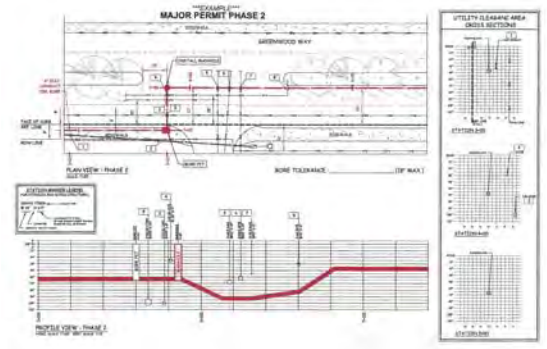

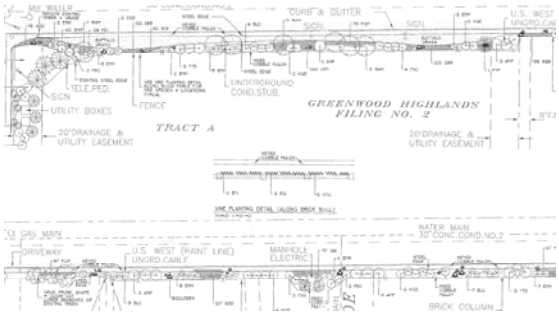

Greenwood Village

Design and Construction Standards

First Edition
August 23, 2011

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First Edition
August 23, 2011

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Notice to Users: The Design and Construction Standards ("Standards" are intended to protect the public health, safety, and welfare of the City of Greenwood Village ("City") by regulating the design and construction of public improvements within the City.

This First Edition of the Standards is a guidance document that references other Standards that the Village uses as baseline specifications. All references to any code, regulation, standard specification of other agency or organization listed in the following chapters are made a part of these Standards by reference and shall be the lasted edition or revision. The most current City Standard Special Revisions that alter these baseline specifications are available upon request and will be integrated into subsequent editions of the Design and Construction Standards.

City of Greenwood Village
Design and Construction Standards
Summary Table of Contents

General Information	1	General Provisions
	2	Construction Plan Requirements and Record Drawings
	3	Permits
	4	
	5	
Design	6	Transportation Impact Study
	7	Soils Investigation and Pavement Design
	8	Street Design and Technical Criteria
	9	Access Requirements
	10	Utilities
	11	Pedestrian and Bicycle Facilities
	12	Storm Water and Water Quality
	13	Street Lighting
	14	Street Landscaping
	15	
Construction	16	Pavement, Subgrade and Surface Treatments
	17	Embankment and Excavation
	18	Storm Sewer, Manholes and Inlets
	19	Curb, Gutter, Sidewalks, and Flatwork
	20	Traffic Control Devices and Pavement Markings
	21	Trenching, Patching, and Restoration
	22	Landscaping and Irrigation
	23	Construction Traffic Control
	24	Erosion and Sediment Control
	25	Miscellaneous Construction
	26	Inspection, Testing Procedures, and Tolerances
Index		Document Index
Appendices	A	School Walking Route Maps
	B	Undergrounding Resolution

TABLE OF CONTENTS

CHAPTER 1 – GENERAL PROVISIONS

1.00 GENERAL **8**
Intent 8
Applicability 8
Incorporated by Reference 8

CHAPTER 2 – CONSTRUCTION PLAN REQUIREMENTS AND RECORD DRAWINGS

2.00 GENERAL **9**
Intent 9
Applicability 9
Incorporated by Reference 9

CHAPTER 3 – PERMITS

3.00 GENERAL **10**
Intent 10
Applicability 10
Incorporated by Reference 10

CHAPTER 6 – TRANSPORTATION IMPACT STUDY

6.00 GENERAL **11**
Intent 11
Applicability 11

6.01 RESPONSIBILITY, MEETINGS, WARRANTS, AND WAIVERS **11**
Responsibilities for a Transportation Impact Study (TIS) 11
Scoping Meeting 11
Warrants for a Transportation Impact Study 12
Transportation Impact Study Waiver 12

6.02 TRANSPORTATION IMPACT STUDY REQUIREMENTS **12**
Format 12
Executive Summary 13
Project Description 13
Project Location and Zoning 13
Study Area Boundaries 13
Existing Roadway and Transportation Network Description 13
Analysis Horizons 14

6.03 TRAFFIC VOLUMES **14**
Existing Traffic Volumes / Traffic Counts 14

Background Traffic 14
Project Traffic 15

6.04 PROJECT IMPACTS **16**
Objective 16
Traffic Impacts 16

6.05 ANALYSIS AND FORECASTED TRAFFIC VOLUME **17**
Peak Hour Intersection Level of Service (LOS) 17
Access Locations and Traffic Signals 18
Turn Lane Storage Requirements 19
Appropriateness of Acceleration or Deceleration Lanes 19
Safe Mobility of Bicycles and Pedestrians 19
Special Analysis/Studies 19

6.06 RECOMMENDATIONS **20**

6.07 CONCLUSION **20**

6.08 DETAILS **21**
Attachment A 21

CHAPTER 7 – SOILS INVESTIGATION AND PAVEMENT DESIGN

7.0 GENERAL **22**
Intent 22
Applicability 22
Incorporated by Reference 22

7.01 STANDARD SPECIAL REVISIONS **22**

CHAPTER 8 – STREET DESIGN CRITERIA

8.00 GENERAL **23**
Intent 23
Applicability 23

8.01 DESIGN PRINCIPLES **23**
Street Design Standards 23
Street Name Signs and Traffic Control Devices 23

8.02 STREET CLASSIFICATIONS **24**
Local Streets: 24
Collector Streets 24
Minor Arterial Streets 25
Principle Arterial Streets 26

8.03 DETAILS **27**
Figure A-1 27
Figure A-2 28
Figure A-3 29

CHAPTER 9 – ACCESS REQUIREMENTS

9.00 GENERAL **30**
Intent 30
Applicability 30

9.01 DESIGN REQUIREMENTS **30**
Safety Considerations 30
Location 30

CHAPTER 10 – UTILITIES

10.00 GENERAL **32**
Intent 32
Applicability 32
Incorporated by Reference 32

CHAPTER 11 – PEDESTRIAN AND BICYCLE FACILITIES

11.00 GENERAL **33**
Intent 33
Applicability 33
Incorporated by Reference 33

CHAPTER 12 – STORM WATER AND WATER QUALITY

12.00 GENERAL **34**
Intent 34
Applicability 34
Incorporated by Reference 34

CHAPTER 13 – STREET LIGHTING

13.00 GENERAL **35**
Intent 35
Applicability 35
Incorporated by Reference 35

CHAPTER 14 –STREETSCAPE LANDSCAPING

14.00 GENERAL **36**
Intent 36
Applicability 36
Incorporated by Reference 36

CHAPTER 16 – PAVEMENT, SUBGRADE, AND SURFACE TREATMENTS

16.00 GENERAL **37**

Intent 37
Applicability 37
Incorporated by Reference 37

16.01 STANDARD SPECIAL REVISIONS **37**

CHAPTER 17 – EMBANKMENT AND EXCAVATION

17.00 GENERAL **38**
Intent 38
Applicability 38
Incorporated by Reference 38

17.01 STANDARD SPECIAL REVISIONS **38**

CHAPTER 18 – STORM SEWER, MANHOLES, AND INLETS

18.00 GENERAL **39**
Intent 39
Applicability 39
Incorporated by Reference 39

18.01 STANDARD SPECIAL REVISIONS **39**

CHAPTER 19 – CURB, GUTTER, SIDEWALKS, AND FLATWORK

19.00 GENERAL **40**
Intent 40
Applicability 40
Incorporated by Reference 40

19.01 STANDARD SPECIAL REVISIONS **40**

CHAPTER 20 – TRAFFIC CONTROL DEVICES AND PAVEMENT MARKINGS

20.00 GENERAL **41**
Intent 41
Applicability 41
Incorporated by Reference 41

20.01 STANDARD SPECIAL REVISIONS **41**

CHAPTER 21 – TRENCHING, PATCHING, AND RESTORATION

21.00 GENERAL **42**
Intent 42
Applicability 42
Incorporated by Reference 42

CHAPTER 22 – LANDSCAPING AND IRRIGATION

22.00 GENERAL **43**
Intent 43
Applicability 43
Incorporated by Reference 43

CHAPTER 23 – CONSTRUCTION TRAFFIC CONTROL

23.00 GENERAL **44**
Intent 44
Applicability 44
Incorporated by Reference 44

23.01 STANDARD SPECIAL REVISIONS **44**

CHAPTER 24 – EROSION AND SEDIMENT CONTROL

24.00 GENERAL **45**
Intent 45
Applicability 45
Incorporated by Reference 45

CHAPTER 25– MISCELLANEOUS CONSTRUCTION

25.00 GENERAL **46**
Intent 46
Applicability 46
Incorporated by Reference 46

25.01 STANDARD SPECIAL REVISIONS **46**

CHAPTER 26 – INSPECTION, TESTING PROCEDURES, AND TOLERANCES

26.00 GENERAL **47**
Intent 47
Applicability 47
Incorporated by Reference 47

26.01 STANDARD SPECIAL REVISIONS **47**

CHAPTER 1 – GENERAL PROVISIONS

1.00 GENERAL

Intent

The intent of these standards is to define and establish principles, standards and procedures for the all work within the City. The chapters and appendices that make up these standards pertain to planning, design, approval, construction, inspection, testing, and documentation of public improvements.

Applicability

These standards shall apply to all property within the City right of way unless otherwise referenced.

Incorporated by Reference

The following standards (the latest editions, unless otherwise stated) shall be used as the presumptive standard when specific design and construction methods, materials or procedures are not specifically addressed in these Standards.

1. Colorado Department of Transportation "Standard Specification for Road and Bridge Construction"
   http://www.coloradodot.info/business/designsupport/construction-specifications/2011-Specs

2. Metropolitan Government Pavement Engineering Council (MGPEC) "Pavement Design Standards and Construction Specification"
   http://www.mgpec.org/id68.html

3. American Disability Act
   https://bookstore.transportation.org/

4. American Disability Act and American Association State Highway and Transportation Officials (AASHTO) "A Policy on Geometric Design of Highway and Streets" and "Guide for Development of Bicycle Facilities"
   https://bookstore.transportation.org/item_details.aspx?id=1917

CHAPTER 2 – CONSTRUCTION PLAN REQUIREMENTS AND RECORD DRAWINGS

2.00 GENERAL

Intent

This chapter establishes the standard design and construction requirements, templates, layouts etc. required for construction plans and record drawings.

Applicability

This Chapter shall apply to all plans required for construction of public facilities within the City public right of way.

Incorporated by Reference

All work shall be completed in a manner and method acceptable to the City and in accordance with current City guidelines.

CHAPTER 3 – PERMITS

3.00 GENERAL

Intent

This chapter provides applicants with direction to the types of permits, fees, procedures and submittal requirements required for work within the City public right of way.

Applicability

This Chapter shall apply to all contractors, public utility agencies and property owners occupying or installing public or private improvements or storing material or equipment within the City public right of way or easement.

Incorporated by Reference

The Public Right of Way Permit standards set forth in **Chapter 11, Article 3, Division 1** of the **Greenwood Village Code (**http://www.colocode.com/greenwood/greenwood_11.pdf) are adopted as the presumptive standard. The application and permit submittal process shall be conducted in a method acceptable to the City and in accordance with current City guidelines and practices.

CHAPTER 6 – TRANSPORTATION IMPACT STUDY

6.00 GENERAL

Intent

The chapter provides directions for land owners or land development applicants to conduct a Transportation Impact Study (TIS) to assess the effects that a particular development submittal will have on the Village's transportation network. These standards are designed to be consistent, and provide proper traffic planning and engineering practices when land use actions are being considered within the Village. It provides a standard process, set of assumptions, set of analytic techniques, and presentation format to be used in the preparation of such studies.

Applicability

This chapter applies to all development proposals that exceed the minimum generated traffic threshold, seek direct access to an arterial street, or required by the Village for a localized safety or capacity deficient issue.

6.01 RESPONSIBILITY, MEETINGS, WARRANTS, AND WAIVERS

Responsibilities for a Transportation Impact Study (TIS)

The responsibility for assessing the traffic impacts associated with a proposed land use action rests with the land owner or land development case applicant. The assessment of these impacts shall be within the TIS as specified herein, prepared under the supervision of a Registered Professional Engineer in the State of Colorado with adequate experience in transportation planning and traffic engineering. Upon submittal of a draft TIS, the Village will review the study data sources, methods, and findings based on these study standards, the Village's Comprehensive Plan, Transportation Plan, the Parks, Trails and Open Space Master Plan, and associated studies. Any necessary revisions will be incorporated prior to submitting a final study.

For all State Highways within the study area, the Applicant may also be required to meet the impact study guidelines set by the Colorado Department of Transportation (CDOT).

