

PEOPLE'S ORDINANCE NO. 17

SERIES 1987

AN ORDINANCE ADOPTING THE BRECKENRIDGE STREET STANDARDS
FOR THE TOWN OF BRECKENRIDGE, COLORADO

WHEREAS, the Town of Breckenridge by State Statute, Town Charter and ordinance is authorized to administer the Town Street Systems including, but not limited to, maintenance layout, alterations, deletions, additions, property acquisition, and traffic regulation. Town jurisdiction extends to all streets other than State or Federal Highways within the corporate limits of the Town of Breckenridge.

WHEREAS, it is desirable to design and construct public streets and private roadways to minimum standards which promote the safe and efficient movement of vehicular traffic through the Town.

WHEREAS, the safe and efficient movement of traffic is necessary to promote the health, safety and welfare of the citizens of Breckenridge.

NOW THEREFORE BE IT ORDAINED BY THE TOWN COUNCIL OF THE TOWN OF BRECKENRIDGE, COLORADO.

10-1-1 TITLE:

This chapter is entitled, and may be cited as, the "Breckenridge Street Standards Ordinance."

10-1-2 REPEAL:

Title 11, Chapter 1 of the Breckenridge Town Code is hereby repealed.

10-1-3 PURPOSE (Criteria):

The purposes of these standards are to define policies and procedures and to establish standards relating to the development of new streets and the improvement of the existing streets in the Town of Breckenridge. This ordinance is not intended to be used as a substitute for knowledge, experience, or judgment but as a guide to aid in deciding those factors needed to intelligently plan, design, construct and upgrade Town streets.

10-1-4 GENERAL:

The design criteria as presented in Appendix I are intended to aid in preparation of plans and specifications for the Town of Breckenridge, including minimum standards where required. As with any design criteria, occasions may arise where the minimum standards are either inappropriate or cannot be practically implemented. In these cases a variance to these criteria shall be considered. Written request for each variance should be directed to the Town Engineer.

10-1-5 DEFINITIONS AND ABBREVIATIONS:

Wherever the following words, phrases or abbreviations appear in these specifications they shall have the following meanings.

AASHTO: American Association of State Highway and Transportation Officials.

Acceleration Lane: A speed change lane, including tapered areas, for the purpose of enabling a vehicle entering a roadway to increase its speed to a rate at which it can more safely merge with through traffic.

Access: Driveway or other point of access such as a street, road, or highway that connects to the general street system. Where two public roadways intersect, the secondary roadway will be the access.

Approach: The portion of an intersection leg which is used by traffic approaching the intersection.

Average Daily Traffic (ADT): The total bidirectional volume of traffic passing through a given point during a given time period, divided by the number of days in that time period.

Capacity: The maximum number of vehicles that have a reasonable expectation of passing over a given roadway or section of roadway in one direction during a given time period under prevailing roadway and traffic conditions.

Construction: The construction, reconstruction or alteration of any opening, excavation, tunnel, sidewalk, curb, gutter, street or other work of any kind within the public way which results in the physical alteration.

Consultant: Shall mean a person, partnership or corporation duly, registered as a professional engineer according to Colorado statutes who is hired by the landowner or developer and is empowered to act as his agent.

Contractor: Shall mean a person, partnership or corporation who will actually perform construction as defined herein and who is required to apply for and obtain a uniform excavation and encroachment permit from the Town.

Critical Volume: A traffic volume (or combination of volumes) for a given street which produces the greatest utilization of capacity for that street in terms of passenger cars or mixed vehicles per hour.

Days: Shall mean calendar days not normal working days unless stipulated as working days.

Deceleration Lane: A speed change lane, including tapered areas, for the purpose of enabling a vehicle that is to make an exit turn from a roadway to slow to a safe turning speed after it has left the main stream of faster moving traffic.

Design Hour Volume: Hourly traffic volume used for street design and capacity analysis, usually one or more peak hours during a 24 hour period.

Design Speed: Five miles per hour above the proposed or desired speed limit of the facility under design.

Design Vehicle: Developments intended for public use must be designed for the following types of vehicles:

Residential (excluding single family or duplex)	SU30
Commercial Uses	WB40
Industrial Uses	WB50

For public streets, the following design vehicles must be used:

Commercial/Multi-family, Locals and Minor Collectors	SU30
Major Collectors	WB40
Arterials	WB50

SU designation is for Single Unit Vehicles
WB designation is for wheel base length on multi-axle vehicles

Definitions for the above vehicle types are found in AASHTO: A Policy on Geometric Design of Highway & Streets. (Latest revision)

Developer: Shall mean the person or persons legally responsible for the construction of streets within a specific subdivision or planned unit development.

DHV: Design Hour Volume.

Divided Highway: A highway with separated roadways for traffic in opposite directions, such separation being indicated by depressed dividing strips, raised curbs, traffic islands, other physical separations, or by standard pavement markings and other traffic control devices.

Driveway: A constructed access serving three or less units and abutting to a street or private driveway.

Drawings: Detailed and working drawings including plan and profile, cross sections, and detail sheets (utility drawings).

Easements and Rights-of-Way: That portion of public land, or private land dedicated to the public for surface or subsurface drainage, overhead or underground utility ways, vehicular access, or other public uses.

Engineer: Shall mean the Town Engineer, Town of Breckenridge, Colorado, or his authorized representatives acting on behalf of the Town.

Fire Trucks: A fire apparatus truck particular to the Town of Breckenridge with a minimum 55 ft. inside and 70 ft. outside turning radius.

Flowline: The transition point between the gutter and the face of the curb. Where no curb exists, the flowline will be considered the edge of the outside traveled lane.

Grade: Rate or percent of change in slope, either ascending or descending from or along the highway. It is measured along the centerline of the highway or access.

Inspector: Shall mean an authorized representative of the Town Engineer assigned to make detailed inspections for contract performances, standards and contract compliance.

May: A permissive condition. No requirement for design or application is intended.

M.U.T.C.D.: Manual on Uniform Traffic Control Devices, and the Colorado Supplement. (Latest revision)

NFPA: National Fire Protection Association.

Private Roadway: A roadway serving three or more units which is not constructed, owned or maintained by the Town but is constructed per this ordinance.

Public Way: Includes all public alleys, easements, rights of way, sidewalks, walkways, footpaths, streets, roads, highways, Town lots and drainageways.

Shall: A mandatory condition. Where certain requirements in the design or application are described with the "shall" stipulation, it is mandatory that these requirements be met.

Sight Distance: The length of roadway ahead visible to the driver. The minimum sight distance available should be sufficiently long

to enable a vehicle traveling at or near the design speed to stop before reaching a stationary object in its path.

Speed Change Lane: A separate lane for the purpose of enabling a vehicle entering or leaving a roadway to increase (acceleration lane) or decrease (deceleration lane) its speed to a rate at which it can more safely merge or diverge with through traffic.

Streets, Roads and Highways: The entire width of every public right of way owned by or dedicated to the Town which shall include the traveled roadway as well as the property between roadway and adjacent property line.

Stopping Sight Distance: The distance traveled by the vehicle from the instant the driver of a vehicle sights an object necessitating a stop, to the instant brake application begins.

Storage Lane: Additional lane footage added to a deceleration lane to store the maximum number of vehicles likely to accumulate during a critical period without interfering with the through lanes.

Street: A general term denoting a public way for purposes of vehicular travel, including the entire area within the right-of-way (includes alleyways).

Snow Stack & Storage: Additional area within or out of right of ways which are used for stacking of snow from roadways. Snow stack widths shall be measured from the outside edge of roadway shoulders or behind curbs. Widths will vary with topography and street classifications.

Substantial Completion: The time when the work has progressed to the point where it is sufficiently complete, so that, it (or a specified part) can be utilized for the purpose for which it is intended.

Town: The Town of Breckenridge, Colorado, a Colorado municipal corporation.

VPD: Vehicles per day.

10-1-6 POLICY SUMMARY:

A. General

The statements contained in this Section are the basis for all street standards within the Town of Breckenridge and are to be used as guidelines in the design and evaluation of all streets.

B. Design Standards

The policy of the Town will be to evaluate designs of street improvements submitted to the Town based on the standards set forth by the Town of Breckenridge. This ordinance generally follows criteria as set forth by the American Association of State Highway and Transportation Officials (AASHTO) and the Standard Specifications for Road and Bridge Construction as set forth by the State of Colorado. Criteria specific to the Town of Breckenridge have been added.

C. Preparation by Professional Engineer

All street plans shall be prepared by or under the direct supervision of a professional engineer registered in the State of Colorado. The engineer preparing or supervising the preparation of the plan shall verify that the proposed streets

will meet the standards and criteria of the ordinance and related regulations including integration with other project features such as drainage, flood plains, grading, parking and landscaping.

