CITY OF ALBUQUERQUE

Planning Department
Brennon Williams, Director

Mayor Timothy M. Keller

October 22, 2019

David Soule, P.E.
Rio Grande Engineering
P.O. Box 93924
Albuquerque, NM 87199

RE: 1817 Bluffside NW
Grading and Drainage Plan
Engineer's Stamp Date: 10/21/19
Hydrology File: H11D015B

Dear Mr. Soule:

Based upon the information provided in your resubmittal received 10/22/19, the Grading and Drainage Plan is approved for Building Permit. Please attach a copy of this approved plan in the construction sets for Building Permit processing along with a copy of this letter.

Prior to approval in support of Permanent Release of Occupancy by Hydrology, Engineer Certification per the DPM checklist will be required.

If you have any questions, please contact me at 924-3995 or rbrissette@cabq.gov.

Sincerely,

Renée C. Brissette

Renée C. Brissette, P.E. CFM
Senior Engineer, Hydrology
Planning Department

PO Box 1293

Albuquerque

NM 87103

www.cabq.gov

City of Albuquerque

Planning Department

Development & Building Services Division

DRAINAGE AND TRANSPORTATION INFORMATION SHEET (REV 6/2018)

Project Title: 1817 BLUFFSIDE NW Building Permit #:_____ Hydrology File #: _____

DRB#: _____ EPC#: _____ Work Order#: _____

Legal Description: LOT 1 , BLOCK 4 VISTA MAGNIFICA

City Address: 1817 BLUFFSIDE NW

Applicant: GABRIEL HERNANDEZ Contact: _____

Address: _____

Phone#: _____ Fax#: _____ E-mail: _____

Other Contact: RIO GRANDE ENGINEERING Contact: DAVID SOULE

Address: PO BOX 93924 ALB NM 87199

Phone#: 505.321.9099 Fax#: 505.872.0999 E-mail: david@riograndeengineering.com

TYPE OF DEVELOPMENT: ___ PLAT X RESIDENCE ___ DRB SITE ___ ADMIN SITE

Check all that Apply:

DEPARTMENT:

X HYDROLOGY/ DRAINAGE

___ TRAFFIC/ TRANSPORTATION

TYPE OF SUBMITTAL:

X ENGINEER/ARCHITECT CERTIFICATION

X PAD CERTIFICATION (PAD COMPLETED FORMS SET)

___ CONCEPTUAL G & D PLAN

X GRADING PLAN

___ DRAINAGE REPORT

___ DRAINAGE MASTER PLAN

___ FLOODPLAIN DEVELOPMENT PERMIT APPLIC

___ ELEVATION CERTIFICATE

___ CLOMR/LOMR

___ TRAFFIC CIRCULATION LAYOUT (TCL)

___ TRAFFIC IMPACT STUDY (TIS)

___ STREET LIGHT LAYOUT

___ OTHER (SPECIFY) _____

___ PRE-DESIGN MEETING?

IS THIS A RESUBMITTAL?: ___ Yes X No

TYPE OF APPROVAL/ACCEPTANCE SOUGHT:

X BUILDING PERMIT APPROVAL

___ CERTIFICATE OF OCCUPANCY

___ PRELIMINARY PLAT APPROVAL

___ SITE PLAN FOR SUB'D APPROVAL

___ SITE PLAN FOR BLDG. PERMIT APPROVAL

___ FINAL PLAT APPROVAL

___ SIA/ RELEASE OF FINANCIAL GUARANTEE

___ FOUNDATION PERMIT APPROVAL

___ GRADING PERMIT APPROVAL

___ SO-19 APPROVAL

___ PAVING PERMIT APPROVAL

___ GRADING/ PAD CERTIFICATION

___ WORK ORDER APPROVAL

___ CLOMR/LOMR

___ FLOODPLAIN DEVELOPMENT PERMIT

___ OTHER (SPECIFY) _____

DATE SUBMITTED: _____ By: _____

COA STAFF: ELECTRONIC SUBMITTAL RECEIVED:_____

FEE PAID:_____

CITY OF ALBUQUERQUE

Planning Department
Brennon Williams, Interim Director

Mayor Timothy M. Keller

August 30, 2019

David Soule, P.E.
Rio Grande Engineering
P.O. Box 93924
Albuquerque, NM 87199

RE: 1817 Bluffside NW
Grading and Drainage Plan
Engineer's Stamp Date: 08/17/19
Hydrology File: H11D015B

Dear Mr. Soule:

PO Box 1293

Albuquerque

NM 87103

www.cabq.gov

Based upon the information provided in your submittal received 08/19/2019, the Grading & Drainage Plan **is not** approved for Building Permit. The following comments need to be addressed for approval of the above referenced project:

1. The topographic survey does not show the existing conditions along Casade Place correctly. As you can see in the July 24, 2019 photos show the vertical cuts that were not caused by drainage. This needs to reflect what the Owner's contractor graded within the public Right-of-Way along Casade Place N CONTOURS ARE COMPUTER GENERATED SPOTS ON CURB AND HOUSE APPEAR CORRECT

2. Provide the existing and proposed grades on both sides of the proposed retaining wall. we have added, proposed grades are extrapolated
3. Provide sections through all external boundaries showing proposed retaining walls, garden walls, property/ROW lines, existing and proposed grades. In accordance with DPM Ch.22, section 5 part B, grading and wall construction near the property line may not endanger adjacent property or constrain its use.

We have added sections and structural details by others

4. If the proposed retaining wall will create such an encroachment, written agreement from both landowners must be provided for such work. Written permission must include: signature of the property owner or owners representative, statement that undersigned is the owner or authorized representative, permission to construct the encroachment with a brief description of the encroachment.
   Wall will not encroach, all impacted property shall be restored
5. Since the retaining wall Casade Place NW is actually holding up the public road because of grading done within the public Right-of-Way, a slope easement is needed. This slope easement will be sized from the property line along Casade Place with a 3:1 slope down to the existing grade. This is so if the retaining wall fails and it effects the public road, the City not replace the retaining wall but will put back a dirt slope at 3:1.
   We are not aware of the ordinance that requires such easement.
6. Also you can see in the July 24, 2019 photos the extent of the roadway undermining. The Owner needs to contact David Harrison (Street Maintenance) at (505) 857-8053 to coordinate the roadway repair, the drive pad removal, and the installation of curb & gutter. Owner did contact Mr. Harrison, the email of the owners response is enclosed

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7. Please provide all required written agreement from adjacent landowners which were effective from the grading on their property. Written permission must include: signature of the property owner or owners representative, statement that undersigned is the owner or authorized representative, permission to grade on their property with a brief description of the extent of the grading.
   We have provided the only owner willing.
8. Standard review fee of $150 will be required at the time of resubmittal.
   Understood

If you have any questions, please contact me at 924-3995 or rbrissette@cabq.gov.