Scoping Meeting

The Professional Engineer preparing the TIS shall meet with the Community Development Department in a pre-submittal scoping meeting before beginning the study to discuss analytic parameters and procedures. Prior to this meeting, the applicant's Engineer should have identified site location, proposed site uses, and preliminarily, daily and peak hour trip generation at build-out. In the scoping meeting with the Village staff, the following parameters, and others, may be discussed:

1. Previous TIS prepared for the site, if any
2. Determine the limits of the study area for the impact analysis
3. Identify intersections within the study area to be analyzed
4. The appropriate peak hours for evaluation
5. Proposed access and its relationship to adjacent properties and their existing/proposed access
6. The appropriate trip generation rates and trip distribution at build out
7. Trip adjustment factors, if any
8. Determine the horizon years for the analysis
9. Proposed phasing plan, if applicable
10. Sources and methodology for developing short and long-range background traffic forecasts
11. Anticipated street improvements, to be constructed by applicant
12. The need to evaluate traffic accident history and potential safety issues
13. The need to evaluate pedestrian / bicycle facilities, movements and safety

Warrants for a Transportation Impact Study

One of the main factors in determining if a TIS is required is "trip generation," which is defined as a single or one direction trip with either the origin or destination inside the study area. The trip generation is essentially all inbound and outbound trips that are anticipated to be created by the proposed development.

1. Transportation Study **-** Any development proposal shall submit a TIS when the average daily trips (ADT) are expected to exceed 100 ADT or the peak hour trip generation is over 40 inbound and outbound trips, and if any new access is requested for an arterial street. Furthermore, all development proposals requiring access to a State Highway are required to also comply with the Colorado Department of Transportation (CDOT) traffic study requirements.

2. Additional TIS Analysis - Further study may also be required by the Village for localized safety or capacity deficiencies for the following reasons:
   a. There is an existing traffic problem such as a high level of accidents, or the intersection is in need of a traffic signal, or turn lanes
   b. Neighborhood sensitivity or adjacent areas that may be perceived as impacted
   c. Current or projected level of service of the street adjacent to the development, which will be affected
   d. Proximity of access to existing driveways or intersections
   e. Property has been vacant for more than a year
   f. Change in land use

3. Transportation Memorandum **-** A transportation memo may be considered in lieu of a TIS if the following requirements are met;
   a. The projected average daily trip generation is less than 40 peak hour trips, and
   b. Any new access requests are for only local streets, and
   c. If the property is being redeveloped the increase in the number of vehicular trips for the proposed use does not exceed the trip generation from the existing use by more than 20 peak hour trips or 100 ADT, and
   d. Pedestrian and bicycle facilities exist or will be constructed on or adjacent to the site, or the proposed use will not generate any new pedestrian or bicycle trips.

Transportation Impact Study Waiver

If the applicant seeks to waive the TIS, or specific portions of the study waived, then the applicant *must* schedule a meeting with the Director of Community Development. A written waiver request *must be* submitted to the Director at least four working days prior to this meeting. The Director, or designee shall consider, as a minimum, the following items in the preparation of the rationale statement:

1. Adverse Impacts - The potential adverse impacts of the proposed development on the local and regional transportation system are not increased by granting the waiver.

2. Safety - The proposed development does not create a safety issue.

The applicant or any citizen materially affected by the proposed waiver may appeal the decision of the Community Development Director. The appeal will be approved or disapproved by a majority vote of the City Council.

6.02 TRANSPORTATION IMPACT STUDY REQUIREMENTS

Format

The information provided in the TIS shall include the following sections outlined below. The study shall be typed and bound with pages numbered, and clearly identify the data and information in the appropriate sections. In addition, the study shall contain a table of contents, lists of figures and tables, all necessary maps, and shall

indicate any map pockets and included drawings. The appendices shall include all trip generation worksheets, traffic analysis worksheets, existing traffic counts, and any other supporting data.

Executive Summary

The TIS shall provide an executive summary that provides an overview of the study and discusses the principal findings and recommendations of the report. Data within the summary should be presented in text, maps and tables, and presented graphically as needed to accurately reflect the summary of the study. The summary shall be prepared as a condensed stand alone document.

Project Description

A description of the proposed project will be prepared and include the following;

1. Purpose of the study
2. The study area
3. Type of proposed land use
4. Size of the proposed project (number of dwelling units and square footage of buildings)
5. Identify horizon years
6. Timing or proposed phases with anticipated completion date

In addition, a description of how bicycle and pedestrian traffic will be accommodated within the proposed site plan and adjacent streets or trails. This description shall include a discussion of how the proposed bike and pedestrian facilities will connect into the existing network of sidewalks, trails, and bike facilities thus creating a continuous network to adjacent land uses. Condition of sidewalks (attached/detached), pathways, trails, and bike facilities shall also be discussed.

Project Location and Zoning

Include a vicinity map detailing the property location, a conceptual site plan reflecting the boundaries of the project or development, a description and figure depicting the proposed vehicular access locations, and information detailing the designated zoning district, general terrain and physical features of the site and the surrounding area.

Study Area Boundaries

The study area for a project shall include all streets and transportation routes, including streets/driveways, sidewalks and trails providing access to the site, or that are located adjacent to the project. The study area shall also include the nearest arterial/arterial intersection(s), adjacent driveways, and internal roads/drives. In addition, the study area will be determined on engineering judgment and an understanding of existing and future land use and traffic conditions in the vicinity of the project. The following shall be considered by the Village in defining the study area:

1. Road Issues **-** Major streets and intersections either current or future years, where
   a. The project contributes 10 percent impact (vehicle delay) during the peak hours to any approach leg of the intersection where the intersection is currently operating at a acceptable level of service, or
   b. The project contributes a 5 percent impact (vehicle delay) during the peak hours to any approach leg of the intersection where the intersection is currently operating at an unacceptable level of service.
   c. Local safety issues exist or would be created by the proposed development.

2. Land Use Issues
   a. Adjacent and neighboring land uses including light rail stations.
   b. Major projects within the vicinity.
   c. Projects with access to an arterial roadway.
   d. Residential areas that may be impacted by the proposed development.

Existing Roadway and Transportation Network Description

Describe and include street orientations, functional street classifications and lane configurations, street and intersection geometries, and all existing and proposed driveways and accesses proposed for the subject property. Similar information for the adjacent property shall be provided as well, if pertinent, on the same map.

Traffic control measures, including signage and striping, speed limits, parking restrictions, sight distance limitations, traffic signals, transit routes, the presence of bicycle and pedestrian facilities, and any other related traffic operations information and planned or approved improvements shall also be included.

Analysis Horizons

Each TIS shall address two analytic horizons, Design Year 1 and Design Year 20.

1. Design Year 1 (DY-1**) -** The first horizon is the proposed project completion date. This horizon shall be referred to as DY-1. In this design year, the immediate impacts of the development on the street system are investigated. If the project is planned to be developed in phases then additional horizon years may require additional analysis at the completion of major phases.

2. Design Year 20 (DY-20) **-** This is a long-range 20 year projection intended to evaluate the implications of the fully developed proposed project on the long-range traffic conditions. To forecast future traffic conditions current traffic counts shall be increased to account for local and regional growth.

6.03 TRAFFIC VOLUMES

Existing Traffic Volumes / Traffic Counts

Current A.M. and P.M. peak hour traffic counts, as specified by the Village, shall be obtained for the streets within the study area. Counts shall be obtained between Tuesday and Thursday during a non-holiday weekday, or as directed by the Community Development or Public Works Department based on the proposed land uses. Traffic counts may require seasonal adjustments depending on when the data was collected and if the project is considered to be in an affected area (e.g. school, special event or tourism). For example, if the study area includes a school or route to school the traffic counts may be adjusted to account for school traffic. Peak hour traffic volumes should be conducted over a two-hour period and shown in 15 minute increments to clearly identify the peak hours. Peak volumes should also be separated into individual turning movements at intersections (signalized and unsignalized) in the study area. Traffic count data for both daily and peak hours and analysis worksheets consistent with operational analysis techniques outlined in the current *Highway Capacity Manual* should be provided in the Appendix. Figures illustrating the turning movement volumes for study area intersections shall also be included. Weekend or noon hour counts and average daily trips may also be required where appropriate or when requested by the Community Development or Public Works staff.

These traffic counts shall be no more than one year old from the date of the application submittal. Sources for the traffic counts shall be explicitly stated, such as CDOT counts, new counts by applicant, or Village traffic counts.

Background Traffic

For DY-1 the traffic projections shall be the sum of existing traffic volumes plus the established background traffic growth rate determined by Community Development. DY-1 volume also needs to account for any additional traffic from nearby development projects that may be completed and generating traffic by DY-1. Background traffic projections for DY-20 shall be based on a growth rate factor established by Community Development and include other trip generations that are not accounted for in DY-1. This may include new developments likely to be generating trips in this time period and approved projects that have not been constructed within or near the study area. Long range traffic projections can also be obtained from CDOT or the Denver Regional Council of Governments (DRCOG) long range travel demand forecast model. Contact Community Development staff if the applicant is considering these or other sources to determine the background growth rate. Figures illustrating the peak hour background turning movement volumes for each design year and intersections in the study area, including project access points shall be included.

Project Traffic

1. Trip Generation Rate **-** Trip generation for the proposed development should be calculated from the latest data contained within the Institute of Transportation Engineers' (ITE) *Trip Generation Manual*. Other industry publications, such as ITE Journal or other sources may be approved by the Village. In the event that rates are not available for a proposed land use, the rates are inconsistent with proposed land use, or more specific rates are available from local sources, the applicant shall recommend and provide sufficient justification for a generation rate, following the procedures prescribed in the ITE *Trip Generation Manual*. In all cases the trip generation rate must be acceptable to the Village.

2. Trip Generation Table **-** The applicant shall prepare a trip generation table listing each land use that requires trip generation analysis at build out. For each trip generation summary include a description of each land use type, the ITE land use code (if used), the size and unit measure for each land use, average trip generation rate for total daily traffic and peak hour traffic (a.m., noon and/or p.m. peak hour traffic generation may be required), and the resultant total trips generated for each time period and each land use. The data source used for the trip generation rates shall be stated.

3. Adjustments to Trip Generation Rates **-** After first calculating trip generation at full ITE rates or pre-approved rates from other professional sources, trip making reduction factors may be used. These factors fall into two categories: those that "remove" or "move" generated trips, and those that reassign some portion of generated trips to the background stream of traffic. In all cases, the underlying assumptions of the ITE Manual's rates must be recognized and considered before any reductions are claimed.

   Two specific trip categories will be considered. The first category is for internal site trips, transit use, or Transportation Demand Management (TDM). The second category is how the traffic study assumes rates for mixed land uses that result in lower trip generation when applying individual rates to each land use. If reductions are claimed, analytic support to show how the figures were derived shall be provided:

   a. *Internal Site Trips or TDM*: Analytic support documentation of internal site trips, or TDM trips, such as transit use, bike trips, or walking trips shall be provided to show how trip adjustments are derived. Overly optimistic assumptions regarding transit use and TDM actions will not be accepted unless accompanied by documentation that outlines specific implementation proposals, that will become a condition of approval.
   b. *Pass-by Trips*: The second category may be considered when trips to the proposed development currently exist as part of the background traffic stream, referred to as pass-by trips. Pass-by percentages identified in the ITE Trip Generation report or other industry publications will be considered with appropriate explanation and documentation

   Pass-by traffic must continue to be assigned to site driveways and access points, but is not additive to the background stream of traffic. Smaller passerby percentages than documented rates may be appropriate if other trip making reduction factors are claimed. A technical appendix, table or map that illustrates the re-diversions of pass-by trips is required which may be submitted as a legible hand written work sheet(s).

4. Project Trip Distribution **-** Project trip distribution can be based on the professional engineer's judgment applied to one or more of the following: the site's location within the Village, DRCOG traffic forecasts, market analysis, existing traffic flows, or applied census data. Regardless of the estimates the procedure and the logic for estimating the trip distribution must be well documented. The resulting trip distribution shall be identified and illustrated with a graphical figure detailing the percentages making each movement, at each intersection in the study area.

5. Project Trip Assignment - The project traffic will be assigned to the street system according to the trip distribution established above. The trip assignment shall develop anticipated traffic volumes for each of the movements identified by the trip distribution and each of the designated design years identified in the analysis. The resulting traffic volumes shall be illustrated with graphical figures detailing the anticipated volumes making each movement, at each intersection in the study area.

6. Total Traffic – Total traffic shall be determined for each of the analysis horizon design years identified for the study. Total traffic projections shall include project traffic, background traffic, and existing traffic. The future total traffic shall be depicted on figures for each design year and identified peak hours. These figures shall also present turn movement volumes at study area intersections and project access points.

