



# City of Golden

## **STREET, DRAINAGE & SIDEWALK SPECIFICATIONS**

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## SECTION 1. INTRODUCTION

### **1.1 Intent & Application**

1. The City of Golden's *Street, Sidewalk & Drainage Specifications* (hereinafter called *Specifications*) regulate City-funded capital projects and projects constructed by others (including land developers) which will either be dedicated to or accepted by the City of Golden for ownership and maintenance. All work within the public right-of-way, in City alleys, and on City property is governed by these specifications.
2. These *Specifications* shall apply to all new development, and the City Engineer may allow modifications to these *Specifications* when necessary to accommodate an existing development or other site-specific circumstances. These *Specifications* should be used in conjunction with the City's Zoning Regulations and Subdivision Design Standards.
3. These *Specifications* are not intended to apply to new parking lots which will remain private and which will not be turned over to the City for ownership and maintenance. However, such improvements shall meet the drainage specifications set forth herein. In addition, the City Engineer, at his/her discretion, may require that new streets which are intended to remain private and which will not be turned over to the City for ownership and maintenance must meet these *Specifications*.
4. The City also publishes *Water and Sanitary Sewer Specifications* under separate cover, which regulate all utility projects within the City, whether they are City-funded capital projects or projects constructed by others (including land developers) which will either be dedicated to or accepted by the City of Golden for ownership and maintenance.
5. To aid in the interpretation of these *Specifications*, the following is defined:
  1. Whenever the term "*Specifications*" is used herein, it means these *Street, Drainage & Sidewalk Specifications*, as adopted by City Council and as may be amended from time to time.
  2. The term "City Engineer" as used herein shall be deemed to include the City Engineer, his/her designee, or the Public Works Director.

### **1.2 Interpretation:**

The following principles shall be used in interpreting these *Specifications*:

1. The provisions of this chapter shall be regarded as the minimum requirements for the protection of the public health, safety, general welfare, and environment. This chapter shall therefore be regarded as remedial and shall be liberally construed to further its underlying purpose.
2. This chapter is not intended to interfere or conflict with, abrogate, or annul any other regulation, ordinance, statute, or provision of law.
3. Whenever a provision of this chapter and a provision of any other law, ordinance, resolution, rule, or regulation of any kind, including any other provision of this chapter, contains any restrictions covering the same subject matter, the more restrictive shall govern.
4. The foregoing principles notwithstanding, the city council directs those city officials responsible for enforcement of this chapter to utilize a reasonable common sense approach in the interpretation and application of the specific provisions of this chapter. To this end, city officials charged with the responsibility for enforcement and administration of provisions of this chapter shall be entitled to utilize discretion in waiving specific application requirements, provided that such discretion shall be exercised in a manner to preserve the purposes and intention of this chapter and to not jeopardize the health, safety, or general welfare of the public or the environment. When exercising discretion to waive or modify any specific application requirements, said city official shall consider:
  1. The scope and nature of the proposed project.
  2. The impact of the project on the properties in the general vicinity of the project.
  3. The impact of the project on municipal facilities and services, including without limitation, streets, water, sewer, drainage, police, and fire protection services.
  4. Whether the information contained in a requirement sought to be waived is reasonable and readily available from other materials submitted in conjunction with the application.
  5. Strict enforcement of each provision of this chapter shall not be required, and the city official charged with enforcement of this chapter shall be entitled to utilize the legal principle of prosecutorial discretion.

### **1.3 Inspection**

1. At all times during construction of the public improvements, and until final acceptance thereof by the City, the City shall have the right, but not the duty, to inspect materials and workmanship in order to ascertain conformance with the approved plans, standards and specifications.
2. The developer and/or owner shall reasonably cooperate and assist the City in gaining appropriate access to the areas designated for inspection.
3. It shall be the duty of the Developer and/or owner to notify the City upon discovery of any non-conformance with said plans, standards and specifications to which the developer has or should have actual knowledge of such non-conformance.
4. Inspection and acceptance of work by the City shall not relieve the Developer of any responsibility to comply with the plans, specifications and/or developer agreement.

### **1.4 Testing**

1. When materials testing types and frequencies are not specified in these *Specifications*, the City may require that the developer and/or owner follow the current edition of the *Standard Specifications for Road and Bridge Construction*, published by the Colorado Department of Transportation.
2. The design engineer, owner, and/or developer shall ensure that adequate materials testing is performed to ensure that construction of all public improvements complies with the approved plans and specifications.
3. Submittal of the engineering certifications required in Section 5 of these *Specifications* shall be deemed evidence that the design engineer(s) have reviewed all applicable materials test reports, and are satisfied that the number, frequency and type of materials tests performed on the public improvements provide reasonable assurance that the public improvements were constructed in accordance with the approved plans and specifications.

**END OF SECTION 1**

## **SECTION 2. ENGINEERING PLAN & REPORT SUBMITTALS**

### **2.1 Introduction**

1. The intent of this section is to establish criteria for the submittal of engineering design plans and reports.

### **2.2 Interpretation**

1. The following principles shall be used in interpreting this chapter:
  1. The provisions of this chapter shall be regarded as the minimum requirements for the protection of the public health, safety, general welfare, and environment. This chapter shall therefore be regarded as remedial and shall be liberally construed to further its underlying purpose.
  2. This chapter is not intended to interfere or conflict with, abrogate, or annul any other regulation, ordinance, statute, or provision of law.
  3. Whenever a provision of this chapter and a provision of any other law, ordinance, resolution, rule, or regulation of any kind, including any other provision of this chapter, contains any restrictions covering the same subject matter, the more restrictive shall govern.
2. The foregoing principles notwithstanding, the city council directs those city officials responsible for enforcement of this chapter to utilize a reasonable common sense approach in the interpretation and application of the specific provisions of this chapter. To this end, city officials charged with the responsibility for enforcement and administration of provisions of this chapter shall be entitled to utilize discretion in waiving specific application requirements, provided that such discretion shall be exercised in a manner to preserve the purposes and intention of this chapter and to not jeopardize the health, safety, or general welfare of the public or the environment. When exercising discretion to waive or modify any specific application requirements, said city official shall consider:
  1. The scope and nature of the proposed project.
  2. The impact of the project on the properties in the general vicinity of the project.

3. The impact of the project on municipal facilities and services, including without limitation, streets, water, sewer, drainage, police, and fire protection services.
4. Whether the information contained in a requirement sought to be waived is reasonable and readily available from other materials submitted in conjunction with the application.
5. Strict enforcement of each provision of this chapter shall not be required, and the city official charged with enforcement of this chapter shall be entitled to utilize the legal principle of prosecutorial discretion.

### **2.3 Types of Submittals**

1. **GRADING PLANS** - This submittal details the overlot grading proposed for the site and should include significant features such as retaining walls and grades matching to adjacent properties. This information may be included with the drainage plans unless a separate overlot grading permit is desired.
2. **DRAINAGE REPORTS**- This submittal includes the Phase I, Phase II, and Phase III Drainage report and plan submittal. The developer will be required to comply with the provisions set forth in Section 4 of these *Specifications*, which reference the *Urban Storm Drainage Criteria Manual* published by the Urban Drainage & Flood Control District.
3. **PRELIMINARY CONSTRUCTION PLANS** - These plans address the preliminary (functional) design of streets and other improvements within easements and the public right-of-way.
4. **FINAL CONSTRUCTION PLANS** - These are biddable construction documents for the public improvements on the project, including water, sanitary sewer, drainage, street, curb and gutter, sidewalk, grading, details, retaining walls, bikepaths, etc.. They include public and private street plans and drainage elements which may or may not be dedicated to the City. They also may include signing, pavement marking, and traffic signal plans.
5. **SOILS/PAVEMENT DESIGN REPORT** -This documents the soil conditions and proposed pavement installation with the structural cross sections for streets which will be dedicated to and owned and maintained by the City.
6. **GEOLOGIC/GEOTECHNICAL REPORT** - This report documents geologic conditions anticipated at the site and their compatibility with the

proposed development. This report must contain any required mitigation measures to deal with swelling soils, dipping bedrock, etc.

7. RETAINING WALL DESIGN REPORT - This report provides construction documents with all supporting engineering calculations necessary for any proposed retaining wall installations.
8. All submittals are to be prepared by a Colorado-registered professional engineer except for geologic reports which are to be prepared by a Colorado-registered professional geologist and/or professional engineer.

#### **2.4 Grading Plan Review Checklist**

1. The following checklist is provided to assist in developing plans and reports pursuant to these Specifications. The design engineer is encouraged to discuss the project with the City Engineer prior to the first submittal.
2. The City of Golden requires grading plans to detail overlot grading and document significant features such as retaining walls. Submittals also are necessary to ensure that on-site drainage is adequately handled and that the proposed development grading plans are compatible with adjacent property topography.
3. If the grading and drainage plans are being combined in one submittal, the plan sheet should indicate such. Also, the grading plan checklist should be used in conjunction with the drainage report checklist in preparation of the plans.
4. The following checklist has been developed to assist in preparation of grading plans. The City Engineer may, in his/her sole discretion, waive any of the following guidelines, or require additional information of the applicant to assist in his/her review of the submittal.
5. The general notes included with this checklist are to be used on grading plan submittals. This list of general notes is not intended to be all inclusive for every project, therefore, additions may be required.

##### 1. Plan Sheet Format

1. Scale: 1" = 50' or Larger, North Arrow, Title Block, Legend.
2. Vicinity Map 1" = 500'
3. Contour Lines (2' Maximum Intervals)
4. 24" x 36" Plan Sheets
5. Date of plans, and Dated, Sealed, and Signed by P.E.
6. Street Names, Dimensions and Grades
7. Match Lines and Sheet Numbers

8. Approval Block
9. General Notes
10. Bench Mark Description and Elevation
11. Baseline or Control Line

2. Present Site Conditions

1. Existing Site Topography Extending a Minimum of 50 Feet past property boundaries
2. Existing Features
  1. Easements and Rights-of-Way
  2. All Utilities
  3. Drainageways With 100-Year Floodplain and Floodway
  4. Irrigation Ditches or Laterals
  5. Buildings, Fences, Retaining Walls, Trees and Other Physical Features

3. Proposed Site Conditions

1. Proposed Contours With Match to Existing Contours
2. Drainage Flow Arrows.
3. Grade Breaks and Slopes 3:1 or Greater
4. Cut and fill Areas and Quantities Shown
5. Proposed Improvements
6. Sidewalks, Bikepaths and Other Public Improvements
7. Driveway Grades and Dimensions
8. Storm Drainage Structures
9. Fences, Retaining Walls and Other Site Improvements
10. Lowest Finished Floor Elevations For All Buildings
11. Erosion Protection
12. City of Golden, or other Standard Details, referenced where applicable. Where City or other Standard Details are not proposed, Details of proposed work

4. General Notes—the following must be on all grading plans:

1. Grading plan is for rough grading only. Changes may be necessary to bring plan into conformance with approved Final Drainage Plan and Site Plan.
2. A water truck shall be made available within 24 hours of City inspector's request for dust control on site.
3. Any settlement or soil accumulations beyond the property limits due to grading or erosion shall be repaired immediately by the contractor.
4. No grading shall take place in Special Flood Hazard Areas until the Final Drainage Plan, Drainage Report, and/or Floodplain

Development permit have been approved and all appropriate permits have been obtained.

5. Any construction debris or mud tracking in the public right-of-way resulting from this development shall be removed immediately by the contractor.
6. The contractor shall immediately fix any excavations or excessive pavement failures caused by the development and shall properly barricade the site until construction is complete. Failure by the contractor to correct any of the above within 48 hours of written or verbal notice by the City shall cause the City to issue a stop work order and/or do the work and make a claim against the permit guarantee for any cost incurred by the City.
7. Areas being disturbed by the grading shall be reseeded with native vegetation or as approved on the development plan.
8. A Stormwater Permit is required prior to issuance of any grading permit.
9. It shall be the responsibility of the developer during construction activities to resolve any construction problems due to changed conditions or design errors encountered by the contractor during the progress of any portion of the proposed work. If, in the opinion of the City's inspector, the modifications proposed by the developer to the approved plans involve *significant* changes to the character of the work or to contiguous public or private improvements, the developer shall be responsible for submitting revised plans to the City of Golden for approval prior to any further construction related to that portion of the work. Any improvements constructed not in accordance with the approved plans, or the approved revised plans, shall be removed and the improvements shall be reconstructed according to the approved plans at the contractor's expense.
10. The contractor shall be solely and completely responsible for conditions at and adjacent to the job site, including safety of all persons and property during performance of the work. This requirement shall apply continuously and not be limited to normal working hours.
11. The duty of the city to conduct construction review of the contractor's performance is not intended to include review of the adequacy of the contractor's safety measures in, on, or near the construction site.
12. Contractor shall contact the Utility Notification Center of Colorado for location of existing underground utilities at least 48 hours prior to commencement of construction.
13. A City of Golden Street Activity Permit, Street Cut Permit, and/or Curb/Gutter/Sidewalk Permit may be required in conjunction with a grading permit.

## **2.5 SOIL AND PAVEMENT DESIGN REPORT CHECKLIST**

1. The following checklist is provided to assist in developing plans and reports pursuant to these *Specifications*. The design engineer is encouraged to discuss the project with the City Engineer prior to the first submittal.
2. The City of Golden requires soils and pavement design reports to detail soil conditions at the site and the effect on pavement designs. The reports are to include the soils information necessary to substantiate the proposed pavement design. Submittals also are necessary to ensure that proposed public streets are designed for the maximum practical useful life.
3. In general, subject to City Engineer approval, the minimum section which may be allowed on a City street is 8 inches of Class C base course material and 5 inches of hot bituminous pavement. Full depth pavement 7 inches thick may also be acceptable as a minimum standard cross section.
4. The following checklist has been developed to assist in preparation of soil and pavement design reports. The City Engineer may, in his/her sole discretion, waive any of the following guidelines, or require additional information of the applicant to assist in his/her review of the submittal.
5. The general notes included with this checklist are to be used on soil and pavement design report submittals. This list of general notes is not intended to be all inclusive for every project, therefore, additions may be required.

1. Plan Sheet Format

1. Scale: 1" = 50' or Larger, North Arrow, Title Block, Legend.
2. Vicinity Map 1" = 500'
3. 24" x 36" Plan Sheets
4. Date of plans, and Dated, Sealed, and Signed by P.E.
5. Street Names, Dimensions and Grades
6. Match Lines and Sheet Numbers
7. Approval Block
8. General Notes

2. Report Format

1. Title Page With Project Address
2. 8 1/2" x 11" Report, Bound or in a Folder
3. Dated, Checked, Signed and Sealed by a Professional Engineer (Both Soils and Pavement if Done by Different Parties)
4. Original and Revision Dates

- 3.. Soils Information

1. Boring Locations On site Plan
  2. Boring Logs
  3. Gradation Tests
  4. Atterberg Limits
  5. Compaction Tests
  6. Percent Swell
  7. Soil Classification (AASHTO)
  8. Problem Areas on the Site
4. Design Criteria
    1. Roadway Cross-section
    2. Forecast Traffic Volumes
    3. Construction Traffic Forecast
    4. 18-kip ESALs
    6. Serviceability Index
    7. Regional Factor
5. Pavement Design
    1. Weighted Structural Number
    2. CBR Tests
    3. Design CBR
    4. R Value
    5. Subgrade Properties
    6. Base course (8" Minimum)
    7. Pavement (5" Minimum)
    8. Alternatives
6. Construction Methods
    1. Retesting After Rough Grading
    2. Paving Sequence
    3. Lift Thickness
    4. Problem Areas
    5. Construction Traffic Control Plan

## **2.6 STREET CONSTRUCTION PLAN CHECKLIST**

1. The following checklist is provided to assist in developing plans and reports pursuant to these *Specifications*. The design engineer is encouraged to discuss the project with the City Engineer prior to the first submittal.
2. The City of Golden requires construction plan submittals on development projects when improvements are proposed within easements, public right-of-ways, public alleys, or on public streets. Plans may be required at two points in the development process: the preliminary (functional) design stage and the final design stage.

3. The following checklist has been developed to assist in preparation of street construction plans. The City Engineer may, in his/her sole discretion, waive any of the following guidelines, or require additional information of the applicant to assist in the review of the submittal.
4. The purpose of the preliminary construction plan submittal is to allow the engineering staff and applicant to discuss the functional or preliminary design at an early stage in development. The preliminary submittal should address the horizontally controlled plan elements plus any topographic details involving grade changes that would require walls, slopes, utility relocations, etc.
5. The final construction plan submittal should be based on an approved preliminary plan. The submittal should be a complete, biddable, and self supporting plan set including all the details and documentation necessary for construction of the proposed improvements.
6. Plan Sheet format
  1. Scale: 1" = 50' horizontal or larger, 1" = 5' vertical or larger
  2. North arrow, Title block, legend
  3. Vicinity map 1" = 500' or larger
  4. 24" x 36" plan sheets
  5. Original and revision dates
  6. Plans sealed, signed and dated by a professional engineer
  7. Street names and dimensions
  8. Matchlines & sheet numbers
  9. Approval block
  10. General notes
7. Horizontal And Vertical Control
  1. Bench mark description and elevation
  2. Section line or control line with ties to section corner
  3. Beginning station tied and referenced to section or control line
8. Plan Requirements:
  1. Existing improvements for the full width of the street up to 50' beyond the construction limits.
  2. Limits of construction noted
  3. Location of proposed and existing property lines, easements, City right-of-ways, etc.
  4. List of quantities (preliminary submittal only)
  5. Existing utilities, proposed utilities and utilities to be relocated.
  6. Locations of fixed objects (trees, poles, fences, etc.)

7. Proposed street improvements (sidewalk, curb and gutter, asphalt patchback, etc.)
  8. Existing and proposed drainage structures (inlets, manholes, channels, outlet structures, etc.)
  9. Curve layout including radius, length of curve, P.I. deflection angle, degree of curvature, P.C., P.T., and offsets
  10. Proposed 1" = 50' striping and signing plan indicating lane width, MUTCD sign codes, etc. (See Section 300)
  11. Proposed 1" = 20' traffic signal plan (See Section 300)
9. Profile/Cross Section Requirements
1. Three line profiles (centerline and towlines) or centerline profile and cross *sections* every 50 feet extending a minimum of 50' beyond the project limits
  2. On widening/matching projects 3 line profiles and cross sections every 25' extending a minimum of 50' beyond the project limits are required.
  3. Vertical curve data including length of curve, P.V.C., P.V.T., P.V.I., beginning and end grades
  4. Profiles for all curb returns
  5. Existing profile elevations extended 100 feet beyond the end/beginning of the project
  6. Cross sections extended 25' beyond property line
10. General Notes—the following must be on all street plans:
1. All work within the public right-of-way or easement shall conform to the City of Golden Standards.
  2. The City Engineer or Public Works Director may require traffic calming measures be designed into proposed roadways.
  3. It shall be the responsibility of the developer during construction activities to resolve any construction problems due to changed conditions or design errors encountered by the contractor during the progress of any portion of the proposed work. If, in the opinion of the City's inspector, the modifications proposed by the developer to the approved plans involve *significant* changes to the character of the work or to contiguous public or private improvements, the developer shall be responsible for submitting revised plans to the City of Golden for approval prior to any farther construction related to that portion of the work. Any improvements constructed not in accordance with the approved plans, or the approved revised plans, shall be removed and the improvements shall be reconstructed according to the approved plans.
  4. The contractor shall be solely and completely responsible for conditions at and adjacent to the job site, including safety of all

persons and property during performance of the work.

This requirement shall apply continuously and not be limited to normal working hours.

5. The duty of the city to conduct construction review of the contractor's performance is not intended to include review of the adequacy of the contractor's safety measures in, on, or near the construction site.
6. Contractor shall contact the Utility Notification Center of Colorado for location of existing underground utilities at least 48 hours prior to commencement of construction.
7. A City of Golden Street Activity Permit, Street Cut Permit, and/or Curb/Gutter/Sidewalk Permit may be required in conjunction with a grading permit.
8. The Contractor shall provide all lights, signs, barricades, flagmen or other devices necessary to provide for public safety in accordance with the current Manual on Uniform Traffic Control Devices.
9. The Contractor shall provide ingress and egress to private property adjacent to the work throughout the period of construction and prior to beginning work shall obtain written agreement from the affected property owners impacted by the work.
10. Prior to final placement of surface pavement, all underground utility mains shall be installed and service connections stubbed out beyond curb line when allowed by the utility. Service from public utilities and from sanitary sewers shall be made available for each lot in such a manner that it will not be necessary to disturb the street pavement, curb, gutter, and sidewalk when connections are made.
11. Mylar and electronic copies of record drawings shall be submitted to the City of Golden as a condition of final acceptance of work. Reference Section 5 regarding final acceptance of public improvements for additional detail.
12. No portion of the street may be final-paved until all street lighting improvements designed to serve the street and/or development have been completed.
13. Survey Monuments must be set within 60 days of completion of project.

## **2.7 Retaining Wall Design Checklist**

1. The following checklist is provided to assist in developing plans and reports pursuant to these *Specifications*. The design engineer is encouraged to discuss the project with the City Engineer prior to the first submittal.
2. The City of Golden requires retaining design reports to detail soil conditions

at the site and proposed retaining wall designs. The reports are to include the soils information and structural information necessary to substantiate the proposed retaining wall design.

3. The following checklist has been developed to assist in preparation of retaining design reports. The City Engineer may, in his/her sole discretion, waive any of the following guidelines, or require additional information of the applicant to assist in his/her review of the submittal.
4. Engineering calculations must be submitted with the construction drawings covering items noted in the checklist.
5. If any "standard" wall designs are proposed, a copy of the design and reference of design source may be submitted in lieu of calculations.
6. Report format
  1. Title Page With project address and location
  2. 8 1/2" x 11" Report, with details or details on 24" x 36" plan sheets
  3. Dated, Checked, Signed, and sealed by a professional engineer
  4. Original and revision dates
  5. Site plan with wall location (1" = 50' or larger)
7. Design data
  1. Soils Report and/or source of design data
  2. Weight/density of Soil, Concrete, Rock, etc
  3. Allowable bearing pressure
  4. Equivalent fluid pressure
  5. Construction material strengths
  6. Coefficient of friction
  7. Adjacent ground surface slopes
  8. Surcharge loading
8. System Stability Check
  1. Overturning Factor of Safety Greater Than 1.5
  2. Sliding Factor of Safety Greater Than 1.5
  3. Bearing Pressure Less Than Allowable Soil Bearing Pressure
  4. Footing Base at or Below Frost Depth
  5. Slope Stability
9. Plan Requirements
  1. Existing Improvements Depicted by Dashed Lines, Proposed Construction by Solid Lines.
  2. Limits of Construction Noted.

3. Location of Proposed and Existing Property Lines, Easements, Etc.
4. Location of Fixed Objects (Trees, Poles, Fences, Etc.)
5. Layout Data
6. Profiles
7. Cross Sections
8. Elevations with Benchmark
9. Control Line
10. Horizontal Layout
11. Wall Dimensions

10. Wall Details

1. Concrete/Masonry
  1. Reinforcing Steel
  2. Weep Holes
  3. Control/Expansion Joints
  4. Type of Concrete
  5. Facing
2. Timber
  1. Lumber Treatment
  2. Dead Men
  3. Drift Pins
  4. Tie Backs/Anchors
  5. Batter
3. Stacked Rock
  1. Base Material
  2. Rock Sizes & Shapes
  3. Batter

11. Grading/Drainage

1. Ground Slope
2. Backfill Material
3. Drainage System

12. General notes—the following must be on all retaining wall design plans:

1. A building permit is required for construction of retaining walls, unless otherwise waived by the City Engineer and/or Chief Building Official.
2. It shall be the responsibility of the developer during construction activities to resolve any construction problems due to changed conditions or design errors encountered by the contractor during the progress of any portion of the proposed work. If, in the opinion of the City's inspector, the modifications proposed by the developer to the approved plans involve *significant* changes to the character of the work or to contiguous public or private improvements, the developer

shall be responsible for submitting revised plans to the City of Golden for approval prior to any farther construction related to that portion of the work. Any improvements constructed not in accordance with the approved plans, or the approved revised plans, shall be removed and the improvements shall be reconstructed according to the approved plans, at the contractor's expense.

3. The contractor shall be solely and completely responsible for conditions at and adjacent to the job site, including safety of all persons and property during performance of the work.  
This requirement shall apply continuously and not be limited to normal working hours.
4. The City's review of the contractor's performance is not intended to include review of the adequacy of the contractor's safety measures in, on, or near the construction site.
5. Contractor shall contact the Utility Notification Center of Colorado for location of existing underground utilities at least 48 hours prior to commencement of construction.
6. A City of Golden Street Activity Permit, Street Cut Permit, and/or Curb/Gutter/Sidewalk Permit may be required in conjunction with a retaining wall building permit.
7. The Contractor shall provide, at this expense, all lights, signs, barricades, flagmen or other devices necessary to provide for public safety in accordance with the current Manual on Uniform Traffic Control Devices.
8. Prior to final approval of the retaining wall, the design engineer must submit a certification that the wall was constructed in substantial compliance with the approved plans and design report.

**END OF SECTION 2**

## **SECTION 3. STREETS & TRANSPORTATION**

### **3.1 Introduction**

The intent of this section is to establish criteria for the design and construction of streets and alleys, bike paths, and sidewalks. This section governs all new streets, sidewalks, bikepaths, and all work in the public right-of-way.

### **3.2 Interpretation**

The following principles shall be used in interpreting this chapter:

1. The provisions of this chapter shall be regarded as the minimum requirements for the protection of the public health, safety, general welfare, and environment. This chapter shall therefore be regarded as remedial and shall be liberally construed to further its underlying purpose.
2. This chapter is not intended to interfere or conflict with, abrogate, or annul any other regulation, ordinance, statute, or provision of law.
3. Whenever a provision of this chapter and a provision of any other law, ordinance, resolution, rule, or regulation of any kind, including any other provision of this chapter, contains any restrictions covering the same subject matter, the more restrictive shall govern.
4. The foregoing principles notwithstanding, the city council directs those city officials responsible for enforcement of this chapter to utilize a reasonable common sense approach in the interpretation and application of the specific provisions of this chapter. To this end, city officials charged with the responsibility for enforcement and administration of provisions of this chapter shall be entitled to utilize discretion in waiving specific application requirements, provided that such discretion shall be exercised in a manner to preserve the purposes and intention of this chapter and to not jeopardize the health, safety, or general welfare of the public or the environment. When exercising discretion to waive or modify any specific application requirements, said city official shall consider:
  1. The scope and nature of the proposed project.
  2. The impact of the project on the properties in the general vicinity of the project.
  3. The impact of the project on municipal facilities and services, including without limitation, streets, water, sewer, drainage, police, and fire protection services.

4. Whether the information contained in a requirement sought to be waived is reasonable and readily available from other materials submitted in conjunction with the application.
5. Strict enforcement of each provision of this chapter shall not be required, and the city official charged with enforcement of this chapter shall be entitled to utilize the legal principle of prosecutorial discretion.
6. Traffic calming measures required by the City may require deviations from these standards. Any traffic calming measures being considered must meet the standards for traffic calming identified in the Golden Municipal Code and established by City Council resolution.

### **3.3 Functional Street Classification**

1. Street classifications in the City of Golden are based on the following criteria:
  1. Traffic Volume- minimum traffic volumes expected at full development of areas served.
  2. Street Width-measured from flowline to flowline.
  3. Speed Limit- as posted
  4. Access
  5. Traffic Control type- signals, stop signs, etc.
2. Five basic functional systems are used to classify roadways in the City as follows:
  1. Principal Arterials
  2. Minor Arterials
  3. Collector
  4. Local
  5. Private

For specific street classifications consult the current *Golden Major Thoroughfare Plan*.

