayor and Town Council for the purpose of defraying expenses of all work performed by the town or its agents in connection with processing or approving the application for a subdivision or for inspecting or installing any fixture or apparatus in any subdivision. Such fees shall in no case be less than the fee charged for similar services provided by the town to persons who are not subdividers.

02.08.030. Utility Connection.

It shall be the responsibility of the developer to connect to any utilities or improvements wherever they are located and extend those improvements to and through the development as shown on the final plat.

02.08.040. Water Supply.

Each developer shall connect the subdivision with the town water system with all appurtenances and shall make such water available to each lot within the subdivided area. Adequacy of supply and sizes of water mains shall be established by the town engineer or his/her designee.

Workmanship and details of construction shall be in accordance with the ATown Development Standards@ and/or other codes adopted by the town. All work in connection with water services shall be done as directed and under the supervision of the town engineer or his/her designee.

02.08.050. Sewer and Sewage Facilities.

The developer shall provide each lot with a sanitary sewer system in accordance with the ordinances of the town and pursuant to these "ATown Development Standards" and/or other codes adopted by the town. All said work shall be done as directed and under the supervision of the town engineer or his/her designee.

02.08.060. Streets.

The developer shall construct all streets required by the subdivision as specified by the Town Council in accordance with the town "Development Standards". All streets shall be constructed pursuant to standards recommended by the town engineer or his/her designee. The developer shall be responsible to construct all streets required in the final plat and as a condition of the final plat approval to the standard required by the town engineer or his/her designee. The developer shall be required to provide an engineered design for the street sub-grade construction.

02.08.062. Street Grades.

The maximum grade of any street in the subdivision shall be 8 percent. Where the observance of this standard is not feasible, the Town Council, subject to the prior recommendation of the Planning Commission, shall have the power to grant an exception when special pavement surfaces and adequate leveling areas are installed and in the opinion of the Town the best subdivision of the land is thereby secured.

02.08.063. Street Names.

New street names should not duplicate those already existing. A street obviously a continuation of another already in existence should bear the same name. Before the street is named, the proposed name must be submitted to and approved by the Planning Commission and Town Council.

02.08.064. Cul-De-Sacs.

The maximum length of a cul-de-sac is 400 feet measured from the nearest right-of-way line of the adjoining street to the center of the cul-de-sac, and the minimum radius of the cul-de-sac is 60 feet at the property line.

Surface water must drain away from the turnaround. A exception may be granted where surface water cannot be drained away from the turnaround along the street due to grade. Should this exception exist, necessary catch basins and drainage easements shall be provided.

02.08.065. Partial Width Streets.

Half streets shall not be permitted except in cases where there exists an adjacent subdivision with an existing dedicated half street. Only in those instances, will the partial width streets be allowed to make the adjacent street complete.

In certain conditions, and when special approval is given, half road widths may be allowed. Partial width streets requires all improvements to the centerline plus an additional nine (9) feet of asphalt. Any item not covered specifically in the Development Standards will be reviewed by the town engineer for his/her recommendation.

02.08.066. Temporary Turn-Arounds.

Temporary turn-arounds are to be provided on all streets which are more than one (1) lot from intersections. These are to be recorded on the plat as easements; ~~100~~ **80** feet diameter with an asphalt surface, of 2 1/2" overlaying 6" of approved road base material.

02.08.067. Curves.

Reverse curves shall have a tangent of at least one hundred (100) feet unless, in the opinion of the Planning Commission, such in not necessary. Two curves in the same direction shall be separated by a tangent of at least 200 feet except that the Planning Commission may authorize a tangent of less than 200 feet where it can be shown that no appreciable traffic hazard will result therefrom.

02.08.068. Off-Setting Intersections.

All intersections shall be at right angles extending a minimum of 150 feet along the centerlines from the center of the intersection. Offset intersections will have a minimum offset of 120 feet between centerlines.

02.08.071. Street Curves.

Where the street lines within a block deflect from each other at any one point more than ten (10) degrees, there shall be a connecting curve. The radius of the curve for the inner street line shall be not less than 350 feet for arterial streets, 250 feet for collector streets, and 100 feet for minor streets.

02.08.072. Dead End Streets.

Dead-end streets shall be permitted only in cases where the Planning Commission is of the opinion that there is a reasonable expectation that such street will be extended to a suitable outlet when the adjacent property is platted. If the Planning Commission permits the platting of dead-end streets with the expectations of such future expansion, the Commission shall determine whether the Subdivider shall provide a temporary turn-around at the closed end of the street.

02.08.073. Horizontal Alignment.

The centerline of pavement shall coincide with centerline of the right-of-way, except for irregular rights-of-way.

02.08.074. Survey Monuments.

Survey monuments shall be placed in the subdivision as required by the town engineer.

02.08.075. Parking Lots and Driveways.

Parking shall meet the requirements of the zoning ordinance.

Parking lots and drives shall be designed to meet appropriate engineering standards, including drainage and load capacity. Driveway grades shall not exceed 12 percent.

Where observance of this standard is not feasible, the Town Council, subject to the prior recommendation of the planning commission shall have power to grant an exception.

No driveway providing access to a garage or off-street parking area within a lot shall have a downslope grade from the adjacent street to the garage or covered off-street parking area except when approved by the Planning Commission. The Planning Commission may approve a downslope driveway upon a finding that any drainage of surface water will be adequately diverted from entry into the dwelling, garage or other covered parking area and that the proposed diversion treatment will not impact adjacent properties. All drive and parking lot drainage, asphalt, and base design designs shall be reviewed by the town engineer or his/her designee prior to approval.

02.08.078. Curbs and Gutters.

Curbs and gutters shall be built on all existing and proposed streets required by the subdivision in accordance with the town Development Standards.

02.08.079. Easements.

Easements of not less than eight (8) feet on each side of rear lot lines and side lines and ten (10) feet along front lot lines will be required where necessary for poles, wire, conduits, sewers, gas and water mains, and other public utilities. Easements of greater width may be required along property lines where necessary for surface overflow or for the extension of main sewers or similar utilities.

02.08.080. Drainage.

The developer shall install a storm water drainage system pursuant to standards recommended by the town engineer or his/her designee. Potential groundwater of subsurface drainage problems may require additional requirements; further requirements will be reviewed and approved by the town engineer or his/her designee. Pumping of groundwater across sidewalks or into gutters will not be allowed.

02.08.090. Underground Utilities.

Utilities including electrical, telephone, and cable television lines, shall be underground to a minimum depth of 36 inches except when the town feels that such underground lines are not in the best interest of the town.

02.08.100. Licensed Contractor.

All work performed in accordance with this title shall be performed by a contractor licensed to perform such work by the State of Utah. A copy of Contractors State License shall be submitted to Town Clerk prior to commencing any work. A copy of Contractors State License shall be submitted to town clerk prior to commencing any work.

02.08.140. Standards for Construction Drawings.

For final plat requirements refer to the final plat application and checklist located in the appendix of this Title.

02.08.150. Testing.

A. *Quality Assurance.*

1. The developer or Contractor shall be responsible for all sampling, delivery of samples to a qualified testing agency, testing, and delivery of test results or materials certifications to Town at no charge to the Town. Testing and certifications reports shall be approved by the Town as to conformance to Town Standard Specifications prior to final inspection and/or acceptance by the Town of any materials or workmanship.

B. *Submittals.*

1. Field Test Report: When possible, submit original report

- immediately to Engineer or inspector, but in no case later than end of current day.
2. Laboratory Test Report: Submit original report to Engineer within 48 hours after test results are determined.
- C. *Sampling.*
1. The Town Engineer or Town Inspector may require that sampling be performed in their presence, in which case the Developer or Contractor shall be notified of this requirement in writing at the time the building permit is issued, or at the preconstruction meeting, or when construction drawings are released by the Town for construction, as applicable.
 2. The presence of a Town Inspector shall not relieve the Developer/Contractor of any requirement in Section 02.08.150.
 3. Each sample or test shall be accompanied by the following written data, which shall be reported to the Town with test results:
 - a. Name of Project
 - b. Name of Developer/Contractor
 - c. Project Street Address
 - d. Appropriate Test Name
 - e. Date of Sampling
 - f. Sample Number (if more than one sample per day)
 - g. Name of technician who performed the testing
 - h. Location of sample
- D. *Testing Agency.*
1. All materials testing, whether in a laboratory or in the field, shall be conducted by a testing agency approved by Town.

Chapter 02.10. Inspection.

02.10.010. All Work Subject to Inspection.

All construction work involving the installation of improvements in subdivisions shall be subject to inspection by the Town. The developer shall be responsible to provide inspection and certified reports from a qualified testing lab or engineering firm for the following inspections:

- A. Compaction of all trenches;
- B. Pressure tests on water mains;
- C. Slump tests and compression tests and air entrainment on all concrete work; and
- D. Compaction test on all subbase, untreated base course, and bituminous surface course.

Certain types of construction shall have continuous inspection while others may have

only periodic inspections. The requirement for continuous inspections shall be determined by the Town Engineer. It is the responsibility of the developer/subdivider to insure that all contractors give the Town appropriate notice to allow scheduling of said inspections.

- A. Inspection shall be required on the following types of work:
1. Laying of street surfacing.
 2. Laying of drainage pipe, water pipe, sewer pipe, valves, hydrants and testing.
 3. Sub-grade.
 4. Street grading and gravel base.
 5. Excavations for structures.
 6. Trenches for laying pipe.
 7. Forms for structures. No work shall be started except in the presence of, or with the prior approval of the town engineer or his/her designee.
 8. All proposed cuts and fills for street improvements.

02.10.020. Inspection Fees.

Inspection fees and/or connection fees required by ordinance shall be paid and permits required shall be obtained prior to the recording of final plat.

02.10.025. Acceptance of Improvements.

Inspection made by the town to determine compliance with the specifications does not imply acceptance of the work. The town requires completion of all facilities before any are accepted for maintenance. Final acceptance of improvements will be made by town council action, following inspection and written approval by the town engineer. All improvements shall be free from defects or damage at the time of inspection. Specifically the following are required:

1. All water valve boxes shall be raised to pavement level.
2. All water valves and hydrants shall be operative.
3. Grades. All grades and cut sheets shall be approved by and obtained from the town engineer or his/her designee.
4. Construction signs. The contractor shall furnish and maintain adequate construction signs and barricades to protect the public and shall meet the requirements of the Manual of Uniform Traffic Control Devices..
5. Clean-up. Where excavations are made in town streets, the rock, etc., shall be removed and gravel base placed in the excavation the same day as backfill is placed.

02.10.030. Requests for Inspection.

Requests for inspection shall be made to the town by the person responsible for the construction. Requests for inspection on work requiring continuous inspection shall be made three (3) days prior to the commencing of the work. Notice shall also be given 36 hours, excluding weekends, in advance, of the starting of work requiring periodic inspection.

02.10.040. Construction Completion Inspection.

An inspection shall be made by the town engineer or his/her designee after all construction work is completed. Any faulty or defective work shall be corrected by the persons responsible for the work within a period of thirty (30) days of the date of town engineer=s or his/her designee inspection report defining the faulty or defective work.

It is further agreed and understood that the determination for necessity of repairs and maintenance of the work rests with the town engineer or his/her designee. His/Her decision upon the matter shall be final and binding upon the developer, and the guarantee hereby stipulated shall extend to and include, but shall not be limited to the entire street base, and all pipes, joints, valves, backfill and compaction as well as the working surface, curb, gutter and other accessories that are, or may be affected by the construction operations, and whenever, in the judgement of the town engineer or his/her designee, shall cause a written notice to be served the developer and thereupon the developer shall undertake and complete such repairs, maintenance or rebuilding. If the developer fails to do so within ten (10) days from the date of the service of such notice, the town engineer

or his/her designee shall have such repairs made, and the cost of such repairs shall be paid by the developer together with twenty (20) percent in addition thereto as and for stipulated damages for such failure on the part of the developer to make the repairs.

02.10.050. Work Without Inspection.

Any work performed without proper inspections, as required above, will give the town the option of requiring removal and replacement of the un-inspected work. The town shall have the option of retaining part or all of the bond for two (2) years after installation of improvements in violation of this chapter. It is pertinent that the developer insure his/her contractors request all necessary inspections.

