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Council Action and Executive Summary

Item # 12 **Ordinance/Resolution#** Ord. 2699

For Meeting of November 4, 2013 (Ordinance First Reading Date)

For Meeting of November 18, 2013 (Adoption Date)

Please check box that applies to this item:

☐ QUASI JUDICIAL ☐ LEGISLATIVE ☒ ADMINISTRATIVE

TITLE: **AN ORDINANCE REPEALING LAS CRUCES MUNICIPAL CODE (LCMC) 1997, SECTIONS 32-136 THROUGH 32-144, DESIGN STANDARDS, IN ITS ENTIRETY AND ENACTING NEW LCMC 1997 SECTIONS 32-136 THROUGH SECTION 32-144, DESIGN STANDARDS; AND TO AMEND LCMC 1997 SECTION 38-60(B), WALLS AND FENCES-RETAINING WALLS; AND LCMC 1997 SECTION 30-233(6)A.8, SUBMITTAL REQUIREMENTS-RETAINING WALLS.**

PURPOSE(S) OF ACTION:

Revise and update design standards.

COUNCIL DISTRICT: ALL		
Drafter/Staff Contact: Roy Arnoldt P.E.	**Department/Section:** Public Works/Project Development	**Phone:** 528-3168
City Manager Signature:		

BACKGROUND / KEY ISSUES / CONTRIBUTING FACTORS:

The Public Works Department was tasked with revising and updating the existing design standard for "Fences and Walls and Retaining Walls" (LCMC 1997 Sections 32-136 through 32-144). During this revision, various discussions were held with both City staff and private engineers to identify and document design standards necessary to ensure good engineering and credible designs of yard walls, retaining walls, and slope protection that are widely used and are universally accepted.

The design standard document that resulted from these discussions was sent to local engineers, architects, developers, and rock wall builders for review and comments (see Attachments "D" and "E"). All response recommendations are included within the final draft of this design standards ordinance.

The focus of these changes is to properly identify soil properties and subsurface investigation requirements; and to ensure that proper engineering analysis is applied to the design and construction of walls, fences, or slope protections.

The revised design standards ordinance titled, "Fences, Walls, Retaining Walls, and Slope Protection," provides simple and clear language to the design engineer, architect, developer, builder, and general public to ensure both credibility of the final design and uniformity in its application.

Additionally, the Public Works Department is recommending City Council amend the following LCMC 1997 sections to read as follows:

> Section 30-233 a.8 - "8. Retaining wall with elevations shown on both sides of the wall including wall height with dimensions, drainage and all design calculations."
>
> Section 38-60(B) - "Retaining wall. Is a designed wall constructed of brick, block, rock, concrete, MSE, or reinforced concrete, to retain a specific depth of soil or surcharge. This wall type is designed to resist the sum of all specific soil pressures with a predetermined safety factor."

SUPPORT INFORMATION:

1. Ordinance.
2. Exhibit "A", Proposed New LCMC Sections 32-136 through 32-144.
3. Exhibit "B", Proposed LCMC Section 38-60(B).
4. Exhibit "C", Proposed LCMC Section 30-233(6)A.8.
5. Attachment "A", LCMC Sections 32-136 through 32-144 in legislative format.
6. Attachment "B", LCMC Section 38-60(B) in legislative format.
7. Attachment "C", LCMC Section 30-233(6)A.8 in legislative format.
8. Attachment "D", Cover letter requesting review of proposed ordinance.
9. Attachment "E", Mailing list.

SOURCE OF FUNDING:

Is this action already budgeted?			
	Yes	☐	See fund summary below
	No	☐	If No, then check one below:
N/A	*Budget Adjustment Attached*	☐	Expense reallocated from: _____
		☐	Proposed funding is from a new revenue source (i.e. grant; see details below)
		☐	Proposed funding is from fund balance in the _____ Fund.
Does this action create any revenue?			
	Yes	☐	Funds will be deposited into this fund: _____ in the amount of $_____ for FY__.
N/A	No	☐	There is no new revenue generated by this action.

BUDGET NARRATIVE

N/A

FUND EXPENDITURE SUMMARY:

Fund Name(s)	Account Number(s)	Expenditure Proposed	Available Budgeted Funds in Current FY	Remaining Funds	Purpose for Remaining Funds
N/A	N/A	N/A	N/A	N/A	N/A

OPTIONS / ALTERNATIVES:

1. Vote "Yes"; this will repeal Las Cruces Municipal Code (LCMC) 1997, Sections 32-136 through 32-144, Design Standards, in its entirety and enact new LCMC 1997 Sections 32-136 through Section 32-144, Design Standards; and amend LCMC 1997 Section 38-60(B), Walls and Fences-Retaining Walls; and LCMC 1997 Section 30-233(6)A.8, Submittal Requirements-Retaining Walls.
2. Vote "No"; this will keep the existing language and standards currently in LCMC 1997. This action would retain the current standards that fail to identify current design practices and may prevent them from requiring City retaining wall design submissions to meet nationally accepted standards.
3. Vote to "Amend"; this would allow City Council to modify the ordinance as it deems appropriate.
4. Vote to "Table"; this would allow City Council to table/postpone the ordinance and direct staff accordingly.

REFERENCE INFORMATION:

The resolution(s) and/or ordinance(s) listed below are only for reference and are not included as attachments or exhibits.

1. N/A

COUNCIL BILL NO. 14-014
ORDINANCE NO. 2699

AN ORDINANCE REPEALING LAS CRUCES MUNICIPAL CODE (LCMC) 1997, SECTIONS 32-136 THROUGH 32-144, DESIGN STANDARDS, IN ITS ENTIRETY AND ENACTING NEW LCMC 1997 SECTIONS 32-136 THROUGH SECTION 32-144, DESIGN STANDARDS; AND TO AMEND LCMC 1997 SECTION 38-60(B), WALLS AND FENCES-RETAINING WALLS; AND LCMC 1997 SECTION 30-233(6)A.8, SUBMITTAL REQUIREMENTS-RETAINING WALLS.

The City Council is informed that:

WHEREAS, the City of Las Cruces (City) is updating various design standards to include the existing fences, walls, and retaining walls design standards which were adopted in 2004 (Council Bill No. 05-018; Ordinance No. 2131); and

WHEREAS, our goal is to build stronger ties between design professionals and our growing community to ensure uniformity of design requirements; and

WHEREAS, the City of Las Cruces is proposing to adopt updated sections and articles in LCMC 1997 design standards to provide simple and clear minimum uniform standards to improve the design and construction of fences, walls, retaining walls, and slope protection" within the City of Las Cruces.

NOW, THEREFORE, Be it ordained by the governing body of the City of Las Cruces:

(I)

THAT LCMC 1997, Sections 32-136 through 32-144 are hereby repealed in its entirety.

(II)

THAT LCMC 1997, new Sections 32-136 through 32-144 are hereby enacted as shown in Exhibit "A," attached hereto and made part of this ordinance.

(III)

THAT LCMC 1997, Section 38-60(B) is amended and is hereby enacted as shown in Exhibit "B," attached hereto, and made a part of this ordinance.

(IV)

THAT LCMC 1997, Section 30-233A.8 is amended and is hereby enacted as shown in Exhibit "C," attached hereto, and made a part of this ordinance.

(V)

THAT City staff is hereby authorized to do all deeds necessary in the accomplishment of the herein above.

DONE AND APPROVED this _____day of _____, 20____.

APPROVED:

_____
Mayor

ATTEST:

_____
City Clerk

(SEAL)

VOTE:
Mayor Miyagishima: _____
Councillor Silva: _____
Councillor Smith: _____
Councillor Pedroza: _____
Councillor Small: _____
Councillor Sorg: _____
Councillor Thomas: _____

Moved by: _____

Seconded by: _____

APPROVED AS TO FORM:

_____
City Attorney

DIVISION 3
FENCES, WALLS, RETAINING WALLS, AND SLOPE PROTECTION

Sec. 32-136. Scope of Division. Construction of all fences, walls, retaining walls, and slope protection within the City shall require an approved building permit and shall conform to the minimum design standards as specified within this division and in accordance with the latest City adopted edition of the *International Building Code (IBC),* City construction specifications, and Design Standards. Exempt items are listed in Las Cruces Municipal Code (LCMC), Chapter 30, Article II, Division 3, Sec. 30-201.

Sec. 32-137. Definitions. The following words, terms and phrases, when used in this division, shall have the meanings ascribed to them in this section and are part of the LCMC.

Building/Construction Permit is an official document or certificate issued by the Building Official authorizing performance of a specific activity as defined in LCMC, Chapter 30, Article II, Division 2, Secs. 30-171 through 30-722.

City is the City of Las Cruces administrative government which encompasses all lands within the City's corporate boundary as designated by the present City limit location(s) plus the addition of lands outside City limits which are either leased or annexed.

City of Las Cruces Design Values are listings of various engineering design values that amend the soil engineering properties in the IBC. When no site-specific soil properties have been identified through exploration and laboratory testing, these amended values shall be used.

City Project Review is conducted to confirm that engineering principals are applied in conformance with both City Design Standards and the IBC.

Compaction is the process of making a soil denser through the application of dynamic impact to the soil mass. Specific minimum requirements are found within the current City Construction Specifications (Standard Specifications for Roadway Construction).

Concrete Masonry Units (CMUs) are preformed concrete blocks typically used to construct retaining walls, yard walls, or building walls. They typically are available at most building supply and home improvement stores.

Control Measures (CMs) are preferred defensive mechanisms designed to reduce soil erosion from surface storm water. (See Storm-Water Pollution Prevention Plan (SWPPP).)

Decorative Retaining Wall (Segmented Retaining Wall): See Garden Retaining Walls.

Engineer (Professional) is a person licensed by the New Mexico State Board of Licensure who is legally allowed to represent themself to the public as an engineer and is allowed to perform engineering design or construction of private and public works.

Engineering Site Review is a surficial review of a site to determine its preliminary engineering capability based on exposed indicators that include historical site stability and past development(s). This investigation is performed under the direction of an engineer.

Erosion Control - See Storm-Water Pollution Prevention Plan (SWPPP).

Essential Structures are structures designed to remain operational in the event of extreme environmental events such as flood, wind, snow, or earthquakes. Such design requirements are

typically used for, but not limited to, the design of structures for public health and safety services. (See ASCE 7.10 for extensive listing.)

Expansion joint is a designed break within a concrete or masonry structure to allow movement from both shrinkage (concrete curing) and thermal expansion/shrinkage.

Expansive soils are soils that contain a high concentration of clay-sized particles that. when wetted. will expand in size and lose strength, or. when dried, will shrink and form a hard cemented layer. These soils are typically restrictive to the water passage.

Fence is any artificially constructed access barrier consisting of posts, wire, wood, steel, cable or similar material to enclose or screen areas of land. Included within this definition are prefabricated fence panels (wood, plastic, or metal) that are typically sold at building supply stores.

Garden Retaining Walls (segmented retaining walls) are retaining walls constructed using commercially available stacked concrete blocks to form its face. Typically, such walls are used to support raised planting beds for landscaping purposes. These walls are generally less than 24 inches (24") high and have unreinforced backfills. See LCMC, Chapter 38, Article VI, Sec. 38-60 for additional wall information.

Geotechnical Soils Investigation is an engineering investigation of the subsurface soils at a specific location to establish their unique engineering design properties. Investigations are documented with all findings, location(s), investigation equipment listing, with field crew names, and responsible engineer included.

Geotechnical Soils Report is a written summary report containing all information obtained from a geotechnical soils investigation, a discussion of the findings and their evaluation(s), and a summary of specific engineering design recommendations, parameters, or designs. This document is signed and sealed by an engineer.

