CMAS – INTRO TO LAND AND BUILDING IN THE FOOTHILLS

MOUNTAIN METRO ASSOCIATION OF REALTORS

CONTINUING EDUCATION COURSE



DEAN DALVIT, AIA, PE & BRIAN WELCH, PE

ENGINEERING AND ARCHITECTURAL EXPERTISE ACROSS MULTIPLE FRONT RANGE COUNTIES

- SPECIALIZE IN LAND DEVELOPMENT
- SINGLE FAMILY, MULTI FAMILY, SUBDIVISIONS, AND COMMERCIAL DEVELOPMENT
- TEAM OF ENGINEERS AND ARCHITECTS INCLUDING CIVIL, STRUCTURAL, MECHANICAL, ELECTRICAL, AND PLUMBING TO TACKLE PROJECTS FROM START TO FINISH

TODAY'S TOPIC – FROM DREAMING TO BUILDING

LAND USE AND DESIGN; CIVIL ENGINEERING

- 1. THE PROPERTY SEARCH AND WISH LIST
- 2. LOCATIONAL CHALLENGES
- 3. BUYING
- 4. DESIGN THROUGH PERMITING
- 5. BUILDING



PROPERTY SEARCH

What type of lot is your client looking for?

Every client is different, the more requirements that they have, the more challenging and costly it will likely be

Explain to your client that the iconic geography of Colorado presents many building challenges. Mountains to our West are great but it makes building very challenging due to topography

The more complex the lot, the more important the due diligence

HELP SET EXPECTATIONS EARLY AND OFTEN!



PROPERTY SEARCH

- 1. THE PROPERTY SEARCH AND WISH LIST
 - LOCATION
 - REMOTE OR EASILY ACCESSIBLE
 - PAVED OR GRAVEL
 - TERRAIN
 - 8% DRIVEWAY WILL SET HOUSE ELEVATION
 - ~150' LENGTH BEFORE EMERGENCY TURN AROUNDS
 - GARAGE ACCESS CAN BE 12' ABOVE ROAD
 - TYPICAL MOUNTAIN LOT VARIES BETWEEN 15-35%.
 - UTILITIES
 - VERIFY WELL/WATER DISTRICT AND AVAILABLE TAPS
 - VERIFY SEPTIC/SEWER DISTRICT AND SPECIAL DISTRICTS

- DRY UTILITIES (ELECTRIC, GAS, FIBER)
- VIEWS
 - MOUNTAIN VIEWS
 - ELEVATION
 - ROCK OUTCROPPINGS
 - OTHER BUILDABLE LOTS
- EXPOSURE
 - SOUTH & WEST VIEWS
 - NORTH & EAST VIEWS



CASE STUDY – FOX RIDGE



architecture : engineering : planning

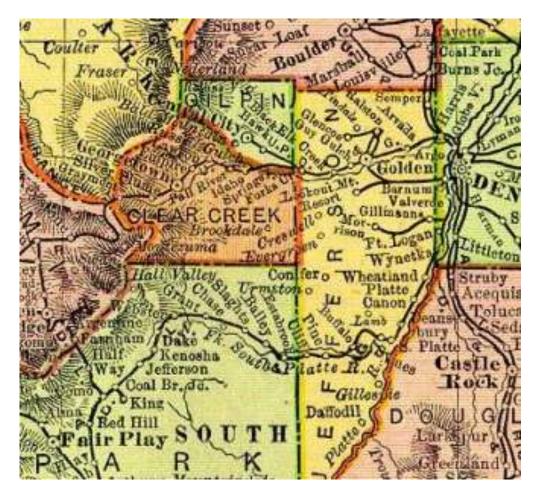


TOTAL COST OF SITE

LOCATIONAL CHALLENGES

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- 2. NOW YOU KNOW WHAT THEY WANT, BUT WHERE?
 - LOCATIONAL CHALLENGES
 - COUNTY/CITY
 - ZONING
 - HOA
 - REGIONAL DISTRICTS
 - PROPERTY BACKGROUND



COUNTY MOUNTAIN LIVING CHECKLISTS

- MAKE SURE PROPERTY IS A LEGAL PARCEL
- ZONING, REGS, LAND USE PLANS, HOA
- PROOF OF ACCESS
- BUILDING PERMIT REQUIREMENTS
- CONSTRAINTS TO DEVELOPMENT
 - EASEMENTS, MINERAL/WATER RIGHTS, ABANDONED MINES, FLOODPLAINS/GEOLOGIC HAZARDS
- WATER AND SANITATION
- PUBLIC SERVICES AND UTILITIES
- LIVING CONDITIONS
 - HOA, SCHOOLS, CLIMATE, RECREATION
- WILDLIFE CONSTRAINTS
 - PETS, PLANTINGS
- WILDFIRE DANGER



