Job No. 153795

November 7, 2016

Challenger Colorado, LLC
8605 Explorer Drive, Suite 250
Colorado Springs, CO 80920

Re: Perimeter Drain Observation
7239 Cedar Brush Ct
Lot 72, Trails at Forest Meadows, Filing No. 3
Colorado Springs, Colorado

Dear Challenger Colorado, LLC:

At your request, Rocky Mountain Group (RMG) has observed the visible components used to construct the subsurface perimeter drain and damp proofing at the above referenced site on November 4, 2016. This observation did not include a verification of the foundation insulation.

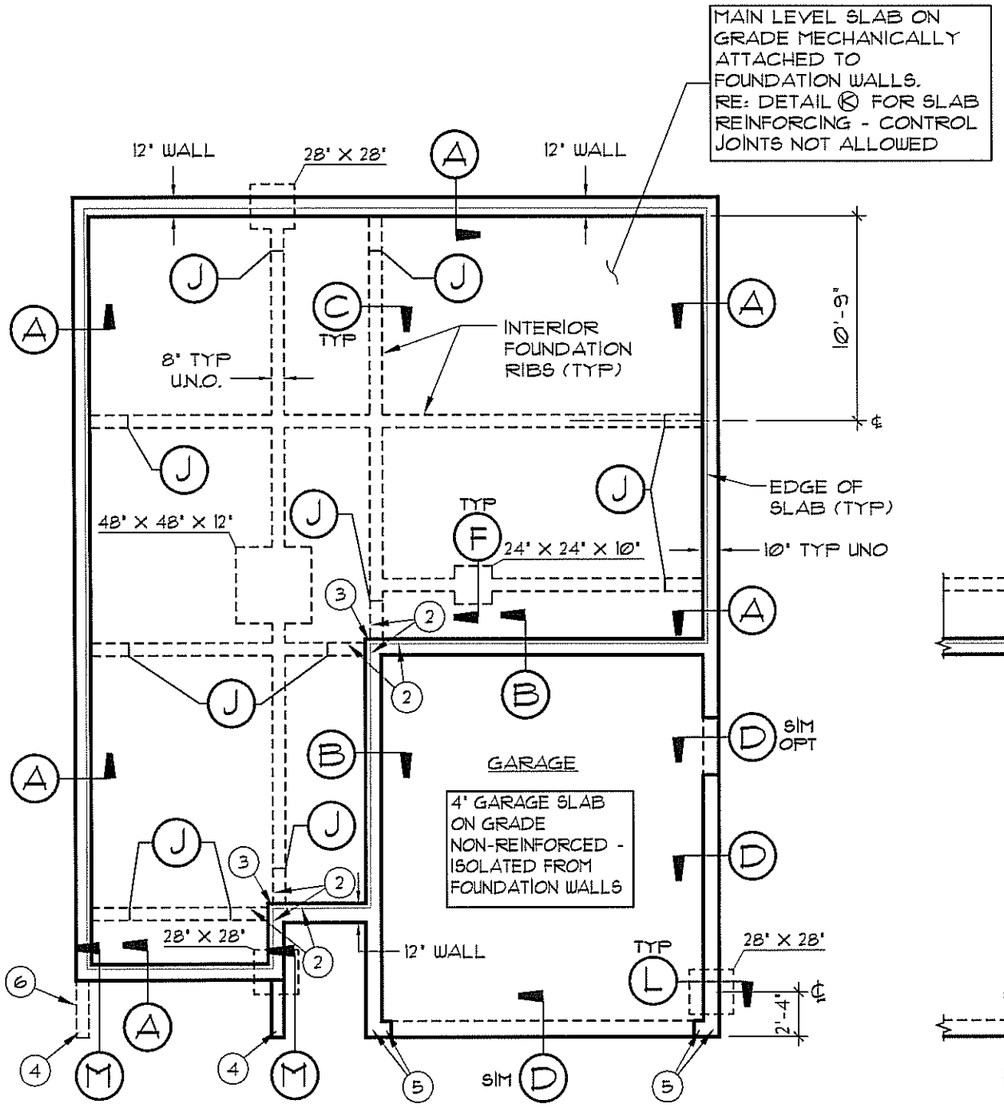
The drain pipe consisted of a 3-inch diameter flexible pipe and gravel. The portions of the drain observed have been installed in substantial conformance with our recommendations. The drain discharged into a sump pit. No sump pump or outfall was installed at the time of our observation.

This is not a comprehensive inspection of the drain system. The line and grade of the drain system was "spot checked" and had slope in substantial conformance with our recommendations at the areas observed. Determination of the performance of the drain system after the house is constructed is not included in this observation. Various construction processes which determine the performance of subsurface drains are completed at times before and after our observation.

Should you have questions, please do not hesitate to call.