D. Administrative Procedures

In order to implement the provisions of this ordinance, the Town Manager shall adopt "Administrative Procedures and Design Guidelines for Street Plans" for the content of street plan submittals and guidelines for performing the designs necessary for implementation of the intent of this ordinance. The Town Manager may modify the procedures and guidelines from time to time to incorporate new analysis and design methods or to improve the administrative procedures.

10-1-7 STREET PLAN REQUIREMENTS & DESIGN GUIDELINES:

A. Preliminary Engineering Street Plan

A preliminary engineering street plan shall be submitted before the second preliminary hearing of the Planning Commission in accordance with the Administrative Procedures and Design Guidelines for Street Plans. Requirements for preliminary submittals for projects not requiring two preliminary hearings will be determined by the Town Engineer.

B. Final Engineering Street Plan

A final engineering street plan shall be submitted before the final hearing of the Planning Commission in accordance with the Administrative Procedures and Design Guidelines for Street Plans.

C. Final Street Construction Drawings

Final street construction drawings shall be submitted to the Town Engineer and accepted prior to issuance of a building permit or recording of a subdivision agreement. All drawings and specifications shall be dated and stamped "Approved for Construction". Requirements for the drawings are detailed in the Administrative Procedures.

D. Record Drawings

Record drawings are to be submitted to and accepted by the Town Engineer prior to final acceptance of the improvements. Requirements for the record drawing submittal are detailed in the Administrative Procedures.

10-1-8 PERMITS REQUIRED:

It shall be unlawful for any person, other than an officer or employee of the Town in the course of his employment, to make, cause or permit any construction in, on, under or within a public way of the Town unless such person shall have first obtained a uniform excavation and encroachment permit from the Town Engineer and unless such construction is performed in conformity with the permit and the terms and provisions of this Chapter. Included herein is construction on private property which extends onto or directly affects any public way of the Town.

10-1-9 FEES AND DEPOSITS:

The following amounts shall be posted for development deposits or encroachment permits prior to any construction occurring.

A. Performance Guarantees

A letter of credit, cash deposit or other acceptable security in an amount determined by the Town Engineer and in form approved by the Town Attorney shall be deposited with the Town prior to the issuance of a development permit or a building permit to guarantee construction and performance for a period of two (2) years following issuance of the certificate of substantial completion by the Town Engineer. If the estimate for installation of all project infrastructure items is less than \$25,000, then an irrevocable letter of credit or cash bond will be the only acceptable security. Performance guarantee amounts may be reduced after one year. Determination of the amount of guarantee after one year shall be by the Town Engineer.

Construction Cost		Performance & Payment 24 mo. Guarantees
\$0-\$25,000	125%	25%-100% Cash or letter of credit only
Over \$25,000	125%	25%-50% cash letter of credit or bond

Other methods of performance, payment, and 24-month guarantee may be acceptable. Determination of acceptability shall be made by the Town Attorney.

B. Encroachment Permit

1) Permit Fee: Each individual application for a permit shall be accompanied by a non-refundable permit and inspection fee of ten dollars (\$10.00); provided, however, in any case where such application is made subsequent to commencement of construction, the fee shall be two hundred ten dollars (\$210.00).

2) Deposits: Prior to issuance of a permit, the Town Engineer shall determine the amount necessary to cover the cost of restoring the public way after construction using the following general guidelines:

Fixed Base Rate	\$300.00
Surface Area Rates for	
Town Streets and Alleys	\$ 3.00/sq.ft.
Utility Drainage and Non-vehicular Easements	\$ 2.00/sq.ft.

An additional fee to guarantee repair of trench failure to be levied for that part of the trench under travelled road. Volume of trench to be calculated and charged at \$10.00/cu.yd.

Special Rates (in addition to fixed and area rates)

Curb and Gutter Sections	\$ 14.00/lf
Landscape, Driveway Apron, Miscellaneous Flatwork	\$ 2.00/sq.ft.
Right of way or major control monuments	\$100.00 each

Provided, however, the Town Engineer shall have complete discretion to determine the exact amount of the deposit based on the conditions and circumstances of each project. Prior to issuance of a permit, the amount as determined by the Town Engineer shall be deposited with the Town Clerk in the form of a certified or cashiers check, cash or other, if approved by the Finance Director.

3) Public Utilities: Any public utility operating within the Town may, at its option, elect to make a one time three thousand dollar (\$3,000.00) deposit to apply to all utility installations within the Town, or with the Town Engineer's approval, submit a letter of responsibility or guarantee in an amount acceptable to the Town Engineer.

4) Refund of Deposits: The Town Engineer shall, upon final inspection of the work performed, determine the quality and acceptability of that work and authorize partial or total refund of deposits. If the contractor completes all construction activities without calling for appropriate inspection, the Town Engineer may, at his sole discretion, order the deposits be retained for one calendar year to determine acceptability of the work performed.

5) Deficiency: If after issuance of a permit, any deposit is determined to be less than sufficient to pay all costs, the contractor shall, upon demand, no later than ten (10) days after being billed by the Town, or prior to the issuance of any further permits, pay to the Town an amount equal to the deficiency. If the contractor fails or refuses to pay the deficiency, the Town may institute an action to recover the amount in any court of competent jurisdiction and refuse to issue any subsequent permits. Until the deficiency is paid in full, no additional permits shall be issued to the contractor. The remedies herein are in the alternative and are not exclusive.

10-1-10 PRIVATE ROADWAYS:

Consideration of private roadways are strongly discouraged within the Town of Breckenridge. Any proposed private roadways must be reviewed by Town Staff prior to the planning process.

10-1-11 STREET LIGHTING AND SIGNAGE:

Proposed street lighting along all public rights of way must be coordinated through the Town. All street lighting criteria shall be reviewed with the Town Engineer and Public Works Director to set specific requirements. All costs for new street lighting on public streets must be paid for by the developer or land owner. All signage and traffic control devices are to be installed and paid for by the developer in all new developments.

10-1-12 CONSTRUCTION TIMING LIMITATIONS:

A. Work authorized by a permit shall be performed between the hours of seven o'clock (7:00) A.M. and seven o'clock (7:00) P.M., Monday through Friday (except holidays), unless the contractor obtains written consent from the Town Engineer to do the work earlier or later than the stated hours or on a weekend or holidays.

B. No street cut permit authorized under this Chapter shall be issued so as to allow a street opening or pavement cut between November 1 and April 30, except on accordance with the following:

1. The Town Engineer may issue a permit for a street opening or pavement cut between November 1 and December 1 if it is determined that special or unforeseen circumstances require the issuance of the permit or if the applicant for the permit is a public utility.

If the Town Engineer determines that an extension should be allowed, the applicant may be required to comply with any of the following additional items:

- a. Post an additional sum to pay the costs of cold patching the cut, maintenance of the cut or possible damage to the public way that may occur over the winter; or
 - b. To temporarily cold patch the excavation; or
 - c. Use of other reasonable construction methods which the Town Engineer determines necessary in order to protect the public way until the excavation is permanently closed. In addition, any applicant requesting an extension shall agree to provide a permanent patch or closure for the street cut the following summer when the ground and weather permit the same.
2. In no event shall a permit be issued from November 1 through April 30 except in the case of an emergency as determined by the Town Engineer.

10-1-13 ADDITIONAL REQUIREMENTS AND VARIANCES:

A. The Town of Breckenridge reserves the right, in the Town's best interest, to issue and enforce more stringent criteria should adverse conditions exist. Also, occasions may arise where the minimum standards are inappropriate. In such a case, an application for a variance to these criteria may be considered which shall be approved or denied by the Town Engineer. The consultant preparing the plans must certify that the variance will result in construction with performance criteria comparable to the Standards set forth in this Ordinance. Approval from the Town Engineering Department constitutes best efforts to insure the submittal information complies to Town ordinances. Responsibility for correctness of design lies with the professional design engineer who shall verify that the information is correct and accurate and that the proposed design conforms with all applicable standards and regulations of the Town of Breckenridge.

10-1-14 ENCROACHMENTS, LITTER PROHIBITED:

A. No person shall obstruct or place an encroachment upon any Town public way or other public place except as authorized by Town Council or Town ordinance.

B. No person shall litter, track, deposit, or cause to be littered, tracked, or deposited, sand, gravel, rocks, mud, dirt, or any other debris or material, except snow, upon any public way or any portion thereof.

C. No person owning or operating trucks and other vehicles shall fail to clean such vehicles to eliminate their tracking or depositing, sand, gravel, rocks, mud, dirt, or any other debris or material, except snow, upon any public way or any portion thereof.