Good Engineering is the correct application of the current scientific principals to the evaluation, design, and construction of structural engineering projects. All projects must meet the minimum standards as adopted by the City. All designs are based on health, safety, convenience, and general welfare of the public.

Ground Water is free water/moisture located beneath the ground surface in soil pore spaces and rock fractures. Typically, it represents seepage from the ground surface or adjacent water sources.

International Building Code (IBC) is the model building code developed by the International Code Council (ICC). This code has been adopted by the City of Las Cruces for construction within the City exempting one- and two-family dwellings.

International Residential Code (IRC) a comprehensive, stand-alone residential code which contains minimum regulations for one- and two-family dwellings and townhouses up to three stories. It brings together all building, plumbing, mechanical, fuel gas, energy and electrical provisions for one- and two-family residences.

Landscape Architect is an individual registered under the Landscape Architects Practice Act to practice landscape architecture in the state of New Mexico. Nothing contained in this definition shall be construed as authorizing a landscape architect to engage in the practice of architecture,

engineering, or land surveying as defined by New Mexico Administrative Code, Title 16, Chapter 44, Landscape Architects.

Mechanically Stabilized Earth (MSE) Retaining Walls are a style of retaining walls that appear similar to garden walls but are typically internally reinforced by geotextile/geogrid layers extending into their retained backfills from their block facings. These walls are designed by engineers.

No Disturbance Zone (Figure A) is part of the designed foundation zone downslope of a retaining wall foundation. This zone develops the passive resistance to prevent the horizontal forces from the retained fill from moving the wall. Typically, this zone is a minimum width equivalent to the depth of the retained soil.

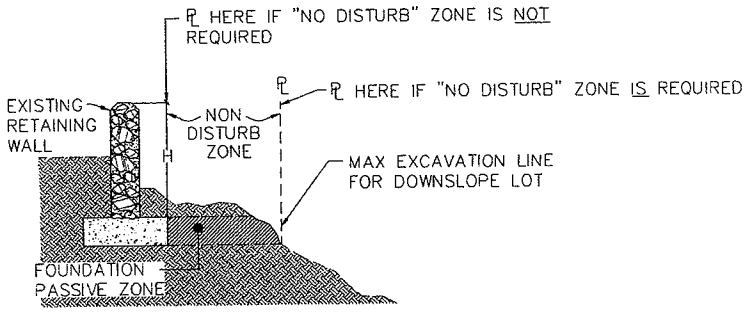

Figure A. No Disturbance Zone

NPDES is the Federal National Pollutant Discharge Elimination System. This national law is the basis for the City of Las Cruces Stormwater Management Plan (SWMP).

Open Landscape Retaining Walls (Segmented Retaining Walls): see Garden Retaining Walls.

Passive Zone is the zone located immediately downslope of a retaining wall foundation that is specifically designed to prevent the wall from sliding from the pressure of the retained soil (See **No Disturbance Zone.)**

Practice of Engineering is any creative or engineering work that requires engineering education, training, and experience in the application of special knowledge of the mathematical, physical and engineering sciences to such creative work as consultation, investigation, forensic investigation, evaluation, planning and design of engineering works and systems, expert technical testimony, engineering studies and the review of construction for the purpose of assuring substantial compliance with drawings and specifications; any of which embrace such creative work, either public or private, in connection with utilities, structures, buildings, machines, equipment, processes, work systems, projects and industrial or consumer products or equipment of a mechanical, electrical, hydraulic, chemical, pneumatic, environmental or thermal nature, insofar as they involve safeguarding life, health. or property, including such other professional services as may be necessary to the planning, progress. and completion of any engineering work.

Presumptive Soil Bearing Capacity is a general soil bearing capacity value based only on the soil classification. City adopted presumptive soil bearing values shall be used if no site specific soil properties have been developed from a site investigation (see table for City of Las Cruces Design Values in Sec. 32-138. Fences, Walls, Retaining Walls, and Slope Protection). Alternate soil bearing capacity values may be used for design if based on a site-specific geotechnical investigation and laboratory soil testing.

Poorly Drained Soil is a soil gradation that contains a high percentage of silt and clay-sized particles that act to restrict water passage.

Private-to-Private Yard Wall Construction is the construction of a yard or garden wall on private land that does not have any impact on public lands or utilities.

Retaining Wall is a designed wall constructed of brick, block, rock, concrete, MSE, or reinforced concrete, to retain a specific depth of soil or surcharge. Retaining walls must be designed to resist the sum of all specific forces with a predetermined safety factor.

Retaining Wall System is a combination of retaining walls and slope protection designed and constructed to retain and protect a single large slope.

Retained fill Depth (grade differential) is the fill depth retained by a retaining wall as measured by the soil surface elevation difference immediately adjacent to both sides of the wall.

Review for Building Permit Application is the City's review of proposed development plans, documents, and specifications to insure compliance with all Local, State, and Federal applicable codes, standards, and ordinances. This review does not approve Professional Engineering design(s) but ensures only that reasonable engineering standards-of-practice have been employed in the design process.

Rock Wall (Rubble Stone) is a wall construction style composed of roughly fractured stones laid without regularity of coursing and bonded with cement grout forming consistent joints and high internal strength. Such construction can be used for either yard or retaining walls.

Safety Factor is a reasonable engineering design factor increasing a force or load to cover unknown factors/forces that may impact it. Typically such factors are in the range of 1.5 – 2.0 (min) for retaining walls and may extend much higher for other specific engineered designs.

Setback is the right-angle distance from an adjacent structure to a point on a property line. For more information see LCMC, Chapter 38, Article VI, Sec. 38-62 and Article VII, Secs. 38-70 through 38-73.

Slope Protection is a surface added to a slope to provide erosion protection. Typically it is composed of loose or cemented rock on slopes that are below their angle of internal friction, or part of a retaining wall system for slopes above their retained soil angle of internal friction.

Specification is an explicit set of requirements to be satisfied by a material, product, or service.

Stone Masonry is the profession and skill used in building rock walls. Stone masonry utilizes carefully fitted stones in a matrix of cement mortar to form a strong, durable, and stable structure.

Storm-Water Pollution Prevention Plan (SWPPP) is an engineered plan to combat potential pollutant sources at a construction site by presenting appropriate measures to prevent or control the pollution of stormwater runoff. It is based on the National Pollutant Discharge Elimination System (NPDES) laws and regulations. Minimum compliance to the SWPPP plan will identify and place best management practices (BMPs) and CMs that are locally available and have been proven successful at specific locations within/around the construction site.

Structural Fill is a fill designed by a professional engineer to have high strength that can support a structure without settlement or displacement. Such fills consist of soils that are both layer placed and compacted to high compaction levels. Typically, this construction is inspected and tested to ensure that the designed minimum compaction levels are achieved.

Wall is an artificially constructed barrier of solid material such as brick, block, rock, concrete (or reinforced concrete), used to enclose or screen an area.

Wall Foundation Zone (Figure B) is the zone that supplies the structural support for a wall and may include resistance to its lateral movement. This is the zone immediately below the foundation and includes the prepared subgrade it rests on.

Wall Height is the physical height of a wall measured vertically from the top of its foundation to the top of the wall structure.

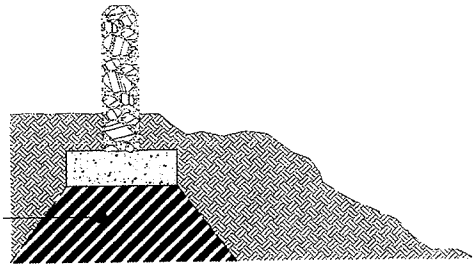

Figure B. Wall Foundation Zone

Well-Drained Soil is a mixture of sand and rock with only minor amounts of silt and no clay component.

Word Terminology: Whenever construction permit documents contain the words "adopted," "reasonable," "suitable," "acceptable," "properly," "satisfactory," or words like "effect" and "import", unless otherwise specified herein, shall mean adopted, reasonable, suitable, acceptable, proper, or satisfactory in the judgment of the City and its engineer or designee. This acceptance refers only to the compliance with existing City codes and specifications and does not infer the acceptance of the responsibility for the accompanying design.

Yard Wall is a wall constructed of brick, block, rock, concrete or reinforced concrete, erected to enclose or screen yard areas. A yard wall does not retain a grade differential and may be located on a property line with ownership shared between adjacent property owners.

Sec. 32-138. Fences, Walls, Retaining Walls, and Slope Protection. The following shall be applied to all fences, walls, retaining walls, and slope protection designs and construction:

A. Construction permit applications shall include all structural calculations, investigative reports, and design documentation.

B. All fences, walls, retaining walls, and slope protection within Las Cruces shall be designed and constructed per LCMC, Chapter 32 and in accordance with the latest City-adopted edition of the IBC for both private and public construction. The Zoning Code height restriction that shall be applied is stated in LCMC, Chapter 38, Article VI, Sec. 38-60.

C. The exposed face(s) of a fence, yard wall, or a yard/retaining wall combination shall be designed to resist ninety (90) mph winds acting perpendicularly against front and back wall exposures. Use the design criteria specified in ASCE 7-10.

D. The following design values shall be used when **no geotechnical site-specific investigation and subsequent laboratory test values have been developed:**

City of Las Cruces Design Values

Ø	28°	[a] Soil Angle of Internal Friction (max)
Ys	120 PCF	[a] Compacted (dry) Soil Density (min)
Y'w	43.3 PCF	[c] Active Equivalent Fluid Pressure. (min)
K	(Only Soil Test Value)	[b] Soil Permeability Coefficient
P_{use}	2,000 PSF	[a] Useable foundation bearing capacity (IBC max)
F_y	60 KSI	Rebar, yield strength (min)
S_{28}	3,000 PSI	Concrete compressive strength, 28 days (min)
S_{28}	Based on ASTM C270 design for (Yard walls only)	Mortar use type S cement, designed per ASTM C270, and field tested per ASTM C780 procedure A1 & A3
S_{28}	1800 PSI (Retaining walls only)	Mortar use type S cement, compressive strength (min)
Yc	150 PCF	Density of concrete (min)
YRW	135 PCF	Density of rock masonry wall (min)
Wall Rock Quality	30	AASHTO T-176, rock quality (min)
$\int$	0.25	Coefficient of friction for soil/concrete (IBC) (max)

[a] *Site specific soil properties gained from a Geotechnical investigation and subsequent soil laboratory testing shall be used when available.*

[b] *Published soil permeability data typically relate poorly to local stratigraphy and soil structure, therefore only site-specific field/laboratory permeability tests shall be use.*

[c] *Based on 120 PCF and Ø =28°*

E. **Seismic Design.** Retaining walls and essential structures shall be designed to resist loads induced by seismic activity using the following criteria: $S_s = 0.31$, $S_l = 0.10$, and Site Class D unless determined otherwise by a site-specific investigation with a signed and sealed geotechnical engineering analysis/report.

F. Proposed excavation of existing ground surface immediately downslope of a structure (wall/building), known as the "**No Disturbance Zone,**" shall not be undertaken unless a specific engineering analysis and design determines that the structure will remain stable during and after the excavation. Such design documents shall be signed and sealed by an engineer and meet all requirements as listed in OSHA Trenching and Excavation Standards, 29 CFR, Part 1926.650. If this zone extends onto adjacent property, it shall be within a maintenance easement.

G. It shall be the property developer/owner's responsibility to ensure that their development does not extend onto, or impact, adjacent lots, properties, or developments. An engineer shall provide full design documentation with signature and seal for all development plans.

H. All development shall prevent drainage impacts on adjacent slopes and structures.

I. Any retaining wall foundation or its "**No Disturbance Zone,**" shall not extend into a Special Flood Hazard Area (SFHA), floodplain, or on-lot ponds without a geotechnical engineering design to ensure its continued foundation stability under flood saturation or erosion. All such designs shall be based on an established Base Flood Elevation from a 100-year event (1% chance of occurrence). Documentation shall include a hydrologic evaluation to confirm

full compliance with CFR, Title 44 and LCMC, Chapter 34. These engineered designs must include all documentation with signature and seal.