6.04 PROJECT IMPACTS

Objective

The principal objective of the transportation impact study is to identify a proposed development's impact on the transportation system and necessary improvements to assure safe and reasonable operating conditions in the future. The key elements to be considered include:

1. Street classification and daily traffic volume
2. Peak hour intersection level of service
3. Appropriateness of access locations and future traffic signals
4. Specific treatments for site intersections and other key intersections in the study area
5. Turn lane storage requirements
6. Appropriateness of acceleration or deceleration lanes
7. Safe mobility of bicycles and pedestrians.

Traffic Impacts

Overall needs and incremental needs induced by the proposed land use action shall be identified. The impact section shall detail the proposed facility improvements and the operating conditions that result. Three conditions are to be evaluated for each design year, as follows:

1. For DY – 1:
   a. Background traffic on "*background committed*" network; this analysis presents a description of how the street system would operate without the proposed land use action.
   b. Total traffic on "*applicant committed*" network; this analysis is required as it describes how the street system operates with the proposed land use action and accompanying roadway improvements, in place.
   c. Total traffic on "*mitigated*" network; if the above analysis does not yield the target peak hour level of service, further examination of possible improvements necessary to yield such a level must be undertaken.

2. For DY – 20:
   a. Background traffic on "*planned*" network; this analysis is required in all cases, as it presents a description of how the street system would operate in the long range future without the proposed land use action.
   b. Total traffic on "*applicant committed*" network; as with DY-1, this analysis is required to provide a description of the future operations of the street network with the proposed land use action in place.
   c. Total traffic on "*mitigated*" network; if the above analysis does not yield the target peak hour level of service, it will be necessary to further examine possible improvements to achieve such a level.

Definition of Target Peak Hour Level of Service (LOS) - The LOS of an intersection ranges from A to F, characterizing the operational conditions of the traffic flow. LOS A represents the free-flow conditions where vehicles experience little to no delays. LOS F indicates the worst-case scenario with high congestion, a complete breakdown of traffic flow and high vehicular delays. Although LOS A through C may be the desired levels, LOS D is considered

acceptable in urban areas during the peak hours. Traffic conditions with LOS of E or F are generally considered unacceptable and represent significant travel delay, increased accident potential, and inefficient motor vehicle operation. For these reasons, LOS D is the established peak hour target LOS for the Village, which is consistent with the American Association of State Highway and Transportation Officials for developed areas, the Colorado Department of Transportation (CDOT), and the Arapahoe County Transportation Plan.

For each design year, the project impact analysis shall include "*background committed*" and "*planned*" transportation facilities that are part of the Village's Capital Improvement Program, or improvements which have appropriated and obligated funds by other agencies, cities/counties, or special districts. Transportation improvements committed to by the applicant ("*applicant committed*"), including on-site facilities, site-adjacent improvements, and potentially off-site improvements shall be included in the analysis. However, all potential improvements mentioned above must be anticipated for completion by the design year being analyzed otherwise they can not be included in the analysis. The Village will check to assure that "*applicant committed*", or "*mitigated*" improvements proposed with the land use action are identified in the "Recommendations" section of the report and become a condition of approval and part of a development improvement agreement (DIA). A reference page listing all identified transportation improvement projects, the agency constructing the improvements, the anticipated completion date, and the source of the listed improvement needs to be included in the Appendix of the report.

6.05 ANALYSIS AND FORECASTED TRAFFIC VOLUME

Using the traffic volumes forecast, a general evaluation shall be made and general capacity required for each design year. Incremental differences attributable to the proposed land use action shall be identified. A map showing generalized capacities for each condition/situation analyzed shall be presented for each design year.

Peak Hour Intersection Level of Service (LOS)

Peak hour intersection LOS shall be analyzed for signalized and unsignalized intersections on arterial and collector level streets within the study area. In some instances local level street intersections may also be analyzed. The analysis shall be conducted using methodology specified in the most current version of the *Highway Capacity Manual.* Peak hours for analysis will typically include AM and PM weekday peak hours. However, other analysis time periods, such as a weekday noon-hour peak or a weekend peak hour, shall be used where appropriate for the proposed land use action. The applicant is advised to consult with Village staff in the scoping meeting to review the acceptability of analysis time periods.

The goal of this analysis is to identify through and turning lane needs at these intersections for the different design year scenarios. A map for each design year showing intersection lane configurations and level of service under each scenario shall be presented. All level of service worksheets shall be included in the Appendix.

Signalized intersection LOS analyses shall use the existing timing and phasing of the intersections for all scenarios. If the analyses are to deviate from existing timings or phasing, then a detailed signal progression analyses for the affected corridor shall be provided. In general terms, the Village's target LOS is D during the peak periods. If LOS D or better for all intersections is maintained then the proposed development will not be required to provide LOS-related traffic analysis for "mitigation" improvements in the two design year scenarios.

If the background traffic scenario analysis for DY-1 and DY-20 exceeds the target LOS (D), the proposed land use action must demonstrate that the project does not further degrade the LOS once the project traffic is added to the traffic volume. If conditions deteriorate further, the applicant shall be required to mitigate the project's impact so as to achieve no additional impact. The City may also utilize the Exaction and Dedication ordinance to address the impact.

The results of the LOS analyses for each scenario and each design year shall be summarized into one or more tables that illustrate the differences in LOS for each scenario. At a minimum, these tables shall list the LOS results for each intersection, as well as the appropriate time delay values for each intersection. Below is an example of a LOS table.

Table 1 - Example LOS table

Scenario	AM Peak Hour		PM Peak Hour	
	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)
2010 Existing	C	22.6	C	31.1
2012 Background	C	31.5	D	37.4
2012 Total	D	39.5	D	49.6
2012 Mitigated	na	-	na	-
2030 Background	D	48.0	D	51.8
2030 Total	E	61.4	F	82.3
2030 Mitigated	D	52.2	D	54.7

* Note: all improvements that are proposed in the "Total" and "Mitigated" scenarios must be reflected as a note to the table and attributed to the correct scenario. These improvements will become a condition of approval and part of the DIA.

Access Locations and Traffic Signals

The design, number, and location of access points to a public street must be submitted for approval by the Community Development Director, or designee. If a proposed land use action seeks access to a State Highway the CDOT access Permit process shall be followed. The number of access points must be kept to a minimum and be designed to be consistent with the type of street.

1. Access points will be reviewed and approved on the following information:
   a. Access locations shown on the plan set.
   b. Proposed traffic turning movements.
   c. Analysis of on site stacking/queuing and impacts to adjacent streets.
   d. Geometric design of the access and proposed improvements to the street system in accordance with these standards.
   e. Safety concerns regarding limited sight distance (Line of sight triangles for determining sight distances and landscape restrictions shall be drawn on the plan sets.)
   f. Compliance with the CDOT State Highway Access Code and any adopted access management plans if access is requested for a State Highway.
   g. Signalization requirements and design in accordance with these guidelines.

2. The appropriateness of traffic signals, access locations and type must be established:
   a. Each arterial intersection/full access point in the study area must be evaluated, using the warrants in the *Manual on Uniform Traffic Control Devices* (MUTCD), to determine if signalization will be necessary for each design year. Traffic signals specifically warranted by the proposed land use action shall be identified.
   b. The acceptability of the traffic signal locations must be demonstrated. Any new traffic signal installation must be reviewed and evaluated by the Village's Public Works Department.
   c. If the access to the proposed development is proposing a traffic signal, or will necessitate modifications to a traffic signal, the following additional analysis is required.
      1) A signal progression (time-space) analysis to assure that any site access approaches or intersections proposed for signalization are properly located.
      2) An intersection capacity operation analysis for all signals included in the progression analysis, and providing complete input and output reports, data and assumptions.
      3) The signal timings, phasing and data used in each analysis shall be consistent
      4) Highway traffic signal progression analysis including progression bandwidth, efficiency and level of service determinations, assumptions and data with complete input and output menu reports provided and including all existing and anticipated future signals within 1 mile of the proposed access

5) A signal cycle length of between 60 and 120 seconds and consistent with the existing corridor signal operation and function shall be used for the analysis or as determined by the Village.
6) Analysis will use the posted speed limit(s) but may submit an additional analysis if it can be shown that a different speed is more efficient for capacity, highway delay and travel time.
7) The highway bandwidth used shall be consistent with the requirements of the assigned street classification or access category
8) Signal phasing will normally assume lead phasing. Lag phasing may not be included unless specifically authorized
9) The green time allowed for the cross street shall be no less than the time necessary to accommodate pedestrian movement.
10) Analysis of storage queue lengths for auxiliary lanes at signalized intersection within the study area.

Any access, which would reduce the desirable bandwidth if a traffic signal were installed, shall be identified. In general terms, that access should remain unsignalized and have turning movements limited by driveway design or median islands, unless the impacts to traffics operation are made even worse with a median or restricted driveway. The implications of the proposed land use action upon the adequacy of the arterial signal progression must be identified. A map showing signal locations for each design year shall be provided. Distances between signalized intersections (centerline) shall be indicated. Signal progression worksheets (time-space diagrams) shall be included in the Appendix.

Turn Lane Storage Requirements

Turn lane storage lengths may need to be identified for the "mitigation" scenario, based on forecasted turning volumes, capacity analyses, AASHTO analytic techniques, and the Highway Capacity Manual. Appropriate documentation of the calculations must be provided.

Appropriateness of Acceleration or Deceleration Lanes

All proposed project entrances on arterials shall be evaluated as to whether an acceleration lane or deceleration lane is required per the most recent edition of the CDOT State Highway Access Code. In some instances proposed access points on a collector level street may also require the analysis.

Safe Mobility of Bicycles and Pedestrians

All proposed land use actions are required to provide safe facilities on-site and/or off-site for bicycle and pedestrian mobility. Pedestrian and bike facilities shall be reviewed and discussed for the following related items:

1. School routing plans per the MUTCD or Village school route maps

2. The demand and need for pedestrian and bicycle facilities adjacent to the project area and within the study area.

3. Street design standards and the associated elements (refer to the Village's Design and Construction Standards).

4. Geometric improvements and recommended traffic control devices to accommodate bicyclists and pedestrians.

5. Directness and continuity of bicycle and pedestrian facilities.

6. Safety conditions such as adequate lighting, separation from motor vehicles, and surface condition.

Special Analysis/Studies

This section provides the Village with opportunities to request specific focused traffic analysis germane to the proposed land use action. Additional analysis could include access control, access spacing, accident/safety concerns, emergency routes, cut through traffic, and residential quality of life issues.

Neighborhood Transportation Impact Evaluation - The TIS may be required to include a focused analysis of the potential project related impacts on adjacent residential neighborhood quality of life issues such as, potential cut through traffic, and increase speeding/volume concerns. If it is determined that a neighborhood transportation impact evaluation is required the following procedure should be followed.

1. Examine existing transportation conditions within the neighborhood. This should follow the same procedure as set forth earlier for the transportation impact analysis. Daily and peak hour traffic volumes should be collected for the local streets to be included in the analysis.

2. Determine project generated traffic for all modes within the neighborhood and show on a figure.

3. Determine total traffic projections for the local streets. This should follow the same procedures as described earlier, including other projects and area wide growth.

4. Determine if the proposed land use action would create significant impacts to the residential streets using the criteria stated earlier.

5. If necessary, develop measures, including but not limited to traffic calming techniques, to mitigate any significant impacts.

6. The neighborhood TIS should also discuss how pedestrians and bicyclist would access the proposed project to/from the adjacent neighborhood(s), and the need for special facilities to enhance direct pedestrian and bicycle connectivity.

6.06 RECOMMENDATIONS

This section shall describe the location, nature, and extent of all transportation improvements that the applicant's engineer recommends in order to yield reasonable operating conditions and/or achieve the target LOS in each design year with the proposed land use action approved as requested.

The applicant's engineer shall submit a "Recommended Improvements Summary Sheet" similar to Attachment A to present the project recommendations. One sheet may be used for both design years if all improvements can be conveniently describe thereon. If not, one or more sheets should be completed for each design year.

All transportation and recommended improvements should be identified on the summary sheet, including "*background committed*", "*planned*", "*applicant committed*", and "*mitigated*". Each project should be briefly described as to its location, the type of project, flow-line and right-of-way/easement needs. Also, commitment to the improvement shall be identified, either by the Village, local governments, districts, or by the applicant (this also may include the "*applicant committed*" and "*mitigated*" projects). As previously stated only improvements by the Village, other agencies, or special districts which funds have been committed shall apply. Identification of a project as "*not currently committed*" may be an appropriate description for needed projects. Please refer to the Village's Exactions and Dedications section of the Land Development Code. However, the goal of the recommendations shall be to identify a program of improvements that will support the proposed land use action in each design year.

Supporting Documentation: Provide detailed descriptions and an aerial of all proposed and recommended improvements. Include basic design details showing the length, width and other pertinent geometric features of any proposed improvements.