02.10.055. As-Built Drawings.

As-built drawing shall be submitted to the town engineer or his/her designee before final inspection and acceptance by the town. The portion of the bond generally released at final inspection will not be released until the as-builts are submitted and approved.

Chapter 02.12. Prerequisites of Contractors.

02.12.010. Prequalification.

Insurance.

The contractor shall not commence work in town property, streets, easements, or right-of-ways until he has obtained, as a minimum, the insurance required hereunder and evidence of such insurance has been submitted to and approved by the Town. The submittal of said evidence to the Town shall not relieve or decrease the liability of the contractor hereunder.

Workers= Compensation & Employers= Liability Insurance.

1. As required by State law.
2. Commercial General Liability Insurance - ISO Form CG 00 01 (11/85) or equivalent, occurrence policy, with the following information:
 - a. Limits of not less than -

- I. General Aggregate \$1,000,000
- ii. Products - Comp/OPS Aggregate \$1,000,000
- iii. Personal and Advertising Injury \$ 500,000
- iv. Each Occurrence \$ 500,000
- v. Fire Damage (any one fire) \$ 50,000
- vi. Medical Expense (any one person) \$ 5,000
- b. Endorsements attached thereto including the following or their equivalent:
 - i. ISO Form CG 25 03 (11/85), Amendment Of Limits Of Insurance (Designated Project or Premises), describing the subject contract and specifying limits as shown above.
 - ii. ISO Form CG 20 10 (11/85), Additional Insured -- Elk Ridge, Lessees, or Contractors (Form B), naming the Town as additional insured and containing the following statement, AThis Endorsement Also Constitutes Primary Coverage in the Event of any Occurrence, Claim, or Suit@.
 - iii. Automobile Liability Insurance, with
 - a. Limits of not less than \$1,000 Combined Single Limit per accident.
 - b. Coverage applying to any auto.

Elk Ridge requires all contractors doing work in or on any Town property, street, easement, or right-of-way to pre-qualify. A current contractor's license, insurance information, and an information sheet must be on file with the engineer's office, prior to any construction in present or proposed town streets.

A bond will be required with each project. Prior to any construction being completed in or on town property, streets, easements, or right-of-ways, a permit must be picked up and approved. The permit must be completed forty-eight (48) hours prior to construction. A notice must be given to the town engineer or his/her designee 24 hours prior to inspections. Failure to obtain a permit or proceeding without notification shall constitute grounds for legal action. The town will inspect all work. The contractor must make arrangements with the town for inspections. If work is performed without proper inspections or without pre-qualifying, the town may hold that portion of the bond for five (5) years after completion of improvements, or require reinstallation.

Prior to starting construction, the developer shall schedule with the town engineer or his/her designee a pre-construction meeting with all contractors and sub-contractors. Contractors are required to meet with the town engineer or his/her designee prior to commencing construction.

02.12.030. Street Excavation Permits.

In order for a street excavation permit to be approved, Elk Ridge needs the following

information: (1) Copy of Contractors License; (2) Certificate of Insurance; (3) Cash Bond of \$1,000.00; and (4) Detailed drawing of proposed work and traffic control (4 copies). The contractor is given a copy of the signed permit and the signed / approved plan after the town engineer or his/her designee has approved and signed the application. Time limits may be set; and the permit can be suspended for non-compliance.

Chapter 02.14. Earthwork.

02.14.010. General.

This section defines the requirements for excavation and backfill for structures, construction requirements for embankments and fills and subgrade preparation for pavements and other surface improvements.

02.14.020. Subgrade Soil.

Subgrade soil for all concrete structures, regardless of type or location, shall be firm, dense, thoroughly compacted and consolidated; shall be free from mud and muck; and shall be sufficiently stable to remain firm and intact under the feet of the workmen engaged in subgrade surfacing, laying reinforcing steel, and depositing concrete. Coarse gravel or crushed stone may be used for subsoil reinforcement if results are satisfactory to the town engineer or his/her designee. Such material shall be applied in layers, not exceeding 6 (six) inches in thickness, each layer being embedded in the subsoil by thorough tamping. All excess soil shall be removed to compensate for the displacement of the gravel or crushed stone and the finished elevation of any subsoil reinforced in this manner and shall not be above the specified subgrade.

02.14.030. Backfill Around Structures.

Backfill around structures shall be placed to the lines shown on the approved drawings, as directed by the town engineer or his/her designee. After completion of foundation, footings and walls and other construction below the elevation of the final grades, and prior to backfilling, all forms shall be removed and the excavation shall be cleaned of all trash and debris. Material for backfilling shall consist of excavated material or borrow of sand, gravel, or other suitable material, and shall be placed in layers not exceeding eight (8) inches in uncompacted thickness. Each layer shall be compacted by hand or machine tampers or by other suitable equipment to a density equal to ninety-five (95) percent of maximum dry density as measured by AASHTO T180 method C.

02.14.040. Construction of Embankments and Fills.

Unsuitable materials that occur in the foundation for embankments and fills shall be removed by clearing, stripping and/or grubbing. Where suitable materials occur, after stripping, the foundation shall be scarified to a depth of not less than six (6) inches, and the loosened material shall be moistened and compacted as hereinafter specified for each layer. All materials in embankments and fills shall be placed, moistened, and compacted as provided in the following paragraphs.

When the embankment or fill exceeds the amount of excavation, sufficient additional material shall be obtained from borrow pits provided by the contractor. All material proposed to be imported shall be subject to the review and approval of the town engineer or his/her designee prior to starting of hauling operations.

The materials used for embankment and fill construction shall be free from sod, grass, trash, rocks larger than six (6) inches in diameter and all other material unsuitable for construction of compacted fills. Grading of completed embankments and fills shall bring the surfaces to a smooth, uniform condition with final grades being within 0.1 foot of the design grade.

02.14.050. Compacting Earth Materials.

The material shall be deposited in horizontal layers having a thickness of not more than 6 (six) inches after being compacted as hereinafter specified; provided, that when mechanical equipment is used for placing and compacting the material on a sloping foundation, the layers may be placed parallel to the foundations. The distribution of materials shall be such that the compacted material will be homogeneous and free from lenses, pockets, or other imperfections. Prior to and during compaction operations the material shall have the optimum moisture content required for the purpose of compaction and the moisture content shall be uniform throughout the layers, insofar as practical. Moistening of the material shall be performed at the site of excavation, but such moistening shall be supplemented, as required by sprinkling at the site of construction. If the moisture content is more than optimum for compaction the compaction operations shall be delayed until such time as the material has dried to the optimum moisture content. When the material has been conditioned as hereinbefore specified, the backfill or embankment shall be compacted as follows:

- A. Under roadways and extending one foot beyond the proposed curb line the fill or embankment material shall be compacted to a density equal to not less than 95% of maximum dry density as measured by AASHTO T-180, Method C or the modified proctor test ASTM D-1557.
- B. Under driveways the fill or embankment material (to at least one foot each side of the edge of the slab) shall be compacted to a density equal to not less than 95% of maximum dry density as measured by AASHTO T-180, Method C or the modified proctor test ASTM D-1557.
- C. Other fills and embankments not listed above shall be compacted to a density equal to not less than 90% of maximum dry density as measured by AASHTO T-180, Method C or the modified proctor test ASTM D-1557.

02.14.060. Road Subgrade Preparation.

In both cut and fill areas the paving subgrade shall be scarified to a depth of ten (10) inches and compacted to the equivalent of ninety-five (95) percent of maximum dry density as measured by AASHTO T-180, method C or the modified proctor test ASTM D-1557. No rocks larger than two (2) inches in diameter, organic material, soft clay, spongy material or other deleterious material will be permitted in this scarified subgrade layer. Rough subgrades shall be shaped and graded to within a tolerance of 0.15 Feet of design grade and drainage shall be maintained at all times. The developer shall provide to the town engineer or his/her designee the results of a sub-surface investigation performed by the developer's engineer and the recommendation as to whether existing material is adequate for road construction. Sub-surface investigations should be done to determine if bank run is needed under the roadbase.

During the rolling operation, moisture content of the subgrade layer shall be maintained at no less than ninety-seven (97) or more than 105% of optimum moisture content. Rolling shall be continued until the entire road bed (to one foot back of road) is compacted to the specified density to a minimum depth of ten (10) inches.

02.14.070. Slope Safety.

All slope construction shall be in accordance with all Town, State and Federal regulations. Plans and Specifications for structures must be approved by the town if the excavation is greater than five (5) feet. No permanent slopes steeper than 3:1 shall be allowed without a retaining structure unless otherwise approved in writing by the town engineer or his/her designee. The width of the excavation shall be increased if necessary to provide space for sheeting, bracing, shoring and/or other supporting installations. Unsafe slopes will be the cause for immediate shutdown of the project.

02.14.080. Water Settling.

Water settling may be permitted with preapproval by the town engineer or his/her designee, depending upon the type of soil and location. When water settling is approved, a Town representative shall be at the job site during the compaction. When the material has dried sufficient to allow compaction tests, the contractor shall dig test holes for compaction tests at locations and depths required by the town engineer or his/her designee.

02.14.090. Removal and Replacement of Defective Fill.

Fill not conforming to the requirements of this specification shall be reworked to the requirements or removed and replaced with acceptable fill.

Chapter 02.16. Excavation and Backfill for Trenches.

02.16.010. General.

These specifications cover excavation and backfill of trenches for the installation of storm sewer, sanitary sewer, and water lines in streets and subdivisions.

02.16.020. Trench Safety.

All construction shall be done in accordance with the provisions of the Utah State Industrial Commission and OSHA regulations. No trenches shall be left open at any time unless guarded with adequate barricades, warning lamps and signs.

When required, excavation shall be braced and shored to support the walls of the excavation to eliminate sliding and settling and as may be required to protect the workers, the work in progress, and existing utilities and improvements. All such sheeting, bracing and shoring shall comply with the requirements of the Utah State Industrial Commission and OSHA.

Any injury or damage resulting from lack of adequate bracing and shoring shall be the responsibility of the developer/contractor and the developer/contractor shall, at his/her own expense, effect all necessary repairs or reconstruction resulting from such damage. No inspections will be done in unsafe trenches and will be the cause for immediate shutdown at the project.

02.16.030. Dewatering Excavation Area.

All seepage or storm water that may occur or accumulate in the excavation during the progress of the work shall be removed. In areas where the nature of the soil and the hydrostatic pressures are of such a character as to develop a quick condition in the earth mass of the trench, the DEWATERING operation shall be conducted so that the hydrostatic pressure will be reduced to or near zero in the immediate vicinity of the trench. All excavations shall be kept entirely free of water at all times during the construction of the work or until otherwise directed by the town engineer or his/her designee.

02.16.040. Gravel Foundation for Pipe.

When the subgrade material does not afford a sufficiently solid foundation to support the pipe and superimposed load; where water must be drained to maintain a dry bottom for pipe installation and at other locations as previously defined, the subgrade shall be excavated to the specified depth and replaced with crushed rock or gravel conforming to the following gradation:

<u>SCREEN</u>	<u>% PASSING</u>
1"	100
2"	5

The gravel material shall be deposited over the entire trench width in six (6) inch maximum layers, each layer shall be compacted by tamping, rolling, vibrating, spading, slicing, rodding or by a combination of one or more of these methods. In addition the material shall be graded to produce a uniform and continuous support for the installed pipe.

02.16.050. Disposal of Materials.

All excavation material, which is not required for or is unsuitable for backfill, shall be immediately removed from the area and not obstruct streets, and driveways. Storm ditches shall be kept clean of excavated material.

02.16.060. Trench Backfill.

General. The term backfill as hereafter used has reference to the filling of the trench to the natural ground level or to the grade line.

A. *Backfill Around Concrete.*

1. Granular material containing no rocks larger than two (2) inches for pipe sizes of eight (8) inches to twenty-four (24) inches in diameter.
2. Maximum rock size of three (3) inches for bedding of pipe over twenty-four (24) inches in diameter
3. Granular material shall be well graded as to participle size and distribution.
4. Granular materials shall be placed under and around the pipe in horizontal layers not to exceed 6 inches and tamped by hand or pneumatic tampers up to the lower one-sixth (1/6) of the outside diameter of the pipe and with a minimum of three (3) inches below the pipe. The pipe shall be covered to at least six (6) inches above the top of the pipe using the same material.