D. No person shall plow, shovel, or otherwise deposit or cause to be deposited, any snow upon any public way or any portion thereof. It is a specific defense to a charge of violating this subsection that the snow was shoveled or swept directly from a sidewalk in front of a residence in a residential area, and that the snow so deposited did not impair the use of the street by vehicular traffic. The provisions of this subsection do not apply to persons brushing off snow which has accumulated naturally upon a motor vehicle parked on or driven upon a public way.

E. If the Director of Public Works finds that any person has violated the provisions of subsections B, C or D of this Section, the Director of Public Works may notify the person or any employer of such person of the duty to remove any sand, gravel, rocks, mud, dirt, snow, or any other debris or material so deposited within twenty four (24) hours from the date of the notice. Notice under

this subsection is sufficient if hand delivered to the person or an employer of such person. No such notice shall be required if the Director of Public Works determines that an emergency exists.

F. If the person so notified fails to remove debris as required by the notice prescribed by subsection E of this Section, or if the Director of Public Works determines that an emergency exists, the Director of Public Works may remove the debris or cause it to be removed and charge the costs thereof to the person violating the provisions of this Section.

G. If any person fails or refuses to pay when due any charge imposed under this Section, the Town Manager may, in addition to taking other collection remedies, certify due and unpaid charges to the Breckenridge Finance Director for collection.

H. No person shall fail or refuse to comply with the notice of the Director of Public Works prescribed by subsection E of this Section.

10-1-15 SNOW STACKING:

Snow stacking areas shall be provided for all public rights of way. Snow stacking areas shall be adequate to provide storage of average snowfalls from the months of November to April. Snow stacking areas shall be able to provide actual storage volumes for approximately 48 cu. ft./ft. of 12' lane of traffic. Maximum stacking height allowed will be 5 ft. consideration for extra snow stack areas at intersections and cul-de-sacs will be required.

10-1-16 REMOVAL OF SNOW AND ICE:

No owner, manager, agent or occupant of real property within the Town shall allow snow or ice to accumulate on public sidewalks and pedestrian passageways abutting their property, and they shall have joint and several responsibility for the removal of all such snow and ice.

10-1-17 PROHIBITED ACTS AND CONDITIONS:

- A. Depositing Litter in Streets: It shall be unlawful to deposit or litter any street with ashes, sod, earth, grass clippings, sand or gravel, rubbish, waste paper, garbage or any other waste material whatsoever.
- B. Restriction on Tire Equipment: It shall be unlawful for any person to operate or move upon any asphalt surfaced street in the Town any vehicle equipped with metal or solid rubber tires or tires which have any flange, cleat, spike, or other protuberances of any material other than rubber, provided that this Section shall not apply to the use of tire chains or cleated snow or passenger tires approved for use upon the highways of Colorado. Any vehicle equipped with "street pads" shall be allowed.
- C. Snowmobiles Prohibited: It shall be unlawful for any person to use or operate or to permit the use of operation of a snowmobile upon any street within the Town.
- D. Trailer Coaches: It shall be unlawful for any person to use or occupy any vehicle or similar portable structure having no foundation other than wheels or jacks and so designed or constructed as to permit occupancy for dwelling or sleeping purposes, whether the same is self-contained or not, for human habitation upon the public ways or upon any public property within the limits of the Town.

10-1-18 STREET MONUMENTS:

- A. The corners of lots, tracts or other parcels of land, and any line points of reference shall, when established on dredge tailings by a land survey, be solidly embedded in concrete per details approved by the Town Engineer and shall be in addition to the minimum standards for surveys set forth in the Colorado Revised Statutes.
- B. If any person shall damage, destroy or remove any corner or line point monument of any type without having first made satisfactory arrangement with the Town Engineer for reconstruction of said monument, said person shall be liable for any and all costs of replacement of said monument and in addition is subject to a fine of not more than three hundred dollars (\$300.00) and/or imprisonment for a term not to exceed ninety (90) days for each offense.
- C. Construction of infrastructure for all new subdivisions shall include provisions for installation by the owner of permanent survey monumentation as required by the Town Engineer and consistent with Colorado State Standards.

10-1-19 APPENDIX

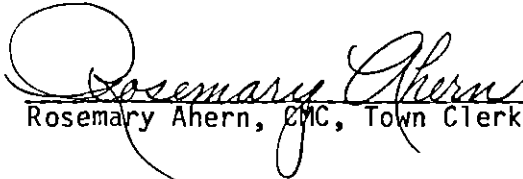
Appendix I to the Town of Breckenridge Street Standards Ordinance is hereby adopted by reference.

10-1-20 VIOLATIONS AND PENALTIES


- A. It is unlawful to erect, construct, reconstruct, alter, or use any structure or to use any land in violation of this ordinance.
- B. Any person, firm, or corporation violating any portion of these regulations is guilty of a misdemeanor, and upon receiving conviction thereof, shall be punished by a fine of not more than three hundred dollars (\$300.00) and/or imprisonment for a term not to exceed ninety (90) days for each offense. Each day during which such illegal construction, reconstruction, alteration, maintenance, or use continues shall be deemed a separate offense.
- C. In addition or as an alternative to such fine and/or imprisonment, the Town may seek other remedies provided in law or equity including but not limited to damages, injunction, mandamus, or abatement.

INTRODUCED, READ ON FIRST READING, APPROVED AND ORDERED PUBLISHED IN FULL ONLY this 9th day of June, 1987. A Public Hearing shall be held at the regular meeting of the Town Council of the Town of Breckenridge, Colorado on the 23rd day of June, 1987, at 7:30 p.m. or as soon thereafter as possible in the Municipal Building of the Town.

ATTEST:


 Rosemary Ahern, ZMC, Town Clerk

TOWN OF BRECKENRIDGE

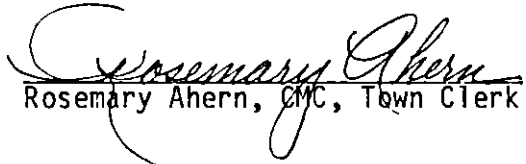

 Stephen C. West, Mayor


READ, ADOPTED ON SECOND READING AND ORDERED PUBLISHED BY TITLE ONLY this 23rd day of June, 1987.

A copy of this Ordinance is available for inspection in the office of the Town Clerk.

ATTEST:

TOWN OF BRECKENRIDGE


Rosemary Ahern, CMC, Town Clerk


Stephen C. West, Mayor

APPROVED IN FORM

Town Attorney _____ Date _____

TABLE OF CONTENTS

	PAGE NUMBER
I. GENERAL	A 1
II. STREET CLASSIFICATION	A 1
A. General	A 1
B. Arterial	A 1
C. Major Collector	A 1
D. Minor Collector	A 1
E. Local	A 1
III. DESIGN STANDARDS	A 2
A. Speed Classifications	A 2
B. Right of Way	A 2
C. Street & Lane Widths	A 2
D. Horizontal Alignment	A 2
E. Vertical Alignment	A 4
F. Sight Distance	A 7
G. Stopping Sight Distance	A 8
H. Specific Criteria	A 9
1) Intersections	A 9
2) Cul-de-Sacs	A 10
3) Bus Turnouts	A 10
4) Pedestrian/Bicycle Facilities	A 11
5) Bridges	A 11
6) Guard Rail	A 11
7) Curbs, Gutters and Drainage Plans	A 12
I. Structural Design Criteria	A 13
J. Traffic Control Devices	A 16
K. Street Lighting	A 16
L. Utility Coordination	A 17
M. Drainage	A 17
IV. PRIVATE ROADWAYS AND DRIVEWAYS	A 19
V. CONSTRUCTION STANDARDS	A 19

I. GENERAL

This document is known as the "Appendix to the Town of Breckenridge Street Standards Ordinance". The Appendix has been ordained by the Town Council of Breckenridge and as part of the "Breckenridge Street Standards Ordinance". Contained in this Appendix are specific requirements delineating design standards required for the preparation of design documents for streets in the Town of Breckenridge.

II. STREET CLASSIFICATION

A. General

Town Streets are classified according to function. Functional classifications shall be established by the Town Engineer. The Town Engineer has the authority to make the determination for road classification. Criteria used to design roadways are based on their functional classification. For planning purposes, the Town of Breckenridge uses the following functional categories in classifying its roads:

B. Arterial

An arterial street is a general term denoting a roadway designed or operating with the following characteristics:

1. Posted speed limit greater than or equal to 35.
2. 4-lane minimum width, plus additional turn lanes.
3. 5,000 vehicles per day expected minimum traffic volume when the land which the arterial serves is fully developed.
4. Limited access to adjacent parcels of land.
5. Traffic control devices to be in accordance with MUTCD.