6.07 CONCLUSION

A conclusion shall be included as part of the report that provides a clear and concise description of the study findings and recommendations.

6.08 DETAILS

Attachment A

Recommended Improvements Summary Sheet

Improvement Description (Type, Location, …)[1]	Responsible Party			
	Background Committed[2]	Planned[3]	Applicant Committed	Mitigated
Design Year 1 (DY-1)				
Design Year 20 (DY-20)				

[1] Describe improvement type and location (e.g. intersection widening, number of lanes needed, right-of-way needed). Example: Widen Caley Avenue at Syracuse Street for a westbound right turn lane. Additional 12 feet of right-of-way is needed along Caley Avenue. Be certain to include any necessary bicycle or pedestrian improvements.

[2] The responsible party or project must be identified in this table for any improvements assigned in this column.

[3] The responsible party or project must be identified in this table for any improvements assigned in this column.

CHAPTER 7 – SOILS INVESTIGATION AND PAVEMENT DESIGN

7.0 GENERAL

Intent

This chapter provides the structural design criteria and procedures related to public improvements including but not limited to new roadways, auxiliary lanes, curb and gutter, sidewalks and medians.

Applicability

This chapter applies to all streets within the City public right of way.

Incorporated by Reference

The following standard (the latest edition, unless otherwise stated) shall be used as the presumptive standard when specific design and construction methods, materials or procedures are not specifically addressed in these Standards.

1. Metropolitan Government Pavement Engineering Council (MGPEC) "Pavement Design Standards and Construction Specification"
   http://www.mgpec.org/id68.html

7.01 STANDARD SPECIAL REVISIONS

(The presumptive standard may be amended as necessary to provide additional clarity or to reflect changes in policy or engineering practices. Such revisions shall be listed and included in this section and are currently in development.)

CHAPTER 8 – STREET DESIGN CRITERIA

8.00 GENERAL

Intent

This chapter provides the design and technical criteria for roadway design. It includes street layout criteria, classification and function.

Applicability

This chapter applies to all streets within the City public right of way.

8.01 DESIGN PRINCIPLES

Street Design Standards

1. Streets shall be located with appropriate regard for topography, creeks, wooded areas, and other natural features which would enhance attractive development.

2. Existing streets, including preliminary platted streets, in adjoining territory shall be continued at equal or greater width and in similar alignment by streets proposed in the subdivision, unless variations are approved by the Planning and Zoning Commission.

3. Streets within subdivisions shall be designed as a system of circulation routes, so that the use of local streets by through traffic will be discouraged.

4. Streets shall intersect as nearly at right angles as possible.

5. Reserve strips controlling access to streets shall be prohibited.

6. A cul-de-sac shall not exceed one thousand (1,000) feet in length, measured along the centerline of the cul-de-sac, between the center of the turn-around and the right-of-way line of the abutting through (intersecting) streets.

7. Where a street will eventually be extended beyond the proposed develpment but is temporarily dead-ended, an interim turnaround may be required.

8. No street names shall be used which will duplicate or be confused with the names of existing streets. All street naming shall be in accordance with the street naming policy of the City of Greenwood Village.

9. Arterial streets shall not be intersected by local streets.

10. All streets in subdivisions which are classified in any PUD Zone as set forth in the zoning ordinance of the City of Greenwood Village shall be completed with concrete gutters and pavements. These streets shall be constructed to specifications as set forth in the construction chapters of these standards.

11. More stringent requirements due to design variations may be imposed by the City Council based on recommendations by the Planning and Zoning Commission or City Engineer.

Street Name Signs and Traffic Control Devices

Street name signs shall be in accordance with Greenwood Village specifications and shall be furnished by the developer at his expense. Traffic control devices authorized under the Manual on Uniform Traffic Control Devices

as published by the U.S. Department of Transportation, Federal Highway Administration, shall be installed by the developer, or by the City at the developer's expense. These devices and their cost shall be listed in the Subdivision Agreement. Prior to probationary street acceptance, all traffic control devices listed in the Subdivision Agreement shall be installed.

8.02 STREET CLASSIFICATIONS

Local Streets:
The following minimum factors apply to single-family residential areas as well as multiple-family residential and urban residential areas. All local streets shall be designed in accordance with the typical cross-section diagram shown in the Appendix- Standard Drawings, Figure A-1.

1. Function - Local streets collect provide direct access to adjacent property. Traffic carried by local streets shall have an origin or destination within the neighborhood. Utility easements shall be available.
2. Right- of Way Width - 50 feet minimum.
3. Number of Moving Lanes - Two.
4. Access Conditions - Intersections at grade with direct access to abutting property permitted.
5. Traffic Characteristics – Traffic requirements in other than residential areas may require special design consideration be the Engineer.
6. Planning Characteristics – Local streets shall be designed to discourage through traffic from moving through the neighborhood. Local streets shall no intersect major arterial streets. Attached sidewalks are permissible.
7. Type of Curb and Gutter – Six (6) inch Vertical.
8. Cul-De-Sacs – All cul-de-sacs shall have a curb diameter of seventy (70) feet.
9. Sidewalk Widths – Five (5) feet wide attached or detached.
10. Street Widths - 35' flow line to flow line.
11. Minimum Radius of Curvature on Center Line (Horizontal) - 275 feet.
12. Minimum Length of Vertical Curves (Per AASHTO) :

ALGEBRAIC DIFFERENCE IN GRADES (%)	ELEVATION EVERY 50 FEET ON VERTICAL CURVE MINIMUM LENGTH VERTICAL CURVE (FEET)
0 – 4	100
4 – 5	150
5 – 7	200
7 – 11	300

Collector Streets
The following minimum design factors apply to collector streets (see **Figure A-2** at the end of this chapter):

13. Function - Collector streets collect and distribute traffic between arterial and local streets and serve as main connectors within communities, linking one neighborhood with another. Traffic carried by collector streets has an origin or a destination within the community. Utility easements shall be available.
14. Right- of Way Width - 60 feet minimum.
15. Number of Moving Lanes - Two.
16. Access Conditions - Intersections at grade with direct access to abutting property permitted.
17. Traffic Characteristics - Regulation of traffic accomplished through the use of stop signs and channelization. Traffic signals normally used only at intersections with collectors and arterial streets.
18. Planning Characteristics - Collector streets shall have continuity throughout a neighborhood but need not extend beyond the neighborhood. Intersections with collectors and arterial streets shall be at least one-quarter mile apart. Sidewalks shall be detached, 6' wide.
19. Type of Curb and Gutter - Vertical, detached sidewalk.
20. Street Widths - 27' flow line to flow line.

21. Street Grades - Minimum grade 0.5% - maximum grade 5%.
22. Curb Radii – Twenty (20) feet minimum at street intersections.
23. Minimum Radius of Curvature on Center Line (Horizontal) - 275 feet.
24. Minimum Length of Tangents Between Curves (Reverse curves permissible) - 50 feet.
25. Minimum Length of Vertical Curves (Per AASHTO) :

ALGEBRAIC DIFFERENCE IN GRADES (%)	ELEVATION EVERY 50 FEET ON VERTICAL CURVE MINIMUM LENGTH VERTICAL CURVE (FEET)
0 – 3	150
3 – 5	200
5 – 7	300
7 – 9	400
9 – 11	600

Minor Arterial Streets

The following design factors apply to minor arterial streets. (See **Figure A-2** at the end of this chapter):

1. Function – Arterial routes permit relatively unimpeded traffic movement and are intended for use on those routes where four moving lanes and one left-turn lane are required but where a major arterial cross-section would not be warranted
2. Right-of-Way Width - 100 feet minimum.
3. Number of Moving Lanes – Four, plus center turn lane.
4. Access Conditions – Intersection at grade. Intersection with other streets will not be restricted. Access from street of lower classification will be permitted but in all cases will be controlled by traffic control devices. Normally, all abutting property will be allowed access to the street and will face the street but increased setbacks may be required.
5. Traffic Characteristics - Regulation of traffic accomplished by signs and channelization. Unless otherwise warranted, traffic signals shall be located only at intersections will streets of higher classification. Parking shall be prohibited.
6. Planning Characteristics – Arterials shall be spaced from ½ to 1 mile apart and shall, where possible, be continuous. Arterials shall act as boundaries between neighborhood areas. Detached sidewalks shall be required. Arterials may separate major land uses.
7. Type of Curb and Gutter - Vertical, detached 8 foot sidewalk required.
8. Street Widths - 62' flow line to flow line.
9. Street Grades - Minimum grade 0.5% - maximum grade 5%.
10. Curb Radii - Thirty (30) feet minimum at street intersections.
11. Minimum Radius of Curvature on Center Line (Horizontal) - 350 feet.
12. Minimum Length of Tangents Between Curves - 200 feet.
13. Minimum Length of Vertical Curves (Per AASHTO) :

ALGEBRAIC DIFFERENCE IN GRADES (%)	ELEVATION EVERY 50 FEET ON VERTICAL CURVE MINIMUM LENGTH VERTICAL CURVE (FEET)
0 – 2.5	200
2.5 – 4	300
4 – 5	400
5 – 6.5	500
6.5 – 8	600
3 – 9	700
9 – 10	800

10 – 11	900

Principle Arterial Streets

The following minimum design factors apply to principal arterial streets. (See **Figure A-3** at the end of this chapter):

1. Function - Principal arterial streets permit rapid and relatively unimpeded traffic movement throughout the City, connecting major land use elements as well as communities with one another.
2. Right-of-Way - 120' minimum.
3. Number of Moving Lanes - Four or six.
4. Access Conditions - Intersections will generally be at grade. Access from collector and arterial streets shall be controlled by traffic control devices. Normally, abutting properties and local streets will not be allowed direct access to the street. Abutting residential properties shall not face on the roadway unless separated from it by a frontage road.
5. Traffic Characteristics - Movement of traffic will be controlled by signals and channelization. Parking shall be prohibited. Roadways shall have a median strip between them.
6. Planning Characteristics - Principal arterial streets shall be spaced approximately one mile apart and shall traverse the entire city and/or county. Principal arterial streets shall not bisect neighborhoods but shall act as boundaries between them. Detached 8 foot sidewalks are required.
7. Type of Curb and Gutter - Vertical, detached sidewalk required.
8. Street Widths - Two 27' flow line to flow line lanes.
9. Street Grades - Minimum grade 0.5% - maximum grade 4%.
10. Curb Radii - Thirty-five (35) feet minimum at street intersections
11. Minimum Radius of Curvature on Center Line (Horizontal) - 600 feet.
12. Minimum Length of Tangents Between Curves - 300 feet.
13. Minimum Length of Vertical Curves (Per AASHTO):

ALGEBRAIC DIFFERENCE IN GRADES (%)	MINIMUM LENGTH VERTICAL CURVE (FEET)
0 – 1.5	200
1.5 – 2	300
2 – 2.75	400
2.75 – 3.5	500
3.5 – 4	600
3 – 4.75	700
4.75 – 5.5	800
5.5 – 6	900