- B. *Backfill Around Corrugated Steel, Plastic, Polyethylene or Other Fragile Materials.* Back fill around these types of pipe shall be minus one (1) inch granular material. It shall be placed at least three (3) inches below the pipe and to the center of the pipe and compacted to a minimum of ninety percent (90%) of the maximum density as per AASHTO T-180 method C. Then backfill will be placed in horizontal layers not to exceed six (6) inches or as approved in writing by the town engineer or his/her designee. The pipe shall be covered with the same material up to twelve (12) inches above the top of the pipe.
- C. *Backfill Around Ductile Iron and Steel Pipe.* Under no circumstances shall the granular material around the pipe exceed two (2) inches in diameter.

02.16.070. Backfill for Pipe on Hard Foundations.

In no case shall pipe be laid directly on rock, hard clay, shale or other hard material. Where foundations are of this nature, the contractor shall excavate a space below the pipe and backfill it with bedding material. Under these circumstances the depth of the bedding material shall not be less than one-half inch (2") per foot of height of fill above the pipe with a minimum allowable thickness of four inches (4"). The remaining backfill shall be in accordance with the procedure outlined in Section 02.16.040.

02.16.080. Backfilling Above Pipe Zone and Consolidation of Backfill.

Backfill shall be carefully placed around and over pipes and shall not be permitted to fall directly on a pipe from such a height or in such a manner as to cause damage. In these specifications the process of preparing the trench bottom to receive the pipe and the backfilling on each side of the pipe to a level over the top of the pipe is defined as bedding. Bedding requirements are as defined in the specifications for each specific pipe material.

Trench backfilling above the level of the pipe bedding shall normally be accomplished with native excavated materials, unless such material cannot be properly compacted, and shall be free from rocks larger than six (6) inches in diameter and any organic material or debris.

The backfill in all utility trenches shall be either compacted or consolidated according to the requirements of the materials being placed. Under pavements, or other surface improvements the in place density shall be a minimum of ninety-five (95) percent of laboratory standard maximum dry density as determined by AASHTO T-180, method C or the modified proctor test ASTM D-1557. In shoulders and other areas the in place density shall be a minimum of ninety (90) percent of the maximum dry density as determined by the same laboratory method.

02.16.090. Compaction and Consolidation of Backfill.

- A. *Compaction of Backfill.* Backfill shall be compacted by means of sheepsfoot rollers, pneumatic tire rollers, vibrating rollers, or other mechanical tampers of a size and type approved by the town engineer or his/her designee. During compaction, the material shall be placed at a moisture content such that after compaction, the required relative densities will be produced; also the material shall be placed in lifts which, prior to the compaction, shall not exceed twelve (12) inches or as approved in writing by the town engineer or his/her designee. Prior to compaction each layer shall be evenly spread, moistened, and worked by disk harrowing, or other means approved by the town engineer or his/her designee. If the required relative density is not attained, test sections will be required to determine any adjustments in compacting equipment, thickness of layers, moisture content and compactive effort necessary to attain the specified minimum relative density. Approval of equipment, thickness of layers, moisture content and compactive effort shall not be deemed to relieve the contractor of the responsibility for attaining the specified minimum relative densities. The contractor in planning his/her work shall allow sufficient time to perform the work connected with the test sections and to permit the town engineer or his/her designee to make test for relative densities.
- B. *Consolidation of Backfill.* When authorized by the town engineer or his/her designee, shall be accomplished by those methods in which water is used as the essential agent to produce the desired condition of density and stability. Water shall be applied by jetting unless flooding is specifically authorized by the town engineer or his/her designee. Authorization by the town engineer or his/her designee to use any consolidation method does not relieve the contractor of his responsibility to meet the specified density requirements. Water for consolidation shall be furnished by the contractor at his/her own expense. In the jetting procedure the jets shall be inserted at not more than four-foot intervals (staggered) throughout the length of the backfilled area and shall be slowly forced down to the bottom of the trench or top of previously jetted lift and held until the trench backfill is completely saturated with water. Depth of jetted lift shall not exceed 5 feet. All water consolidation shall be performed as per Section 02.14.090.
- C. *Imported Backfill Material.* In the event the native excavated material is not satisfactory for backfilling as determined by the town engineer or his/her designee, the contractor shall provide imported granular material. This granular material shall pass a 4-inch square sieve and shall not contain more than fifteen (15) percent of material passing a 200-mesh sieve, and shall be free from sod, vegetation and other organic or deleterious materials.
- D. *Disposal of Excess Materials.* All excess materials shall be hauled away from the construction site and disposed of by the contractor.
- E. *Compaction tests on trenches* shall be conducted at a minimum of each 150 linear feet of trench, around manholes, valve boxes, and each lateral per lift.

02.16.100. Cutting of Asphalt.

Where the excavation is made in a paved street, the asphalt surface shall be cut on each side of the trench prior to excavation to provide a vertical joint in the surface. Cutting of the asphalt will be made with an asphalt saw.

02.16.100. Curb and Gutter.

- A. Curb, and Gutter. Where curb, and gutter exists, excavation may be made by tunneling provided the following requirements are met. Excavation shall be vertical and as near to the curb as possible. The length of the tunnel shall not exceed the width of the curb and gutter. At least three feet of undisturbed earth shall be left under the curb. Where the excavation does not meet these requirements, a section of curb from joint to joint shall be removed and replaced.
- B. Gas Lines and Water Lines may be jacked, augured or jetted under curb and gutter provided the resulting hole diameter does not exceed one (1) inch plus the outside diameter of the pipe installed.
- C. Backfill of Sidewalk Tunnels. Where the curb has been tunneled, the hole shall be filled from each end with earth compacted with mechanical tampers to 90% of AASHTO T-180, Method C. A 3'-0" section of trench on each side of the tunnel and any space between the curb shall be backfilled with mechanically compacted earth as specified.

02.16.120. Testing.

Tests to determine acceptability of backfill placed will be done by a firm hired by the developer. The testing company/developer will use standard procedures of the American Society of Testing Materials (ASTM) and/or American Association of State Highway Transportation Officials (AASHTO). If the backfill so tested does not meet the requirements of these specifications, the trench shall be re-excavated and the backfill replaced in accordance with these specifications.

02.16.130. Blasting.

Blasting will not be allowed except by permission from the town engineer or his/her designee. The contractor shall comply with all laws, ordinances, and applicable safety code requirements and regulations relative to the handling, storage, and use of explosives and protection of life and property. He/she shall be fully responsible for all damage attributable to his/her blasting operations.

Excessive blasting or overshooting will not be permitted and any material outside the authorized cross section which may be shattered or loosened by blasting shall be removed by the contractor.

Chapter 02.18. Water Lines.

02.18.010. General.

These specifications cover the installation of culinary water lines. Special and unusual piping and plumbing for equipment or structures are treated as separate items and are not included in this item.

- A. *Inspection.* All pipe used shall be carefully inspected prior to installation. Any or all defective pipe shall be rejected.
- B. *Care and Handling of Pipe.* Adequate precautions shall be taken to prevent damage to piping and protective coatings. Proper implements, tools, and facilities shall be provided and used for safe and convenient prosecution of the work. Pipe placed in trenches shall be lowered in place piece by piece by means of ropes, booms, or any type of power equipment sufficient to handle each piece separately. In no case shall pipe be allowed to fall freely from the top to the bottom of the trench.
- C. *Pipe Cleanliness.* All foreign matter or dirt shall be removed from the inside of the pipe before it is placed and it shall be kept clean during and after laying.
- D. *Minimum Cover.* All water mains and service laterals shall have a minimum cover of 4 feet to the top of the pipe.

02.18.20. Pipe Installation.

- A. *General.* The pipe shall be installed in accordance with the best current practices. Under no circumstances will any pipe be laid until inspection is complete and elected samples have adequately passed the requirements of the applicable specification. All pipe shall be laid true to line and grade where indicated.
- A slight excavation for the barrel of the pipe shall be maintained by a slight excavation for the bell at the joints.
- B. *Rubber Gasket Joints.* All rubber joints shall be completed in accordance with installation instructions supplied by the manufacturers of the pipe, taking particular care to avoid twisting of the pipe or otherwise causing damage to the gasket. All joints to be deflected shall be laid straight and then deflected after the joint is completed. Backfill may or may not be done prior to placing the next section of pipe at the option of the contractor, but subsequent adjustment or damage to jointing shall require the pipe section to be removed, cleaned and rejoined as for new pipe at the contractor's own expense.
- C. *Connection to Existing Water Lines.* Information on the drawings regarding existing water lines is taken from "as-constructed" drawings from the town or utility company files and may or may not be accurate as to size, type of material or location. The Contractor will be responsible to determine the proper fittings and materials required, obtain the town engineer or his/her designee's approval of

Where the planned connection, and perform the construction in a suitable fashion. fitting sizes, such as Tees and Crosses, are shown on the plans, those sizes will be used. However, no attempt has been made to show all needed fittings or materials.

02.18.030. Ductile Iron Pipe.

- A. *Materials.* Ductile iron pipe shall conform to all requirements of ANSI/AWWA C151/A21.51, "American National Standard for Ductile Iron Pipe, Centrifugally Cast in Metal Molds or Sand-Lined molds, for Water or Other Liquids." Minimum pressure Class will be 250 for pipes larger than 12-inch diameter. Pipes of 12-inch diameter and smaller shall be pressure Class 350. All pipe shall be made of good quality Ductile Cast Iron and of such chemical composition and structure as is required to meet the physical and mechanical property requirements of the standard and wrapped with polywrap as per AWWA C105.
- B. *Joints.*
1. *Mechanical Joints.* All mechanical joints shall meet requirements of ANSI/AWWA C111/A21.11. All gasket surfaces shall be smooth and free from imperfections. Gaskets shall conform to tests in accordance with specifications and shall be less than one year old.
 2. *Push-on Joints.* All push-on joints shall meet the requirements of ANSI/AWWA C111/A21.11. Gaskets shall be free from defects and not over one year old. Lubricants shall be non-toxic and have no deteriorating effects on gasket materials. It shall not impart taste to water in a pipe. It shall conform in every way to ANSI 21.11.
 2. *Flanged Joints.* Flanges shall meet the requirements of ANSI/AWWA C110/A21.10, "American National Standard for Ductile Iron and Gray Iron Fittings, 3-inch Through 48-inch for Water and Other Liquids." Flanged joints shall be bolted firmly with machine, stud or cap bolts of proper size. Flange maybe cast integrally with the pipe or may be screwed on threaded pipe. Flanges shall be faced and drilled and of proper dimensions for size and pressure required. Bolts and nuts, unless otherwise specified, shall be made of the best quality refined iron or metal steel and have clean, well-fitting threads. Bolts will be provided with standard hexagonal nuts and standard hexagonal heads. Bolts shall be of the diameter required for each flange and when installed shall be of length so that no more than 3/8-inch nor less than 1/8-inch extends past face of nut. [All buried fittings having steel bolts shall be coated with a non-oxide wax and wrapped with polyethylene]. Gaskets shall be rubber, either ring or full face, and are 1/8th-inch thick. A gasket for each flanged joint of proper size as shown on the drawings.
- C. *Coatings and Linings for Ductile Iron Pipe.* All exterior surfaces of pipe and

fittings shall be coated with hot coal tar approximately 1 mil thick. All interior surfaces shall be cement mortar lined with a standard thickness according to ANSI/AWWA C104/A21.4-80.

- D. *Flanges.* Flanges when required shall conform to ANSI/AWWA C115/A21.15-83.
- E. *Fittings.* Fittings for Ductile Iron Pipe shall conform to the provisions of ANSI/AWWA C110/A21.10-82 or C153/A21.53-58.