3. Principal Arterial:
  1. Posted speed limit greater than or equal to 35 mph.
  2. 4-lane minimum width, plus additional turn lanes.
  3. 12,000 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 at major intersections provided by traffic signals.  
Side street control provided by stop signs.
4. Minor Arterial
    1. Posted speed limit from 30 through 40 mph.
    2. Traffic volumes generally greater than 7,000 vehicles per day when the land which the minor arterial serves is fully developed.
    3. Designed to handle traffic volumes loading from and onto local, collector, and arterial roadways.
    4. Traffic control at major intersections provided by traffic signals; side street, control by stop signs.
    5. No backout drives are permitted.
  5. Collector
    1. Posted speed limit from 25 through 35 mph.
    2. Traffic volumes generally less than 7,000 vehicles per day.
    3. Traffic control on collectors generally provided by stop signs.
  6. Local (including private streets)
    1. Posted speed limit from 25 through 30 mph.
    2. Traffic volumes up to 2500 vehicles per day.
    3. Designed for safety of motorists, pedestrians and bicyclists, and ease of access to adjacent parcels of land.
    4. Traffic control by stop signs, yield signs, or right-of-way rules for uncontrolled intersections.
    5. Private streets must meet the same engineering standards for pavement section as a public street in an area of comparable density and traffic volume. **PRIVATE STREETS ARE PROHIBITED IN SINGLE FAMILY RESIDENTIAL SUBDIVISIONS.** The city prefers concrete sidewalk, curb and gutter or drainage pans on private streets. Other treatments will be reviewed for appropriateness on a case-by-case basis.
    6. The width of private streets may be varied according to density and traffic impact of each site, but is subject to review and approval by the City Engineer and/or Planning & Development Department staff.
    7. Appropriate signs must be permanently maintained at the entrance to the private street system that clearly indicate to the public and to the city police and street maintenance crew that the street system is private property and therefore privately maintained. The developer must submit the proposed text of such signage to the City Engineer for review and approval.

8. The developer of the private street system must submit the portion of the covenant, declaration and/or by-laws of the homeowner association agreement which clarifies the responsibilities for the private street system (maintenance, policing, lighting, and drainage and signals, and maintenance of common open spaces) for “approval as to form” by the City Attorney’s office. This information may alternatively be indicated as a stipulation on the Official Development Plan or the Subdivision Plat. This information must be approved by the time of the approval of the final plat, rezoning, or site plan, as appropriate.
9. Any traffic control devices proposed for the private street systems, such as signs, signals, markings, speed control mechanisms, etc., must comply with the current edition of the Manual of Uniform Traffic Control Devices, and will be subject to review and approval by the City Engineer. The first 50 ft. of a private access approach to an existing or proposed signalized intersection must be dedicated as permanent easement measured from the flowline of the public street toward the development to provide for traffic signal loop detector placement, pavement markings, etc.
10. Street construction plans for proposed private streets are required to be submitted to the City for review by the City Engineer and/or other appropriate staff.

### **3.4 Traffic Studies**

1. Traffic studies may be required by the City in order to adequately assess impacts of a development proposal on the existing and/or planned street system. The primary responsibility for assessing the traffic impacts associated with a proposed development will rest with the developer, with the City serving in a review capacity.
2. Unless waived by the City, a written study, paid for by the developer, meeting the criteria established in these Specifications and the Golden Municipal Code, will be required for a development proposal when trip generation caused by the proposed development during the peak hour is expected to exceed 100 vehicles as determined by the City.
3. The traffic study will be the responsibility of the applicant/developer and must be prepared by a professional engineer registered/licensed to practice in the State of Colorado. Upon submittal of a draft traffic study, the City will review the study data sources, methods, and findings. Review comments will be provided in a written form. The developer and the engineer will then have an opportunity to incorporate necessary revisions prior to submitting a final report. All studies must be approved by the City before final site plan approval.

4. Generally, City staff will attempt to review any first submittal traffic study within 15 working days of the date of the submittal to the City Engineer. If study revisions are needed, City staff will generally review these revisions within 10 working days of the date of revision submittal. Longer time periods will be necessary depending upon review caseloads, and if the State Department of Transportation or Jefferson County is involved in the review process.
5. **The following submittals will require traffic studies:**
  1. A rezoning application or an application for annexation into the City.
  2. A preliminary plat or final plat if the property has already been rezoned for the proposed use and no traffic study was required for rezoning, or the land use assumptions at the time of platting will result in trip generation increasing by more than 15% compared to trip generation estimates made for the traffic study at the time of rezoning.
  3. Prior to issuance of a building permit, if the property has already been zoned/platted and no previous traffic study less than two years old exists.
  4. Site access is required off a State Highway. Prior to issuing an access permit, approval from both the City and the Colorado Department of Transportation must be obtained.
  5. Additional access off a State Highway to an existing use is being requested.
  6. Any change of use affecting access from a State Highway.
  7. The applicant will be required to submit a new traffic study if, after submitting the original traffic study for any of the above submittals, the land use intensity is increased by more than 15%, or the land use is changed so that trip generation is increased by more than 15%.
  8. The City Engineer and/or Planning & Development Department staff may require a traffic study for any development at their discretion.
  9. All previous traffic studies relating to the development that are more than two years old may have to be updated.

10. Where access points are not defined or a site plan is not available at the time the traffic study is prepared, additional traffic work may be required when a site plan becomes available or the access points are defined.

### **3.5 Traffic Study Format**

1. In order to provide consistency and to facilitate staff review of traffic studies, the following format must be followed in the preparation of such studies by transportation consultants.
2. The introduction portion of the report must contain the following:
  1. Land use, Site and Study Area Boundaries
  2. A brief description of the size of the land parcel, general terrain features, the location within the jurisdiction and the region must be included in this section. In addition, the roadways that afford access to the site, and are included in the study area, must be identified.
  3. The exact limits of the study should be based on engineering judgment and an understanding of existing traffic conditions surrounding the site. A vicinity map that shows the site and the study area boundaries, in relation to the surrounding transportation system, must be included.
  4. Existing and Proposed Site Uses

The existing and proposed uses of the site must be identified in terms of the various zoning categories of the City. In addition, the specific use for which the request is being made must be identified if known, since a number of uses may be permitted under existing ordinances. It shall be the intent of the traffic study to evaluate the reasonable worst case traffic impacts for the proposed development allowed by the zoning. If several different uses are permitted by the zoning, the highest trip generation uses must be assumed for the study.

5. Existing and Proposed Uses in Vicinity of Site

A complete description (including map) of the existing land uses in the study area as well as their current zoning and use, must be included. In addition, all vacant land within the study area and its assumed future uses must be identified.

6. Existing and Proposed Roadways and Intersections

Within the study area, the applicant must describe and provide volumes for existing roadways and intersections including geometric and traffic signal control as well as improvements contemplated by government agencies. This must include the nature of the improvement project, its extent, implementation schedule, and the agency or funding source responsible. A map must be provided showing the location of such facilities.

3. Trip Generation and Design Hour Volumes

1. A summary table listing each type of land use, the size involved, the average trip generation rates used (total daily traffic and a.m./p.m. peaks), and the resultant total trips generated must be provided.
2. Trip generation must be calculated for the maximum uses allowed under the existing and proposed zoning based on the latest data contained within the Institute of Transportation Engineer's (ITE) Trip Generation Manual. In the event that data is not available for the proposed land use, the developer and/or its consulting engineer may submit alternate data that mostly closely matches the proposed land use.
3. The calculation of design hour volumes used to determine study area impacts must be based on:
  1. Peak hour trip generation rates as published in the most current ITE Trip Generation Summary.
  2. NCHRP Report 187 where required.
  3. Traffic volume counts for similar existing uses, if no published rates are available.
  4. Additional sources from other jurisdictions, if acceptable to the City.
  5. Use of the following percentage rates to account for passerby traffic may be considered upon approval of the City. Internal trip reductions and modal split assumptions will require analytical support to demonstrate how the figures were derived and will require approval by the City.
  6. Passerby factors are to be used to reduce the estimated additional total daily traffic to street(s) serving a proposed

development. They are not to be applied directly to reduce trip generation and turning movement volumes at driveways serving the proposed development.

**TABLE 3-1: Passerby Factors**

LAND USE	PASSERBY COMPONENT
Banks/financial institutions	14%
Regional shopping center	9%
Supermarket	28%
Hardware Store	8%
Auxiliary Commercial Uses	16%
Convenience Stores	16%
Drive-in/Drive thru restaurants	50%
Service stations	50%

4. Trip Distribution
  1. The estimates of percentage distribution of trips from the proposed development to destinations in the metro region must be clearly stated in the report using the north, south, east, west compass points. Market studies and information concerning origin of trip attractions to the proposed development may be used to support these assumptions where available. A map showing the percentage of site traffic on each street must be provided as part of the traffic study graphic material.
  
5. Trip Assignment
  1. The direction of approach of site generated traffic via the area's street system will be presented in this section. The technical analysis steps, basic methods, and assumptions used in this work must be clearly stated. The assumed trip distribution and assignment must represent the most logically traveled routes for drivers assessing the proposed development.
  
6. Existing and Projected Traffic Volumes
  1. Graphics must be provided which show the following traffic impacts for private access points, intersections and streets specified in the traffic study requirements form.
  2. A.M. peak hour site traffic (in and out) including turning movements.

3. P.M. peak hour site traffic (in and out) including turning movements.
  4. A.M. peak hour total traffic including site generated traffic (in and out). These volumes must include through and turning movement volumes for current conditions and a separate set of numbers that also include 20 year projections or build out (whichever is specified by the City).
  5. P.M. peak hour traffic total including site generated traffic (in and out). These volumes must include through and turning movement volumes for current conditions and a separate set of numbers that also include 20 year projections or build out (whichever is specified by the City).
  6. Any other peak hour which may be critical to site traffic and the street system in the study area should be included in the graphics and show the same information as is provided for the A.M./P.M. peak hours.
  7. Actual counts of existing total daily traffic for the street system in the study area at the time the study is being prepared.
  8. Projected total daily traffic for the street system in the study area based on traffic from the proposed development and counts of existing daily traffic obtained as described herein. The component of the existing daily traffic attributable to the existing uses must be identified and the increase in total daily traffic from the proposed uses.
  9. Projected total daily traffic for the street system in the study area based on traffic from the proposed development, counts of existing daily traffic, and traffic projections based on build out of land use within the study area or a 20 year projection.
  10. All raw traffic count data (including average daily volumes and peak hour turning movements) and analysis worksheets must be provided in the appendices of the report. Computer techniques, and the associated printouts, may be used as part of the report.
  11. All total daily traffic counts must be actual counts and those obtained by the Colorado Department of Transportation, the City, or other agencies may be acceptable if not more than two years old.
7. Level of Service

1. Level of service “C” will be the design objective for all movements and under no circumstances will less than level of service “D” be accepted for site and non-site traffic including existing traffic at build-out of the study area. The design year will be approximately 20 years following construction and include volumes generated by build-out of the study area or a 20 year projection in background traffic.
2. The following interpretations of “Level of Service” have been provided:
  1. Level of Service A. A condition of free flow with low traffic density, where no vehicle waits longer than one signal cycle.
  2. Level of Service B. A stable flow of traffic where only on a rare occasion do drivers wait more that one signal cycle.
  3. Level of Service C. Still in the zone of stable flow, but intermittently drivers must wait through more than one signal cycle and backups by a develop behind left turning vehicles.
  4. Level of Service D. Approaching instability, drivers are restricted in their freedom to change lanes and delays for approaching vehicles may be substantial during peak hours.
  5. Level of Service E. Traffic volumes near or at the capacity of the arterial and long queues of vehicles may create lengthy delays especially for left turning vehicles.
  6. Level of Service F. Congested condition of forced traffic flow, where queued backups from locations downstream restrict or prevent movement of vehicles out of the approach, creating a storage area during part or all of the peak hour.
8. Capacity Analysis
  1. A capacity analysis will be conducted for all public street intersections impacted by the proposed development and for all private property access points to streets adjacent to the proposed development as specified in the traffic study requirements from and within the limits of the previously defined study area. The A.M., P.M., and any other possible peak period will be tested to

determine which peak hours need to be analyzed. Capacity calculations should also include an analysis for the 20<sup>th</sup> year projections or study area build out conditions. The capacity analysis calculations should be based on the planning analysis techniques established by the Federal Highway Administration. All capacity analysis work sheets must be included in the appendices of the report.

## 9. Traffic Signals

1. The need for new traffic signals will be based on warrants contained in the current edition of the Manual on Uniform Traffic Control Devices. In determining the location of a new signal, traffic progression is of paramount importance. Generally a spacing of one-half mile for all signalized intersections should be maintained. This spacing is usually desirable to achieve good speed, capacity, and optimum signal progression. Pedestrian movements must be considered in the evaluation and adequate pedestrian clearance provided in the signal cycle split assumptions.
2. To provide flexibility for existing conditions and ensure optimum two-way signal progression, a traffic engineering analysis must be made to properly locate all proposed accesses that may require signalization. The section of roadway to be analyzed for signal progression will include all existing and possible future signalized intersections.
3. The progression pattern calculations must use a cycle consistent with current signal timing. A desirable bandwidth of 50% of the signal cycle must be used where existing conditions allow. Where intersections have no signals presently, but are expected to have signals, typically a 60% mainline, 40% cross street cycle split should be assumed. Cycle split assumptions must relate to volume assumptions in the capacity analysis of individual intersections, and where computerized progression analysis techniques are used, they must be of the type which utilizes turning movement volume data and pedestrian clearance times in the development of time/space diagrams. The green time allocated to the cross street will be considered no less than the time which is required for a pedestrian to clear the main street using Manual on Uniform Traffic Control Devices standards. Those intersections which would reduce the optimum bandwidth if a traffic signal were installed may be required to remain unsignalized and have turning movements limited by access design or median islands.

## 10. Traffic Accidents

1. Traffic accident data for affected street corridors may be required for the study. The study period will normally be three years. Where this is necessary, estimates of increased or decreased accident potential must be evaluated for the development, particularly if the proposed development might impact existing traffic safety problems in the study area
11. Noise Attenuation
1. Noise attenuation measures are required by the Golden Municipal Code. The applicable Municipal Code sections, as may be updated and amended from time to time, are incorporated herein by reference.
12. Conclusions
1. This chapter of the report must be a clear, concise description of the study findings. It is anticipated that this conclusion chapter will serve as the executive summary.
13. Recommendations
1. In the event that analysis indicates unsatisfactory levels of service on study area roadways, a description of proposed improvements to remedy deficiencies must be included. In general, the recommendation section should include:
    - 1.. Proposed Recommended Improvements- This section must describe location, nature, and extent of proposed improvements to assure sufficient roadway capacity. A sketch of each improvement should be provided showing the length, width and other pertinent geometric features of the proposed improvements.
    2. Volume/Capacity Analysis at Critical Points- Another iteration of the volume/capacity must be described, which demonstrates the anticipated level of service as a result of making these improvements.
    3. Traffic Volume Proportions- Percentages based on the traffic impact analysis may be required to determine the proportion of traffic using various public improvements (both existing and proposed) from several developments within the study area.

### **3.6 Trip Generation Rates**

1. The estimation methods recommended under the “Trip Generation” section herein will be used for all traffic studies. Rates referred to in this section are one-way trip ends and not two-way round trips. Rates provided for the following specific uses supercede the trip generation rates in the Trip Generation Manual of the Institute of Transportation Engineers and all other rates:

1. Drive-In Banks

Trip generation rates per window and per 100 sq. ft. of lobby are summarized in the following table.

**TABLE 3-2: Drive-In Bank Trip Generation Rates**

Size of area occupied by Bank	Daily trips per 1000 sf of lobby <sup>1</sup>	Peak hour trips per 1000 sf	Daily trips per window	Peak trips per window <sup>2</sup>
< 10,000 sf	250	17.5	200	35
10,001 – 15,000 sf	200	14	175	35
15,001 – 20,000 sf	125	11	150	35
> 20,001 sf	75	7.5	100	35

<sup>1</sup> Excluding the drive-thru windows

<sup>2</sup> These are trip ends and represent 35 total trips entering and exiting each window.

2. Flea Markets

1. A daily trip generation rate of 16 per booth must be used in all traffic studies. The peak hour is noon to 1:00 p.m. on Saturday and the peak hour trip rate must be 2.4 trips per booth.

3. Sports Recreation Centers

Centers would be of the type comprising a swimming pool, running track, basketball facilities, weight room and racquetball facilities will be used estimating trips from sports recreation centers.

4. Mixed Use Developments

1. City studies have indicated that daily trip generation from office/commercial mixed use developments can be

accurately predicted by the application of ITE rates to each individual use.

### **3.7 Geometric Street Design**

1. **Right-of-way, Street and Lane Widths:** The minimum required right-of-way width for a street is based on the required width of paving plus an additional width on each side of the paving to accommodate curbs, sidewalks, and utilities. These are minimum requirements. The City may require additional widths for needed through lanes, turn lanes, speed change lanes, and where it is necessary to accommodate slopes and drainage structures.
2. The following table summarizes right-of-way and street widths. All dimensions are in feet. See Details in the Appendix.

**TABLE 3-3: Minimum Right-of-Way and Street Widths**

Street Classification	Minimum Right-of-Way Width <sup>1</sup>	Minimum Street Width <sup>2</sup>
Local street-single family residential areas	55 ft	36 ft
Local street-multi-family residential areas	60 ft	40 ft
Collector street with no adjacent driveway access	60 ft	40 ft
Arterial street	100 ft	64 ft

<sup>1</sup> Right-of-way width may need to be increased if Planning and/or Public Works Depts. require detached sidewalks to be located entirely within the right-of-way. Alternatively, the Planning and/or Public Works Depts. may allow a portion or all of the detached sidewalks to be located in easements.

<sup>2</sup> Measured between the flowlines of the curb and gutter. The listed widths assume parking is allowed on both sides of the street. If parking is restricted on one or both sides of the street, widths may be reduced at the City Engineer's discretion.

<sup>3</sup> The City Engineer may require deviations from the specified street widths for traffic calming purposes.

3. The following street lane widths are to be used in conjunction with the minimum street widths in Table 3 above. All dimensions are in feet.

**TABLE 3-4: Minimum Street Lane Widths<sup>1</sup>**

Lane Type	Local Street	Collector Street	Arterial Street
Thru w/parking both sides	10 ft	11 ft	12 ft
Thru w/parking one side	10 ft	11 ft	12 ft
Thru w/ no parking	10 ft	11 ft	12 ft
Left turn lane <sup>4</sup>	10 ft	11 ft	12 ft

<sup>1</sup>The City Engineer may require deviations from the specified lane widths for traffic calming purposes.

<sup>2,3</sup> Curb parking is never permitted on arterial streets.

<sup>4</sup> Excludes 1 foot gutter pan in an adjacent raised median.

4. On roadways where no curb and gutter is to be provided, a minimum 4 foot paved and stabilized shoulder must be provided for disabled vehicle emergency parking.

### **3.8 Horizontal and Vertical Alignments**

1. Horizontal
  1. Designs must conform to any future street right-of-way. Proposed streets must be in continuous alignment with existing, planned or platted streets with which they are to connect.
  2. Arterial, collector and local streets (if not ending in a cul-de-sac) must extend to the boundary lines of the land to be subdivided and/or served. Proposed streets with widths different from existing streets to which they are being connected must be transitioned using City pavement transition taper standards. Excessively long straight residential streets, conducive to high speed traffic, may be prohibited.
  3. Minimum Horizontal Curve Design Criteria are summarized below. For additional standards on State Highways, consult CDOT.

**TABLE 3-5: Minimum Horizontal Curve Design Criteria**

Criteria	Local Street	Collector Street	Arterial Street
Min. design speed (mph)	30	35	40
Min. centerline radius (ft)	100	300	300
Min. horiz. Sight dist. (ft)	200	250	325
Min. rev. curve tangent (ft)	0	100	200
Min. int'n approach tan (ft) <sup>1</sup>	0	200	300

<sup>1</sup>Where a curved road approaches an intersection, these tangent sections must be provided on the approach to the intersection to provide for adequate sight distances for traffic control devices at the intersection.

4. At the connection of two local streets with different alignments where the connecting curve is less than the minimum 150 ft. radius, the outside flowline may be required to be flared as shown in the Appendix.
5. Additional pavement width may be required to on horizontal curves on collector and arterial streets to provide for vehicle maneuvers where no superelevation is provided and the minimum horizontal curve design criteria in the above table have not been met. The method of calculation for the widening will be as described in the AASHTO “A Policy on Geometric Design of Highways and Street,” current edition.

## 2. Vertical

1. Grades and vertical sight distance are critical to ensure proper drainage and/or safety for vehicles and pedestrians. Grades of streets shall not be less than 0.5%. **The maximum grade on all new streets is 8%.** For unsignalized intersections, the maximum allowable grade in the intersection is 4%, and extends a minimum of 50 ft. in each direction from the outside edge of traveled way of the intersecting street. At signalized intersections, the maximum grade is 2% within the intersection and for 200 ft. in each direction.
2. Exceptions to Maximum Grades: A local access or low volume road may, at the City Engineer’s discretion, have sections with a grade of 9% provided all of the following conditions are met:
  1. The section shall be no longer than 50 feet.
  2. The section shall have a horizontal radius of 1500 feet or greater.
  3. Grades shall not exceed 6% for 500 feet on either end of the section.
  4. Curves with a horizontal radius of less than 600 feet shall not be within 500 feet of either end of the section.
  5. Land on each side of the section must be designated permanent open space.

**TABLE 3-6: Minimum Vertical Curve Design Criteria**

Algebraic difference in grades	Min. length of vertical curves <sup>1</sup> (ft)		
	Local Street	Collector Street	Arterial Street
Less than 0.5%	0	0	0
0.51% to 1%	50	50	(2)
1.01% to 2%	100	150	(2)
2.01% to 3%	150	150	(2)
3.01% to 4%	150	220	(2)
4.01% to 5%	150	280	(2)
Greater than 5.01%	(3)	(4)	(2)
Min. vertical sight dist. <sup>5</sup> (ft)	150	200	(2)
Min. reverse curve tan. (ft)	0	100	200

- <sup>1</sup> All vertical curves must be symmetrical parabolic curves.
- <sup>2</sup> Reviewed and approved by the City.
- <sup>3</sup> An additional 30 ft. length of vertical curve must be provided for each additional 1% (or fraction thereof) change in grade above 5%.
- <sup>4</sup> An additional 50 ft. length of vertical curve must be provided for each additional 1% (or fraction thereof) change in grade above 5%.
- <sup>5</sup> All minimum stopping sight distances for vertical curves with crests must be shown on the construction plans. Sight distances are based on design speeds.

3. **Superelevation on Horizontal Curves:** Maximum superelevation rates for major collector and arterial streets of 0.04 to 0.06 ft/ft (4% to 6%) are generally recommended for use in the City of Golden. Superelevation is not recommended for use on collector and local street curves. All roadway designs utilizing superelevation are subject to review and approval by the City Engineer. For design details and methodology, it is recommended that the following be consulted: “A Policy on Geometric Design of Highway and Streets,” AASHTO, current Edition.
4. The minimum cross slope on streets to be owned and maintained by the City shall be 2%. When reconstructing an existing City street, or milling and overlaying an existing City street, the minimum cross slope shall be 2%. The City Engineer and/or Public Works Director are authorized to grant exemptions or variances from this requirement.

**3.9 Intersections**

1. **Angles**
  1. Proposed public streets must intersect one another at 90 degree angles or as close to 90 degrees as topography permits (no less than 80 degrees).
2. **Spacing and Offsets**

1. The following standards apply to City Streets. Intersection spacing on State Highways is subject to the provisions of the State Highway Access Code.
  1. Arterials: Signalized intersections will normally be spaced at half mile intervals. Nonsignalized intersections must be “tee” intersections spaced at least 600 ft. apart. Nonsignalized four-way intersections may be allowed on arterial streets provided that the design of the intersection precludes left turns onto and through movements across the arterial. If the overlap of left turn storage requirements for two “tee” intersections exceed 600 ft., the minimum spacing must be increased to provide adequate left turn storage in both directions.
  2. Collectors: Signalized intersections will normally be spaced at half mile intervals, although other locations may be permitted if adequate signal progression can be maintained. Nonsignalized four legged intersections must be spaced at least 600 ft. apart. When “tee” intersections are used, the center lines of streets not in alignment must normally be offset a minimum of 250 ft. from the nearest four legged intersection. If the left turn storage requirements for adjacent intersections overlap, the minimum spacing must be increased to provide adequate left turn storage in both directions.
  3. Commercial/MultiFamily Local Streets: Four legged intersections will 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 125 ft.
  4. Single Family Residential Local Streets: Four legged intersection will normally be spaced at least 300 feet apart. Where “tee” intersections are proposed, the center lines of streets not in alignment must be offset at least 125 feet.
  
3. Corner Radii
  1. At public street intersections, the property line corners and minimum flowline radii will be as shown in the following table.
  2. The vehicle used for designing intersections must be based on the following:

Commercial/Multi-family Locals and Minor Collectors

SU30

**TABLE 3-7: Minimum Intersection Flowline Radii<sup>1</sup>**

Intersection type	Flowline Radius (ft)
Local – Local	15
Local – Collector	25
Local - Arterial	30
Collector - Collector	30
Collector – Arterial <sup>2</sup>	30
Arterial – Arterial <sup>2</sup>	30

<sup>1</sup> 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.

<sup>2</sup>At signalized intersections where right turn channelization islands are provided (see Appendix ) or high truck and bus volumes may use the access, a larger flowline radius may be required.

4. Road Width Transition Tapers

1. When constructing a roadway that will directly connect with an existing roadway of a different width, it is necessary to install a transition taper between the two. The length of taper depends upon the offset difference between the outside traveled edge of the two sections and the ratios shown in the following table. These ratios are not to be used in the design of speed change or left turn storage lanes.

**TABLE 3-8: Minimum Road Width Transition Tapers**

Design Speed (mph)	Transition Run/Offset (ft/ft)
25	15/1
30	15/1
35	20/1
40	25/1
45	30/1
50	35/1
55	40/1
60	45/1

5. Striped Left Turn Approach and Bay Tapers for City Streets

1. The minimum requirements are summarized in following table, and striping layouts are illustrated in The Appendix. The standard collector street cross section is 36 ft. widening to 44 ft. at signalized intersections, intersections with potential for signalization, or intersections with potential for substantial turning movement volumes.
2. Although these distances are for straight tapers, reverse curve type tapers may be used.

**TABLE 3-9: Minimum Left Turn Approach and Tapers**

Design Speed (mph)	Approach (ft) <sup>1</sup>	Taper (ft) <sup>2</sup>
25	125	100
30	180	120
35	245	140
40	320	160
45	405	180
50	500	200
55	605	220

<sup>1</sup>This length also applies to departure tapers in the appendix.

<sup>2</sup>At existing closely spaced intersections, bay tapers may be shortened to provide adequate storage lengths.

6. Left Turn Lane Storage Lengths for City Streets
  1. Left turn lane storage design at both signalized and unsignalized intersections for proposed street design plans can be determined from nomographs in The Appendix. New streets will use the desirable lengths. Minimum design lengths will only be permitted under constraints imposed by geometrics of existing streets. Lengths of dual left turn lanes must be based on a minimum of 60% of the single lane length required.
7. Signalized Intersections
  1. See nomograph in The Appendix. If no specific information is available, a signal cycle length of 100 seconds and 5 percent trucks must be used to determine left turn storage lengths.
8. Unsignalized Intersections
  1. See the Appendix. Opposing volumes include only through volumes opposing the left turn movement on the same street for which the left turn channel is being designed.

2. On roads with one travel lane in each direction, the design length of left turn lane will be determined by the City but will be generally twice the requirement for a four lane highway.
9. **Speed Change Lane Design**
1. For Right Turns to Accesses on City Streets: On City arterial and collector streets, the design of acceleration/deceleration lanes for right turns will meet requirements of the State Highway Access Code, provided sufficient right-of-way is available. If off-site right-of-way is insufficient to construct speed change lanes to these standards, the developer will be responsible for the cost of condemnation to obtain such right-of-way at the developer's cost. Where driveways have to be located in close proximity to one another in order to provide access to adjacent properties, the City will permit speed change lanes to be combined if the minimum design standards.

### **3.10 Sight Distance**

1. At Public Street Intersections:
  1. As illustrated in the Appendix, at any intersection of two public streets, a 55 ft. sight distance triangle must provide for an unobstructed view across the triangle formed by joining points measured 55 ft. distant along curb line from the intersection of the two streets. Within the area of the triangle, there must be no sight obscuring or partly obscuring wall, fence, sign, foliage, or berming higher than 36 inches above the curb grade or, in the case of trees, foliage lower than 8 ft. Vertical measurement must be made from the flowlines of the two streets forming the triangle, or if no gutter exists, from the edge of the nearest traveled way. Objects that may be located in the triangular area that such as hydrants, utility poles, utility junction boxes, and traffic control devices. These must be located to minimize visual obstruction.
  2. For rounded property corners, the triangular area must be between the curb lines extended and a diagonal line joining the points on the property lines, 55 ft. from the point of their intersection.
  3. The above also applies to intersections of public streets and railroad right-of-way at railroad crossings not controlled by gates or flashing lights.