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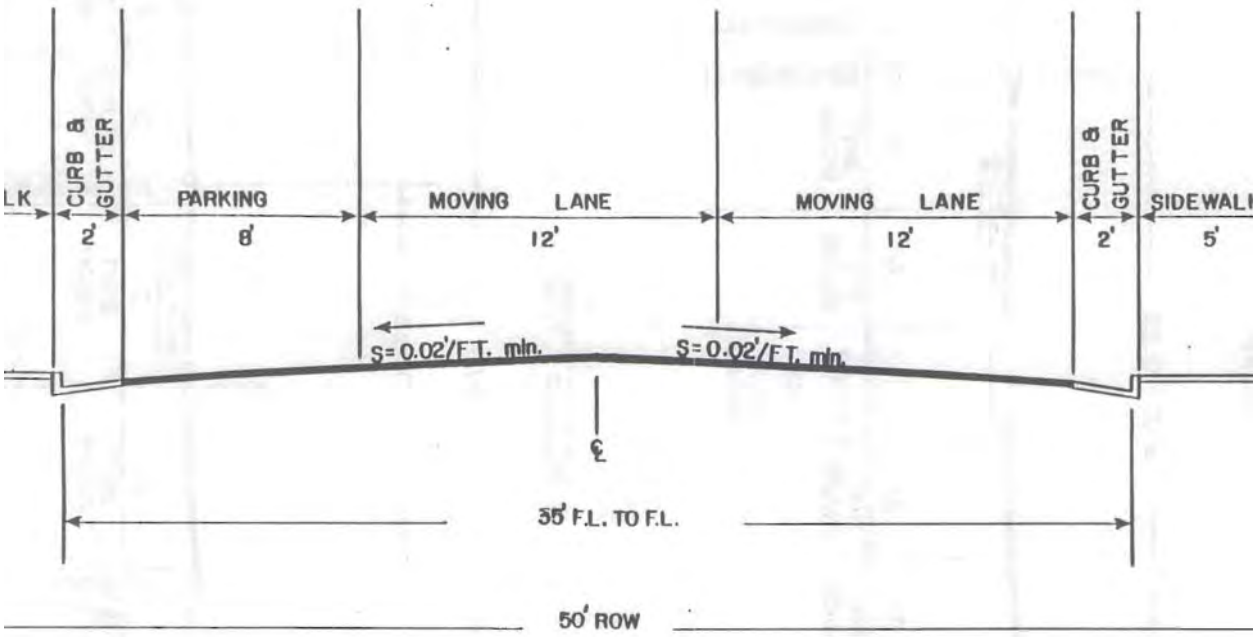
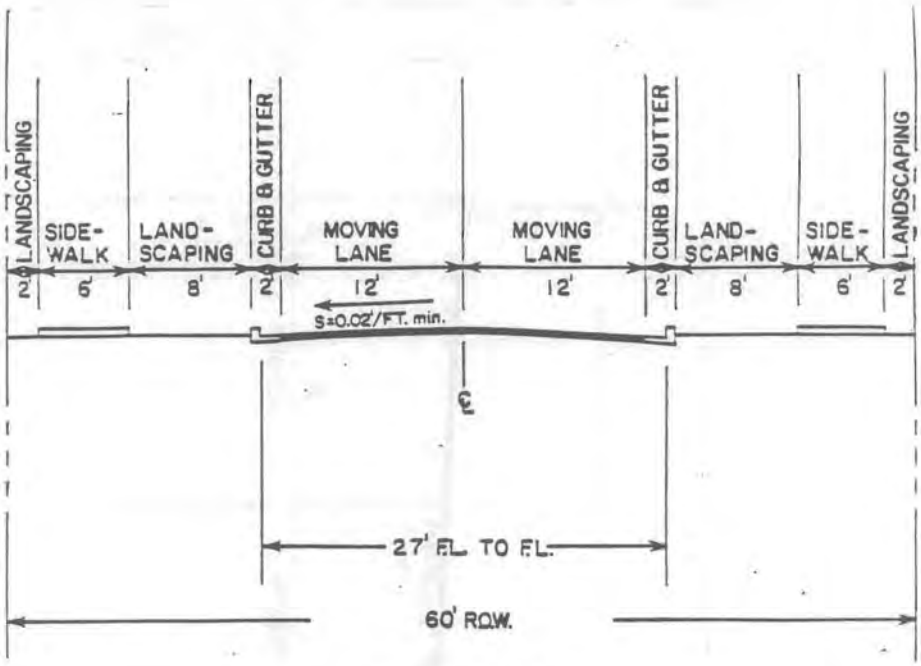
8.03 DETAILS

Figure A-1

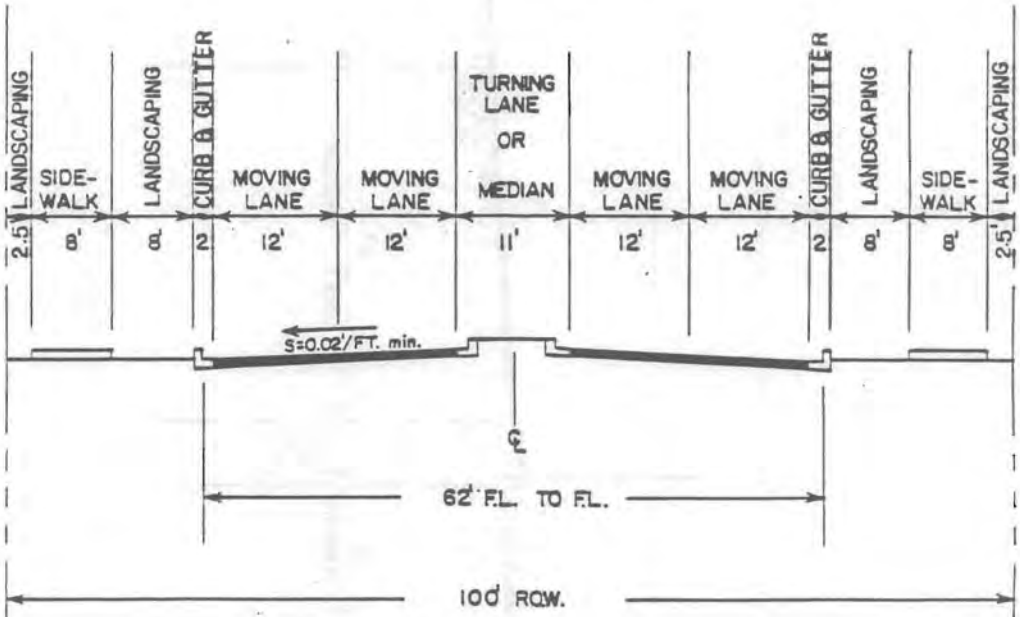


LOCAL

Figure A-2



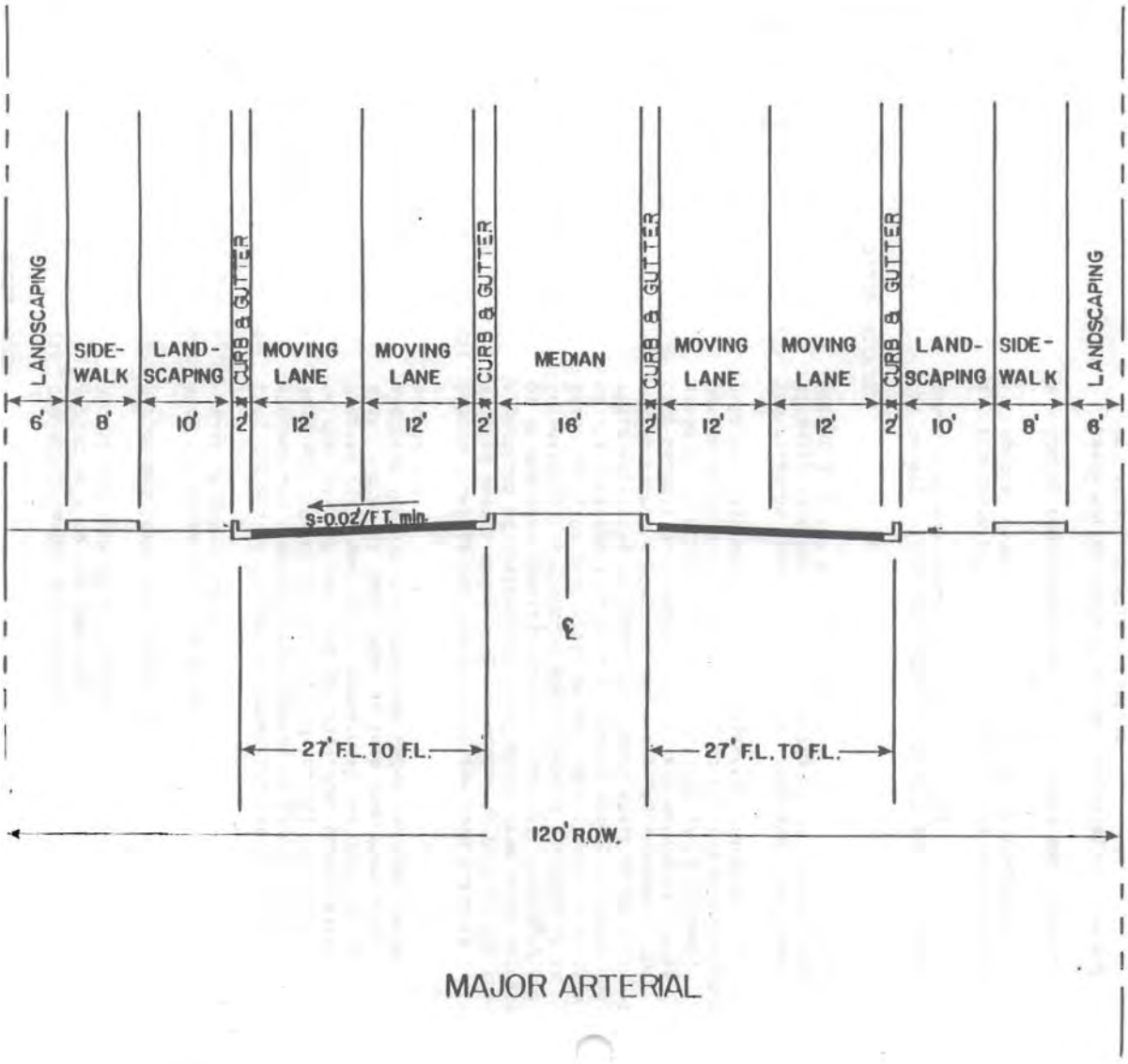
COLLECTOR



MINOR ARTERIAL

FIGURE A-2. - 43 -

Figure A-3



CHAPTER 9 – ACCESS REQUIREMENTS

9.00 GENERAL

Intent

This chapter establishes the design and technical criteria for all access to the network of streets within the City to maintain safe and efficient network.

Applicability

The provisions of this chapter shall apply to all properties and public streets within the corporate limits of the city.

9.01 DESIGN REQUIREMENTS

Safety Considerations

No access approach, driveway, or curb cut shall be constructed or maintained which creates a threat to the safety of persons or vehicles in the vicinity of the access approach, driveway, or curb cut. No permit for the construction of an access approach, driveway, or curb cut shall be issued unless the Director of Community Development determines that the proposed access approach, driveway, or curb cut will not create a threat to the safety of persons or vehicles in the vicinity of the proposed access approach, driveway, or curb cut. In making this determination, the Director of Community Development shall consider the following factors:

1. Whether the street to which access is sought is residential or commercial in character;

2. Whether the proposed access approach, driveway, or curb cut would cross a sidewalk;

3. Whether drivers of vehicles using the proposed access approach, driveway, or curb cut would have difficulty in seeing pedestrians or other vehicles in the vicinity;

4. Whether pedestrians or the drivers of other vehicles would have difficulty in seeing vehicles using the proposed access approach, driveway, or curb cut;

5. Whether the proposed access approach, driveway, or curb cut would result in increased noise, dirt, smoke, or fumes in the vicinity of the proposed access approach, driveway, or curb cut;

6. Whether the property for which an access approach, driveway, or curb cut is proposed is already served by an existing access approach, driveway, or curb cut;

7. Whether parking is permitted on the street to which access is proposed;

8. The width of the street to which access is sought;

9. The posted speed limit on the street to which access is sought;

10. The distance of the proposed access approach, driveway, or curb cut from the curb line of the nearest street which intersects the street to which access is proposed;

11. The proximity of the proposed access approach, driveway, or curb cut to residential neighborhoods and schools.

Location

1. No access approach, driveway or curb cut shall be closer than fifty-five feet to the curb line of any street which intersects the curb line of the street to which access is gained.

2. The width of any access approach, driveway, or curb cut shall not exceed thirty-five feet as measured along its intersection with the property line.

3. No two access approaches, driveways, or curb cuts on the same lot shall be closer together than fifty-five feet measured along their intersections with the curb line. In business and commercial areas, no access approach, driveway, or curb cut shall be closer than fifteen feet to a property line of an adjacent property except where there is shared access with the adjacent property.

4. The minimum distance at which the centerline of an access approach, driveway, or curb cut shall be visible from the adjacent street (sight distance) shall be one hundred thirty feet. If required for safety reasons, the Director of Community Development may require a sight distance in excess of one hundred thirty feet. The minimum sight distance shall be measured in the following manner: The reference point on the adjacent street shall be located on the centerline of the traffic lane closest to the access point, driveway, or curb cut, and at a height of 3.5 feet above the street surface; the reference point on the access approach, driveway, or curb cut shall be located on its centerline, back a distance of fifteen feet from the property line, and at a height of six inches from the access approach, driveway, or curb cut surface.

CHAPTER 10 – UTILITIES

10.00 GENERAL

Intent

This chapter sets forth the design and location requirements for all utilities within the public right of way.

Applicability

This chapter shall apply to all contractors, public utility agencies and property owners installing public or private underground utilities within a City public right of way or easement.

Incorporated by Reference

The Public Right of Way Permit standards set forth in **Chapter 11, Article 3, Division 1** of the **Greenwood Village Code (**http://www.colocode.com/greenwood/greenwood_11.pdf) are adopted as the presumptive standard for underground utility design and shall be designed in a manner and method acceptable to the City and in accordance with current City guidelines and practices.

CHAPTER 11 – PEDESTRIAN AND BICYCLE FACILITIES

11.00 GENERAL

Intent

This chapter establishes the minimum design criteria for pedestrian and bicycle facilities.

Applicability

This chapter applies to all sidewalks, curb ramps, multi-use trails, bike lanes or other bike and pedestrian facilities within City public right of way or easement.

