ENGINEERING REGULATIONS, CONSTRUCTION SPECIFICATIONS and DESIGN STANDARDS



Engineering Division Department of Public Works City of Lakewood, Colorado

September 1986 Updated through March 2021 ENGINEERING REGULATIONS, CONSTRUCTION SPECIFICATIONS AND DESIGN STANDARDS

# CITY OF LAKEWOOD, COLORADO DEPARTMENT OF PUBLIC WORKS

September 1986 Updated through March 2021

I.	INTRODUCTION	3
II.	ENGINEERING PLAN/REPORT SUBMITTALS	5
A	. GENERAL INFORMATION	5
В	. NUMBER OF SUBMITTALS	6
С	APPROVED PLANS/REPORTS	6
D	DRAFTING/REPORT STANDARDS	6
E	. STATE HIGHWAYS	6
F	OTHER AGENCIES	7
G	CHECKLISTS GRADING PLANS SOIL AND PAVEMENT DESIGN REPORT STREET CONSTRUCTION PLANS RETAINING WALL DESIGN	
III	RIGHT OF WAY/STREET IMPROVEMENTS	
A	. PAVEMENT STRUCTURAL DESIGN	
В	. PAVEMENT UTILITY CUT AND PATCH SPECIFICATIONS	
С	STREET GRADING	
D	PIPE TRENCHING	
E	ALL WEATHER ACCESS	
F	CUL-DE-SACS	
G	SURVEY MONUMENTS	40
IV.	CONSTRUCTION SPECIFICATIONS	42
V.	WATER PROVIDERS AND SANITATION DISTRICTS	44
VI.	DESIGN STANDARDS	49
A	. CITY OF LAKEWOOD DESIGN STANDARDS	49
B S'	. COMMONLY USED COLORADO DEPARTMENT OF TRANSPORTATION TANDARDS	
VII	REFERENCE DOCUMENTS	
VII	I. COUNCIL ORDINANCE	

## I. INTRODUCTION

## I. INTRODUCTION

The Engineering Regulations, Construction Specifications and Design Standards regulate both public improvements and private work which will either be dedicated to or accepted by the City. In addition, all work within the public right-of-way is governed by these regulations. They are intended to provide for coordinated modern development with adequate facilities to serve and protect the users.

They are meant to apply rigidly to new developments which are not constrained by already existing improvements. However, this manual is not to be applied, without qualification, to infill development. Infill development in an urban area is often constrained when matching existing improvements. To the extent deemed possible by the City Engineer, infill developments shall match these Engineering Standards. The City Engineer however, may allow modification of these standards when necessary to allow private and public construction which is compatible with surrounding in-place improvements.

These standards may also be used in conjunction with the City's zoning regulations and subdivision ordinances for site development work on private property.

The design standards, numbers 1 through 30, included in Chapter VI must be used on all public improvement projects and private work which will either be dedicated to or accepted by the City.

The City also publishes Transportation Engineering Design Standards and a Storm Drainage Criteria Manual. These two documents are an integral part of the Engineering Regulations, Construction Specifications and Design Standards.

This document replaces the City of Lakewood "Engineering Regulations, Construction Specifications and Design Standards May 26, 1981."

II. ENGINEERING PLAN/REPORT SUBMITTALS

## II. ENGINEERING PLAN/REPORT SUBMITTALS

#### A. GENERAL INFORMATION

The City of Lakewood has responsibility for the health, safety, and welfare of the public within City right-of-way. Therefore, the Engineering Division has established and the City Council has adopted construction standards and engineering reviews for proposed developments.

With the establishment of engineering reviews for proposed developments, developers are required to submit plans/reports for review. The developer is encouraged to have his engineer meet with the Engineering Division so that the project's technical aspects can be discussed prior to submitting plans. The submittals which may be required and their intent are as follows:

PUBLIC IMPROVEMENT AGREEMENT (PIA) - This is a contract between the City and a property owner/developer which sets forth the terms and conditions for right-of-way dedications and the improvements required within the public right-of-way or easements. An estimate of quantities required for the improvements is included.

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. These are typically done with the drainage plans unless a separate overlot grading permit is desired.

PRELIMINARY DRAINAGE REPORT - This report identifies and defines drainage problems and conceptually addresses the proposed drainage system including storm detention requirements and impacts on adjacent properties.

FINAL DRAINAGE REPORT - This report contains construction documentation of the approved conceptual drainage system including all the details, engineering calculations and impacted adjacent property owner approvals if required by the City.

PRELIMINARY CONSTRUCTION PLANS - These plans address the preliminary (functional) design of streets and improvements within easements and the public right-of-way. These plans are the basis for the public improvement agreement (PIA).

FINAL CONSTRUCTION PLANS - These are construction documents for the public improvements on the project. They include public and private street plans and drainage elements within easements or the public right-of-way. They also may include signing, pavement marking and traffic signal plans.

PAVEMENT DESIGN REPORT - This documents the soil conditions and proposed pavement installation with the structural cross sections for both parking lots and streets.

GEOLOGIC REPORT - This report documents geologic conditions anticipated at the site and their compatibility with the proposed development. RETAINING WALL DESIGN REPORT - This report provides construction documents with all supporting engineering calculations necessary for retaining wall installations that are 30" or more above finished grade.

These submittals are reviewed by the Engineering Division in conjunction with other City department staff to ensure conformance with City standards. All submittals are to be prepared by a registered professional engineer except for geologic reports which are to be prepared by a professional geologist.

#### B. NUMBER OF SUBMITTALS

Three sets of plans/reports are required on each initial submittal except for street construction plans where twelve sets are required. If additional sets are needed for agency referral reviews, the applicant will be contacted by the Engineering Division.

Upon approval a mylar sepia and/or additional copies of the submittal may be required. The applicant will be contacted by the Engineering Division regarding this.

A transmittal letter should accompany each submittal giving pertinent information such as review desired and contact person.

#### C. APPROVED PLANS/REPORTS

Plans and/or reports must be approved prior to initiation of any construction activities. Approved plans and/or reports will be valid for two years from the date of approval.

Review is for general compliance with City of Lakewood Engineering standards and requirements. The City of Lakewood is not responsible for the correctness of design, dimensions, details, quantities and design safety during construction.

#### D. DRAFTING/REPORT STANDARDS

All reports submitted for review must be type written and legible. All drawings submitted for review shall meet the Colorado Department of Transportation Drafting Standards, and be on 24" x 36" plan sheets. Final drawings submitted for approvals shall be three mil mylar sepia copies of originals.

#### E. STATE HIGHWAYS

Whenever a project is proposed on or adjacent to a state highway, the City of Lakewood coordinates the review of the project with the Colorado Department of Transportation. The City also is responsible for submitting all access permits to the Department once final construction plans have been approved by the City Engineer.

Construction activities on state highways will be governed by the Colorado Department of Transportation regulations and inspection will be undertaken by the Department's forces.

State highways within the City of Lakewood currently include; Wadsworth Boulevard, Sheridan Boulevard, portions of Kipling Street, 6th Avenue, Colfax Avenue, Morrison Road and Hampden Avenue.

## F. OTHER AGENCIES

Depending on the project's location, the City may also refer the plans for review and comments to other agencies. Those agencies include: Urban Drainage and Flood Control District, Jefferson County, Army Corps of Engineers, State Engineer's Office, Denver, Wheat Ridge, Public Utility Companies and Fire Protection Districts. Agencies which would receive referrals would depend on the proposed project's location and improvement plans.

## G. CHECKLISTS

The following checklists are provided to assist in developing plans and reports which meet the City's requirements for the specific submittal. Use of the checklists by designers has proven beneficial in speeding the City review time for plan and report submittals.

The checklists include:

- 1. Grading Plans
- 2. Soil and Pavement Design Reports
- 3. Street Construction Plans
- 4. Retaining Wall Design

<u>The design engineer is encouraged to discuss the project with the Engineering</u> <u>Division prior to the first submittal</u>. This also has proven beneficial in reducing the City review time for plan and report submittals.

#### DEVELOPMENT REVIEW CHECKLIST

## GRADING PLANS

The City of Lakewood 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.

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.

The following checklist has been developed to assist in preparation of grading plans. It includes items pertinent for the City's review and reflects established professional engineering practice for preparation of grading plans. If you have any questions regarding items on this list, please call the Engineering Development Assistance Section.

#### GENERAL NOTES

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 appropriate.

#### APPROVAL BLOCK

The approval block on the last page of this checklist must be on all grading plan sheets. It should be placed as close as possible to the title block in the lower right corner of the sheet.

I.	<u>PLAI</u>	N SHEET FORMAT	<u>PRESENT</u>	<u>COMMENT</u>
	a.	Scale: 1"=50' or larger		
	b.	North arrow		
	C.	Title block		
	d.	Vicinity map 1"=500'		
	e.	Contour lines (2' maximum intervals)		
	f.	24" x 36" plan sheets		
	g.	Original and revision dates		
	h.	Dated, checked, sealed and signed by a PE		
	i.	Legend		
	j.	Street names, dimensions and grades		
	k.	Match lines and sheet numbers		
	I.	Approval block		
	m.	General notes		
	n.	Bench mark description and elevation (must be City of Lakewood, USGS or NGS Datum).		
	0.	Baseline or control line		

II.	PRESENT SITE CONDITIONS	PRESENT	<u>COMMENT</u>
	<ul> <li>a. Existing site topography extending a minimum of 50' past property limits</li> <li>b. Existing features <ol> <li>Easements and rights-of-way</li> <li>All utilities</li> <li>Drainageways with 100-year floodplain and floodway limits</li> <li>Irrigation ditches or laterals</li> <li>Buildings, fences, retaining walls, trees and other physical features</li> </ol> </li> </ul>		
III.	PROPOSED SITE CONDITIONS		
	<ul> <li>a. Proposed contours with match to existing contours</li> <li>b. Drainage flow arrows</li> <li>c. Grade breaks and slopes 3:1 or greater indicated on plan</li> <li>d. Cut and fill areas and quantities* shown</li> <li>e. Proposed improvements <ol> <li>Sidewalks, bikepaths and other public improvements</li> <li>Sidewalks, bikepaths and other public</li> <li>provements</li> <li>Driveway grades and dimensions</li> <li>Storm drainage structures</li> <li>Fences, retaining walls and other physical site improvements (cross sections may be necessat to detail these features)</li> <li>Lowest finished floor elevations for all buildings</li> </ol> </li> </ul>	ary	
IV.	STANDARD DETAILS		
	<ul> <li>a. City or CDOT standard details referenced where applicable</li> <li>c. Where City or CDOT standards cannot be used, details in the plans</li> </ul>		

\* Quantities are not required unless separate overlot grading permit requested.