J. The minimum upslope setback for any wall from the top edge(s) of a soil bank/slope is typically two (2) times the wall height as measured from the top of the stable portion of the bank to the closest edge of the wall foundation. This value may be modified by an engineer based on a geotechnical soils investigation and associated design. Additional setback distance adjustments may be added by the City's engineering staff or the Community Development Department if the stability of a soil slope(s) or the soil bearing capacity could become compromised from flooding, stability, or if it has a history of instability.

Sec. 32-139. Erosion Control. The following shall apply to all construction listed in this Division:

A. All development, construction, temporary grading, and subsequent erosion controls for fences, walls, retaining walls, and slope protection shall meet the erosion control requirements as stated in LCMC, Chapter 32, Article V, Secs. 32-301-and 32-302. All BMPs shall be listed in the SWPPP plans.

B. All grading for construction shall limit surface soil disturbance to a minimum.

C. All development resulting in land disturbance shall be erosion protected by an approved surface water drainage SWPPP plan and a Notice of Intent (NOI), which must be included as part of the initial project design plan submissions for construction permit.

Sec. 32-140. Geotechnical Soils Investigation. A geotechnical soils investigation shall explore and identify the type and structure of the subsurface soils at a specific site.

A. **Specific tests** and activities shall be conducted to identify at a minimum:

1. Soil type, color, moisture-content, gradation, and index properties.
2. Changes in soil type with depth.
3. Soil strength tests at specific depths including zones of weakness.
4. Ground water table (GWT), its elevation, and the sampling date if encountered in the exploration.
5. Actual bottom-of-hole (BOH) elevation based on topographic site map to locate various soil strata and bearing capacity.

B. **Sampling:** All laboratory testing shall come from undisturbed soil samples.

C. **Equipment Information:**

1. Describe the field exploration company, equipment, sampler size, operator and who logged hole.
2. Document weather, site, exploration hole location on site map, hole number, and the top-of-hole elevation/location.
3. Log all information onto field soil boring log sheets including field testing/sampling and its depth, the site, sign field log sheet.

D. **Ponds:** Site investigation subsurface exploration depth below the designed bottom-of-pond (BOP) elevation with percolation tests to define the infiltration zone shall be:

1. Yard ponds – Exploration at least five feet (5') (min) below the designed bottom-of-pond (BOP) elevation for at least twenty percent (20%) of ponds in a development. Exploration points shall be equally spaced across proposed pond locations.
2. Community Ponds – One exploratory hole at least ten feet (10') below BOP (min) for each pond.
3. City Ponds – One exploratory hole at least twenty feet (20') below BOP (min) for each pond.
4. Soil Samples – shall be undisturbed samples for laboratory classification and permeability testing. Other parameters may be required to support specific pond requirements. They may include, but are not limited to, the following:
   a. Additional permeability tests at specific depths. This testing may be required for impoundments that are designed to permeate water into GWT during a specific time period.
   b. Installation of subsurface instrumentation required for engineering design or monitoring.

Sec. 32-141. Geotechnical Soils Report. A Geotechnical Soils Report based on a Geotechnical Soils Investigation shall be required if the soil conditions are unknown, unreliable, or otherwise unusual as determined by the City of Las Cruces Community Development Department, Technical and Engineering Services Section. This requirement must also be met for soils that are classified as expansive, very fine, loose structure, have a history of instability, have a potential for future instability, whose properties are inconsistent, or will have a designed slope steeper than 3:1. Any soils report, or addendum, for a project/development shall be part of the building permit application and shall be presented as part of the construction permit drawing submittal. A Geotechnical Soils Report shall be included with the following items A through J as a minimum:

A. Hole number with top-of-hole and bottom-of-hole elevation(s).

B. Soil stratigraphy (exploration logs).

C. In situ soil testing with test type and location(s).

D. Soil classification (AASHTO/Unified); and support testing.

E. Sieve analysis and support testing.

F. Water table elevations notation on exploration logs.

G. Discussion of all findings (investigative and laboratory) with specific design recommendations pertaining to the subject project/development. All soil engineering calculations using the specific soil parameters determined from the exploration and testing shall be included.

H. Other parameters may be required, including but not limited to the following to support-specific development requirements:

1. Structural design factors (R value, CBR value, or SPT tests); with testing results.

2. Stability design for slopes that exceed minimum design standards.
3. Seismic testing with data and interpretation.
4. Resistivity testing with data and interpretation.
5. Topographic map of the ground surface with exploration holes locations noted. Possibly including various cross sections showing identified subsurface stratigraphy.

I. Seismic Site Classification.

J. Ss (0.2-sec response), S_1 (1.0-sec response).

Sec. 32-142. Fence Construction (Nonrockwall). The following applies to all fences either manufactured or site constructed.

A. **All Fences.**

- All designs shall be reviewed by the City to insure compliance with applicable City codes, and zoning ordinances prior to installation.
- Fence location shall be accurately drawn on a site plan to include height, gate locations, the adjacent rights-of-way and easements, and property lines.
- All fencing installations shall withstand ninety (90) mph winds against their exposed surfaces applied perpendicular to each side separately.
- No fences or their footings shall be placed on City of Las Cruces property.
- Fence post foundations shall extend a minimum of two feet (2′) into the ground per engineers design. Fence post foundations shall be enclosed in concrete for a minimum lateral dimension of two (2) times the post diameter minimum and extend six inches (6″) below the bottom of the post.

B. **Fences under six feet (6′) high.**

- All fences under six feet (6′) high shall be installed per manufacturer and engineers, recommendations.

C. **Fences over six feet (6′) high.**

- All fences over six feet (6′) high shall be designed by an engineer.

Sec. 32-143. Slope Protection. The following applies to all slope protection applications:

A. All slope protection steeper than 3:1 shall be designed by an engineer.

B. Mortar for rock slope protection shall be Type M and shall have a minimum compressive strength of two thousand five hundred (2500) psi at twenty-eight (28) days as determined by the AASHTO T 106 test. A mix design certification for the mortar mixture shall be forwarded to the City of Las Cruces Public Works Department, Contracts Administration Section for compliance review and approval prior to use.

C. Rock and mortar slope protection shall be both internally and externally drained to expel collected water to designed collection point(s).

D. Internal drainage of slope protection shall:

1. Use two-inch (2″) diameter (min) high-density polyethylene (HDPE) pipes extending through the slope protection.
2. Drainage pipe inlet ends shall have a single layer of geotextile (drainage) over them.
3. Horizontal spacing of the drainage pipes shall be twenty feet (20′) (max).
4. Additional rows of drainage pipes shall be spaced every ten feet (10′) of slope distance.
5. Drainage pipe locations shall be staggered from adjacent row locations.
6. Pipes shall be sloped to drain onto slope protection surface.
7. Drainage pipes shall have a secured geotechnical (drainage) covering over their inlet ends if draining a sand retained back-fill.

E. The downslope edge of slope protection shall include a stable foundation structure to prevent movement.

F. The downslope edge shall be graded to drain collected water to designated areas as designed.

G. The unprotected soil adjacent to slope protection shall not be steeper than four to one (4H:1V) unless otherwise recommended by a Geotechnical Soils Report and designed by an engineer. Adjacent slopes shall drain surface water away from the slope protection.

H. Prior to placing slope protection, the fill slopes shall be constructed as a structural fill including both layer placement and compaction. The layer thickness shall be per an engineer's design and the minimum compaction shall be ninety-five percent (95%) of AASHTO T-180 at a moisture content plus or minus 2 percent (±2%) of optimum. Compaction testing is defined under structural fill requirements, City of Las Cruces Standards Specifications, latest Edition.

I. Cut slope construction (undisturbed soil) shall have its exposed surface compacted to ninety-five percent (95%) of AASHTO T 180 prior to the placement of the slope protection. Compaction testing of the embankment soil shall be a minimum of one (1) test every five hundred (500) square feet of slope protection.

J. Rock and mortar slope protection shall have a six-inch (6″) thick mortar bed (min) with rocks embedded three to four inches (3-4″) into the mortar. The joints between rocks shall be tightly packed with mortar. The mortar shall extend to within one quarter inch ($^1/_4$″) of the rock surface. All grout joints between the rocks shall be between one-half inch ($^1/_2$″) and two point two inches (2.2″) wide with a mean average under three-quarter's inch (¾″) and have a troweled finish. Alternative designs for any slope protection will be considered by the Community Development Department.

K. Rock used in slope protection construction shall meet the size as specified in the latest Edition of the New Mexico Department of Transportation (NMDOT) Standard Specifications for Highway and Bridge Construction. Rock quality shall be a minimum of thirty (30) as tested by AASHTO T 176 and ASTM D2419.

L. All slope protection designs shall be reviewed by the City of Las Cruces Community Development Department, Technical and Engineering Services Section prior to issuance of a construction permit.

M. Slope protection using planted vegetation is encouraged. Its design shall be in compliance with the City of Las Cruces Landscape design standards and shall include an adequate watering system, plant maintenance plan, and meet the following specifications:

1. Plants specified shall be suitable for the Chihuahuan Desert climate. Native plants are preferred but other suitable plants will be considered for approval by the City Landscape Architect.
2. All seed planting shall be covered with a securing blanket to protect seeds to full germination.
3. Planting and irrigation plans must be stamped by a Landscape Architect licensed to practice in the State of New Mexico.
4. A varied planting is more effective than a monoculture on a slope, and therefore, is desired by the City.
5. Use of plastic sheeting under a mulch layer is not allowed.
6. Organic mulch (i.e., straw mats, tacked clean straw, bark-mulch, or similar) are recommended for use with newly planted vegetation.
7. Slopes steeper than 4:1 shall not be used for planting for slope protection.
8. United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) practice standards shall be met for slope protection planting as presented in the following guidelines:
   a. Reference NRCS Conservation Practice Standard, Conservation Cover, Code 327.
   b. Reference NRCS Conservation Practice Standard, Critical Area Planting, Code 342.
   c. Reference NRCS Conservation Practice Standard, Mulching, Code 484.
   d. Reference NRCS Conservation Practice Standard, Runoff Management System, Code 570.

Sec. 32-144. Walls.

A. **General Design Requirements:**

1. Construction plans for proposed walls shall show property address, property lines, adjacent structures, surveyed location with setbacks, and setbacks in sufficient details to complete the construction. Construction plan details shall include surface drainage and surcharge load designations. Access portals through any wall shall be fully designed to insure retention of backfill.
2. The permittee is responsible for the location of all property lines affected by a proposed wall and shall be responsible for the location of footings and walls with respect to those boundaries.
3. Walls shall be set on stable soil. Areas identified by the City as having a history of instability shall be either stabilized as part of the wall design or the wall setback onto an adjacent stable site. Specific site investigation and design may be required. Figure C shows the differences in the three wall types.

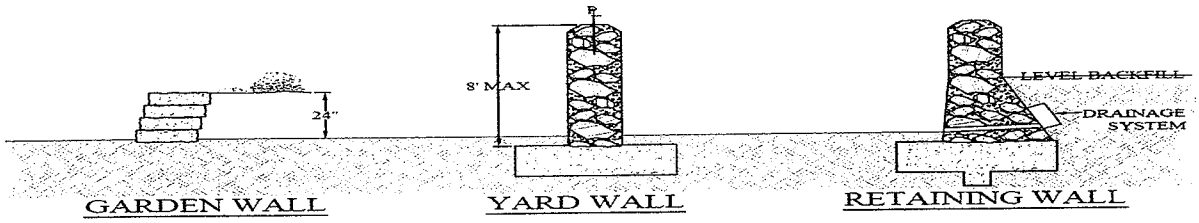

Figure C. Wall Types

4. No items shall be attached to any wall unless included in the initial wall design. The design of additional attachments shall be signed and sealed by an engineer.

