

ORDINANCE NO. 937

AN ORDINANCE OF DRAPER CITY AMENDING SECTION 9-27-085 OF THE DRAPER CITY MUNICIPAL CODE RELATED TO THE DESIGN AND REVIEW OF RETAINING WALLS

WHEREAS, retaining wall construction can cause potential danger to life and property;

WHEREAS, the International Building Code requires a building permit for walls over four feet;

WHEREAS, there are a variety of guidelines and construction specifications to assist in the proper design of retaining walls over four feet prior to submitting for a building permit;

WHEREAS, retaining walls perform differently when built in different soils and must be designed with specific soil information incorporated into the design;

WHEREAS, Draper City desires to provide clear direction about what is required for a retaining wall building permit; and

WHEREAS, the proposed zoning ordinance text amendment set forth herein has been reviewed by the Planning Commission and the City Council, and all appropriate public hearings have been held in accordance with Utah law to obtain public input regarding the proposed revisions;

NOW, THEREFORE, BE IT ORDAINED BY THE CITY COUNCIL OF DRAPER CITY, STATE OF UTAH, AS FOLLOWS:

**Section 1. Amendment.** Section 9-27-085 of the Draper City Municipal Code is hereby amended to read in its entirety as set forth in Exhibit "A," attached hereto and incorporated herein by reference.

**Section 2. Severability.** If any section, part or provision of this Ordinance is held invalid or unenforceable, such invalidity or unenforceability shall not affect any other portion of this Ordinance, and all sections, parts and provisions of this Ordinance shall be severable.

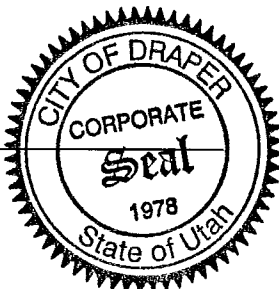
**Section 3. Effective Date.** This Ordinance shall become effective 20 days after publication or posting, or 30 days after final passage, whichever is closer to the date of final passage.

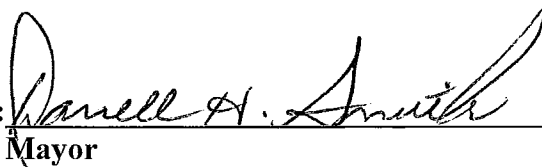
PASSED AND ADOPTED BY THE CITY COUNCIL OF DRAPER CITY, STATE OF UTAH, THIS 20<sup>th</sup> DAY OF APRIL, 2010.

DRAPER CITY

ATTEST:

  
City Recorder



By:   
Mayor

## EXHIBIT "A"

### Section 9-27-085 Retaining Walls.

- (a) Applicability. This section applies to all retaining walls as defined in Section 9-3-040.
- (b) Building Permit Required. Except as otherwise provided in Subsection (c), all retaining walls require a building permit prior to construction or alteration. Permit applications shall be processed and issued in accordance with building permit procedures and applicable provisions of this Section. Building permit review fees will be assessed and collected at the time the permit is issued.
- (c) Building Permit Exemptions. The following do not require a building permit:
- (1) retaining walls less than four feet in exposed height with less than 10H:1V (Horizontal:Vertical) front and back slopes within ten feet of the wall;
  - (2) non-tiered retaining walls less than three feet in exposed height with back slopes flatter than or equal to 2H:1V and having front slopes no steeper than or equal to 4H:1V;
  - (3) tiered retaining walls less than three feet in exposed height per wall and which have front slopes and back slopes of each wall no steeper than or equal to 10H:1V within ten feet of the walls; and
  - (4) retaining walls less than 50 square feet in size.
- (d) Geologic Hazard Ordinance Applicability. The Draper City Geologic Hazard Ordinance, Title 9-19, Appendix C, Section 1.2, requires global stability analysis of modified natural slopes steeper than 3H:1V and cut or fill slopes of 2H:1V or greater.
- (e) Engineer Design Required. All retaining walls required to obtain a building permit shall be designed by an engineer licensed by the State of Utah.
- (f) Height, Separation and Plantings.
- (1) For the purposes of this subsection, the height of a retaining wall is measured as exposed height (H) of wall.
  - (2) A single retaining wall shall not exceed nine feet in height.
  - (3) Terracing of retaining walls is permitted where justified by topographic conditions, but the combined height of all walls shall not exceed 18 feet. Walls with a separation of at least 2H (H of largest of 2 walls) from face of wall to face of wall shall be considered as separate walls. In a terrace of retaining walls, a minimum horizontal separation of H/2 is required as measured from back of lower wall to face of higher wall.
  - (4) For walls viewable from a public right-of-way, the horizontal separation between walls shall be planted with a minimum of five shrubs for every 20 linear feet of planting area. The

size of the shrubs shall be less than one-half the width of the terrace. Shrubs shall be watered by drip irrigation to minimize erosion.