Incorporated by Reference

The pedestrian and bicycle standards and technical criteria set forth in the **Greenwood Village Code and Chapter 8 of the Design and Construction Standards of the Greenwood Village Code** http://www.colocode.com/greenwood/greenwood_11.pdf are adopted as the presumptive standard and adopts as a secondary codes the following:

1. American Disability Act, and "Colorado Department of Transportation Roadway Design Guide" – Chapter 14 Bicycle and Pedestrian Facilities.
   http://www.coloradodot.info/programs/bikeped/documents/DesignGuide-Ch14

2. American Association State Highway and Transportation Officials (AASHTO) "A Policy on Geometric Design of Highway and Streets" and "Guide for Development of Bicycle Facilities" current editions.
   https://bookstore.transportation.org/item_details.aspx?id=1917

CHAPTER 12 – STORM WATER AND WATER QUALITY

12.00 GENERAL

Intent

This chapter provides the minimum design and technical criteria for storm drainage and erosion control within the City and establishes the City's storm drainage policies and floodplain regulations.

Applicability

This Chapter shall apply to all sitework permits, new development and redevelopment projects within the City and all work within the City public right of way or easement.

Incorporated by Reference

The following standards, (the latest editions, unless otherwise stated) shall be used as the presumptive standard when specific design and construction methods, materials or procedures are not specifically addressed in the Standards.

1. Storm Water and Water Quality standards set forth in the **Greenwood Village Drainage Criteria Manual** http://www.greenwoodvillage.com/index.aspx?NID=1272

2. Greenwood Village Construction Site Management Manual http://www.greenwoodvillage.com/index.aspx?NID= 570

CHAPTER 13 – STREET LIGHTING

13.00 GENERAL

Intent

The intent of this chapter is to ensure that street lighting the City public right of way is designed to complement the surrounding area while promoting and protecting the public health, safety and welfare.

Applicability

This chapter shall apply throughout the City except in the Town Center zone district.

Incorporated by Reference

The Street Lighting standards set forth in **Chapter 11, Article 2** of the **Greenwood Village Code** http://www.colocode.com/greenwood/greenwood_11.pdf are adopted as the presumptive standard.

CHAPTER 14 –STREETSCAPE LANDSCAPING

14.00 GENERAL

Intent

This chapter intends to improve public safety by preventing sight distance and facility obstructions and sidewalk and street damage, to promote suitable landscape species selection for streetscapes, to minimize tree and landscape maintenance costs and to create an aesthetic community image through continuity.

Applicability

This chapter shall apply to all City public right of way.

Incorporated by Reference

All landscaping within the City public right of way shall be designed in a manner and method acceptable to the City and in accordance with current City guidelines and practices.

CHAPTER 16 – PAVEMENT, SUBGRADE, AND SURFACE TREATMENTS

16.00 GENERAL

Intent

This chapter sets forth the standard specifications for construction of pavement, subgrade, and surface treatments within the City public right of way.

Applicability

This Chapter shall apply to all new construction and reconstruction and repair of improvements within the City public right of way.

Incorporated by Reference

The following standard (the latest edition, unless otherwise stated) shall be used as the presumptive standard when specific design and construction methods, materials or procedures are not specifically addressed in these Standards.

1. Metropolitan Government Pavement Engineering Council (MGPEC) "Pavement Design Standards and Construction Specification"
   http://www.mgpec.org/id68.html

16.01 STANDARD SPECIAL REVISIONS

(The presumptive standard may be amended as necessary to provide additional clarity or to reflect changes in policy or engineering practices. Such revisions shall be listed and included in this section and are currently in development.)

CHAPTER 17 – EMBANKMENT AND EXCAVATION

17.00 GENERAL

Intent

This chapter sets forth the standard specifications for excavation, hauling, disposal, placement, and compaction of all material encountered within the limits of work within the City public right of way.

Applicability

This Chapter shall apply to all new construction and reconstruction and repair of improvements within the City public right of way.

Incorporated by Reference

The following standard (the latest edition, unless otherwise stated) shall be used as the presumptive standard when specific design and construction methods, materials or procedures are not specifically addressed in these Standards.

1. Metropolitan Government Pavement Engineering Council (MGPEC) "Pavement Design Standards and Construction Specification"
   http://www.mgpec.org/id68.html

17.01 STANDARD SPECIAL REVISIONS

(The presumptive standard may be amended as necessary to provide additional clarity or to reflect changes in policy or engineering practices. Such revisions shall be listed and included in this section and are currently in development.)

CHAPTER 18 – STORM SEWER, MANHOLES, AND INLETS

18.00 GENERAL

Intent

This chapter sets forth the standard specifications for construction of storm sewers, manholes and inlets within the City public right of way.

Applicability

This Chapter shall apply to all new construction and reconstruction and repair of improvements within the City public right of way.

Incorporated by Reference

The following standard (the latest edition, unless otherwise stated) shall be used as the presumptive standard when specific design and construction methods, materials or procedures are not specifically addressed in these Standards.

1. Colorado Department of Transportation "Standard Specification for Road and Bridge Construction" http://www.coloradodot.info/business/designsupport/construction-specifications/2011-Specs

18.01 STANDARD SPECIAL REVISIONS

(The presumptive standard may be amended as necessary to provide additional clarity or to reflect changes in policy or engineering practices. Such revisions shall be listed and included in this section and are currently in development.)

CHAPTER 19 – CURB, GUTTER, SIDEWALKS, AND FLATWORK

19.00 GENERAL

Intent

This chapter sets forth the standard specifications for curb, gutter, sidewalks and flatwork within the City public right of way.

Applicability

This Chapter shall apply to all new construction and reconstruction and repair of improvements within the City public right of way.

Incorporated by Reference

The following standard (the latest edition, unless otherwise stated) shall be used as the presumptive standard when specific design and construction methods, materials or procedures are not specifically addressed in these Standards.

1. Metropolitan Government Pavement Engineering Council (MGPEC) "Pavement Design Standards and Construction Specification"
   http://www.mgpec.org/id68.html

19.01 STANDARD SPECIAL REVISIONS

(The presumptive standard may be amended as necessary to provide additional clarity or to reflect changes in policy or engineering practices. Such revisions shall be listed and included in this section and are currently in development.)

CHAPTER 20 – TRAFFIC CONTROL DEVICES AND PAVEMENT MARKINGS

20.00 GENERAL

Intent

The intent of this chapter is to ensure that the traffic control devices including but not limited to signs, signals and markings in the City are designed to complement the surrounding area while promoting and protecting the public health, safety, and welfare.

Applicability

This chapter shall apply to all new construction and reconstruction and repair of improvements within the City public right of way.

Incorporated by Reference

The following standard (the latest edition, unless otherwise stated) shall be used as the presumptive standard when specific design and construction methods, materials or procedures are not specifically addressed in these Standards.

1. Colorado Department of Transportation "Standard Specification for Road and Bridge Construction" http://www.coloradodot.info/business/designsupport/construction-specifications/2011-Specs

20.01 STANDARD SPECIAL REVISIONS

(The presumptive standard may be amended as necessary to provide additional clarity or to reflect changes in policy or engineering practices. Such revisions shall be listed and included in this section and are currently in development.)

CHAPTER 21 – TRENCHING, PATCHING, AND RESTORATION

21.00 GENERAL

Intent

This chapter sets forth the standard specifications for trenching, patching and restoration within the City public right of way.

Applicability

This Chapter shall apply to all new construction and reconstruction and repair of improvements within the City public right of way.

Incorporated by Reference

The Public Right of Way Permit standards set forth in **Chapter 11, Article 3, Division 1** of the Greenwood Village Code http://www.colocode.com/greenwood/greenwood_11.pdf are adopted as the presumptive standard. In addition all work shall be performed in a manner and method acceptable to the City and in accordance with current City guidelines and practices.

CHAPTER 22 – LANDSCAPING AND IRRIGATION

22.00 GENERAL

Intent

This chapter sets forth the standard specifications for landscaping and irrigation within the City public right of way.

Applicability

This Chapter shall apply to all new construction and reconstruction and repair of improvements within the City public right of way.

Incorporated by Reference

All work shall be completed in a manner and method acceptable to the City and in accordance with current City guidelines.

CHAPTER 23 – CONSTRUCTION TRAFFIC CONTROL

23.00 GENERAL

Intent

This chapter consists of furnishing, installing, moving, maintaining and removing temporary traffic control devices for work performed with the City public right of way and easements.

Applicability

This Chapter shall apply to all new construction and reconstruction and repair of improvements within the City public right of way.

Incorporated by Reference

The following standard (the latest edition, unless otherwise stated) shall be used as the presumptive standard when specific design and construction methods, materials or procedures are not specifically addressed in these Standards.

1. Colorado Department of Transportation "Standard Specification for Road and Bridge Construction" http://www.coloradodot.info/business/designsupport/construction-specifications/2011-Specs

23.01 STANDARD SPECIAL REVISIONS

(The presumptive standard may be amended as necessary to provide additional clarity or to reflect changes in policy or engineering practices. Such revisions shall be listed and included in this section and are currently in development.)

CHAPTER 24 – EROSION AND SEDIMENT CONTROL

24.00 GENERAL

Intent

This chapter defines the Best Management Practices (BMPs) during site work within the City public right of way.

Applicability

This Chapter shall apply to all new construction and reconstruction and repair of improvements within the City public right of way.

Incorporated by Reference

The following standards, (the latest editions, unless otherwise stated) shall be used as the presumptive standard when specific design and construction methods, materials or procedures are not specifically addressed in the Standards.

1. Storm Water and Water Quality standards set forth in the **Greenwood Village Drainage Criteria Manual**
   http://www.greenwoodvillage.com/index.aspx?NID=1272

2. Greenwood Village Construction Site Management Manual
   http://www.greenwoodvillage.com/index.aspx?NID= 570

CHAPTER 25– MISCELLANEOUS CONSTRUCTION

25.00 GENERAL

Intent

This chapter sets forth the standard specifications for miscellaneous structures within the City public right of way.

Applicability

This Chapter shall apply to all new construction and reconstruction and repair of improvements within the City public right of way.

Incorporated by Reference

The following standard (the latest edition, unless otherwise stated) shall be used as the presumptive standard when specific design and construction methods, materials or procedures are not specifically addressed in these Standards.

1. Colorado Department of Transportation "Standard Specification for Road and Bridge Construction" http://www.coloradodot.info/business/designsupport/construction-specifications/2011-Specs

25.01 STANDARD SPECIAL REVISIONS

(The presumptive standard may be amended as necessary to provide additional clarity or to reflect changes in policy or engineering practices. Such revisions shall be listed and included in this section and are currently in development.)

CHAPTER 26 – INSPECTION, TESTING PROCEDURES, AND TOLERANCES

26.00 GENERAL

Intent

This chapter sets forth the standard specifications for inspection, testing procedures, and tolerances for construction within the City public right of way.

Applicability

This Chapter shall apply to all new construction and reconstruction and repair of improvements within the City public right of way.

Incorporated by Reference

The following standard (the latest edition, unless otherwise stated) shall be used as the presumptive standard when specific design and construction methods, materials or procedures are not specifically addressed in these Standards.