Sincerely,

Renée C. Brissette

Renée C. Brissette, P.E. CFM
Senior Engineer, Hydrology
Planning Department

PO Box 1293

Albuquerque

NM 87103

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Weighted E Method

												100-Year, 6-hr.			24-hour
Basin	Area (sf)	Area (acres)	Treatment A %	Treatment A (acres)	Treatment B %	Treatment B (acres)	Treatment C %	Treatment C (acres)	Treatment D %	Treatment D (acres)	Weighted E (ac-ft)	Volume (ac-ft)	Flow cfs		Volume (ac-ft)
NATIVE	8570.00	0.197	0%	0	50%	0.098	50%	0.09837	0%	0.000	0.830	0.014	0.48		0.014
UPLAND(ult)	10713.00	0.246	0%	0	10%	0.025	40%	0.09837	50%	0.123	1.448	0.030	0.87		0.038
PROPOSED	8570.00	0.197	0%	0	40%	0.079	34%	0.06689	62%	0.122	1.826	0.030	0.88		0.038
INCREASE												0.016	0.40		0.024

Equations:

Weighted E = Ea*Aa + Eb*Ab + Ec*Ac + Ed*Ad / (Total Area)

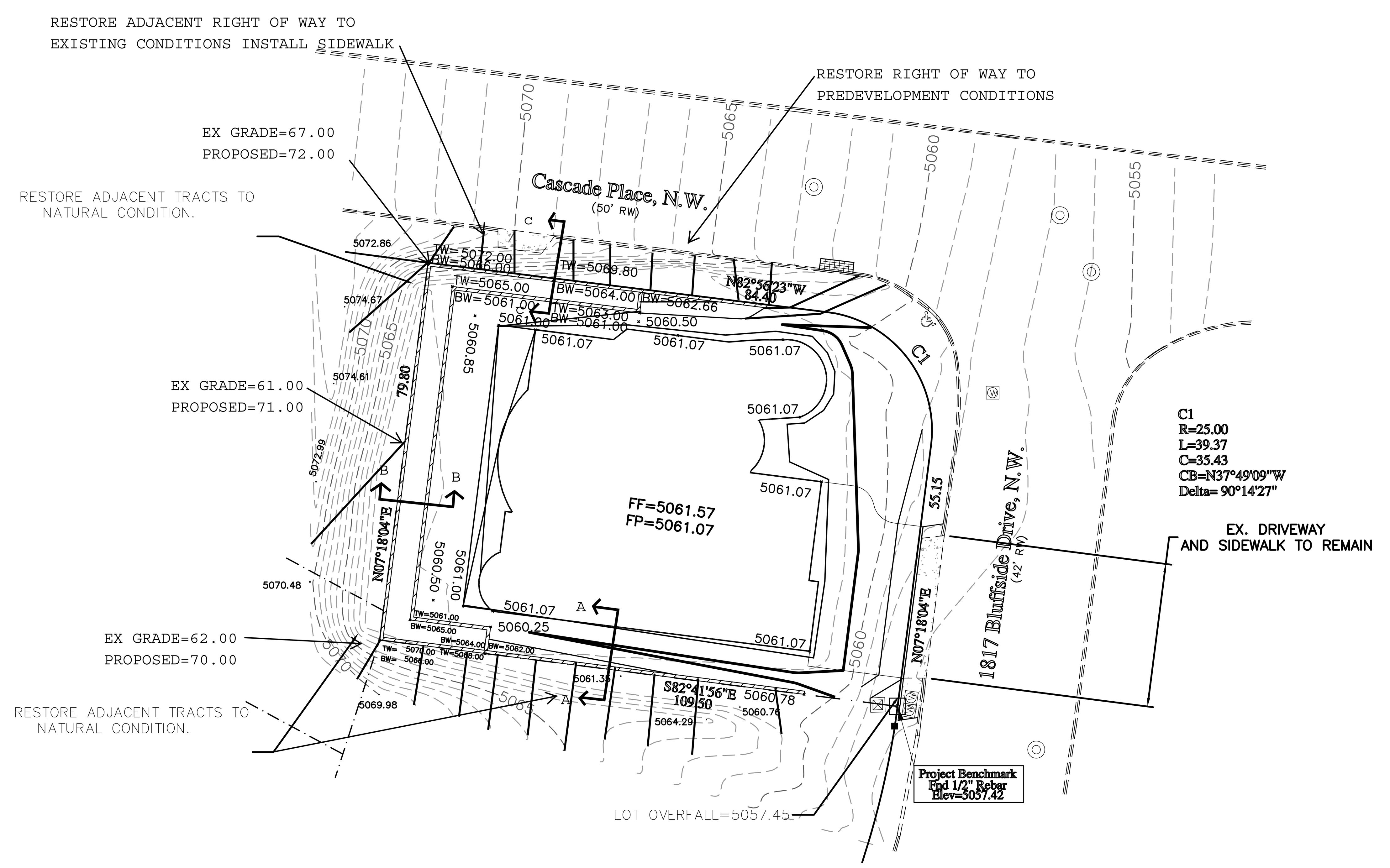
Volume = Weighted D * Total Area

Flow = Qa * Aa + Qb * Ab + Qc * Ac + Qd * Ad

Where for 100-year, 6-hour storm- zone 1

Ea= 0.44	Qa= 1.29
Eb= 0.67	Qb= 2.03
Ec= 0.99	Qc= 2.87
Ed= 1.97	Qd= 4.37

This site is within a developed subdivision. Per the approved drainage report (H11D15), the lots free discharge and are captured by a city maintained storm drain.It appears the grading of this lot occured prior to the topography survey. Several of the adjoining lots have been encroached upon. The owner shall restore the existing grades at the property lines and restore all impacted areas. Acknowledgement of this encroachment from impacted neighbors will be provided prior to certification of occupancy