#### **GENERAL NOTES**

- 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. Water truck if called for by the City Inspector will be provided to keep wind erosion in check.
- 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 delineated Flood Hazard Areas until the Final Drainage Plan has 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. 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 notice by the City shall cause the City to issue a stop work order (red tag) and/or do the work and make a claim against the letter of credit for any cost incurred by the City.
- 6. Areas being disturbed by the grading shall be reseeded with native vegetation or as approved on the development plan.
- 7. It shall be the responsibility of the developer during construction activities to resolve 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 future contiguous public or private improvements, the developer shall be responsible for submitting revised plans to the City of Lakewood 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.
- 8. 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.

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.

9. Contractor shall contact Utility Notification Center of Colorado (1-800-922-1987) for location of underground gas, electric, and telephone utilities at least 48 hours prior to commencement of construction.

#### APPROVAL BLOCK

#### ENGINEERING APPROVAL CITY OF LAKEWOOD

Review is only for general compliance with City of Lakewood Engineering standards and requirements. All responsibility for existing conditions, correctness of dimensions, details, concepts, quantities and safety during construction shall remain with those designing, developing and constructing the project.

City Engineer

Date

## DEVELOPMENT REVIEW CHECKLIST

## SOIL AND PAVEMENT DESIGN REPORT

The City of Lakewood requires pavement design reports for proposed streets and parking lots. The reports are to include the soils information necessary to substantiate the proposed pavement design.

The Colorado Department of Transportation methodology is accepted for both rigid and flexible street pavement designs. For parking lots the Asphalt Institute or Portland Cement Association methodologies are also accepted in lieu of the Colorado Department of Transportation methodology.

The following checklist has been developed to assist in preparation of soil and pavement design reports. It includes items pertinent for the City's review and reflects established professional engineering practice for pavement design. If you have any questions regarding items on this list, contact the Engineering Development Assistance Section.

#### APPROVAL BLOCK

The approval block shown on the last page of this checklist the page of the submittal.

I. a. b. c. d.	PLAN SHEET FORMAT Title page with project address and approval block 8½" x 11" report, bound or in a folder Dated, checked, signed and sealed by a PE (both soils and pavement if done by different parties) Original and revision dates	PRESENT	<u>COMMENT</u>
II. a. b. c. d. e. f. g. h.	SOILS INFORMATION Boring locations on site plan Boring logs Gradation tests Atterberg limits Compaction tests Percent swell* Soil classification (AASHTO) Problem areas on the site		
III. a. b. c. d. e. f.	DESIGN CRITERIA Roadway classification Forecast traffic volumes Construction traffic forecast 18 KIP EDLA or DTN Serviceability index Regional factor		
IV. a. b. c. d.	<u>PAVEMENT DESIGN</u> Weighted structural number CBR Tests Design CBR R Value		

e. f. g. h. i.	Subgrade properties City of Lakewood pavement design nomographs Basecourse Pavement Alternatives	
V.	CONSTRUCTION METHOD	
a.	Retesting after rough grading	 
b.	Paving sequence	
C.	Lift thickness	 
d.	Problem areas	 
e.	Construction traffic control plan	 

\*Note: If percent swell exceeds 1.5%, the report shall include the proposed method(s) to deal with swelling soil characteristics.

## APPROVAL BLOCK

ENGINEERING APPRO	VAL
CITY OF LAKEWOOI	D
Review is only for general compliant Lakewood Engineering standards ar requirements. All responsibility for e conditions, correctness of dimensior concepts, quantities and safety durin construction shall remain with those developing and constructing the pro	ce with City of nd existing ns, details, ng designing, ject.
City Engineer	Date

## DEVELOPMENT REVIEW CHECKLIST

## STREET CONSTRUCTION PLANS

The City of Lakewood requires construction plan submittals on development projects when improvements are proposed within easements, public rights-of-way or on private streets. Plan submittals are required at two points in the development process. The first is at the preliminary (functional) design stage and the second is when plans are finalized.

The following checklist has been developed to assist in preparation of street construction plans. It includes items pertinent for the City's review and reflects established professional engineering practice for preparation of construction plans. If you have any questions regarding items on this list, please call the Engineering Development Assistance Section.

#### PRELIMINARY CONSTRUCTION PLANS

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. This will allow for a constructive discussion of the design submittal prior to initiation of the details required with final construction plans. The preliminary submittal should address the horizontally controlled plan elements plus any topographic details involving grade changes of 3' or more that would require walls, slopes, utility relocations, etc. The preliminary submittal is also used for preparation of the public improvement agreement (PIA) and therefore must contain an approximate list of quantities for improvements within City right-of-way or easements. The items required on the preliminary plan submittal are indicated by an asterisk (\*) on the following checklist.

#### FINAL CONSTRUCTION PLANS

The final construction plan submittal should be based on the approved preliminary plan. The submittal should be a complete and self supporting plan set including all the details and documentation necessary for construction of the proposed improvements. City of Lakewood and CDOT standards which are being used on the project can be referenced rather than detailed if desired.

#### GENERAL NOTES

The general notes included with this checklist are to be used on construction plan submittals. This list of general notes is not intended to be all inclusive for every project, therefore, additions may be appropriate.

#### APPROVAL BLOCK

The approval block found on the last page of this checklist must be on all construction plan sheets. It should be placed as close as possible to the title block in the lower right corner of the sheet.

I.	PLAN SHEET FORMAT	PRESENT	COMMENT
*a. *b. *c. *f. *f. *j. *k. I.	Scale: 1" = 50' horizontal or larger, 1" = 5' vertical or larger North arrow Title block Vicinity map 1" = 500' or larger 24" x 36" plan sheets Original and revision dates Plans checked, sealed, signed and dated by a PE Legend Street names and dimensions Match lines and sheet numbers Approval block General notes		
II.	HORIZONTAL AND VERTICAL CONTROL		
*a. *b. *c.	Bench mark description and elevation (must be City of Lakewood, USGS or NGS datum) Section line or control line with ties to section corner Beginning station tied and referenced to section line or control line		
III.	PLAN REQUIREMENTS		
*a. *b. *c.	Existing improvements for the full width of the street up to 50' beyond the construction limits depicted by dashed lines, proposed construction depicted by solid lines Limits of construction noted Location of proposed and existing property lines, easements. City right-of-way, etc.		
*d.	List of quantities (preliminary submittal only)		
*e.	Existing utilities, proposed utilities and utilities to be relocated (these may be on a separate plan sheet)		
*f. *a	Locations of fixed objects (trees, poles, fences, etc.)		
у.	gutter, asphalt patchback, etc.)		
*h. i	Existing and proposed drainage structures (inlets, manholes, channels, outlet structures, etc.)		
	PI deflection angle, degree of curvature,		
*j.	Proposed 1"=50' striping and signing plan indicating		
*k.	Proposed 1"=20' traffic signal plan		

PROFILE/CROSS SECTION REQUIREMENTS	<u>PRESENT</u>	<u>COMMENT</u>
<ul> <li>Three line profiles (centerline and flowlines) or centerline profile and cross sections every 50' extending a minimum of 50' beyond the project limits</li> </ul>		
b. On widening/matching projects 3 line profiles and cross sections every 25' extending a minimum of 50' beyond the project limits are required.		
<ul> <li>c. Vertical curve data including length of curve, PVC., PVT, PVI, beginning and end grades</li> </ul>		
d. Profiles for all curb returns		
<ul> <li>Existing profile elevations extended 100' beyond the end/beginning of the project</li> </ul>		
f. Cross sections extended 25' beyond property line		
IV. STANDARD DETAILS		
a. City or CDOT standard details referenced where		
<ul> <li>b. Where City or CDOT standards cannot be used, details on the plans</li> </ul>		

\* Items required on preliminary street construction plans.

## APPROVAL BLOCK

## ENGINEERING APPROVAL CITY OF LAKEWOOD

Review is only for general compliance with City of Lakewood Engineering standards and requirements. All responsibility for existing conditions, correctness of dimensions, details, concepts, quantities and safety during construction shall remain with those designing, developing and constructing the project.