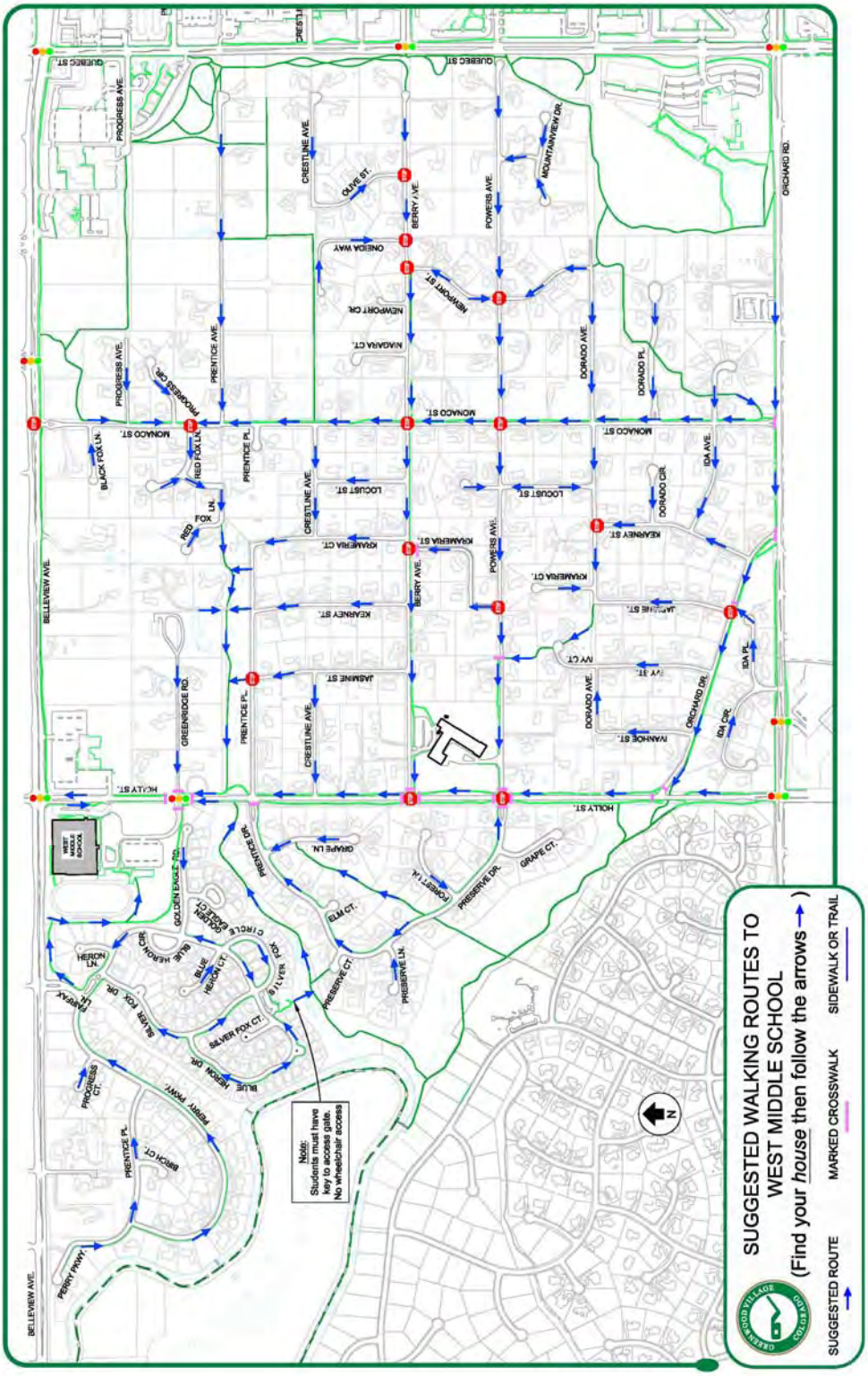
1. Colorado Department of Transportation "Standard Specification for Road and Bridge Construction" http://www.coloradodot.info/business/designsupport/construction-specifications/2011-Specs

26.01 STANDARD SPECIAL REVISIONS

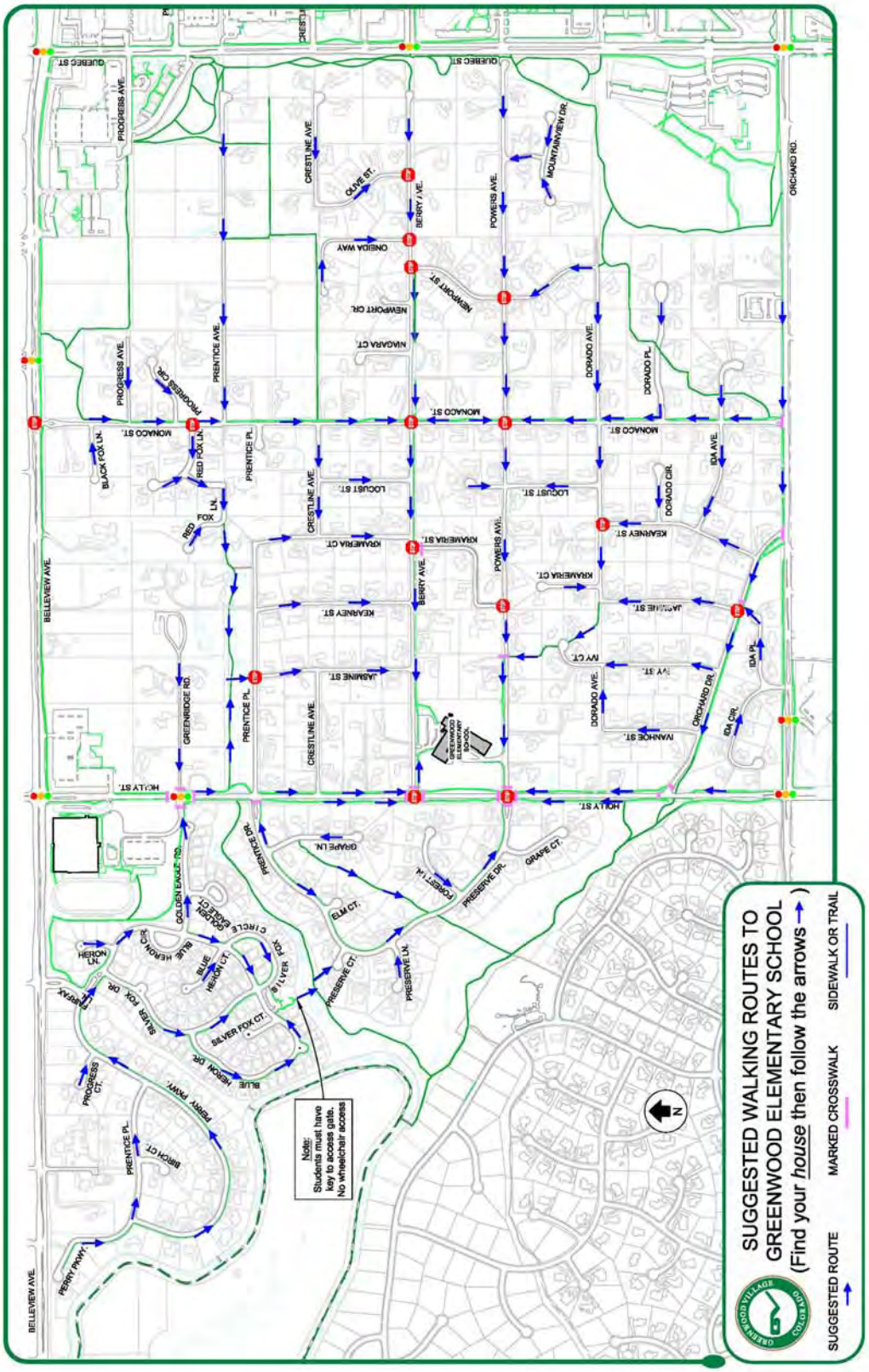
(The presumptive standard may be amended as necessary to provide additional clarity or to reflect changes in policy or engineering practices. Such revisions shall be listed and included in this section and are currently in development.)

APPENDIX A

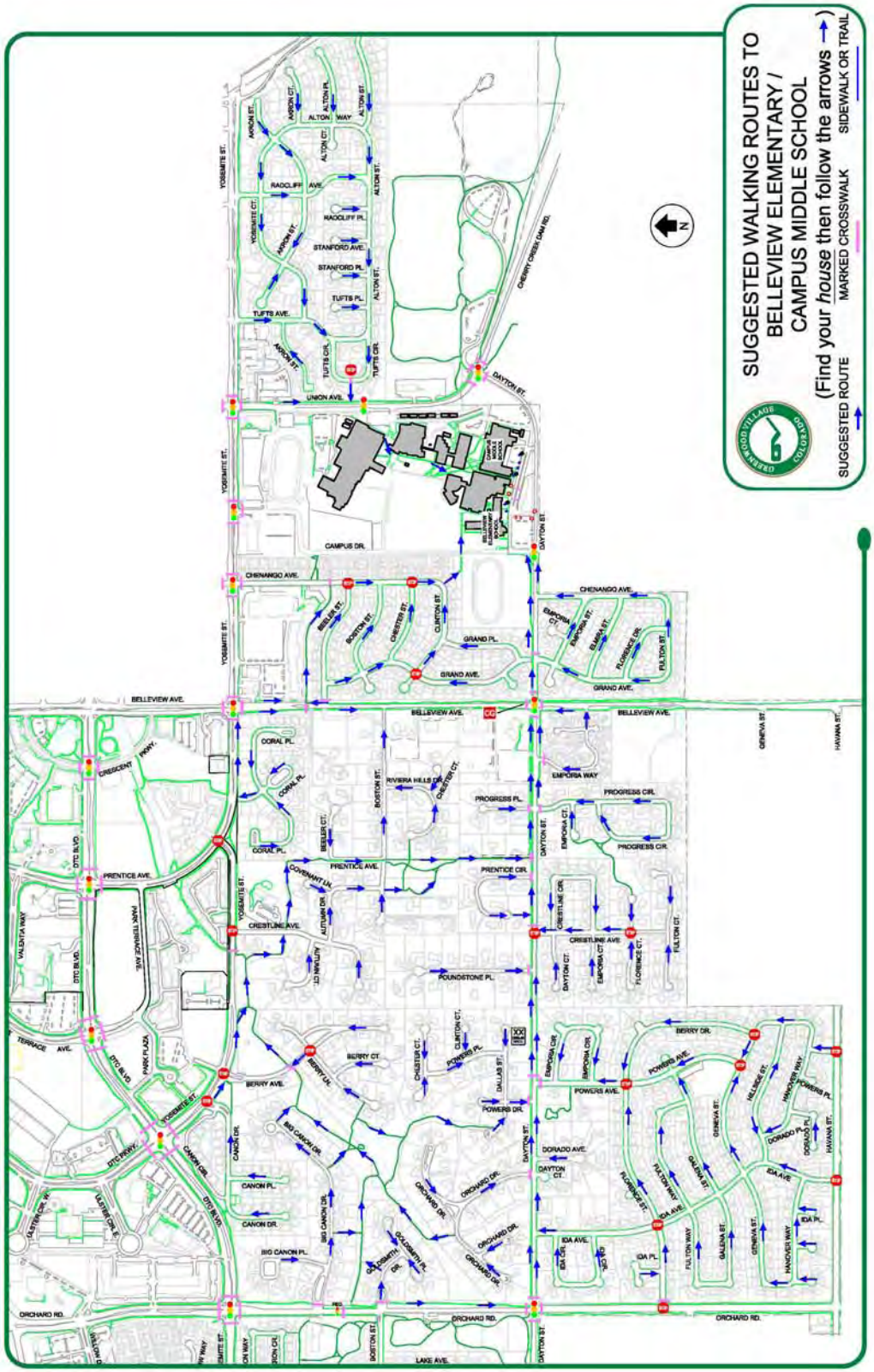
School Walking Route Map 1



School Walking Route Map 2



School Walking Route Map 3

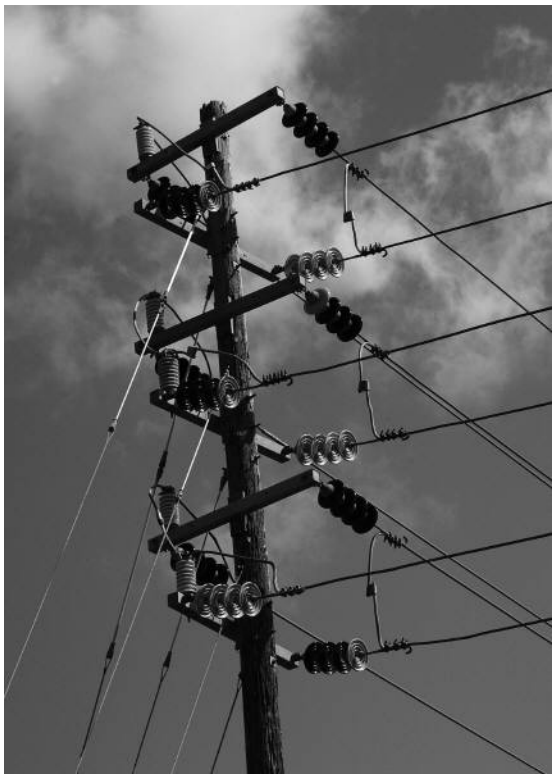


APPENDIX B

Greenwood Village 1% Fund Utility Undergrounding Policy October 2009

Greenwood Village

1% Fund Utility Undergrounding Policy



Prepared by Public Works

October 2009

Policy for Utility Undergrounding Utilizing Xcel 1% Funds

The following is the policy for use of 1% Funds for undergrounding of aerial Xcel Energy power lines, in accordance with the 2008 Franchise Agreement. The intent of the policy is to identify and prioritize lines to be undergrounded as part of the five-year undergrounding plan (Five Year Plan). Potential projects will be prioritized in a manner that allows for efficient use of 1% funding, and provides a real and tangible improvement to the public.

Potential 1% Fund undergrounding projects will be prioritized based on the following factors.

I. Cost Savings – Cost savings allows more lines to be undergrounded each year thus providing a greater benefit to the Village. Potential cost saving measures shall include any means to supplement the total cost of undergrounding through a Village project or third party, either for the undergrounding of overhead lines, or to offset costs associated with restoration of the infrastructure and/or landscaping.