02.18.040. PVC Pipe.

- A. *Materials.* Pipe for the transmission and distribution of water shall be manufactured in accordance with AWWA C900-81, "AWWA Standard for Polyvinyl Chloride (PVC) Pressure Pipe, 8-inch through 12-inch, for Water". The PVC pipe shall have a cast-iron-pipe-equivalent outside diameter. All PVC pipe shall have a working pressure of 250 PSI.
- B. *Joints.* Joints shall be push on rubber gasket type. Lubrication shall be water soluble, non-toxic, non-objectionable in taste and odor imparted to the water, non-supporting of bacteria growth, and have no deteriorating effect on the PVC pipe or rubber gaskets.
- C. *Fittings.* All fittings to be used with the PVC pipe shall be the same as fittings for Ductile Iron Pipe and shall conform to the provisions of ANSI/AWWA C110/A21.10-82 or C153/A21.53-58.
- D. *Magnetic Locator Tape.* All pipe shall include a 3-inch magnetic locator tape installed in the pipeline trench approximately 12-inches below the ground surface. A tracer wire shall be installed with the pipe and attached to all hydrants and valves.
- E. *All PVC pipe* being inserted into fittings shall have the bevel end removed.

02.18.050. Valves.

- A. *Resilient Seated Gate Valve.* Valves in sizes 4" through 10" shall be of the iron body, non rising bronze stem, resilient seated type, manufactured to equal or exceed all applicable AWWA standards of C-509 latest revision and all specific requirements outlined in these specifications.
1. Valves shall open left and be provided with 2" square operating wrench nuts unless otherwise specified.
 2. When valves are Mechanical Joint, they shall be furnished with all necessary glands, followers, and bolts and nuts to complete installation.
 3. The disc shall have integrally cast ASTM B-62 bronze stem nut to prevent twisting, binding or angling of the stem. Designs with loose stem nuts are not acceptable.
 4. Bronze valve stems shall be interchangeable with stems of the double disc valves of the same size, direction of opening and manufacture.
 5. All internal ferrous surfaces shall be coated, holiday free, to a minimum thickness of 4 mils with a two part thermo setting epoxy coating. Said coating shall be non-toxic, impart no taste to the water, formulated from materials deemed acceptable in the Food and Drug Administration Document Title 21 of the Federal Regulations on food additives, Section 121.2514 entitled Resins and Polymeric Coatings. It shall protect all seating and adjacent surfaces from corrosion and prevent build-up of scale or tuberculation.
 6. The sealing element shall be secured to the disc with self locking stainless steel screws, and it shall be field replaceable, and shall be such that it cannot be installed improperly.
 7. Stem failure from over torquing in either the open or closing position shall occur externally at such a point as to enable the stem to be safely turned use of a readily available tool after exposure of the valve through excavation.
 8. Valve design shall incorporate a positive metal to metal stop to prevent over-compression of the sealing element.
 9. A full faced composition gasket placed between machined body and bonnet flanges is required to eliminate cold flow or creep action present with "O" ring gasketed bodies.
 10. The exterior of the valves shall be Asphalt Varnish, JAN-P-450. If exterior epoxy is used, all bolts and nuts shall be made of Stainless Steel to prevent galvanic corrosion of said nuts and bolts due to insulation from the ferrous valve and line.

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- B. *Butterfly Valve.* Unless otherwise noted, all valves 12" and larger shall be butterfly valves conforming to the latest revision of AWWA Standard C-504, Class 250-B, and shall comply with the following:
1. Valve bodies shall be cast iron, ASTM A-126 Class B. Body ends shall be flanged with facing and drilling in accordance with ANSI B16.1, Class 125; or mechanical joint in accordance with AWWA C-111. All mechanical joint end valves shall be furnished complete with joint accessories (bolts, nuts, gaskets, and glands). All valves shall conform with AWWA Standard C-504, Table 3, Laying Lengths for Flanged Valves and Minimum Body Shell Thickness for all Body Types.
 2. Valve disc shall be ductile iron ASTM A-536, grade 65-45-12. Valve disc shall be of the offset design providing 360 degree uninterrupted seating.
 3. The resilient seat shall be natural rubber bonded to an 18-8, Type 304 stainless steel retaining ring secured to the disc by 18-8, Type 304 stainless steel screws. The seat shall be capable of mechanical adjustment in the field and field replaceable without the need for special tools. Valve body seat shall be 18-8, Type 304 Stainless Steel.
 4. Valve shafts shall be 18-8, Type 304 stainless steel. Shafts shall be of the two piece stub design and attached to the disc by means of "O" ring sealed taper pins with lock nuts.
 5. The valve assembly shall be furnished with a non-adjustable factory set thrust bearing designed to center the valve disc at all times.
 6. Shaft bearings shall be contained in the integral hubs of the valve body and shall be self-lubricated sleeve type.
 7. Valve shaft seal shall consist of "O" Rings. Where the valve shaft projects through the valve body for actuator connection, the "O" Ring packing seal shall be field replaceable as a part of a removable bronze cartridge.
 8. When manual actuators are required they shall be of the traveling nut design capable of withstanding 450 foot pounds of input torque against the open and closed stops. All actuators shall have adjustable mechanical stop limits. The closed position stop shall be externally adjustable. Valves shall be installed with the shaft horizontal unless otherwise directed by the Engineer and shall be provided with a 2-inch square operating nut for manually operating the valve with a "T" handle wrench.
 9. All valves shall be coated with epoxy in conformance to AWWA Standard C-550, latest revision. Interior wetted ferrous surfaces shall be coated a nominal 10 mils thick for long life; and body exterior shall have a minimum of 3 to 4 mils coating thickness in order to provide superior base for field-applied finish coats.
- C. *Valve Boxes.* All buried valves shall be installed complete with two-piece, cast iron, slip type, 5-1/4-inch shaft valve box with drop lid. The lid shall have the word "Water" cast in the metal.

Valves and valve boxes shall be installed where shown on the drawings. Valves and valve boxes shall be set plumb. Valve boxes shall be centered directly over

the valve. Valves shall be aligned with property lines where possible. Earth fill shall be carefully tamped around the valve box to a distance of four (4) feet on all sides of the box, or to the undisturbed trench face if less than four (4) feet.

- Valves shall have the interiors cleaned of all foreign matter before installation. All valve boxes located in streets shall be installed as nearly to grade as possible. After the pavement is in place, the valve boxes shall be raised to grade, the surrounding asphalt shall be neatly cut to form a 2 foot square opening with the valve box centered, and a concrete collar shall be cast around the box. Valve boxes in off-road areas shall extend six (6) inches above grade. Lid detail shall be similar to Comco C-6517.
- D. *Couplings.* Couplings shall be equal to the product of Smith-Blair or Dresser cast iron couplings being used on all cast iron and PVC pipe. Couplings shall be of the straight, transition, or reducing style as required by the specific installation. All steel fittings and bolts shall be coated with a non-oxide coating and wrapped with polyethylene.
- E. *Pressure regulation valves* which are required in a development shall be designed by the developers engineer and the design shall be submitted to the town engineer or his/her designee for review prior to starting construction.

02.18.060. Fire Hydrants.

Fire hydrants shall be set vertical and held in place by adequate concrete blocking which shall be left in the trench. A gravel filled drip area shall be provided. See Standard Detail for Fire Hydrants, Town Drawings.

Hydrants shall be set at a height that will allow approximately two (2) inches exposed between the finished ground and the sidewalk flange.

Fire hydrant location to be set by Town.

Fire hydrants shall be 6 inch waterous cast iron, Muller Modern Construction or approved equal, and conform to Specification C-502-64 of the American Water Works Association, including a 6 inch gate valve and valve box complete for a 4' 6" trench with one 4 2 inch streamer nozzle and two 2 2 inch hose nozzles. Hydrants shall open to the left and be frost proof. The threads shall be National Standard Fire Hose Thread. All outlets will have a national standard thread and the hydrant shall be red in color. Spacing of fire hydrants shall be according to the Uniform Fire Code and/or Town Standards. No lot shall be more than 250 feet from a fire hydrant, nor shall fire hydrants be spaced more than 500 feet apart as measured along the street right-of-way line.

02.18.070. Water Main Locations.

Water mains shall be located on either the north or east sides of a roadway and ten feet from the centerline.

Water mains shall be minimum one (1) foot vertical above the sewer. Separation between water and sewer mains shall be 10 feet (horizontally) minimum unless authorized in writing by the town engineer or his/her designee.

02.18.080. Water Meters and Service Lines.

Prior to the installation of the water service line, the engineer retained by the developer shall stake out the water meter location and provide the grade at which the lid is to be set. All water service lines shall start with a corporation stop at the main and shall be of type "K" copper and meter setters of twenty-one (21) inch or taller and are braced and meet height specs in thirty-six (36) inch can with four (4) inch ring lid and shall be used and installed with the top of the setter at a depth of not less than eighteen inches and not more than twenty-two (22) inches from the lid of the meter box. Setters shall have dual check valves. Meter boxes shall be placed in the town right of way within 2 feet of property line so that a fence may be placed on property without interfering with the maintenance and reading of said meter. No meters shall be set in sidewalks or driveways. Meter boxes shall be in good repair and relatively free from obstruction to insure ease in maintenance and reading, (not full of dirt past the base of the meter, having trash present and being badly bent to create a hazard). Damaged boxes shall be replaced. Meter boxes shall be from level to one inch high from the final grade of sidewalk. See detail.

Water mains shall be minimum one (1) foot vertical above the sewer. Separation between water and sewer mains shall be 10 feet (horizontally) minimum unless authorized in writing by the town engineer or his/her designee.

02.18.090. Water Meter Standards.

Water meters will not be placed in driveways or under sidewalks. If a water meter must be moved out of a driveway, the maximum lateral movement is 24 inches. If it must be moved more than 24 inches, a new service line must be installed and the old service lines corp stop shut off.

02.18.100. Tapping of Water Lines.

Tapping valves may only be used when previously approved by the town engineer or his/her designee. Tapping saddles with an AO@ ring may be used if the water main line to be tapped is larger than the new water main line. Where the tap is the same size as the existing main, wrap around stainless steel tapping sleeves shall be used, which encase the full perimeter of the pipe. The valve shall be a tapping valve with a guide lip on the flanged side. The opposite side of the valve shall have a mechanical joint connection. Service taps shall be a minimum of 24" apart. No taps will be allowed within 24" of the end of the pipe.

02.18.120. Testing and Flushing.

A minimum pressure 50% in excess of the maximum line operation pressure shall be maintained on the portion being tested for a minimum period of two (2) hours, using either pneumatic or hydraulic means to maintain the pressure.

After pressure testing, all pipelines shall be flushed. Flushing shall be accomplished through hydrants or, if a hydrant does not exist at the end of the line, the contractor shall install a tap sufficient in size to provide for 2.5 foot-per-second flushing velocity in the line.

A leakage test shall be conducted concurrently with the pressure test.

1. *Leakage defined.* Leakage shall be defined as the quantity of water that must be supplied into the newly laid pipe, or any valved section thereof, to maintain pressure within 5 psi of the specified test pressure after the air in the pipeline has been expelled and the pipe has been filled with water.
2. *Allowable leakage.* No pipe installation will be accepted if the leakage is greater than that determined by the following formula:

$$L = \frac{SD(P)^{0.5}}{133,200}$$

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

- a. Allowable leakage at various pressures is shown in Table 1.
 - b. When testing against closed metal-seated valves, an additional leakage per closed valve of 0.0078 gal/hr/in. of nominal valve size shall be allowed.
 - c. When hydrants are in the test section, the test shall be made against the closed hydrant.
3. *Acceptance of Installation.* Acceptance shall be determined on the basis of allowable leakage. If any test of pipe laid discloses leakage greater than the Contractor shall, at its own expense, locate and repair the defective material until the leakage is within the specified allowance.

All visible leaks are to be repaired regardless of the amount of leakage. All new water systems or extensions to existing systems shall be thoroughly flushed before being placed in service. Flushing shall be accomplished through hydrants, or end of line blowoff assemblies at a minimum flushing velocity of 2.5-feet per second.

The following is the flow quantity required to provide a 2.5 foot-per-second flushing velocity.

PIPE SIZE (IN)	FLOW (G.P.M.)
4	100
6	220
8	390
10	610
12	880
16	1567

02.18.130. Disinfection of Water Lines.

Disinfection of water mains shall be done in accordance with the latest edition of AWWA C651.