Cordially,

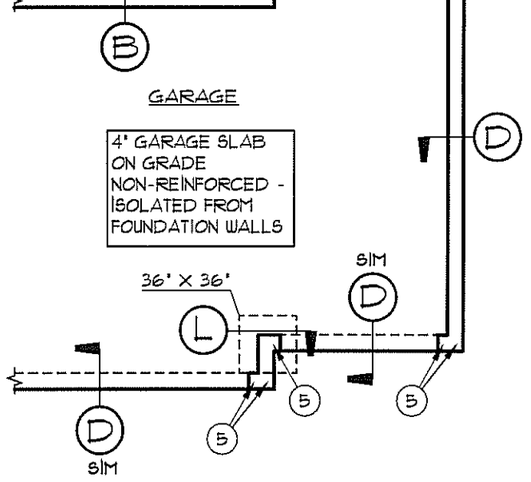
Tony Munger, P.E.
Geotechnical Project Engineer



(ELEVATION 'A', 'B' & 'C')

FOUNDATION PLAN

SCALE: 1/8" = 1'-0"



(3-CAR GARAGE OPTION)

PARTIAL FDN PLAN

SCALE: 1/8" = 1'-0"

LEGEND

	FDN WALL SLAB LEDGE WHERE SHOWN ON PLAN
	INTERIOR RIB
(A)	SECTION OR DETAIL CALLOUT
	SHALLOW PIER
	COLUMN PAD
(1)	SEE PLAN NOTES

PLAN NOTES

(1) **DIMENSION/LAYOUT NOTE:**

DO NOT SCALE. SCHEMATIC LAYOUT SHOWN IS BASED ON DRAWINGS FOR **CHALLENGER HOMES, OF MASTER MODEL 1966.2 DATED May 21, 2015.** FOR THE FIELD LAYOUT REFER TO THOSE DRAWINGS PLUS THE LIMITED DIMENSIONAL INFORMATION SHOWN ON THIS PLAN, GENERAL NOTE (b) AND FOUNDATION NOTES (c) AND (i). ROCKY MOUNTAIN GROUP SHALL BE NOTIFIED OF DIMENSIONAL CHANGES AFFECTING THIS LAYOUT. INSTALL **WALL STEPS** PER DETAILS (G) AND (H)

(2) ALIGN EDGE OF RIB WITH NOTCH IN WALL (TYP)

(3) STAGGER EPOXY DOWELS FROM EACH RIB AT CORNER. MAINTAIN MIN 3" CLEAR CONCRETE EDGE DISTANCE

(4) COLUMN MUST BEAR DIRECTLY ON FOUNDATION - EXTEND COLUMN THROUGH SLAB AS REQUIRED

(5) HOLDOWNS PER STRUCTURAL FRAMING PLANS (BY OTHERS)

(6) T-WALL FOR ELEVATION 'C' ONLY

SOIL DESIGN PARAMETERS

FOUNDATION DESIGN IS BASED ON A MINIMUM ALLOWABLE SOIL BEARING CAPACITY OF **2000 PSF** WITH NO MINIMUM DEAD LOAD REQUIREMENT. **AN OPEN EXCAVATION OBSERVATION BY A LICENSED COLORADO ENGINEER IS REQUIRED PRIOR TO CONSTRUCTION TO VERIFY THESE SOIL PARAMETERS AND TO CONFIRM THE SUITABILITY OF A "STIFFENED SLAB" TYPE FOUNDATION. COMPACTION TESTING BY A LICENSED COLORADO ENGINEER IS REQUIRED PRIOR TO PLACING THE SLAB REINFORCEMENT TO VERIFY THAT FILL PLACED BELOW INTERIOR (NON-GARAGE) SLABS IS CONSISTENT WITH THESE SOIL DESIGN PARAMETERS. REFER TO THE OPEN EXCAVATION OBSERVATION REPORT FOR ALL REQUIREMENTS AND SPECIFICATIONS PERTAINING TO THE PLACEMENT OF STRUCTURAL FILL**

ALL FOUNDATION WALLS SHOWN SHALL BE POURED MONOLITHICALLY U.N.O.

VERIFY ALL DIMENSIONS PRIOR TO CONSTRUCTION

JOB No. 148836

ARCHITECTS RMG ENGINEERS
ROCKY MOUNTAIN GROUP
Southern Office
Colorado Springs, CO 80918
(719) 548-0600
Central Office:
Englewood, CO 80112
(303) 688-9475
Northern Office:
Greeley / Evans, CO 80620
(970) 330-1071
Woodland Park Office:
(719) 687-6077
Monument Office:
(719) 488-2145
Pueblo / Canon City:
(719) 544-7750