C. Major Collector

A major collector is a general term denoting a roadway designed or operating with the following characteristics:

1. Posted speed limit from 30 to 40 mph.
2. Traffic volumes generally greater than from 3000-5000 VPD vehicles per day when the land which the collector serves is fully developed.
3. Designed to handle traffic volumes loading from and onto local, other collector, and arterial roadways.
4. No back-out drives are permitted.
5. Traffic control devices to be in accordance with MUTCD.

D. Minor Collector

A minor collector is a general term denoting a roadway designed or operating with the following characteristics:

1. Posted speed limit from 25 through 35 mph.
2. Traffic volumes generally from 1,000 to 3,000 vehicles per day.
3. Designed to handle traffic volumes loading from and onto local, other collector, and arterial roadways.
4. Traffic control by signage shall be in accordance with MUTCD.
5. No backout drives are permitted.

E. Local

A local street is a general term denoting a roadway designed or operating with the following characteristics:

1. Posted speed limit from 15 to 25 mph.
2. Traffic volumes up to 1,000 vehicles per day.
3. Designed for the safety of pedestrians and bicyclists, and the ease of access to adjacent parcels of land.
4. Traffic control by signage shall be in accordance with MUTCD.

III. DESIGN STANDARDS

A. Speed Classifications

The choice of design speed is influenced principally by the character of terrain, type of roadway i.e. (arterial, collector, etc.) and traffic volume. A roadway in the valley floor justifies a higher design speed than a roadway through steeper mountainous terrain.

Design speeds to be utilized for street design in the Town of Breckenridge are listed below and in the summary Table 3.13.

Table 3.1 Speed Classifications

<u>Classification</u>	<u>Design Speeds, Mph</u>
Arterial	40
Major Collector	35-45
Minor Collector	30-40
Local	20-30

B. Right of Way

The width of right-of-way (R.O.W.) depends on the street cross-section to be used, topography in the area, and other physical controls. It is important to acquire sufficient R.O.W. to facilitate future widening and other improvements as traffic warrants.

Minimum R.O.W. widths to be dedicated for street construction in the Town of Breckenridge are listed below and in Summary Table 3.13. These minimums may increase where necessary to meet all maximum side slope requirements.

The minimum clearance from the right-of-way line to the catch point of a cut or fill slope should be 5 feet for all types of cross-sections. When feasible, at least 10 feet should be provided. Restrictive easements may be provided in lieu of dedicated right-of-way, if approved by the Town Council.

Table 3.2 Right of Way Widths

<u>Classifications</u>	<u>Minimum R.O.W. Width, Ft.</u>
Arterial	80 ft.
Major Collector	80 ft.
Minor Collector	60 ft.
Local	50 ft.
Driveways	N/A

C. Street and Lane Widths

The following are minimum requirements for street and lane widths. Figures 1 through 3 reflect these criteria.

Table 3.3 Street and Lane Widths

<u>Classification</u>	<u>Lane Widths, Street Widths</u>	
	<u>(Pavement)</u>	<u>Ft*</u>
Arterial	12	48-64
Major Collector	12	36
Minor Collector	12	28
Local	12	24
Downtown Historic District	11	22

Pavement widths do not include curb and gutter or pan section widths.

D. Horizontal Alignment

1. Curvature

Table 3.4 specifies a minimum centerline radius of curvature for specific design speeds. This table is based on speed alone and does not

take into consideration sight distance factors. Every effort should be made to exceed the minimum values.

Consistency in design speed and curve radii should be used to avoid surprising the driver. Where changes in the design speed are necessary, the design speed between approach tangents and curves will not change by more than 10 MPH. Under no condition will a low speed curve be introduced at the end of a long tangent, where high approach speeds are anticipated. Compound curves without an intervening tangent will not be permitted where design speeds exceed 25 MPH. The minimum lengths of such tangents are specified in Table 3.4. Broken-back curves are to be avoided.

Table 3.4 Minimum Radius of Curvature

Design Speed*	Minimum Curvature Radius	Minimum Tangent Lengths
mph	ft	ft
15	75	50
20	125	75
25	175	100
30	250	150
35	375	200
40	550	250
45	700	250
50	850	250
55	1200	200

*Posted speed shall be 5 mph below design speed.

To avoid the possibility of introducing serious traffic hazards, coordination is required between horizontal and vertical alignment. Particular care must be exercised to maintain proper sight distances at all times.

Fire Department Access - In addition, driveways shall have a 26 ft. inside turning radius and 42 ft. minimum outside turning radius to facilitate fire department access.

2. Superelevation

Table 3.5 is used to determine the superelevation for a curve for safe operation at a particular speed:

$$V = [15 (e + f) R]^{.5}$$

Where: e = Superelevation slope in feet per foot
 f = Side friction factor
 R = Radius of curve in feet
 V = Velocity in miles per hour

The following table is to be used for allowable friction factors. Friction factors have been obtained from CDOH Design Manual using snow and ice conditions.

Table 3.5 Allowable Side Friction Factors

Speed (mph)	Friction Factor
15	0.24
20	0.24
30	0.18
40	0.15
50	0.14
60	0.13

On arterial streets and major collectors maximum rate of super-elevation shall be e = .04. On minor collectors superelevation shall be at a maximum rate of e = .04. Local streets superelevation will be evaluated on a case by case basis, but in general shall not be allowed.

a. Axis of Rotation

For undivided streets, the axis of rotation for superelevation is usually the centerline. However, where curves are preceded by long relatively level tangents. The plane of superelevation may be rotated about the edge of the pavement to improve perception of the curve. Drainage pockets caused by superelevation may be avoided by changing the axis of rotation from the centerline to the inside edge of the pavement.

For divided streets, the axis of rotation for superelevation is usually the inside edge of pavement. However, when the median is narrow, this will produce an objectionable saw tooth appearance and should be avoided.

b. Superelevation Transition

A superelevation transition is variable in length depending upon the amount of superelevation. With respect to the beginning or end of the curve, two-thirds of the transition is on the tangent approach and one-third within the curve. This results in two-thirds of the full superelevation at the beginning and at the end of the curve. Figure 4 depicts superelevation transition. Where spiral curves are permitted, the transitions are to be designed using Colorado Department of Highways Standards.

After a superelevation transition is computed, profiles of the pavement edges should be plotted and irregularities removed by introducing smooth curves. For wide pavements, it is often advantageous to plot intermediate profiles. On curved roadways, a pronounced sag may develop on the low side of the superelevation. This is corrected by adjusting the grades on two edges of pavement throughout the curve.

3. Pavement Transition

A pavement transition is the area of variable pavement width encountered when changing from one roadway width, or section, to another. All pavement transitions shall be based on the following formula:

$$L = \frac{WS^2}{60}$$

Where: L = length of transition or taper, ft.
S = posted speed limit - mph
W = offset, feet

E. Vertical Alignment

1. Minimum and Maximum Centerline Grades

Minimum and maximum grades shall be 0.5% and 6% respectively except that increases in grade beyond 6% will be permitted for sections of road where the horizontal radius of curvature exceeds 1,000 feet as follows:

1% for 500 feet maximum to a maximum of 7%
2% for 200 feet maximum to a maximum of 8%

No two such sections will be within 300 feet of each other or within 300 feet of a curve having a radius of less than 500 feet.

Exceptions to maximum grades. A local street or a private roadway may have sections with a grade of 9% provided all of the following conditions are met:

- The section shall be no longer than 500 ft.
- The section shall have a horizontal radius of 1,000 ft. or

- greater.
- Grades shall not exceed 6% for 100 ft. on either end of the section.
- Curves with a horizontal radius of less than 600 ft. shall not be within 500 ft. on either end of the section.
- Land on each side of the section must be designated permanent open space.

These conditions shall be met to avoid access problems for emergency and maintenance vehicles.

Arterials and major collectors shall flatten to 2% or less for at least 100 feet approaching intersections. Minor collectors and local streets shall be designed so that grades will flatten to 4% for at least 100 ft. approaching intersections. Grades approaching the turn-arounds in cul-de-sacs will be 4% or less for at least 50 feet.

These distances will be measured from nearest edge of approaching roadway for intersections and from the return radii of the cul-de-sac.

The maximum design grade should be used infrequently rather than as a value to be used in most cases.

2. Vertical Curves

Properly designed vertical curves shall provide adequate sight distance, safety, comfortable driving, good drainage, and pleasing appearance. Vertical curves in the Town of Breckenridge shall be parabolic curves. Figure 5 gives necessary mathematical relations for computing vertical curves, at either a crest or a sag in the road.

Minimum length of vertical curves shall be in accordance with Table 3.6. All curves are minimums unless otherwise permitted by the Town in specific cases.