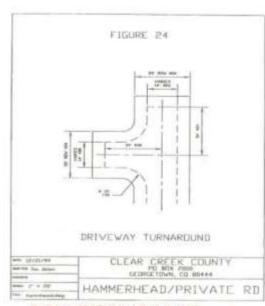


EXAMPLE COUNTY DESIGN STANDARD DOCUMENTS

architecture : engineering : planning

CLEAR CREEK COUNTY

UNLESS OTHERWISE REQUIRED BY THE SITE DEVELOPMENT COORDINATOR, ALL NEW DRIVEWAYS GREATER THAN 100 FEET IN LENGTH SHALL BE ENGINEERED BY A LICENSED COLORADO ENGINEER THAT MEETS ENGINEERED GRADING REQUIRMENTS OUTLINED IN SECTION X107.4 OF THE 2009 IRC AND THE 2009 IBC.



All driveways shall have a minimum driveway surface width of 12 feet if the driveway is less than 200 feet long or 14 feet if the driveway is equal to or greater than 200 feet long. These widths do not include additional width required for proper drainage.

All horizontal curves shall have a minimum curve radii of 30 feet measured from the centerline of the driveway to the center point of the curve.

All driveways shall end in an approved turnaround area with a minimum 13.75 foot radius.

11-23-15

PARK COUNTY

Section 7-204 Driveways

- A. Driveways shall serve no more than two (4) residential Lots. Driveways shall not provide service or access to commercial or industrial zoned property unless approved by the Planning Department.
- B. All driveways serving or located on more than one Lot shall be created by written and recorded easement, plat, deed, or other legally accepted documentation, which ensures perpetual and permanent access and which demonstrates consent and approval of all fee owners of property upon and through which the driveway is located.
- C. Driveways shall meet the following requirements:

	Minimum Width of Traveled Surface	Minimum Centerline Curve Radius	Maximum Linear Distance from Access	Maximum % of Grade Within First 50 Feet from Road	Maximum % of Grade After the First 50 Feet From Road
Driveway serving one or two single family residential lots	16 feet	30 feet	Per Zone District	1 st 10 feet <2%, then 10%	12%
Driveway serving three or four single family residential lots	20 feet	40 feet	1000 feet	1 st 10 feet <2%, then 10%	12%

Per Section 4.7.3.D 2 "Single family residence driveways is excess of 100 feet in length shall provide an adequate turnaround for emergency equipment to within 50 feet of the dwelling unit."

GENERAL COUNTY REQUIREMENTS

County	Max Driveway Slope	Minimum Driveway Width	Driveway Radius	Emergency Turnaround	Max Grade Slope	Permits Reqd.	Retaining Wall Permit	GESC Req	Drainage Req	Defensible Space Requirement
Jefferson	<u>10% (12% if</u> <u>South facing)</u>	<u>10' Drive - 2'</u> <u>Shoulders (14'</u> <u>Total)</u>	<u>30'</u>	Required After <u>150'</u>	<u>50%</u>	<u>NOI</u> <u>Grading</u>	<u>lf > 36"</u>	>5000 sf disturbance or >20% grade	Mountain Porous Landscape Device	Yes
Clear Creek	<u>10% (12% with</u> permission)	<200' = 12' total >200' = 14' Total	<u>30'</u>	<u>After 100'</u>	<u>100%</u>	Driveway and Excavation Permit	<u> f > 48"</u>	> 2500CY Earthwork or >20,000SF Disturbance	Infiltration System if roof > 1750 SF	<u>Yes</u>
Park	<2% for 10' then 10% (after 50' 12%)	16'	30'	N/A - If longer than 200' need all weather surface	Per Geotech	Driveway Cut Permit	lf > 48"	N/A	N/A	Voluntary (Insurance may require)
Gilpin	12%	12	30'	After 150'	Per Geotech	Access Permit (First 20')	lf > 48"	N/A	Can't increase runoff more than 10%	Voluntary (Insurance may require)

LOCATIONAL CHALLENGES

- ZONING, HOA, AND LOT RESTRICTIONS
 - FIRST PART OF DUE DILIGENCE BEFORE STARTING DESIGN
 - CAN RESTRICT MANY THINGS
 - ENTRANCE LOCATION
 - STRUCTURE LOCATION SETBACKS
 - STRUCTURE SIZE AND TYPE
 - ARCHITECTURE MATERIALS
 - FUTURE POTENTIAL FOR GUEST HOMES OR ADDITIONAL STRUCTURES