City Engineer

Date

## GENERAL NOTES

- 1. All work within the public rights-of-way and easements shall conform to the City of Lakewood Engineering Regulations, Construction Specifications and Design Standards.
- 2. A Work in Public Ways **<u>permit is required</u>** for all work in the public rights-of-way. In addition, any work performed within State rights-of-way will require a State permit.
- The contractor shall contact the Utility Notification Center of Colorado (1-800-922-1987) and other affected utilities to <u>locate underground facilities</u> at least 48 hours prior to commencement of construction.
- 4. The contractor shall <u>notify the City Inspector</u> at 303-987-7900 24 hours prior to starting work and 24 hours prior to each desired and required inspection.
- 5. The contractor shall be solely and completely responsible for conditions at and adjacent to the job site, including <u>safety</u> of all persons and property during performance of the work. This requirement shall apply continuously and not be limited to normal working hours and includes traffic control in accordance with the Manual on Uniform Traffic Control Devices. The City's review of plans and construction is not intended to include review of the adequacy of the safety measures in, on, or near the construction site.
- 6. It shall be the responsibility of the developer during construction activities to <u>resolve</u> <u>construction problems</u> due to changed conditions or design errors encountered by the contractor during the progress of any portion of the 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 future contiguous public or private improvements, the developer shall be responsible to <u>revise plans</u> and submit them to the City for approval prior to any further construction related to that portion of the work. Any improvements not constructed in accordance with the approved plans, or the approved revised plans, shall be removed and the improvements shall be reconstructed at no cost to the City.
- 7. The contractor shall **provide access** to and from all private property adjacent to the work throughout the period of construction.
- 8. <u>**Relocate all utility poles**</u> prior to placement of concrete. Xcel electric pole relocations are coordinated through the City and require a minimum of 160 days written notice to the City's Traffic Engineering Division for relocation.
- 9. <u>Adjust rims</u> of all cleanouts, manholes, valve covers and survey monuments to finished grade and cross-slope prior to final lift of paving.

- 10. Prior to final placement of surface pavement, all <u>underground utility facilities and</u> <u>street lighting</u> shall be installed and service connections stubbed out beyond curb line. 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. All <u>above-ground objects</u> shall be located at least two feet from the edge of all sidewalks and bike paths. Such objects include utility boxes and poles, bus benches and shelters, retaining walls, etc.
- 12. **Survey Monuments** must be set prior to City acceptance of the improvements.
- 13. Mylar "<u>AS-BUILT" plans</u> are required prior to final acceptance of work by the City. As-built plans shall accurately reflect horizontal and vertical locations and sizes all of storm sewer components including pipes, inlets, manholes, outlets, etc.
- 14. Permission to reproduce these plans is hereby expressly given to the City of Lakewood for City purposes associated with plan review, approval, permitting, inspection and construction of the work.

## DEVELOPMENT REVIEW CHECKLIST

## RETAINING WALL DESIGN

The City of Lakewood requires retaining wall submittals for proposed retaining walls which exceed 30 inches above the lowest finished grade, are on or near a property line, public right-ofway or public use area or impact the current grading or drainage characteristics on adjacent properties. This includes concrete, timber and rock walls.

The following checklist has been developed to assist in preparation of retaining wall submittals. It includes items pertinent for the City's review and reflects established professional engineering practice for design of retaining walls. If you have any questions regarding items on this list, contact the Engineering Development Assistance Section.

#### CALCULATIONS

Engineering calculations must be submitted with the construction drawings covering items noted in the checklist. If any commonly accepted "standard" wall design such as one from CDOT Bridge Standards is used, a copy of the design and the reference or source for the design can be submitted in lieu of calculations.

#### **GENERAL NOTES**

The general notes included with this checklist are to be used on retaining wall plan submittals. This list of general notes is not intended to be all inclusive for every project, therefore, additions may be appropriate.

#### APPROVAL BLOCK

The approval block shown on the last page of this checklist must be on the title page of the submittal.

I.		<u>REPORT/PLAN FORMAT</u>	PRESENT	<u>COMMENT</u>
	a. b. c. d. e.	Title page with address and approval block 8 $\frac{1}{2}$ " x 11" Report and details or details on 24" x 36" plan sheet with supporting calculations Dated, checked, signed and sealed by PE Original and revision dates Site plan with wall location (1" = 50' or larger)		
II.		DESIGN DATA		
	a. b. d. e. f. g. h.	Soils report and/or source of design data Weight/density soil, concrete, rock, timber Allowable bearing pressure Equivalent fluid pressure Construction material strengths Coefficient of friction Adjacent ground surface slopes Surcharge loadings		

## III. SYSTEM STABILITY CHECK

<ul> <li>a. Overturning factor of safety greater than 1.5</li> <li>b. Sliding factor of safety greater than 1.5</li> <li>c. Bearing pressure less than allowable soil bearing pressure</li> <li>d. Footing base at or below 36" frost depth</li> <li>e. Slope stability</li> </ul>	
IV. PLAN REQUIREMENTS	
<ul> <li>a. Existing improvements depicted by dashed lines, proposed construction by solid lines</li> <li>b. Limits of construction noted</li> <li>c. Location of proposed and existing property lines, easements, etc.</li> <li>d. Location of fixed objects (trees, poles, fences, etc.)</li> <li>e. Layout data <ol> <li>Profiles</li> <li>Cross sections</li> <li>Elevations with benchmark</li> <li>Control line</li> <li>Horizontal layout</li> </ol> </li> </ul>	
V. <u>WALL DETAILS</u>	
<ul> <li>a. Concrete/Masonry</li> <li>1. Reinforcing steel</li> <li>2. Weep holes</li> <li>3. Control/expansion joints</li> <li>4. Type of concrete</li> <li>5. Facing</li> </ul>	
<ul> <li>b. Timber</li> <li>1. Lumber treatment</li> <li>2. Dead men</li> <li>3. Drift pins</li> <li>4. Tie backs/anchors</li> <li>5. Batter</li> </ul>	
<ul> <li>c. Stacked Rock</li> <li>1. Base material</li> <li>2. Rock sizes/shapes</li> <li>3. Batter</li> </ul>	 

#### VI. **GRADING/DRAINAGE**

- a. Ground slope b. Backfill material
- c. Drainage system

## APPROVAL BLOCK

ENGINEERING APPROVAL		
CITY OF LAKEWOOD		
Review is only for general compliance with City of		
Lakewood Engineering standards and		
requirements. All responsibility for existing		
conditions, correctness of dimensions, details,		
concepts, quantities and safety during		
construction shall remain with those designing,		
developing and constructing the project.		
City Engineer Date		

## **RETAINING WALL - GENERAL NOTES**

- 1. <u>A separate permit is required</u> for construction of any retaining wall or series of interdependent retaining walls which will support material exceeding 30 inches in height, for all walls in or immediately adjacent to right-of-way, and for all walls which will be maintained by a Homeowners' Association.
- The contractor shall contact the Utility Notification Center of Colorado (1-800-922-1987) and other affected utilities to <u>locate underground facilities</u> at least 48 hours prior to commencement of construction.
- 3. The contractor shall <u>notify the City Inspector</u> at (303-987-7900) 24 hours prior to starting work.
- 4. The contractor is solely and completely responsible for conditions at and adjacent to the job site, including <u>safety</u> of all persons and property during performance of the work. This requirement shall apply continuously and not be limited to normal working hours and includes traffic control in accordance with the manual on Uniform Traffic Control Devices. The City's review of plans and construction is not intended to include review of the adequacy of the safety measures in, on, or near the construction site.
- 5. It shall be the responsibility of the developer to <u>resolve construction problems</u> due to changed conditions or design errors encountered by the contractor during the progress of any portion of the 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 future contiguous public or private improvements, the developer shall be responsible to <u>revise plans</u> and submit them to the City for approval prior to any further construction related to that portion of the work. Any improvements not constructed in accordance with the approved plans, or the approved revised plans, shall be removed and the improvements shall be reconstructed at no cost to the City.
- 6. A <u>Retaining Wall Conformance Statement</u> must be submitted to and approved by the City prior to issuance of a Certificate of Occupancy or Certificate of Acceptance.
- 7. Permission to reproduce these plans is hereby expressly given to the City of Lakewood for City purposes associated with plan review, approval, permitting, inspection and construction of the work.

## III. RIGHT-OF-WAY/STREET IMPROVEMENTS

## III RIGHT OF WAY/STREET IMPROVEMENTS

## A. PAVEMENT STRUCTURAL DESIGN

The pavement sections proposed for streets and parking lots in new developments are to be documented in a "Soil and Pavement Design Report" prepared by a registered professional engineer. A checklist noting the items necessary in that report is included in section II of this document.

## Street Classifications

<u>STREET</u>	AVERAGE DAILY	ADJACENT LAND USES
CLASS	VOLUMES	
Arterial or Major Streets	12,000 plus	High Density Multi-family Residential Regional Commercial/Office
Major Collectors	7,000 plus	Low Density Local Commercial High Density Multi Family Residential
Minor Collectors	Less than 7,000	Low Density Neighborhood Commercial Low Density Multi-family Single Family Residential
Local	Less than 2,500	Residential or Predominantly Residential with Local Commercial Uses at Select Intersections

These classifications are provided as a general guide to assist in the pavement structural design. For determination of street classifications, refer to the City of Lakewood Transportation Engineering Design Standards.

#### EDLA Values

The following tables may be used to calculate the 18 KIP Equivalent Daily Loaded Axle (EDLA) values for pavement design. They were developed by the City in concert with the local chapter of the Institute of Transportation Engineers (ITE). They are based on collected traffic data and the Colorado Department of Transportation design methodology.

If traffic counts to forecast design year volume are not already available, the City of Lakewood Traffic Engineering Division should be contacted for forecast traffic volumes on a particular street. The "Design Year" shall be 20 years from the proposed development date for both streets and parking lot designs.

#### EDLA VALUES FOR PROPOSED MAJOR/ARTERIAL STREETS

TOTAL NUMBER OF	THROUGH LANES
<u>4 LANE</u>	<u>6 LANE</u>
58	39
88	58
117	78
146	97
176	117
205	137
235	156
264	176
293	195
	TOTAL NUMBER OF <u>4 LANE</u> 58 88 117 146 176 205 235 264 293

## EDLA VALUES FOR PROPOSED MAJOR COLLECTOR STREETS

DESIGN YEAR	TOTAL NUMBER OF THROUGH LANES	
VOLUME	<u>2 LANE</u>	<u>4 LANE</u>
7,000	44	33
8,000	51	38
9,000	57	43
10,000	64	48
11,000	70	52
12,000	76	57

## EDLA VALUES FOR PROPOSED MINOR COLLECTOR STREETS

DESIGN YEAR	
<u>VOLUME</u>	<u>2 LANE</u>
3,000	16
4,000	22
5,000	28
6,000	33
7,000	39

#### EDLA VALUES FOR PROPOSED LOCAL STREETS

DESIGN YEAR <u>VOLUME</u>	<u>2 LANE</u>
Less than 1,000	5
2,000	8
2,500	10

The minimum EDLA for local streets and parking lots shall be 5.0.