EROSION CONTROL NOTES:

1. CONTRACTOR IS RESPONSIBLE FOR OBTAINING A TOPSOIL DISTURBANCE PERMIT PRIOR TO BEGINNING WORK.

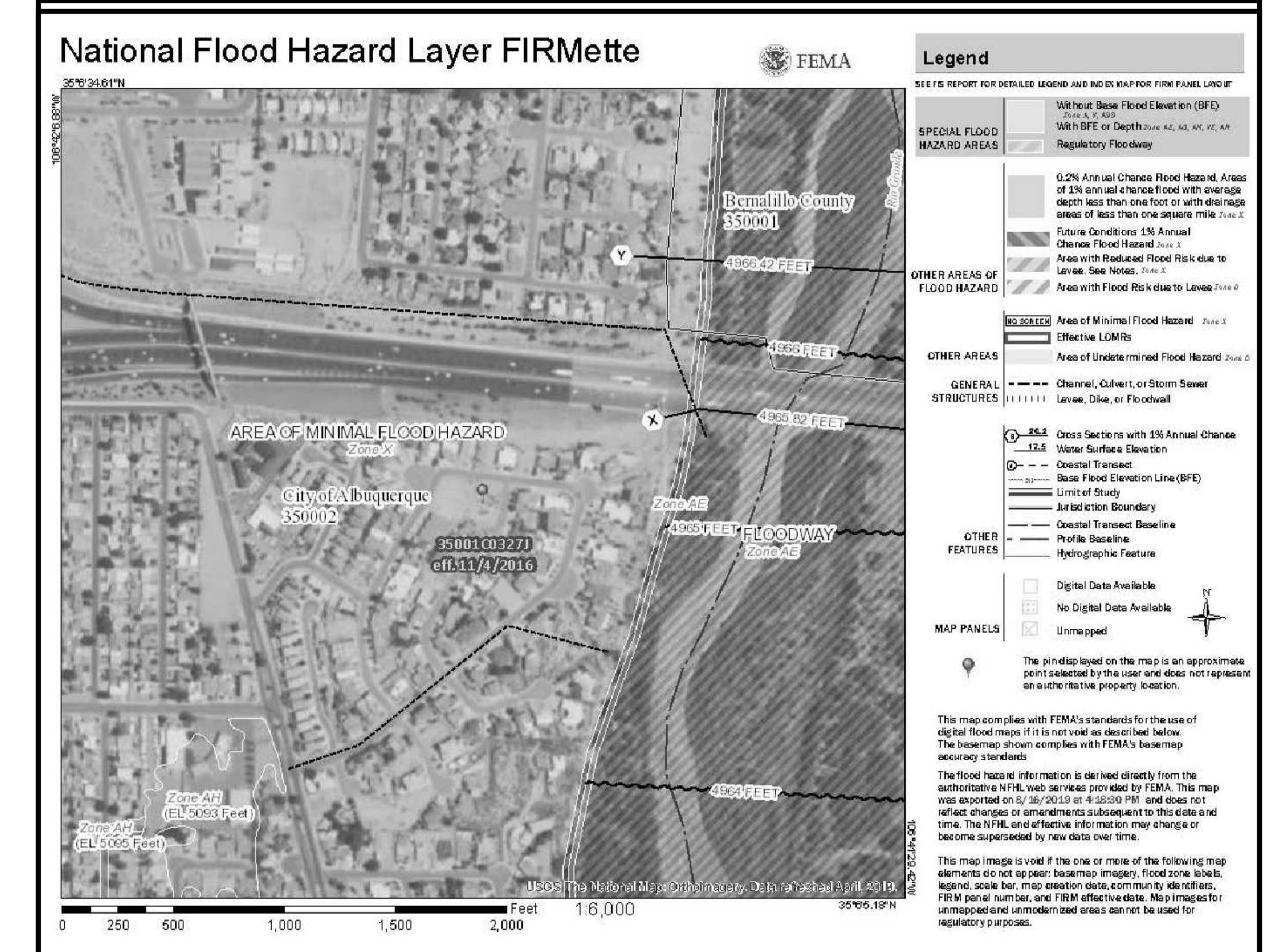
2. CONTRACTOR IS RESPONSIBLE FOR MAINTAINING RUN—OFF ON SITE DURING CONSTRUCTION.

3. CONTRACTOR IS RESPONSIBLE FOR CLEANING ALL SEDIMENT THAT GETS INTO EXISTING RIGHT—OF—WAY.

4. REPAIR OF DAMAGED FACILITIES AND CLEANUP OF SEDIMENT ACCUMULATIONS ON ADJACENT PROPERTIES AND IN PUBLIC FACILITIES IS THE RESPONSIBILITY OF THE CONTRACTOR.

5. ALL EXPOSED EARTH SURFACES MUST BE PROTECTED FROM WIND AND WATER EROSION PRIOR TO FINAL ACCEPTANCE OF ANY PROJECT.

VICINITY MAP: H—11—Z



FIRM MAP:

LEGAL DESCRIPTION:

Lot 1, Block 4, Vista Magnifica

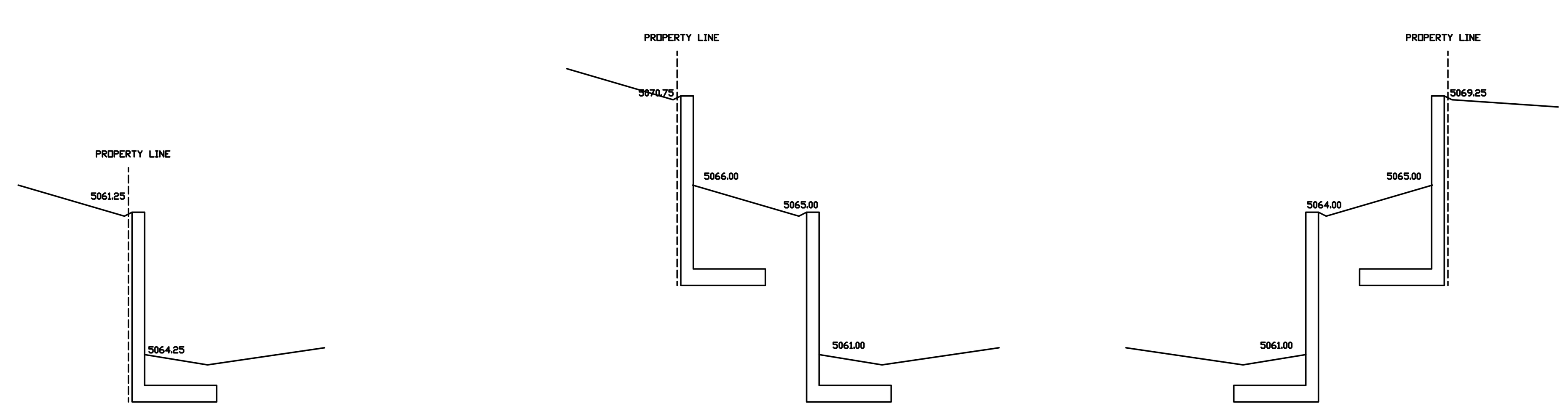
NOTES:

1. ALL SPOT ELEVATIONS REPRESENT FLOWLINE ELEVATION UNLESS OTHERWISE NOTED.

2. ALL SLOPES SHALL BE 3:1 MAX. AND GRAVEL OR NATIVE SEEDING PRIOR TO CO.

LEGEND

— — —xxxx— — —	EXISTING CONTOUR
— — —xxxx— — —	EXISTING INDEX CONTOUR
——xxxx——	PROPOSED CONTOUR
——xxxx——	PROPOSED INDEX CONTOUR
▶—	SLOPE TIE
× xxxx	EXISTING SPOT ELEVATION
× xxxx	PROPOSED SPOT ELEVATION
——-—-——	BOUNDARY
—— — ——	CENTERLINE
————	RIGHT—OF—WAY
==========	EXISTING CURB AND GUTTER
▭▭▭▭	PROPOSED CMU SCREEN WALL



SECTION A-A SECTION B-B SECTION C-C

CAUTION:

EXISTING UTILITIES ARE NOT SHOWN. IT SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR TO CONDUCT ALL NECESSARY FIELD INVESTIGATIONS PRIOR TO ANY EXCAVATION TO DETERMINE THE ACTUAL LOCATION OF UTILITIES & OTHER IMPROVEMENTS.

N

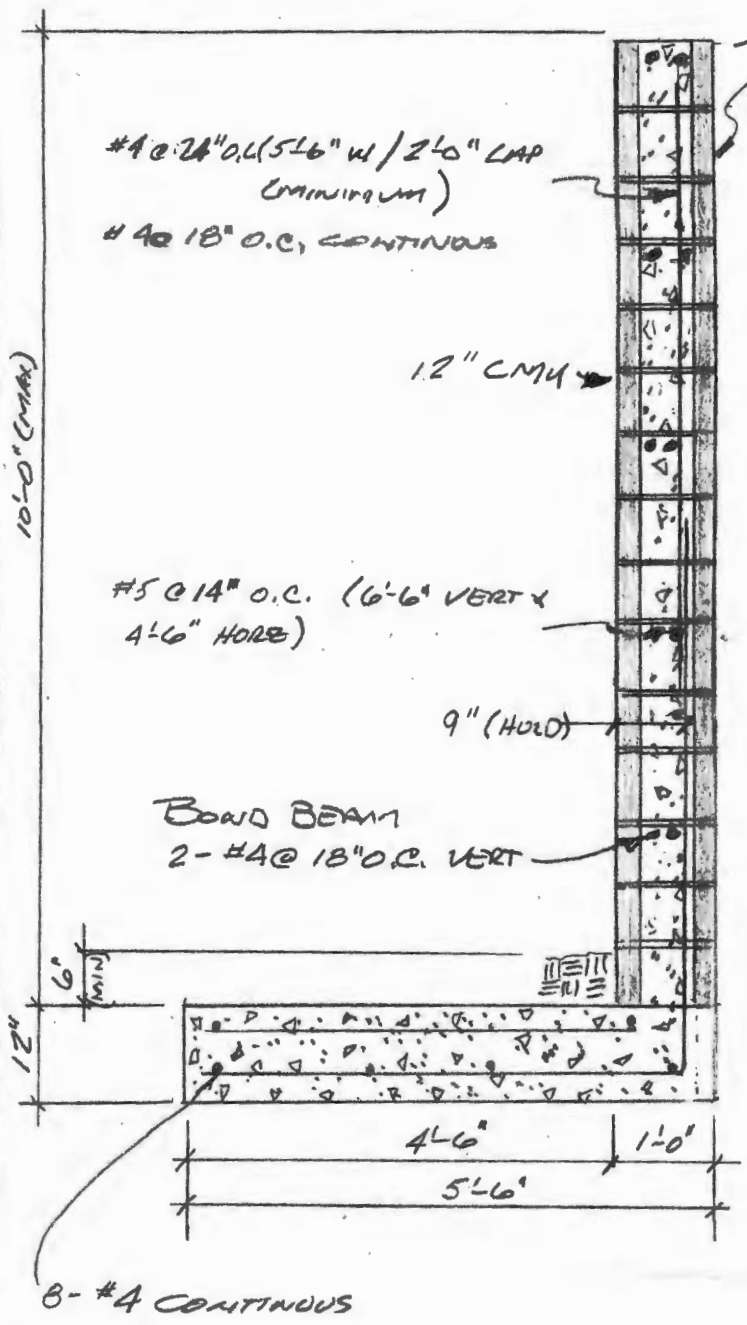
20 10 0 10 20

SCALE: 1"=20'

ENGINEER'S SEAL	1817 BLUFFSIDE	DRAWN BY WCWJ
DAVID SOULE NEW MEXICO 14522 REGISTERED PROFESSIONAL ENGINEER	GRADING AND DRAINAGE PLAN	DATE 8—16—19
10/21/19	Rio Grande Engineering 1606 CENTRAL AVENUE SE SUITE 201 ALBUQUERQUE, NM 87106 (505) 872—0999	2109067—LAYOUT—8—15—19
DAVID SOULE P.E. #14522		SHEET # —
		JOB # 2109067