(g) Submittals. The following documents and calculations prepared by a licensed engineer of the State of Utah shall be submitted with each retaining wall building permit application:

(1) profile drawings if the retaining wall is longer than 50 linear feet, with the base elevation, exposed base elevation and top of wall labeled at the ends of the wall and every 50 linear feet or change in grade;

(2) cross-sectional drawings including surface grades and structures located in front of and behind the retaining wall a distance equivalent to three times the height of the wall and if the 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 the slope;

(3) 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 the wall and every 50 linear feet or change in grade;

(4) material strength parameters used in the design of the retaining wall, substantiated with laboratory testing of the materials as follows:

(i) for soils, this may include, but is not limited to, unit weights, direct shear tests, triaxial shear tests and unconfined compression tests;

(ii) if laboratory testing was conducted from off-site but similar soils in the area, the results of the testing with similar soil classification testing must be submitted;

(iii) for segmented block walls, the manufacturer's test data for the wall facing, soil reinforcement, and connection parameters shall be submitted in an appendix;

(iv) minimum laboratory submittal requirements are the unit weight of retained soils, gradation for cohesionless soils, Atterberg limits for cohesive soils, and shear test data;

(v) soil classification testing shall be submitted for all direct shear or triaxial shear tests;

(vi) if a Proctor is completed, classification testing shall be submitted with the Proctor result; and

(vii) laboratory testing shall be completed in accordance with applicable American Society for Testing and Materials (ASTM) standards;

(5) design calculations ensuring stability against overturning, base sliding, excessive foundation settlement, bearing capacity, internal shear and global stability as follows:

(i) if geogrids are used, additional calculations for pullout, tensile overstress,

internal sliding, facing connection and bulging shall be completed, and other calculations used to meet design standards for that particular material are required;

(ii) the design engineer shall indicate the design standard used and supply a printout of the input and output of the files in an appendix;

(iii) calculations shall include analysis under static and seismic loads, which shall be based on the characteristic earthquake or maximum credible earthquake (MCE), with spectral acceleration factored for site conditions in accordance with the IBC;

(iv) Mechanically Stabilized Earth (MSE) walls shall be designed in general accordance with 2001 FHWA NHI-00-043 Mechanically Stabilized Earth Walls and Reinforced Soil Slopes or the National Concrete Masonry Association (NCMA) Design Manual for Segmental Retaining Walls;

(v) rock walls shall be designed in general accordance with the 2006 FHWA-CFL/TD-06-006 "Rockery Design and Construction Guidelines;" and

(vi) concrete cantilever walls shall be designed in general accordance with specifications provided in current American Concrete Institute or American Society of Civil Engineers publications;

(6) a global stability analysis demonstrating minimum factors of safety of at least 1.50 under static conditions and at least 1.10 under seismic loading conditions as follows:

(i) factors of safety results shall be presented to the nearest hundredth;

(ii) seismic loads shall be based on the characteristic earthquake, with spectral acceleration factored for site conditions in accordance with IBC;

(iii) the cross-sectional view of each analysis shall be included, and the printout of the input and output files placed in an appendix; and

(iv) 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 wall structure;

(7) 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:

(i) a synthetic material designed for the application may be used in lieu of the gravel;

(ii) if the engineering can substantiate proper filtering between the retained soils and the drain rock, then the filter fabric may be omitted; and

(iii) 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;

(8) the design engineer's acknowledgment of the soil strength parameters used in the design and the engineer's acceptance of the site for use of the retaining wall and if a separate geotechnical report was prepared and used by the design engineer, the geotechnical report shall be submitted, substantiating the values used for the materials strength analysis; and

(9) an inspection frequency schedule.

(h) Preconstruction Meeting. At least 48 hours prior to construction of any approved retaining wall, a preconstruction meeting shall be held as directed by the Building Official. The meeting shall include the City's reviewing engineer, the Building Official or a member from the Community Development Department, the design engineer, and the project manager or property owner.

(i) Inspections and Final Report. The design engineer shall make all inspections needed for final approval and acceptance of the retaining wall when construction is complete. A final report from the engineer shall state that the retaining wall was built according to the submitted design. The report shall include details of the inspections of the wall in accordance with the inspection frequency schedule. All pertinent compaction testing shall also be included with the final report.