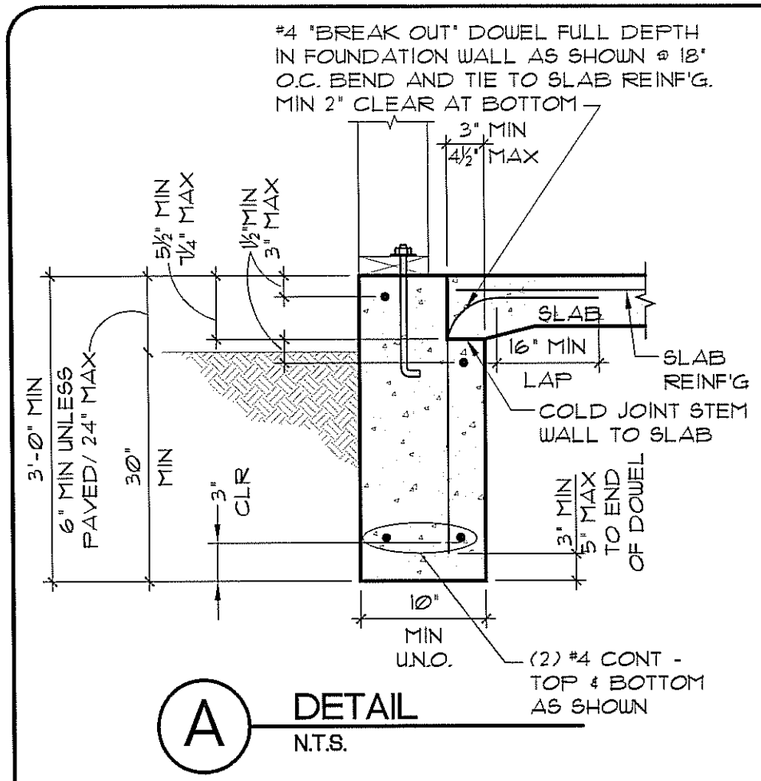
COLORADO LICENSED
MATTHEW ALAN LUNDBERG
7/23/15
45990
PROFESSIONAL ENGINEER

1966.2 MASTER
STIFFENED SLAB FOUNDATION
EL PASO COUNTY, COLORADO
CHALLENGER HOMES

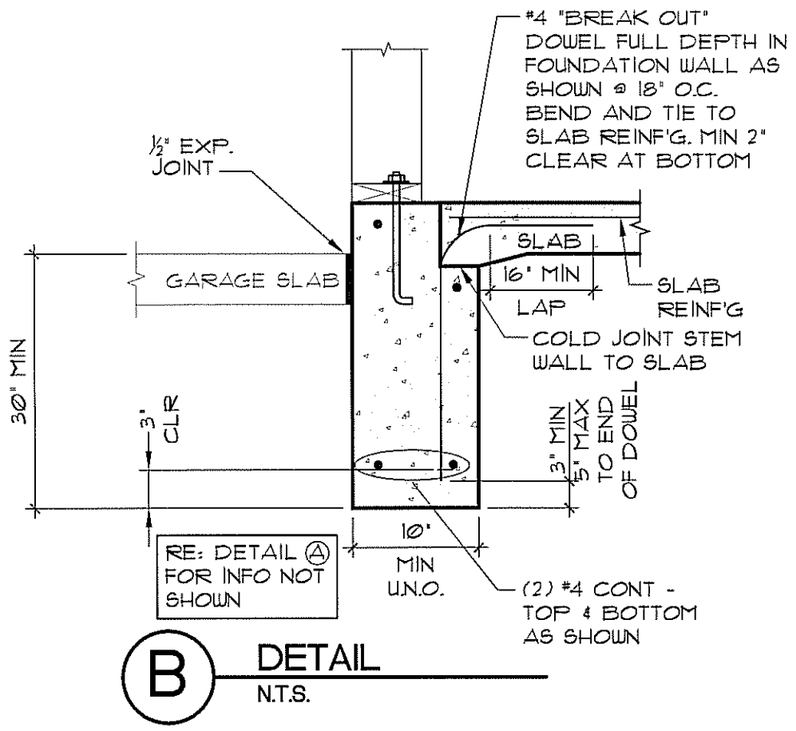
ENGINEER:	ML
DRAWN BY:	CL
CHECKED BY:	ML
ISSUE:	7-23-15
REVISION:	DATE: / JOB #:

FOUNDATION PLAN

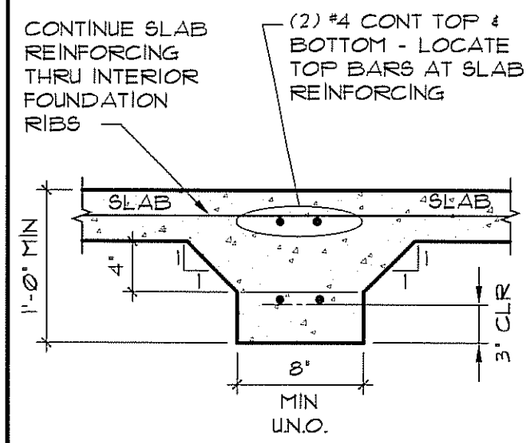
SHEET No. F1F OF 4
MASTERS / CHALLENGER



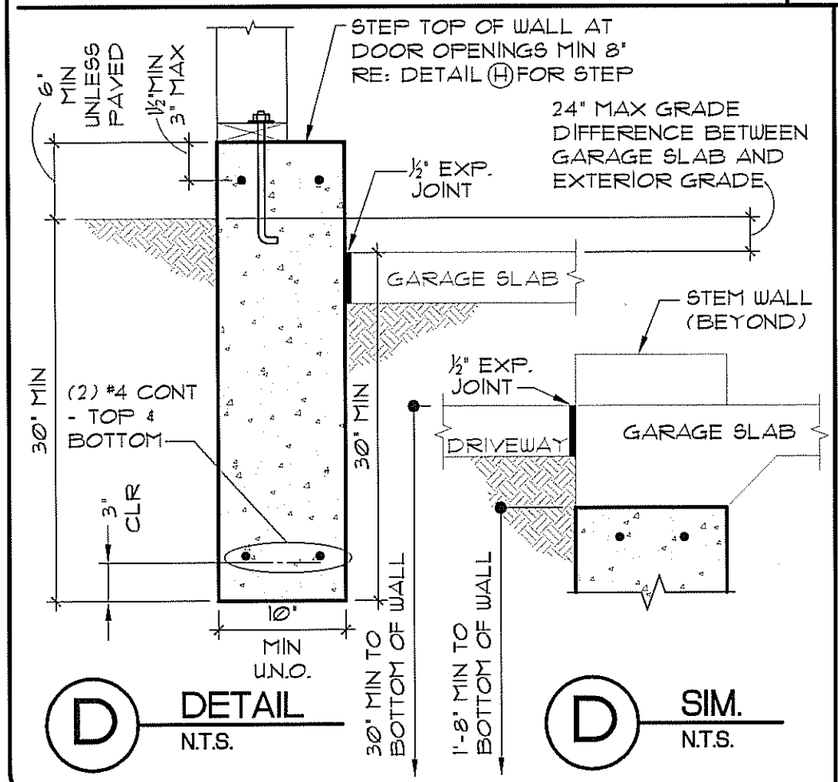
A DETAIL
N.T.S.



B DETAIL
N.T.S.

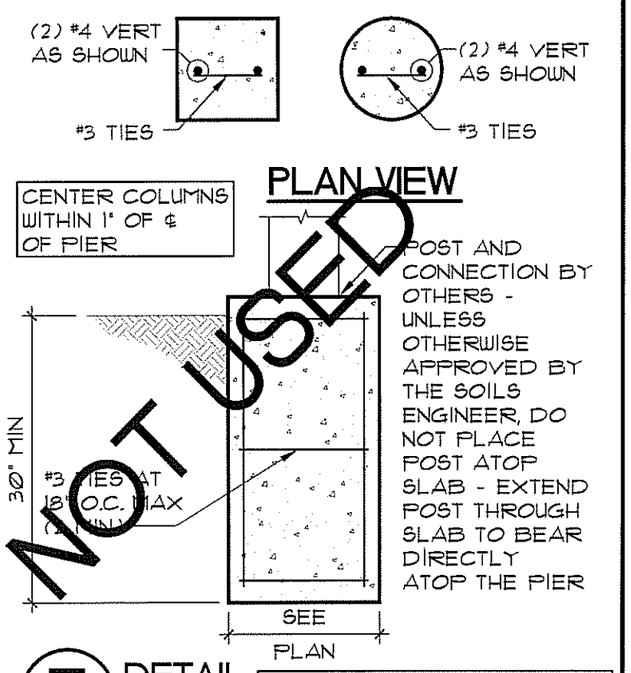


C DETAIL
N.T.S.



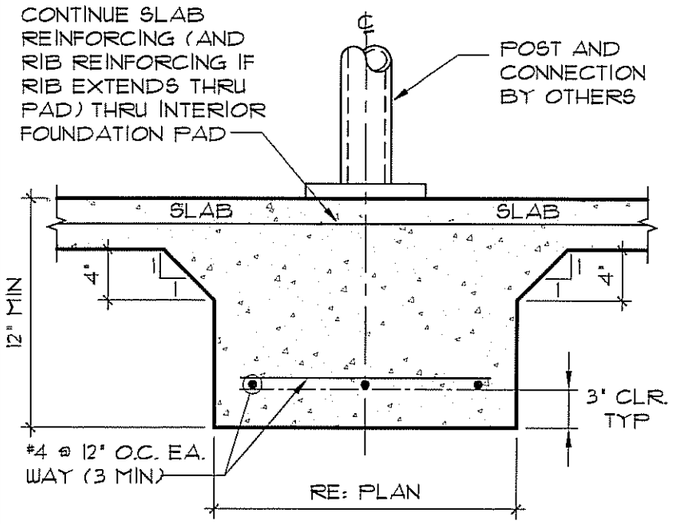
D DETAIL
N.T.S.

D SIM.
N.T.S.



E DETAIL
N.T.S.

LOCATE PIER ON NATURAL, UNDISTURBED SOIL OR ON APPROVED STRUCTURAL FILL



F DETAIL
N.T.S.