George Knipprath PE, Inc.
Structural Design/Analysis
3012 Charleston NE
Albuquerque, NM 87110
(505) 250-6073 FAX (505) 292-6124
kniprath@nmia.com

Job No. 1908005 - 1817 BLUFFSIDE AVE NW
Client AFFORDABLE LANDSCAPE MAINTAN
By GCK **Date** Rev 8/24/19
Checked _____ **Date** _____
Sheet No. 1 **Of** _____



Notes:

- Concrete to be 3.000 psi @ 28 days
- Steel to be ASTM A615-40
- Grout to be 2,500 psi
- Soil Bearing 1,500 psf (min)(Assumed)
- Owner assumes responsibility for displacement when a soils report is not provided prior to design.
- Wall is not designed for extension or Attachment

10'-0" CMU Retaining Wall
1817 Bluffside Avenue NW
Albuquerque, NM
Job # 1908005

GEORGE C. KNIPPRATH NEW MEXICO 7397 PROFESSIONAL ENGINEER 8/27/19

George Knipprath PE, Inc.
3012 Charleston NE
Albuquerque, NM 87110
Phone (505) 250 6073
kniprath@nmia.com

Project Name/Number : 1908005
Title 10'-0" CMU Retaining Wall
Dsgnr: George Knipprath,
Description....
10'-0" CMU retaining wall

Date: 17 AUG 2019

This Wall in File: f:\RetainPro_10\1908005.RPX

Cantilevered Retaining Wall

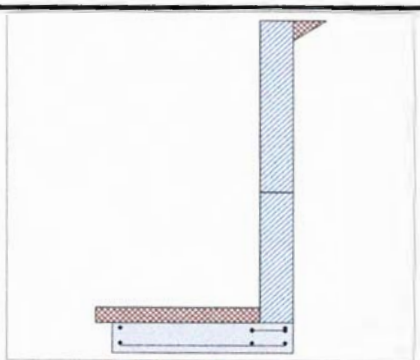
Code: IBC 2012,ACI 318-11,ACI 530-11

Criteria

Retained Height	=	10.00 ft
Wall height above soil	=	0.00 ft
Slope Behind Wall	=	0.00
Height of Soil over Toe	=	6.00 in
Water height over heel	=	0.0 ft

Soil Data

Allow Soil Bearing	=	4,000.0 psf
Equivalent Fluid Pressure Method		
Active Heel Pressure	=	24.0 psf/ft
	=	
Passive Pressure	=	250.0 psf/ft
Soil Density, Heel	=	120.00 pcf
Soil Density, Toe	=	0.00 pcf
Footing||Soil Friction	=	0.400
Soil height to ignore for passive pressure	=	12.00 in



Surcharge Loads

Surcharge Over Heel	=	0.0 psf
Used To Resist Sliding & Overturning		
Surcharge Over Toe	=	0.0 psf
Used for Sliding & Overturning		

Axial Load Applied to Stem

Axial Dead Load	=	0.0 lbs
Axial Live Load	=	0.0 lbs
Axial Load Eccentricity	=	0.0 in

Lateral Load Applied to Stem

Lateral Load	=	0.0 #/ft
...Height to Top	=	0.00 ft
...Height to Bottom	=	0.00 ft
Load Type	=	Wind (W) (Service Level)
Wind on Exposed Stem (Service Level)	=	0.0 psf

Adjacent Footing Load

Adjacent Footing Load	=	0.0 lbs
Footing Width	=	0.00 ft
Eccentricity	=	0.00 in
Wall to Ftg CL Dist	=	0.00 ft
Footing Type		Line Load
Base Above/Below Soil at Back of Wall	=	0.0 ft
Poisson's Ratio	=	0.300

Design Summary

Wall Stability Ratios

Overturning	=	1.03 Ratio < 1.5!
Sliding	=	0.70 UNSTABLE!
Total Bearing Load	=	2,155 lbs
...resultant ecc.	=	2.61 in
Soil Pressure @ Toe	=	10,535 psf NG
Soil Pressure @ Heel	=	0 psf OK
Allowable	=	4,000 psf
Soil Pressure Exceeds Allowable!		
ACI Factored @ Toe	=	14,749 psf
ACI Factored @ Heel	=	0 psf
Footing Shear @ Toe	=	116.5 psi NG
Footing Shear @ Heel	=	0.0 psi OK
Allowable	=	82.2 psi

Sliding Calcs

Lateral Sliding Force	=	1,452.0 lbs
less 100% Passive Force	= -	156.3 lbs
less 100% Friction Force	= -	862.0 lbs
Added Force Req'd	=	433.8 lbs NG
....for 1.5 Stability	=	1,159.8 lbs NG

Vertical component of active lateral soil pressure IS considered in the calculation of soil bearing pressures.

Load Factors

Building Code	IBC 2012,ACI
Dead Load	1.200
Live Load	1.600
Earth, H	1.600
Wind, W	1.000
Seismic, E	1.000

Stem Construction

		2nd Stem OK	Bottom Stem OK
Design Height Above Ftg	ft =	4.33	0.00
Wall Material Above "Ht"	=	Masonry	Masonry
Design Method	=	ASD	ASD
Thickness	=	12.00	12.00
Rebar Size	=	# 4	# 5
Rebar Spacing	=	24.00	8.00
Rebar Placed at	=	Edge	Edge
Design Data			
fb/FB + fa/Fa	=	0.509	0.632
Total Force @ Section			
Service Level	lbs =	385.8	1,200.0
Strength Level	lbs =	617.3	1,920.0
Moment....Actual			
Service Level	ft-# =	729.1	4,000.0
Strength Level	ft-# =	1,166.6	6,400.0
Moment.....Allowable	ft-# =	1,428.5	6,318.8
Shear.....Actual			
Service Level	psi =	2.8	8.6
Strength Level	psi =	5.0	15.7
Shear.....Allowable	psi =	57.9	59.1
Anet (Masonry)	in2 =	139.50	139.50
Rebar Depth 'd'	in =	9.00	9.00
Masonry Data			
f'm	psi =	2,500	2,500
Fs	psi =	20,000	20,000
Solid Grouting	=	Yes	Yes
Modular Ratio 'n'	=	12.89	12.89
Wall Weight	psf =	133.0	133.0
Short Term Factor	=	1.000	1.000
Equiv. Solid Thick.	in =	11.60	11.60
Masonry Block Type	=	Normal Weight	
Masonry Design Method	=	ASD	
Concrete Data			
f'c	psi =		
Fy	psi =		