5. Reinforcing bars placed within all concrete structures shall be placed on chairs or tied prior to the placing of the concrete. Stabbing dowels into wet concrete is not allowed (see ACI 318).

6. Rock walls shall be constructed with no voids in their structure and contain large interlocking stones which overlap both horizontally and vertically. Material other than concrete mortar and rock IS NOT ALLOWED within a rock wall unless approved by the design engineer. The presence of unapproved material within a rock wall will be the basis for rejection of construction.

7. Minimum construction temperature. For both concrete and mortar construction is 40° F and rising for both air and ground temperatures for concrete sections under 12" thick. No ice shall be present within the materials (mixing sand and water) to be added to fresh mortar/concrete. Temperature projections for the four (4) days immediately following placement shall remain above 40° F or the construction shall be covered and heated to 55° F (min) for the same period (see ACI 306R-88).

8. Maximum concrete temperature. For concrete placement the maximum maintained allowable temperature is 90° F. If concrete is to be cooled by the addition of ice, after-placement-slump tests are to be taken to insure that the water/cement ratio remains within design tolerances. If outside the allowed water content, the specific truck of concrete is rejected and all of its concrete is to be removed from the work site.

9. Once mixed, concrete and cement mortar shall not be retempered by the addition of water or sand and shall only be placed while in a workable condition. Once the mortar has started to "set," it shall not be used and must be removed from the construction site by the contractor.

10. Cement shall not be stockpiled on the work site. Sand may be stockpiled on the work site provided it is protected from moisture and adjacent contamination. All loose material shall be stored away from streets and storm drains. Approved silt fencing, or filtration medium, to prevent siltation, shall be used to protect all on-site storm drain systems.

11. Only walls designed and constructed by the City for public projects shall be constructed on City property per their approved construction plans.

12. Private-to-private yard or garden wall construction typically will require no building permit or public inspection but must meet City zoning codes for design and construction standards and specifications. Such construction is totally the responsibility of the developer/homeowners and their engineer.

13. Any wall that will help restrain wind or water erosion within a lot or area shall be constructed during the project's initial construction phase. This designation shall be identified as part of the site design by the engineer and verified by the City of Las Cruces Community Development Department, Technical and Engineering Services Section prior to the construction permit issuance.

B. **Concrete:**

1. All concrete shall have a minimum tested compressive strength of three thousand (3000) psi after a twenty-eight (28) day cure for wall construction. All concrete mix designs shall be forwarded to City of Las Cruces Public Works Department, Contracts Administration Section for approval prior to start of construction (mix design documentation is typically available from concrete plant mix supplier).
2. All concrete quantities over one (1) cubic yard shall be plant mixed with a minimum strength of three thousand (3000) psi after a twenty-eight (28) day cure. Concrete quantities less than one (1) cubic yard may be site mixed but shall have a minimum compressive strength of three thousand (3000) psi after a twenty-eight (28) day cure.
3. Portland cement shall conform to ASTM C150/C150M and shall be Type I or Type II.
4. Sand for concrete shall be washed and only stored where separated from the underlying ground surface and contamination from all elements.

C. **Mortar:**

1. Mortar for all retaining walls shall have a minimum compressive strength of eighteen hundred (1800) psi. Yard walls shall comply with ASTM C270-12. Mortar cubes shall be cured and tested in accordance with AASHTO T 106.
2. Required proportioning shall be determined from the mix design by a testing laboratory and signed by an engineer. Mortar for rock wall, retaining wall, and slope protection shall be Type S prepared per ASTM C270 and tested in accordance with ASTM C780, using procedure A1 or A3. All mix design certification shall be forwarded to the City of Las Cruces Public Works Department, Contracts Administration Section for approval prior to start of construction.
3. Mortar mixing may be by hand or a rotating paddle-mixing machine. Mortar shall be sampled in accordance with ASTM C172.
4. Mortar shall only be placed while in a "workable" condition with no signs of it starting to "set". If a rock is moved once the mortar has started to set, the mortar shall be removed and replaced with fresh mortar before the rock is replaced.
5. Mortar joint widths shall be between one-half inch ($^1/_2$″) (min) and two-point-two inches (2.2″) (max) wide with a mean average under three-quarters inch (¾″). All joints over two-point-two inches (2.2″) wide shall be removed prior to mortar setting and be reconstructed. All mortar joints shall be filled to within one-quarter inch (¼″) of the wall face and be finished (troweled) to a flat or slightly pointed face. Identical joint finishing shall also be applied to all "buried" sections of a rock wall. For nonstandard mortar joint architecture, alternative designs are encouraged for review and approval by the City of Las Cruces Community Development Department, Technical and Engineering Services Section.

6. Portland cement for mortar shall conform to ASTM C150M and shall be Type I or Type II.
7. Sand for site-mixed mortar shall be commercially washed and supplied.
8. Sand shall only be stored on-site when separated from underlying ground surface and protected from all adjacent contamination.
9. Mortar joints on rock walls may have small pieces of rock (shards) placed into their exposed surfaces for appearance provided that the following is achieved:
   a. Construction must place the rock shards into the mortar after it has been extended to within one-quarter inch (¼″) of the wall exterior surface.
   b. All shards shall be placed with a fifty percent (50%) (min) embedment into the wet wall mortar.
   c. All shards shall have one-eighth inch ($^1/_8$″) (min) distance between adjacent rock surfaces.
   d. All shards shall be both clean and moist when inserted into the grout surface.
   e. All rock shards shall have a quality as tested by AASHTO T-176 of thirty (30) (min).
   f. Testing frequency for extension of grout to within one-quarter inch (¼″) of wall exterior rock surface shall be three check points per each twenty feet (20') of finished wall per side.

D. **Rock:**

1. Rock for wall construction shall be placed with all surfaces clean and damp for good mortar adhesion.
2. Rocks for wall construction shall be of size and shape, and laid in a manner, that they "overlap" both horizontally and vertically within the wall.
3. Rocks grouted onto the outer face(s) of a wall in a "veneer" fashion, shall include a "tie" structure extending into the wall. Such "tie" structure shall be designed by an engineer.
4. Quality and size of the rock used for both cemented slope protection and walls shall meet size as described in the NMDOT Standard Specification for Highway and Bridge Construction, latest Edition.
5. All rock for wall construction shall have a quality of thirty (30) (min) as tested by AASHTO T 176 and a durability test as specified in the NMDOT Standard Specifications for Highway and Bridges for Class E & F Grouted Riprap using AASHTO T 96 and T 104.
6. Rock used for wall construction shall have dimensions (L, W, D) approximately equal. Smallest dimension of rock is three inches (3″).
7. Rock used in wall construction shall have no weathered joints and only crystalline structure.
8. Because of its tendency to quickly decompose, siltstone is not allowed in any wall structure.

E. **Wall Foundation:**

1. All wall footings shall bear on a compacted cohesionless (sand/crushed gravel) subgrade soil a minimum of eight inches (8″) thick and not on a cohesive (silt, clay, or caliche) soil. All foundation soils shall be compacted to ninety-five percent (95%) of ASTM D1557-12 or AASHTO T 180 test standards, at a moisture content of plus or minus two percent (± 2%) of optimum. Compaction shall be tested per City of Las Cruces Standard Specifications for Roadway Construction, latest Edition.
2. All footings (except garden wall) shall be constructed of concrete with vertical faces on all four lateral sides. Locations where the soil will not hold a vertical face the foundation faces will be formed.
3. Unless differing engineering recommendations with calculations have been developed, the following shall apply:
   a. Footing thickness shall be twelve inches (12″) of concrete (min).
   b. Minimum footing reinforcement is two (2) #4 deformed bars (continuous) with eighteen inches (18″) (min) lateral spacing and #4 cross-bars at twenty-four inches (24″) spacing (max). Footing continuous reinforcing shall comply with ACI 318, with a minimum steel ratio of 0.0014.
   c. Concrete covering over all reinforcing bars and their ends shall be three inches (3″) thick (min). All reinforcing bars shall be supported by chairs to insure three inches (3″) of concrete cover.
   d. Soil cover over the top of wall footing shall be twelve inches (12”) (min).
   e. First course of rock above the footing shall have an average diameter between eight inches (8″) and sixteen inches (16″) with a six-inch (6″) (min) embedment into the foundation concrete.

F. **Final Cleanup:**

1. All exposed wall surfaces, and adjacent ground surfaces, shall be cleaned of splattered mortar left from construction. Removal methods shall be approved by City of Las Cruces Public Works Department (Contract Administration Section) prior to application. All debris and removed mortar shall be removed from the construction site by contractor.
2. All adjacent disturbed soil shall be constructed to designed shape and contour per final design. All adjacent soil surface shall be planted for erosion prevention or designed landscaping.

G. **No Disturbance Zone** (see Figure A on page 3)**:**

1. Construction/disturbance plans within a no disturbance zone shall be designed by an engineer and approved by the City of Las Cruces Community Development Department, Technical and Engineering Services Section.
2. Design documentation shall include:
   a. Geotechnical Soils Report signed and sealed by and engineer.
   b. Project specific construction drawings and supporting design calculations.

c. Building permit application shall include both a and b.

3. Ground surfaces down-slope of the no-disturbance zone shall be no steeper than 3:1 (H:V).

4. The no-disturbance zone shall not extend onto adjacent property except within a permanent retaining wall easement for both slope stability and maintenance.

H. **Garden Walls** may be constructed without an engineered design or a City building permit provided they meet the following criteria (1 – 4):

1. Garden walls shall be constructed using the manufacturer's design and construction specifications and have a retained soil height of less than twenty-four inches (24″) above the adjacent ground surface.

2. Any garden wall over twenty-four inches (24″) high shall be considered to be a retaining wall and shall require a review by the City of Las Cruces Community Development Department, Technical and Engineering Services Section for adequacy, zoning, and ordinance compliance prior to issuance of a construction permit

3. Garden walls may be constructed along property lines if within their height restrictions, have a level backfill, and must totally remain on the wall owner's property.

4. Private garden walls shall not be located on City property.

5. Garden walls under forty-eight inches (48″) high may be designed by a Landscape Architect registered in the State of New Mexico. Such walls shall have no backfill reinforcement, have a level backfill, and no additional surcharge. Design drawings shall be signed and sealed by a New Mexico registered Landscape Architect.

6. Garden walls over forty-eight inches (48″) high with reinforced backfill, or backfill surcharge above level shall be signed and sealed by an engineer.

I. **Yard Walls** - Reinforced Concrete, Masonry, or Rock/Mortar (Figures D and E under Sec. 32-145. Retaining Wall Design Standards): Yard walls may be constructed without an engineered design provided they meet all of the following design criteria:

1. Yard wall shall have **no** grade differential between its front and back.

2. Yard wall foundation zone shall have a history of stability or be constructed as a structural fill.

3. Yard walls *separating individual lots* may be constructed as part of the individual lot development(s).

4. Yard wall height shall be less than eight feet (8') high (max) as measured from the top of the foundation to the top-of-wall in accordance with the zoning codes (see LCMC, Chapter 38, Article VI, Section 38-60(C)).

5. Yard wall footing width shall have the following minimum widths:

- *reinforced concrete and reinforced masonry wall:* twenty-six inches (26″) (min).
- *mortared rock wall:* twenty-four inches (24″) (min).

6. Yard wall expansion joints-are required for both concrete masonry units (CMUs) and reinforced concrete walls and shall be spaced sixteen feet (16') (max) along each wall segment. These joints shall extend from the foundation to the top-of-the-wall.