   When evaluating potential cost savings, projects will be identified as either "HIGH PRIORITY", "MEDIUM PRIORITY" or "LOW PRIORITY." Projects that receive supplemental funding of fifty percent (50%) or more of the total project cost will be identified as "HIGH PRIORITY." Projects that receive supplemental funding between twenty percent (20%) and forty-nine percent (49%) of the total project cost will be identified as "MEDIUM PRIORITY." Projects receiving supplemental funding in an amount less than twenty percent (20%) of the total project cost, or those that will be funded solely through the 1% Fund will be identified as "LOW PRIORITY."

   A listing of potential cost saving opportunities is presented below. The list should not be considered as a complete list of possible outside funding sources, only a summary of the most likely cost saving opportunities.

   - Capital Improvement Projects – CIP projects include improvements constructed on Village owned property or ROW, and shall include annual maintenance projects such as the Pavement Management Program and Concrete Replacement Program.

   - Partnering – Staff will identify potential joint projects and contact the adjacent municipality or jurisdiction to determine the feasibility of potential partnering opportunities. In the event that an adjacent municipality or jurisdiction expresses interest in a joint undergrounding project, staff will evaluate the opportunity and present it to City Council for further direction.

   - Resident Contribution (LID, etc.) – Staff will not actively pursue partnering opportunities through resident contributions, but will support resident participation in undergrounding projects through the formation of Local Improvement Districts. When a project identified in the Five Year Plan is located in a residential area and contains adjacent overhead lines that are not included in the undergrounding project, staff will notify the affected homeowners and advise them of the process and benefit of forming a Local Improvement District as a means to underground additional lines.

- Xcel system upgrades – In the event of an Xcel system upgrade in an area considered for potential undergrounding, the cost benefit will be evaluated and presented to Council for approval.

II. Safety –Projects will be evaluated on the increase in overall public safety due to undergrounding of the aerial lines. Safety issues that can be reduced or resolved through undergrounding of aerial power lines will be evaluated through the criteria listed below.

- Roadway Safety – Exposure of an existing aerial facility to potential damage caused by a vehicular collision. Exposure to damage by vehicular traffic shall be evaluated based on the proximity of the lines to the roadway, and the traffic volume of the roadway.

    - When aerial facilities are located within the Clear Zone of the roadway, as defined by the most recent edition of the Roadway Design Guide, and contain an average daily traffic (ADT) in excess of 6,000 vehicles per day (VPD), the Roadway Safety shall be identified as a "HIGH PRIORITY."

    - For locations where the aerial facilities are located in the Clear Zone, but the ADT is below 6,000, the Roadway Safety shall be identified as a "MEDIUM PRIORITY."

    - If the aerial lines are not located in the Clear Zone, the Roadway Safety shall be identified as a "LOW PRIORITY."

- Pedestrian Safety – Bicycle and pedestrian exposure to harm in the event that an overhead power line is damaged by a vehicular collision, force of nature, or other unknown cause of damage. Bicycle and pedestrian exposure is rated in the following manner:

    - Lines located adjacent to, or crossing a Safe Route to School or lines located immediately adjacent to a school bus stop shall have a Pedestrian Safety classification of "HIGH PRIORITY."

    - Lines located adjacent to, or crossing a Regional Trail shall have a Pedestrian Safety classification of "MEDIUM PRIORITY."

    - All other lines shall have a Pedestrian Safety classification of "LOW PRIORITY."

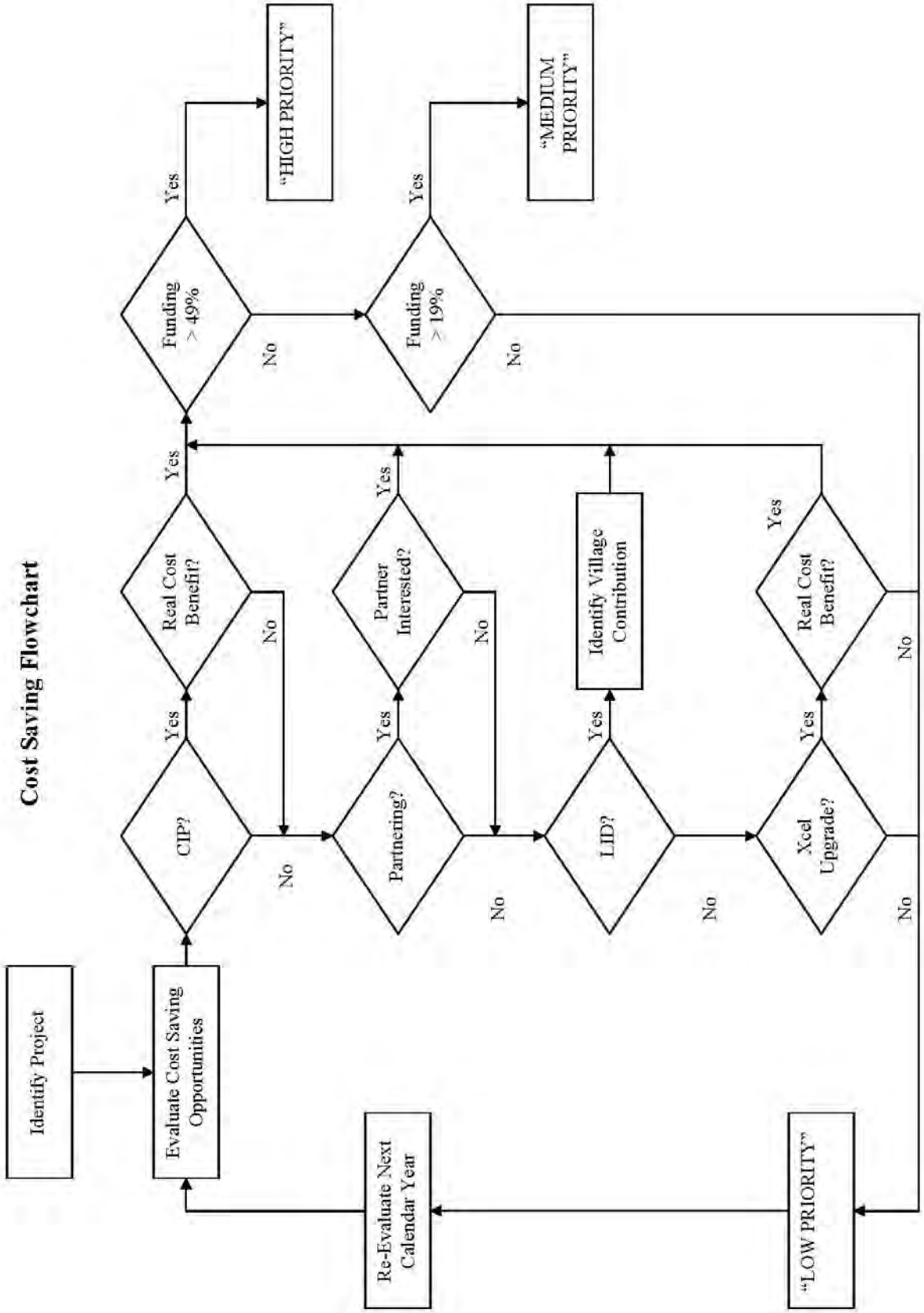
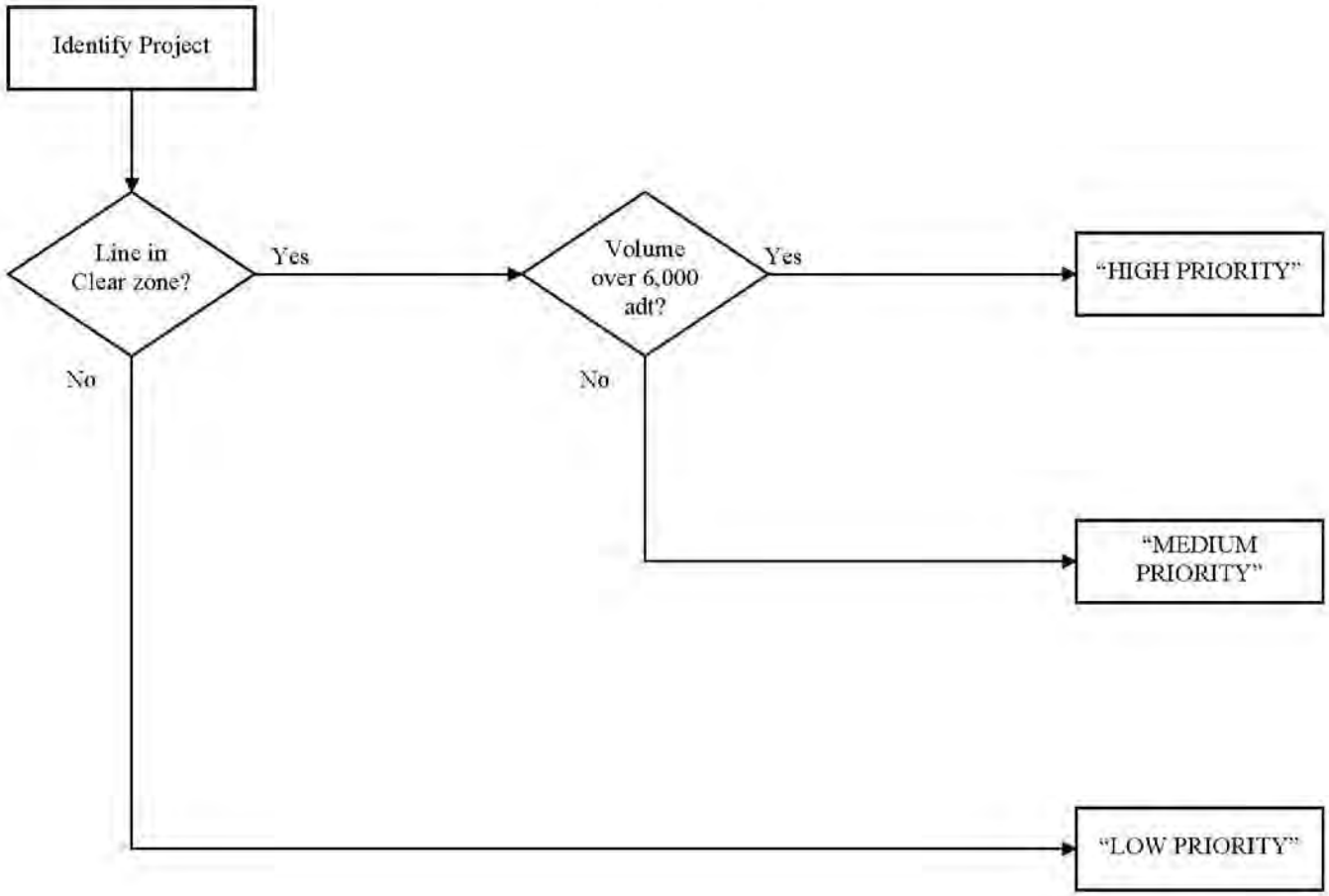
III. Number of Homes Served – When evaluating items I and II listed above, consideration will be given to the number of homes served by lines considered for any potential undergrounding project. In the event that after evaluation, two or more projects contain the same rating, priority will be given to the project that serves the most Village residents.

Based on the factors listed above, potential undergrounding projects will be prioritized based on the following scoring system.

- “HIGH PRIORITY” – 3 Points
- “MEDIUM PRIORITY” – 2 Points
- “LOW PRIORITY” – 1 Point

Each potential project will receive a cumulative score based on the point rating for Cost Savings, Roadway Safety, and Pedestrian Safety. On a yearly basis, projects will be ranked by overall score, and the Five Year Plan will incorporate all projects that can be funded through the 1% Fund allocation, including the Three-Year Projection. Projects that will be partially funded through an outside funding source, i.e. those with a Cost Savings rating of “HIGH PRIORITY” or “MEDIUM PRIORITY”, will be scheduled for the anticipated year of the CIP and/or partnering opportunity. Additional projects will be scheduled for years that do not contain a Cost Savings opportunity. 1% Fund projects will be scheduled in a manner that results in a negative 1% Fund balance equal to the maximum 3 year projection allowed under the provisions of the Xcel Energy Franchise Agreement.

All projects will be re-evaluated on a yearly basis and the Five Year plan will be modified as necessary based on the current priority ratings. Staff will present the revised Five Year Plan to Council for approval. City Council may consider other factors in determining the Five Year Plan and the prioritization for use of Xcel 1% Funds in undergrounding overhead power lines.


Cost Saving Flowchart
Identify Project
Evaluate Cost Saving Opportunities
CIP?
Yes
No
Real Cost Benefit?
Yes
No
Funding > 49%
Yes
"HIGH PRIORITY"
No
Funding > 19%
Yes
"MEDIUM PRIORITY"
No
Partnering?
Yes
Partner Interested?
Yes
No
No
LID?
Yes
Identify Village Contribution
No
Xcel Upgrade?
Yes
Real Cost Benefit?
Yes
No
No
Re-Evaluate Next Calendar Year
"LOW PRIORITY"

Roadway Safety Flowchart