George Knipprath PE, Inc.
3012 Charleston NE
Albuquerque, NM 87110
Phone (505) 250 6073
kniprath@nmia.com

Project Name/Number : 1908005
Title 10'-0" CMU Retaining Wall
Dsgnr: George Knipprath,
Description....
10'-0" CMU retaining wall

This Wall in File: f:\RetainPro_10\1908005.RPX

RetainPro (c) 1987-2019, Build 11.19.05.01
License : KW-06054216
License To : GEORGE KNIPPRATH PE, INC.

Cantilevered Retaining Wall

Code: IBC 2012,ACI 318-11,ACI 530-11

Footing Dimensions & Strengths

Toe Width	=	4.50 ft
Heel Width	=	1.00
Total Footing Width	=	5.50
Footing Thickness	=	12.00 in
Key Width	=	0.00 in
Key Depth	=	0.00 in
Key Distance from Toe	=	0.00 ft

f'c = 3,000 psi Fy = 40,000 psi
Footing Concrete Density = 150.00 pcf
Min. As % = 0.0018
Cover @ Top 3.00 @ Btm.= 3.00 in

Footing Design Results

		Toe	Heel
Factored Pressure	=	14,749	0 psf
Mu' : Upward	=	13,165	0 ft-#
Mu' : Downward	=	71,442	0 ft-#
Mu: Design	=	5,714	0 ft-#
Actual 1-Way Shear	=	116.54	0.00 psi
Allow 1-Way Shear	=	82.16	43.82 psi

Toe Reinforcing = # 5 @ 7.99 in
Heel Reinforcing = # 5 @ 17.99 in
Key Reinforcing = # 4 @ -0.01 in

Other Acceptable Sizes & Spacings

Toe: #4@ 7.72 in, #5@ 11.97 in, #6@ 17.00 in, #7@ 23.19 in, #8@ 30.53 in, #9@ 38
Heel: Not req'd: Mu < phi*5*lambda*sqrt(f'c)*Sm
Key: No key defined

Min footing T&S reinf Area 1.43 in2
Min footing T&S reinf Area per foot 0.26 in2 /ft

If one layer of horizontal bars:	If two layers of horizontal bars:
#4@ 9.26 in	#4@ 18.52 in
#5@ 14.35 in	#5@ 28.70 in
#6@ 20.37 in	#6@ 40.74 in

Summary of Overturning & Resisting Forces & Moments

Item		.....OVERTURNING..... Force lbs	Distance ft	Moment ft-#		.....RESISTING..... Force lbs	Distance ft	Moment ft-#
HL Act Pres (ab water tbl)		1,452.0	3.67	5,324.0	Soil Over HL (ab. water tbl)		5.50	
HL Act Pres (be water tbl)				3,300.9	Soil Over HL (bel. water tbl)		5.50	
Hydrostatic Force					Watre Table		5.50	
Buoyant Force	=		2.75		Sloped Soil Over Heel	=		
Sloped Soil Over Heel	=	1,452.0	3.67	5,324.0	Surcharge Over Heel	=		
Surcharge over Heel	=				Adjacent Footing Load	=		
Surcharge Over Toe	=				Axial Dead Load on Stem	=		
Adjacent Footing Load	=				* Axial Live Load on Stem	=		
Added Lateral Load	=				Soil Over Toe	=	2.25	
Load @ Stem Above Soil	=				Surcharge Over Toe	=		
	=				Stem Weight(s)	=	1,330.0	5.00	6,650.0
					Earth @ Stem Transitions	=			
					Footing Weight	=	825.0	2.75	2,268.8
					Key Weight	=			
					Vert. Component	=		5.50	
Total	=	1,452.0	**O.T.M.** =	8,624.9	**Total** =		2,155.0 lbs	**R.M.**=	8,918.8

Resisting/Overturning Ratio = **1.03**
Vertical Loads used for Soil Pressure = 2,155.0 lbs

* Axial live load NOT included in total displayed, or used for overturning resistance, but is included for soil pressure calculation.

Vertical component of active lateral soil pressure IS considered in the calculation of Sliding Resistance.

Vertical component of active lateral soil pressure IS considered in the calculation of Overturning Resistance.

Tilt

Horizontal Deflection at Top of Wall due to settlement of soil

(Deflection due to wall bending not considered)

Soil Spring Reaction Modulus	250.0	pci
Horizontal Defl @ Top of Wall (approximate only)	0.043	in

The above calculation is not valid if the heel soil bearing pressure exceeds that of the toe, because the wall would then tend to rotate into the retained soil.