JOB No. 148836

ARCHITECTS RMG ENGINEERS
ROCKY MOUNTAIN GROUP

Southern Office
Colorado Springs, CO 80918
(719) 548-0600
Central Office:
Englewood, CO 80112
(303) 688-9475
Northern Office:
Greeley / Evans, CO 80620
(970) 330-1071
Woodland Park Office:
(719) 687-6077
Monument Office:
(719) 488-2145
Pueblo / Canon City:
(719) 544-7750

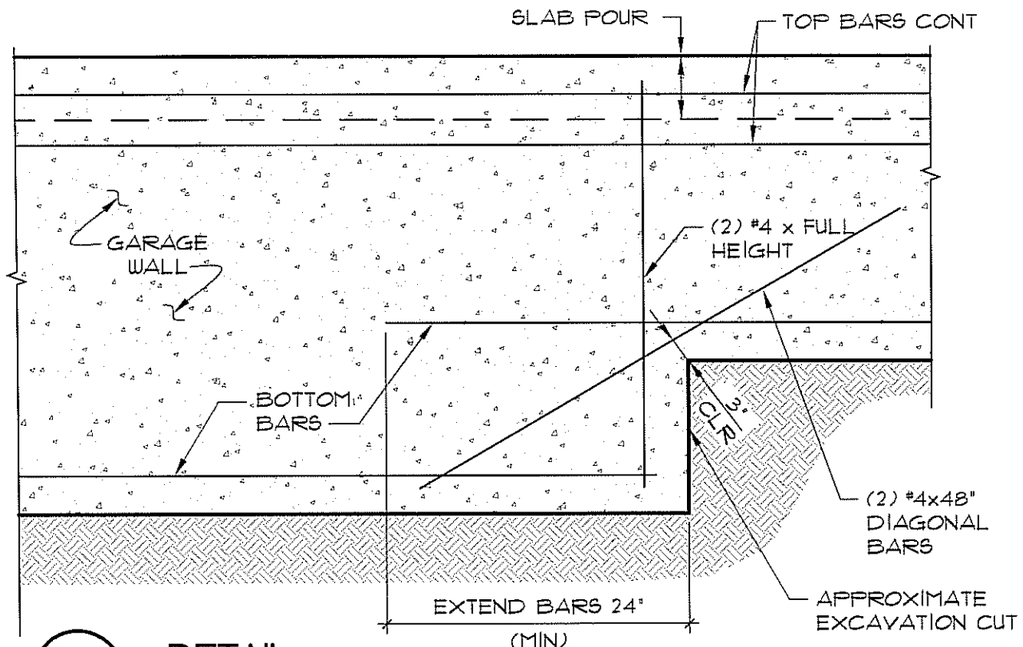
COLORADO LICENSED
MATTHEW ALAN LUNDBERG
7/23/15
45990
PROFESSIONAL ENGINEER

1966.2
MASTER
STIFFENED SLAB FOUNDATION
EL PASO COUNTY, COLORADO
CHALLENGER HOMES

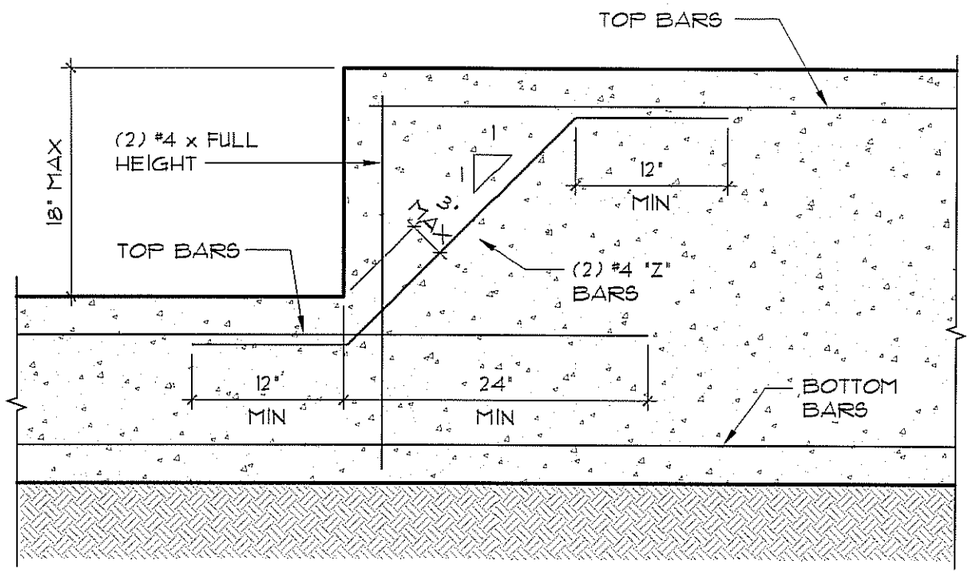
ENGINEER:	ML
DRAWN BY:	CL
CHECKED BY:	ML
ISSUE:	7-23-15
REVISION:	DATE: / JOB #:

FOUNDATION DETAILS

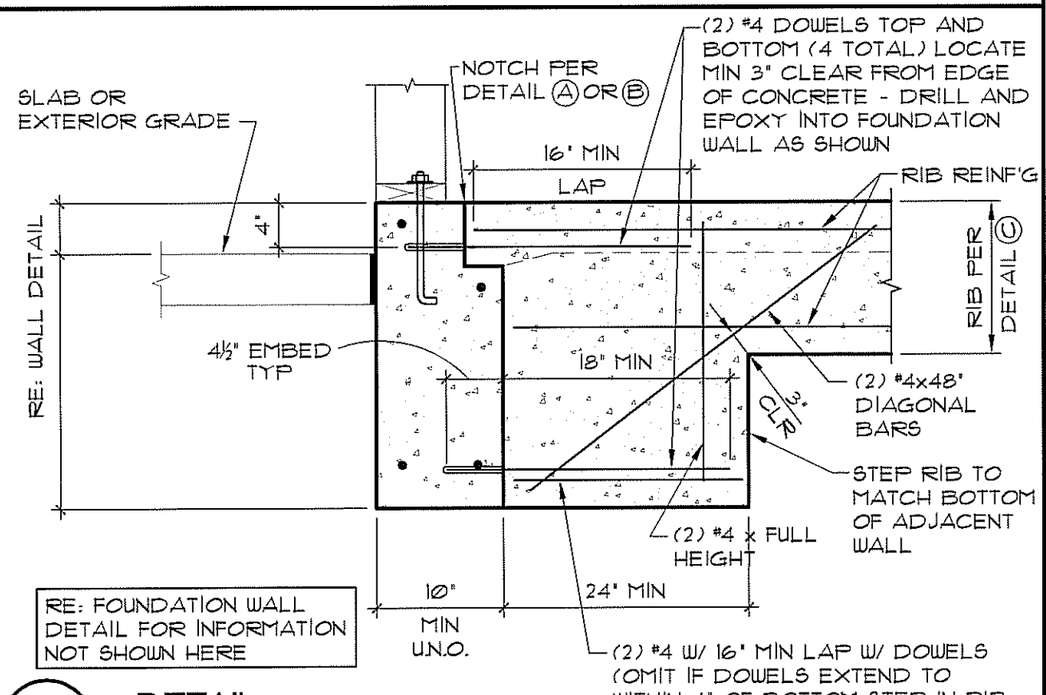
SHEET No. F2F OF 4
MASTERS / CHALLENGER



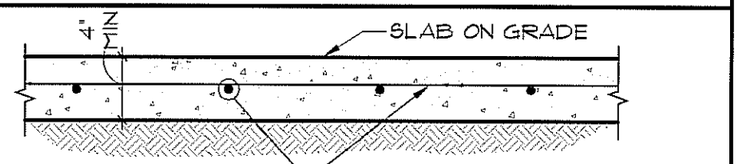
G DETAIL
N.T.S.



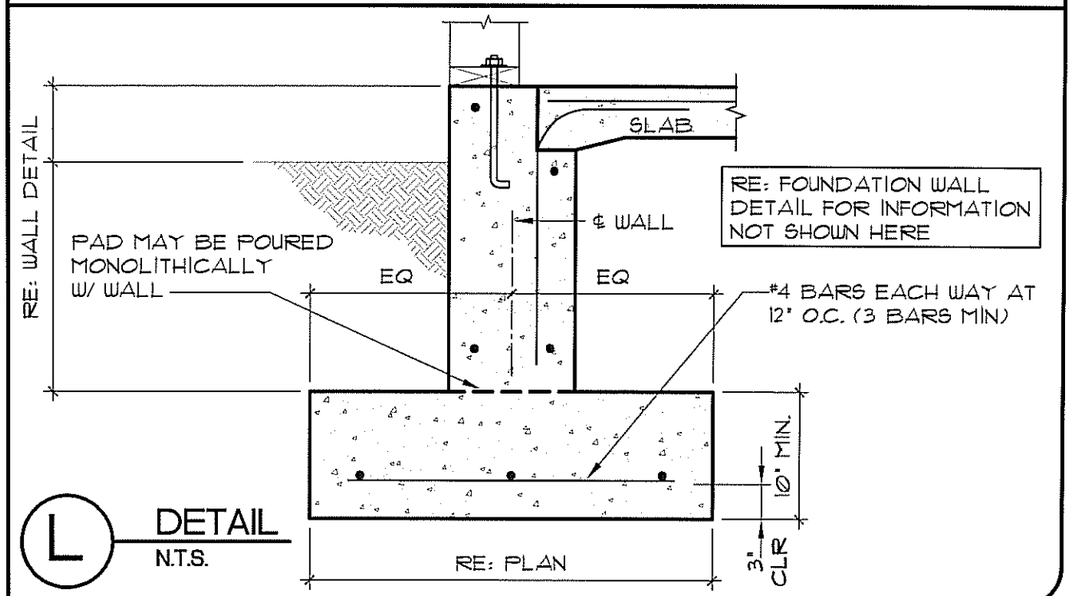
H DETAIL
N.T.S.



J DETAIL
N.T.S.



K DETAIL
N.T.S.



L DETAIL
N.T.S.