UTILITIES AND LOCAL SERVICES

- WATER DISTRICTS
 - LIMITED TAPS
 - TAP AND SERVICES COSTS
 - WATER RIGHTS AND FEES
- SEWER DISTRICTS
 - SEPTIC AND COMMUNITY SEWER
 - ADVANCED TREATMENT DISTRICTS
 - SEPTIC LOCATIONS AND PUMPING

CASE STUDY – SILVER ROCK MANOR

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BUYING



3. BUYING

- THIS IS YOUR DEAL
 - AS DESIGN PROFESSIONALS, WE LOOK FOR A LIST OF ITEMS PRIOR TO DESIGN, IT WILL SAVE THE BUYER TIME AND EXPENSE TO SPEND MORE ON A PREPARED LOT. HAVING AN ENGINEER VET OUT POSSIBLILITIES BEFORE SELLING OR PRIOR TO BUYING IS A VALUABLE INVESTMENT.
 - MOUNTAIN HOME DESIGN WILL REQUIRE A SURVEY, PROVIDING ONE WHILE SELLING OR HAVING ONE BEFORE BUYING IS HIGHLY RECOMMENDED.
 - MOST STRUCTURAL ENGINEERS WILL REQUIRE A GEOTECHNICAL SOILS REPORT PRIOR TO DESIGN

YOU CAN ADD VALUE ON THE BUYER OR THE SELLER SIDE OF THE DEAL!

- RESEARCH AND INVESTMENT WILL RESOLVE MANY OF THE ISSUES WE PRESENT TODAY, ENGINEERS ARE OFTEN WILLING TO VISIT THESE LOTS TO HELP STREAMLINE THE PROCESS AND ELIMINATE POTENTIAL ISSUES.
 - ACCESS EASEMENTS, RIGHT OF WAY, PLAT, RECORDINGS
 - HOA RESTRICTIONS AND COVENANTS
 - WATER AND SEWER AVAILABILITY

BUILDING



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LET'S TALK ABOUT SQUARE FOOTAGE!



DESIGN THROUGH PERMITTING

- 4. The permitting process for large homes is now treated similarly to that of retail or commercial developments; standards and requirements are very thorough, long, and tough. Long driveways, existing private roads, and extensive grading can all cause tens of thousands of dollars of improvements.
- PERMIT PROCESS
 - DEFENSIBLE SPACE
 - LAND DISTURBANCE PERMIT
 - TERMS AND ACRONYMS
 - GRADING REQUIREMENTS
 - STORMWATER DESIGN

- EROSION CONTROL
- DRIVEWAY DESIGN
- RETAINING WALL DESIGN
- ACCESS PERMIT
- BUILDING PERMIT
- WELL PERMIT
- SEPTIC PERMIT

PROFESSIONAL DISCIPLINES AND SCOPE



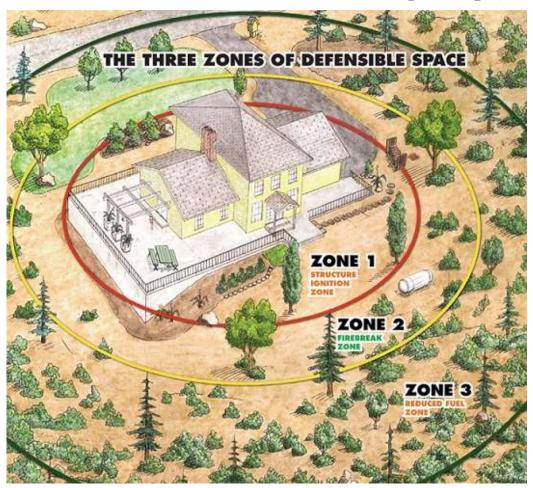


- ARCHITECTS
 - PROGRAMMING AND DESIGN OF RESIDENCE
- SURVEYORS
 - SURVEY OF LOT, TOPOGRAPHY, RESEARCH OF EASEMENTS OR OTHER ENCUMBERANCES
- GEOTECHNICAL ENGINEERS
 - SOIL TESTING DETERMINES TYPE OF FOUNDATION TO BE USED
 - OTHER ISSUES BEDROCK LOCATION, HIGH GROUNDWATER
- STRUCTURAL ENGINEERS
 - DETERMINE STRUCTURAL COMPONENTS NEEDED TO BUILDING ARCHITECTS DESIGN
 - DESIGN RETAINING WALLS NEEDED
- MECHANICAL, ELECTRICAL, PLUMBING (MEP) ENGINEERS
 - HVAC (HEATING, VENTALATION, AIR CONDITIONS)
- CONTRACTORS
 - OBTAINS PERMITS USING APPROVED ENGINEERING PLANS FROM APPROPRIATE AUTHORITIES
 - CONSTRUCTS APPROVED DESIGN