7. Yard wall thickness (min):

   - *reinforced masonry* – six inches (6″) (min).
   - *mortared rock* – sixteen inches (16″) (min).
   - *reinforced concrete* – six inches (6″) (min).

8. Yard wall reinforcement (min):

   - *reinforced concrete* - #4 rebar vertically and horizontally @ eighteen inches (18″) on center (max).
   - *reinforced masonry* - #4 rebar vertically @ twenty-four inches (24″) (max) and #4 rebar horizontally in an eight inch (8″) (max) bond beams at the top of the wall and @ forty-eight inches (48″) (max).
   - *mortared rock* – mortared rock walls shall not contain steel reinforcement except in its concrete footing.

9. Any yard wall that does not meet the above specifications shall be designed by an engineer.

Sec. 32-145. Retaining Wall Design Standards: (Figure F in this section). An engineer shall design all retaining walls.

1. Retaining wall types include, but are not limited to, Mechanically Stabilized Earth (MSE), gabion, reinforced concrete, reinforced earth, bin, anchored or tied-back, rock gravity, terraced, and nonstandard systems including, but not limited to, rock veneer wall modifications.

2. Retaining wall construction drawings. Developers, property owners, or builders shall submit detailed engineered construction drawings and specifications for each specific location at time of building permit application. As a minimum, the following information shall be included:

   - Construction drawings for all walls shall be on 24″ x 36″ sheets.
   - Specifications may be either on the drawing sheet or on separate $8^1/_2$″ x 11″ sheets.
   - All Geotechnical Design Reports and wall calculations shall be on separate $8^1/_2$″ x 11″ sheets.
   - Typical cross-section/detail of the wall shall include finished soil elevations on both sides of wall and identify surcharges and their locations
   - All wall reinforcement locations and required concrete cover.
   - All material specifications.
   - Wall locations shall be identified on specific site grading plans to scale with survey information.

- Construction plans shall note elevations of top-of-wall (TOW) at its ends, corners, and bottom-of-footings (BOF).
- Construction plans shall show all adjacent structure(s), utilities, and property lines within twenty feet (20') on each side of a wall or wall system.
- Construction plans shall accurately show wall system(s) width and property line location(s) to scale.
- Construction drawings shall show drainage system(s) and associated water collection system.
- Additional requirements by the City of Las Cruces Community Development Department, Technical and Engineering Services Section.

3. Retaining wall designs:

- Shall be for a fifty (50) year (min) safe service life.
- Reinforcement requirements shall be designed by an engineer.
- Retaining wall design loadings shall include sum of forces from retained soil, adjacent loads, passive forces, base friction, and wind loads. Essential structures shall also include seismic acceleration. All wall designs require a minimum factor-of-safety of 1.5 against overturning, sliding, and foundation bearing from the summation of all applied forces.
- Resultant force vector for the sum of all retaining wall loads shall be within the middle one-third (1/3) of the foundation width and give a positive bearing stress under the foundation heal.
- Retaining wall systems shall be wall segments individually designed. The global stability of the entire slope shall be checked for minimum safety factor of 1.5.
- Retaining walls shall be designed to ultimate height as required for final site development.
- Retaining wall designs shall use the City of Las Cruces Design Values, Sec. 32-138(D) in this document unless a site-specific geotechnical investigation and soils laboratory testing identifies alternative soil structural properties. The alternative values shall then be used.
- Retaining wall exposed face batter shall be positive (into the wall) and have a 1:24 (H:V) (min) slope after completion of all foundation yielding and back fill placement.
- Retaining wall ends shall meet the following requirements:

  a. Must have a structural connection to another wall/structure, use wing walls, have slope reinforcement, or have a 3:1 (H:V) soil slope or less to insure fill containment.

  b. Temporary wall ends for fill containment may be designed for wall segments to be extended in the future.

c. Fill containment design(s) shall be shown on the approved wall construction plans.

4. Future wall modification: If a retaining wall design includes a future modification:
   - The "retaining" part of the wall shall be designed and constructed to retain the ultimate lateral loads during the projects initial construction phase. Its foundation shall be sized to avoid exceeding the allowable soil bearing capacity, overturning, or sliding resistance by a safety factor of 1.5 (min) due to the ultimate loads against the wall.
   - Changes to a retaining wall backfill (retained fill) after completion of its initial construction shall require investigative and design documentation signed and sealed by an engineer.
   - Wall structural modifications shall require a full review by the City of Las Cruces Community Development Department, Technical and Engineering Services Section prior to issuance of a new building permit.
   - All drawings and calculations for the modification shall be included with the initial building permit application.
5. Ground surface drainage: ground surfaces adjacent to any wall shall be graded to prevent water infiltration into the wall foundation zone. Where this is not practical, one of the following shall be part of the final design by an engineer.
   - A drainage system(s) extending from the retained ground surface to the bottom-of-wall-foundation for the length of the wall.
   - The wall designed to withstand the additional hydraulic pressure of the saturated backfill.
6. Wall drainage system outlets shall drain into a designed collection area(s).
7. All retaining walls supporting streets or driveways that could block emergency services upon their failure shall be designated as Essential Structures and be designed per the current City-adopted IBC and ASCE 7-10, including appropriate seismic acceleration. Included are walls retaining slopes with historic instability. For seismic evaluation, see City of Las Cruces Design Values, Section 32-138(E) in this document.
8. Retaining wall foundations shall extend through their retained fills or be founded on a structural fill constructed per engineer's design.
9. Retaining walls supporting public roads and streets located within the public rights-of-way or at the following locations shall be constructed to their ultimate dimensions during the projects initial development phase. This means any retaining wall:
   - Forming the border with adjacent public rights-of-way.
   - Reinforcing a slope with a history of instability.
   - That is part of a specific site/area drainage system.
   - Or wall system, retaining over two feet (2') of soil.

- A surcharge (vehicles, structure, or sloped backfill above level), within one wall height horizontal distance from the fill side wall face.
- That is part of the site development of an essential structure.
- That is determined by the City Building Official to help reduce surface erosion from either wind or storm water prior to the subdivision complete built-out.

10. Retaining wall back fill extending to twice the wall height horizontally from the wall shall comply with the following:

- Shall be sand, noncohesive, and well-drained soil-rock mixture.
- Compacted using any hand compaction equipment such as "vibratory plate compactor", "jumping jack" stomper/rammer, or small roller. Exercise caution to not move or break the wall.
- Backfill soil shall have a maximum aggregate size of four inches (4″).
- Backfill that is not surcharged by a structure or slope to be layer placed in eight inch (8″) (max) loose lifts and compacted to 90% of ASTM D1557.
- Backfill that is surcharged by a structure or slope shall be layer placed and compacted as a structural fill.
- Compaction testing shall be one (1) test per each two hundred square feet (200 ft^2) (min) per alternate soil back fill layers.
- Beyond this zone, the soil may be compacted to design engineer's specified density.
- Walls using a poorly drained soil back-fill shall be designed to resist the additional hydraulic pressure and expansion from total backfill soil saturation.
- Surface drainage (see Sec. 32-145(5) in this document).

11. Retaining wall drains:

- Bottom row of drains extending through a retaining wall shall be located with their outlets within six inches (6″) (max) above adjacent finished ground surface.
- May extend through the retaining wall using a three-inch (3″) diameter (min) PVC plastic pipe and graded to drain away from the retained fill.
- Drain pipe inlets to be securely covered with geotextile (drainage) secured to the pipe.
- Walls over 8 feet (8') high shall have two rows of drains (min) with the second being three feet (3') above the bottom row with locations staggered.
- Horizontal spacing of drain pipes shall be ten feet (10') (max) with each row of outlet location staggered.
- All drain water shall be drained to designated collection area(s). All drainage paths on adjacent property shall be located within a "Maintenance Easement." Drainage way maintenance shall remain responsibility of retaining wall owner.

12. In-ground ponds and swimming pools:

- Shall be setback the larger of either ten feet (10') or twice the height of the retaining wall (as measured from the top of its foundation to its top), from any retaining wall.
- If pond/pool seepage could reach the wall foundation, then a drainage system to intercept the water shall be installed. This drainage zone shall extend from the ground surface to below the bottom-of-footing elevation and laterally the full length of the impoundment (min) along the wall.
- Drainage shall be into designated collection area or utility.

13. Landscaping in close proximity to a retaining wall shall be specifically considered in the structural analysis of the wall. Such planting zones may require specific independent drainage system(s) to prevent hydraulic pressure buildup against the retaining wall(s). Root barriers shall also be designed for areas of future root growth.

14. Engineers Certification: At the conclusion of the permitted construction of a retaining wall, the engineer or designee shall submit to the Building Official a written statement that site visits have been made and that all retaining wall plans have been met to the best of the structural observer's knowledge and comply with the permitted design requirements and plans. This document shall be signed and sealed by the engineer *(*see current City- adopted IBC, Section 1702.)

City of Las Cruces
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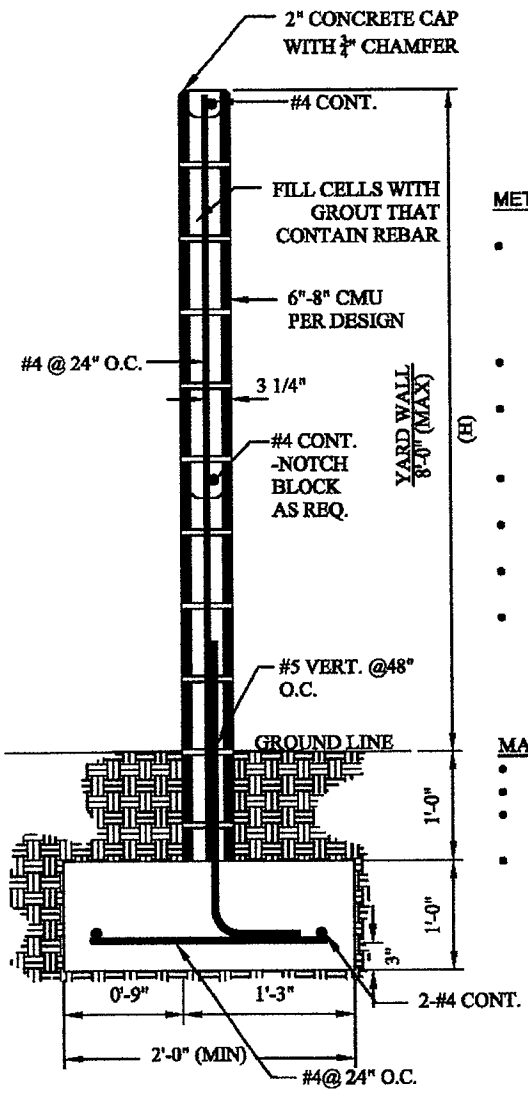

METHODS

- SOIL FOUNDATION ZONE SHALL BE SCARIFIED 8" DEEP AND COMPACTED TO 95% OF MODIFIED PROCTOR WITH MOISTURE WITHIN 2% OF OPTIMUM CONTENT. FOUNDATION ZONE SHALL BE MAINTAINED IN THIS CONDITION UNTIL CONCRETE FOOTING IS POURED.
- EXPANSIVE OR POORLY DRAINED SOILS ARE PROHIBITED IN BACKFILL ZONE.
- FORMS ARE REQUIRED FOR CONCRETE FOUNDATION POURS TO INSURE VERTICAL FOOTING EDGES AND DESIGN DIMENSIONS.
- REBAR SHALL BE PLACED WITH A MINIMUM OF 3" CONCRETE COVERING FOR GROUND CONTACT.
- APPROVED CHAIRS OR PRE-CAST RISERS MUST BE USED TO SUPPORT ALL REBARS.
- MORTAR EDGES SHALL NOT RECESS MORE THAN ¼" FROM WALL FACE.
- WALL HEIGHT: SEE CITY OF LAS CRUCES MUNICIPAL CODE, CHAPTER 38, ARTICLE IV, SEC 38-60(C).