#### Soil Conditions

A soils and pavement design report is required for all proposed street and parking lot pavements. Should the soils report indicate varying soil conditions with the potential presence of excessive swelling (greater than 1.5%) or other potentially troublesome characteristics, alternative designs will need to be presented for the potential "hot spots" on the project.

Also, should the field inspection upon completion of the overlot grading indicate areas apparently differing from the report conditions or presenting potential problems, an amended pavement design report will be required.

#### Design Criteria

Following are the design criteria for the respective pavement types which are to be used for developing an appropriate pavement design. An allowance must be made for construction truck traffic based on forecast volumes and loadings. Thicker pavement sections may be required based on these forecasts.

#### Flexible Pavements

The design shall be based on Colorado Department of Transportation methodology with soils classified in accordance with the AASHTO soil classifications. A sieve analysis and an Atterberg limit is required every tenth of a miler on every street if street lengths are less than one-tenth mile. In parking lots they are required in each representative use area. A CBR test will be required for every representative soil type.

If the plastic index from the soil analysis exceeds 30 and the liquid limit exceeds 45, a swell consolidation test and additional CBR tests may be required by the City Engineer in order to properly design the pavement structural section.

The minimum regional factor shall be 1.00 (1.25 if curb and gutter is not used). The serviceability index shall be a minimum of 2.0 after twenty (20) years for streets with an ADT less than 750. Streets with an ADT greater than 750 shall be 2.5 after twenty years. The acceptable design nomographs for pavement design are shown in design aids No. 1, 2 and 5 which are at the end of this section.

The minimum Weighted Structural Number shall be 2.04 with the minimum cross section allowed on any street being five inches (5") of hot mix asphalt pavement on compacted subgrade.

Lifts on asphalt pavement shall not be less than one and one-half inches  $(1 \frac{1}{2})$  or more than three inches (3") in depth. Final lifts shall not be placed between October 1 and April 1 without City approval.

The minimum cross-section for parking lots shall be two and on-half inches (2 ½") of Hot Bituminous Pavement and four inches (4") of aggregate base course (Class 6) on 6" compacted subgrade. An equivalent full depth asphalt section may also be used over compacted subgrade. Pavement thickness above the minimum must be used in areas such as trash truck service areas. The pavement design for parking lots may be based on the Asphalt Institute methodology in lieu of CDOT if desired.

The allowable strength coefficients for pavement design are:

Component	Coefficient
Road Mix Bituminous Pavement	0.20

Existing Bituminous Pavement	0.20
Plant Mix Bituminous Base	0.34
Hot Bituminous Pavement	0.44
Aggregate Base Course (CL 6) (CBR>84)	0.14*
Aggregate Base Course (CL 6) (CBR<84)	0.12
Aggregate Base Course (CL 1)	0.10
Emulsified Asphalt Treated A.B.C.	0.20
Cement Treated A.B.C.	0.23
Hydrated Lime Treated A.B.C.	0.14
Select Borrow	0.10

\* Source and strength tests must be approved by City prior to use.

#### **Rigid Pavements**

The design of rigid pavements shall be based on the Colorado Department of Transportation's design procedure with soils classified in accordance with the AASHTO soil classifications. A sieve analysis and an Atterberg limit is required every tenth of a mile or on every street if street lengths are less than one tenth of a mile. In parking lots they are required in each representative use area.

A CBR test will be required for each representation soil type.

If the plastic limit from the soil analysis exceeds 30 and the liquid limit exceeds 45, a swell consolidation test and additional CBR tests may be required by the City Engineer in order to properly design the pavement structural section.

Serviceability Index for designs shall be 2.0 after 20 years for streets with less than 750 ADT and 2.5 for streets with an ADT greater than 750.

The minimum section required for streets shall be six inches (6") of non-reinforced Portland Cement concrete pavement on compacted subgrade. For acceptable joint details, see design standard No. 14. An acceptable design nomograph for pavement design is shown in design aids No. 3, 4 and 5 which are at the end of this section.

The minimum cross section required for parking lots shall be 4  $\frac{1}{2}$ " of non-reinforced Portland cement concrete on compacted subgrade.

The pavement design for parking lots may be based on the Portland Cement Association methodology in lieu of CDOT if desired.

#### **Bikeways**

Bikeways shall be a minimum of four inches (4") of Portland Cement concrete on compacted subgrade. Driveway crossings and attached bike paths will be thicker as indicated in design standard No. 11. For guidelines on clearance, widths and grades see the Transportation Engineering Design Standards.











## B. PAVEMENT UTILITY CUT AND PATCH SPECIFICATIONS

#### 1. <u>General</u>

Reference Design Standard #18a and #18b.

These specifications shall apply to the removal and replacement of pavement, sidewalks, paths, driveways, curbs, gutters and other surface improvements when required for the repair or installation of infrastructure.

Mix designs for all proposed concrete and asphalt materials shall be approved by the Engineering Division prior to placement of any surface. The City may require third-party testing provided by the Permittee of any material during or after final placement to determine compliance with these specifications. The City may require removal and replacement of any material or constructed pavement which does not meet City specifications.

Any improvements in the right-of-way or on private property damaged during construction shall be repaired prior to placement of the permanent pavement patch. Damaged sections of concrete shall be removed and replaced to the nearest control joint. Replacement of less than a full stone of concrete will not be permitted. Integral curb, gutters, and/or sidewalk/paths shall be replaced in their entirety. Private improvements shall be replaced to equal or better condition, and at a minimum, in accordance with these specifications.

Cuts in asphalt streets that are over 8 feet in both dimensions shall require the use of a paving box. Cuts over 12 feet in width and 200 feet in length shall require the use of a self-propelled paver.

Cuts will not be allowed on public streets that have been overlayed within four (4) years or sealcoated within two (2) years except for emergency repair of existing facilities, or when approved by the City Engineer. When reviewing a request for a street cut on a recently resurfaced street, the City Engineer shall consider factors such as:

- Whether the applicant considered the City's anticipated resurfacing schedule prior to planning the proposed street cut,
- Alternatives that eliminate or reduce the need for the street cut,
- Whether the proposed street cut is needed to provide new service to a new customer, and
- The City Engineer may require additional restoration requirements beyond the permanent patch requirements of these specifications, to restore ride quality and anticipated pavement life, as a condition of approval. Additional requirements may include resurfacing an area larger than the street cut, replacing or using paving fabric or other materials, a longer warranty, payment to the City equal to the anticipated restoration remedy, or a reasonable combination thereof.

Cuts on public streets that have been overlaid within eight (8) years and are longer than 200 feet or consist of multiple cuts that, upon review by the City may affect the ride quality of the street, will require milling and an overlay to restore ride quality and anticipated pavement life. Milling shall extend from the gutter or edge of asphalt to the center line of the street on residential streets, or to adjacent lane lines on collector and arterial streets.

 The minimum overlay depth for HBP Grading SX shall be three (3) times the nominal particle size or two (2) inches whichever is greater. HBP shall be placed using a self-propelled paver to the widths noted above.

 The minimum overlay depth for SMA virgin ½ inch mix shall be two (2) inches placed using a self-propelled paver to the widths noted above.

Cuts on public streets that have been seal coated within three (3) years and are longer than 200 feet or consist of multiple cuts that, upon review by the City, may affect the anticipated pavement life of the street, will require re-seal coating of the entire street for the length of the cut(s).

For projects that require patching using SMA pavement, the Permittee may submit a request to the City to accept cash payment in lieu of providing permanent SMA patching. Acceptance of all requests is at the discretion of the City. Requests will be evaluated based on quantity of material needed, location, schedule for current and following year's overlay program and potential cost.

Upon completion of the permanent patch, the surface shall be thoroughly compacted, smooth, and free from ruts, humps, depressions, or irregularities and shall not separate from pre-existing adjacent pavement. When a straightedge ten feet long is laid across the permanent patch both parallel to the centerline of the street and in a direction perpendicular to the centerline, the surface shall not vary more than 3/16 inch from the lower edge of the straight edge. Patches exhibiting deviations greater than 3/16 inch shall be replaced prior to acceptance of the patch. Patches separating from pre-existing adjacent pavement more than 3/16 inch shall be replaced or sealed as directed by the City. Patches shall have a cross slope consistent with the design of the existing roadway.

## 2. Cutting Streets

The Engineering Division shall be notified 24 hours in advance and shall inspect utility cuts whenever they are made in the public rights-of-way. All cuts require a city permit.

All streets shall be kept open to traffic by the Permittee unless otherwise approved by the City Engineer. Prior to beginning work, a traffic control plan must be submitted to and approved by the Traffic Engineering Division. All barricading and traffic control devices shall be in compliance with the approved traffic control plan.

Existing pavements may be removed by jack hammering, line cutting, or saw cutting to straight lines parallel and perpendicular to the flow of traffic. Prior to final patching, asphalt and concrete pavements shall be cut to clean, straight lines. Angled and irregular shaped patches will not be allowed and the edges of patches shall not fall within two feet of existing wheelpaths. (Reference Design Standard #18b)

Patches on asphalt streets shall not be less than two feet in any dimension unless approved by the City Engineer. Cuts shall not leave strips of existing pavement less than three feet in width from the edge of the new patch to the lip of the gutter, edge of paved roadway surface, or edges of existing patches. Patches on all streets shall be 4 sided, with sides either parallel or perpendicular to the direction of traffic.