The pipe shall be clean prior to disinfection. If in the opinion of the Town, contamination is such that it cannot be removed by flushing, the pipe shall be cleaned by mechanical means and then swabbed with a one percent (1%) hypochlorite disinfection solution.

The pipeline shall be disinfected as outlined in AWWA C651. The tablet method shall consist of placing calcium hypochlorite tablets at the specified rate in the main during construction at the upstream end of each section of pipe. The tablet shall be attached with an adhesive, such as Permatex No. 1 or equal. The line shall then be filled slowly (velocities less than 1 ft/sec), expelling all air pockets and maintaining the disinfection solution in the line for at least twenty-four (24) hours, forty-eight (48) hours if the water temperature is less than forty-one degrees (41) F. The disinfection solution shall have a concentration of at least twenty-five (25) mg/l of available chlorine. The continuous feed shall be done exactly as outlined in AWWA C651 and shall have a twenty-five mg/l available Chlorine after twenty-four (24) hours. Under both methods the contractor shall not be allowed to flush the line until the chlorine residual test has been passed by the Town.

After the chlorination, the line shall be thoroughly flushed with velocities greater than 2.5 ft/sec with clean water and if necessary re-chlorinated until satisfactory bacteriological testing is obtained. If any of the tests fail the contractor shall be responsible for the fees of additional tests. All new lines shall be isolated from existing lines when tested. Following the approval of the testing and installation of a water main, the entire water line will be flushed through the end of the main via an approved outlet.

The developer shall take bacteria samples at the sites designated by the town engineer or his/her designee for each job, based on the following formula:

1. A. Minimum of 1 sample up to 200 feet.
B. Minimum of 2 samples up to 600 feet. (One in the middle and one on the end).
C. Minimum of 1 sample every 600 feet.
D. Sampling points to be established during the pre-construction meeting for each project.
2. If any sample point fails on the first test, the line will be flushed and re-tested at all sample points.
3. If any sample point fails a second time the complete line will re-disinfected and re-tested at all sample points.
4. If any samples come back marked Apresence@, which means coliform bacteria is present, the line will be re-disinfected and re-tested at all sample sites.

Water services will not be installed until bacteria sample results have been approved by the town engineer or his/her designee.

Chapter 02.22. Sewer Lines.

02.22.010. General.

These specifications cover the installation of sewer lines. Excavation and backfill of trenches are specified in Section 02.16. The minimum cover of sewer laterals is at 3' 6" at the property line.

02.22.020. Pipe.

A. *Concrete Sewer Pipe.* All sewer pipe 18" inch and larger shall be concrete. All pipe to be used shall be new and shall be of the type described as rubber gasket concrete sewer pipe, and shall conform to the following requirements: 18-Inch and larger diameters. Pipe with these diameters shall be reinforced concrete pipe conforming to the class as shown on the plans of ASTM Specification designated C76 or ASTM C655 as applicable. Pipe with these diameters shall be supplied in lengths of not less than seven and one-half (7 2) feet. Cement used in the pipe shall be Type II, as described in ASTM C15C. Pipe Joints shall conform to ASTM Specification C443 and shall be of the bell and spigot type, and shall be so designated as to provide for self-centering and, when assembled, to compress the gasket to form a watertight seal. Rubber Ring Gaskets for use on concrete pipe with rubber gasket joints shall be molded or extruded and cured in such a manner that any cross section will be dense, homogeneous, and free from porosity and other imperfections. The gaskets

shall be extruded or molded to the specified size within a tolerance of plus or minus 1/32 of an inch for any diameter measured at any cross section. The gaskets shall be fabricated from a high-grade tread-type compound. The basic polymer shall be natural rubber, or a copolymer of butadiene styrene synthetic. The gaskets shall meet the physical tests requirements in ASTM Designation C443.

B. *PVC Sewer Pipe.* All sewer pipe 8-Inch to 15-Inch pipe shall conform to ASTM 3034 and polyethylene pipe shall conform to ASTM F 405 and ASTM F 667. PVC shall have a minimum wall thickness of SDR 35; however the town engineer or his/her designee may require a heavier wall thickness when needed. The pipe shall be bedded in one (1) inch minimum granular material with the pipe

haunches compacted to 90% of optimum density by the AASHTO T-99 test. The pipe must have a minimum of twelve (12) inches of bedding gravel over the top of the pipe. pipe buried more than twelve (12) feet deep shall require manufacturing and engineering specifications to be submitted to the town engineer or his/her designee for written approval. Joints shall be water tight unless otherwise approved by the town engineer or his/her designee. In no case shall pipe be accepted that has a deflection of more than 5% after it has been backfilled. A pipe deflection test shall be required of the Developer/Contractor after backfilling and compaction of the trench.

02.22.030. Laying.

Under no circumstances shall any pipe be laid until inspection is complete adequately passed the requirements indicated above. All pipe shall be laid true to line and grade with the bell end up grade. All pipe shall be laid up grade with a suitable excavation for the bell. Special care shall be taken that pipe is well bedded on a solid foundation throughout the length of the barrel. The bedding of all pipe shall conform at least to the characteristics of Class C bedding except as herein designated by the engineer. No length of pipe shall be laid until the preceding length has been thoroughly embedded and secured in place, so as to prevent any movement and selected samples have or disturbance of the finished joint. For the purpose of maintaining grades, grade stakes may be required. Each section of pipe shall be checked for alignment and grade before each joint is made. If a laser beam is used, a grade stake shall be established at each manhole and a maximum of 200 feet apart.

Jointing. All rubber gasket joints shall be completed in accordance with installation instructions supplied by the manufacturers of the pipe, taking particular care to avoid twisting of the pipe or other damage to the gasket. After jointing, approved backfill material shall be placed along the lower half of the pipe section and tamped thoroughly so as to maintain the section firmly in position. Any subsequent adjustment or damage to jointing shall require the pipe section to be removed and rejoined as for new pipe.

02.22.040. Manholes and Appurtenances.

- A. *Manholes* shall be precast reinforced Portland Cement Concrete. Excavation and concrete shall conform to applicable specifications meeting ASTM C478. Concrete shall be low alkali Type II.
- B. *Manhole Frames and Covers.*
Material. All castings shall be of ASTM A-48, Class 35 iron free from blowholes and shrinkage defects. Castings shall be free from fins and burrs and shall be shot-blasted to remove sand and other foreign matter. Freedom from cracks and defects shall be ascertained by the engineer prior to installation.
Type of Cover and Frames. Manhole covers and frames on all manholes shall be standard circular, solid, non-rocking type with pick hole with the word Asewer@ cast on the cover. Clear openings shall be of the diameter shown on the plans. The minimum weight of the cover shall be one hundred sixty (160) pounds. The minimum weight of the frame shall be two hundred eighty (280) pounds. (COMCO A-1180 or A-1181 as required).
After castings have seasoned sufficiently so that there will be no further distortion due to temperature changes, the cover and ring seat shall be machined so the entire area of the seat will be in contact with the cover, in any position of the cover on the seat.
The tops of the cover and frame shall be flush and there shall be one-eighth inch (1/8") clearance all around the periphery of frame between the cover and the frame.
- C. *Manhole Construction-Precast Manholes.* Precast manholes shall be constructed as indicated on the standard plans. Bases for precast units shall be constructed in place and shall conform to specifications for "manhole bases" as herein specified. The walls of the manhole above the base shall be built up to such an elevation of the street or natural ground surface, whichever is applicable. Manholes shall be plumb and so positioned that the center line of the manhole is coincidental with the center line of the sewer line. Fiberglass steps shall be installed and offset cones providing a direct vertical step onto the steps from the top of the manhole.
- D. *Manholes* will be 48" I.D. under 18" main line and 60" I.D. for 18" and larger sewer mains.

02.22.050. Manhole Bases.

Manhole bases shall be constructed of concrete to the dimensions shown on the drawings. Main line sewer pipe and projecting ends of the sewer and pipe stubs shall be adequately supported to prevent displacement from line or grade during installation of the base. All manholes shall have the invert shape as indicated on the "Standard Details" to provide an adequate channel between the inlet and outlet pipes. The entire surface of the manhole invert, including channels and shelves shall be steel-troweled to a smooth dense surface. All inverts of junction manholes shall be shaped while the bases of the manholes are under construction. All inverts shall follow the grades of the pipe entering the manholes. Rubber boots shall be provided to connect the inlet and outlet pipes and provide watertight joints.

02.22.060. Connecting to Existing Sewers.

Manholes used to connect the sewer to the existing sewer shall be plumb and centered on the existing sewer. The new pipe shall be placed against the existing pipe at the elevation designated by the engineer and the base poured as specified above. Care shall be taken not to disturb the alignment of the existing sewer during the excavation procedure. Any damage to the existing sewer shall be repaired.

All manhole covers and valve boxes shall be on a level with the finished grade of the asphalt as to not create a problem with snow removal equipment.

02.22.070. Sewer Laterals.

All sewer laterals shall be connected to concrete sewer mains by use of the "Provo City Saddle" (cast iron), a wax bowl ring and then secured with plumbers tape and concrete or a wye connection. Connections to P.V.C. shall use tapping tees. Sewer laterals to extend 12' beyond property line. Any bend in a service line between the main line and the property line greater than 22.5° needs to have a clean-out.

02.22.080. Minimum Slopes.

Minimum slopes for different size pipes are as follows:

MINIMUM SEWER MAIN SLOPES

PIPE DIAMETER	MINIMUM SLOPE
4"	2%
6"	1%
8"	.334%
10"	.248%
12"	.194%

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14"	.158%
15"	.144%
16"	.132%
18"	.113%
21"	.092%
24"	.077%
27"	.066%
30"	.057%
36"	.045%

02.22.090. Cleaning.

After the sewer lines have been laid and the trench back-filled, they shall be thoroughly cleaned and tested for leakage and alignment in the presence of the town engineer or his/her designee before acceptance by the owner. Cleaning shall be done using a high pressure jet cleaning machine, producing a min. of 800 psi. Waste water and debris shall not be permitted to enter sewer lines in service, but shall be removed at the lowest manhole of the extension. Such cleaning shall be done by private crews at the expense of the owner.

A. *Displacement Test.* The displacement test shall be conducted by the developer and inspector in the presence of the engineer and shall consist of the following: all sewer mains shall be washed and inspected using a television inspection unit.. The tv inspection of any mains which reveal broken, misaligned or displaced pipe, or other defects, as designated by the town engineer or his/her designee shall be remedied by the contractor. After cleaning and inspection have been completed, the line shall be tested for leakage by the following method:

B. *Leakage Tests.* The Low Pressure Air Test shall be conducted by the following method under the direction of the town engineer or his/her designee with equipment equal to Cherne Industrial, Inc.

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

Low pressure air shall be introduced into the sealed line until the internal air

pressure reaches 4 PSIG greater than the average back pressure of any ground water that may be over the pipe. At least two (2) minutes shall be allowed for the air pressure to stabilize.

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

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

Pipe Diameter in Inches	Minutes
4	2.0
6	3.0
8	4.0
10	5.0
12	5.5
15	7.5
18	8.5
21	10.0
24	11.5

If the installation fails to meet this requirement, the contractor shall determine at his/her own expense the source of leakage. He shall repair or replace all defective materials and/or workmanship.

02.22.100. Sewer Lift Stations.

Sewer Lift Stations which are required in a development shall be designed by the developers engineer and the design shall be submitted to the town engineer or his/her designee for review prior to starting construction.

Chapter 02.23. Storm Drains.

02.23.010. General.

These specifications will cover the installation of storm drains. Excavation and backfill of trenches is covered in Section 02.16. All developments will be responsible to provide a storm drain system on-site in the development that will contain a 25-year storm event. The maximum allowable storm water discharge from any development will be limited to .2 cfs/acre of development. In the event that any storm water will be discharged beyond the current town boundaries, the development will be responsible to provide a storm drain system on-site that will contain a 100 year storm event. All storm drain pipes shall have a minimum cover of two (2) feet.