MATERIALS

- CONCRETE: 3000 PSI COMPRESSIVE STRENGTH (28 DAYS).
- REBAR SHALL BE GRADE 60.
- MORTAR: THE 28-DAY COMPRESSIVE SHALL BE 1800 PSI (MINIMUM) COMPRESSIVE STRENGTH MIX DESIGN.
- CEMENT USED IN MORTAR SHALL CONFORM TO ASTM STANDARD C-150 AND BE TYPE I OR II.

CONDITIONS

- GROUND SURFACE SHALL BE FLAT OR SLOPE AWAY FROM WALL ON BOTH SIDES.
- NO SURCHARGE LOADS SHALL BE ALLOWED WITHIN H (FT) FROM THE EXISTING WALL.
- NO VERTICAL/LATERAL LOADS SHALL BE ATTACHED TO THE WALL BEYOND ORIGINAL DESIGN.
- BACKFILL AND SUBGRADE SHALL BE GRANULAR AND WELL-DRAINED SOILS.
- NO BACKFILL SHALL BE ADDED ABOVE DESIGNED GROUND SURFACE(S).
- CITY RESERVES THE RIGHT TO STOP WORK IF ANY DEVIATIONS ARE NOTED.

Figure D. Eight-Foot (8') Concrete Block Yard Wall

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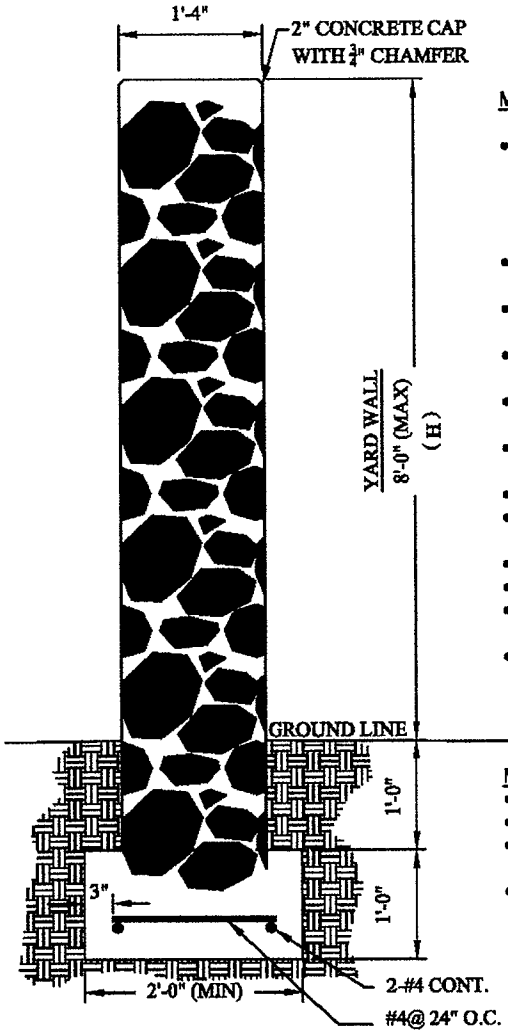


METHODS

- SOIL FOUNDATION ZONE SHALL BE SCARIFIED 8" DEEP AND COMPACTED TO 95% OF MODIFIED PROCTOR WITH MOISTURE WITHIN 2% OF OPTIMUM CONTENT. FOUNDATION ZONE SHALL BE MAINTAINED IN THIS CONDITION UNTIL CONCRETE FOOTING IS POURED.
- EXPANSIVE OR POORLY DRAINED SOILS ARE PROHIBITED IN BACKFILL ZONE.
- FORMS ARE REQUIRED FOR CONCRETE FOUNDATION POURS TO INSURE VERTICAL FOOTING EDGES.
- REBAR SHALL BE PLACED WITH A MINIMUM OF 3" CONCRETE COVERING FOR GROUND CONTACT.
- APPROVED CHAIRS OR PRE-CAST RISERS MUST BE USED TO SUPPORT ALL REBARS.
- THE FIRST COURSE OF ROCK SHALL BE IMBEDDED 6" (MIN) INTO THE CONCRETE FOOTING .
- WALL MUST BE SOLID WITH NO VOIDS IN ITS CENTER.
- LARGE ROCKS SHALL INTERLOCK AND OVERLAP BOTH HORIZONTALLY AND VERTICALLY.
- NO DEBRIS SHALL BE IN THE WALL STRUCTURE.
- ALL VOIDS SHALL BE FILLED WITH QUALITY MORTAR.
- MORTAR EDGES SHALL NOT RECESS MORE THAN ¼" FROM WALL FACE.
- WALL HEIGHT: SEE CITY OF LAS CRUCES MUNICIPAL CODE, CHAPTER 38, ARTICLE IV, SEC 38-60)(C).

MATERIALS

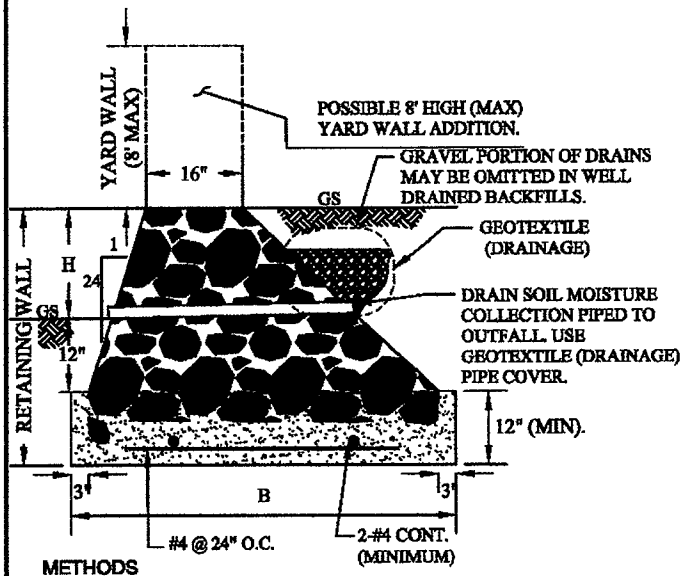
- CONCRETE: 3000 PSI COMPRESSIVE STRENGTH (28 DAYS).
- REBAR SHALL BE GRADE 60.
- MORTAR: THE 28-DAY COMPRESSIVE SHALL BE 1800 PSI (MIN) COMPRESSIVE STRENGTH MIX DESIGN.
- CEMENT USED IN MORTAR SHALL CONFORM TO ASTM STANDARD C-150 AND BE TYPE I OR II.

CONDITIONS

- GROUND SURFACE SHALL BE FLAT OR SLOPE AWAY FROM WALL ON BOTH SIDES.
- NO SURCHARGE LOADS SHALL BE ALLOWED WITHIN H (FT) FROM THE EXISTING WALL.
- NO VERTICAL/LATERAL LOADS SHALL BE ATTACHED TO THE WALL BEYOND ORIGINAL DESIGN.
- BACKFILL AND SUBGRADE SHALL BE GRANULAR AND WELL-DRAINED SOILS.
- NO BACKFILL SHALL BE ADDED ABOVE DESIGNED GROUND SURFACE(S).
- CITY RESERVES THE RIGHT TO STOP WORK IF ANY DEVIATIONS ARE NOTED.

Figure E. Eight-Foot (8') Rock Yard Wall

City of Las Cruces
PEOPLE HELPING PEOPLE



MATERIALS

- CONCRETE: 3000 PSI COMPRESSIVE STRENGTH (28 DAYS).
- REBAR TO BE GRADE 60.
- MORTAR: THE 28-DAY COMPRESSIVE SHALL BE 1800 PSI (MINIMUM) COMPRESSIVE STRENGTH
- MIX DESIGN CEMENT USED IN MORTAR SHALL CONFORM TO ASTM STANDARD C-150 AND BE TYPE I OR II.

METHODS

- SOIL FOUNDATION ZONE SHALL BE SCARIFIED 8" DEEP AND COMPACTED TO 95% OF MODIFIED PROCTOR WITH MOISTURE WITHIN 2% OF OPTIMUM CONTENT. FOUNDATION ZONE SHALL BE MAINTAINED IN THIS CONDITION UNTIL CONCRETE FOOTING IS POURED.
- BACKFILL SOIL PLACED "BEHIND" ALL RETAINING WALLS, AND EXTENDING "H" FEET HORIZONTALLY FROM THE WALL, SHALL BE WELL DRAINED SOIL-ROCK MIXTURE AND SHALL HAVE A MAXIMUM AGGREGATE SIZE OF FOUR (4") INCHES. BACKFILL IN THIS ZONE SHALL BE COMPACTED USING ONLY HAND COMPACTION EQUIPMENT SUCH AS A" VIBRATORY PLATE COMPACTOR" OR "JUMPING JACK" STOMPER/RAMMER.
- BACKFILL EXTENDING BEYOND "H" ZONE SHALL BE COMPACTED TO ENGINEER'S SPECIFICATIONS USING REASONABLE MOTORIZED EQUIPMENT.
- ALL BACKFILL SHALL BE LAYER PLACED IN EIGHT-INCH (8") LOOSE LIFTS (MAX) AND COMPACTED.
- FORMS ARE REQUIRED FOR CONCRETE FOUNDATION POURS TO INSURE VERTICAL FOOTING EDGES.
- REBAR SHALL BE PLACED WITH A MINIMUM OF 3" CONCRETE COVERING FOR GROUND CONTACT.
- APPROVED CHAIRS OR PRE-CAST RISERS MUST BE USED TO SUPPORT ALL REBARS.
- THE FIRST COURSE OF ROCK SHALL BE IMBEDDED INTO THE CONCRETE FOOTING 6" (MIN).
- WALL MUST BE SOLID WITH NO VOIDS.
- LARGE ROCKS SHALL INTERLOCK AND OVERLAP BOTH HORIZONTALLY AND VERTICALLY
- NO DEBRIS SHALL BE IN THE WALL STRUCTURE.
- ALL VOIDS SHALL BE FILLED WITH QUALITY MORTAR.
- MORTAR EDGES SHALL NOT RECESS MORE THAN ½" FROM WALL FACE.
- ROCK YARD WALL MAY BE ADDED TO TOP OF RETAINING WALL UP TO EIGHT FEET (8') HIGH WITH FOUNDATION ENLARGED TO INSURE A FACTOR-OF-SAFETY = 1.5 (MIN).

CONDITIONS

- RETAINED BACKFILL SHALL BE FLAT OR SLOPE AWAY FROM THE WALL.
- NO VERTICAL/LATERAL LOADS CAN BE ADDED TO COMPLETED WALL BEYOND ORIGINAL DESIGN.
- NO ADDITIONAL BACKFILL SHALL BE ADDED TO RETAINED GROUND SURFACE (GS).
- THREE-INCH DIAMETER SCHEDULE 10 PVC PIPE WEEP HOLES SHALL BE PLACED AT 2 X H (FT) HORIZONTAL SPACING WHEN WALLS ARE HIGHER THAN 24" ABOVE DOWNSLOPE GROUND SURFACE.
- WEEP HOLE PIPES INLETS SHALL BE COVERED WITH FINE MESH SCREEN OR DRAINAGE GEOTEXTILE AND SECURED.
- CITY RESERVES THE RIGHT TO STOP WORK IF ANY DEVIATIONS OF THESE STANDARDS ARE NOTED.