Patches on concrete streets shall not be less than five feet in any dimension, and patches shall not leave strips of existing concrete pavement of less than five feet in width from the edge of the new patch to the lip of the gutter, edge of paved roadway surface or adjacent concrete construction joints. Patches within existing patches will not be accepted. Boundaries of the patches will coincide. (Reference Design Standard #18b)

Asphalt and concrete pavements shall be removed by saw cutting prior to final patching (asphalt pavements may also be rotomilled). Care shall be taken to avoid breaking away the edges of the existing pavement or damaging the remaining pavement with heavy
construction equipment. Any overbreak or separation outside the original cut shall be recut and squared off.

## 3. Trench Backfill

Excavation, including the manner of supporting excavation and provisions for access to trenches, shall comply with current OSHA regulations for trench safety.

Trench backfill shall consist of on-site structural excavated material, approved imported fill, or "flowable backfill."

In areas where lime treated sub-base, cement modified sub-base, soil cement, or similar materials have been used, the Permittee shall replace the material in kind, or provide flowable backfill up to the bottom level of the hot bituminous or concrete pavement.

On-site excavated material or imported fill used for backfill shall be compacted to the density and moisture content outlined below:

AASHTO CLASSIFICATION	REQUIRED COMPACTION	MOISTURE CONTENT TOLERANCE FROM OPTIMUM
A-1, A-2-5, A-2-7, A-3, A- 4, A-5	Min. 95% of AASHTO T180	-3 to +3
A-2-4, A-2-6, A-6, A-7	Min 95% of AASHTO T 99	0 to +3

#### (Table 1) Backfill Compaction and Moisture Requirements

Backfill material must be placed and compacted in maximum eight inch loose lifts, unless compaction equipment is used that allows larger lift thickness, as approved by the Inspector.

On trenches of under 200 lineal feet (I.f.) in length and less than 500 square feet (s.f.) in total area, the City shall perform moisture/density testing as needed. On all trenches of over 200 I.f. in length, or 500 s.f. in total area, the Permittee shall be responsible for testing of trench backfill. Testing shall be done under the direction of a professional engineer licensed in the State of Colorado and practicing in this field. Minimum testing frequency shall be one density test for each two vertical feet of backfill for each 100 I.f. or 500 s.f. In no case shall there be less than three tests in any trench with the tests distributed from two feet above the utility line to the subgrade. Test results shall be provided to the City prior to placement of the hot bituminous pavement or Portland cement concrete pavement. Failure to provide timely documentation of testing will result in removal and replacement of the backfill and pavement at the Permittee's expense or inplace testing at the Permittee's expense.

The alternative to the use of structural on-site excavated material or approved imported fill is the use of flowable backfill. Flowable backfill shall consist of a controlled low strength, self-leveling concrete material composed of a mixture of cement, fly ash, aggregate, water, and chemical admixtures. Flowable backfill shall have a design compressive strength of between 50 and 150 psi at 28 days when tested in accordance with ASTM D 4832. The mix should have a design slump between six and ten inches. The flowable backfill mix design shall be submitted to the Engineering Division for approval prior to construction. The mix design shall include verification of the 28 day compressive strength.

Flowable backfill shall be discharged directly from the truck into the space to be filled, or by other methods approved by the City. The mix may be placed partial or full depth. When used as backfill in the pipe zone, care should be taken to prevent flotation or misalignment of the pipe by means of straps, soil anchors or other approved means of restraint. Material

may be placed in stages with initially less flowability, to prevent movement or flotation of pipe. Compaction of flowable backfill will not be required.

Placement of pavement materials or vehicle traffic shall not be allowed until the flowable backfill has achieved a penetration resistance of a least 600 psi using a hand-held penetrometer, in accordance with ASTM C 403. This penetration resistance shall be considered achieved when a person weighing at least 150 pounds, using their body weight, cannot penetrate the flowable backfill with the square cut end of a No. 4 steel reinforcing bar. A traffic plate or barricading of the patch area will be required until temporary or permanent patching is completed, as per the approved traffic control plan.

Flowable backfill shall be placed to the levels indicated in the <u>Permanent Patch</u> section of these specifications. Traffic will not be allowed directly on the flowable backfill material.

#### 4. Temporary Patch

Temporary patches will not be allowed without prior approval by the City Engineer or his designee.

Whenever permanent pavement patches are not constructed immediately following utility cut backfilling operations, temporary pavement patches consisting of minimum of three inches of hot or cold mix asphalt may be utilized to provide the required number of paved travel lanes. Temporary pavement patches may be left in place for a maximum of 14 calendar days, unless otherwise required by the City Engineer, following completion of backfilling operations. Temporary patches must be inspected daily by the contractor and maintained by the contractor to the following tolerances at all times.

The following surface tolerance for temporary patches shall be observed. When a 10-foot straight edge is laid across the temporary patch both parallel to the centerline of the street and in a direction perpendicular to the centerline, a rut, hump, or depression of more than  $\frac{3}{4}$  inch shall not be present. Deteriorated temporary patches exhibiting ruts, humps, or depressions in excess of  $\frac{3}{4}$  inch shall be repaired or replaced immediately upon notification from the City.

## 5. Permanent Patch

The Engineering Division shall be notified 24 hours in advance of placement of the permanent patch.

Prior to placing the permanent patch, the existing pavement shall be sawcut or rotomilled to a neat straight line. The sawcut or rotomill edge shall extend to a minimum depth of six inches or saw cut full depth if the pavement is less than six inches thick. Any additional asphalt below this level may be cut to a vertical edge utilizing jackhammers, cutting wheels or other approved methods.

Concrete pavement must be sawcut full depth.

Pavement shall be replaced at the minimum thickness shown below.

Roadway Classification	Hot Bituminous Pavement	Concrete Pavement
Arterial	9"	9"
Collector	7"	7"
Local	5"	5"
In no case shall the patch thickness be less than existing adjacent pavement.		

#### (Table 2) Minimum Pavement Patch Thickness

Hot bituminous pavement shall meet City of Lakewood and CDOT specifications for grading S or SX hot bituminous pavement material requirements. Binder material shall be PG 58-28 or 64-22. Compaction shall be between 92 and 96 percent of the maximum specific gravity, CP-51. Average compaction of less than 92 percent will be cause for rejection. A tack coat shall be applied to all edges of the existing pavement prior to final patching. Maximum lift thickness on asphalt patches is 3 inches.

Asphalt mix designs shall be submitted to the Engineering Division for approval prior to construction. On patches of under 200 l.f. in length and less than 500 s.f. in total area, the City shall perform testing as needed. The Permittee shall be responsible for compaction testing on asphalt patching for trenches exceeding 200 l.f. in length, or 500 s.f. in total area. A minimum testing frequency shall be one compaction test on each lift placed, for each 200 l.f. or 500 s.f. of patch. In all cases there shall be at least one test on each lift for any patch that exceeds the size limits shown above.

#### 6. <u>Concrete Sidewalks, Bikepaths, Driveways, Curbs and Gutters, and Other</u> <u>Structures</u>

Whenever an excavation cuts a concrete sidewalk, bikepath, driveway, curb and gutter, or other structure, a neat saw cut shall be made one foot (1') back from each side of the excavation to undisturbed soil; the concrete shall be removed to the nearest joint. All broken material shall be removed. Once the excavation is backfilled and subgrade compacted to 95% compaction (See Table 1), the structure shall be replaced with concrete meeting City of Lakewood and CDOT specifications for Class B concrete.

## 7. <u>Concrete Streets</u>

Concrete pavement shall be neatly sawn and removed 1 foot back from each side of the excavation; however, in no case shall the repair be less than five feet in width. If a construction, contraction, or expansion joint is less than five feet from the edge of the saw cut, the surface shall be removed back to the joint. All cuts shall be four sided.

Concrete for patching shall meet the specifications for CDOT Class B concrete with the following exception: Concrete shall be a minimum 7-sack mix with 5,000 PSI at 28 days. Test cylinders shall be specified as requested by the City Engineer or his designee.

Concrete mix designs and a jointing plan shall be submitted to the City for approval prior to construction. On patches of under 200 l.f. in length and less than 500 s.f. in total area, the City shall perform testing as needed. The Permittee shall be responsible for testing of all concrete patching for trenches exceeding 200 l.f. in length, or 500 s.f. in total area.

Testing shall include air content, temperature, slump and 7, 14, and 28 day compressive strength testing on every concrete delivery truck.

Where concrete improvements are removed and replaced adjacent to an asphalt paved surface, a minimum width of two feet of the asphalt paved surface shall be removed and replaced in a manner meeting the permanent patch requirements.

## 8. Pavement Marking and Loop Detectors

All traffic control devices removed or disturbed during construction must be replaced upon completion of the permanent patch including but not limited to signs, paint, thermoplastic or pre-formed plastic pavement markings, and traffic signal detector loops. Temporary lane lines and other markings used during construction shall be permanently removed, to the satisfaction of the Traffic Engineering Division, prior to placing the new traffic stripes or markings.

## 9. Parkways, Medians and Other Unpaved Surfaces

If a permit for work in the public way creates any excavations that lie within unpaved areas and parkways, the excavated soil shall be carefully deposited and satisfactorily tamped in uniform layers not greater than eight inches (8") in thickness until the backfill reaches the top of the substructure. The remainder of the excavation shall be backfilled in uniform layers not exceeding twelve inches (12") in thickness, and satisfactorily tamped to within one foot (1') of the surface. The backfilling operation shall continue with soil until the backfill remains slightly above the ground level. Excess material shall be disposed of. Granular backfill meeting City specifications may also be used, however, topsoil shall be used for the final foot of backfill.

Excavations will require restoration of the area to original condition, including irrigation system repair, topsoil placement, seeding, sodding and/or replacement of plant materials. It is the responsibility of the permittee to establish a good stand of grass. The area shall be left free from debris and clods. On steep embankments or upon request of the City Engineer, sod or other erosion control techniques shall be used for restoration.