02.23.020. Pipe.

A. *Concrete Sewer Pipe.*

1. Concrete sewer pipe may be used for storm drains up to and including 18-inch size unless otherwise specifically designated in these Specifications or on the approved Drawings.
2. Pipe shall be extra strength pipe manufactured to comply with the requirements of ASTM Designation C-14.
3. Joints shall be of the bell and spigot rubber gasket design with joints and gaskets conforming to the requirements of ASTM Designation C-443.
4. Pipe joints shall be so designed as to provide for self-centering, and when assembled, to compress the gasket for form a water-tight seal.
5. The gasket shall be confined in a groove on the spigot, so that pipe movement of hydrostatic pressure cannot displace the gasket.

- B. *Reinforced Concrete Pipe.*
1. Reinforced concrete pipe shall be used for all storm drains of size larger than 18-inches and for all drains of smaller size where installation does not provide a cover of at least 3 feet over the top of the pipe.
 2. Reinforced concrete pipe shall comply with the requirements of ASTM C-76 (Class III) with bell and spigot rubber gasket type joints for sanitary sewers and the alternate option of tongue and groove mortar joints for storm drain lines.
- C. *High Density Polyethylene Pipe (HDPE).*
1. Smooth Pipe Systems.
 - a. Material: Polyethylene code designation PE 3408 as rated in ASTM D 2239 with a minimum ASTM D 3350 cell classification of 345434C, and an SDR or pressure class rating as indicated.
 - b. Fittings: Manufactured of same resin as the pipe.
 - c. Joints:
 - i. Thermally welded butt fusion in accordance with ASTM D 3261.
 - ii. Flanged in accordance with ASTM D 2657.
 - iii. Ultra high molecular weight electrofusion tape with a polyethylene coupler meeting ASTM F1055 requirements.
 - d. Nuts and Bolts: Carbon steel machined heavy hex heads, Class 2 fit in accordance with ASTM A 307; Grade B, threads in accordance with ASME B1.1. Tape wrap steel materials for protection against corrosion after piping installation.
 2. Corrugated Pipe Systems.
 - a. Material: A High density polyethylene pipe shall be smooth lined and meet the requirements of AASHTO M294 Type S.@
 - b. Material: Polyethylene, in accordance with ASTM F 405 or ASTM F 667, Type III, Category 4 or 5, Grade P33, Class C, or Grade P34, Class C as defined by ASTM D 1248.
 - c. Fittings: Manufactured of same resin as the pipe.
 - d. Joints: Split corrugated couplings with plastic or stainless steel ties and leak resistant neoprene gasket.
 3. Pipe Markings.
 - a. Mark pipes continuously to identify:
 - i. Manufacturer=s name (or trademark) and code.
 - ii. Nominal size.
 - iii. Polyethylene code designation.
 - iv. SDR rating. (Not applicable to corrugated polyethylene.)
 - v. Date of manufacture.
 - vi. Pressure class. (Not applicable to corrugated polyethylene.)
 - vii. ASTM or AWWA designation number.

02.23.030. Laying.

Under no circumstances shall any pipe be laid until inspection is complete adequately passed the requirements indicated above. All pipe shall be laid true to line and grade with the bell end up grade. All pipe shall be laid up grade with a suitable excavation for the bell. Special care shall be taken that pipe is well bedded on a solid foundation throughout the length of the barrel. The bedding of all pipe shall conform at least to the characteristics of Class C bedding except as herein designated by the engineer. No length of pipe shall be laid until the preceding length has been thoroughly embedded and secured in place, so as to prevent any movement and selected samples have or disturbance of the finished joint. For the purpose of maintaining grades, grade stakes may be required. Each section of pipe shall be checked for alignment and grade before each joint is made. If a laser beam is used, a grade stake shall be established at each manhole and a maximum of 200 feet apart.

Jointing. All rubber gasket joints shall be completed in accordance with installation instructions supplied by the manufacturers of the pipe, taking particular care to avoid twisting of the pipe or other damage to the gasket. After jointing, approved backfill material shall be placed along the lower half of the pipe section and tamped thoroughly so as to maintain the section firmly in position. Any subsequent adjustment or damage to jointing shall require the pipe section to be removed and rejoined as for new pipe.

In addition to the above requirements, all pipe installation shall comply to the specific requirements of the pipe manufacturer. HDPE shall be installed as per manufacturer's instructions, ASTM D 2321 or ASTM D 2774 as applicable.

02.23.040. Manholes.

A. *Manholes* shall be precast reinforced Portland Cement Concrete. Excavation and concrete shall conform to applicable specifications meeting ASTM C478.

Concrete shall be low alkali Type II.

B. *Manhole Frames and Covers.*

Material. All castings shall be of ASTM A-48, Class 35 iron free from blowholes and shrinkage defects. Castings shall be free from fins and burrs and shall be shot-blasted to remove sand and other foreign matter. Freedom from cracks and defects shall be ascertained by the engineer prior to installation.

Type of Cover and Frames. Manhole covers and frames on all manholes shall be standard circular, solid, non-rocking type with pick hole with the word Astorm drain@ cast on the cover. Clear openings shall be of the diameter shown on the plans. The minimum weight of the cover shall be one hundred sixty (160) pounds. The minimum weight of the frame shall be two hundred eighty (280) pounds. (COMCO A-1180 or A-1181 as required).

After castings have seasoned sufficiently so that there will be no further distortion due to temperature changes, the cover and ring seat shall be machined so the entire area of the seat will be in contact with the cover, in any position of the cover on the seat.

The tops of the cover and frame shall be flush and there shall be one-eighth inch

(1/8") clearance all around the periphery of frame between the cover and the frame.

- C. *Manhole Construction-Precast Manholes.* Precast manholes shall be constructed as indicated on the standard plans. Bases for precast units shall be constructed in place and shall conform to specifications for "manhole bases" as herein specified. The walls of the manhole above the base shall be built up to such an elevation of the street or natural ground surface, whichever is applicable. Manholes shall be plumb and so positioned that the center line of the manhole is coincidental with the center line of the storm drain line. Fiberglass steps shall be installed and offset cones providing a direct vertical step onto the steps from the top of the manhole.
- D. *Manholes* will be 48" I.D. under 18" main line and 60" I.D. for 18" and larger storm drain mains.

02.23.050. Manhole Base.

Manhole bases shall be constructed of concrete to the dimensions shown on the drawings. Main line storm drain pipe and projecting ends of the sewer and pipe stubs shall be adequately supported to prevent displacement from line or grade during installation of the base. All manholes shall have the invert shape as indicated on the "Standard Details" to provide an adequate channel between the inlet and outlet pipes. The entire surface of the manhole invert, including channels and shelves shall be steel-troweled to a smooth dense surface. All inverts of junction manholes shall be shaped while the bases of the manholes are under construction. All inverts shall follow the grades of the pipe entering the manholes. Rubber boots shall be provided to connect the inlet and outlet pipes and provide watertight joints.

02.23.060. Minimum Slopes.

Minimum slopes for different size pipes are as follows:

MINIMUM STORM DRAIN MAIN SLOPES

PIPE DIAMETER	MINIMUM SLOPE
12"	.194%
14"	.158%
15"	.144%
16"	.132%
18"	.113%
21"	.092%
24"	.077%
27"	.066%
30"	.057%
36"	.045%

02.23.070. Cleaning.

After the storm drain lines have been laid and the trench back-filled, they shall be thoroughly cleaned and tested for leakage and alignment in the presence of the town engineer or his/her designee before acceptance by the owner. Cleaning shall be done using a high pressure jet cleaning machine, producing a min. of 800 psi. Waste water and debris shall not be permitted to enter storm drain lines in service, but shall be removed at the lowest manhole of the extension. Such cleaning shall be done by private crews at the expense of the owner.

02.23.080. Sumps.

Sumps shall be located as staked in the field and indicated on the plans. They shall be to the grade indicated by the cutsheets and as staked in the field. Excavation and backfill shall conform to Chapter 02.16 of these specifications. If the sump is located in an area where the earth is stratified with gravel layers, care shall be taken during backfill to be sure that these layers are not sealed off from the sump beginning three (3) feet below the bottom of the sump up to the top of the subgrade. One to three inch diameter drain rock shall be used. The original material shall be removed and the total backfill done with imported drain rock. After backfilling is completed, the entire excavation shall be thoroughly flooded to insure that settlement is complete. Grates shall be set in place and adjusted for final elevation and alignment. The Town may require a fabric barrier between the drain rock and road base (or other backfill) when there is the possibility of road base moving into the void space of drain rock.

Sumps may be constructed of either twelve (12) gauge galvanized, corrugated steel or reinforced concrete, precast sections and shall meet the requirements of ASTM C478-73 in accordance with standard detail drawing. Either class shall have eccentric lids to ensure adjustments in alignment.

02.23.090. Inlet Structures.

- A. All inlet structures shall be reinforced concrete boxes (precast or cast-in-place) with a gravel bottom.
- B. Inlet Grates and Frames.
 - 1. Material. All castings shall be of ASTM A-48, Class 35 iron free from blowholes and shrinkage defects. Castings shall be free from fins and burrs and shall be shot-blasted to remove sand and other foreign matter. Freedom from cracks and defects shall be ascertained by the engineer prior to installation.
The type of grate and frame shall be D&L 1-3516 or approval equivalent.
- C. Each inlet structure shall have a minimum 12" drain pipe extending to the storm drain main line.

02.23.100. Retention/Detention Basins.

- A. *Retention Basins.* All retention basins shall be constructed with a maximum water depth of 12 inches. All retention basins shall have a series of interconnected sumps connected to curb inlet boxes or storm drain main lines.
- All retention basins shall be landscaped in accordance with Town Standards.
All retention basins shall be constructed for drainage areas designated in the general plan. Basins for smaller areas may be allowed only with prior written approval of the town engineer or his/her designee.

B. *Detention Basins.* All detention basins shall be constructed with a maximum water depth of 24 inches; with that depth remaining for no longer than a 6 hour period. Detention basins may be constructed in landscape or parking areas.

Chapter 02.24. Restoration of Surface Improvements.

02.24.010. General.

The contractor shall be responsible for the protection and the restoration or replacement of any improvements existing on public or private property at the start of work or placed there during the progress of the work.

Existing improvements shall include but are not limited to permanent surfacing, ditches, driveways, culverts, fences, walls and landscaping. All improvements shall be reconstructed to equal or better, in all respects. The contractor shall be responsible for maintaining a road surface suitable for travel by the public. He/She shall be responsible for all dust control and all claims and damages resulting from his/her failure to maintain the construction area.

All road cuts shall be repaired within two (2) working days.

02.24.020. Road Base.

Where trenches are excavated through gravel surfaced areas such as roads and driveways, etc., the gravel surface shall be restored and maintained as follows:

- A. The gravel shall be placed deep enough to provide a minimum of 6 inches of material.
- B. The gravel shall be placed in the trench at the time it is backfilled. The surface shall be maintained by blading, sprinkling, rolling, adding gravel, etc., to maintain a safe uniform surface satisfactory to the engineer. Excess material shall be removed from the premises immediately.
- C. Material for use on gravel surfaces shall be obtained from sound tough durable gravel or rock meeting AASHTO T-27 requirements. The following requirements for grading shall be met:

Passing 1-inch sieve	100%
Passing 3/4 inch sieve	85%-100%
Passing No. 4 Sieve	45%- 65%
Passing No. 10 Sieve	30%- 30%
Passing No. 200 Sieve	5%- 10%

02.24.030. Bituminous Surface.

Where trenches are excavated through bituminous surfaced roads, driveways or parking areas, the surface shall be restored and maintained as follows:

- A. A temporary gravel surface shall be placed and maintained as required in Section 02.24.040 after the required backfill and compaction of the trench has been accomplished.
- B. The gravel shall be placed to such depth as to provide a minimum of six (6) inches below the pavement and shall be brought flush with the paved surface.
- C. The area over trenches to be resurfaced shall be graded and rolled with a roller weighing not less than twelve tons, or with the rear wheels of a five-yard truck loaded to capacity, until the subgrade is firm and unyielding. Mud or other soft or spongy material shall be removed and the space filled with gravel and rolled and tamped thoroughly in layers not exceeding 6 inches in thickness. The edges of trenches which are broken down during the making of subgrade shall be removed and trimmed neatly before resurfacing.
- D. Before any permanent resurfacing is placed, the contractor shall cut the existing paving to clean, straight lines as nearly parallel to the center line of the trench as practicable and 6" wider on each side of trench than initial excavation. Said straight lines have no deviations from such lines except as specifically permitted by the engineer.
- E. Existing bituminous paving shall be cut back a minimum of six inches beyond the limits of any excavation or cave-in along the trench so that the edges of the new paving will rest on at least six (6) inches of undisturbed soil.
- F. Within five (5) working days and weather permitting, the bituminous surface shall be restored by standard paving practices to a minimum thickness of 2-1/2 inches to match existing pavement height.
- G. Pavement restoration shall include priming of pavement edges and sub-base with an asphalt tack coat and placing and rolling plant mix bituminous material to the level of the adjacent pavement surfaces.
- H. All pavement restoration shall conform to Section 02.26 of these specifications.