Figure F. Rock/Mortar Retaining Wall
(Retaining wall with yard wall additions up to eight feet (8'))

REFERENCED STANDARDS

This section lists the standards referenced within this document. All standards referenced in Chapter 32, of the City of Las Cruces Municipal Code (LCMC) have been adopted by the City for use in the design and construction of projects within the City. Other standards that have previously been adopted within the current IBC, are listed in Chapter 35 of that document.

AASHTO (American Association of State Highway and Transportation Officials)

T-96	Standard Method of Test for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
T-104	Standard Method of Test for Soundness of Aggregate by Use of Sodium Sulfate or Magnesium Sulfate
T-106	Standard Method of Test for Compressive Strength of Hydraulic Cement Mortar (Using 50-mm or 2-in. Cube Specimens)
T-176	Standard Method of Test for Plastic Fines in Graded Aggregates and Soils by Use of the Sand Equivalent Test
T-180	Standard Method of Test for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18") Drop

ACI (American Concrete Institute)

306R-88	Cold Weather Concreting
318	Building Code Requirements for Structural Concrete and Commentary

ASCE (American Society of Civil Engineers)

7-10	Minimum Design Loads for Buildings and Other Structures

ASTM (American Society for Testing and Materials)

C150/C150M	Standard Specification for Portland Cement
C172-99	Standard Practice for Sampling Freshly Mixed Concrete
C270	Standard Specification for Masonry Construction
C270-12A	Standard Specification for Mortar for Unit Masonry
C780	Standard Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry
D1557	Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft 3) (2,700 kN-m/m 3)
D2419-09	Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate

IBC (International Building Code)

Sec 1702	Structural Observation

LCMC (Las Cruces Municipal Code)

Chapter 30	Buildings and Building Regulations		
	Article II, Division 2	Building Permit and Inspection Process	
		Secs. 30-170 thru 30-722	
	Article II, Division 3	Types of Construction Not Requiring a Permit	
		Sec. 30-301	Exempt Building Permits
Chapter 32	Design Standards		
	Article V	Standards for Erosion Control	
		Sec. 32-301	Soil Erosion Control
		Sec. 32-302	Wind Erosion Control

LCMC (Las Cruces Municipal Code) (continued)

Chapter 34	Drainage and Flood Control		
Chapter 38	Zoning		
	Article VI	Special Provisions	
		Sec. 38-60	Walls and Fences
		Sec. 38-62	Exceptions and Modifications
	Article VII	Nonconforming Uses, Structures and Property	
		Secs. 38-70 thru 38-73	

OSHA (Occupational Safety and Health Administration) Regulations

29 CFR, Part 1926	Safety and Health Regulations for Construction, Subpart P - Excavations	
	1926.650	Scope, application and definitions applicable to this subpart.
44 CFR	Emergency Management and Assistance	

Sec. 38-60. Walls and fences.

A.

Purpose. A wall or fence is not required by this Code except in mobile home parks/recreational vehicle parks. When provided, this section defines the regulations regarding walls and/or fences. The wall/fence height regulations are defined for residential land uses and nonresidential land uses regardless of the zoning district in which the land use is located. However, see section 38-57, mobile home parks/recreational vehicle parks, for when walls or fences are required to be provided and additional regulations.

B.

Definitions.

Common wall or *common fence.* An artificially constructed barrier or structure along a property line between two or more properties owned by two or more separate property owners.

Fence. An artificially constructed barrier of posts, wire, wood, steel, cable or similar material erected to enclose or screen areas of land (design standards, chapter 32).

Retaining wall. Is a designed wall constructed of brick, block, rock, concrete, MSE, or reinforced concrete, to retain a specific depth of soil or surcharge. This wall type is designed to resist the sum of all specific soil pressures with a predetermined safety factor.

Wall. An artificially constructed barrier of solid material such as brick, block, rock, or concrete, erected to enclose or screen areas of land (design standards, chapter 32).

C.

Height.

1.

Residential land uses (regardless of the zoning district in which the land use is located):

a.

Required front yard: Four-foot maximum.

b.

Required rear and side yard: Eight-foot maximum.

c.

Sec. 30-233. Submittal requirements.

The material required filed for each permit application under division 4 is as follows:

(1)

Completed application to include property owner's signature, contractor's name and license number;

(2)

Plan review fee, if applicable;

(3)

Permit fee (required at time of permit issuance);

(4)

Park fee (required at time of permit issuance);

(5)

Utility development impact fees (required at time of permit issuance);

(6)

Construction drawings. Construction drawings shall be blueline or similar process and be drawn to accurately display appropriate information, the minimum scale to be one-quarter inch = 1.0 foot. (Smaller scale may be approved by the plan reviewer.) Blueline or similar process copies must measure at least 18 x 24 inches, and must include the information identified in (6)a. and (6)b. Permit applications for mobile/manufactured homes are exempt from submitting construction drawings as well as items 1—5 of subsection (6)b below, but shall comply with site plan requirements 1—12 of subsection (6)a.

a.

Site plan. The site plan shall be either blueline or a similar process on paper measuring at least 8 ½ × 11 inches. Copies submitted shall be legible and at a scale that accurately represents the information. The following information shall be provided on the site plan.

1.

General legal description of subject property. If the tract of land is not within an approved and filed subdivision, a vicinity map must be included showing the exact location of the property. The site plan shall include the entire lot or tract.

2.

Boundary lines including dimensions and angles, north arrow and graphic scale.

3.

All adjacent streets, public right-of-ways, and easements shall be shown and labeled.

4. Curbing, gutters, sidewalks, and parkways shall be shown, whether existing or proposed, labeling, and width dimensions shall be shown as well. All curb cuts shall be shown and shall comply with the City of Las Cruces Traffic Standards and shall conform to ADA standards. Clear sight triangle on corner lots shall be included.

5. Required setback lines shown as dashed line and labeled.

6. All structures shall be accurately located and labeled on site plans, including accessory structures, porches, carports, patios, concrete slabs, etc.

7. All dimensions shall be shown from the closest point between any part of a structure (i.e., dwelling, porch, carport, etc.) and at right angle from the property line.

8. Retaining walls with elevations shown on both sides of the wall including wall height with dimensions, drainage, and all design calculations.

9. Parking spaces, driveways, garages, carports, and other parking areas shall be labeled as such with dimensions shown.

10. Drainage concept with appropriate elevations and drainage flow arrows shall be shown on plans in accordance with filed subdivision. Grading/drainage plans for new construction shall show calculations for ponding or indicate approved ponding size and shall dimension all ponding areas.

11. Indicate grades for front yard, pad, finished floor, backyard and existing grades outside property line, plus top of curb elevations at property lines per approved grading/drainage plan for the subdivision.

12.

~~Sec. 32-136. Scope of division.~~

~~Construction of all fences, walls or retaining walls within the city shall require an approved building permit issued by the city, and shall conform to the minimum design standards as specified within this division.~~

~~*(Ord. No. 949, § 3.2A, 9-8-87; Ord. No. 1224, § 1, 3-18-91; Ord. No. 2131, § I, 9-7-04)*~~

~~Sec. 32-137. Definitions.~~

~~The following words, terms and phrases, when used in this division, shall have the meanings ascribed to them in this section, except where the context clearly indicates a different meaning:~~

~~*Decorative wall* means any wall used for landscaping purposes not more than 24 inches in height, 12 inches wide, and not located on property lines.~~

~~*Fence* means an artificially constructed barrier of posts, wire, wood, steel, cable or similar material erected to enclose or screen areas of land.~~

~~*Retaining wall* means an artificially constructed structure that retains 4.0 feet of grade differential or a surcharge load.~~

~~*Wall* means an artificially constructed barrier of solid material such as brick, block, rock, or concrete, erected to enclose or screen areas of land.~~

~~*(Ord. No. 949, § 3.2A, 9-8-87; Ord. No. 2131, § I, 9-7-04)*~~

~~***Cross reference**— Definitions generally, § 1-2.*~~

~~Secs. 32-138—32-142. Reserved.~~

~~***Editor's note**—~~

~~Ord. No. 2131, § I, adopted Sept. 7, 2004, repealed sections 32-138—32-142, in their entirety. Former sections 32-138—32-142 pertained to the application procedure, retention and validity of approved plans, expiration of permits and submittal requirements, and derived from Ord. No. 949, § 3.2B—F, adopted Sept. 8, 1987; Ord. No. 1929, §§ I, II, adopted Aug. 5, 2002.~~

~~Sec. 32-143. Wall design requirements.~~

~~In addition to the following wall design requirements, (1)—(6) refer also to the rock/mortar retaining walls diagram and construction notes found at the end of this section.~~

~~(1)~~

~~Under this division, the permittee shall be responsible for the location of all property lines affected by a proposed wall and shall be responsible for the placement of footings and walls with respect to property boundaries.~~

~~(2)~~

~~Subgrade for walls shall be compacted to 90 percent of modified proctor as determined by ASTM standard D1557.~~

~~(3)~~

~~Concrete for footings shall be transit mix and shall attain a minimum strength of 2,500 psi in 28 days. The bottom of the footings shall be located a minimum 12 inches in thickness below the finish grade of soil. Hand mix concrete will only be allowed in footings having a total lineal footage of 25 feet or less within the entire project.~~

~~(4)~~

~~Reinforcing steel for concrete footings shall be two number 4 continuous deformed bars conforming to ASTM standard A617 and shall be grade 40.~~

~~(5)~~

~~Mortar shall attain a minimum of 1,200 psi in 28 days with a suggested mix in the ratio of one part Portland cement by volume with over one-fourth to one-half parts of hydrated lime or lime putty by volume, and the aggregate shall be not less than two and one-fourth; and not more than three times the sum of the volumes of the cement and lime used; or one-half by volume of cement, one part by volume of type II masonry cement, and the aggregate shall not be less than two and one-fourth and not more than three times the sum of the volume of the cement used. Minimum thickness of rock walls shall be 16 inches, except decorative walls.~~

~~(6)~~

~~For subdivision development, walls are not required to be built at the time of roadway construction unless under the following circumstances:~~

~~a.~~

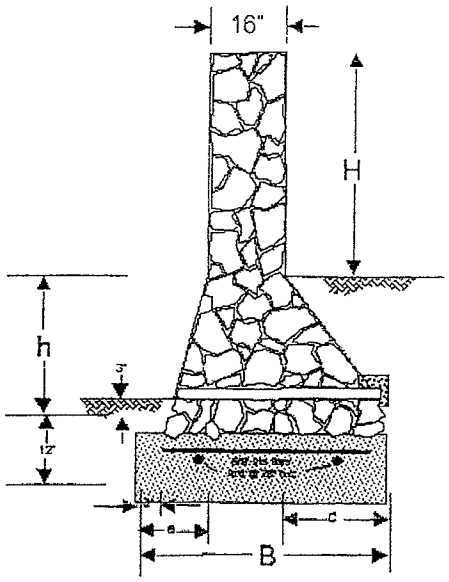
~~Adjacent to dedicated right-of-way.~~

~~b.~~

~~Abutting an existing wall or a retaining wall for the purposes of mitigating erosional damage to adjacent development, where the existing wall or retaining wall's height is less than 3.0 feet above the proposed grade. Construction of the wall or retaining wall shall be a minimum 4.0 feet in height, measured from the proposed grade.~~

Rock/Mortar Retaining Walls

(Retain up to 4 ft with additional garden walls up to 6 ft)



Dimensions				
H	h	B	a	c
All Dimensions are in inches				
24 to 72	0-20	22	0	0
	21-27	25	3	0
	28-39	25	3	0
	40-61	47	4	21

Conditions

- Backfill shall be flat or slope away from wall
- No surcharge loads allowed within 3 x h (ft) from wall
- No vertical/lateral loads can be added to wall
- Backfill must not be clay or clay like materials
- Backfill and sub-grade must be granular and well drained
- A 12" x 12" continuous gravel drain (3/4" material) is required
- 3" diameter schedule 10 PVC weep holes shall be provided at 2Xh (in ft) max when walls are higher than 20".
- Weep hole shall be covered with a fine mesh located 3" above the bottom of the gravel drain.
- Walls must only be used in stand alone conditions, not in parallel or in series.
- City reserves the right to stop work if any deviation is noted.