4. In addition to the above, at any intersection of two public streets, an unobstructed view as defined 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 line (labeled  $d^1$  or  $d^2$  in the Appendix), 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.
2. At private Accesses to Public Streets
    1. At any intersection of a private property or parking structure access and a public street, it is recommended that an unobstructed view as defined above, across the triangle formed by joining points measured 55 ft. along both the curb line on the public street and private access edge line from the point of intersection of the street and access be provided. Four rounded property corners, the triangular area must be between the curb line and access edge line extended and a diagonal line joining the points on the property and private access edge lines, 55 ft. from the point of their intersection.
    2. In addition to the above, at any intersection of a private property access and a public street, an unobstructed view, as defined in 3.10.1.1, 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 (labeled  $d^1$  and  $d^2$  in the Appendix), 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.
    3. Minimum Sight Distance
      1. Sight distance as shown in the following tables are designed to enable vehicles to:
        1. When turning left or right, accelerate to the operating speed of the street without causing approaching vehicles to reduce speed by more than 10 miles per hour.
        2. When turning left, clear the near half of the street without conflicting with vehicles approaching from the left.

2. The distance requirements based on a 3.5 ft. driver eye height and 4.25 ft object height for passenger cars; a 6.0 ft driver eye height and a 4.25 ft object height for semi-trailers.
3. The operating speed on each approach is assumed to be, in order of desirability,
  1. the 85<sup>th</sup> percentile speed,
  2. the speed limit if based on an engineering study,
  3. in the case of a new facility, 80 percent of the design speed.
4. When the criteria for sight distances cannot be met, the City will prohibit turns by exiting vehicles when appropriate or require additional speed change lane length.  
 These standards apply to accesses on City Streets.

**TABLE 3-10: SIGHT DISTANCE<sup>1</sup>—Passenger Cars exiting private accesses or public streets onto TWO-LANE Roads**

1

Speed (mph)	Sight Distance LEFT (ft) <sup>2</sup>	Sight distance RIGHT (ft) <sup>3</sup>
20	150	130
25	240	200
30	350	260
35	430	350
40	530	440
45	610	570
50	740	700
55	830	860

<sup>1</sup>Measured from the driver’s eye ten feet back of the flowline or pavement edge.

<sup>2</sup>Corresponds to d1 in Appendix detail.

<sup>3</sup>Corresponds to d2 in Appendix detail.

**TABLE 3-11: SIGHT DISTANCE—Passenger Cars exiting private accesses or public streets onto FOUR-LANE and SIX-LANE Roads**

Speed (mph)	Sight Distance LEFT (ft) <sup>1</sup>	Sight distance RIGHT (ft) <sup>2</sup>
20	130	130
25	180	200
30	220	260
35	300	350
40	380	440
45	500	570
50	620	700
55	760	860

<sup>1</sup>Measured from the driver's eye ten feet back of the flowline or pavement edge to a vehicle in the outside lane. Corresponds to d1 in Appendix detail.

<sup>2</sup>Measured from the driver's eye ten feet back of the flowline or pavement edge to a vehicle approaching in the median lane. Corresponds to d2 in Appendix detail.

**TABLE 3-12: SIGHT DISTANCE<sup>1</sup>—Semi-trailers exiting private accesses or public streets onto TWO-LANE Roads**

Speed (mph)	Sight Distance LEFT (ft) <sup>2</sup>	Sight distance RIGHT (ft) <sup>3</sup>
20	300	200
25	400	320
30	500	400
35	680	640
40	850	850
45	1160	1160
50	1600	1600
55	2000	2000

<sup>1</sup>Measured from the driver's eye ten feet back of the flowline or pavement edge.

<sup>2</sup>Corresponds to d1 in Appendix detail.

<sup>3</sup>Corresponds to d2 in Appendix detail.

**TABLE 3-13: SIGHT DISTANCE—Semi-trailers exiting private accesses or public streets onto FOUR-LANE and SIX-LANE Roads**

Speed (mph)	Sight Distance LEFT (ft) <sup>1</sup>	Sight distance RIGHT (ft) <sup>2</sup>
20	200	200
25	320	320
30	400	400
35	640	640
40	850	850
45	1160	1160
50	1600	1600
55	2000	2000

<sup>1</sup>Measured from the driver's eye ten feet back of the flowline or pavement edge to a vehicle in the outside lane. Corresponds to d1 in Appendix detail.

<sup>2</sup>Measured from the driver's eye ten feet back of the flowline or pavement edge to a vehicle approaching in the median lane. Corresponds to d2 in Appendix detail.

5. The sight distances shown in following tables are required for vehicles turning left from a public street and entering a private access or another public street to allow drivers a clear view of oncoming vehicles and complete the maneuver safely.

**TABLE 3-14: SIGHT DISTANCE<sup>1</sup>—Passenger cars entering private accesses or public streets by LEFT TURNS from a public street**

Speed (mph)	Two-lane Road	Four-lane Road	Six-lane Road
20	150	160	170
25	190	200	220
30	230	250	270
35	300	320	340
40	370	390	420
45	450	470	500
50	520	550	580
55	600	630	670

<sup>1</sup>Measured in feet from the point where a left-turning vehicle stops to a vehicle approaching in the outside lane.

**TABLE 3-15: SIGHT DISTANCE<sup>1</sup>—Semi-trailers entering private accesses or public streets by LEFT TURNS from a public street**

Speed (mph)	Two-lane Road	Four-lane Road	Six-lane Road
20	260	280	300
25	330	360	380
30	400	440	480
35	480	540	580
40	570	620	670
45	680	730	800
50	810	880	950
55	910	990	1060

<sup>1</sup>Measured in feet from the point where a left-turning vehicle stops to a vehicle approaching in the outside lane.

6. The sight distances in the tables apply when highway grades are zero to 3.0% (either up or down). When grades are steeper than 3.0%, adjustments must be used to compensate for the different distances required to reach the speed of traffic. Adjustment factors are provided in the following table.

**TABLE 3-16: Factors for the Effect of GRADE on Sight Distance**

Grade	Upgrade Factor <sup>1</sup>	Downgrade Factor <sup>2</sup>
0-3.0%	1.0	1.0
3.1-5%	0.6	1.4
5.1-8%	0.5	1.7

<sup>1</sup>When the highway in the section to be used for acceleration after leaving the access descends, sight distance in the direction of approaching descending highway traffic should be reduced by these factors.

<sup>2</sup>When the highway in the section to be used for acceleration after leaving the access, ascends, the sight distance in the direction of approaching ascending traffic should be increased by these factors.

4. Stopping Sight Distance

1. 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.

**TABLE 3-17: Minimum Stopping Sight Distance<sup>1</sup>**

Design Speed (mph)	Stopping Sight Distance (ft)
20	125
25	150
30	200
35	250
40	325
45	400
50	475
55	550
60	650

<sup>1</sup>Assumes a driver reaction time of 2.5 seconds; a driver's eye height of 3.5 ft; and object height of 0.5 ft.

2. To allow for the effect of grade on stopping sight distance, the factors in the following table must be used.

**TABLE 3-18: Effect of GRADE on Stopping Sight Distance**

	Increase for Downgrades				Decrease for Upgrades		
	Correction in Stopping Distance (ft)				Correction in Stopping Distance (ft)		
Design Speed	3%	6%	8%	Assumed Speed <sup>1</sup>	3%	6%	8%
23-30	10	20	30	20-28	10	10	20
31-40	20	40	70	29-35	10	20	30
41-50	30	70	110	37-44	20	30	40
51-60	50	110	170	45-52	30	50	70
61-65	60	130	200	53-55	30	60	90

<sup>1</sup>Average running speed is assumed to allow for the fact that vehicles normally travel at a slower speed on an upgrade.

**3.11 Bikepath and Sidewalk Clearances, Widths, Grades and Routes**

1. Bikepaths must have a minimum width of 10 feet, a maximum grade of 8% on sustained grades, and a 2% cross slope.
2. Sidewalks must be a minimum of 5 feet in width.
3. Maximum detachment of a bikepath or sidewalk from the street curb should not exceed 15 feet. This is to avoid pedestrians and bicyclists leaving the alignment of the designated path as a short cut. If head-in parking is permitted adjacent to the bikepath, 2 feet of additional width will be required.
4. Fixed objects higher than 6 inches should not be closer than 2 feet to the edge of the bikepath/sidewalk. Objects such as signal or utility poles, signs, bus benches, fire hydrants, etc., must not be located in the sidewalk or bikepath.
5. On arterial and collector streets, the sidewalk or bikepath must normally be detached. Detached sidewalks must be 5 ft. wide; bikepaths 10 ft. wide.
6. On arterials and collectors, where it is attached, the sidewalk must be a minimum of 8 feet in width and the bikepath 10 feet in width (in certain situations, 12 feet of width may be required). Special lighting treatment may be required for bikepaths provided in the middle of developments that are not adjacent to public streets.
7. Where sidewalk and bikepaths are located near major RTD bus stops or transfer points, the City may require wider facilities to provide for adequate passenger and storage areas.

8. Any time a sidewalk or bikepath on a street or in a structure having public access is adjacent to a retaining wall, a pedestrian guardrail, and/or a bicyclist guard rail must be provided to protect pedestrians and bicyclists, in accordance with the City's adopted building code.
9. Sidewalks and bikepaths may be required to extend offsite in order to terminate them properly so that pedestrians and bicyclists using such facilities can safely reach adjacent developments.
10. Sidewalks are to comply with ADA requirements. See Appendix details for information on ADA accessible ramps adjacent to streets.
11. See Appendix details for sidewalk chases. The City Engineer may require the installation of sidewalk chases, and may require compliance with, at his/her discretion, one of the sidewalk chase details included herein.

### **3.12 Guard Rails**

1. Roadway hazards that may require shielding by a roadside barrier can be placed into five main categories. Fixed objects; embankment hazards; nontraversable hazards; and treatments; ditch sections. Curb and gutter will not be regarded as an adequate barrier for redirecting vehicles. Although the following guard rail criteria have been provided for City streets, the City recognizes that the provision of guard rails to redirect errant vehicles may only be necessary on high speed facilities. On lower speed streets, the need for guard rails will be based on these criteria as well as engineering judgment, local conditions, and type of roadside hazard. Detailed procedures for installation of roadside barriers are provided in the AASHTO "Guide for Selecting, Locating and Designing Traffic Barriers."
2. Construction Details: The current edition of the Colorado Department of Transportation's Standard Plans should be consulted for the following guardrail construction detail.
  1. Lateral clearances from edges of traveled way (typically between 5 and 13 ft.).
  2. Height of top rail above the curb or pavement (typically 25-30 inches).
  3. Post spacing (typically 12 ft. 6 in. with 6 ft. 3 in. spacing for the curved end sections).
  4. End Treatments.

**3.13 Medians**

1. Raised medians may be required on arterial roadways and may be allowed on local collector roadways.
2. Median widths must be a minimum of 4 ft. flowline to flowline.
3. If left turn lanes are installed in the median, the median must be no less than 14 ft. wide, flowline to flowline. See table for recommended median widths.
4. Cuts in existing medians must be approved by the City. In new roadway designs, the minimum spacing of median openings will be kept to 600 ft. Increased storage lengths and tapers may be required as determined by the City based on available turning movement volume data. Median openings that allow left turns in both directions must not be less than 50 ft. nose to nose.
5. All median turn lanes and openings must be designed for at least WB-40 trucks.
6. Fixed objects will not normally be permitted in medians. Plantings must be located so as not to violate the sight distance standards provided herein.

**TABLE 3-19: Recommended Median Widths**

<b>Function</b>	<b>Minimum Width (ft)</b>	<b>Desired Width (ft)</b>
Separation of opposing traffic	5 <sup>1</sup>	10
Pedestrian refuge and space for traffic control devices	6 <sup>1</sup>	14
Left turn speed change and storage	14	20
Crossing/Entering vehicle storage <sup>2</sup>	20	40
U-turns, inside to outside lanes	20	56
U-turn, inside to inside lanes	32	68

<sup>1</sup>Cannot accommodate left-turn lanes which will be prohibited.

<sup>2</sup>This enables vehicles crossing a street with a median or turning left onto such a street to use the median area for storage so as to negotiate each half of the street separately.

**3.14 Vertical Clearance of Structures**

1. On City streets, a minimum vertical clearance of 17.5 feet must be provided for all overhead structures, as measured from the crown of the street (allowing for future overlays) to the lowest portion of the structure.

### **3.15 Cul-de-Sac Lengths**

1. The total street length of a cul-de-sac or loop cul-de-sac, as shown in the appendix, must not be greater than 500 ft. except if one of the following conditions is met.
  1. The total cul-de-sac length may be increased to a maximum of 1,000 ft. for P.U.D., RE, R1, R1A, R2 Zone Districts, provided it is approved by the Golden Fire Department and City Engineer.
  2. The total length of the cul-de-sac for Zone Districts higher than RE, R1, R1A or R2 may be increased to a maximum of 750 ft. provided it is approved by the Golden Fire Department.
  3. Cul-de-sacs serving developments with buildings exceeding 26' in height may require a 45' radius cul-de-sac bulb to permit ladder fire trucks to turn around. The design is subject to approval by the City of Golden Fire Chief.
2. The Fire Marshall may require various types of fire protection (for example and by illustration only, residential fire sprinkler systems) if proposed cul-de-sac lengths will exceed 500 feet.
3. The City Engineer may require temporary cul-de-sacs to be constructed on dead end street segments that are anticipated to be extended in the future.

### **3.16 Traffic Signals**

1. Traffic Control Device Costs and Associated Easements
  1. When it can be shown that a particular development impacts a street or streets to a point that a traffic signal or other traffic control device is deemed necessary for the safe and efficient movement of vehicles and/or pedestrians, the developer will be required to pay for all or some portion of the installation. If the developer declines to pay for such a device, the City will limit turning movements at the access to prevent unsafe movements from occurring.
  2. At proposed signalized intersections, the first 50 ft. of a private driveway approach must be dedicated as a permanent easement to the City as measured from the flowline to the cross street to provide for traffic signal loop detector placement.

3. Modification or relocation costs of existing traffic control device equipment such as signals on State Highways and City Streets will be the responsibility of the developer.
2. Installation/Relocation of Traffic Signals via Developers Agreements
  1. New traffic signal installations and relocations of existing signal equipment may be required in developer agreements.
  2. New signals will be installed only when warranted as specified in the Manual on Uniform Traffic Control Devices.
  3. The projected need for a traffic signal will be based on traffic studies submitted by the developer's traffic consultant and approved by the City.
  4. The volume studies to determine when a traffic signal needs to be installed will be conducted by the City of Golden and/or Colorado Department of Transportation.
  5. The developer must provide the City collateral in the form of an irrevocable Letter of Credit to guarantee payment of the total cost of installation for a traffic signal prior to the issuance of a building permit for any structure to be built within the development.
  6. The irrevocable Letter of Credit must remain in effect for a minimum of five years.
  7. The actual amount of the collateral, based on current costs, to be posted with the City for the installation of a traffic signal specified in the Subdivision Improvements Agreement will be determined at the time of application of the first building permit, and must be posted before the first building permit can be issued.
  8. In the event that the collateral posted with the City is due to expire prior to the end of the five year period, the City will require the Owner and Developer to renew the collateral, and the City may require that the amount of collateral be revised to reflect current costs.
  9. When a new traffic signal becomes warranted, the City will notify the Developer in writing of such a determination. The developer must make payment to the City within sixty days of receipt of the letter. Complete traffic signal design plans, stamped by a Colorado professional engineer, must accompany the payment.

10. Upon receiving the payment, the City will return the collateral to the Owner and Developer within 30 days, and install the traffic signal(s) within nine months of the date it received the developer's payment.
11. If the payment is not made to the City, the City will use the collateral in order to install the traffic signal.
12. In the event that the City of Golden and/or the Colorado Department of Transportation determines that a traffic signal is not warranted within five years after receipt of the collateral, the collateral will be returned to the Developer.
13. In addition to the above new signal installation requirements, the Developer must also pay for the cost of relocation of, and any modifications made to, existing traffic signals located adjacent to the development that are necessary due to the development.

### **3.17 Traffic Control in Construction Zones**

1. On State Highways within the City, the Colorado Department of Transportation must approve work area traffic control signing and detour plans. These plans must conform to the Manual on Uniform Traffic Control Devices.
2. All construction zone traffic control plans approved by CDOT for work on State Highways within the City must be submitted to the City for information purposes.
3. All work area traffic control plans for construction zones on City streets must be submitted to the City Engineer or Streets Superintendent for review, and must be designed in accordance with the current edition of the Manual on Uniform Traffic Control Devices.
4. No construction or maintenance activity shall commence on City streets until the construction zone traffic control plans have been approved by the City Engineer.

### **3.18 Striping Plans**

1. In order to facilitate striping of new streets or restriping of existing streets necessitated by development, striping plans must be submitted as part of the construction plans for the public improvements for review by the City.
2. If striping plans require the addition, relocation and removal of pavement markings, the cost of these items will be borne by the developer. The City

will indicate as part of the striping plan approval process whether the City will install the striping and then invoice the developer, or whether the developer will be required to install the striping. Regardless of the option selected, the addition, relocation and/or removal of striping is the developer's expense.

3. The striping plans must be designed in accordance with the current edition of the Manual on Uniform Traffic Control Devices.

### **3.19 Traffic Control Signage Plans**

1. In order to facilitate installation of traffic control signs on new streets (public or private) or resigning of existing streets necessitated by development, traffic control sign plans must be submitted as part of the construction plans for the public improvements for review by the City.
2. If sign plans require the addition, relocation and removal of traffic control signs, the cost of these items will be borne by the developer.
3. The traffic control sign plans must be designed in accordance with the current edition of the Manual on Uniform Traffic Control Devices.
4. The traffic control sign plan must state that the City will install all required traffic control signs at the developer's expense. The City must be notified in writing by the developer a minimum of 30 days in advance of when the sign installation will be required. The City may withhold further approvals, permits, or C.O.'s if the sign costs are not paid by the developer.

### **3.20 Street Name Signs**

1. In order to facilitate installation of street name signs on new streets (public or private) or resigning of existing streets necessitated by development, sign plans must be submitted as part of the construction plans for the public improvements for review by the City.
2. If street name sign plans require the addition, relocation and removal of traffic control signs, the cost of these items will be borne by the developer.
3. The street name sign plans must be designed in accordance with the current edition of the Manual on Uniform Traffic Control Devices.
4. The street name sign plan must state that the City will install all required street name signs at the developer's expense. The City must be notified in

writing by the developer a minimum of 30 days in advance of when the sign installation will be required. The City may withhold further approvals, permits, or C.O.'s if the sign costs are not paid by the developer.

### **3.21 Emergency Access Lanes**

1. The developer is responsible for the installation and maintenance of the signs and markings necessary to designate emergency access lanes on private property, in accordance with the approved plans.
2. Emergency access lanes must be able to accommodate all emergency vehicles, including fire equipment, and must be delineated in a clear and uniform manner.
3. Easements for emergency access lanes should allow the shortest practical direct access to points of concern.
4. The emergency access lane will be paved or surfaced with an alternate surface treatment meeting the requirement of the Fire Department having jurisdiction.
5. The emergency access lane must have a minimum continuous width of 20 feet, unless it is a one way aisle or for emergency vehicle use only in which case a 15 feet width will suffice.
6. All corners must have a minimum continuous width of 25 feet and when a turnaround is employed, the minimum radius must be 45 feet.
7. Grades must not exceed 8%.
8. Where structures are erected over any part of the access lane, vertical clearance must not be less than 13.5 feet.
9. The access lanes must be kept free and clear of all obstructions to allow free flow of emergency vehicles.
10. The lanes may be used for the maneuvering of vehicles, but cannot be used for parking or storage of vehicles.
11. Directional arrows may be used on the signs to indicate limits of emergency access lanes.
12. All signs must comply with the current Manual on Uniform Traffic Control Devices.

13. In addition to standard signs, pavement markings may be necessary to delineate the limits of the emergency access lanes. Whether or not pavement markings are necessary will be determined on a case-by-case basis.
14. The City Engineer must be consulted prior to installation of signs and markings in order to ensure that the designation of the emergency access lane(s) is adequate and in conformance with MUTCD standards.

### **3.22 Transit Facilities**

1. Collector and arterial roadways may sometimes serve as commuter bus routes with frequent stops which may require special pavement design.
2. At existing or planned bus stop locations, additional sidewalk or bikepath widths may be required for bus bench and/or shelter placement.
3. The Regional Transportation District is responsible for the location, operation and maintenance of all bus stops.

**END OF SECTION 3**

## **SECTION 4. DRAINAGE SPECIFICATIONS**

### **4.1 Introduction**

1. Presented in these specifications (also called the criteria) are the minimum design and technical criteria for the analysis and design of storm drainage facilities within the City of Golden. All subdivisions, re-subdivisions, planned unit developments, or any other proposed development or construction submitted for approval shall include adequate storm drainage system analysis and appropriate drainage system design. Such analysis and design shall meet or exceed the criteria.
2. Policies and technical criteria not specifically addressed in the City criteria shall follow the provisions of the “Urban Storm Drainage Criteria Manual”, Volumes 1 through 3 inclusive, dated June 2001, authored by the Urban Drainage & Flood Control District, as may be amended from time to time (hereinafter called the Manual). The applicant is also referred to the Colorado Department of Transportations’ Standard Plans for additional design details not covered in these criteria or the Manual.

### **4.2 Interpretation:**

The following principles shall be used in interpreting this chapter:

1. The provisions of this chapter shall be regarded as the minimum requirements for the protection of the public health, safety, general welfare, and environment. This chapter shall therefore be regarded as remedial and shall be liberally construed to further its underlying purpose.
2. This chapter is not intended to interfere or conflict with, abrogate, or annul any other regulation, ordinance, statute, or provision of law.
3. Whenever a provision of this chapter and a provision of any other law, ordinance, resolution, rule, or regulation of any kind, including any other provision of this chapter, contains any restrictions covering the same subject matter, the more restrictive shall govern.
4. The foregoing principles notwithstanding, the city council directs those city officials responsible for enforcement of this chapter to utilize a reasonable common sense approach in the interpretation and application of the specific provisions of this chapter. To this end, city officials charged with the responsibility for enforcement and administration of provisions of this chapter shall be entitled to utilize discretion in waiving specific application requirements, provided that such discretion shall be exercised

in a manner to preserve the purposes and intention of this chapter and to not jeopardize the health, safety, or general welfare of the public or the environment. When exercising discretion to waive or modify any specific application requirements, said city official shall consider:

1. The scope and nature of the proposed project.
2. The impact of the project on the properties in the general vicinity of the project.
3. The impact of the project on municipal facilities and services, including without limitation, streets, water, sewer, drainage, police, and fire protection services.
4. Whether the information contained in a requirement sought to be waived is reasonable and readily available from other materials submitted in conjunction with the application.
5. Strict enforcement of each provision of this chapter shall not be required, and the city official charged with enforcement of this chapter shall be entitled to utilize the legal principle of prosecutorial discretion.

#### **4.3 Review and Approval:**

1. The City will review all drainage submittals for general compliance with these criteria. An approval of drainage submittals by the City does not relieve the owner, engineer, or designer from responsibility of ensuring that the calculations, plans, specifications, construction, and record drawings are in compliance with the criteria and the Manual.
2. The City may request that the Urban Drainage & Flood Control District (hereinafter referred to as UD&FCD) review reports and construction plans required by these criteria. Where major drainage way improvements or floodplain delineation are involved, UD&FCD approval may be required.

#### **4.4 Basic Principles & Policies**

1. Drainage is a sub-system of all urbanization. The planning of drainage facilities must be included in the urbanization process. The first step is to include drainage planning with all regional and local development master plans. The drainage report shall address multiple purpose use of land for drainage and open space.

THE POLICY OF THE CITY SHALL BE TO CONSIDER STORM DRAINAGE A SUB-SYSTEM OF THE OVER-ALL URBAN SYSTEM AND TO REQUIRE STORM DRAINAGE PLANNING FOR ALL DEVELOPMENTS TO INCLUDE THE ALLOCATION OF SPACE FOR DRAINAGE FACILITIES.

2. Multi-purpose Resource: Storm water runoff is an urban resource. Whereas the runoff can be a liability to urbanization, storm runoff has potential for beneficial use. This use, however, must be compatible with adjacent land uses and Colorado Water Law.
3. When storm water runoff is treated as a resource, quality aspects of the water become important. This in turn relates to issues such as street cleaning practices, solid waste collection and removal services, and regulations on the development of raw land to control erosion and resulting silt loads.
4. The existing drainageways and storage locations frequently interrelate with the water rights, which must be addressed when planning the facility to preserve their integrity.
5. Ditches which have direct flow rights from a stream are controlled by headgates. Drainage improvements, which alter the quantity (or quality) of the water available to the headgate, affect the ability to divert water. Other ditches obtain all portions of the rights by intercepting the shallow groundwater. If the water right has not been abandoned or transferred to another location, the drainage design (including the sub-surface system) must be planned and constructed to preserve the water right. Similar situations can also occur when planning drainage facilities near reservoirs.

THE POLICY OF THE CITY SHALL BE TO RECOGNIZE THE POSSIBLE EFFECTS OF DRAINAGE DESIGNS ON WATER RIGHTS AND TO INLCUDE THE INTERRELATIONSHIP IN THE PLANNING AND DESIGN OF THE PROPOSED DRAINAGE FACILITY.

6. Jurisdictional Boundaries: Since drainage considerations and problems are regional in nature, and do not respect jurisdictional boundaries, a successful plan must emphasize regional cooperation in accomplishing the goals.

THE POLICY OF THE CITY SHALL BE TO PURSUE A JURISDICTIONALLY UNIFIED APPROACH TO DRAINAGE TO ASSURE AN INTEGRATED PLAN.

7. Major Drainage way: The definition of a major drainage way is necessary for the clarification and administration of these criteria. For the purpose of these criteria, a Major Drainage way shall be defined as follows:

THE POLICY OF THE CITY WILL BE TO DEFINE A MAJOR DRAINAGEWAY AS ANY DRAINAGE FLOW PATH WITH A TRIBUTARY AREA OF 130 ACRES OR MORE.

#### **4.5 Regional and Local Planning**

1. Basin Transfer: Colorado drainage law recognizes the inequity of transferring the burden on managing storm drainage from one location or property to another. Liability questions also arise when the historic drainage continuum is altered. The diversion of storm runoff from one basin to another should be avoided unless specific and prudent reasons justify and dictate such a transfer. Planning and design of storm water drainage systems shall not be based on the premise that problems can be transferred from one location to another.
2. The subdivision and development processes can significantly alter the historic or natural drainage paths. When these alterations allow water to drain into the subdivision in its natural quantity and manner, and discharges water back into the natural drainage way in the historic quantity and manner, the alterations are generally acceptable. When, however, the improvements or alterations impede the natural drainage flow into the subdivision, it violates the rule of Colorado law that a property within a natural drainage way is subject to the historic drainage from upper lands. In addition, if the subdivision outfall system does not return the drainage to the natural drainage way, then the rule that drainage water cannot be sent down to do more harm than formerly to lower lands is violated. Development which alters drainage patterns in violation of either of these principles will not be approved.

THE POLICY OF THE CITY SHALL BE TO AVOID INTER-BASIN TRANSFER OF STORM DRAINAGE RUNOFF AND TO MAINTAIN THE HISTORIC DRAINAGE PATH, DRAINAGE QUANTITY, AND DRAINAGE MANNER WITHIN THE BASIN. HOWEVER, THE TRANSFER OF DRAINAGE FROM BASIN TO BASIN IS A VIABLE ALTERNATIVE IN CERTAIN INSTANCES AND WILL BE REVIEWED ON A CASE-BY-CASE BASIS, AT THE SOLE DISCRETION OF THE CITY ENGINEER.

3. Master Planning: As set forth in the policy statement 4.4.1, drainage planning is required for all new development or redevelopment.