(j) Maintenance. All retaining walls must be maintained in a structurally safe and sound condition and in good repair.

**Affidavit of Posting**

**SALT LAKE COUNTY, STATE OF UTAH**

I, the Recorder of Draper City, by my signature below, certify that copies of **Ordinance No. 937** for the **City of Draper**, which **Passed and Adopted by the City Council of Draper City, State of Utah on the 20<sup>th</sup> day of April, 2010** were posted at the following places: Draper City Bulletin Board, Salt Lake County Library, Draper Senior Citizens Center, within the municipality.

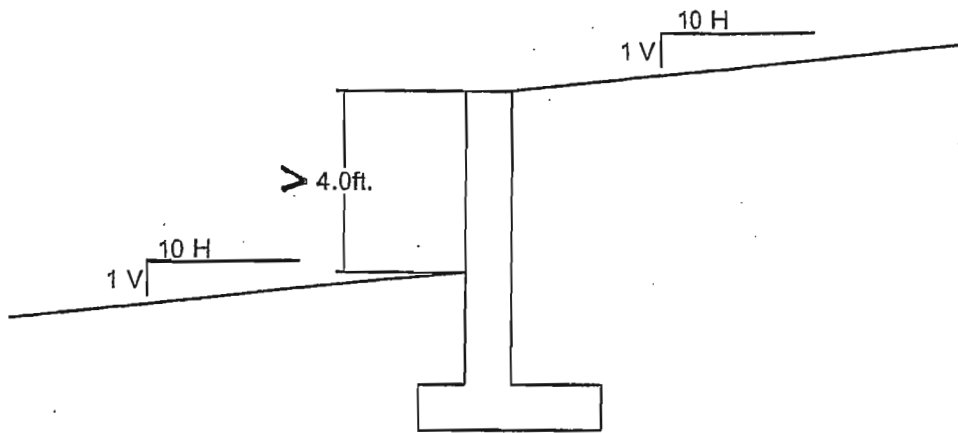
**Posting Period:** April 21, 2010 through May 11, 2010

City Seal

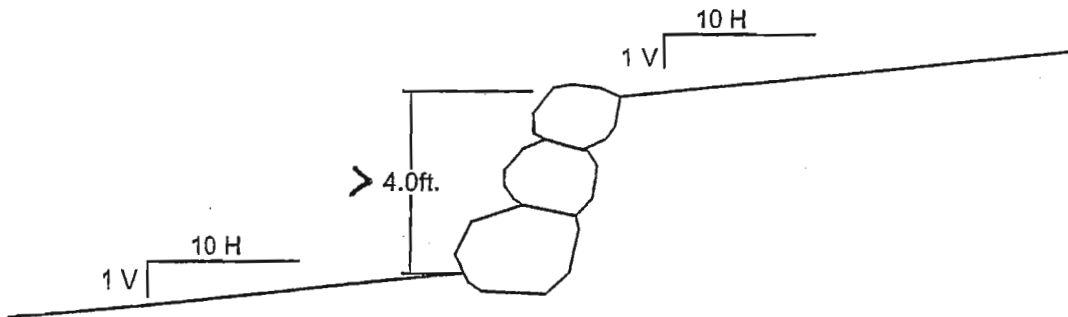


A handwritten signature in cursive script, appearing to read "Tracy B. Norr", written over a horizontal line.