Materials

- Concrete for footings – 2,500 psi (28 days) w/ 1-3/4" MSA and max 4" slump
- Rebar – Grade 40 min.
- Mortar – either lime or type s mortar cement

  Mortar proportions:

  Portland Cement (low alkali) 1 part

  Hydrated lime (type s) ½ part

  Clean washed mortar sand (imported) 4 ½ parts.

Methods

- Soil under footing to be scarified (8") and compacted to 95% of modified proctor and within 2% of optimum moisture content and maintained in such condition until footing is poured.
- Soil used for backfill around wall must be placed with the same conditions above unless the soil has more than 35% finer than a #200 sieve in which case 90% compaction will be allowed.
- Forms may be required if the soil will not hold a vertical face for pouring the footings.
- Rebar shall be placed with a minimum of 3" clearance from the ground and approved chairs or pre-cast risers must be used.
- The first course of rock must be imbedded in the footings by at least 6"
- Wall must be solid with no voids in the center with large interlocking stones which typically interlock and overlap both horizontally and vertically. No debris will be permitted in the wall, all voids must be filled with quality mortar.
- Mortar joints must not recess more than ½ inch from the face of the wall.

~~Rock/Mortar Retaining Walls~~

~~(Ord. No. 949, § 3.2G, 9-8-87; Ord. No. 2131, § I, 9-7-04)~~

~~Sec. 32-144. Retaining wall design requirements.~~

~~(a)~~

~~Under this division, the permittee shall be responsible for the location of property lines affected by a proposed retaining wall and shall be responsible for the placement of footings and walls with respect to property boundaries.~~

~~(b)~~

~~Subgrade for retaining walls shall be compacted to 95 percent of modified proctor as determined by ASTM standard D1557.~~

~~(c)~~

~~Concrete for footings shall be transit mix and shall attain a minimum strength of 2,500 psi in 28 days. The bottom of the footings shall be located a minimum 12 inches in thickness below the finish grade of soil. Hand mix concrete will only be allowed in special circumstances as approved by the city.~~

~~(d)~~

~~Reinforcing steel for concrete footings shall be deformed bars conforming to ASTM standard A617 and shall be grade 40 and per the approved engineer's design.~~

~~(e)~~

~~Mortar shall attain a minimum of 1,200 psi in 28 days with a suggested mix in the ratio of one part Portland cement by volume with over one-fourth to one-half parts of hydrated lime or lime putty by volume, and the aggregate shall be not less than two and one-fourth and not more than three times the sum of the volumes of the cement and lime used; or one-half by volume of cement, one part by volume of type II masonry cement, and the aggregate shall not be less than two and one-quarter and not more than three times the sum of the volume of the cement used.~~

~~(f)~~

~~Portland cement for mortar shall conform to ASTM standard C150 and shall be type I or type II.~~

~~(g)~~

~~Backfill material to be placed adjacent to the retaining walls shall be a granular soil with compaction requirements as per the engineer's design. Expansive type soils are prohibited as backfill materials.~~

~~(h)~~

~~Developers, subdividers, or builders shall submit retaining wall design drawings and specifications including design calculations for each wall to be constructed; or various options of the type and style of retaining walls may be used and receive approval through the subdivision construction drawing approval process for the respective subdivision as provided in article X of chapter 37~~

~~(i)~~

~~For subdivision development, walls are not required to be built at the time of roadway construction unless under the following circumstances:~~

~~(1)~~

~~Retaining embankment in dedicated right-of-way.~~

~~(2)~~

~~Abutting an existing wall or a retaining wall for the purposes of mitigating erosional damage to adjacent development; where the existing wall or retaining wall's height is less than 3.0 feet above the proposed grade. Construction of the wall or retaining wall shall be a minimum 4.0 feet in height, measured from the proposed grade.~~

~~*(Ord. No. 949, § 3.2H, 9-8-87; Ord. No. 2131, § I, 9-7-04)*~~

Sec. 38-60. Walls and fences.

A.

Purpose. A wall or fence is not required by this Code except in mobile home parks/recreational vehicle parks. When provided, this section defines the regulations regarding walls and/or fences. The wall/fence height regulations are defined for residential land uses and nonresidential land uses regardless of the zoning district in which the land use is located. However, see section 38-57, mobile home parks/recreational vehicle parks, for when walls or fences are required to be provided and additional regulations.

B.

Definitions.

Common wall or *common fence.* An artificially constructed barrier or structure along a property line between two or more properties owned by two or more separate property owners.

Fence. An artificially constructed barrier of posts, wire, wood, steel, cable or similar material erected to enclose or screen areas of land (design standards, chapter 32).

Retaining wall. ~~An artificially constructed structure that retains 4.0 feet or more of grade differential or surcharge load (design standards, chapter 32).~~ Is a designed wall constructed of brick, block, rock, concrete, MSE, or reinforced concrete, to retain a specific depth of soil or surcharge. This wall type is designed to resist the sum of all specific soil pressures with a predetermined safety factor.

Wall. An artificially constructed barrier of solid material such as brick, block, rock, or concrete, erected to enclose or screen areas of land (design standards, chapter 32).

C.

Height.

1.

Residential land uses (regardless of the zoning district in which the land use is located):

a.

Required front yard: Four-foot maximum.

b.

Sec. 30-233. Submittal requirements.

The material required filed for each permit application under division 4 is as follows:

(1)

Completed application to include property owner's signature, contractor's name and license number;

(2)

Plan review fee, if applicable;

(3)

Permit fee (required at time of permit issuance);

(4)

Park fee (required at time of permit issuance);

(5)

Utility development impact fees (required at time of permit issuance);

(6)

Construction drawings. Construction drawings shall be blueline or similar process and be drawn to accurately display appropriate information, the minimum scale to be one-quarter inch = 1.0 foot. (Smaller scale may be approved by the plan reviewer.) Blueline or similar process copies must measure at least 18 x 24 inches, and must include the information identified in (6)a. and (6)b. Permit applications for mobile/manufactured homes are exempt from submitting construction drawings as well as items 1—5 of subsection (6)b below, but shall comply with site plan requirements 1—12 of subsection (6)a.

a.

Site plan. The site plan shall be either blueline or a similar process on paper measuring at least 8 ½ × 11 inches. Copies submitted shall be legible and at a scale that accurately represents the information. The following information shall be provided on the site plan.

1.

General legal description of subject property. If the tract of land is not within an approved and filed subdivision, a vicinity map must be included showing the exact location of the property. The site plan shall include the entire lot or tract.

2.

Boundary lines including dimensions and angles, north arrow and graphic scale.

3.

All adjacent streets, public right-of-ways, and easements shall be shown and labeled.

4.

Curbing, gutters, sidewalks, and parkways shall be shown, whether existing or proposed, labeling, and width dimensions shall be shown as well. All curb cuts shall be shown and shall comply with the City of Las Cruces Traffic Standards and shall conform to ADA standards. Clear sight triangle on corner lots shall be included.

5.

Required setback lines shown as dashed line and labeled.

6.

All structures shall be accurately located and labeled on site plans, including accessory structures, porches, carports, patios, concrete slabs, etc.

7.

All dimensions shall be shown from the closest point between any part of a structure (i.e., dwelling, porch, carport, etc.) and at right angle from the property line.

8.

Retaining walls with elevations shown on both sides of the wall including wall height ~~(if applicable)~~ with dimensions, drainage, and all design calculations.

9.

Parking spaces, driveways, garages, carports, and other parking areas shall be labeled as such with dimensions shown.

10.

Drainage concept with appropriate elevations and drainage flow arrows shall be shown on plans in accordance with filed subdivision. Grading/drainage plans for new construction shall show calculations for ponding or indicate approved ponding size and shall dimension all ponding areas.

11.

Indicate grades for front yard, pad, finished floor, backyard and existing grades outside property line, plus top of curb elevations at property lines per approved grading/drainage plan for the subdivision.

12.

ATTACHMENT "D"

City of Las Cruces

Dear Engineer, Architect, Developer, Rock Wall Contractor:

To expand both clarity and usability, the City of Las Cruces has updated the design standard titled "Fences, Walls, Retaining Walls, and Slope Protection" (Chapter 30, Division 3, Sections 30-136 thru 30-145, Las Cruces Municipal Code). Our intention is to make it more user-friendly and complete through these changes. The document has been placed on the City of Las Cruces Web Site under: Departments, Public Works, Engineering Services, Resources, "Walls".

We now ask for public review of this updated document. Because of its technical content, our desire is to have the review focused on professional users like yourself. We request that you review this new document then forward your written comments and suggestions to me.

Some of the new areas within this document are:

a). A listing of design values for wall design on page 6. These design values have been used and shown to be reasonable within the City. If no site-specific design values have been developed from a soils investigation and laboratory testing, these design values are to be used.

b). Specific items that are part of a "Geotechnical Soils Investigation" or a "Geotechnical Soils Report", on pages 7 & 8. Previously our design standard remained silent on the exact contents of this documentation. Our new design standard defines the minimum information to be included in these reports. This information forms the completeness of these engineering reports

c). Rock quality for wall construction, on Page 13. This lists the minimum quality for the rock within a wall to insure a life span of over 50 years. The listed tests establish the required quality.

d). Describes the differences between a yard wall and a retaining wall, on pages 4 & 5. These definitions give specific descriptions of both a yard wall and a retaining wall and pinpoint their unique differences.

e). The minimum strength requirements for both Cement Grout and Concrete, on Page 12. These upgraded values are more in alignment with local minimum specifications to insure a long life span.

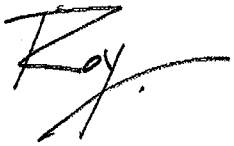
If questions arise, or if you would like to discuss certain items within this document, please plan to attend a meeting on September 7, 2012 from 1:00 PM to 3:00 PM in City Hall conference room 2104, 700 N. Main Street.

If you desire to mail or email your written comments, please direct them to Roy Arnoldt, P.E., City of Las Cruces/Public Works Dept., P.O. Box 20000, Las Cruces, NM 88004 by 5:00 PM on September 7, 2012.

I thank you in advance for your valuable assistance and look forward to your thoughts and suggestions to help us develop a document that best serves all of our community.

If you have any questions, please feel free to call me at phone number (575) 528-3168 or by email at rarnoldt@las_cruces.org.

Best Regards,



Roy Arnoldt P.E.
City of Las Cruces
Public Works Department

pc: Loretta M. Reyes, P.E. – Public Works Director
Louis Grijalva, P.E. – Project Development Administrator

ROCK WALL CONTRACTORS:

Abba Masonry
5122 Answer Dr
LC 88005

Capitol Masonry
1002 Hillrise Ct.
LC 88005

Green Thumb
2211 N Mesquite
LC 88005

Rock Walls
1200 Texas St.
LC 88005

Rokas Construction Co.
Jose Castaneda
6765 Pinta Rd
LC 88005

Southern Comfort Builders
Tony Calderon

ARCHITECTS.

Steve Newby Architect.
1042 S Main St.
LC 88005

Alley & Associates Architects
1691 Hickory Lp.
LC 88005

ASA Architects.
201 N Alameda
LC 88005

Denton Ventures Inc
2480 Roadrunner Pkwy
LC 88005

Lindeen & Associates Architects
618 S Alameda
LC 88005

Molzen-Corben Architects
1155 Commerce Dr
LC 88005

Ron Nims Architect
509 S Main
LC 88005

Steve Newby Architect
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