02.24.040. Cold Weather Patching.

Trenches cut during winter months or when asphalt plants are not operating, shall be patched the same day of the cut with a good quality cold mix and maintained until asphalt plants open. When asphalt plants open, the cold patch shall be removed and a new patch of hot mix asphalt shall be placed within twenty (20) days of plant opening.

02.24.050. Concrete Surfaces.

All concrete curbs, gutters, and driveways shall be removed and replaced to the next joint or scoring lines beyond the damaged or broken sections; or in the event that joints or scoring lines do not exist or are three or more feet from the removed or damaged section, the damaged portions shall be removed and reconstructed to neat, plane faces. All concrete work shall conform to the requirements of Section 02.28 of these specifications.

Chapter 02.26. Street Surfacing.

02.26.010. General.

These specifications cover the preparation of subgrade, the placing of base gravel, and the placing of asphalt surface on any town street.

02.26.015. Traffic Control.

Traffic control shall be submitted to the Town prior to any work in accordance with MUTCD. In order for a street excavation permit to be approved, Elk Ridge needs the following information: (1) Copy of Contractors License; (2) Certificate of Insurance; (3) Performance Bond of \$1000.00; and (4) Detailed drawing of proposed work and traffic control (4 copies).

The contractor is given a copy of the signed permit and the signed / approved plan after the town engineer or his/her designee has approved and signed the application. Time limits may be set; and the permit can be suspended for non-compliance.

02.26.020. Excavation and Fill.

- A. *General.* This item shall consist of the removal of all earth, stone, loose rock, roots, brush and all other materials that may be encountered in shaping the sub-base to the lines indicated on the plans or designated by the engineer.
- B. *Fill.* Where fill is required, it shall be placed in twelve (12) inch layers at or near optimum moisture content and compacted to ninety-five (95) percent of laboratory density as determined by AASHTO T-180, Method C. Materials may be cuts or shall be excavations on the project or imported from off site. Imported materials (3) inches granular, well graded, with the maximum size not to exceed three
- C. *Surplus Material.* The surplus materials that result from the grading will be at the disposal of the contractor and shall be removed from the site.

02.26.030. Subgrade Preparation.

The subgrade shall be shaped and compacted in reasonably close conformity with lines, grades and typical cross section as established by the town engineer or his/her designee. The subgrade shall be compacted to ninety-five (95) percent of laboratory density as determined by ASTM D1557.

Soft and yielding spots which do not compact to the specified density shall be removed and replaced with suitable material.

02.26.040. Gravel Base.

- A. *General.* Gravel base course shall consist of natural gravel, crushed gravel, crushed rock or crushed slag conforming to one of the gradations hereinafter specified, placed on a prepared subgrade as specified herein.
- B. *Materials.* The mineral aggregate shall conform to the following requirements:
 - 1. On that portion of the aggregate passing the No. 40 sieve, the liquid limit shall not exceed 25, nor shall the plasticity index exceed 6 when tested in accordance with AASHTO T89 and T90.
 - 2. The dry mineral aggregate shall be uniformly graded within one of the gradations listed below when tested in accordance with AASHTO T-27. The size of aggregate shall be at the option of the contractor unless otherwise specifically designated.

Percent Passing

Sieve Size	1" MAX	3/4" MAX
1 2 A		
1 A	100	
3/4 A	---	100
2"	70-100	---
3/8"	---	69-100
No. 4	41-68	46-75

No. 16	21-41	22-44
No. 50	10-27	10-28
No. 200	4-13	4-13

Total amount of material passing the No. 200 Sieve shall be determined by washing with water in accordance with AASHTO T-11.

3. Aggregate shall have a percentage of wear not exceeding 50 when tested in accordance with AASHTO T-96. This requirement shall be used only in determining the suitability of the aggregate source and shall not be used for routine control testing.
 4. Crushed slag, if used, shall be uniform in density and quality and have a rodded weight of not less than 75 pounds per cubic foot when tested in accordance with AASHTO T-19. Open hearth slag shall not be allowed.
- C. *Construction Methods.* The mineral aggregate shall be placed on a compacted sub-base, water added, and mixed to provide a moisture content at or near the optimum. The material shall be compacted until the average density of tests performed in accordance with AASHTO T-180, Method is ninety-six (96) percent of the laboratory density and not less than ninety-two (92) percent.

The total thickness shall be reasonably close to that shown on the typical section. Depth analysis shall be made on at least four holes for each section. Base thickness shall be accepted if 75 percent of the test holes are less than 1/4" below the specified thickness and no individual hole shall be more than 3/4" below the specified thickness. Base shall be finished to a smooth uniform line and grade.

02.26.050. Bituminous Surface Course.

- A. *General.* Bituminous surface course shall consist of a mixture of mineral aggregate and bituminous binder conforming to one of the gradings hereinafter specified. It shall be mixed at a central mixing plant and spread and compacted with laydown machines or boxes as approved by the street department.
- B. *Materials.*
 1. Bituminous Material. The bituminous material shall be penetration asphalt cement conforming to the requirement of Section 704 of the State of Utah Standard Specifications for Road and Bridge Construction, 1970 issue.
 2. Mineral Aggregate. Mineral aggregate shall be in accordance with Section 403.03 of the State of Utah Specifications for Road and Bridge Construction, 1970 edition, paragraph (H) through (J).

3. Graduation. The combined dry mineral aggregate shall be uniformly graded and of such a size that will meet one of the gradation limits specified below when tested in accordance with AASHTO T-27.

Sieve Size	Percent Passing	Percent Passing
3/4 A	100	
2"	---	100
3/8"	70-100	---
No. 4	48-76	61-100
No. 8	36-59	43-75
No. 16	27-45	32-55
No. 50	16-29	19-33
No. 200	5-11	7-12

C. *Mix Design*. The contractor shall prepare a mix design using the Marshall Method and the following criteria:

MARSHALL DESIGN CRITERIA :

TEST PROPERTY

- Stability - all mixtures
- Flow - all mixtures
- Percent air voids
- Percent voids in mineral aggregate 3/4" max
- Percent voids in mineral aggregate 1" max
- 50 compaction blows each end of specimen

After a mix design has been approved, the mixture furnished shall conform within the following ranges of tolerance:

Passing No. 4 and larger sieves----- + 7 percent

Passing No. 4, 16, and 50 sieves----- + 5 percent

Passing No. 200 sieve----- + 3 percent

Asphalt content----- + 0.4 percent

D. *Temperature Control.* The viscosity of the asphalt being used shall be between 150 and 300 centistokes as determined in accordance with ASTM designation D2170. The temperature range corresponding to this viscosity range will depend on the type and source of asphalt. The engineer will specify as a part of the mix approval the temperature limits for asphalt, aggregate, mixing and laydown.

E. *Spreading and Compaction.* The bituminous mixture shall be spread with self-propelled mechanical spreading and finishing equipment or box approved by the town engineer or his/her designee. The mixture shall be spread and struck off in such a manner that the finished surface shall conform to the grades and cross sections required by the plans approved by the town engineer or his/her designee. After the mixture has been spread, the surface shall be rolled in a longitudinal direction commencing at the outside edge or lower side and proceeding toward higher side. Each pass of the roller shall overlap the preceding pass by at least one-half the width of the roller. Rolling shall continue until ninety-two (92) percent of laboratory density, as determined by Utah Department of Highways Test Procedure No. 8-942, has been achieved.

the

Thickness shall be reasonably close to the specified thickness. Depth analysis shall be made by cores located at random pattern with no less than four cores in each section. No cores shall show a deficient thickness of less than 1/4".

Deficient thickness shall be corrected by adding additional surface course as directed by the engineer. All work shall be inspected by and certified to by a registered engineer hired by the developer.

F. *Weather Limitations.* No bituminous surface course shall be placed when the temperature of the air or the road is 50 degrees F and falling; or during rainy weather; or when the base is wet. The air temperature shall be measured in the shade.

02.26.060. Manholes and Valve Boxes.

All manhole covers and valve boxes shall be raised to the proper grade after the placement of pavement. The cover shall be removed and raised to the proper elevation with concrete setting the frame 1/4" below the pavement grade. Concrete rings need to be around valve boxes and manholes.

02.26.070. Cross Gutters.

Bituminous surface course shall be three (3) inches thick within thirty (30) feet of a cross gutter.

Chapter 02.28. Concrete Curb and Gutter.

02.28.010. General.

The work shall consist of curb and gutter, sidewalk, combination curb, gutter and sidewalk, cross gutter's, curb, and other related concrete return constructed where indicated on the plans or as directed by the engineer and conforming in all respects to the specified lines, grades, and dimensions. A minimum slope along any curb and gutter shall be .4% and on cross-gutter shall be .5%.

02.28.020. Concrete Materials.

A. *Coarse Aggregate.* A coarse aggregate shall consist of hard durable particles of a mixture of crushed and natural gravel possessing at least fifty percent (50%) of broken surface area. The coarse aggregate shall be free from substances which are chemically active relative to hydrated cement and shall be subject to particularly the following:

1. Deleterious substances shall not exceed:

PERCENT BY WEIGHT	
a. Soft fragments	3.0
b. Coal lumps	1.0
c. Clay lumps	0.5
d. Material passing 39 100 Sieve	1.5
e. Organic material	0.1
f. Total for any or all of above	3.0
2. Loss on abrasion by Los Angeles Abrasion Test not more than forty percent (40%) by weight.
3. Loss on exposure to five (5) cycles of sodium sulfate soundness test, not more than eight (8) percent by weight.

The maximum size of aggregate to be used shall not exceed one and one-half (1 1/2) inches in terms of this size definition contained in ASTM Standards except that the maximum size shall not exceed one-fourth (1/4) of the least dimension of the finished concrete in which the aggregate is to be used. Coarse aggregate shall be uniformly graded within the following range:



	Minimum %	Maximum %
Retained on 1 2" sieve	0.00	10
Retained on 3/4" sieve	30	70
Retained on 3/8" sieve	75	100
Retained on No. 4 sieve	95	100

B. *Fine Aggregate.*

1. Fine aggregate shall consist of clean, hard durable particles of natural sands, subject to the following limitations:

PERCENT BY WEIGHT

- | | |
|----------------------------------|-----|
| a. Soft fragments | 3.0 |
| b. Coal | 1.0 |
| c. Material passing 39 200 Sieve | 3.0 |
| e. Micaceous or flaky particles | 3.0 |
| f. Total for any or all of above | 5.0 |
2. Organic Calorimetric Test using sodium hydroxide shall result in a color not darker than Number 2 in the acceptance range.
3. Loss on exposure to five (5) cycles of the sodium sulfate soundness tests shall not exceed eight percent (8%) by weight.

Fine aggregate shall be uniformly graded within the following range:

	PERCENT	
	MINIMUM	MAXIMUM
Retained on No. 4 Sieve	0	5
Retained on No. 8 Sieve	0	20
Retained on No. 16 Sieve	20	50
Retained on No. 30 Sieve	50	75
Retained on No. 50 Sieve	75	90
Retained on No. 100 Sieve	95	100

C. *Cement.* All cement used shall be Type II. All cement and dry additives shall be stored in damp-proof conditions. Shipments of cement shall be marked and stored in such a manner as to provide positive identification. The supplier shall keep

and have available for inspection at all times an accurate record of supplies and use of
has cement of the various types and shipments. No cement shall be used which
has been subject to dampness or exposure.

- D. *Water.* Water used for concrete shall be potable and free from excess salts, organic material, or other deleterious substances. Addition of water to the mixed concrete after specified workability has been obtained will not be allowed, nor shall any concrete be retempered or remixed.