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Structural Design/Analysis
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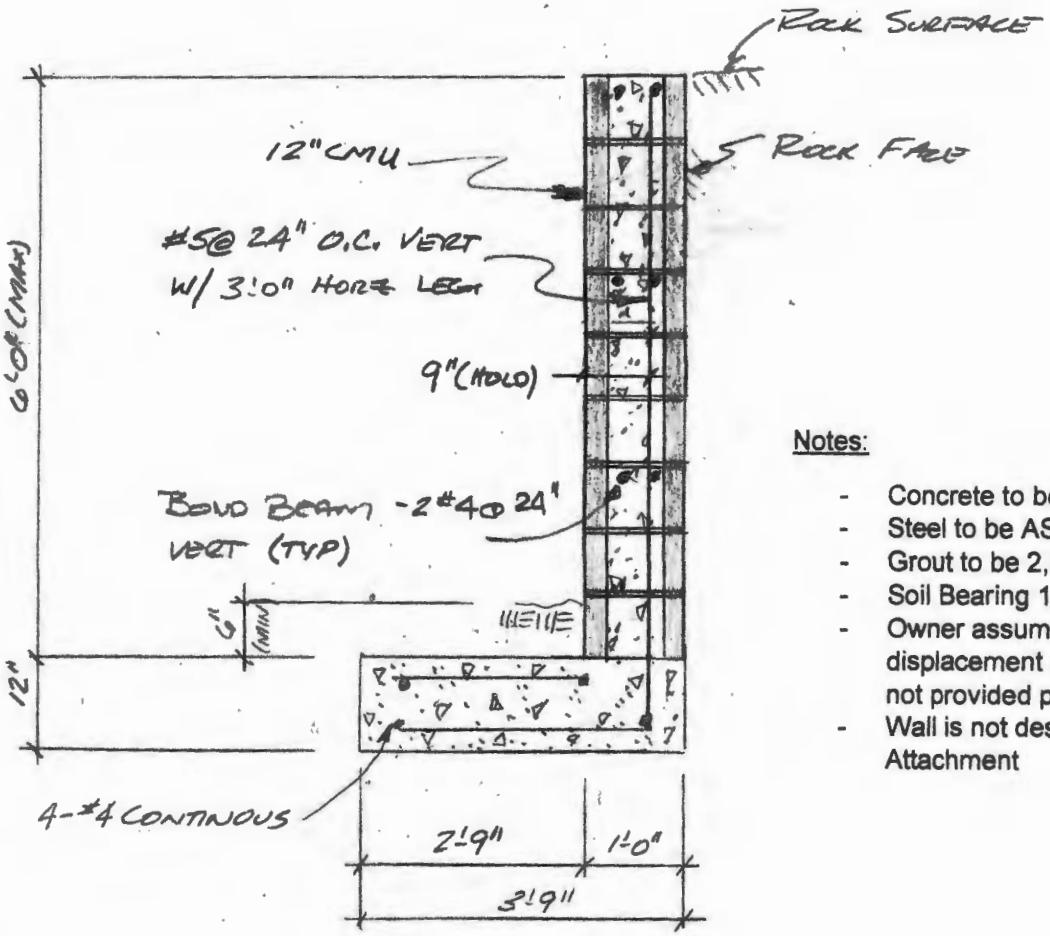
Albuquerque, NM 87110
(505) 250-6073 FAX (505) 292-6124
kniprath@nmia.com

Job No. 1908005 - 1817 BLUFFSIDE AVE NW
Client AFFORDABLE LANDSCAPE MAINTENANCE
By GEC **Date** REV 8/24/19
Checked _____ **Date** _____
Sheet No. 2 **Of** _____



Notes:

- Concrete to be 3.000 psi @ 28 days
- Steel to be ASTM A615-40
- Grout to be 2,500 psi
- Soil Bearing 1,500 psf (min)(Assumed)
- Owner assumes responsibility for displacement when a soils report is not provided prior to design.
- Wall is not designed for extension or Attachment

6'-0" CMU Retaining Wall

1817 Bluffside Avenue NW

Albuquerque, NM

Job # 1908005

GEORGE E.C. KNIPPRATH NEW MEXICO 7397 PROFESSIONAL ENGINEER 8/24/19

George Knipprath PE, Inc.
3012 Charleston NE
Albuquerque, NM 87110
Phone (505) 250 6073
kniprath@nmia.com

Project Name/Number : 1908005
Title 6'-0" CMU Retaining Wall
Dsgnr: George Knipprath,
Description....
6'-0" CUM retaining wall

Date: 17 AUG 2019

This Wall in File: f:\RetainPro_10\1908005.RPX

Cantilevered Retaining Wall

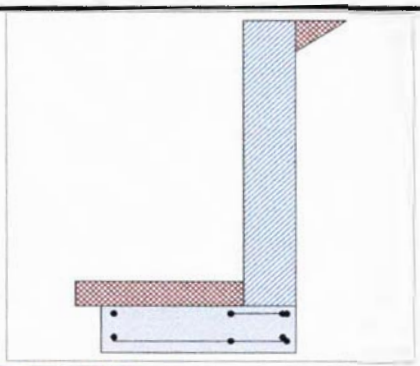
Code: IBC 2012,ACI 318-11,ACI 530-11

Criteria

Retained Height	=	6.00 ft
Wall height above soil	=	0.00 ft
Slope Behind Wall	=	0.00
Height of Soil over Toe	=	6.00 in
Water height over heel	=	0.0 ft

Soil Data

Allow Soil Bearing	=	4,000.0 psf
Equivalent Fluid Pressure Method		
Active Heel Pressure	=	24.0 psf/ft
	=	
Passive Pressure	=	250.0 psf/ft
Soil Density, Heel	=	120.00 pcf
Soil Density, Toe	=	0.00 pcf
Footing||Soil Friction	=	0.400
Soil height to ignore for passive pressure	=	12.00 in



Surcharge Loads

Surcharge Over Heel	=	0.0 psf
Used To Resist Sliding & Overturning		
Surcharge Over Toe	=	0.0
Used for Sliding & Overturning		

Axial Load Applied to Stem

Axial Dead Load	=	0.0 lbs
Axial Live Load	=	0.0 lbs
Axial Load Eccentricity	=	0.0 in

Lateral Load Applied to Stem

Lateral Load	=	0.0 #/ft
...Height to Top	=	0.00 ft
...Height to Bottom	=	0.00 ft
Load Type	=	Wind (W) (Service Level)
Wind on Exposed Stem (Service Level)	=	0.0 psf

Adjacent Footing Load

Adjacent Footing Load	=	0.0 lbs
Footing Width	=	0.00 ft
Eccentricity	=	0.00 in
Wall to Ftg CL Dist	=	0.00 ft
Footing Type		Line Load
Base Above/Below Soil at Back of Wall	=	0.0 ft
Poisson's Ratio	=	0.300

Design Summary

Wall Stability Ratios

Overturning	=	1.64 OK
Sliding	=	1.19 Ratio < 1.5!
Total Bearing Load	=	1,361 lbs
...resultant ecc.	=	0.83 in
Soil Pressure @ Toe	=	866 psf OK
Soil Pressure @ Heel	=	0 psf OK
Allowable	=	4,000 psf
Soil Pressure Less Than Allowable		
ACI Factored @ Toe	=	1,212 psf
ACI Factored @ Heel	=	0 psf
Footing Shear @ Toe	=	70.9 psi OK
Footing Shear @ Heel	=	0.0 psi OK
Allowable	=	82.2 psi

Sliding Calcs

Lateral Sliding Force	=	588.0 lbs
less 100% Passive Force	= -	156.3 lbs
less 100% Friction Force	= -	544.2 lbs
Added Force Req'd	=	0.0 lbs OK
....for 1.5 Stability	=	181.6 lbs NG

Vertical component of active lateral soil pressure IS considered in the calculation of soil bearing pressures.