THE POLICY OF THE CITY SHALL BE TO ENCOURAGE THE DEVELOPMENT OF DETAILED REGIONAL DRAINAGE MASTER PLANS WHICH WILL SET FORTH SITE REQUIREMENTS FOR NEW DEVELOPMENT AND IDENTIFY THE REQUIRED PUBLIC IMPROVEMENTS.

4. Special Planning Areas: There are areas in the City where significant drainage problems currently exist. Any new development or redevelopment in these areas may compound the existing drainage problems.

THE POLICY OF THE CITY IS TO REQUIRE ADDITIONAL ANALYSIS AND/OR DEFINITION OF ADDITIONAL FACILITIES REQUIRED FOR DEVELOPMENT AND REDEVELOPMENT IN CURRENT DRAINAGE PROBLEM AREAS AS DEFINED BY THE CITY.

#### **4.6 Public Improvements**

1. When the drainage master plans identify that public improvements are required, the funding for said improvements should equitably distribute the initial costs and maintenance cost in proportion to the benefits received.
2. Included with the public improvements defined by drainage master plans is the Local Drainage System, which consists of curb and gutter, inlets and storm sewers, culverts, bridges, swales, ditches, channels, detention areas, and other drainage facilities within the development required to convey the minor and major storm runoff to the Major Drainageways. The Major Drainage System consists of channels, storm sewers, bridges, detention areas, and other facilities serving more than the subdivision or property in question.

THE POLICY OF THE CITY IS TO REQUIRE THAT ALL NEW DEVELOPMENT AND REDEVELOPMENT SHALL PARTICIPATE IN THE REQUIRED DRAINAGE IMPROVEMENTS AS SET FORTH BELOW:

1. design and construct the local drainage system as defined by the approved phase-III drainage report and plan .
2. design and construct the connection of the local drainage system to the major drainageway system.
3. equitable financial participation in the design and construction of the major drainageway system within the development as defined

by master drainage plans or as required by the city and as designated in the approved phase-iii drainage report.

#### **4.7 Floodplain Management**

1. The City has adopted floodplain management regulations as part of its Municipal Code and/or Building Code. These regulations are available from the City by request. The designer is referred to the current adopted floodplain regulations for detailed information.

THE POLICY OF THE CITY SHALL BE TO LEAVE FLOODPLAINS IN A NATURAL STATE WHENEVER POSSIBLE AND TO REGULATE DEVELOPMENT IN ACCORDANCE WITH THE ADOPTED FLOODPLAIN REGULATIONS.

#### **4.8 Stormwater Runoff & Detention**

1. Storm Runoff Detention and Water Quality Enhancement: The value of storm runoff detention as part of the urban system has many benefits, and public safety and health benefits can only be obtained through consistent administration of the detention policy. This policy may be adjusted by adopted master plans, at the City Engineer's discretion. Water quality can further be enhanced through the innovative use of Best Management Practices (BMP's) as described briefly in these criteria.

THE POLICY OF THE CITY REQUIRES ONSITE DETENTION FOR ALL NEW DEVELOPMENT, EXPANSION, AND REDEVELOPMENT. THE REQUIRED MINIMUM DETENTION VOLUME AND MAXIMUM RELEASE RATES AT THESE VOLUMES FOR A 10-YEAR AND 100-YEAR RECURRENCE INTERVAL STORM SHALL BE DETERMINED IN ACCORDANCE WITH THE PROCEDURE AND DATA SET FORTH IN THE UD&FCD CRITERIA.

2. Exemptions: Some situations may warrant an exemption from the storm runoff detention policy, at the City Engineer's sole discretion.

THE POLICY OF THE CITY SHALL BE THAT EXEMPTIONS FROM THE DETENTION REQUIREMENT MAY BE GRANTED FOR IN-FILL DEVELOPMENT AND FOR ADDITIONS TO EXISTING BUILDINGS AND ADDITIONS TO EXISTING PAVED AREAS, PROVIDED THE TOTAL IMPERVIOUS AREA OF THE IN-FILL DEVELOPMENT OR THE TOTAL OF ALL EXPANSIONS COVERS LESS THAN 10,000 SQUARE FEET OF NEW IMPERVIOUS PAVED AND ROOF SURFACE. THE CITY ENGINEER MAY, AT HIS/HER DISCRETION, STILL REQUIRE DETENTION FACILITIES FOR IN-

FILL AREAS AND ADDITIONS TO EXISTING BUILDINGS AND ADDITIONS TO EXISTING PAVED AREAS WHEN DEEMED PRUDENT AND IN THE INTEREST OF PUBLIC HEALTH, SAFETY, AND WELFARE. IN ADDITION, THE CITY ENGINEER MAY REQUIRE WATER QUALITY FEATURES AS A CONDITION OF GRANTING THE EXEMPTION TO THE DETENTION REQUIREMENTS. STAGING SEVERAL ADDITIONS OR EXPANSIONS OF LESS THAN 10,000 SQUARE FEET EACH OF NEW IMPERVIOUS AREA OVER TIME TO AVOID THE DETENTION REQUIREMENT WILL NOT BE PERMITTED.

3. Regional Detention Facility exemptions: Some situations may warrant an exemption from the storm runoff detention policy, to account for regional detention facilities, at the City Engineer's sole discretion.

THE POLICY OF THE CITY SHALL BE THAT ONSITE DETENTION REQUIREMENTS MAY BE WAIVED WHERE REGIONAL DETENTION FACILITIES HAVE BEEN CONSTRUCTED WITH THE CAPACITY TO ACCOMODATE FLOWS FROM A FULLY DEVELOPED BASIN, AND SUCH REGIONAL DETENTION FACILITIES ARE PUBLICLY OWNED AND MAINTAINED.

4. Water Quality: Water quality is a critical component of sound stormwater management, and shall be integrated into all planned drainage facilities as required by the City Engineer.

THE POLICY OF THE CITY IS TO REQUIRE THAT THE WATER QUALITY CAPTURE VOLUME BE ADDED TO THE 100-YEAR STORAGE VOLUME, THE 10-YEAR STORAGE VOLUME, AND THE 5-YEAR STORAGE VOLUME.

5. Best Management Practices: The developer is referred to the Manual for more details on BMPs.

THE POLICY OF THE CITY IS TO REQUIRE THE INVESTIGATION AND INNOVATIVE USE OF THE UD&FCD BEST MANAGEMENT PRACTICES (BMP'S) TO ENHANCE THE QUALITY OF WATER DISCHARGED INTO THE CITY'S DRAINAGEWAYS.

#### **4.9 Operations and Maintenance**

1. An important part of all storm drainage facilities is the continued maintenance of the facilities to ensure they will function as designed. Maintenance responsibility for storm drainage and detention facilities lies with the owner of the land, except as modified by specific agreement. Maintenance responsibility shall be delineated on Plats and Final

Development Plans. Maintenance access for detention ponds must be specified, must be adequate for maintenance, and shown on the Plats and Final Development Plans.

THE POLICY OF THE CITY IS TO REQUIRE THAT INSPECTION ACCESS AND MAINTENANCE ACCESS BE PROVIDED TO ALL STORM DRAINAGE FACILITIES TO ASSURE WATER QUALITY AND CONTINUOUS OPERATIONAL CAPABILITY OF THE SYSTEM. SAID MAINTENANCE ACCESS MAY BE GRANTED VIA EASEMENT, ON THE PLAT, OR BY OTHER INSTRUMENT, TO THE CITY, THE OWNER'S ASSOCIATION, OR BOTH, AS DETERMINED BY THE CITY ENGINEER. THE PROPERTY OWNER SHALL BE RESPONSIBLE FOR THE MAINTENANCE OF ALL DRAINAGE FACILITIES INCLUDING INLETS, PIPES, CULVERTS, CHANNELS, DITCHES, HYDRAULIC STRUCTURES, AND DETENTION BASINS LOCATED ON THEIR LAND UNLESS MODIFIED BY THE SUBDIVISION IMPROVEMENTS AGREEMENT.

2. Right to Enter: Under certain circumstances, to ensure the public health, safety and welfare, the City may need to enter property for the purpose of operation, inspection and maintenance of storm drainage facilities.

THE POLICY OF THE CITY SHALL BE THAT AFTER SUFFICIENT NOTICE IS PROVIDED TO THE PROPERTY OWNER BY THE CITY, SHOULD THE OWNER FAIL TO ADEQUATELY MAINTAIN AND/OR OPERATE STORM DRAINAGE FACILITIES, THE CITY SHALL HAVE THE RIGHT TO ENTER SAID PROPERTY FOR THE PURPOSES OF INSPECTION, OPERATION AND/OR MAINTENANCE OF THE STORM DRAINAGE FACILITIES. ALL SUCH MAINTENANCE COSTS INCURRED BY THE CITY WILL BE ASSESSED TO THE PROPERTY OWNER.

3. Easements: The easements required to provide adequate inspection, operation and/or maintenance access are as follows:

THE POLICY OF THE CITY IS TO REQUIRE EASEMENTS AND/OR DEDICATED TRACTS OF LAND FOR INSPECTION, OPERATION , AND/OR MAINTENANCE OF STORM DRAINAGE FACILITIES, AT THE DISCRETION OF THE CITY ENGINEER, AND IN ACCORDANCE WITH THE FOLLOWING TABLE:

**TABLE 4-1: Required Inspection, Operation & Maintenance Easements**

<b>Facility Type</b>	<b>Minimum Easement Width</b>
Single pipe	Width= $D + 2h + 3$ where D= outside span of pipe in feet, h= depth from top of pipe to final surface elevation in feet. 1 Width shall be rounded to next highest 5-foot increment with a minimum width of 20 feet.
Multiple pipes	Width determined on case-by-case basis
Open channels & swales	Q100 < 20 cfs: 20 feet Q100 < 100 cfs: 25 feet Q100 > 101 cfs: see UD&FCD Manual
Detention basins	Sufficient to contain storage, freeboard, release structures, and associated facilities, plus no less than 10 feet for inspection and maintenance access around the entire perimeter. For multiple lots, a dedicated tract of land is required.

Drainage easements shall be kept clear of obstructions to the flow and/or obstructions to maintenance, inspection and/or operation access.

**4.10 Technology Planning and Design**

1. Drainage Criteria: The design criteria presented herein are intended to establish guidelines, standards, and methods for effective planning and design.

THE POLICY OF THE CITY REQUIRES THAT ALL STORM DRAINAGE FACILITIES SHALL BE PLANNED AND DESIGNED IN ACCORDANCE WITH THE CRITERIA SET FORTH HEREIN.

2. Minor and Major Drainage System: Every urban area has two separate and distinct drainage systems: the Minor (or Local) Drainage System and the Major Drainage System, which when combined form the Total Drainage System.
3. The Minor Drainage System is designed to transport the runoff from the five-year frequency events with a minimum disruption to the urban environment. Minor storm drainage can be conveyed in the curb and gutter area of the street or the roadside ditch (subject to street classification and capacity, as defined herein), by the storm sewer, channel, or other conveyance facility.

THE POLICY OF THE CITY IS TO REQUIRE THAT ALL MINOR DRAINAGE SYSTEMS BE SIZED WITHOUT ACCOUNTING FOR

PEAK FLOW REDUCTIONS FROM ONSITE DETENTION, UNLESS OTHERWISE APPROVED BY THE CITY ENGINEER.

4. The Major Drainage System is designed to convey runoff from the 100-year recurrence interval storm to minimize threats to public health, safety and welfare, damage to structures, and interruption to traffic and services. Major storm flows can be carried in the urban street system (within acceptable criteria defined herein), channels, storm sewers, and other facilities.

THE POLICY OF THE CITY IS TO REQUIRE THAT ALL SUBDIVISIONS AND DEVELOPMENT INCLUDE THE PLANNING, DESIGNING, AND IMPLEMENTATION FOR BOTH THE MINOR AND MAJOR DRAINAGE SYSTEMS IN ACCORDANCE WITH THE FOLLOWING TABLE:

**TABLE 4-2: Design Storm Recurrence Interval**

Proposed Land Use	Minor Drainage System	Major Drainage System
All	5 year	100 year

5. Storm Runoff: The storm runoff is to be determined by the criteria established by the UD&FCD in the Manual.

THE POLICY OF THE CITY IS TO REQUIRE THAT STORM RUNOFF BE DETERMINED BY EITHER THE RATIONAL METHOD OR THE COLORADO URBAN HYDROGRAPH PROCEDURE (CUHP), WITHIN THE LIMITATIONS AS SET FORTH IN THE URBAN DRAINAGE CRITERIA. FOR BASINS LARGER THAN 160 ACRES, THE PEAK FLOWS AND VOLUMES SHALL BE DETERMINED BY THE COLORADO URBAN HYDROGRAPH PROCEDURE.

6. Streets: Streets are an integral part of the urban drainage system and may be used for transporting storm runoff up to design limits. The design engineer should recognize that the primary purpose of streets is for traffic, and therefore the use of streets for storm runoff must be restricted.

THE POLICY OF THE CITY IS TO ALLOW THE USE OF STREETS FOR DRAINAGE WITHIN THE LIMITATIONS DESCRIBED IN THE FOLLOWING TABLES, SUBJECT TO CITY APPROVAL:

The maximum allowable street flow for major storm runoff shall be the product of the flow calculated at the “Maximum Theoretical Depth” and the required reduction factor as provided in these criteria.

**TABLE 4-3: Allowable Use of Streets for MINOR Storm Runoff**

Street Functional Classification	Maximum Theoretical Depth
Local street	No curb overtopping. Flow may spread to crown of street. Flow may spread to back of sidewalk for a 4-inch combo curb/sidewalk.
Collector street  Arterial street	No curb overtopping. Flow spread must leave at least one 10-foot lane free of water, 5 feet either side of street crown. No curb overtopping. Flow spread must leave at least two 10-foot lanes free of water, 10 feet either side of street crown or median.

**TABLE 4-4: Allowable Use of Streets for MAJOR Storm Runoff**

Street Functional Classification	Maximum Theoretical Depth
Local street and collector street	Residential dwellings, public, commercial, and industrial buildings shall not be inundated at the ground line. The depth of water at the gutter flow line shall not exceed 12 inches.
Arterial street	Residential dwellings, public, commercial and industrial buildings shall not be inundated at the ground line. To allow for emergency vehicles, the depth of water shall not exceed 6-inches at the street crown and 12 inches at the gutter flow line, whichever is more restrictive.

7. Cross street flow occurs in an urban drainage system under three conditions. One condition occurs when the runoff in a gutter spreads across the street crown to the opposite gutter. The second is when cross pans are used. The third condition occurs when the flow in a drainage

way exceeds the capacity of a road culvert and subsequently overtops the crown of the street.

**TABLE 4-5: Allowable Cross-Street flow**

Street Functional Classification	Minor Drainage System Maximum Depth	Major Drainage System Maximum Depth
Local street	6 inches in cross pan or gutter flowline.	12 inches in gutter flowline.
Collector street	None	12 inches in gutter flowline.
Arterial street	None	None

8. Culvert overtopping. The maximum headwater for the 100-year design flow shall be 1.5 times the culvert diameter or 1.5 times the rise dimension for pipe shapes other than round (local and collector streets only.)

THE POLICY OF THE CITY IS TO LIMIT OVERTOPPING AS DESCRIBED IN THE FOLLOWING TABLE

**TABLE 4-6: Allowable Culvert Overtopping**

Street Functional Classification	Minor Drainage System Maximum Depth	Major Drainage System Maximum Depth
Local street	None	12 inches in gutter flowline.
Collector street	None	12 inches in gutter flowline.
Arterial street	None	None. Minimum clearance between low chord or culvert crown and the energy grade line shall be 6 inches for basins less than 2 square miles, 1 foot for basins up to 10 square miles, and 2 feet for basins greater than 10 square miles.

8. Irrigation Facilities

Irrigation ditches and reservoirs exist within the City. The ditches and reservoirs have historically intercepted the storm runoff from the rural and agricultural type basins. With urbanization of the basin, however, the storm runoff has increased in rate, quantity and frequency, as well as

changed in water quality. The irrigation facilities can no longer be utilized indiscriminately as drainage facilities.

9. Irrigation ditches are designed with flat slopes and limited carrying capacity, which decreases in the downstream direction. Irrigation ditches cannot be used as an outfall point for the storm drainage system.
10. In evaluating the interaction of irrigation ditches with a major drainage way for the purpose of basin delineation, the ditch should not be utilized as a basin.

THE POLICY OF THE CITY SHALL BE TO REQUIRE THAT THE DRAINAGE ANALYSIS ASSUME THAT AN IRRIGATION DITCH DOES NOT INTERCEPT THE STORM RUNOFF FROM THE UPPER BASIN AND THAT THE UPPER BASIN IS TRIBUTARY TO THE BASIN AREA DOWNSTREAM OF THE DITCH.

**END OF SECTION 4**

## **SECTION 5. ACCEPTANCE OF PUBLIC IMPROVEMENTS**

### **5.1 Introduction**

6. The intent of this section is to establish criteria for the acceptance of public improvements by the City.

### **5.2 Interpretation**

1. The following principles shall be used in interpreting this chapter:
  1. The provisions of this chapter shall be regarded as the minimum requirements for the protection of the public health, safety, general welfare, and environment. This chapter shall therefore be regarded as remedial and shall be liberally construed to further its underlying purpose.
  2. This chapter is not intended to interfere or conflict with, abrogate, or annul any other regulation, ordinance, statute, or provision of law.
  3. Whenever a provision of this chapter and a provision of any other law, ordinance, resolution, rule, or regulation of any kind, including any other provision of this chapter, contains any restrictions covering the same subject matter, the more restrictive shall govern.
  4. The foregoing principles notwithstanding, the city council directs those city officials responsible for enforcement of this chapter to utilize a reasonable common sense approach in the interpretation and application of the specific provisions of this chapter. To this end, city officials charged with the responsibility for enforcement and administration of provisions of this chapter shall be entitled to utilize discretion in waiving specific application requirements, provided that such discretion shall be exercised in a manner to preserve the purposes and intention of this chapter and to not jeopardize the health, safety, or general welfare of the public or the environment. When exercising discretion to waive or modify any specific application requirements, said city official shall consider:
    1. The scope and nature of the proposed project.
    2. The impact of the project on the properties in the general vicinity of the project.
    3. The impact of the project on municipal facilities and services, including without limitation, streets, water, sewer, drainage, police, and fire protection services.

4. Whether the information contained in a requirement sought to be waived is reasonable and readily available from other materials submitted in conjunction with the application.
5. Strict enforcement of each provision of this chapter shall not be required, and the city official charged with enforcement of this chapter shall be entitled to utilize the legal principle of prosecutorial discretion.

### **5.3 General**

1. In order to accommodate construction traffic and construction activities, the City Engineer may require that the asphalt be placed on proposed public streets or other areas in two or more lifts. The City Engineer may require that the first lift of asphalt be installed prior to issuance of the first certificate of occupancy or by other deadline established by the City Engineer. The City Engineer may require that the second and final lift of asphalt be installed by a date certain as established by the City Engineer. The provisions of this section shall not relieve the developer/contractor of his responsibility to comply with all approved plans and specifications.
2. The developer may be required to construct all subdivision sidewalks prior to commencing the process described herein for initial acceptance of public improvements. All sidewalks adjacent to any lot must be in a sound and safe condition at the time of request of a certificate of occupancy for a structure on that lot. The City reserves the right to withhold certificates of occupancy until such time that the sidewalks are constructed in a safe condition.

The City Engineer may take into account whether the subdivision developer will be the owner and contractor on each lot (as opposed to the developer selling off each lot to individuals who may have varying schedules for constructing houses on each lot) and the time schedule for constructing the houses on each lot, when making the determination as to when subdivision sidewalk construction will be required. The City Engineer may require that the developer's security remain effective throughout construction until all subdivision sidewalks are constructed.

3. At all times during construction of the public improvements, and until final acceptance thereof by the City, the City shall have the right, but not the duty, to inspect materials and workmanship in order to ascertain conformance with the approved plans, standards and specifications. The developer and/or owner shall reasonably cooperate and assist the City in gaining appropriate access to the areas designated for inspection. It shall be the duty of the Developer and/or owner to notify the City upon discovery of any non-conformance with said plans, standards and specifications to which

the developer has or should have actual knowledge of such non-conformance. Inspection and acceptance of work by the City shall not relieve the Developer of any responsibility to comply with the plans, specifications and/or developer agreement.

4. The City Engineer may require the developer to submit a Phasing Plan for approval if all public improvements are not complete at the time of the submittal. In the City Engineer's sole discretion, initial acceptance may be issued for portions of a development where the public improvements are complete and the requirements for initial acceptance have been met. The City reserves the right to continue to hold security on those portions of the public improvements that have not been completed and are not the subject of the initial acceptance request.

#### **5.4 Initial Acceptance of Public Improvements**

1. Upon completion of the public improvements specified on the final site plan and/or in the subdivision agreement, the developer shall submit the following to the City Engineer:
  1. A written request for initial acceptance of the public improvements.
  2. Record drawings in both mylar and electronic format. Electronic format drawings must be in Autocad 2000 version or newer. (See section 5.5 below for more detail on record drawings.)
  3. Itemized, certified final costs for all public improvements.
  4. A certification from the design engineer, bearing his engineer's seal, stating that all public improvements have been completed in accordance with the plans and specifications.
  5. A certification from the design engineer, bearing his engineer's seal, certifying that the detention facilities meet or exceed the minimum volumes and design release rates shown in the approved drainage report.
  6. Evidence that the developer has submitted the application and all required supporting documentation for a Letter of Map Revision to the Federal Emergency Management Agency for revisions to the floodplain, as applicable.
  7. A certification that the completed public improvements have been fully paid for and that the developer has fully paid all persons or

entities having furnished labor or materials for the design and/or construction of the improvements.

8. Copies of all material test reports, including compaction and other soils tests (subexcavation soils tests included), concrete tests, asphalt tests, pressure and bacteriological tests, video inspections of the sanitary and storm sewer systems, etc.
  9. A warranty performance guarantee (see section below)
  10. Pressure test reports for water and sanitary sewer lines.
  11. High chlorine, low chlorine, and bacteriological clearance test reports for water lines and fire lines.
  12. The City will conduct video inspection of all sanitary sewers and storm sewers at the developer's expense. The developer must notify the City when the sanitary and storm lines are ready for video inspection. Video inspections must be completed prior to initial acceptance of public improvements.
2. Within 15 working days of receipt of all documents specified in section 5.4.1 above, the City Engineer or his/her designee shall conduct a site review of the public improvements.
  3. The City Engineer or his/her designee shall forward a written list of items deemed incomplete or in need of correction to the developer within 10 working days of his site review of the public improvements. Said list shall be as detailed as possible, and shall contain a deadline for the developer to complete and/or correct the deficient items.
  4. The City Engineer, at his/her discretion, may withhold approvals of building permits and/or Certificates of Occupancy if the developer has not complied with all requirements for initial acceptance of the public improvements.
  5. Upon inspection and finding of satisfactory completion of the improvements in compliance herewith and all applicable standards and ordinances of the city, and upon submission and approval of an acceptable warranty performance guarantee as specified in section 5.6 below, the City shall issue a "Certificate of Initial Acceptance" to the Developer which shall commence the running of the warranty period.

### **5.5 Record Drawing Requirements**

1. Record drawings must be submitted in both mylar and electronic format. Electronic format drawings must be in Autocad 2000 version or newer.
2. Water system record drawings must include:
  1. Valve locations, types and sizes.
  2. Fitting locations, types, and sizes.
  3. Service line and stop box location for each lot.
  4. Water main size, location, material type, including distance measurement between valves and fittings.
  5. Fire hydrant location and type.
  6. Locations of blow-offs.
  7. Locations of air-release valves.
  8. Location, type, and size of any water system appurtenances not listed above.
3. Sanitary sewer system record drawings must include:
  1. Manhole locations and sizes.
  2. Manhole rim and invert elevations.
  3. Sewer line pipe size, location, material type, and distance measurements between manholes.
  4. Service line location and size for each lot.
  5. Profile of sewer mains, with gradient shown.
  6. Location, type, and size of any sewer system appurtenances not listed above.
4. Storm sewer system record drawings must include:
  1. Manhole locations and sizes.
  2. Manhole rim and invert elevations.
  3. Pipe size, locations, material type, and distance measurements.

4. Profile of storm sewer mains, with gradient shown.
  5. Location, type, elevations and size of inlets and outlets.
  6. Location, type, and size of any storm system appurtenances not listed above.
5. Street system record drawings must include:
1. Type and location of curb and gutter.
  2. Sidewalk locations and thicknesses.
  3. Horizontal and vertical street data, including profiles, vertical and horizontal curves, etc.
  4. Pavement material type and thickness.
  5. Cross section of pavement section showing base, subbase, and pavement material types and thicknesses.
  6. Street names.

### **5.6 Warranty**

1. The developer shall warrant that all improvements are free from defects, including but not limited to defects of materials, workmanship or design, and that the improvements otherwise fully comply with the applicable approved plans and profiles, and city standards and specifications.
2. A Warranty Performance Guarantee shall be posted and shall be equal to ten percent (10%) of the total cost of the improvements, excluding landscape improvements, as certified to the city, plus twenty percent (20%) of the total cost of landscape improvements, including all vegetative materials and irrigation and recreation facilities. The warranty guarantee shall be in such form and issued by such institution as provided in the Golden Municipal Code. The Warranty guarantee shall provide security for the cost which may be incurred in repairing and/or replacing improvements during the warranty period of one (1) year following initial acceptance by the city, and in defending or removing claims of unpaid laborers, material suppliers and/or subcontractors who may attempt to assert a lien upon the property. The warranty performance guaranty shall not be subject to reduction, pursuant to the Golden Municipal Code.
3. In the event that any substantial repair or replacement is required to any of

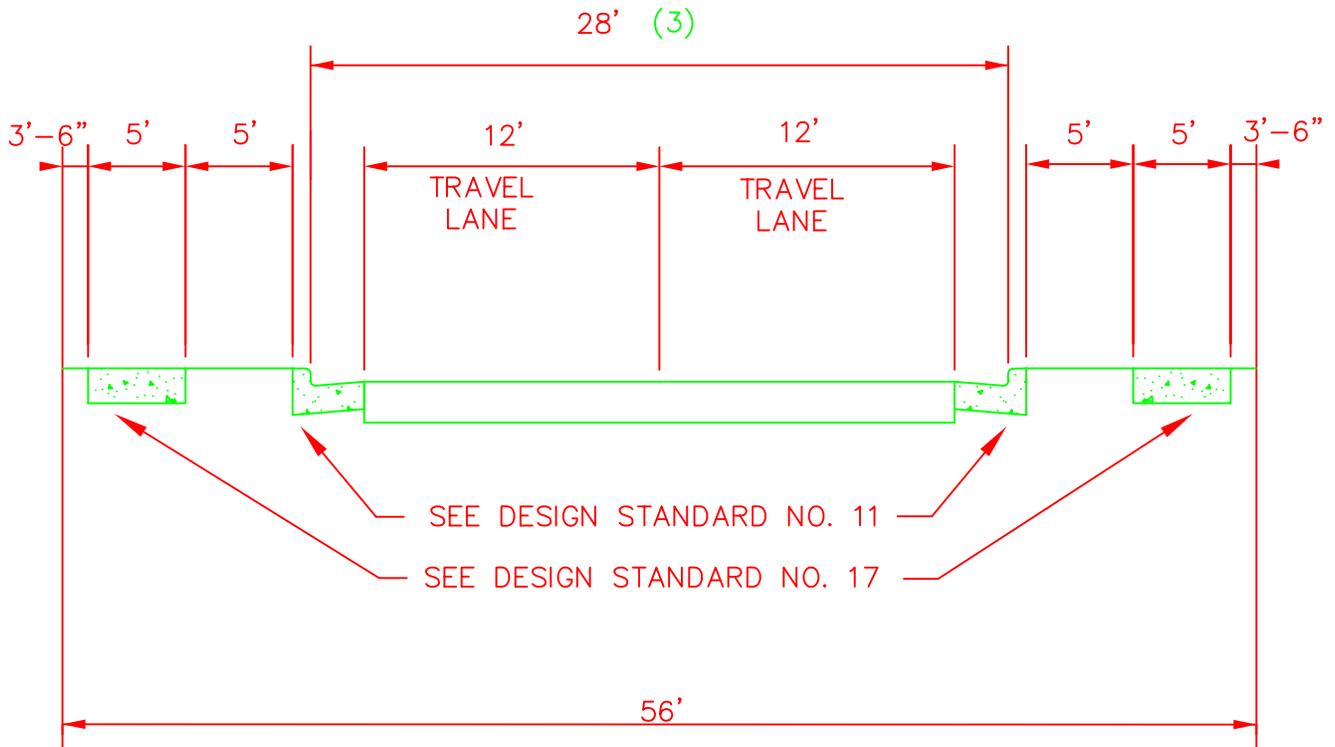
the improvements during the warranty period and such repair or replacement is not timely made upon notice of defect or in any event before expiration of the guaranty period, the city, may, in addition to any other legal remedies available to the city:

1. Extend the warranty period for up to one (1) year following initial approval of the completed repair or replacement; and/or
2. Require that the developer adjust the amount or term of the warranty guarantee as may be appropriate; and/or
3. Call the warranty guarantee and, at the city's discretion, secure repair or replacement of the nonconforming improvements; and/or
4. Order denial or suspension of building permits, utility services or certificates of occupancy outstanding until repair or replacement of any nonconforming improvements have been performed.