JOB No. 148836

ARCHITECTS RMG ENGINEERS
ROCKY MOUNTAIN GROUP

Southern Office
Colorado Springs, CO 80918
(719) 548-0600
Central Office:
Englewood, CO 80112
(303) 688-9475
Northern Office:
Greeley / Evans, CO 80620
(970) 330-1071
Woodland Park Office:
(719) 687-6077
Monument Office:
(719) 488-2145
Pueblo / Canon City:
(719) 544-7750

COLORADO LICENSED
MATTHEW ALAN LUNDBERG
7/23/15
45990
PROFESSIONAL ENGINEER

1966.2
MASTER
STIFFENED SLAB FOUNDATION
EL PASO COUNTY, COLORADO
CHALLENGER HOMES

ENGINEER:	ML
DRAWN BY:	CL
CHECKED BY:	ML
ISSUE:	7-23-15
REVISION:	DATE:
.	JOB #:
.	.
.	.
.	.

FOUNDATION DETAILS

SHEET No. F3F OF 4
MASTERS / CHALLENGER

STRUCTURAL GENERAL NOTES

CODES:

Design is based on, and all construction shall comply with, the 2009 International Residential Code (IRC) / 2011 Pikes Peak Regional Building Code / ASCE 32-01

GENERAL:

a. Foundation design is void two years after original date of issue or date of most recent 'update' revision. Plan must be updated to acceptable codes and practices at that time.

b. **DO NOT SCALE.** Schematic layout shown is based solely on architectural plans and other written documentation received from contractor and/ or client per plan note (1). Any changes to the schematic layout must be specific and clearly conveyed to ROCKY MOUNTAIN GROUP in written form as a change for inclusion into these plans. CONTRACTOR AND/ OR CLIENT SHALL VERIFY ALL DIMENSIONS AND LAYOUT PRIOR TO CONSTRUCTION. Due to the nature of the residential design process, Rocky Mountain Group shall not be held responsible for dimensional and layout discrepancies if this verification is not completed and/ or if Rocky Mountain Group is not notified immediately upon discovery of such discrepancies.

DESIGN LOADS:

Roof Load	(Dead Load) . . . . 15 psf	Floor Load	(Dead Load) . . . . 10 psf
Snow	(Live Load) . . . . 30 psf		(Live Load) . . . . 40 psf
Deck Load	(Dead Load) . . . . 15 psf	Soil Parameters	(EFP) . . . . . 40 pcf (Nonexpansive Backfill)
	(Live Load) . . . . 40 psf		PI . . . . . 20 max
			Cw 2.25

FOUNDATION:

a. This design has been completed in accordance with pertinent standards, recommended design soil parameters and accepted engineering design procedures, and is based on the best information available at the time of completion. The design is intended to minimize differential movement resulting from the heaving or settling of subsurface soils. It must be recognized that foundation components will undergo movement. Client and owners shall appraise any subsequent owners of the soil conditions noted in the soils report for the specific site and advise them to maintain good practices in the future with regard to surface and subsurface drainage, framing of partitions above floor slabs, drywall and finish work above the floor slabs, etc. THIS 'RESIDENTIAL STYLE' FOUNDATION PLAN IS INTENDED TO BE USED WITH THE REFERENCED ARCHITECTURAL/ STRUCTURAL PLAN FOR SITE EXCAVATION AND FOUNDATION CONSTRUCTION.

b. This stiffened slab design is based on the publication 'Design of Slab on Grade Foundations' procedure developed by Walter C. Snowden, RE. updated March, 1996. The design incorporates the weighted plasticity index (PI) and climate rating (CW) listed above.

c. Specific location of wall and slab steps by others unless noted on this plan.

d. Mechanically compact all interior and exterior backfill per Geotechnical Engineer. Avoid inducing construction loads along foundation walls in excess of lateral design loads shown above. Use non-expansive exterior backfill along foundation walls U.N.O.

e. Slope backfill away from the building a minimum of 10% for the first 10 feet. Paved areas may slope at 2%. Carry roof drains across the backfilled areas with a surface outlet. Do not allow water to stand or pond near the building. Do not flood the backfill. Planters, if any, shall be well sealed and drained. Irrigation devices shall be kept a minimum of 5 feet from all foundations.

f. The use of drywells on this site is not recommended.

g. Preparation of subgrade for interior ribs and floor slabs per Geotechnical Engineer.

h. All foundation piers or pads shall be formed to proper dimensions as indicated on the drawings. Center of column or wall shall be located within 4" of the center of the pad.

i. The location of foundation jogs, wall and slab steps and top of wall elevations and connections are critical to foundation performance. These items are frequently not shown on 'residential style' plans and are not within the scope of this design, (unless noted otherwise,) as they typically change during the actual residential construction. As a result this design can not address proper foundation configuration unless stated specifically on the drawings.

j. DO NOT extend plumbing through ribs - plumbing may be extended under ribs in middle third of rib span only. DO NOT locate plumbing parallel to ribs either directly below the ribs or lower than the ribs within a horizontal distance equal to the height of the ribs.

CONCRETE:

a. Detail reinforcement in accordance with ACI 315-99, Detailing Manual.