Load Factors

Building Code	IBC 2012,ACI
Dead Load	1.200
Live Load	1.600
Earth, H	1.600
Wind, W	1.000
Seismic, E	1.000

Stem Construction

		Bottom	
		Stem OK	
Design Height Above Ftg	ft =	0.00	
Wall Material Above "Ht"	=	Masonry	
Design Method	=	ASD	ASD
Thickness	=	12.00	
Rebar Size	=	# 5	
Rebar Spacing	=	24.00	
Rebar Placed at	=	Edge	
Design Data			
fb/FB + fa/Fa	=	0.400	
Total Force @ Section			
Service Level	lbs =	432.0	
Strength Level	lbs =	617.3	1,920.0
Moment....Actual			
Service Level	ft-# =	864.0	
Strength Level	ft-# =	1,166.6	6,400.0
Moment.....Allowable	=	2,155.0	
Shear.....Actual			
Service Level	psi =	3.1	
Strength Level	psi =	5.0	15.7
Shear.....Allowable	psi =	45.3	
Anet (Masonry)	in2 =	139.50	
Rebar Depth 'd'	in =	9.00	
Masonry Data			
f'm	psi =	1,500	
Fs	psi =	20,000	
Solid Grouting	=	Yes	
Modular Ratio 'n'	=	21.48	
Wall Weight	psf =	133.0	
Short Term Factor	=	1.000	
Equiv. Solid Thick.	in =	11.60	
Masonry Block Type	=	Normal Weight	
Masonry Design Method	=	ASD	
Concrete Data			
f'c	psi =		
Fy	psi =		

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Phone (505) 250 6073
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Project Name/Number : 1908005
Title 6'-0" CMU Retaining Wall
Dsgnr: George Knipprath,
Description....
6'-0" CUM retaining wall

This Wall in File: f:\RetainPro_10\1908005.RPX

Cantilevered Retaining Wall

Code: IBC 2012,ACI 318-11,ACI 530-11

Footing Dimensions & Strengths

Toe Width	=	2.75 ft
Heel Width	=	1.00
Total Footing Width	=	3.75
Footing Thickness	=	12.00 in
Key Width	=	0.00 in
Key Depth	=	0.00 in
Key Distance from Toe	=	0.00 ft

f'c = 3,000 psi Fy = 40,000 psi
Footing Concrete Density = 150.00 pcf
Min. As % = 0.0018
Cover @ Top 2.00 @ Btm.= 3.00 in

Footing Design Results

		Toe	Heel
Factored Pressure	=	1,212	0 psf
Mu' : Upward	=	3,246	0 ft-#
Mu' : Downward	=	36,383	0 ft-#
Mu: Design	=	1,112	0 ft-#
Actual 1-Way Shear	=	70.91	0.00 psi
Allow 1-Way Shear	=	82.16	43.82 psi

Toe Reinforcing = # 5 @ 15.99 in
Heel Reinforcing = # 5 @ 17.99 in
Key Reinforcing = None Spec'd

Other Acceptable Sizes & Spacings

Toe: Not req'd: Mu < phi*5*lambda*sqrt(f'c)*Sm
Heel: Not req'd: Mu < phi*5*lambda*sqrt(f'c)*Sm
Key: No key defined

Min footing T&S reinf Area 0.97 in2
Min footing T&S reinf Area per foot 0.26 in2 /ft

If one layer of horizontal bars:	If two layers of horizontal bars:
#4@ 9.26 in	#4@ 18.52 in
#5@ 14.35 in	#5@ 28.70 in
#6@ 20.37 in	#6@ 40.74 in

Summary of Overturning & Resisting Forces & Moments

Item	.....OVERTURNING..... Force lbs	Distance ft	Moment ft-#		.....RESISTING..... Force lbs	Distance ft	Moment ft-#
HL Act Pres (ab water tbl)	588.0	2.33	1,372.0	Soil Over HL (ab. water tbl)		3.75	
HL Act Pres (be water tbl)			850.6	Soil Over HL (bel. water tbl)		3.75	
Hydrostatic Force				Watre Table		3.75	
Buoyant Force =		1.88		Sloped Soil Over Heel =			
Sloped Soil Over Heel =	588.0	2.33	1,372.0	Surcharge Over Heel =			
Surcharge over Heel =				Adjacent Footing Load =			
Surcharge Over Toe =				Axial Dead Load on Stem =			
Adjacent Footing Load =				* Axial Live Load on Stem =			
Added Lateral Load =				Soil Over Toe =		1.38	
Load @ Stem Above Soil =				Surcharge Over Toe =			
=				Stem Weight(s) =	798.0	3.25	2,593.5
				Earth @ Stem Transitions =			
				Footing Weight =	562.5	1.88	1,054.7
				Key Weight =			
				Vert. Component =		3.75	
Total =	588.0	O.T.M. =	2,222.6	Total =	1,360.5 lbs	R.M.=	3,648.2

Resisting/Overturning Ratio = 1.64
Vertical Loads used for Soil Pressure = 1,360.5 lbs

* Axial live load NOT included in total displayed, or used for overturning resistance, but is included for soil pressure calculation.

Vertical component of active lateral soil pressure IS considered in the calculation of Sliding Resistance.

Vertical component of active lateral soil pressure IS considered in the calculation of Overturning Resistance.

Tilt

Horizontal Deflection at Top of Wall due to settlement of soil

(Deflection due to wall bending not considered)

Soil Spring Reaction Modulus 250.0 pci
Horizontal Defl @ Top of Wall (approximate only) 0.021 in

The above calculation is not valid if the heel soil bearing pressure exceeds that of the toe, because the wall would then tend to rotate into the retained soil.