#### **5.7 Final Acceptance of Public Improvements**

1. The Developer is required to maintain and repair all public improvements shown on the approved plans, including, but not limited to drainage systems, erosion control measures, streets, public thoroughfares, curbs, gutters, sidewalks, paving, handicap ramps, street signs, pavement markings, water and wastewater facilities, fire hydrants, etc., until final acceptance thereof by the City.
2. No earlier than sixty (60) days prior to the expiration of the warranty period, the Developer shall submit a written request for final acceptance of the public improvements to the City Engineer. The City Engineer or his/her designee shall conduct a final inspection of the improvements and if such improvements appear to fully conform to the Subdivision Development agreement and the applicable city standards and specifications, and the approved plans, and/or all repairs, if any, that are needed, have been made to bring the same into such conformance, then the city shall issue a "Certificate of Completion" and the city shall release the performance and/or warranty guarantee provided no lien claims or statements have been filed with respect to the project. Neither final acceptance, nor release of the performance or warranty guarantee, shall relieve the developer from the obligation to construct the improvements and warrant them as provided herein.

**END OF SECTION 5**



NOTES:

- 1 BASE COURSE SHALL BE CDOT CLASS 6 COMPACTED TO 95% OPTIMUM DENSITY IN ACCORDANCE WITH AASHTO T-99.
- 2 SUBGRADE COMPACTION TO BE 95% OPTIMUM DENSITY IN ACCORDANCE WITH AASHTO T-99.
- 3 SEE TRANSPORTATION ENGINEERING DESIGN STANDARDS FOR ROADWAY WIDTH REQUIREMENTS.
- 4 "FULL DEPTH" ASPHALT MAY BE INSTALLED IN LIEU OF BASE COURSE.
- 5 THIS DETAIL SHOWS A TYPICAL SECTION. ACTUAL DESIGN TO BE BASED UPON A PAVEMENT DESIGN REPORT APPROVED BY THE CITY.

APPROVED

*Dan Hunt*

DIRECTOR OF PUBLIC WORKS

CITY OF GOLDEN



DEPARTMENT OF PUBLIC WORKS

LOCAL STREET  
SINGLE FAMILY  
RESIDENTIAL

SCALE: NTS

DATE: SEPT 2006

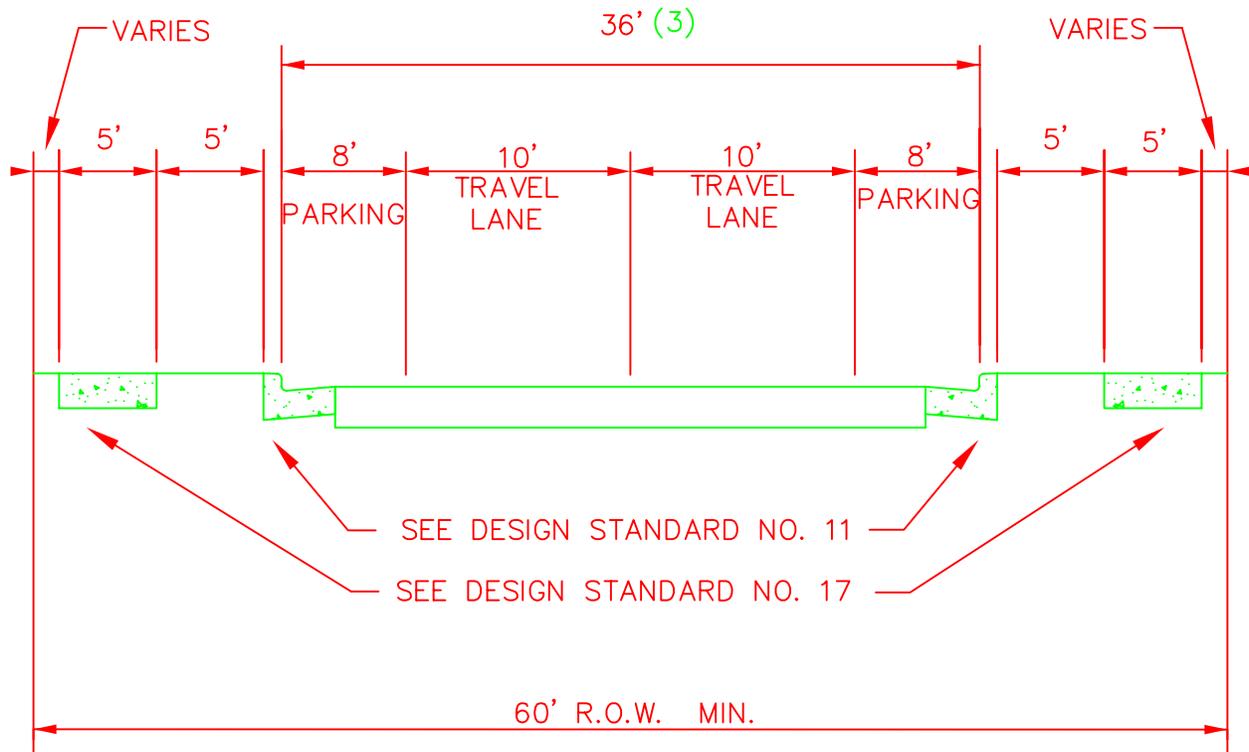
DETAIL NO.

1

APPROVED

*Vince Amanna*

CITY ENGINEER



NOTES:

- 1 BASE COURSE SHALL BE CDOT CLASS 6 COMPACTED TO 95% OPTIMUM DENSITY IN ACCORDANCE WITH AASHTO T-99.
- 2 SUBGRADE COMPACTION TO BE 95% OPTIMUM DENSITY IN ACCORDANCE WITH AASHTO T-99.
- 3 SEE TRANSPORTATION ENGINEERING DESIGN STANDARDS FOR ROADWAY WIDTH REQUIREMENTS.
- 4 "FULL DEPTH" ASPHALT MAY BE INSTALLED IN LIEU OF BASE COURSE, SUBJECT TO CITY ENGINEER APPROVAL.
- 5 THIS DETAIL SHOWS A TYPICAL SECTION. ACTUAL DESIGN IS TO BE BASED UPON A PAVEMENT DESIGN REPORT APPROVED BY THE CITY.

APPROVED

*Dan Hunt*

DIRECTOR OF PUBLIC WORKS

CITY OF GOLDEN



DEPARTMENT OF PUBLIC WORKS

LOCAL STREET  
MULTI-FAMILY, COMM. &  
INDUSTRIAL

SCALE: NTS

DETAIL NO.

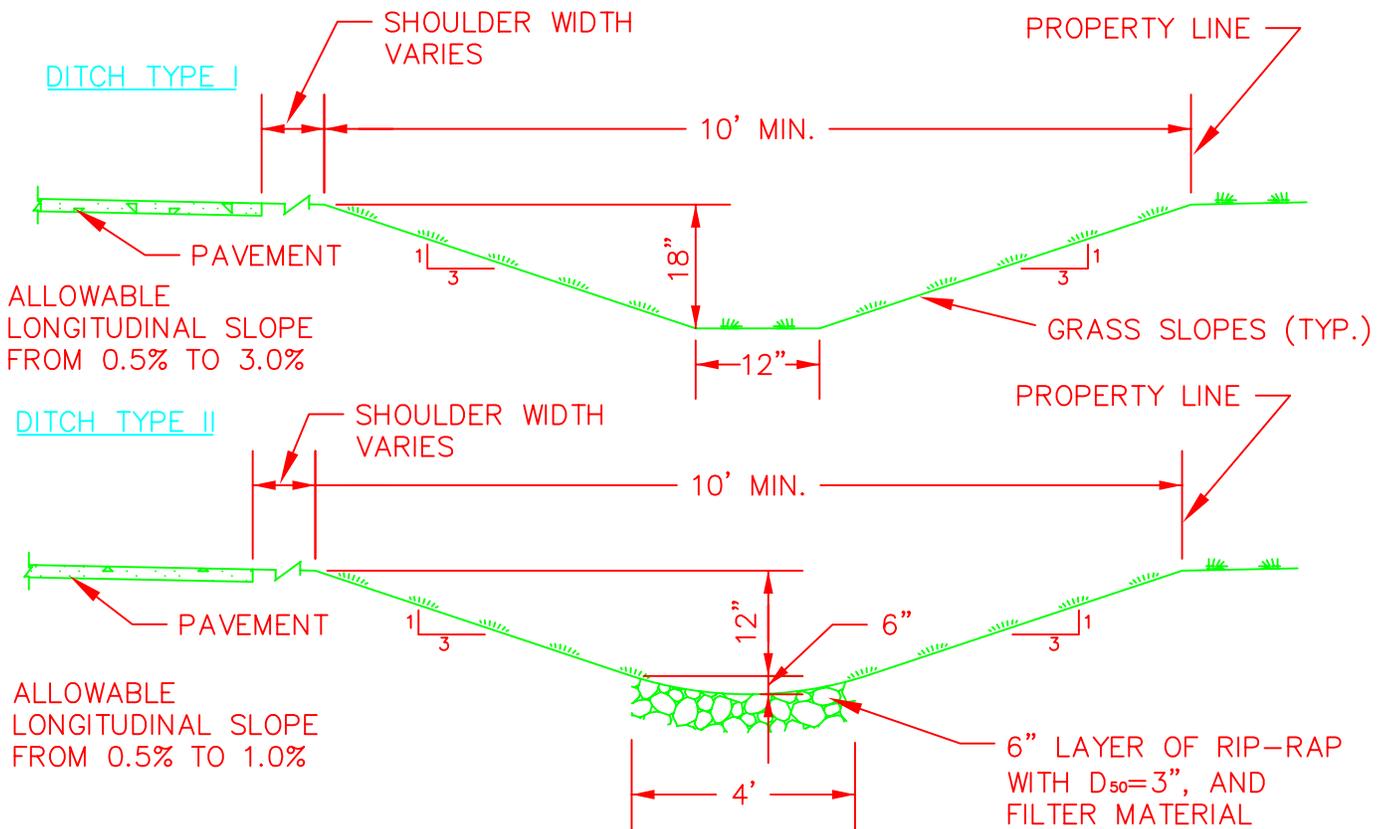
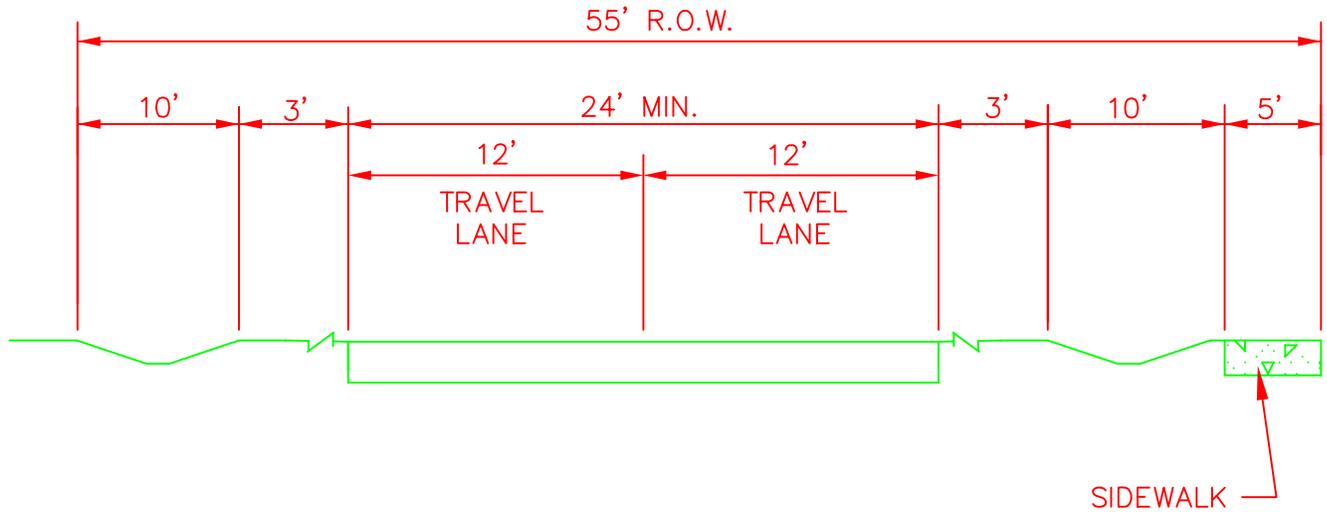
DATE: SEPT 2006

2

APPROVED

*Vince Amanna*

CITY ENGINEER



APPROVED  
  
 DIRECTOR OF PUBLIC WORKS

CITY OF GOLDEN

LOCAL SERVICE  
 ROADSIDE DITCH



APPROVED  
  
 CITY ENGINEER

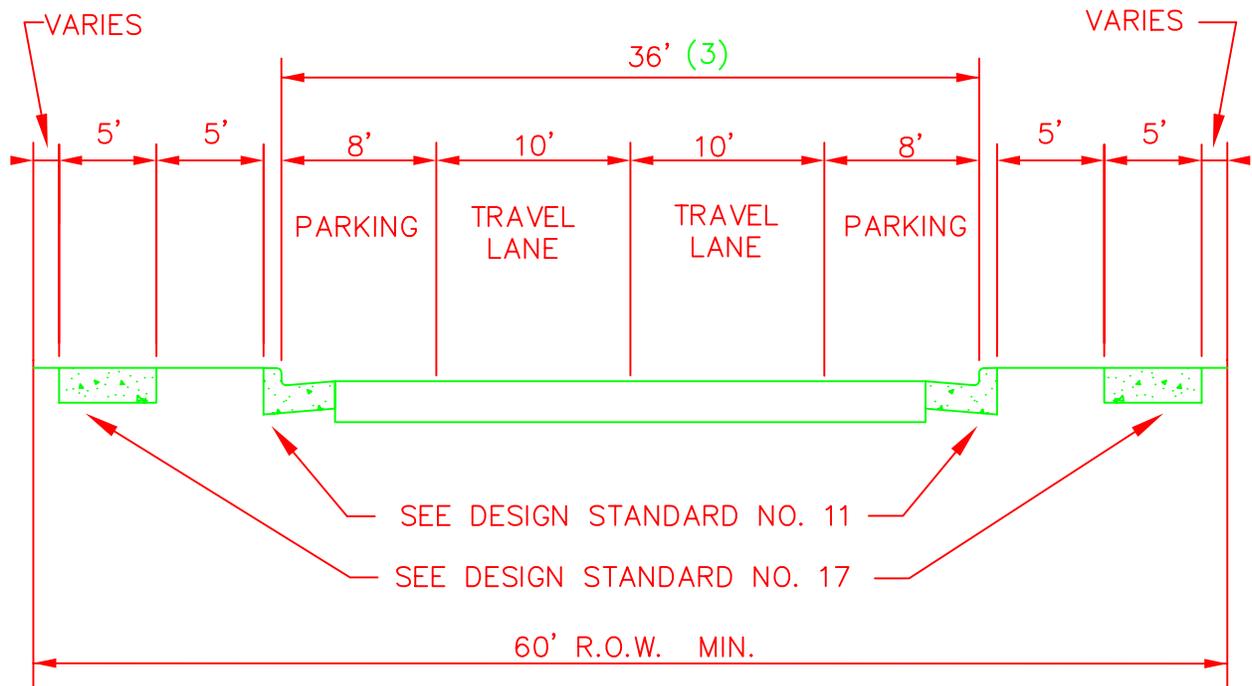
DEPARTMENT OF PUBLIC WORKS

SCALE: NTS

DETAIL NO.

DATE: SEPT 2006

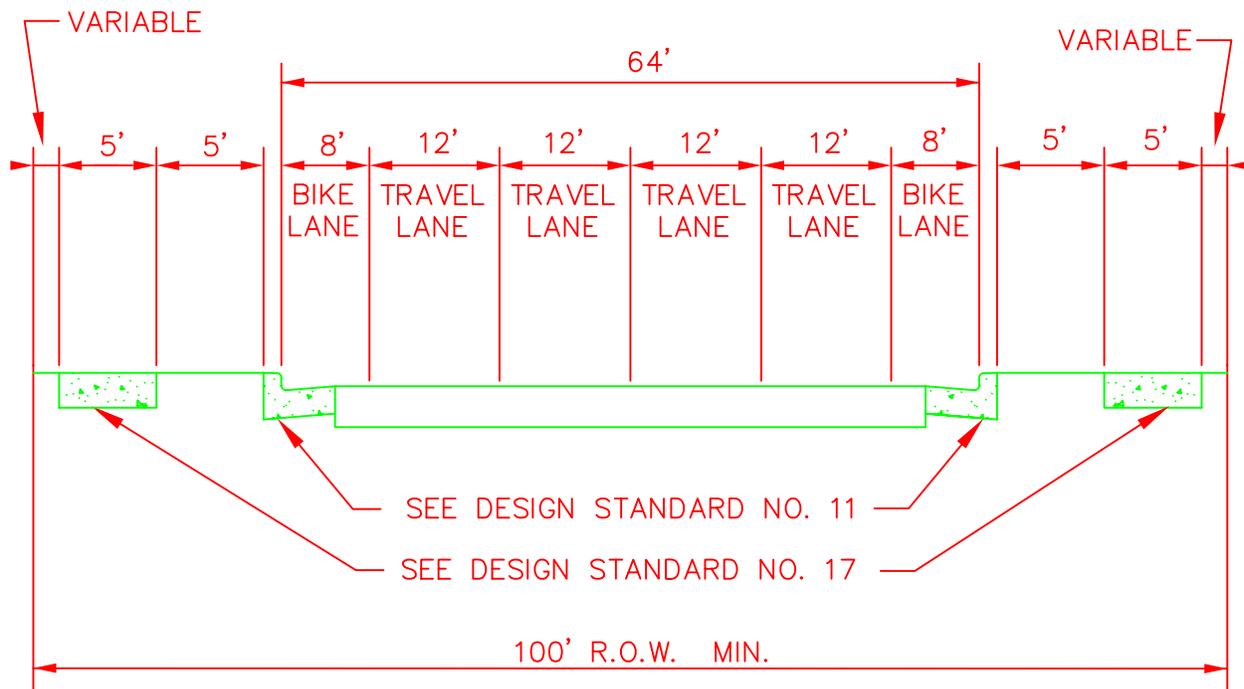
3



**NOTES:**

- 1 BASE COURSE SHALL BE CDOT CLASS 6 COMPACTED TO 95% OPTIMUM DENSITY IN ACCORDANCE WITH AASHTO T-99.
- 2 SUBGRADE COMPACTION TO BE 95% OPTIMUM DENSITY IN ACCORDANCE WITH AASHTO T-99.
- 3 SEE TRANSPORTATION ENGINEERING DESIGN STANDARDS FOR ROADWAY WIDTH REQUIREMENTS.
- 4 FOR REGIONAL BIKEPATH, SIDEWALK MUST HAVE 10' WIDTH MINIMUM. SEE SECTION 300 FOR DETAILS. IF ATTACHED BIKEPATH, 10' WIDTH IS REQUIRED.
- 5 "FULL DEPTH" ASPHALT MAY BE INSTALLED IN LIEU OF BASE COURSE SUBJECT TO CITY ENGINEER APPROVAL.
- 6 THIS DETAIL SHOWS A TYPICAL SECTION. ACTUAL DESIGN TO BE BASED UPON A PAVEMENT DESIGN REPORT APPROVED BY THE CITY.

APPROVED  DIRECTOR OF PUBLIC WORKS	<p style="text-align: center;"><b>CITY OF GOLDEN</b></p>  <p style="text-align: center;"><b>DEPARTMENT OF PUBLIC WORKS</b></p>	COLLECTOR STREET		
APPROVED  CITY ENGINEER		SCALE: NTS	DETAIL NO.	
		DATE: SEPT 2006	<span style="font-size: 2em; color: blue;">4</span>	



NOTES:

- 1 BASE COURSE SHALL BE CDOT CLASS 6 COMPACTED TO 95% OPTIMUM DENSITY IN ACCORDANCE WITH AASHTO T-99.
- 2 SUBGRADE COMPACTION TO BE 95% OPTIMUM DENSITY IN ACCORDANCE WITH AASHTO T-99.
- 3 FOR REGIONAL BIKEPATH, SIDEWALK MUST HAVE 10' WIDTH MINIMUM.
- 4 "FULL DEPTH" ASPHALT MAY BE INSTALLED IN LIEU OF BASE COURSE, SUBJECT TO CITY ENGINEER APPROVAL.
- 5 THIS DETAIL SHOWS A TYPICAL SECTION. ACTUAL DESIGN TO BE BASED UPON A PAVEMENT DESIGN REPORT APPROVED BY THE CITY.

APPROVED

*Dan Hunt*

DIRECTOR OF PUBLIC WORKS

CITY OF GOLDEN



DEPARTMENT OF PUBLIC WORKS

ARTERIAL STREET

APPROVED

*Vince Amanna*

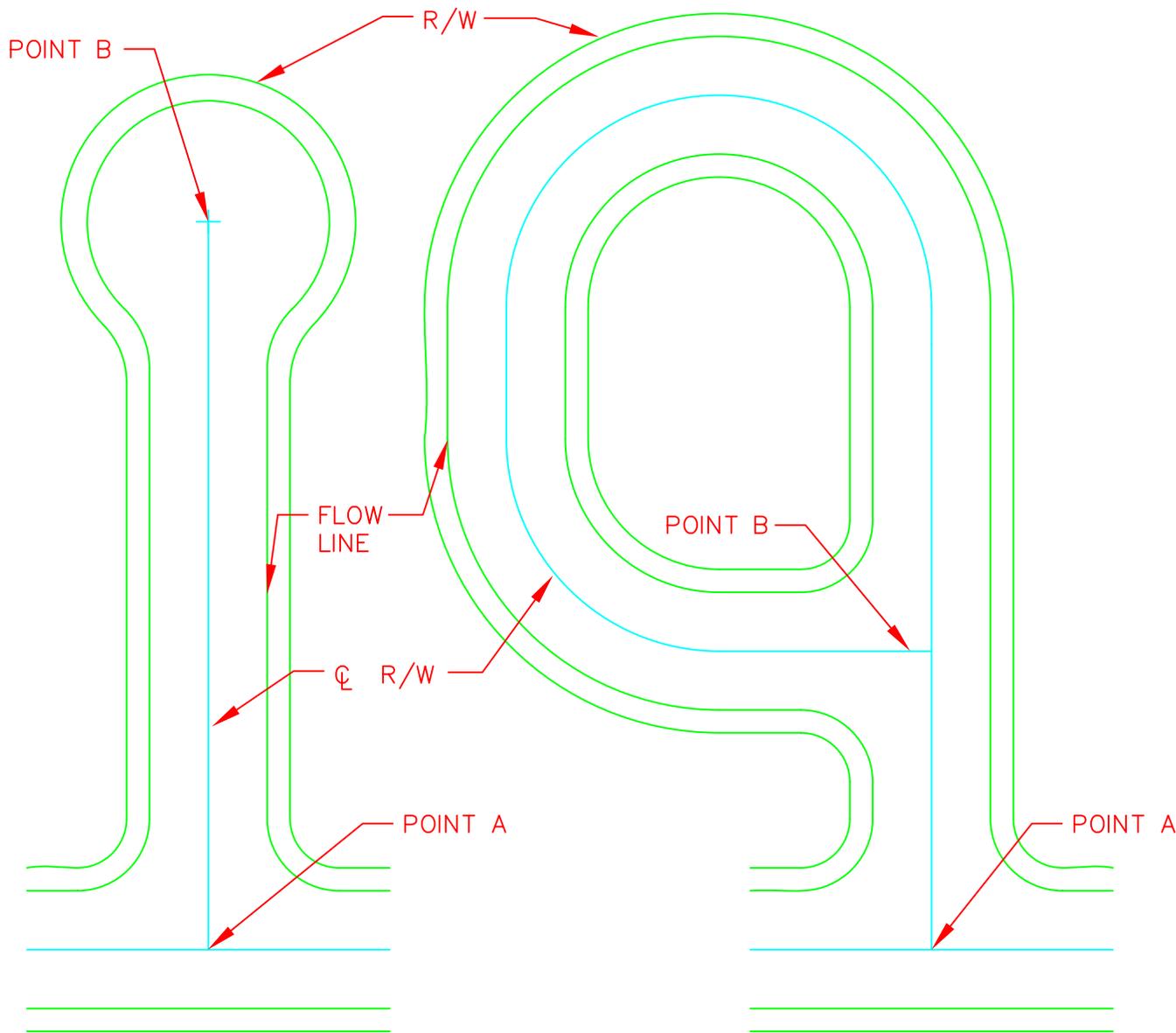
CITY ENGINEER

SCALE: NTS

DATE: SEPT 2006

DETAIL NO.

5



**NOTES:**

- \* FOLLOW THE LONGEST ROUTE BETWEEN POINTS A AND B.
- \* DISTANCE BETWEEN POINTS A AND B SHALL BE CONSIDERED THE TOTAL STREET LENGTH.
- \* SEE SECTION 300 FOR ALLOWABLE LENGTHS.

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*Dan Hunt*

DIRECTOR OF PUBLIC WORKS

**CITY OF GOLDEN**



CUL-DE-SACS

APPROVED

*Vince Amador*

CITY ENGINEER

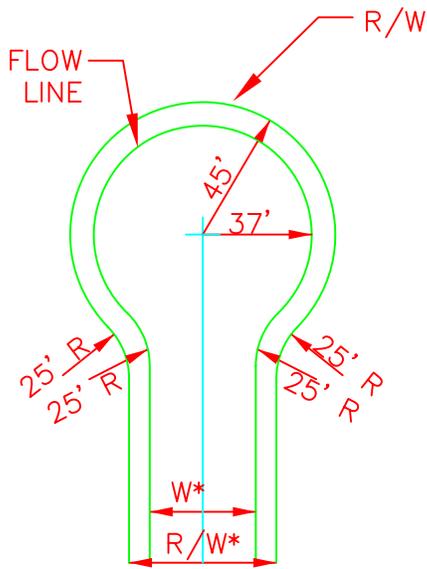
**DEPARTMENT OF PUBLIC WORKS**

SCALE: NTS

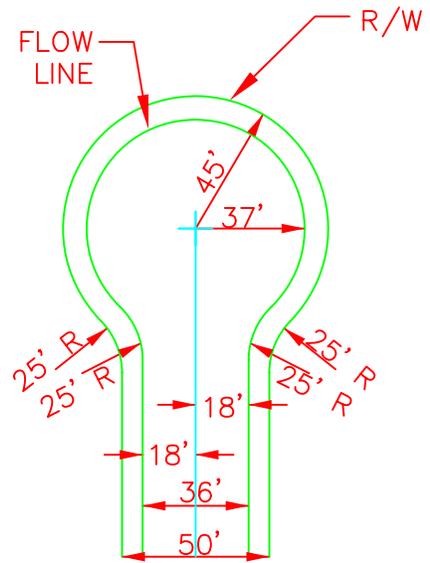
DETAIL NO.