Table 3.6 Minimum Vertical Curve Design Criteria

Design Criteria	Local		Collector		Arterial
	24'	28'	36'	48'	
Algebraic difference (in grades)					
Less than 0.5%	0	0	0	0	
0.5% to 1%	50	50	50	(3)	
1% to 2%	100	100	100	(3)	
2% to 3%	150	150	150	(3)	
3% to 4%	150	150	150	(3)	
4% to 5%	150	150	150	(3)	
5% or greater	(4)	(4)	(4)	(3)	
Min. Vert. Sight Dist.	150	150	150		
in. Reverse Curve Tangent	0	0	0	200	

- 1 Widths are measured from flowline to flowline of the street.
- 2 All vertical curves must be symmetrical parabolic curves.
- 3 An additional 30 ft. length of vertical curve must be provided for each additional 1% (or fraction thereof) change in grade above 5%.
- 4 An additional 50 ft. length of vertical curve must be provided for each additional 1% (or fraction thereof) change in grade above 5%.
- 5 All minimum stopping sight distances for vertical curves with crests must be shown on the construction plans. Sight distances are based on design speeds.

Minimum lengths of vertical curves at the crest of hills are controlled by stopping site distance. Figure 5A depicts this requirement. For

additional standards on state highways, see Section 4 of the State Highway Access Code.

3. Crown Slopes

TYPE OF SURFACE	CROWN SLOPE (PERCENT)
Portland Cement Concrete	2.0
Bituminous Mix Pavements	3.0
Penetration Treated Earth or Gravel	3.0
Unsurfaced Graded Section	3.0

Variance to these slopes will be reviewed on a case-by-case basis by the Town Engineer.

4. Side Slopes

General

Side slopes should be designed for functional effectiveness, ease of maintenance and pleasing appearance.

Cut and fill slopes are as shown on the typical Sections, Figures 1-3. Flatter slopes shall be required in unstable soils. Cut slopes steeper than the standard may be considered in special situations such as in solid material but requires prior approvals by the Town Engineer. Maximum side slopes shall be 2 to 1 (2:1). Side slopes of 3:1 or less are strongly encouraged.

Transition slopes shall be provided between adjoining cuts and fills. Such slopes should intersect the ground at a uniform catch point.

Consideration should be given to snow removal problems and snow storage in slope design. It is considered advisable to use flatter slopes in cuts on the southerly side of the roadway where this will provide additional exposure of the pavement to the sun.

The tops of all cut slopes shall be rounded where the material is other than solid rock. A layer of earth overlying a rock cut shall also be rounded.

Where excessive cut and fill slopes are present, the use of retaining walls or structures may be substantiated. A proposed use shall be approved by the Town Planning and Engineering Departments prior to plan submittal.

a. Slope Benches

The necessity for benches, their width, and vertical spacing shall be established only after an adequate materials investigation. Since greater traffic benefits are realized from widening a cut than from benching the slope, benches should be used sparingly and only where they are justified by sound engineering reasons including the following:

- In unstable material where it is more economical to bench than to flatten the slope.
- To intercept and store loose material resulting from minor slides or erosion.
- For snow storage in special cases as in long through cuts.

For ease of maintenance, a 20-foot bench width is satisfactory. Benches should be sloped to form a valley at least 1

foot deep with the low point, a minimum of 5 feet from the toe of the upper slope. Access for maintenance equipment should be provided to the lowest bench and, if feasible, to the high benches.

5. Vertical Clearance

The minimum vertical clearance to from finished grade to structures and utility lines within Town rights of way shall be 18.0 feet above the traveled way to the lowest portion of the structure.

F. Sight Distance

Before any access is approved, the Town will ensure that vehicles can enter or exit from the proposed access with minimum hazard and disruption of traffic.

1. At Public Street Intersection

At any intersection of two public streets, an unobstructed view as defined in Figure 6 above must be provided across the area formed by the flowline or edge of pavement on one street and the flowline or edge of pavement of the intersecting street and lines, connecting them at 10 ft. from their point of intersection. This area will be used to ensure that drivers of vehicles exiting from the stopped approach have available the minimum sight distance provided in this ordinance. Figure 6 depicts sight distance requirements.

2. At Private Driveways to Public Streets

At any intersection of a private property access and a public street, an unobstructed view, as defined in 10-1-10, must be provided across the area formed by the flowline or edge of pavement on the public street and the private access drive edge line, and lines, connecting them at 10 ft. from their point of intersection. This area will be used to ensure that drivers of vehicles exiting from the stopped approach of an access have available the minimum sight distance.

These sight distance criteria do not apply to single family backout drives where sight distance will be provided based on location of the driver's eye when commencing the backout maneuver.

3. Minimum Sight Distance

Sight distance as shown in Tables 3.7 and 3.8 are designed to enable vehicles to:

- a. Accelerate to the operating speed of the street without causing approaching vehicles to reduce speed by more than 10 miles per hour when turning left or right.
- b. Clear the near half of the street without conflicting with vehicles approaching from the left, when turning left.

The distance requirements are based on a 3.5 ft. driver eye height and 4.25 ft. object height for passenger cars; a 6.0 ft. driver height and 4.25 ft. object height for semi-trailers.

The operating speed on each approach is assumed to be, in order of desirability, a) the 85th percentile speed, b) the speed limit if based on an engineering study, or c) in the case of a new facility, 80 percent of the design speed.

When the criteria for sight distances cannot be met, the Town will prohibit turns by exiting vehicles when appropriate

or require additional speed change lane lengths. These standards apply to accesses on State Highways and Town Streets.

Table 3.7: Sight Distance (ft) for Passenger Cars Exiting from Private Driveways or Public Streets onto Two-Lane Roads

Speed (mph)	Safe Sight Distance - left (d) ft.	Safe Sight Distance - Right (d) ft.
20	150	130
25	240	200
30	350	260
35	430	350
40	530	440
45	610	570
50	740	700
55	830	860
60	950	1,050

Measured from the driver's eye ten feet back of the flowline or pavement edge.

Table 3.8 Sight Distances (ft) for Semi-Trailers Exiting from Private Driveways or Public Streets onto Two-Lane Roads

Speed (mph)	Safe Sight Distance - Left (d)	Safe Sight Distance - Right (d)
20	300	200
25	400	320
30	500	400
35	680	640
40	850	850
45	1160	1160
50	1600	1600
55	2000	2000
60	2500	2500

Measured from the driver's eye ten feet back of the flowline or pavement edge.

G. Stopping Sight Distance

Sight distance is the length of roadway ahead visible to the driver. The minimum stopping sight distance available on a roadway must be sufficiently long to enable a vehicle traveling at or near the roadway design speed to stop before reaching a stationary object in its path or react to a traffic control device such as a stop sign.

Stopping sight distance is calculated in accordance with the following formula:

$$D = 1.47 Vt + \frac{V^2}{30(f+G)}$$

V = speed in MPH

t = reaction time = 2.5 seconds

G = grade, ft/ft

f = coefficient of sliding friction

with f equalling the following factors in Table 3.9 which are based on design speed of roadway:

Table 3.9 Sliding Friction Factors

Design Speed MPH	f Design Criteria: (Snow-packed)
20-40	.24
40-50	.22
50-60	.21

Where an object of the pavement restricts site distance, the minimum radius of curvature is determined by the stopping sight distance, but in no case will it be less than as specified in Table 3.10.

Offset clearance to achieve stopping sight distance on horizontal curves can be obtained from Table 3.10: The centerline of the inside lane is used, with the offset distance measured from the centerline of the inside lane to the obstruction. Figure 7 also depicts stopping sight distance requirements.

Table 3.10 Stopping and Passing Sight Distance

Design Speed	Stopping Sight Distance ft.	Passing Sight Distance ft.
15	100	500
20	150	700
25	200	900
30	250	1100
35	300	1300
40	400	1500
45	500	1650
50	600	1800
55	700	1950

H. Specific Criteria

1. Intersections

a. Angles

Public or private streets must intersect one another at 90 degree angles or as close to 90 degrees as topography permits (no less than 80 degrees).

b. Spacing and Offsets

These standards will be applied to Town Streets. Intersection spacing on State Highways is subject to the provisions of the State Highway Access Code, Section 3.

Commercial/Multifamily Local Streets: Four legged intersections must be spaced at least 450 ft. apart. Where "tee" intersections are used, the center lines of streets not in alignment must normally be offset at a minimum of 300 ft. and be 300 ft. from the nearest four legged intersection.

Single Family Residential Local Streets: Four legged intersections will normally be spaced at least 300 ft. apart. Where "tee" intersections are used, the center lines of streets not in alignment must normally be offset a minimum of 150 ft.

c. Corner Radius

At public street intersections, the property line corners and minimum flowline radii will be as shown in Tables 3.11 and 3.12.