Minimum concrete cover for reinforcement shall be as follows:

Concrete cast against earth . . . . . 3"

Formed concrete exposed to earth or weather . . . . . 1 1/2"

Interior slabs, walls . . . . . 3/4"

b. Minimum recommended compressive design strength of concrete used for foundations shall be 4000 psi.

c. Reinforcing steel shall conform to ASTM A615, grade 60 except #3 bars may be Grade 40.

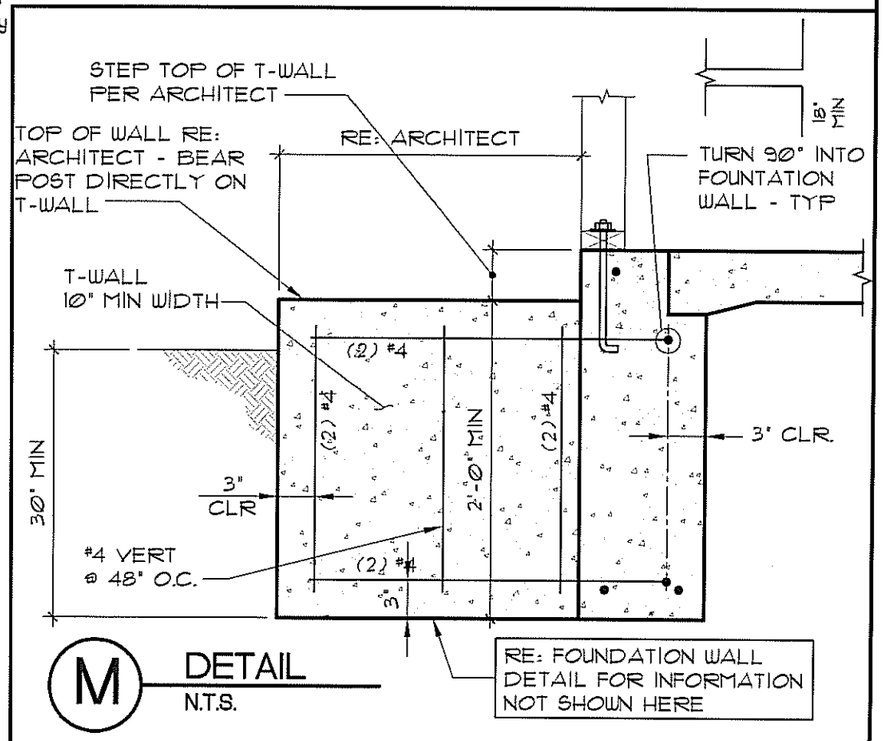
d. Longitudinal reinforcing in walls and footings shall be continuous at corners and intersections. Matching corner bars shall be used. Minimum lap of reinforcing shall be 30 bar diameters. Do not weld splices unless approved by ROCKY MOUNTAIN GROUP.

e. All concrete operations, including but not limited to mix design, mixing, transporting, placing, reinforcing detailing and placing, curing and testing shall be done in accordance with the requirements and application of ACI 301-05. 'Specifications for Structural Concrete.'

f. The contractor is responsible for determining when it is safe to remove forms and/or shoring. Forms and shoring must not be removed until the walls are strong enough to carry their own weight and any anticipated superimposed loads. For foundation walls, this typically requires at least 12 hours of cumulative curing time at a temperature of 50°F or more. Concrete must be adequately covered during cold periods to maintain this surface temperature. Due to varying weather conditions, alternative curing processes, and the use of Type II cement, Rocky Mountain Group suggests forms remain in place a a **minimum of 3 days** to assure this performance specification has been met. When forms are stripped there must be no excessive deflection or distortion or discoloration and no evidence of damage to the concrete. Adequate thermal protection of the concrete shall after stripping for a cumulative period of 48 hours at 50°F, or more, after the initial pour. See foundation notes for continued specifications on when to backfill foundation walls.

g. Type I / II cement shall be used.

h. Anchor bolts per 2009 IRC unless otherwise noted. (Minimum 1/2"Φ anchor bolt with a minimum embedment of 8" spaced at 6 feet o.c. and a maximum of 12" from end of any mudsill)



JOB No. 148836

ARCHITECTS RMG ENGINEERS

ROCKY MOUNTAIN GROUP

Southern Office
Colorado Springs, CO 80918
(719) 548-0600
Central Office:
Englewood, CO 80112
(303) 688-9475
Northern Office:
Greeley / Evans, CO 80620
(970) 330-1071
Woodland Park Office:
(719) 687-6077
Monument Office:
(719) 488-2145
Pueblo / Canon City:
(719) 544-7750

COLORADO LICENSED
MATTHEW ALAN LUNDBERG
7/23/15
45990
PROFESSIONAL ENGINEER

1966.2 MASTER
STIFFENED SLAB FOUNDATION
EL PASO COUNTY, COLORADO
CHALLENGER HOMES

ENGINEER:	ML
DRAWN BY:	CL
CHECKED BY:	ML
ISSUE:	7-23-15
REVISION:	DATE:
	JOB #:

FOUNDATION NOTES

SHEET No. F4F OF 4
MASTERS / CHALLENGER