



Retaining Wall Design Checklist

- To be filled out by the Design Engineer

- All required files to be compiled into one document, both hard and electronic

The following checklist should accompany each retaining wall design. All retaining walls more than four feet in height, as measured from bottom of footing to top of wall, require a building permit (2012 IBC, Section 105); however, only design of retaining walls over 4 feet in exposed height shall require submittal of design calculations as stipulated herein. Retaining walls should be designed in accordance with ARTICLE 3.32 RETAINING WALLS (Ord. No. 2018-05, 09/11/18) of the Alpine City Development Code (see attached document).

Project Information:

Project Address: _____

Applicant Name and Address: _____

Type of Retaining Wall: _____

Design Engineer and Company Name: _____

In left column indicate page, sheet or figure number where item is located. LISTS MARKED ANY OTHER WAY WILL BE RETURNED TO APPLICANT TO CORRECT.

Page, Sheet or Figure No.	Required Submittal Items
	0. No single wall exceeds 9' in height and no tiered system of walls exceeds 18' in height as measure from the bottom of the lowest tier to the top of the highest tier unless previously approved by City Council.
	1. Is a fence required? (see italics below) If yes, include fence detail and connection to top of retaining wall with application with plans. Fence type and location must be shown. Note where this can be found in the application. Home owner required to provide fence application with this permit. <i>Walls greater than four (4) feet in height (H) placed within H/2 of an adjacent property line, which would create a drop-off for the adjacent property, shall install a fence along the top of the wall in accordance with Development Code Section 3.21.6.</i>
	2. Do any of the wall components extend beyond property boundaries? No retaining wall component shall extend beyond property lines unless written

	permission is obtained from the affected property owner. If yes, is written permission included in the application? _____
	3. Profile drawings if the retaining wall is longer than 50 lineal feet, with the base elevation, exposed base elevation and top of wall labeled at the ends of the wall and every 50 lineal feet or change in grade.
	4. Cross-sectional drawings including surface grades and structures located in front and behind the retaining wall a distance equivalent to three times the height of the retaining wall, and if the retaining wall is supporting a slope, then the cross section shall include the entire slope plus surface grades and structures within a horizontal distance equivalent to one times the height of slope.
	5. A site plan showing the location of the retaining walls with the base elevation, exposed base elevation and top of wall labeled at the ends of wall and every 50 lineal feet or change in grade.
	6. A copy of the geotechnical report used by the design engineer. If a design specific study was completed, then skip to Item 7 below. The geotechnical report shall include requirement of Item 7 below otherwise additional laboratory testing is required in Item 7.
_____	7. The material strength parameters used in the design of the retaining wall, substantiated with laboratory testing of the materials as follows
_____	a. for soils, this may include, but is not limited to, unit weights, direct shear tests, triaxial shear tests and unconfined compression tests;
_____	b. if laboratory testing was conducted from off-site but similar soils within a 2000 foot radius of the proposed wall location, the results of the testing with similar soil classification testing needs to be submitted;
_____	c. minimum laboratory submittal requirements are the unit weight of retained soils, gradation for cohesionless soils, Atterberg limits for cohesive soils, and shear test data;
_____	d. soil classification testing shall be submitted for all direct shear or triaxial shear tests;
_____	e. if a Proctor is completed, classification testing shall be submitted with the Proctor result; and,
_____	f. laboratory testing should be completed in accordance with applicable American Society for Testing and Materials (ASTM) standards;
_____	g. for segmented block walls, the manufacturer's test data for the wall facing, soil reinforcement, and connection parameters shall be submitted in an appendix.
_____	8. The design engineer shall indicate the design standard used and supply a printout of the input and output of the files in an appendix with factors of safety within the design standard used as follows:
_____	a. design calculations ensuring stability against overturning, base sliding, excessive foundation settlement, bearing capacity, internal shear and global stability;

<hr/> <hr/> <hr/> <hr/>	<ul style="list-style-type: none"> b. calculations shall include analysis under static and seismic loads, which shall be based on the PGA as determined from probabilistic analysis for the maximum credible earthquake (MCE), with spectral acceleration factored for site conditions in accordance with the current IBC; c. Mechanically Stabilized Earth (MSE) walls shall be designed in general accordance with current FHWA or AASHTO standards for design of Mechanically Stabilized Earth Walls and Reinforced Soil Slopes or the current National Concrete Masonry Association (NCMA) Design Manual for Segmental Retaining Walls; d. rock walls shall be designed in general accordance with 2006 FHWA-CFL/TD-06-006 "Rockery Design and Construction Guidelines," or current FHWA standard of care and; e. concrete cantilever walls shall be designed in general accordance with specifications provided in current American Concrete Institute or American Society of Civil Engineers standards and specifications.
<hr/> <hr/> <hr/> <hr/>	<ul style="list-style-type: none"> 9. A global stability analysis with minimum factors of safety of at least 1.50 under static conditions and at least 1.10 under seismic loading conditions as follows: <ul style="list-style-type: none"> a. factors of safety results shall be presented to the nearest hundredth; b. seismic loads shall be based on the PGA as determined from probabilistic analysis for the maximum credible earthquake (MCE), with spectral acceleration factored for site conditions in accordance with the current IBC; c. the cross-sectional view of each analysis shall be included, and the printout of the input and output files placed in an appendix; and, d. the global stability analysis may be omitted for concrete cantilever retaining walls that extend to frost depth, that are less than nine feet in exposed height, absent of supporting structures within 30 feet of the top of the wall, and which have less than 10H:1V front and back slopes within 30 feet of the retaining structure.
<hr/> <hr/> <hr/> <hr/>	<ul style="list-style-type: none"> 10. A drainage design, including a free draining gravel layer wrapped in filter fabric located behind the retaining wall with drain pipe day-lighting to a proper outlet or weep holes placed through the base of the wall, however: <ul style="list-style-type: none"> a. a synthetic drainage composite may be used behind MSE walls if a materials specific shear testing is completed to determined friction properties between the backfill and synthetic drainage composite; b. a synthetic drainage composite is not allowed behind rock walls; c. a synthetic drainage composite may be used behind the stem of the concrete cantilever walls; d. if the engineering can substantiate proper filtering between the retained soils and the drain rock, then the filter fabric may be omitted, and;

	e. if the retaining wall is designed to withstand hydrostatic pressures or the retained soils or backfill is free-draining as substantiated through appropriate testing, then drainage material may be omitted from the design.
	11. The design engineer's acknowledgement that the site is suitable for the retaining wall;
	12. An inspection frequency schedule.

I _____, declare that I have read Article 3.32, understand and have
 (Engineer of Record)
 complied with the required submittal requirements, accept responsibility for all documents contained herein that relate to the design of the subject retaining wall and have signed and sealed the design calculations and accompanying construction drawings.

Signature of Design Engineer: _____