The vehicle used for designing intersections must be based on the following:

Table 3.11 Vehicle Designation for Corner Radius Design

Commercial/Multi-family Local and Minor Collectors	SU30
Major Collectors	WB40
Arterials	WB50

Table 3.12 Minimum Intersection Flowline Radius

Type of Intersection	Property Line Radius	Flowline (ft)	Flowline (ft)
Local - Local		20	15 radius
Local - Collector		25	15 radius
Collector - Collector		25	10 radius
Local - Arterial		25	independently designed
Collector - Arterial		30	independently designed
Arterial - Arterial			independently designed

1. Additional right-of-way or easement may be required for driveways or public street intersections where islands are being used to channel traffic and control turning movements.

These standards apply to both Public and Private Streets.

2. Cul-de-Sacs

The Town discourages the use of cul-de-sacs in street design. However, if particular designs cannot be accomplished without them, the following guidelines shall apply.

The total street length of a cul-de-sac or a loop cul-de-sac, as shown in the Town of Breckenridge Engineering Design Procedures, must not be greater than 600 ft. except when all of the following conditions are met. The total cul-de-sac length may be increased to a maximum of 1,200 ft.

- a. All buildings along the entire length of the cul-de-sac shall be sprinkled in accordance with the Uniform Fire Code accepted by the Town of Breckenridge and NFPA 13 D.
- b. A minimum turnaround diameter of 90 feet shall be provided for bulb-type turnarounds. Figure 8 depicts standard cul-de-sac. A hammer head turn around will be allowed provided the following criteria are met:

Inside Turning Radius	55 ft.
Outside Turning Radius	70 ft.
Storage Length	40 ft.

Figure 9 depicts a standard hammerhead.

3. Bus Turnouts

The following treatments will allow stopping off of the travel lane and are applicable on arterial and collector streets.

Bus turnouts in public rights-of-way shall be owned and maintained by the Town. Bus turnouts on private property shall be the responsibility of the land owner.

Design guidelines for turnouts (for a single 40-foot bus) are:

- a. Bus bays should be at least 10 feet wide (see Figure 10)
- b. Near-side bus bays should be at least 50 feet long for a single bus, plus a 60 to 80-foot transition distance. The curve used should have a 100-foot radius.
- c. Far-side bus bays should provide a 50-foot loading area plus 40 to 60 feet of transition distance. A 25 to 50-foot radius should be used on the initial exit from the bus bay, followed by a short tangent and a 50 to 100-foot radius curve on entry to the main roadway.
- d. Bus bays should be clearly delineated from the travel lane.

4. Pedestrian/Bicycle Facilities

The Town of Breckenridge Director of Community Development shall be contacted regarding requirements for pedestrian and/or bicycle facilities which are required in certain locations. Attached versus detached sidewalks shall be determined by the Town staff.

Minimum sidewalk width shall be five feet. Sidewalks in the Town of Breckenridge shall have an exposed aggregate concrete surface. The concrete width shall be appointed by the Town Engineer. Minimum bike path width shall be eight feet with adequate shoulders. Minimum section for both shall be either four inches of concrete on a prepared subgrade or two inches asphalt with six inches base on a prepared subgrade.

5. Bridges

Bridges are to conform to Colorado Department of Highways requirements and specifications, plans are to be prepared by a qualified registered engineer and are to be submitted to the Town Engineer for review and approval.

Clear deck width is to accommodate the full width of the traveled lanes and shoulders of approach roads. Bridge widths will be evaluated on a case by case basis.

Pedestrian walkways and railing shall be required as determined in the development review process. Flared approach railings are to be provided on the side opposing traffic flow.

The waterway area shall accommodate a 100-year frequency storm. A minimum of 3 feet of freeboard is required. Additional freeboard will be required where debris laden flows are anticipated.

6. Guard Rail

a. Purpose

Guard rail is installed: to prevent accidents by delineating the street to reduce accident severity by deflecting vehicles into safer paths; and to reduce the case of deceleration in the case of pending collisions with fixed objects. Warrants for guard rail should be in compliance with the CDOH Roadway Design Manual. Additionally, the Town Engineer should be consulted prior to any design of guard rails facilities.

b. Design and Placement

State approved guard rail shall be used. The length of guard rail should be planned in multiples of 12.5 feet and the ends shall be so placed as not to present an abrupt or projecting end facing toward approaching traffic. Delineators shall be installed according to Colorado Department of Highways specifications.

When guard rail is used in conjunction with roadside curbs, the face of the guard rail must be flush with the face of the curb regardless of shoulder width. This is to prevent the take-off ramp effect which may throw a vehicle over the guard rail or turn the vehicle over. When no curb is present, the face of the guard rail shall be flush with the edge of the surfaced shoulder. If for any reason it is desirable to set the guard rail behind the curb, the standard guard rail height shall extend above the top of the curb, and not from the gutter grade.

On curves requiring a reduction in approach speeds, any one of the following conditions indicate that consideration should be given to the installation of guard rail on the outside of the curves:

- (a) Height of embankment more than 10 feet
- (b) Side slope steeper than 2:1
- (c) Substandard pavement and shoulder widths
- (d) Roadside hazards

Whether on curves or on tangents, consideration should be given to the installation of guard rails if there is a concentration of running off roadway accidents or if unusually high embankment or steep terrain give motorists a feeling of insecurity.

In areas subject to dense fog or snow and ice conditions, or if traffic speed and volumes are high, guard rail is justified where its installation would be questionable under less adverse conditions.

An obstruction or sudden constriction in width may require the installation of guard rail.

An isolated sharp curve on a road otherwise built to higher standards may warrant guard rail. Ordinarily, guard rail is placed only on the outside of the curve.

Guard rails may be needed at approaches to bridge piers, abutments, trees or other obstructions.

c. Guard Rail at Bridge Approaches

Guard rail shall be placed at the ends of all bridges on the right of approaching traffic. Where pedestrians, especially school children, are expected to use the shoulder, a walkway should be provided around the end of the guard rail outside the normal shoulder line.

7. Curbs and Gutters and Drainage Pans

a. Policy

Curbs and gutters are required as follows:

- On all streets in flat or rolling terrain within subdivisions or any similar type developments where high densities have been planned.
- When required by drainage, traffic or public safety.
- To replace existing curbs.

b. Approved Types

Approved types can be found in Figure 11. Other types may be used on approval by the Town Engineer. Figures 12 and 13 depict drainage pan details and transition areas.

All curbs, gutters and drainage pans are to be constructed with Class B concrete (Colorado Department of Highways specifications) except that temporary installations may be constructed with asphaltic concrete on approval of the Town Engineer. Additional requirements are found in the Section 10-2, Storm Drainage Standards Ordinance for the Town of Breckenridge.

I. Structural Design Criteria

1. Scope

The purpose of this section is to present the Street Structural Design Criteria required for use on all streets in the Town of Breckenridge.

2. General

Streets shall be designed in accordance with sound engineering practice and in conformance with this section of the street standards, as well as the Street Design Criteria with regard to horizontal and vertical alignment. Town review requirements and drawing detail requirements are found in the Town Planning and Engineering Office. The Town of Breckenridge requires pavements to have a design life of 20 years with a service life of 10 years. At that time it is anticipated that localized patching and an overlay would be required.

3. Soils Testing

In order to design pavements for approval and acceptance by the Town of Breckenridge, sampling and testing must be performed under the direct supervision of a registered Professional Engineer to evaluate the soil characteristics. Sufficient samples shall be taken to properly evaluate all changes in soil character. Samples shall be taken at the depth which will serve as subgrade for new street construction.

When joining to an existing paved street, cores of the existing pavement and base structure shall be made and analyzed to determine whether overlayment is feasible or reconstruction is necessary.

4. Flexible Pavement Design

a. Definition

Flexible pavements are those pavements which have sufficiently low bending resistance to maintain intimate contact with the underlying structure, yet have sufficient stability to support the traffic.

b. Design Requirements

Flexible pavement thickness in the Town of Breckenridge shall be determined using the "Roadway Design Manual" of the State of Colorado, Department of Highways, Division of Highways.

Factors considered in this design are:

- i. Traffic volumes for design of Town streets will be specified by the Town Engineer's office. The 18 kip

Equivalent Daily Load Application (EDLA) will be provided for the design.

- ii. A Serviceability Index of 2.0 shall be used in the design for traffic volumes less than 750 Average Daily Traffic, (A.D.T.). An Index of 2.5 shall be used for all arterial and collector streets.
- iii. Regional factor shall be determined using the summation of drainage conditions and minimum regional factor:

<u>Category</u>	<u>Factor</u>
Drainage (subsurface only)	
Very Poor (high groundwater)	1.00
Poor	0.50
Fair	0.25
Good	-0.25

The minimum regional factor to be used in design shall be 1.5. This value has been obtained from the CDOH manual considering environmental conditions of the area.