02.28.021. ADA Requirements.

All pedestrian facilities will conform to the current Federal ADA Standards.

02.28.022. Base Material.

There shall be a minimum of 4" crushed gravel road base under all concrete.

02.28.030. Testing and Inspection.

- A. Scope. All materials and processes involved in the construction shall be subject to testing and inspection as detailed in the various paragraphs of this section and in general compliance with ASTM E105-54T. Results of tests performed by recognized laboratories to the satisfaction of the engineer shall be accepted by the supplier as a basis for acceptance or rejection of any and all materials. Standard Methods of sampling and testing shall be used. The latest appropriate ASTM Tests and methods shall be considered to be standard, and will include but not be limited to concrete, cement, aggregates additives, curing compounds, parting compounds and jointing materials.
- B. Concrete. Where required by the engineer, samples of concrete may be tested to insure quality concrete.
1. Samples of wet concrete may be tested for air content. Failure to indicate the entrained air specified in this section shall be a basis for rejection of all concrete represented by the test.
 2. Samples of wet concrete may be tested for slump. Failure to indicate the required slump shall be a basis for rejection of all concrete represented by the test.
 3. Concrete compression specimens shall be taken for each pour of section as required by the engineer. Such specimens shall attain the specified strength of twenty-eight (28) days with the provision that no specimen may indicate a compressive strength of less than ninety percent (90%) of

the strengths nominated and with further provision that results from specimens which, in the opinion of the testing authority and the engineer, are obviously faulty or defective may be rejected in determining the requirements. Should any specimens fail to satisfy these requirements, the concrete represented thereby shall be removed and replaced, except that the contractor may submit evidence based on ASTM designation C42-49 which shall be considered by the engineer in relation to this requirement.

- C. *Flow Tests.* All curb and gutter and cross-gutters will have a flow test prior to final inspection to determine any low or high spots. (The Town will be present)

02.28.040. Concrete Mixes.

- A. *Mix Design Requirements.*

Cement content	6 bags per yard minimum
28-day compressive strength	4000 psi
Slump range	1 to 3 inches
Air content	5 to 7 percent

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

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

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

- C. *Control.* Measurements of materials except water shall be by weight. Equipment

used shall be capable of controlling weight within one percent (1%) of each ingredient. Water may be measured either by volume or weight provided that an accuracy of one percent (1%) is maintained. Cement may be assumed to weight ninety-four (94) pounds per sack but proportioning aggregates for fractional sacks of cement will not be permitted unless the fractional amount is weighed for each batch.

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

02.28.050. Mixing, Conveying, and Placing.

- A. *Mixing Time.* Concrete transported in a truck mixer, agitator, or other transportation device shall be discharged at the job and placed in its final position in the forms within one (1) hour after the introduction of the mixing water to the cement and the aggregate, or the cement to the aggregate, except that in hot weather or under other conditions contributing to quick stiffening of the concrete, the maximum allowable time may be reduced by the engineer. The maximum volume of mixed concrete transported in an agitator shall be in accordance with the specified rating.
- B. *Supervision of Placing.* Concrete shall not be poured except under the direct supervision of the town engineer or his/her designee.

02.28.060. Excavation and Backfill.

The contractor shall excavate to the line and grade approved by the town engineer or his/her designee. All boulders, organic materials, soft clay or other unsuitable materials shall be removed and replaced with approved materials. The subgrade shall be properly shaped to conform with the specified cross section and grade.

All materials excavated in connection with the work not needed for backfill shall be removed from the site.

Where the grades are above natural ground the material shall be placed at or compacted to ninety-five (95) percent of the laboratory density as determined by AASHTO T-180.

02.28.070. Forms.

All forms shall be of steel, free from warps, bends or other deformations. They shall be of a size to match the sections shown on the plans. Forms shall be held firmly in place with stakes and shall be true to line and grade. Contraction joints shall be constructed every ten (10) feet by using steel templates one-eighth (1/8) inch in thickness. The templates shall be removed as soon as the concrete has set sufficiently to hold its shape.

02.28.072. Slip Forming.

Strike lines are every 10 feet. The #4 rebar, 2' O.C., is 12" in length placed 4" into curb and 8" into sidewalk. This is placed 2.5" below finished TBC.

02.28.080. Finishing.

As soon as the concrete has set sufficiently to retain its shape without support of the face form, the clamps, spreaders and face forms shall be removed. While the concrete is still green, the surface shall be thoroughly floated with a moist wooden float to provide an even smooth surface, then broomed lightly.

02.28.090. Curing.

As soon as possible after final finishing the finished surface shall be coated with a curing compound. The compound shall be a chlorinated rubber type meeting ASTM C-309K, Type 1, clear. The compound shall be applied in accordance with the manufacturer's recommendations. The compound shall be Intermountain Hard-n-seal or equal. During the months of October through February, no curing compound shall be applied to exposed concrete; instead, exposed concrete shall be covered with plastic for three (3) days to allow for curing.

02.28.100. Cold Weather Concrete.

Concrete shall not be placed when a descending air temperature in the shade and away from artificial heat falls below 35EF. Concrete shall not be poured on frozen ground. Where high temperatures are likely to descend below 32EF, concrete shall be covered or otherwise protected against freezing; add mixtures that are allowed.

02.28.110. Clean Gutter.

Once curb and gutter and surface course is in place they shall be kept as clean as possible. When equipment is required to cross over sidewalk, bridging will be provided to protect concrete. Dirt and gravel will not be placed in gutter or on street. Gutter will flow freely at all times.

02.28.120. ADA Requirements.

All pedestrian facilities will conform to the current Federal ADA Standards.

02.30.110. Right-of-Way.

- A. *Construction Within Right-of-Way.* To the extent feasible, Utility's distribution and transmission lines and appurtenances will be constructed within the right-of-way boundaries of streets, roads and alleys. Whenever, in the opinion of Utility, it is not practical to construct and install its facilities within the limits of streets, alleys, and other public thorough fares, Utility will construct and install such facilities on private rights-of-way.
- B. *Furnishing of Right-of-Way.* Whenever it is necessary for Utility to occupy private rights-of-way, property owner shall furnish or assist in acquiring, without charge to Utility, such right-of-way as is necessary and will assist Utility in securing such other right-of-way as may be necessary to provide service to Consumer.

02.30.120. Access to Premises.

- A. *Utility Access to Premises.* Any properly identified representative of the Utility shall, at all reasonable hours, have free access to and from the premises of the Consumer for the purpose of inspecting Consumer's installations and electric equipment and for the purpose of reading, repairing, testing, or removing the Utility's meter or its other property. When, in the opinion of Utility, emergency conditions exist with respect to Utility's service, Utility's representative shall have immediate and free access to Consumer's premises.

Chapter 02.32. Hillside Site Development.

02.32.010. Average Slope-Definition.

For the purpose of this chapter, the definition of "average" slope shall be as follows: The average slope of the parcel of land or any portion thereof shall be computed by applying the formula,

$$S = \frac{0.00229 \quad I L}{A}$$

to the natural slope of the land before any grading is commenced, as determined from a topographic map having a scale of not less than one inch equals 100 feet and a contour interval of not less than 5 feet, where:

- 0.00229 = A conversion factor of square feet to acres
- S = Average percent slope

- I = Contour interval, in feet
- L = Summation of the length of contour lines, in feet within the subject parcel
- A = Areas in acre of the parcel being considered.

02.32.020. Certified Report Required.

It shall be unlawful for the owner, developer, or any contractor or other person to excavate, grade, level, or build upon any lot or property within the town when the average slope of the lot exceeds ten (10) percent; nor shall any person grade, level, or improve in any manner any parcel of land which is crossed by a natural or manmade water course or existing utility, before such person has submitted to the chief building official a certified report from a qualified civil engineer licensed in the State of Utah containing the information set forth in the following section.

02.32.030. Certified Report Specifications.

The certified report required in the previous section shall contain at least the following information:

- A. A plat of the property showing the following:
 - 1. Contour lines at five (5) foot intervals. Existing contours shall be indicated by dashed lines and proposed contours by solid lines;
 - 2. Elevations at the corners of foundations and at the corners of driveways; and
 - 3. Show or reference any existing or potential groundwater flows which may cause unstable conditions such as debris flow or slides.
 - 4. Cross sections of all proposed streets and driveways at fifty (50) foot intervals along centerline of proposed streets or as directed by Town Engineer.
- B. Assessment of the licensed civil engineer as to the seriousness of any development problems such as erosion, drainage, flood and geologic hazards or unstable soil conditions and their potential effect on adjoining properties and on any proposed improvements to be built on the property.
- C. The proposed method for handling the problems noted in "B" above. No grading shall take place on a hillside area until the proposed method of handling said problems shall be submitted to and approved by the Town Engineer. Owner, Developer, or Contractor shall comply to the following conditions:
 - 1. Any area within a Subdivision which has a slope of thirty (30%) or greater shall remain ungraded.
 - 2. Any area within a Subdivision which has a percent slope between twenty (20%) and twenty-nine (29%) may be graded: provided, however, the grading area shall be less than one half of the area of such slope.
 - 3. Any fill material shall be prepared and compacted as specified in the Construction Standards and Specifications for the Town of Elk Ridge.
 - 4. Cut slopes shall be no steeper than two feet horizontal to one foot vertical (2:1) and shall be designed with an acceptable erosion

of a geogrid combination. control system. An erosion control system is generally composed combination of long-term non-degradable erosion mat, structural and/or geotextile. These materials can be used alone or in

5. Fill slopes shall be no steeper than two feet horizontal to one foot vertical (2:1) and shall be designed with an acceptable erosion control system. An erosion control system is generally composed of a combination of long-term non-degradable erosion mat, structural geogrid and/or geotextile. These materials can be used alone or in combination.
6. Tops or toes of slopes shall be set back from property boundaries a minimum distance of five (5) feet. (Excluding Roads).
7. Areas which have been graded shall be planted with stabilizing plant materials within one hundred twenty (120) days after the completion of final grading. If an area has been determined by the Town as being an area subject to erosion danger, then the Subdivider shall plant acceptable stabilizing plant material. If final grading is completed between October 15 and March 15 of the next year, then organic cover material shall be placed on the graded area to eliminate erosion until the soil can be permanently planted.
8. Natural vegetation shall remain in areas where grading is not permitted. The Town may require additional landscaping in areas which were graded in order to supplement the natural vegetation and to prevent erosion and slope failures.
9. Surface water runoff drainage shall be designed and installed to prevent both on-site flooding and erosion. Such drainage design shall channel water runoff away from cut and fill slopes and away from all buildings.
10. Any buildable area or portion of a build able area shall not be closer than thirty feet (30') to any man-made or natural drainage channel.
11. All drainage areas shall be kept free of debris and soil sedimentation during Subdivision development and building construction.

02.32.035. Streets and Roads. Streets and roads, proposed for steep slopes may not:

- A. Roads that cross slopes greater than thirty percent (30%) must be reviewed by the Planning Commission and the City Engineer; they must conclude that such streets or roads will not have significant adverse visual, environmental, or safety impacts.
- B. Streets and roads proposed to cross slopes greater than (10%) are allowed, subject to the following:
 1. Proof that such street and/ or road will be built with minimum environmental damage and within acceptable public safety parameters.
 2. Such street and road design follows contour lines to preserve the natural character of the land, and are screened with trees or vegetation.
- C. Cutting and filling is minimized and must be stabilized and re-vegetated to a natural state within 1 year. A stabilization and re-vegetation plan must be

approved by the Planning Commission and City Engineer.

02.32.040. Liability.

The purpose of this chapter is to point out to the owner and/or developer of any property that the liability and responsibility of such persons to protect the integrity of their own and adjoining properties, existing water courses and utilities lies upon the person doing the development and upon the owner of the property being developed and not upon the town or any other person. The Town may require additional information on any development or building which may have potential hazards.

Chapter 02.34. Urban/Wildlife Interface

02.34.010. Urban/Wildlife Interface.

All development within the urban/wildlife interface are required to conform to all ordinances and development standards as adopted by the town governing development within the urban/wildlife interface zone. (See Urban Interface Zone Map)

Urban Interface Zone Map