DATE: SEPT 2006

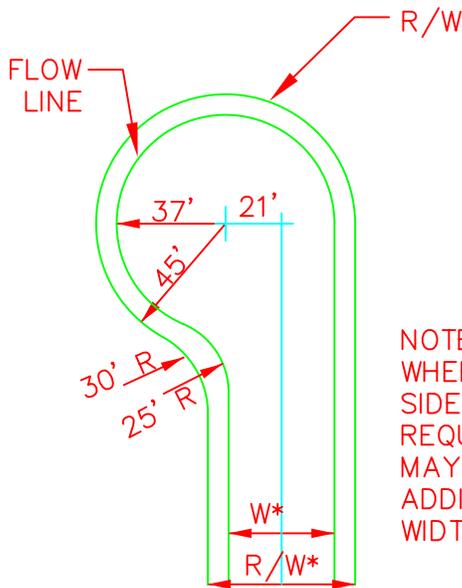
**6**



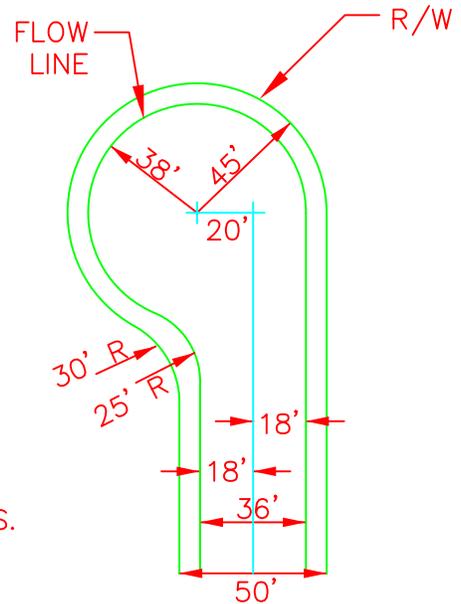
MINIMUM BULB FOR SINGLE FAMILY



MINIMUM BULB FOR MULTI-FAMILY AND COMMERCIAL AREAS



NOTE: IN LOCATIONS WHERE DETACHED SIDEWALKS ARE REQUIRED, THE CITY MAY REQUIRE EITHER ADDITIONAL ROW WIDTHS OR EASEMENTS.



NOTES:

\* WIDTH AS SHOWN ON TYPICAL SECTION, SEE DESIGN STANDARD DETAILS

APPROVED

*Dan Hunt*

DIRECTOR OF PUBLIC WORKS

CITY OF GOLDEN



CUL-DE-SACS

APPROVED

*Vince Anzures*

CITY ENGINEER

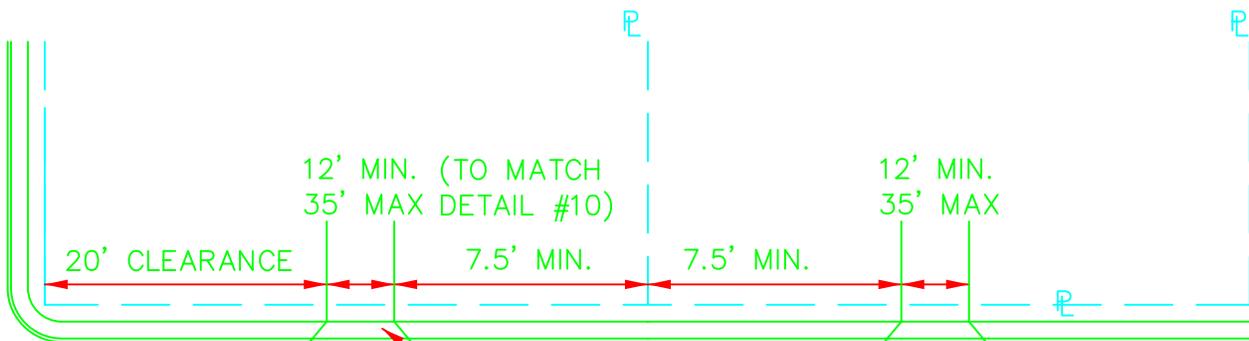
DEPARTMENT OF PUBLIC WORKS

SCALE: NTS

DETAIL NO.

DATE: SEPT 2006

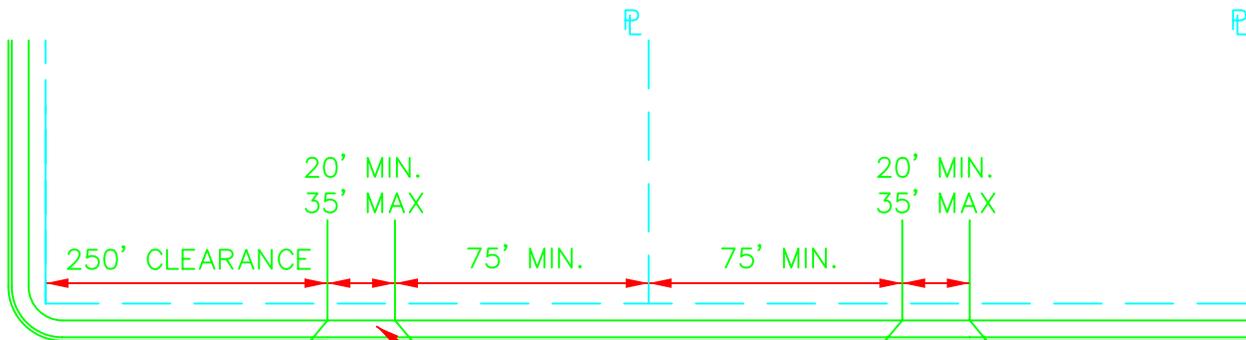
7



DRIVEWAY SHALL BE 6" MIN. THICKNESS CONCRETE TO P (PROPERTY LINE)

### SINGLE FAMILY RESIDENTIAL ACCESSES

THIS STANDARD APPLIES TO SINGLE FAMILY RESIDENTIAL ACCESSES ON LOCAL STREETS. FOR ACCESSSES ON COMMERCIAL/MULTIFAMILY LOCAL STREETS, COLLECTORS AND ARTERIALS THE 20' DIMENSION FROM THE CORNER WILL BE 50'.



DRIVEWAY SHALL BE CONCRETE TO P (PROPERTY LINE)

### MULTI-FAMILY ACCESSSES

THIS STANDARD APPLIES TO ALL TYPES OF ACCESSSES EXCEPT SINGLE FAMILY FOR ALL TYPE OF STREETS. THE 250' DIMENSION FROM THE CORNER MAY BE INCREASED TO PROVIDE ADDITIONAL CLEARANCE FOR LEFT-TURN STORAGE.

APPROVED

*Dan Hunt*

DIRECTOR OF PUBLIC WORKS

CITY OF GOLDEN



MINIMUM ACCESS SPACING

APPROVED

*Vince Amador*

CITY ENGINEER

DEPARTMENT OF PUBLIC WORKS

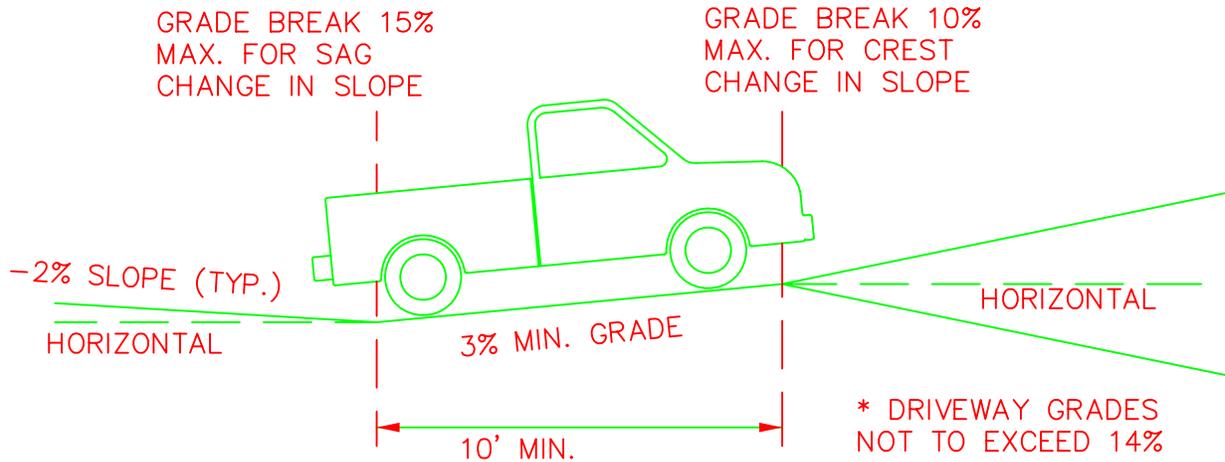
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DATE: SEPT 2006

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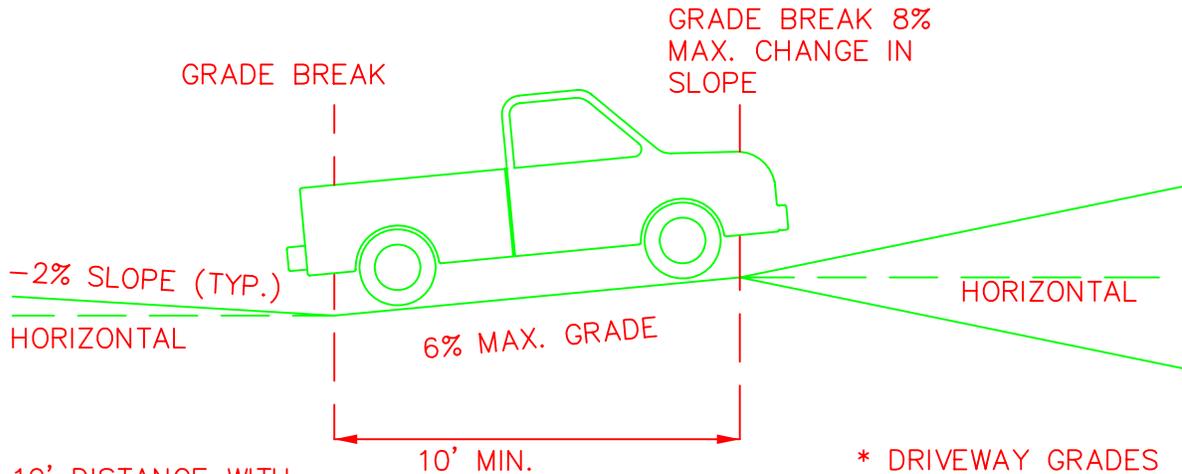
8

# SINGLE FAMILY RESIDENTIAL DRIVEWAYS



NOTE: ANY VARIANCE TO BE APPROVED BY CITY ENGINEER.

# MULTI-FAMILY RESIDENTIAL & COMMERCIAL DRIVEWAYS



\* THE 10' DISTANCE WITH  
ATTACHED WALKS, SHALL BEGIN  
AT THE BACK OF WALK.

APPROVED

*Dan Hunt*

DIRECTOR OF PUBLIC WORKS

CITY OF GOLDEN



DEPARTMENT OF PUBLIC WORKS

ACCESS GRADES

APPROVED

*Vince Amanna*

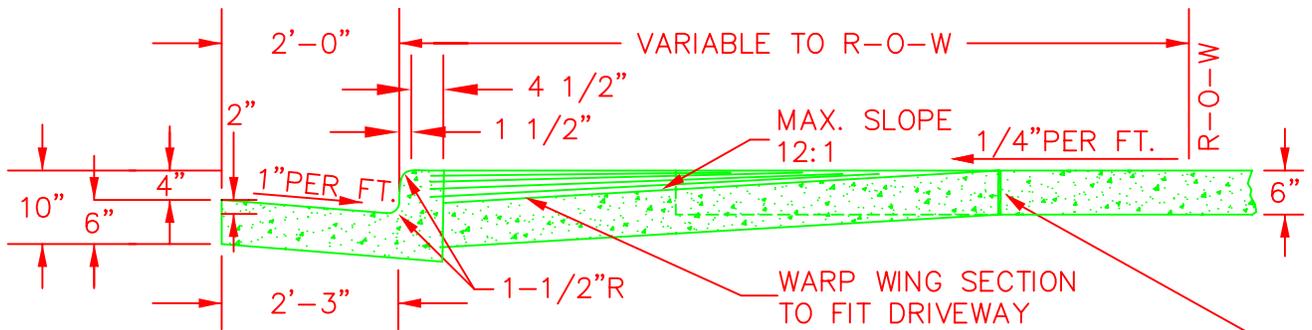
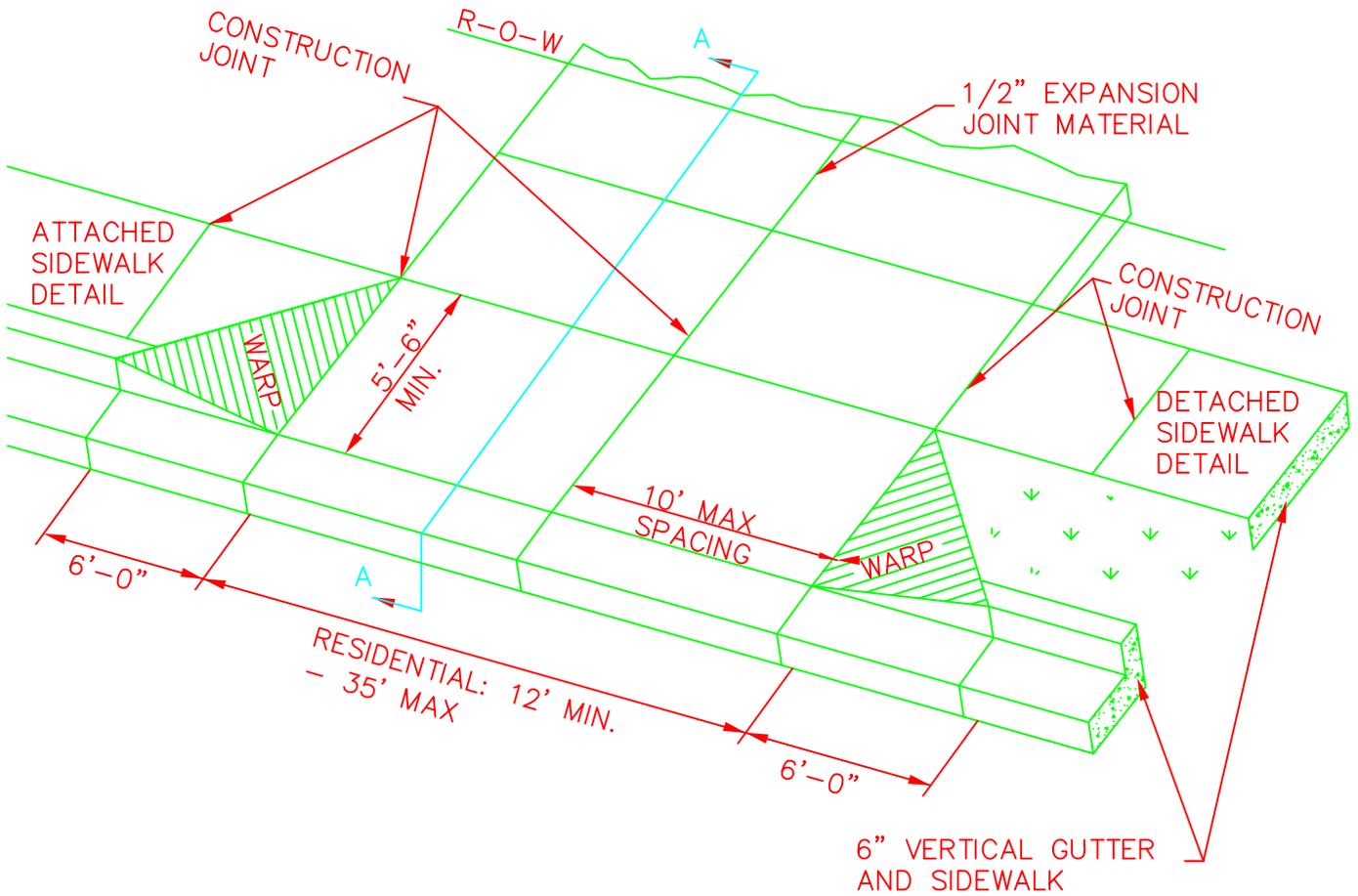
CITY ENGINEER

SCALE: NTS

DATE: SEPT 2006

DETAIL NO.

9



NOTE: SECTION A - A 1/2" EXPANSION JOINT MATERIAL

- 1 THIS STANDARD IS NOT ALLOWED ON ARTERIAL STREETS.
- 2 CONCRETE SHALL BE CDOT CLASS B
- 3 SEE DESIGN STANDARD NO.14 FOR JOINT DETAIL
- 4 SUBGRADE COMPACTION TO BE 95% OPTIMUM DENSITY IN ACCORDANCE WITH AASHTO T-99.
- 5 DRIVEWAY SECTION SHALL BE 10" THICK ON ALL MULTIFAMILY RESIDENTIAL AND COMMERCIAL DRIVEWAYS.
- 6 WHEN MAKING REPAIRS REMOVE FULL STONE

APPROVED  
  
 DIRECTOR OF PUBLIC WORKS

APPROVED  
  
 CITY ENGINEER

**CITY OF GOLDEN**

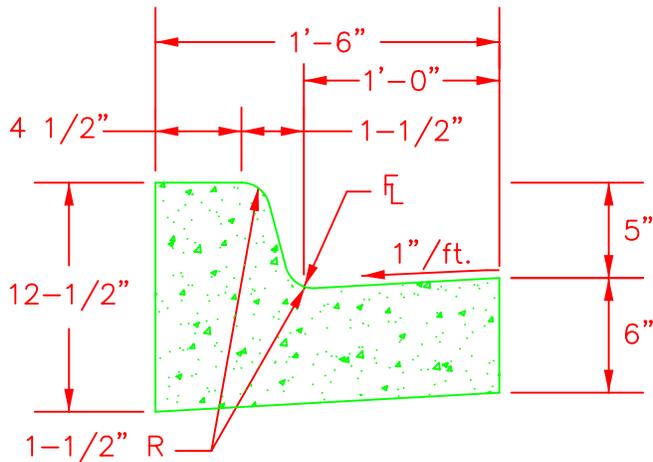


**DEPARTMENT OF PUBLIC WORKS**

DRIVEWAY APPROACH

SCALE: NTS  
 DATE: SEPT 2006

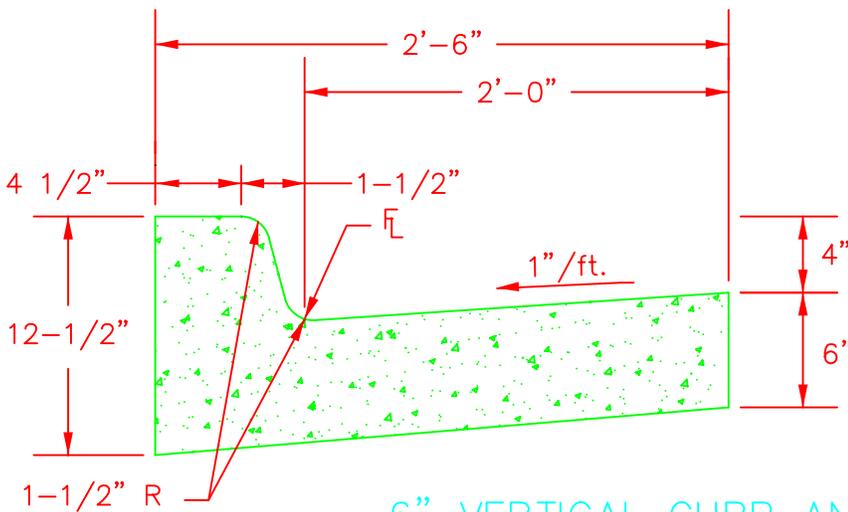
DETAIL NO.  
10



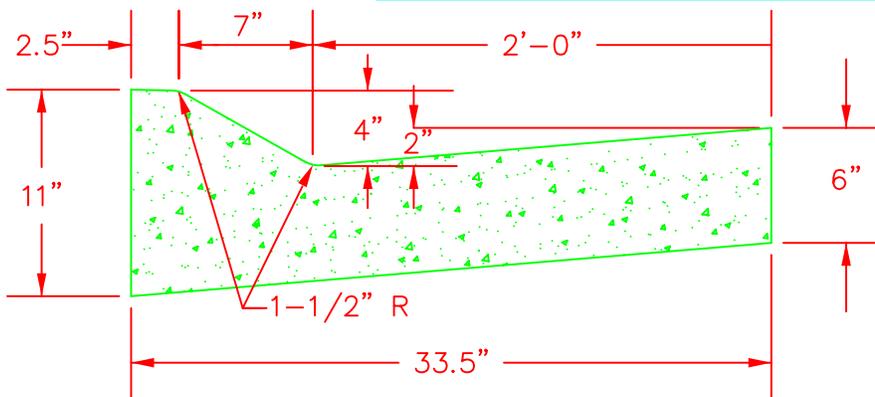
6" VERTICAL CURB WITH 1' GUTTER

**NOTE:**

1. 6" VERTICAL CURB WITH 1.0' GUTTER IS REQUIRED FOR ALL RAISED MEDIANS.
2. WHEN MAKING REPAIRS REMOVE FULL STONE.
3. MOUNTABLE CURB & GUTTER ONLY ALLOWED TO REPAIR EXISTING MOUNTABLE C&G.



6" VERTICAL CURB AND GUTTER



MOUNTABLE CURB & GUTTER

APPROVED

*Dan Skut*

DIRECTOR OF PUBLIC WORKS

APPROVED

*Vince Amanna*

CITY ENGINEER

CITY OF GOLDEN



DEPARTMENT OF PUBLIC WORKS

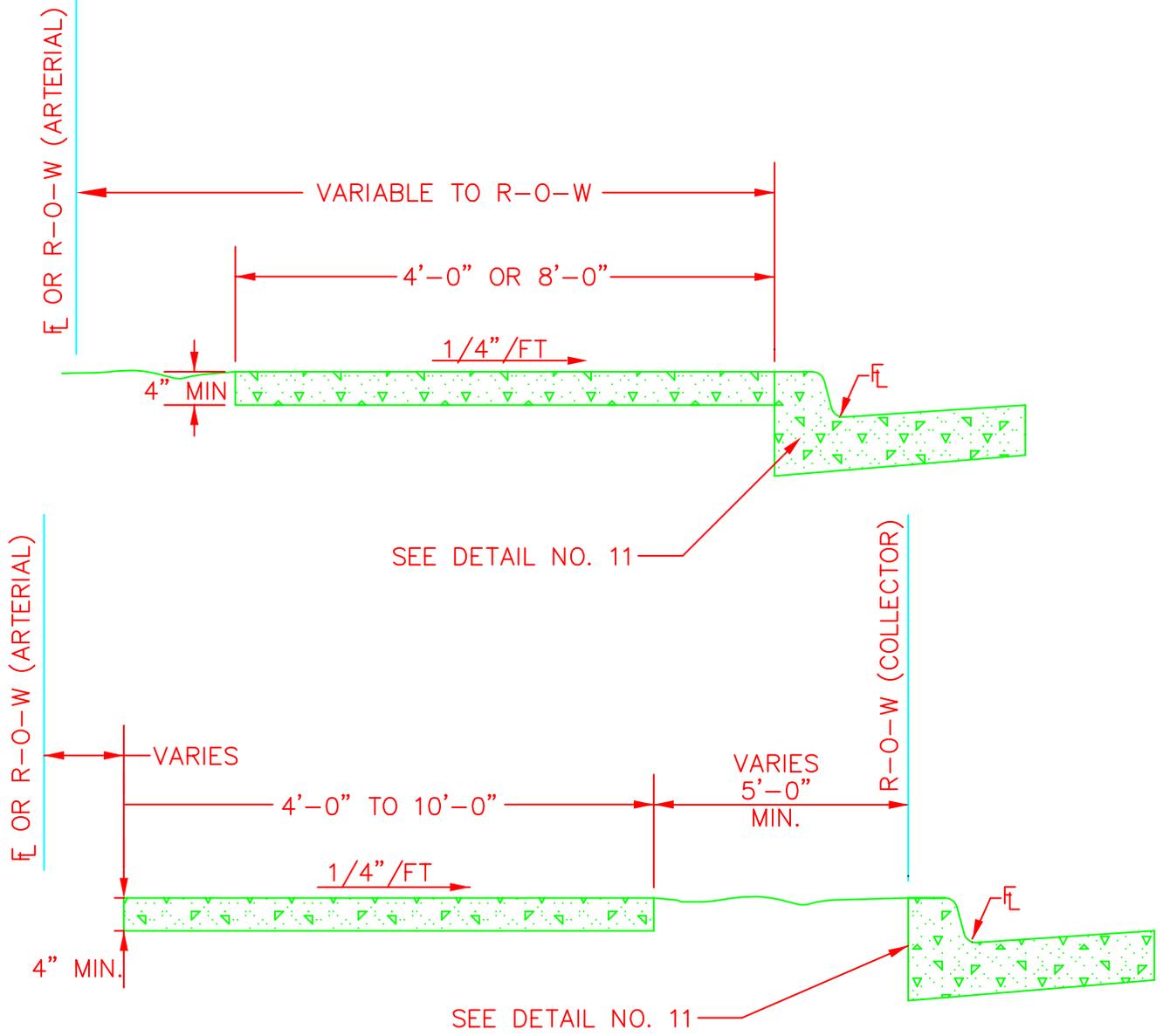
CURB AND GUTTER

SCALE: NTS

DATE: SEPT 2006

DETAIL NO.

11



**NOTES:**

- 1 SEE DETAIL STANDARD NO.14 FOR CONCRETE JOINT DETAILS.
- 2 SIDEWALK WIDTH SHALL BE SPECIFIED ON THE CONSTRUCTION PLANS.
- 3 LANDSCAPE TREATMENT MUST BE SPECIFIED.
- 4 6" VERTICAL CURB, GUTTER, AND SIDEWALK IS REQUIRED FOR
- 5 WHEN MAKING REPAIRS REMOVE FULL STONE.
- 6 COLLECTOR AND ARTERIAL STREETS.
- 6 ATTACHED WALK IS SHOWN FOR REPAIR SECTIONS ONLY.
- 7 IN LOCATIONS WHERE SIDEWALK CROSSES SINGLE FAMILY RESIDENTIAL DRIVEWAYS, SIDEWALK THICKNESS SHALL BE 6" MIN.
- 8 IN LOCATIONS WHERE SIDEWALK CROSSES MULTI-FAMILY OR COMMERCIAL/INDUSTRIAL DRIVEWAYS, OR ALLEYS, SIDEWALK THICKNESS SHALL BE 10" MIN

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 DIRECTOR OF PUBLIC WORKS

APPROVED  
  
 CITY ENGINEER

**CITY OF GOLDEN**



**DEPARTMENT OF PUBLIC WORKS**

**6" VERTICAL CURB & SIDEWALK**

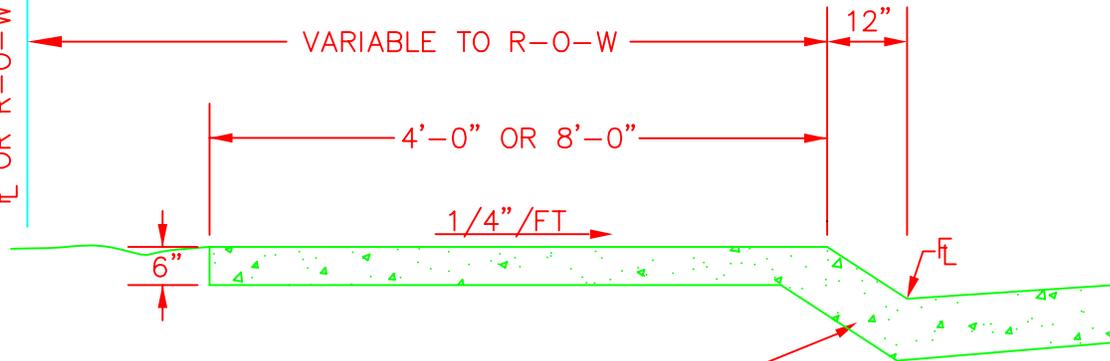
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DATE: SEPT 2006

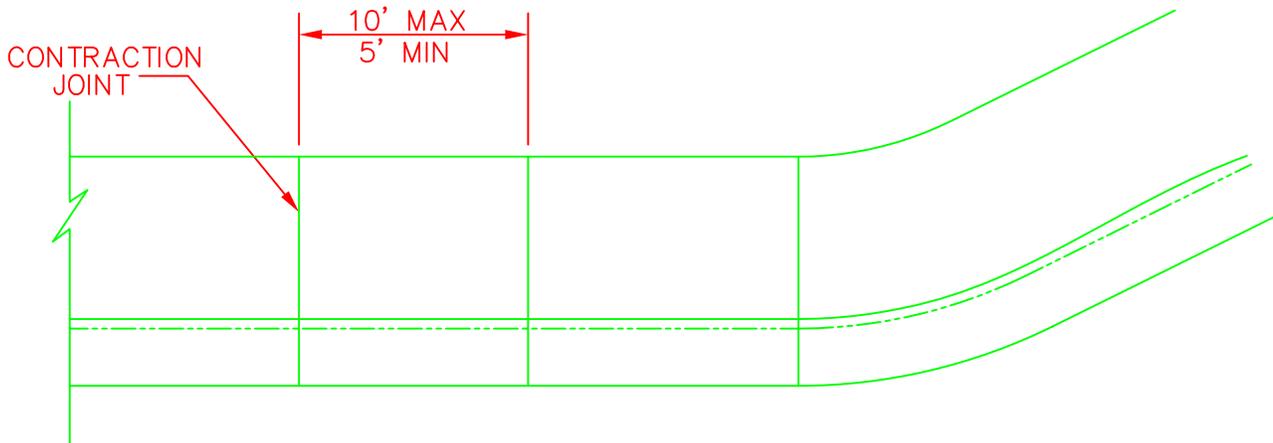
DETAIL NO.