5. Traffic Volume

The traffic volume to be used for design will be specified by the Town Engineer's office. The 18 kip Equivalent Daily Load Application will be provided to the designer. The following is a table of approximate Equivalent Daily Load Applications for the various street classifications. The table should only be used for estimating purposes. All pavements must be designed from specified values.

<u>Street Type</u>	<u>18 kip Equivalent Daily Load Application</u>
Residential	5
Collector	5 to 75
Minor Arterial	30 to 300
Major Arterial	100 to 700

Quality of Subgrade Support

The resistance value "R" of the subgrade shall be determined by the Hveen stabilometer test performed in accordance with AASHTO Designation T190 or ASTM D 2844. The resistance value should represent the upper one (1) foot of the soil beneath the pavement structure. California bearing ratio, (CBR), tests (ASTM D 1883-67) can also be used in testing subgrade support.

Strength of Structural Layers

The strength coefficients of the various layers of the pavement structure shall be determined from Table 603.3 of the Colorado Department of Highways Roadway Design Manual. Hveen stabilometer and cohesion meter tests may be required to determine the strength coefficients.

Minimum Pavement Thicknesses

The minimum thicknesses of asphalt allowed for Town of Breckenridge streets shall be 3 inches. Minimum base course thickness shall be established by design.

6. Rigid Pavement Design

a. Definition

Rigid pavements are those pavements which possess a high bending resistance and distribute loads over a large area of foundation soil. Examples include Portland cement concrete poured directly over foundation soil or any other surface poured over Portland cement concrete base.

b. Design Requirements

Minimum Thickness

The minimum thickness of Portland cement concrete pavement to be used on streets in the Town of Breckenridge shall be four and one-half (4-1/2) inches.

Modulus of Subgrade Reaction "K"

In designing pavement the subgrade is rated according to its "K" value (modulus of subgrade reaction) where

$$K = \frac{\text{load (in PSI on loaded area)}}{\text{deflection (in inches for that load)}}$$

Figure 16 gives a direct relation between "K" value and "R" value which is discussed above. The "R" value of the existing or filled subgrade shall be determined from the stabilometer test and the "K" value determined from this value and Figure 16.

Design Traffic Number

The Town Engineer determines a Design Traffic Number (DTN) for each type of street. The Design Traffic Number is the daily equivalent 18 KIP single axle load application anticipated for that type of street.

Working Stress - (modulus of rupture)

All Portland cement concrete shall have a minimum compressive strength of 4000 PSI (F'c) at 28 days as determined by ASTM C94 test. When the design mix is selected, further testing shall be performed in accordance with ASTM C 293.79 to determine the modulus of rupture.

c. Materials for Portland Cement Concrete Streets

Cement - Shall conform to ASTM C 150 or, C 185 Type I or Type II. The cement supplier shall submit to the Engineer a certificate that the cement used on the project conforms to the applicable specifications with complete mill analysis.

Aggregate - Shall conform to ASTM C 33.

Admixtures - Air entraining admixtures shall conform to ASTM C 260. Type A water reducing admixtures (normal setting) shall conform to ASTM C 494 and may be used when concrete temperature is between 50 and 90 degrees.

Type D water reducing admixtures (retarders) shall conform to ASTM C 494 and may be used when concrete temperature is over 90 degrees. Type E water reducing admixtures (accelerating shall conform to ASTM C 494). Fly-ash shall conform to ASTM C 618.1.

Materials for Curing Concrete -- Shall be liquid linseed oil based curing compound (white) conforming to ASTM C 309 Type II, Class B.

Joint Filling Compound -- Where joints are required to be filled, material shall be hot poured rubberized asphalt joint filling compound conforming to AASHTO-M-173 or Federal Specification SS-S-164 or SS-S-1401a.

d. Proportioning

Cement : 564 lb. minimum
Air Content: 6-1/2% + 1=1/2%
Coarse Aggregate Size: 1=1/2 in. maximum, but not
greater than one-fourth the slab depth
Slump: 1 - 4 inch maximum for surface vibrated
1 - 3 inch maximum for internally vibrated

e. Strength Required

All concrete shall have a specified compressive strength of 4000 psi F'c and a minimum modulus of rupture of 550 psi. Conformance to strength requirements shall be determined by ASTM C 94 Section 16.5.1 and ASTM C 293.79.

f. Applicable Standards

i. "Specifications for Structural Concrete for Buildings" ACI 301.

If Fly-ash is used, the proportions of materials should be determined in accordance with the American Concrete Institute (ACI) Standard 318-77, Section 4.2.

ii. Standard specifications for ready mixed concrete - ASTM C 94 or AASHTO-M-157.

Steel

Tiebar, where used, shall be deformed and shall meet the requirements of ASTM A 615 (billet steel). Epoxy coated rebar may be required.

7. Side Slope Stability analysis, drainage ditch stability analysis, and revegetation design for all new projects shall be submitted to the Town Engineer before beginning construction.

J. Traffic Control Devices

All signs, striping, markers, delineators, signals, and other traffic control devices must conform to the requirements of the Manual on Uniform Traffic Control Devices published by the U.S. Department of Transportation, Federal Highway Administration. In new developments, all required street sign names, speed limit signs, stop signs and other traffic control devices are to be installed and paid for by the developer. Non-standard signs or other traffic control devices are subject to the latest revised State control standards and approval by the Town Engineer must be obtained for their use. Specific requirements shall be reviewed by the Town Engineer prior to construction. Requests for non-standard signs or other devices must be submitted to the Town Engineer along with all data required to support the request.

K. Street Lighting

Street lighting on state highways shall conform to Section 1000 Lighting, of the Roadway Design Manual, State of Colorado Department of Highways, Division of Highways.

Arterials and Collectors: Lighting shall be provided at intersections and along the roadway. Spacing of lighting units shall be approved by the Town Engineer, and shall conform to the latest edition of the IES manual.

Local: New street lights for local streets shall be provided at intersections per the manual. A complete lighting plan may be required along subdivision streets. In addition lighting may be required on sharp curves, crests of hills or cul-de-sacs depending on specific

site conditions. Minimum lighting quantities provided shall be 5800 lumen for local streets.

All street lighting installations shall be coordinated with Public Service Company of Colorado through the Town of Breckenridge.

L. Utility Coordination

All utilities in public street rights of way shall be placed to minimize disturbance to the roadway system. Fire hydrants, street lights, telephone and cable television pedestals, power transformers and power poles shall be placed a minimum of 5 ft. from outside edge of roadway shoulders. At streets where curb and gutter is present, these requirements will be reviewed on a case by case basis.

All manhole rings and covers and valve boxes placed in paved areas shall be recessed from a minimum of one quarter (1/4) inch to a maximum of three quarters (3/4) of an inch from the roadway surface.

M. Drainage

1. General

All roadway drainage facilities shall comply with Section 10-2 Drainage Standards for the Town of Breckenridge. In addition to the requirements set forth in this document, additional requirements are outlined below.

2. Culverts

Culverts are to be located at each natural draw or water course as conditions warrant to prevent excessive accumulation of flow in roadside ditches or along the toe of slopes. Draws and water courses are to be cleared of debris for a distance of 100 feet upstream from all culvert inlets.

Corrugated steel pipe, reinforced concrete pipe, or reinforced concrete boxes shall be used. Steel pipe shall be asphalt coated or paved where soils are corrosive or other conditions exist that may attack the steel. Aluminum and other pipe materials are not permissible for road culverts that are to be maintained by the Town.

When a battery of pipes is used, a clear spacing of 1/2 the pipe diameter (1-foot minimum, 4-foot maximum) must be provided. Pipes shall be rated a HS-20-44 loading. Minimum cover shall be 1 foot over pipes 48 inches in diameter or less and 2 feet over larger pipes. The maximum cover, pipe metal gauge, and strength classification shall be as recommended by the manufacturer and are subject to the approval of the Town Engineer. Additional thickness may be required where conditions are erosive.

3. Roadside Ditches

Road and side ditches shall be a minimum of 2 feet deep. Minimum 18" diameter culverts shall be required where private driveways cross drainage ditches within Town rights of way.