Tracy B. Norr, MMC  
City Recorder  
Draper City, State of Utah



Building Permit Exemption (c-1) for Concrete Wall



Building Permit Exemption (c-1) for Rock Wall

**TAYLOR GEO  
ENGINEERING**

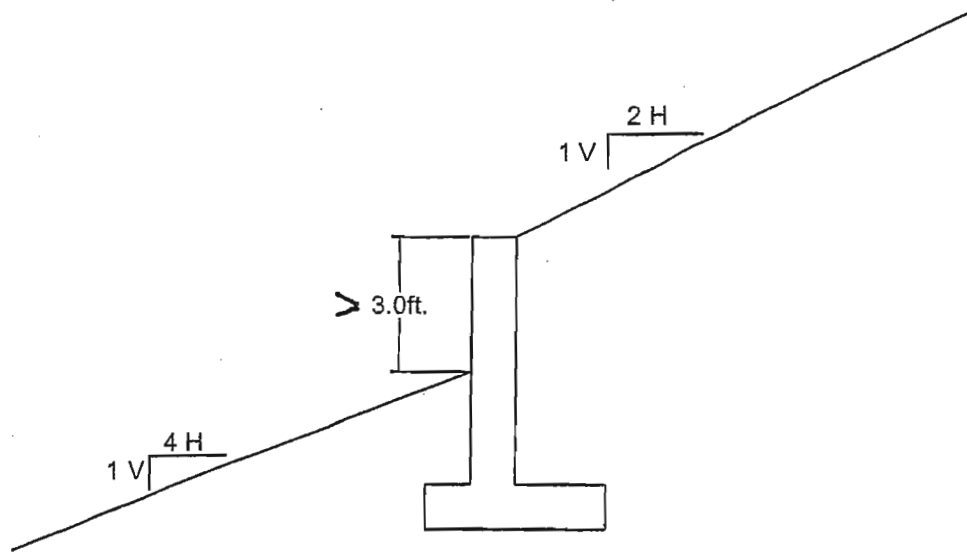
2650 North 150 East  
Lehi, Utah 84043  
Ph. 801-400-9784 Fax. 801-766-3246