## 10. Gravel Streets

Excavations in gravel streets and alleys shall be backfilled in the same manner as excavations in paved streets. The final surface shall be 6 inches of compacted Class 6 aggregate base course material.

## 11. Warranty

All cuts shall be warrantied for two years. During the warranty period, the Permittee shall be required to repair any defects in the final asphalt or concrete patch including, but not limited to:

## <u>Asphalt</u>

- Alligator cracking of the asphalt surface
- Excessive stripping of the asphalt surface
- Potholes in the asphalt surface
- Settlement of the asphalt surface greater than or equal to 1/2 inch
- Separation of the patch from the existing pavement of more than 3/16" of an inch

## <u>Concrete</u>

- Any cracking outside of a control joint
- Any scaling or spalling
- Surface damage
- Settlement of the concrete surface greater than or equal to 1/2 inch

#### Gravel Streets and Other Unpaved Surfaces

Settlement of the surface greater than or equal to ½ inch

## C. STREET GRADING

The intersection of roadway cut slopes with the existing ground shall be rounded in earth cuts, beginning outside the slope stake and extending down the cut slope. The maximum cut and fill slopes after the bench (two foot minimum level area) adjacent to the

roadway/pedestrian facilities shall be:

Maximum Cut or Fill Slope 3:1. Recommended Cut or Fill Slope 4:1 Maximum Slope if maintenance to be undertaken by City is 4:1

Finished pavement cross slopes may not be less than 1% nor exceed 4%. 2% is the recommended standard.

## D. PIPE TRENCHING

All excavating and trenching operations within the City of Lakewood are required to comply with OSHA construction safety and health standards. The standards require that whenever there is danger of moving ground, protection shall be provided either by shoring, sloping the ground, or other equivalent means. These standards shall be rigidly followed.

## E. ALL WEATHER ACCESS

All weather access must be constructed when temporary certificates of occupancy are requested on buildings prior to the public improvements being completed.

All weather access shall meet the following three conditions:

- 1. Pavement shall consist of a minimum of 3" HBP, 20 feet in width.
- 2. The minimum cross slope shall be 2%.

## F. CUL-DE-SACS

The total street length of a cul-de-sac or a loop cul-de-sac, as shown in Design Standards 6A and 6B must not be greater than 500 feet 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 feet for 1R, 2R, 3R and R1A Zone Districts, provided the water supply system for fire protection is approved by the fire protection district.
- 2. The total length of a cul-de-sac for Zone Districts higher than 1R, 2R, 3R or R1A may be increased to a maximum of 750 feet provided the water supply system for fire protection is approved by the fire protection district.
- It should be noted that for cul-de-sacs serving developments with buildings exceeding 26 feet in height, the appropriate fire department may require a 45 foot radius cul-de-sac bulb to permit ladder fire trucks to turn around. The exact design will be determined by the appropriate fire district.

## G. SURVEY MONUMENTS

The standard Survey Monument shown in the design standards shall be installed at all street centerline intersections, the center of radius for cul-de-sacs, and at the end of dead end streets. All monuments shall be set within 60 days of completion of the streets. If this is not done, the City will have the work performed by a registered land surveyor and make a claim against the collateral for the amount of costs plus administration for such work.

# IV. CONSTRUCTION SPECIFICATIONS

## IV. CONSTRUCTION SPECIFICATIONS

By adoption of these Engineering Regulations and Design Standards, the City of Lakewood adopts the current edition of Colorado Department of Transportation's Standard Specifications for Road and Bridge Construction as revised, the Colorado Department of Transportation's Construction Manual as revised, and the Urban Drainage and Flood Control District's current edition of the Drainage Criteria Manual as revised.

Traffic signal construction shall be per the City of Lakewood traffic engineering specifications.

# V. WATER PROVIDERS AND SANITATION DISTRICTS

## V. WATER PROVIDERS AND SANITATION DISTRICTS

The City of Lakewood does not operate or maintain all domestic water and sanitary waste water systems. Provisions of many of these services is provided by the districts within the City noted on the following maps.

LETTERS CORRESPOND TO AREAS ON THE MAP AND ARE CURRENT AS OF SEPTEMBER 1986.

#### WATER PROVIDERS

1.	Alameda Water and Sanitation	
	359 South Harlan, Lakewood, CO 80226	303-936-5313
2.	Bancroft-Clover Water and Sanitation	
	9001 West Jewell Avenue, Lakewood, CO 80226	303-922-1113
3.	Bear Creek Water & Sanitation	
	2517 South Flower Street, Denver, CO 80227	303-986-3442
4.	Bennett Bear Creek Water & Sanitation	
	PO Box 840, Morrison, CO 80456	303-697-0700
5.	Bon-Vue Water and Sanitation	
	PO Box 150789, Lakewood, CO 80215	303-238-2851
6.	College Park Water & Sanitation	
	14799 West 6 <sup>th</sup> Avenue, Ste. A5, Golden, CO 80401	303-278-7223
7.	Consolidated Mutual Water	
	12700 West 27th Avenue, Lakewood, CO 80215	303-238-0451
8.	Denver Water Dept.	
	1600 West 12th Avenue, Denver, CO 80254	303-628-6000
9.	Green Mountain Water and Sanitation	
	13919 West Utah Avenue, Lakewood, CO 80228	303-985-1581
10.	Highview Water	
	1002 Kipling Street, Lakewood, CO 80215	303-233-2182
11.	Lakehurst Water & Sanitation	
	7995 W. Quincy Avenue, Lakewood, CO 80123	303-985-7895
12.	Lakewood Water & Sewer District	
	480 South Allison Parkway, Lakewood, CO 80226	303-987-7900
13.	Lochmoor Water & Sanitation	
	7270 Radcliff Avenue, Littleton, CO 80123	303-973-2782
14.	Mt. Carbon Metropolitan District	
4 -	12340 W Alameda #209, Lakewood, CO 80228	303-985-3333
15.	Pleasant View Water & Sanitation	000 070 0004
40	955 Moss Street, Golden, CO 80401	303-279-3391
16.	South Sheridan Water & Sanitation	000 770 4505
	6399 S Fladlers Green Cir #102, Greenwood Vig, CO 80111	303-779-4525

## SANITATION DISTRICTS

1.	Alameda Water & Sanitation*	.303-936-5313
2.	Bancroft-Clover Water & Sanitation*	.303-922-1113
3.	Bear Creek Water & Sanitation	.303-986-3442
4.	Bennett Bear Creek Water & Sanitation*	303-697-0700
5.	Bon-Vue Water & Sanitation*	.303-238-2851
6.	College Park Water & Sanitation*	.303-278-7223
7.	Daniels Sanitation* (same address as Highview Water)	.303-233-2182
8.	East Jefferson Sanitation	
	390 Union Blvd. #630, Lakewood, CO 80228	.303-986-1444
9.	East Lakewood Sanitation	
	6595 W Ohio Ave., Lakewood, CO 80266	.303922-0270
10.	Green Mountain Water & Sanitation*	.303-985-1581
11.	Lakehurst of Water & Sewer	.303-985-7895
12.	Lakewood Water & Sewer*	.303-987-7900
13.	Lochmoor Water & Sanitation*	.303-796-8281
14.	Mt. Carbon Metropolitan District	.303-987-3305
15.	Northwest Lakewood Sanitation	
	141 Union Boulevard, Ste. 150, Lakewood, CO 80228.	.303-987-0835
16.	Pleasant View Water & Sanitation*	.303-279-3391
17.	West Alameda Heights Sanitation	
	PO Box 260029, Lakewood, CO 80226	.303-232-2577
18.	Wheat Ridge Sanitation	
	7100 W. 44 <sup>th</sup> Ave., #104, Wheat Ridge, CO 80034	.303-424-7252

\*See address under WATER PROVIDER heading.





# VI. DESIGN STANDARDS

## VI. DESIGN STANDARDS

# A. CITY OF LAKEWOOD DESIGN STANDARDS

The following design standards numbers 1 through 33 have been developed for use within the City of Lakewood. They are to be used on all public improvements and private work which will be either dedicated to or accepted by the City.

City of Lakewood Design Standard 1986 Page		
#1	Local Residential Streets	. 50
#2	(Intentionally Not Used)	. 51
#3	Minimum Local Streets for Multi-Family,	
	Commercial and Industrial Areas	. 52
#4	Minimum Collector Street	. 53
#5	Minimum Arterial Roadway	. 54
#6 A,B	Cul-De-Sac	. 55,56
#7	Curb/Gutter	. 57
#8	Curb Radius and Crosspan	. 58
#9	(Intentionally Not Used)	. 59
#10	(Intentionally Not Used)	. 60
#11	Detached Sidewalk/Bikepath	. 61
#12	Driveway	. 62
#13A-H	Curb Ramps	. 63-70
#14	Concrete Joint Details	. 71
#15	Type R Inlet	.72
#16	Inlet Deflector	.73
#17	Survey Monument in Pavement	.74
#18A-B	Pavement Patch Back Detail	. 75-76
#19	Bus Stop Pad	. 77
#20	Typical Sound Wall	. 78
#21	Concrete Pipe Collar	. 79
#22	Shallow Manhole	. 80
#23	Title/Review Approval Block	. 81
#24A,B	Detention Pond Outlet Structure	. 82-83
#25A,B	Sidewalk Chase	. 84-85
#26	Pipe Bedding Detail	. 86
#27	Gutter Temporary End Section	. 87
#28	Asphalt Roadway Temporary End Section	. 88
#29	Pipe/Chase Transition	. 89
#30A,B	Type 13 Inlet (Special)	. 90-91
#31	Patterned Concrete Medians	. 92
#32	Bus Bench Pad Detail	. 93
#32A	Brick Paver (Colfax Avenue) Detail	. 94