TABLE 3.13 DESIGN ELEMENTS SUMMARY

	<u>Arterial</u>	<u>Major Collector</u>	<u>Minor Collector</u>	<u>Local</u>	<u>Private Roadway</u>	<u>Driveway</u>
Speed Classification MPH	>40	35-45	30-40	20-30	N/A	N/A
Min. Right-of-Way Width Ft	80	80	60	50	N/A	N/A
Min. Street Widths Ft.	48	36	28	24	20	20
Min. Lane Widths Ft.	12	12	12	12	*	*
Max. Grade %	6	6	6*	8*	*	(1)
Min. Grades %	0.5	0.5	0.5	0.5	0.5	
Min. Horizontal Curve	375	250	175	125	75	
Min. Tangent Between Curves	200	150	100	75	50	
Min. Vertical Curve	*	*	*	*	*	
Min. Sight Distance Ft.	430	350	240	150	150	
Min. Stopping Sight Distance, Ft.	300	250	200	150	150	
Min. Superelevation, %	4	4	4	0	0	
Min. Curb Radii, Ft.	30	25	25	20	15	
Min. Base & Asphalt, In*	*	*	8/3	6/3	--	
Min. Concrete, In.	6	5	4.5	4.5	--	

* See specific Sections for additional requirements

(1) Driveways greater than 8% will require a platform of sufficient size to stage a fire truck. Dimensions of this platform will be 15'x 25' minimum and shall be graded to a minimum of 2% and a maximum of 4%.

IV. PRIVATE ROADWAYS AND DRIVEWAYS

A. Spacing and Location

An Encroachment Permit is required for private roadways and driveways. In mountainous terrain, individual grading plans must be submitted to the Town Engineer for review and approval. The grading plans must show the widths, grades, cut slopes, fill slopes, and methods of slope protection. Private roadways serving more than two lots in mountainous or flat or rolling terrain shall be considered as a local street and corresponding standards shall apply. Private roadways and driveways are not to be constructed so as to drain onto the main street.

Private roadways and driveways openings are to be located at least 100 feet in commercial areas from the end of a curb return or pavement rounding radius. Private roadway and driveway openings are to be separated by at least 10 (ten) feet or otherwise are to be combined. A driveway detail where a curb cut is required is shown on Figure 14. More spacing may be required for traffic safety, and proper traffic operation. Opening widths shall be as follows:

TABLE 3.14 PRIVATE ROADWAY WIDTHS

<u>TYPE</u>	<u>(OPENING INCLUDING FLARES)</u>	
	<u>MAXIMUM</u>	<u>MINIMUM</u>
Commercial	40 feet	24 feet
Residential	30 feet	24 feet

B. Private Roadways

Private Roadways are constructed and maintained by others but nevertheless must conform to the minimum standards for streets as set forth in this ordinance. Use of Private Roadways is subject to the approval of the Planning Commission. The following minimum criteria must be met when proposing private roadways:

1. The width of private roadways may be varied according to density and traffic impact of each site, after appropriate review by the Town's Planning and Engineering staff. Maximum widths shall be: 24' in residential areas, 36' in commercial areas.
2. The developer of the private roadway must submit the portion of the covenant, declaration and/or by-laws of the homeowners association agreement which clarifies the private responsibilities for the driveway (maintenance, policing, lighting, drainage and signals, and maintenance of common open spaces) for "approval as to form" by the Town Attorney. This information may alternatively be indicated as a stipulation on the Subdivision Plat. This information must be approved at the time of the approval of the final plat, rezoning, or site plan, as appropriate.
3. Any traffic control devices proposed for the private roadway or driveway street system, such as signs, markings, speed control mechanisms, etc., will be subject to review and approval by the Town.
4. Parking platforms for fire trucks shall conform to Table 3.13.
5. The maximum number of private or commercial units that may be served from a private roadway or driveway is 4.

V. CONSTRUCTION STANDARDS

At a minimum, all construction of public and private streets in the Town of Breckenridge shall comply to State Department of Highways, Division of Highways, State of Colorado, Standard Specifications for

Road & Bridge Construction 1986 edition. In addition the following requirements are included.

General: All construction and/or restorations made in a public way shall be made at the direction of the Town Engineer or his designated agent and he shall have the authority to prescribe the construction methods and to attach such other conditions as may be reasonably necessary to prevent damage to public or private property, to minimize the interference with vehicular or pedestrian traffic and to prevent the construction from being conducted in a manner hazardous to life or property or in a manner likely to create a nuisance.

Utilities: Contractor shall call for all appropriate utility locations prior to start of construction and protect those utilities with the same care as given to protection of all adjacent properties. All utility facilities shall be exposed sufficiently ahead of trench excavation work to avoid damage to those facilities and to permit their relocation, if necessary.

Survey Markers and Monuments: Monuments of concrete, iron or other lasting material set for the purpose of locating or preserving the lines of any street or property subdivision, or a precise survey reference point, or a permanent survey bench mark within the Town, shall not be removed or disturbed or caused to be removed or disturbed unless permission to do so is first obtained in writing from the Town Engineer. Permission shall be granted only upon the condition that the contractor shall pay all expenses incident to the proper replacement of the monument, be a registered land surveyor. Markers or monuments inadvertently damaged or destroyed by contractor shall be replaced by a registered land surveyor at contractor's sole cost and expense.

Drainage: Under no circumstances shall any contractor encroach upon, fill, rechannel or contaminate any natural drainage courses as a result of construction.

If Work performed by the contractor interferes with the established drainage system of any street, provision shall be made by the contractor to provide proper drainage to the satisfaction of the Director.

Excavated Materials: Contractor shall strip and store all topsoil, frozen organic materials or any other materials designated as unsatisfactory for structural backfill by the Director. Contractor shall remove asphalt pavement beforehand in those areas where it is most likely to become mixed with excavated material. Pavement may only be used for backfill if broken into pieces that do not exceed six inches (6"). Other asphalt pieces larger than six inches (6") shall be removed and disposed of.

Bedding: Acceptable material for bedding both bottom and top shall be three-fourths inch (3/4") minus crushed aggregate base course material or equal that which meets Colorado Division of Highways Class 7 Specification. Other bedding must be approved by the Town Engineer. All bedding material will be frost-free and placed in a dry trench. Bedding depth shall be a minimum of four inches (4") beneath the line, pipe or other. Top bedding course depth shall be a minimum of twelve inches (12") above line, pipe or other.

Backfill: Native excavation shall be placed in lifts not to exceed eighteen inches (18"). Fill shall be placed to a uniform depth and compacted to ninety five percent (95%) Standard Proctor relative density using mechanical compaction methods to ensure satisfactory results. The Town may waive any required testing if it deems the compactive effort and quality to be satisfactory. Native material for backfill shall be reasonably dry; however, if deemed necessary, contractor may be required to introduce additional moisture to ensure reasonable compaction. No rock larger than eight inches (8") in diameter shall be acceptable for backfill.

Topping Course: In traveled roadways, the final twelve inch (12") lift of backfill shall consist of two (2) six inch (6") lifts of Class 6 structural backfill placed and compacted of two inches (2") below finished asphalt grade to facilitate paving. In graveled roads, final lift of Class 6 material shall be placed and compacted to final roadway elevation.

Hot Bituminous Pavement: Patching and placement of hot bituminous pavement will be made only after all edges and corners of affected areas are hammered or cut square and an application of tack oil is made to provide a quality patch. Hot bituminous pavement shall be graded "E" to be placed a minimum of three inches (3") thick, struck off and surface irregularities adjusted. Surface shall be rolled to Colorado Department of Highway specifications for density to a surface free of undue cracking, displacement or distortions. An inspection must be called for this operation. During certain times of the year when hot plant mixed asphaltic is unavailable, cold plant mixed asphaltic concrete shall be placed; however, this shall not be considered a permanent patch, and the contractor shall maintain this temporary patch as required to ensure proper and safe movement of traffic until such time as a permanent patch is installed. The responsible contractor shall install a permanent patch of hot bituminous asphalt within fifteen (15) days following the availability of the proper material. The Town Engineer may, under certain circumstances, allow late season patches to be hot patched the following spring.

Restoration: In all areas beyond the limits of asphalt and/or graveled shoulder, contractor shall place topsoil to an average depth of six inches (6"). Seeding and mulching will be required in those areas deemed necessary. Contractor shall provide Town with a grass mix specification suitable to the Town prior to any reseeding.

Settling: If any settlement in a construction area occurs within a period of one year from the date of completion of the permanent restoration, any expense incurred by the Town in correcting the settlement shall be paid by the contractor unless proof is submitted by the contractor, satisfactory to the Director, that the settlement was not due to defective backfilling.

Final Clean-Up: Upon completion of all restoration of paving operations, contractor must within a reasonable time remove all surplus materials or debris and return the public way to a condition equal to or better than the original state. Upon satisfactory completion of all work including replacement of paved sections, sidewalks, gravel, shoulder, etc., a final inspection shall be made by the Town Engineer.