**12**

FL OR R-O-W (ARTERIAL)



SEE DETAIL NO. 11



NOTES:

- 1 WIDTH MAY BE INCREASED AT CORNERS FOR PEDESTRIAN RAMPS.
  - \*SIDEWALK, CURB, AND GUTTER SHALL BE POURED MONOLITHICALLY.
  - \*CONCRETE SHALL BE CDOT CLASS B.
  - \*SEE DESIGN STANDARD NO.14 FOR JOINT DETAIL.
  - \*SUBGRADE COMPACTION TO BE 95% OPTIMUM DENSITY IN ACCORDANCE WITH AASHTO T-99.
  - \*WHEN MAKING REPAIRS REMOVE FULL STONE.
- 2 THIS DETAIL TO BE USED WHEN REPLACING EXISTING COMBINATION CURB-WALK. ALL NEW STREETS REQUIRE DETACHED SIDEWALK.
- 3 SIDEWALK THICKNESS TO BE 10" WHEN CROSSING A MULTI-FAMILY OR COMMERCIAL/INDUSTRIAL ACCESS.

APPROVED

*Dan Hunt*

DIRECTOR OF PUBLIC WORKS

CITY OF GOLDEN



DEPARTMENT OF PUBLIC WORKS

MOUNTABLE CURB,  
GUTTER & SIDEWALK

APPROVED

*Vince Amanna*

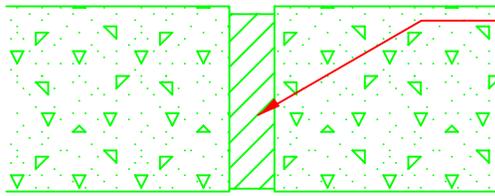
CITY ENGINEER

SCALE: NTS

DATE: SEPT 2006

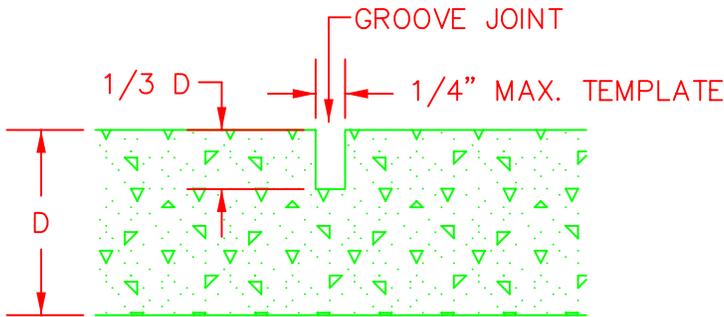
DETAIL NO.

13



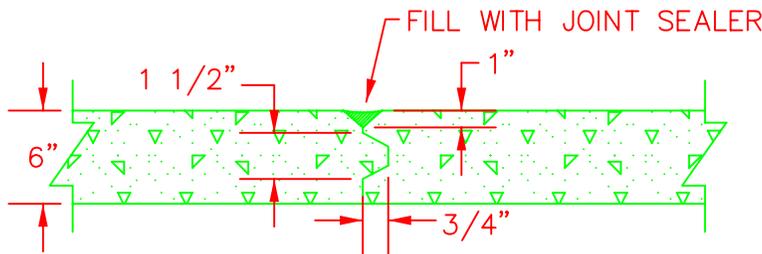
EXPANSION JOINT

- \*1/2" PREMOLDED NON-EXTRUDING EXPANSION JOINT MATERIAL TO MEET AASHTO SPEC. M-59.
- \*EXPANSION JOINTS SHALL BE INSTALLED WHEN ABUTTING EXISTING CONCRETE OR FIXED STRUCTURES SUCH AS INLETS AND DRIVEWAYS, AND EVERY 300' ON LONG STRAIGHT CONCRETE STRETCHES.



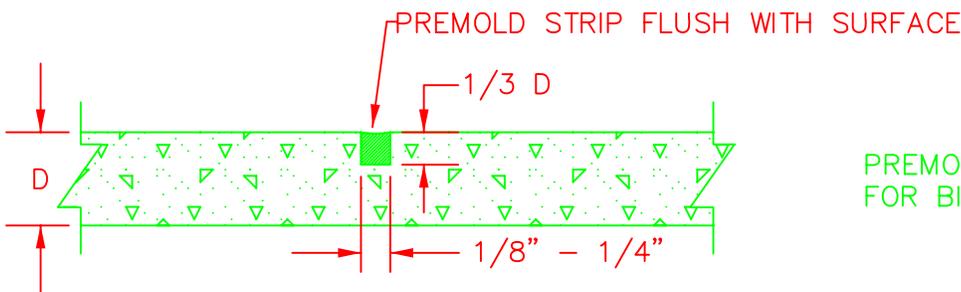
CONTRACTION JOINT

FORM WITH TEMPLATE OR SAWCUT JOINTS. SAWCUT JOINTS, IF USED, SHALL BEGIN AS SOON AS CONCRETE IS HARDENED SUFFICIENTLY TO PERMIT SAWING WITHOUT EXCESSIVE RAVELING AND BEFORE UNCONTROLLED CRACKING OCCURS. MAXIMUM DISTANCE BETWEEN JOINTS IS 10'. MINIMUM DISTANCE IS 5'.



LONGITUDINAL AND TRANSVERSE CONSTRUCTION JOINT

KEYWAY FORMED BY FASTENING METAL KEY TO FORM.



SAWED OR PREMOLEDED STRIP LONGITUDINAL OR TRANSVERSE JOINT

PREMOLDED STRIPS REQUIRED FOR BIKEPATHS.

APPROVED

*Dan Skut*

DIRECTOR OF PUBLIC WORKS

CITY OF GOLDEN



CONCRETE JOINT DETAIL

APPROVED

*Vince Amanna*

CITY ENGINEER

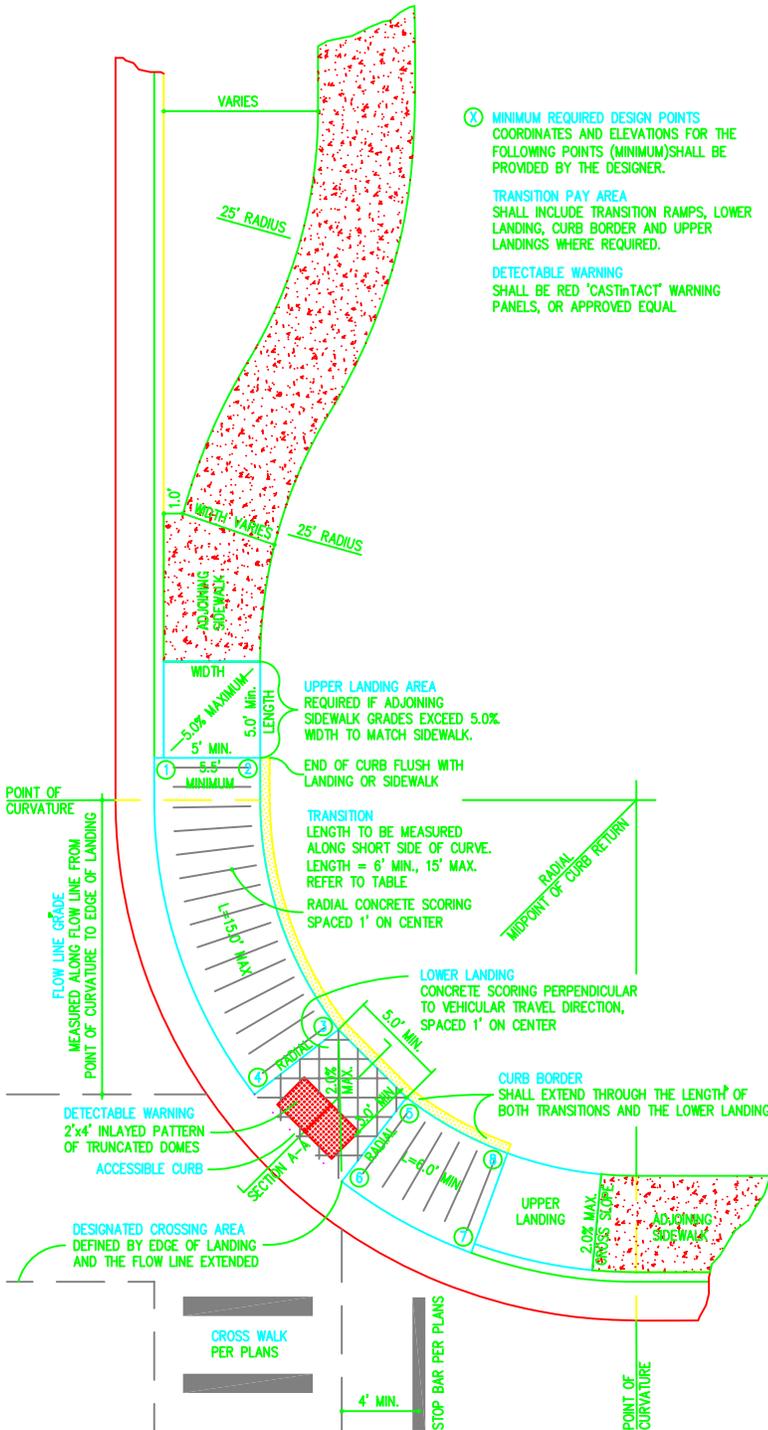
DEPARTMENT OF PUBLIC WORKS

SCALE: NTS

DETAIL NO.

DATE: SEPT 2006

14



**NOTES**

SLOPED TRANSITIONS SHALL COMPLY WITH ALL APPLICABLE RULES AND GUIDELINES OF THE AMERICANS WITH DISABILITIES ACT.

SLOPED TRANSITIONS SHALL BE CONSISTENT WITH THE CURRENT PUBLICATION OF FEDERAL GUIDELINES FOR ACCESSIBLE RIGHTS OF WAY.

LONGITUDINAL SLOPES WITHIN THE TRANSITION SHALL NOT EXCEED 1:12 (8.33%).

CROSS SLOPES, OR SLOPES PERPENDICULAR TO THE DIRECTION OF TRAVEL SHALL NOT EXCEED 1:50 (2.0%)

THE LOWER LANDING AREA IS A REQUIRED ELEMENT.

SLOPED TRANSITIONS ARE A REQUIRED ELEMENT AND SHALL:

- A. NOT EXCEED 1:12 (8.3%) LONGITUDINAL SLOPE ALONG THE SHORTEST SIDE UNLESS TRANSITION LENGTH EXCEEDS 15.0'
- B. NOT EXCEED 1:50 (2.0%) SLOPE PERPENDICULAR TO THE TRAVELED DIRECTION.
- C. NOT EXCEED 15.0' IN LENGTH AS MEASURED ALONG THE SHORTEST SIDE. MAXIMUM LONGITUDINAL SLOPE SHALL BE ADJUSTED TO ACCOMMODATE THE LENGTH.
- D. NOT BE LESS THAN 6.0' IN LENGTH.

THE UPPER LANDING AREA IS REQUIRED IF:

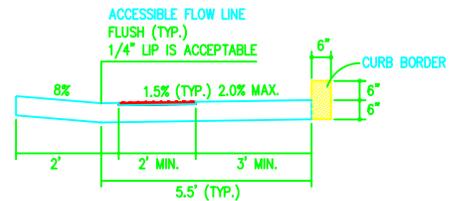
- A. THE ADJOINING SIDEWALK HAS A LONGITUDINAL GRADE (DIRECTION OF TRAVEL) IN EXCESS OF 1:20 (5.0%). SAID LANDING SHALL NOT EXCEED A 1:20 (5.0%) SLOPE IN ANY DIRECTION.
- B. A CHANGE IN DIRECTION IS REQUIRED TO ENTER OR EXIT THE SLOPED TRANSITION. SAID LANDING SHALL NOT EXCEED 1:50 (2.0%) SLOPE IN ANY DIRECTION.

LANDINGS AND SLOPED TRANSITIONS SHALL MATCH THE WIDTH OF THE ADJOINING SIDEWALK, 3.0' MINIMUM.

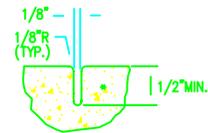
ALL TOOLED JOINTS WITHIN THE SLOPED TRANSITIONS SHALL RUN PERPENDICULAR TO THE DIRECTION OF TRAVEL.

ALL TOOLED JOINTS WITHIN THE LOWER LANDING AREA SHALL RUN PARALLEL TO AND/OR PERPENDICULAR TO THE DIRECTION OF VEHICULAR TRAVEL WITHIN THE TRAVELED WAY.

EXISTING SITE CONDITIONS (IE, NARROW OR NO RIGHT-OF-WAY OR EASMENTS, NARROW SIDEWALK WIDTHS, GRADES, ETC.) MAY PRECLUDE THE USE OF THIS STANDARD BY THE CITY WHEN REPAIRING EXISTING SIDEWALKS AND PEDESTRIAN RAMPS.



SECTION A-A



TOOLED JOINT

APPROVED

*Dan Hunt*

DIRECTOR OF PUBLIC WORKS

APPROVED

*Vince Anzures*

CITY ENGINEER

CITY OF GOLDEN



DEPARTMENT OF PUBLIC WORKS

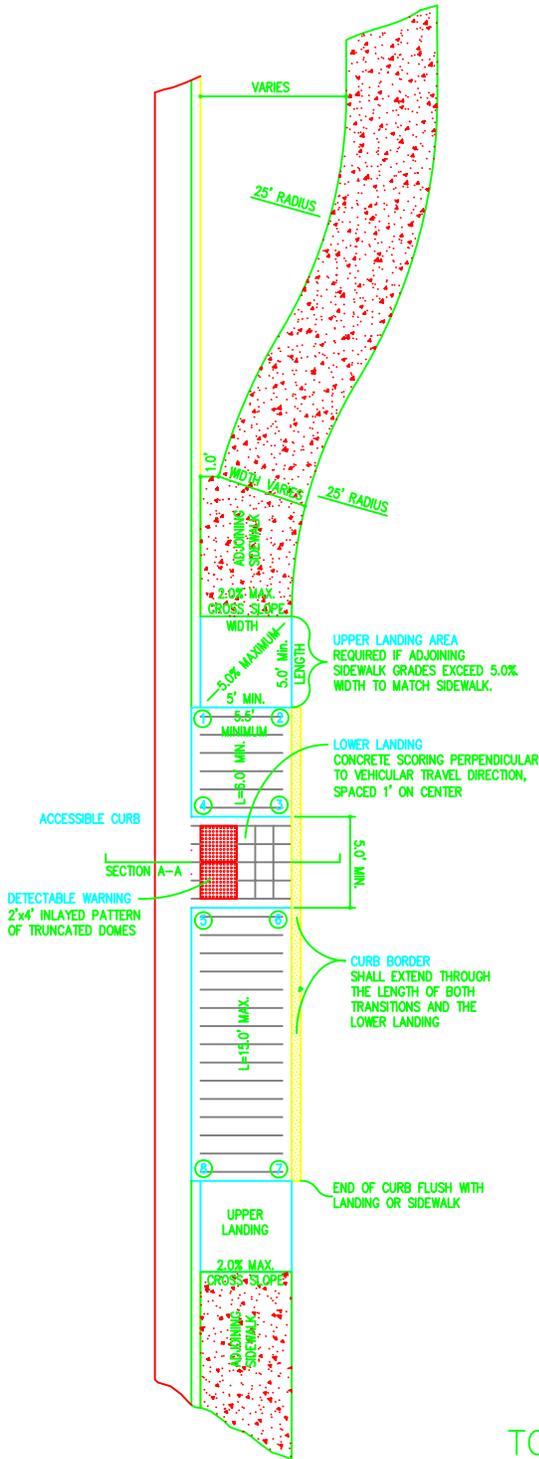
PEDESTRIAN RAMP (CORNER)

SCALE: NTS

DATE: SEPT 2006

DETAIL NO.

15.1



**NOTES**

SLOPED TRANSITIONS SHALL COMPLY WITH ALL APPLICABLE RULES AND GUIDELINES OF THE AMERICANS WITH DISABILITIES ACT.

SLOPED TRANSITIONS SHALL BE CONSISTENT WITH THE CURRENT PUBLICATION OF FEDERAL GUIDELINES FOR ACCESSIBLE RIGHTS OF WAY.

LONGITUDINAL SLOPES WITHIN THE TRANSITION SHALL NOT EXCEED 1:12 (8.33%).

CROSS SLOPES, OR SLOPES PERPENDICULAR TO THE DIRECTION OF TRAVEL SHALL NOT EXCEED 1:50 (2.0%)

THE LOWER LANDING AREA IS A REQUIRED ELEMENT.

SLOPED TRANSITIONS ARE A REQUIRED ELEMENT AND SHALL:

- A. NOT EXCEED 1:12 (8.33%) LONGITUDINAL SLOPE ALONG THE SHORTEST SIDE UNLESS TRANSITION LENGTH EXCEEDS 15.0'
- B. NOT EXCEED 1:50 (2.0%) SLOPE PERPENDICULAR TO THE TRAVELED DIRECTION.
- C. NOT EXCEED 15.0' IN LENGTH AS MEASURED ALONG THE SHORTEST SIDE. MAXIMUM LONGITUDINAL SLOPE SHALL BE ADJUSTED TO ACCOMMODATE THE LENGTH.
- D. NOT BE LESS THAN 6.0' IN LENGTH.

THE UPPER LANDING AREA IS REQUIRED IF:

- A. THE ADJOINING SIDEWALK HAS A LONGITUDINAL GRADE (DIRECTION OF TRAVEL) IN EXCESS OF 1:20 (5.0%). SAID LANDING SHALL NOT EXCEED A 1:20 (5.0%) SLOPE IN ANY DIRECTION.
- B. A CHANGE IN DIRECTION IS REQUIRED TO ENTER OR EXIT THE SLOPED TRANSITION. SAID LANDING SHALL NOT EXCEED 1:50 (2.0%) SLOPE IN ANY DIRECTION.

LANDINGS AND SLOPED TRANSITIONS SHALL MATCH THE WIDTH OF THE ADJOINING SIDEWALK, 3.0' MINIMUM.

ALL TOOLED JOINTS WITHIN THE SLOPED TRANSITIONS SHALL RUN PERPENDICULAR TO THE DIRECTION OF TRAVEL.

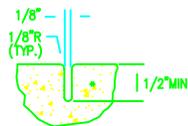
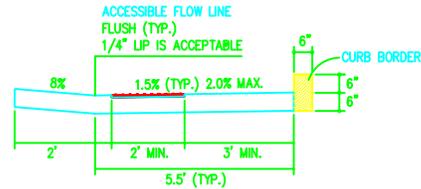
ALL TOOLED JOINTS WITHIN THE LOWER LANDING AREA SHALL RUN PARALLEL TO AND/OR PERPENDICULAR TO THE DIRECTION OF VEHICULAR TRAVEL WITHIN THE TRAVELED WAY.

EXISTING SITE CONDITIONS (IE, NARROW OR NO RIGHT-OF-WAY OR EASMENTS, NARROW SIDEWALK WIDTHS, GRADES, ETC.) MAY PRECLUDE THE USE OF THIS STANDARD BY THE CITY WHEN REPAIRING EXISTING SIDEWALKS AND PEDESTRIAN RAMP.

- ⓧ MINIMUM REQUIRED DESIGN POINTS COORDINATES AND ELEVATIONS FOR THE FOLLOWING POINTS (MINIMUM) SHALL BE PROVIDED BY THE DESIGNER.

**TRANSITION PAY AREA**  
SHALL INCLUDE TRANSITION RAMP, LOWER LANDING, CURB BORDER AND UPPER LANDINGS WHERE REQUIRED.

**DETECTABLE WARNING**  
SHALL BE RED "CASTIN TACT" WARNING PANELS, OR APPROVED EQUAL



APPROVED

*Dan Hunt*

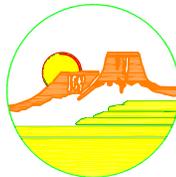
DIRECTOR OF PUBLIC WORKS

APPROVED

*Vince Anzures*

CITY ENGINEER

CITY OF GOLDEN



DEPARTMENT OF PUBLIC WORKS

PEDESTRIAN RAMP  
(MID-BLOCK)

SCALE: NTS

DATE: SEPT 2006

DETAIL NO.

15.2

# CITY OF GOLDEN

## PUBLIC RIGHTS OF WAY

### PARALLEL CURB TRANSITIONS

Max Grade 8.3%

1                      2                      3,5                      4,5

	Flow Line Grade	Delta	Calc. Length	Transition Length	Transition Grade	Transition Required?	Top Landing Required?
DOWN HILL	-8.0%	16%	3.06	6	0.3%	NO	NO
	-7.5%	16%	3.16	6	0.8%	NO	NO
	-7.0%	15%	3.26	6	1.3%	NO	NO
	-6.5%	15%	3.37	6	1.8%	NO	NO
	-6.0%	14%	3.49	6	2.3%	NO	NO
	-5.5%	14%	3.61	6	2.8%	NO	NO
	-5.0%	13%	3.75	6	3.3%	NO	NO
	-4.5%	13%	3.90	6	3.8%	NO	NO
	-4.0%	12%	4.05	6	4.3%	NO	NO
	-3.5%	12%	4.23	6	4.8%	NO	NO
	-3.0%	11%	4.41	6	5.3%	YES	NO
	-2.5%	11%	4.62	6	5.8%	YES	NO
-2.0%	10%	4.84	6	6.3%	YES	NO	
NOT PERMITTED	-1.5%	10%	5.08	6	6.8%	6	6
	-1.0%	9%	5.36	6	7.3%		
	-0.5%	9%	5.66	6	7.8%		
	0.0%	8%	6.00	6	8.3%		
	0.5%	8%	6.38	7	7.6%		
	1.0%	7%	6.82	7	8.1%		
	1.5%	7%	7.32	8	7.8%		
UP HILL	2.0%	6%	7.89	8	8.3%	YES	NO
	2.5%	6%	8.57	9	8.1%	YES	NO
	3.0%	5%	9.38	10	8.0%	YES	NO
	3.5%	5%	10.34	11	8.0%	YES	NO
	4.0%	4%	11.54	12	8.2%	YES	NO
	4.5%	4%	13.04	14	8.1%	YES	NO
	5.0%	3%	15.00	15	8.3%	YES	NO
	5.5%	3%	17.65	15	8.8%	YES	YES
	6.0%	2%	21.43	15	9.3%	YES	YES
	6.5%	2%	27.27	15	9.8%	YES	YES
	7.0%	1%	37.50	15	10.3%	YES	YES
	7.5%	1%	60.00	15	10.8%	YES	YES
8.0%	0%	150.00	15	11.3%	YES	YES	

- 1 No curb transition shall be constructed that runs less than six (6) feet in length. No curb transition is required to exceed 15' in length as measured along the shortest side. In such cases the grade of the transition shall be adjusted to accommodate t
- 2 Maximum grade of a curb transition shall not exceed 1:12 (8.3%) with the exception of a curb transition whose length has been set at the fifteen (15) foot maximum length.
- 3 Curb Transitions may not be required along the downstream (lower) side of curb returns with flowline grades in excess of 1:3 (3.0%).
- 4 A landing at the high end of a parallel curb transition is not required unless the adjoining sidewalk grade exceeds 1:20 (5.0%).
- 5 A landing at the high (top) end of a parallel curb transition is required at any change in direction. Said landing shall be a minimum of five (5) feet square with a maximum cross slope in any direction of 1:50 (2.0%).
- 5 The City of Golden does not allow curb returns whose flow line grades are less than 1:50 (2.0%)

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 CITY ENGINEER

CITY OF GOLDEN



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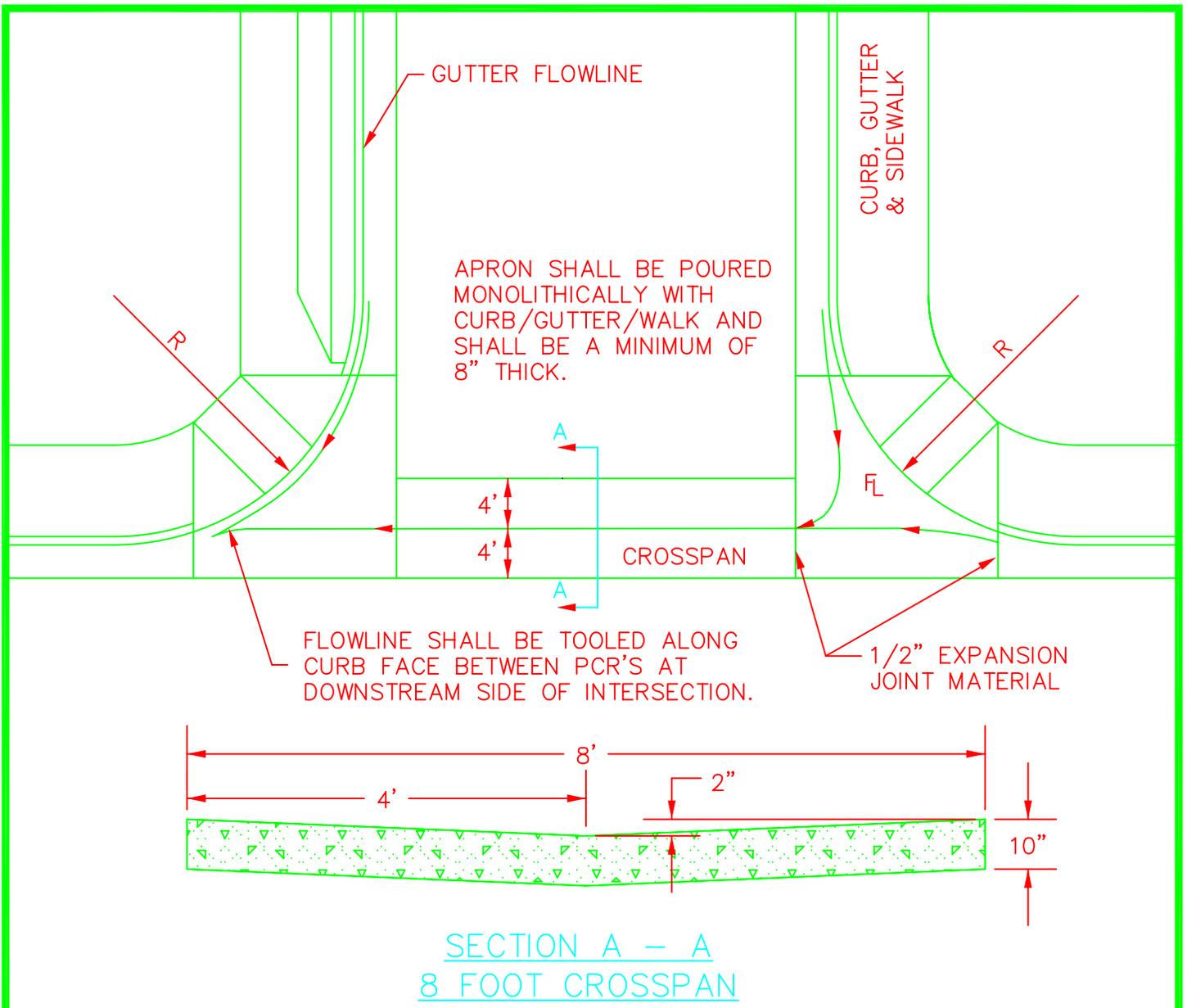
PEDESTRIAN RAMP  
(CURB TRANSITION)

SCALE: NTS

DATE: SEPT 2006

DETAIL NO.