## INTENTIONALLY NOT USED















## INTENTIONALLY NOT USED

## INTENTIONALLY NOT USED





$\left  \begin{array}{c} \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\$			
NOTES:			
<ol> <li>For ramp cross</li> </ol>	section, see design standard No. 13G.		
(2) All ramps shall including trunca areas shall star shall extend 2	have detectable warnings ted domes and color contrast. The detecta t 6 to 8 inches from the flow line of the feet up the ramp area. See design standa	ble warning curb and rd No.13H.	
③ Centerlines of c	pposing ramps and intervening crosswalk s	hall coincide.	
④ This design star	ndard can be used anywhere in the block.		
5 Three feet long landing required at top of ramp, landing width equal to ramp width, no landing slope steeper than 50:1 or 1/4" per Ft.			
6 Cross slopes of sidewalk and ramp not to exceed 50:1 or 1/4" per Ft.			
1 APPROVED	CITY OF LAKEWOOD, COLORADO	REVISIONS	
DIRECTOR OF PUBLIC WORKS	DEPARTMENT OF PUBLIC WORKS DIVISION OF ENGINEERING	04/03 05/03	
APPROVED		DESIGN STANDARD NO	
Athatchisin	CURB RAMP TYPE 1	13A	
CITY ENGINEER		E/PINKBODK/STONO13A	

Retr de Schrachto Hutter	ATTRONED	
NOTES:		
(1) Horizontal geometry of the back of walk varies depending radius and pre-existing physical obstructions. Provide a width route behind the ramp with an aesthetically pleasing	on the curb 3' minimum 1 appearance.	
② For ramp cross section, see design standard No.13G.		
3 All ramps shall have detectable warnings including truncated domes and color contrast. The detecta areas shall start 6 to 8 inches from the flow line of the shall extend 2 feet up the ramp area. See design standard	ble warning curb and rd No.13H.	
④ The wings shall be textured with a coarse broom finish a be steeper than 12:1 or 1" per ft.	nd shall not	
5 To be used when crosswalk exists in one direction only.		
6 Centerlines of opposing ramps and intervening crosswalk s	shall coincide.	
Three feet long landing required at top of ramp, landing width equal to ramp width, no landing slope steeper than 50:1 or 1/4" per ft.		
DIRECTOR OF PUBLIC WORKS	REVISIONS 12/97 04/03 05/03	
APPROVED CURB RAMP TYPE 2 CITY ENGINEER	DESIGN STANDARD NO	

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NOTES	<u>.</u> :		
1	Horizontal geor radius and pre width route be	metry of the back of walk varies depending e—existing physical obstructions. Provide a hind the ramp with an aesthetically pleasing	on the curb 3' minimum g appearance,
2	For ramp cros	s section, see design standard No.13G.	
3	All ramps shall	have detectable warnings	
	including trunc	ated domes and color contrast. The detector	ble warning
	shall extend 2	feet up the ramp area. See design stando	ard No.13H.
4	The wings shal be steeper tha	be textured with a coarse broom finish a n 12:1 or 1" per ft.	nd shall not
5	(5) Apron concrete shall be finished with the flow line separated from the ramp area by a minimum of 6". (see Design Standard No. 8.)		
6	Centerlines of	opposing ramps and intervening crosswalk	shall coincide.
Three feet long landing required at top of ramp, landing width equal to ramp width, no landing slope steeper than 50:1 or 1/4" per ft.			
1.	APPROVED	CITY OF LAKEWOOD, COLORADO	REVISIONS
DIRECTO	A OF PUBLIC WORKS	DEPARTMENT OF PUBLIC WORKS DIVISION OF ENGINEERING	04/03 05/03
	APPROVED		DESIGN STANDARD NO
Alth	tchim TY ENGINEER	CURB RAMP TYPE 3	1 3C

<ul> <li>NOTES:</li> <li>1 Horizontal geometry of the back of walk varies depending on the curb radius and pre-existing physical obstructions. Provide a 3' minimum width route behind the ramp with an aesthetically pleasing appearance.</li> <li>2 For ramp cross section, see design standard No. 13G.</li> <li>3 All ramps shall have detectable warnings including truncated domes and color contrast. The detectable warning areas shall start 6 to 8 inches from the flow line of the curb and shall extend 2 feet up the ramp area. See design standard No.13H.</li> <li>4 The wings shall be textured with a coarse broom finish and shall be no steeper than 12:1 or 1" per ft.</li> <li>5 Centerlines of opposing ramps and intervening crosswalk shall coincide.</li> <li>(6) Three feet long landing required at top of ramp, landing width equal to the ramp width, no landing slope steeper than 50:1 or 1/4" per ft.</li> </ul>			
DIRECTOR OF PUBLIC WORKS	OD, COLORADO PUBLIC WORKS NGINEERING	REVISIONS 12/97 04/03 05/03	
CURB RAM	P TYPE 4	DESIGN STANDARD NO	

<ul> <li>NOTES:</li> <li>(1) This design standard should be used only for infill situations where right-of-way restrictions or immovable obstructions exist. (City Engineer approval required.)</li> <li>(2) For ramp cross section, see design standard No. 13G.</li> <li>(3) All ramps shall have detectable warnings including truncated domes and color contrast. The detectable warning areas shall start 6 to 8 inches from the flow line of the curb and shall extend 2 feet up the ramp area. See design standard No.13H.</li> </ul>			
DIRECTOR OF PUBLIC WORKS APPROVED DIFFECTOR OF PUBLIC WORKS APPROVED DIFFECTOR OF PUBLIC WORKS	CITY OF LAKEWOOD, COLORADO DEPARTMENT OF PUBLIC WORKS DIVISION OF ENGINEERING CURB RAMP TYPE 5	REVISIONS 12/97 04/03 05/03 DESIGN STANDARD NO 13E	

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NOTES :	
Horizontal geometry of the back of walk varies depending radius and pre-existing physical obstructions. Provide a width route behind the ramp with an aesthetically pleasing	on the curb 3' minimum g appearance,
2 For ramp cross section, see design standard No. 13G.	
(3) All ramps shall have detectable warnings including truncated domes and color contrast. The detecta areas shall start 6 to 8 inches from the flow line of the shall extend 2 feet up the ramp area. See design standa	ble warning curb and rd No.13H.
The wings shall be textured with a coarse broom finish a steeper than 12:1 or 1" per ft.	nd shall be no
5 Centerlines of opposing ramps shall coincide.	
6 Three feet long landing required at top of ramp, landing to the ramp width, no landing slope steeper than 50:1 or	width equal r 1/4" per ft.
(7) This design standard is for use with traffic islands.	
DIRECTOR OF PUBLIC WORKS	REVISIONS 04/03 05/03
APPROVED	DESIGN STANDARD NO
CURB RAMP TYPE 3	13F






	VIDTH TO MATCH SIDEN NET VIDTH TO MATCH SIDEN AU AU AU AU AU AU AU AU AU AU	WALK WIDTH. DITIONAL NO. 4 AR- 11 O. C. 1/2" O. C. C. 2. STANDARD. YPE R INLET S AND BAR BELOW FOR (EWOOD TS.			
SPECIAL NOTES •MAXIMUM GRADE BREAK AT INLETS OF 1%. •WIDTH OF INLET TOP SLAB SHALL MATCH WIDTH OF SIDEWALK. •INLET CAN BE USED AS A JUNCTION BOX. •INLETS MUST BE CONSTRUCTED IN 5' INCREMENTS. •GUTTER AND TOP OF INLET SHALL BE POURED MONOLITHICALLY WITH ADJACENT CURB AND GUTTER. APPROVED MULTICALLY OF LAKEWOOD, COLORADO DEPARTMENT OF PUBLIC WORKS REVISIONS					
APPROVED CITY ENGINEER	INLET TYPE R	design standard no. 15			













NEW OR EXISTIN CONCRETE PIPE- NO. 4 AT NO. 4 AT SECONCRETE SIZ OMIT REINFO COVER, AND CONCRETE SIZ	COLLAR IS REQUIRED WHERE THE CHANGE IN ALIGNME NEW OF THE LARGER PIPE. D=D <sub>1</sub> OR D <sub>2</sub> , WH REGER THAN 66", A SPECIAL COLLAR DETAIL IS REQUIRED. THE HOSE OF THE LARGER PIPE. D=D <sub>1</sub> OR D <sub>2</sub> , WH REGER THAN 66", A SPECIAL COLLAR DETAIL IS REQUIRED. THE NOT LISTED, USE NEXT SIZE LARGER. RCING ON ALL PIPES LESS THAN 24" IN DIAMETER WITH SUBSTITUTE WITH WIRE MESH. AALL BE CDOH CLASS B.	ISTING         PIPE         D       L         T         12"       1.0'         10'       4"         18"       1.0'         24"       1.0'         36"       1.5'         48"       1.5'         57"       1.5'         60"       1.75'         60"       1.75'         10'       6''         66"       1.75'         NT       EXCEEDS         RETE       COLLAR,         ICHEVER       IS         MINIMUM       2'
8		ti D
APPROVED <i>Alastan</i> DIRECTOR OF PUBLIC WORKS	CITY OF LAKEWOOD, COLORADO DEPARTMENT OF PUBLIC WORKS DIVISION OF ENGINEERING	REVISIONS
APPROVED	CONCRETE PIPE COLLAR	design standard no. 21



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ENGINEERING APPROVAL CITY OF LAKEWOOD	Review is only for general compliance with City of Lakewood Engineering standards and requirements. All responsibility for existing conditions, correctness	of dimensions, details, concepts, quantities and safety during construction shall remain with those designing, developing and constructing the project.	CITY ENGINEER DATE	PROJECT NAME, LOCATION, & SHEET TITLE	* <sup>2</sup> c;	• ***		SCALE HORIZ: NEET. PROJECT NO.	VENI:	DATE: SHEET NO. OF SHEETS	CONSULTING ENGINEERING FIRM NAME, ADDRESS, &				τ. 	
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APPRO DIRECTOR PUBLIC	APPROVED CITY OF LAKEWOOD, COLORADO DEPARTMENT OF PUBEIC WORKS DIVISION OF ENGINEERING						REV	ISIONS								
APPROVED TITLE/REVIEW APPROVAL BLOCK CITY ENGINEER					DESIGN ST		NO.									

