Draper City Retaining  
Wall Ordinance

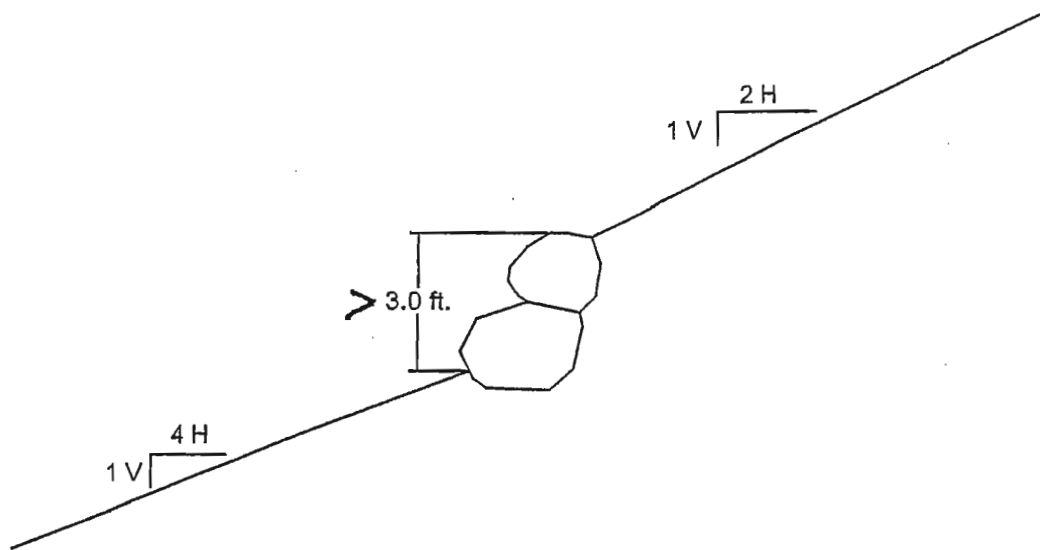
Exemption Figures

Sheet 1

Aug. 3, 2010



Building Permit Exemption (c-2) for Concrete Wall



Building Permit Exemption (c-2) for Rock Wall

**TAYLOR GEO  
ENGINEERING**

2650 North 150 East  
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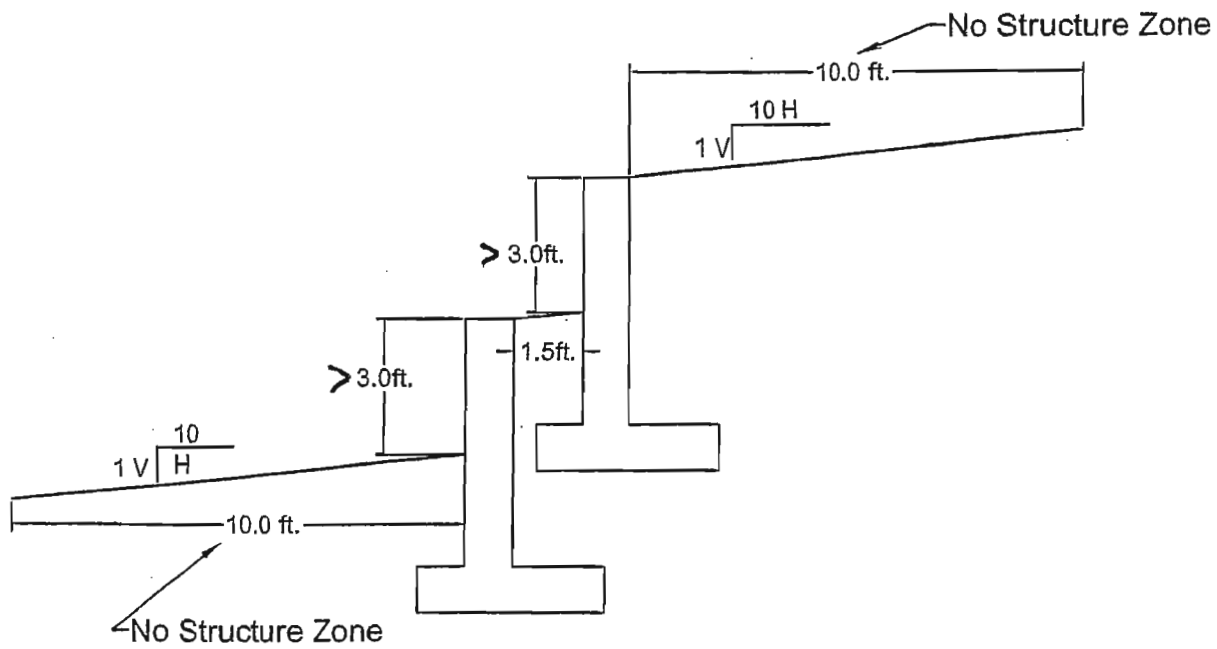
Draper City Retaining  
Wall Ordinance

Exemption Figures

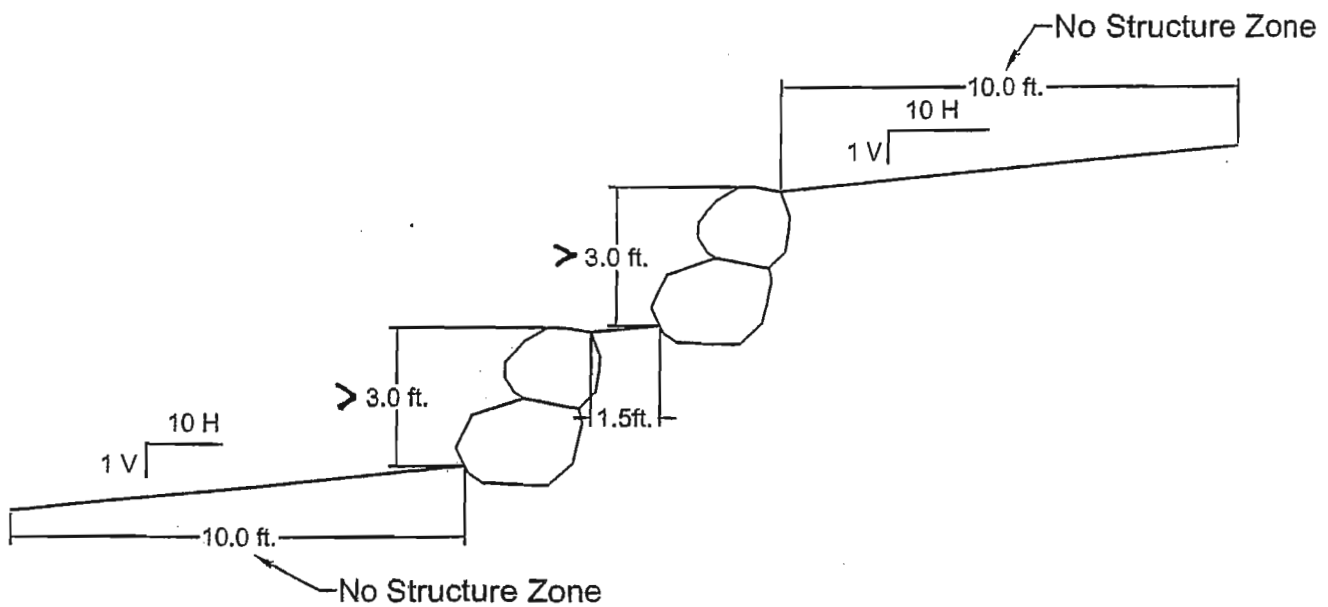
Sheet 2

Aug. 3, 2010





Building Permit Exemption (c-3) for Concrete Wall



Building Permit Exemption (c-3) for Rock Wall

**TAYLOR GEO  
ENGINEERING**

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Draper City Retaining  
Wall Ordinance

Exemption Figures

Sheet 3

Aug. 3, 2010