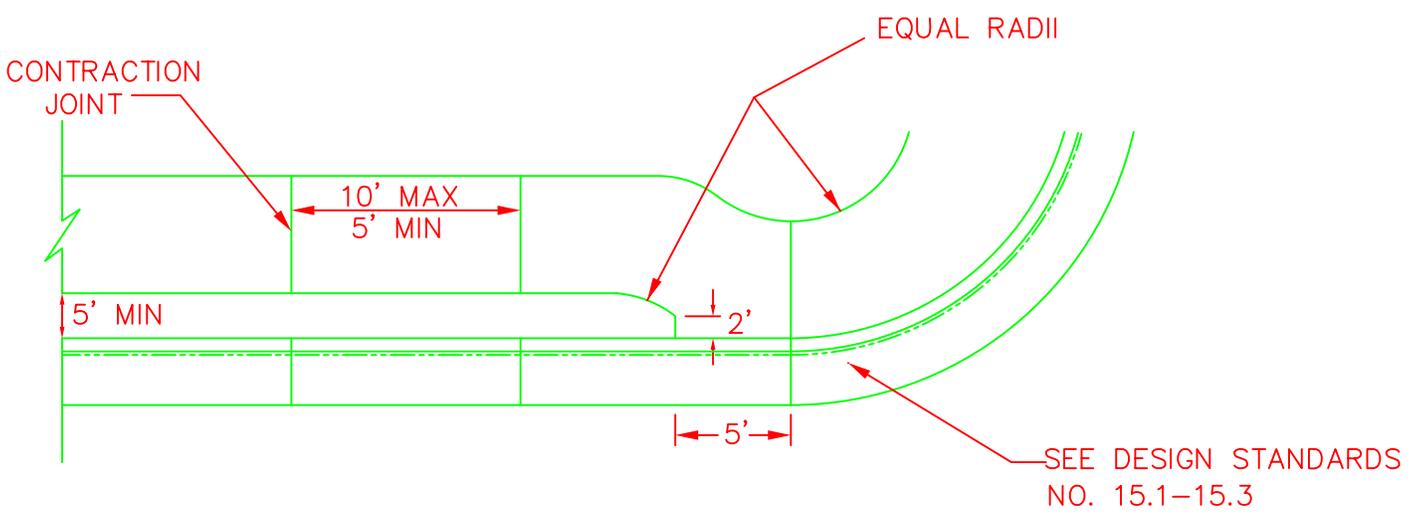
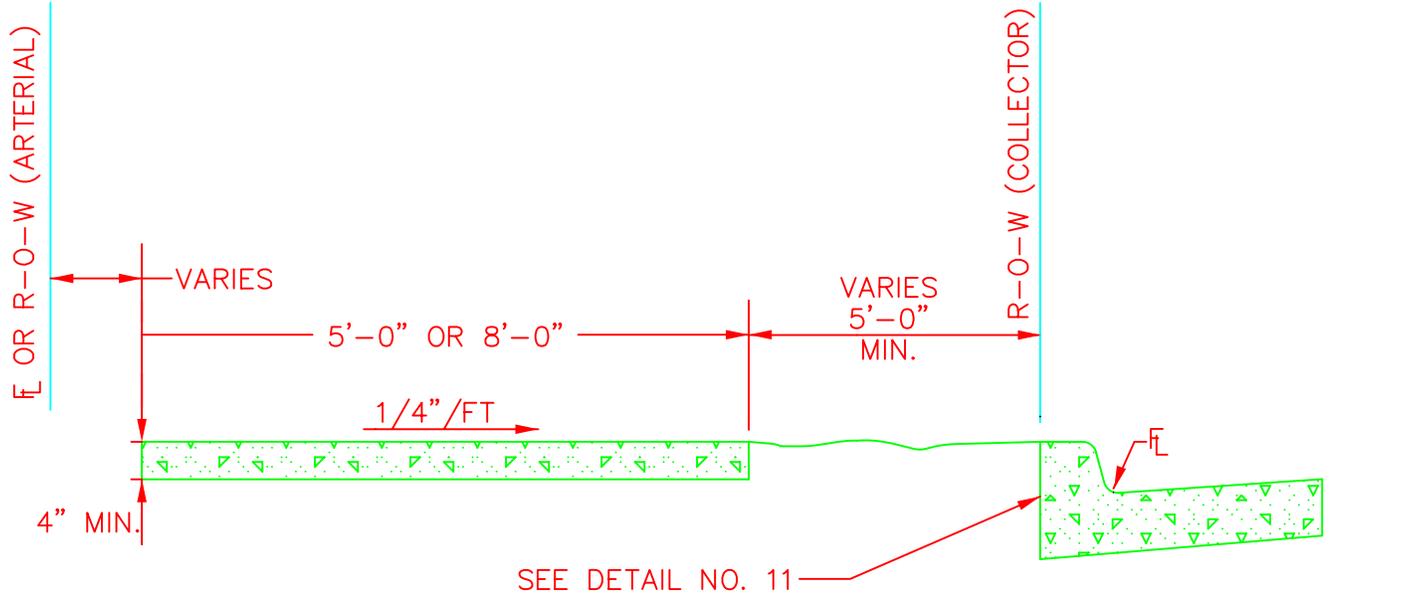
15.3



**NOTE:**

- \* SEE STANDARD NO. 14 FOR CONCRETE JOINT DETAILS.
- \* SEE STANDARD NO. 15.1-15.3 FOR CURB RAMP DETAILS.
- \* EXPANSION JOINTS ARE REQUIRED AT P.C.R.'S.
- \* CROSSPANS ARE NOT PERMITTED ACROSS ARTERIAL/COLLECTOR STREETS.

APPROVED  DIRECTOR OF PUBLIC WORKS	<p style="text-align: center;"><b>CITY OF GOLDEN</b></p>  <p style="text-align: center;"><b>DEPARTMENT OF PUBLIC WORKS</b></p>	CURB RADIUS AND CROSSSPAN	
APPROVED  CITY ENGINEER		SCALE: NTS DATE: SEPT 2006	DETAIL NO. <p style="text-align: center; font-size: 24pt;"><b>16</b></p>



NOTES:

- 1 6" THICK WALK SECTIONS SHALL BE CONSTRUCTED AT ALL RESIDENTIAL DRIVEWAYS AND AREAS NEEDED FOR UTILITY OR EMERGENCY ACCESS.
- 2 10" THICK WALK SECTIONS SHALL BE CONSTRUCTED AT ALL MULTIFAMILY RESIDENTIAL AND COMMERCIAL DRIVEWAYS.
- 3 CONCRETE SHALL BE CDOT CLASS B.
- 4 SEE DESIGN STANDARD NO. 14 FOR JOINT DETAIL.
- 5 SUBGRADE COMPACTION TO BE 95% OPTIMUM DENSITY IN ACCORDANCE WITH AASHTO T-99.
- 6 IF USED AS A BIKEPATH, MIN. THICKNESS SHALL BE 6", WITH 10" THICKNESS PER NOTE #2.
- 7 IF USED AS A BIKEPATH, PREMOLDED STRIPS REQUIRED.

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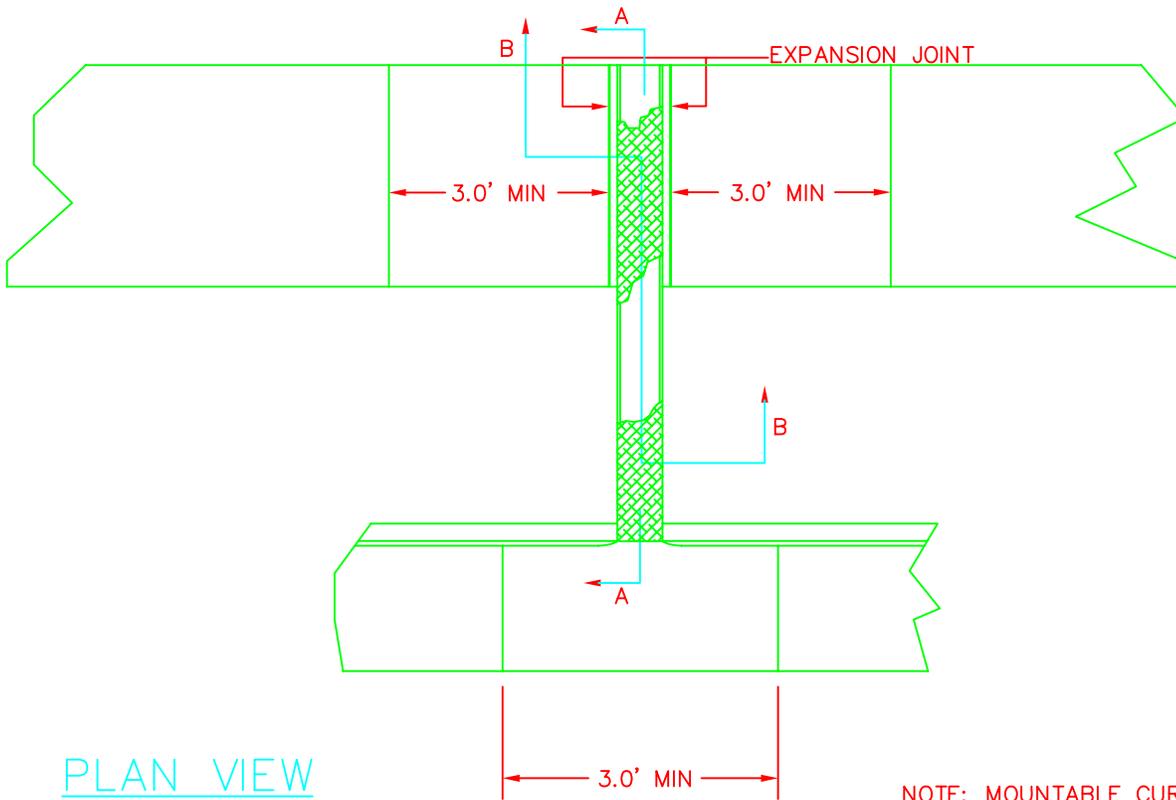
DETACHED  
 SIDEWALK/BIKEPATH

SCALE: NTS

DATE: SEPT 2006

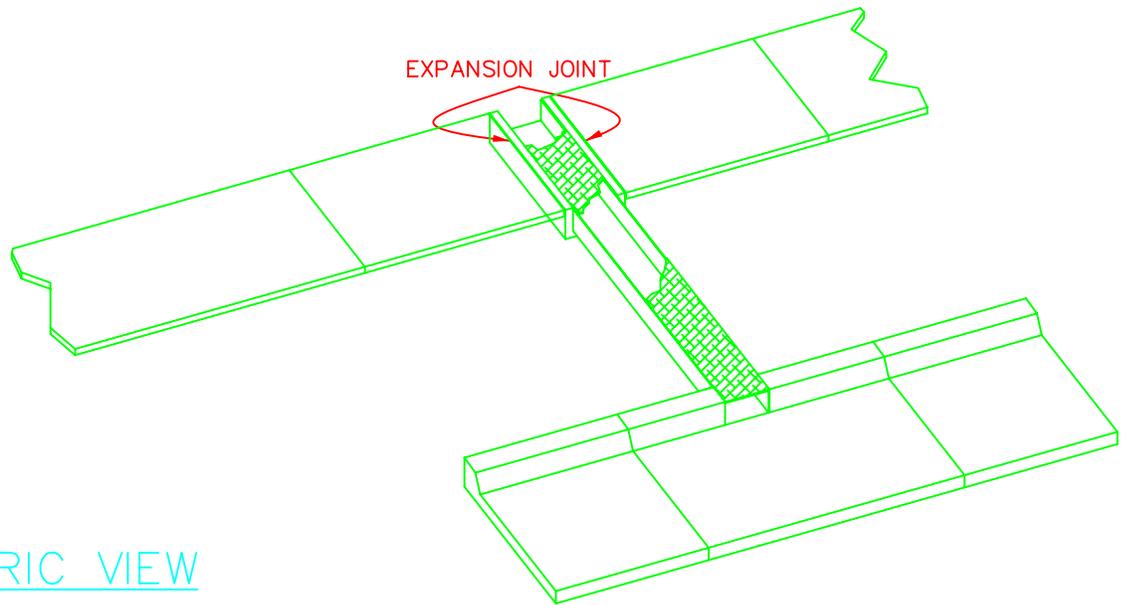
DETAIL NO.

17



PLAN VIEW

NOTE: MOUNTABLE CURB & GUTTER DETAILS ARE SIMILAR.



ISOMETRIC VIEW

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*Vince Amanna*

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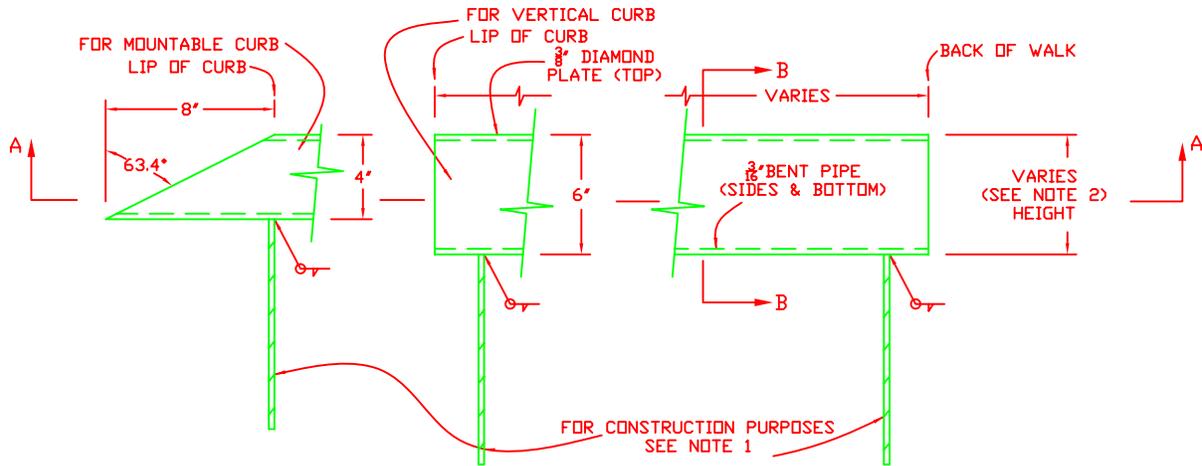
SIDEWALK CHASE

SCALE: NTS

DATE: SEPT 2006

DETAIL NO.

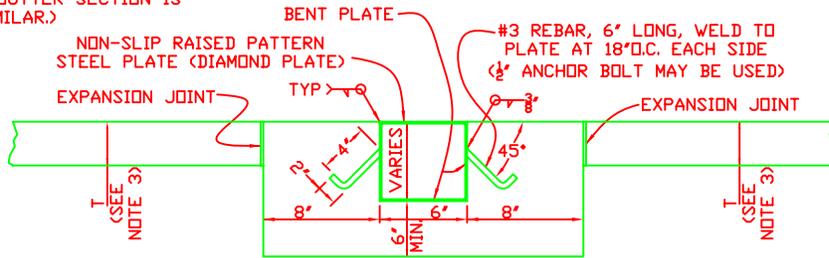
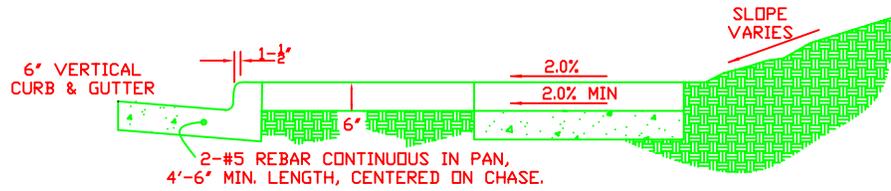
18.1



## SIDEWALK CHASE ELEVATION

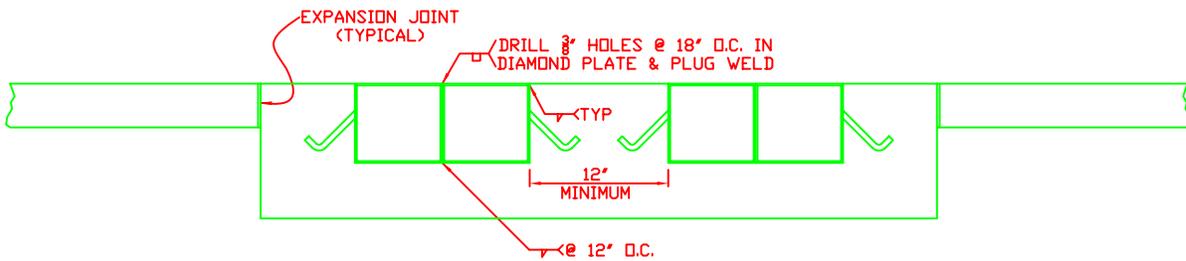
### SECTION A-A FLOW TO GUTTER

(NOTE: MOUNTABLE CURB & GUTTER SECTION IS SIMILAR.)



- NOTES**
- 18"-#4 REBAR: WELD ONE BAR NEAR EACH END OF TUBE; SUPPLY AT LEAST TWO BARS PER TUBE, MORE IF CONTRACTOR DEEMS APPROPRIATE. REBAR IS USED TO SUPPORT AND ALIGN TUBE UNTIL CONCRETE IS PLACED.
  - HEIGHT OF SIDE WALK CHASE SHALL MATCH CURB HEIGHT. I.E. HEIGHT FROM FLOWLINE TO TOP OF CURB.
  - T=THICKNESS OF WALL.

### SECTION B-B



## MULTIPLE CHASE

WHEN OPENINGS ARE LARGER THAN 12"

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*Don Hunt*

DIRECTOR OF PUBLIC WORKS

APPROVED

*Vince Amanna*

CITY ENGINEER

CITY OF GOLDEN



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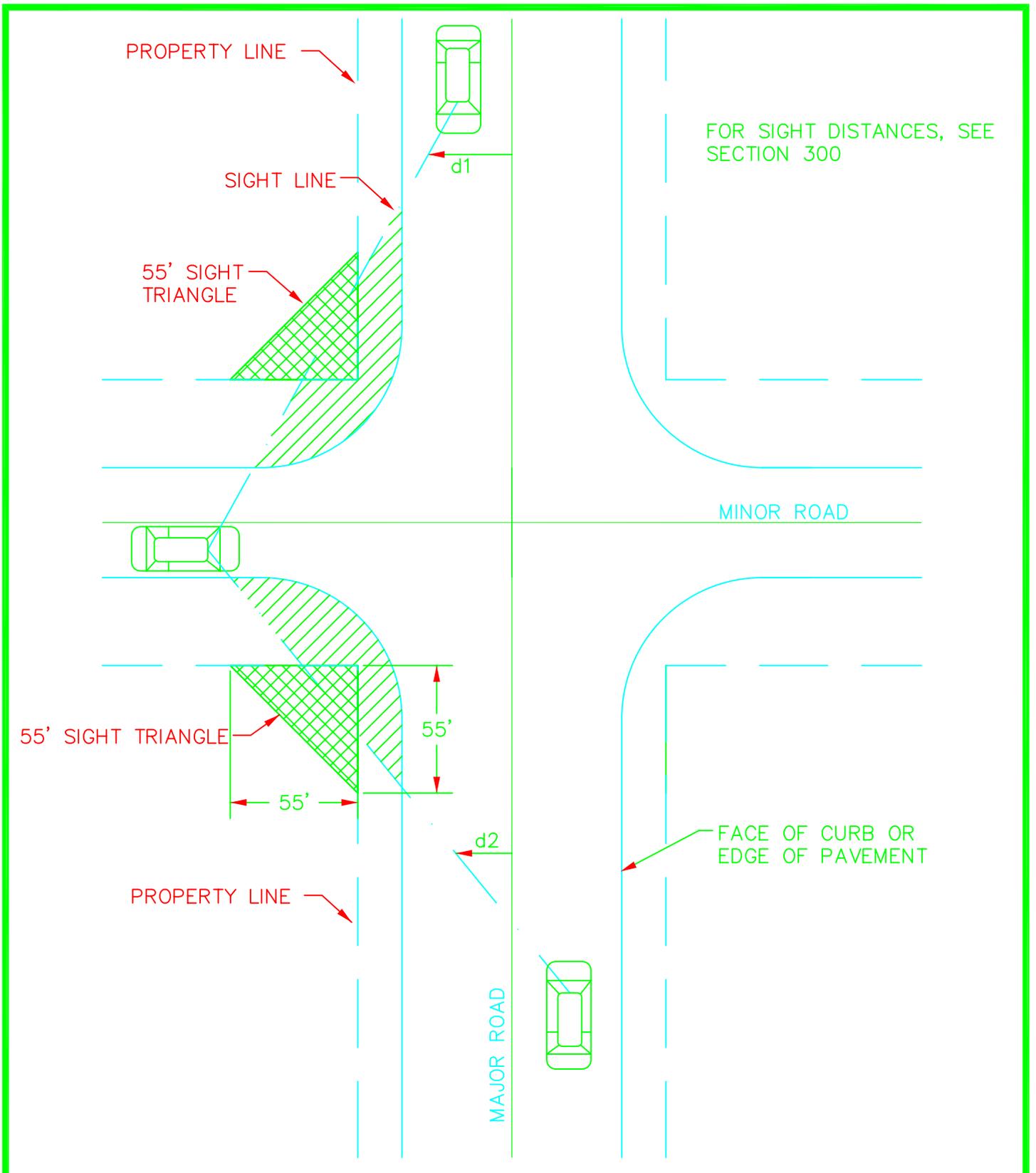
SIDEWALK CHASE

SCALE: NTS

DATE: SEPT 2006

DETAIL NO.

18.2



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*Vince Amanna*  
 CITY ENGINEER

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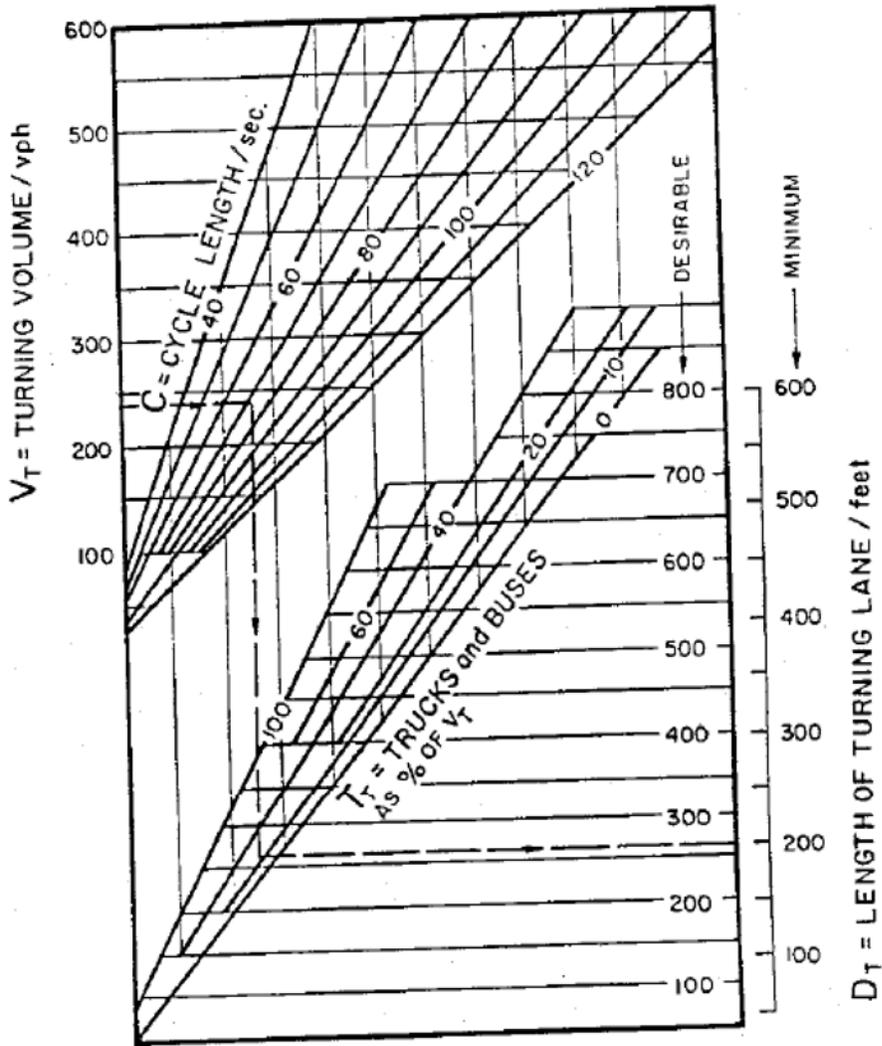
SIGHT DISTANCE  
 DIAGRAM

SCALE: NTS

DATE: SEPT 2006

DETAIL NO.

19



AT GRADE SIGNALIZED INTERSECTION

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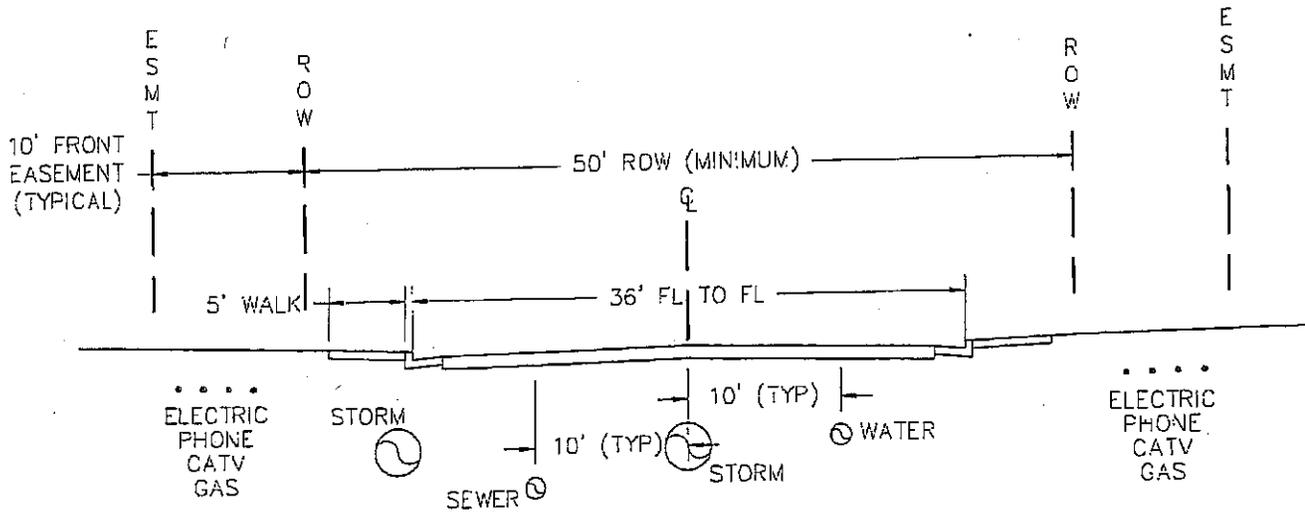
LEFT TURN STORAGE  
LENGTH NOMOGRAPH

SCALE: NTS

DATE: SEPT 2006

DETAIL NO.

20



NOTES:

1. STREET SECTION IS TYPICAL.
2. SECTION IS EAST OR NORTH TO THE RIGHT.
3. MINIMUM DEPTH OF COVER PER STANDARDS.
4. STORM SEWER AT CENTERLINE OR UNDER SIDEWALK.
5. FRONT LOT EASEMENT MAY VARY.
6. DRY UTILITIES ARE WITHIN FRONT LOT EASEMENT.
7. FOR DRY UTILITIES, REFERENCE ALL APPLICABLE PROVISIONS IN CHAPTERS 11 AND 17 OF THE GOLDEN MUNICIPAL CODE AND CHAPTER, LATEST EDITION.

APPROVED

*Dan Kent*

DIRECTOR OF PUBLIC WORKS

APPROVED

*John A. Lewis*

CITY ENGINEER

CITY OF GOLDEN



DEPARTMENT OF PUBLIC WORKS

TYPICAL UTILITY LOCATION

SCALE: NTS

DATE: SEPT 2006

DETAIL NO.

UT-1