1/4"-1/2" LATEX MORTAR BASE	3 5/8" x 7 5/8" x (LKWD BRICK B IN LATEX MORTA	2 1/4" FLASH BR TILE CO. OR AP R THIN SET, STAC	ROWN BRICK . PROVED SUBSTITUTE) K BOND PATTERN.
BOND BREAKER	BOND	BREAKER	
1/4" / FT.	* * * * ****	CURB & GUTTE	R TYPE 2 SEC I-B
6"CONC. PVMT.			
SIDEWALK	· · · · · · · · · · · · · · · · · · ·	Salar and Arts	é
	Arrin .	n (* 1978) <u>* 1979</u>	
	ALILAT	TTT	/
6 CONCRETE PAVEMENT		111	-
6"COMPACTED SUBGRADE	122	+ HAND TIG	HT JOINTS 1/4" MAX
	ATTACHED WALK	SWEPT W	TH DRY MIXTURE OF
an an an arrest a construction of the second se		I PART P	ORTLAND CEMENT
2% MIN. 4"	BOND BREAKER	AND 3 P	ARTS MORTAR SAND.
	17/FI * *	UGHTLY	WITH WATER
2% MIN.	• /	Eloniter	and waren.
6"CONCRETE	• • • • • ·	1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1	54
PAVEMENT		۰. ۱	
	1////	TTI	
		1111	4
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NOTES:	DETACHED WALK		
<ul> <li>2) Subgrade compaction to be 3) Brick used is to be 8000 parabsorption not to exceed 84</li> <li>4) All mortar shall be cleaned 50 7-5/8" dimension of bricks</li> <li>6) The brick pavers are not to and/or inlets.</li> <li>7) The bond breaker material at 8) No sealers or curing comport pavers. Slabs shall have a minimum of seven (7) days.</li> <li>9) The latex mortar bedding sl from one manufacturer and s Compressive strength: Tensile strength: Bond strength: Water absorption Ozone resistance: 200 The use of polyvinyl acetat be permitted.</li> <li>10) Handle, store, mix and apple manufacturer's instructions</li> </ul>	hours @ 200 ppm c, natural rubber or res	surface with ss SX, maximum surface prior to Colfax Aven lveways, pedes nil thickness. concrete slat be covered and shock and chem physical requision 500 500 No loss of sin latex emuls	AASHTO T-99. cold water to acceptance. ue traffic lanes. trian ramps bs covered with wet cured for a ical resistant, irements: 0 psm Min. 0 psi Min. 0 psi Min. 4.0% Max. 5 strength sions shall not
APPROVED CITY OF	E LAKEWOOD COL	ORADO	REVISIONS
R. Clasting DEBA	RTMENT OF PUBLIC W	ORKS	8
DRECTOR OF	DIVISION OF ENGINEERING		and a second
PUBLIC WORKS			
APPROVED 3-7-89 BRICK PAL	FR (COLEAN AVE )	DETAIL	DESIGN STANDARD NO.
Santhutchison BRICK PAV	NOT TO SCALE	DETAIL	32-A
CITY ENGINEER			

## B. COMMONLY USED COLORADO DEPARTMENT OF TRANSPORTATION STANDARDS

In addition to the City of Lakewood Design Standards, the following Colorado Department of Transportation Standards are commonly used and accepted on construction projects within the City of Lakewood.

When similar details appear in both documents the City of Lakewood Design Standard shall be used.

M-100-1	Standard Symbols
M-107-1	Temporary Erosion Control
M-604-1	Pipe Sewer in Trench
M-604-20	Manholes
M-604-21	Steps for Manholes and Inlets
M-412-1	Concrete Pavement Joints
M-609-1	Standard Curbs and Gutters
M-606	Guard Rail
M-601	Box Culverts
M-603	Metal/Concrete Pipe

# VII. REFERENCE DOCUMENTS

### **VII. REFERENCE DOCUMENTS**

The <u>Storm Drainage Criteria Manual</u> of the City of Lakewood, Colorado, dated August 9, 1982, is hereby adopted and incorporated by reference herein as a part of the Engineering Regulations, Construction Specifications and Design Standards.

The <u>Transportation Engineering Design Standards</u> of the City of Lakewood, Colorado, dated June, 1985, are hereby adopted and incorporated by reference herein as a part of the Engineering Regulations, Construction Specifications and Design Standards.

## VIII. COUNCIL ORDINANCE

#### 0-86-107

#### A BILL FOR AN

ORDINANCE ADOPTING BY REFERENCE THE ENGINEERING REGULATIONS, CONSTRUCTION SPECIFICATIONS AND DESIGN STANDARDS, DATED SEPTEMBER 1986; FURTHER REPEALING ORDINANCES 0-81-63; 0-82-102; 0-83-45; 0-83-67; AND 0-85-65

WHEREAS, it is necessary and desirable that the construction of public facilities and construction work within the public ways of the City be performed in accordance with uniform acceptable engineering standards and procedures; and

WHEREAS, failure of such construction to conform to acceptable and uniform engineering standards and procedures is or may be detrimental to and may endanger the public health, safety and welfare; and

WHEREAS, adherence to such standards and procedures is essential to the protection of the public investment in such facilities and public ways; and

WHEREAS, by Ordinance 0-81-63, the City adopted <u>Engineering Regulations</u>, <u>Construction Specifications</u>, and <u>Design Standards</u>, (sometimes hereinafter referred to as "Engineering Regulations"), and said standards and procedures are in need of revision; and

WHEREAS, by Ordinance 0-82-102 the City adopted the <u>Storm Water Drainage</u> <u>Criteria Manual</u> as an Addendum to the "Engineering Regulations"; and

WHEREAS, by Ordinance 0-83-45 the City Council adopted the <u>Transportation</u> <u>Planning Design and Policy Standards for Development Review</u> which was subsequently amended by Ordinance 0-83-67 and both Ordinances now need to be repealed; and

WHEREAS, by Ordinance 0-85-65 the City adopted the <u>Transportation</u> <u>Engineering Design Standards</u> as an Addendum to the "Engineering Regulations"; and

WHEREAS, due to the fact the "Engineering Regulations", are hereby being repealed and reenacted, and the <u>Storm Drainage Criteria Manual</u> and the <u>Transportation Engineering Design Standards</u> were adopted as addenda to said "Engineering Regulations", it is deemed appropriate to repeal said ordinances; and

WHEREAS, the <u>Storm Drainage Criteria Manual</u> and the <u>Transportation</u> <u>Engineering Design Standards</u> are incorporated by reference into the new "Engineering Regulations".

NOW, THEREFORE, BE IT ORDAINED by the City Council of the City of Lakewood, Colorado, that:

SECTION 1. Ordinances 0-81-63, 0-82-102, 0-83-45, 0-83-67 and 0-85-65 are hereby repealed.

SECTION 2. Pursuant to Title 31, Article 16, C.R.S., the <u>Engineering</u> <u>Regulations, Construction Specifications and Design Standards</u> of the City of Lakewood, dated September 1986 are hereby adopted by reference.

Page 2 Ord. 0-86-107

SECTION 3. The said <u>Engineering Regulations</u>, <u>Construction Specifications</u>, <u>and Design Standards</u>, shall govern construction of public facilities and construction within the public ways of this City; and no such construction shall be approved unless performed and completed in accordance with such <u>Engineering Regulations</u>, <u>Construction Specifications</u>, and <u>Design Standards</u>.

SECTION 4. In cases of conflict between the <u>Engineering Regulations</u>, <u>Construction Specifications</u>, and <u>Design Standards</u> adopted herein and any other rule, regulation, or ordinance of the City, the said <u>Engineering Regulations</u>, <u>Construction Specifications</u>, and <u>Design Standards</u> shall prevail.

SECTION 5. The Director of the Department of Public Works shall have and is hereby given the authority to, from time to time and at any time, make minor additions, revisions, and corrections to said <u>Engineering Regulations</u>, <u>Construction Specifications</u>, and <u>Design Standards</u> in accordance with good engineering standards and practice.

SECTION 6. Three copies of each of the above documents shall be on file in the City Clerk's office and are open to public inspection during regular office hours.

SECTION 7. This ordinance shall take effect thirty (30) days after final publication.

INTRODUCED, READ AND PASSED on first reading at a regular meeting of the City Council on October 27, 1986; ordered published in full in the Lakewood Sentinel and Public Hearing and consideration on final passage set for November 24, 1986, at 7 O'clock p.m. at Lakewood City Hall, 445 South Allison Parkway, Lakewood, Colorado.

Linda Shaw, Mayor

ATTEST:

Karen Goldman, City Clerk

INTRODUCED, READ AND ADOPTED by the City Council the <u>24th</u> day of <u>November</u>, 1986.

APPROVED AND SIGNED THIS \_25th day of \_\_\_\_\_, 1986

Linda Shaw

Page 3 Ord. 0-86-107

I hereby certify and attest that the within and foregoing Ordinance was introduced, read and passed on first reading on the date hereinabove set forth, published in full in the Lakewood Sentinel on the <u>30th</u> day of <u>October</u>, 1986; introduced, read, finally passed and adopted by the City Council, and signed and approved by the Mayor on the dates hereinabove set forth.

ATTESTED AND CERTIFIED:

10 10 10 10 10 10

Karen Goldman, City Clerk Approved as to form: City Attorney	1. hoonan	Date November	17 1986
Community Development Parks and Recreation Employee Relations Finance	Date Date Date Date	City Manager Public Safety Public Works City Clerk	Date Date / <u>0</u> -& Date