DEFENSIBLE SPACE

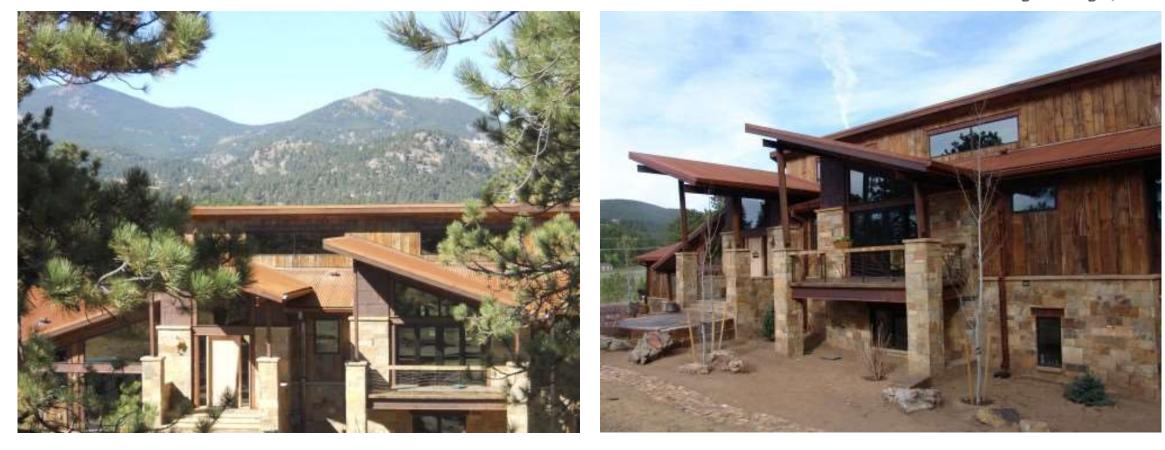


- INSURANCE REQUIREMENTS
- APPLIES TO WOODED LOCATIONS
- DENSITY AND DISTANCE FROM STRUCTURES TAKEN INTO CONSIDERATION

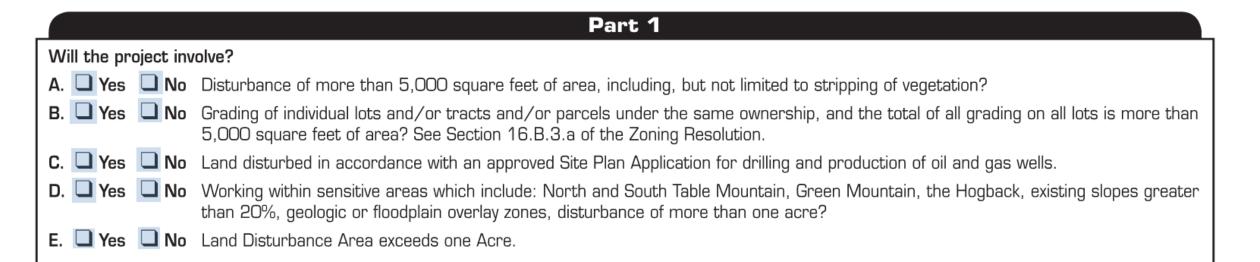


CASE STUDY-RED FOX RUN





DO I NEED A GRADING PERMIT?



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Part 2

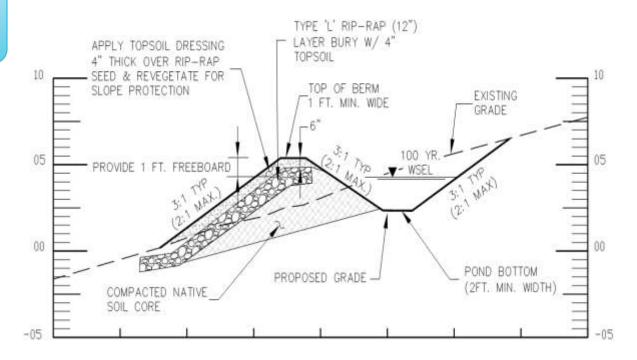
If you answered **NO** to *all* of the questions in Part 1, you **do not** need a Land Disturbance Permit. However, you still need to comply with the Grading and Erosion Control Performance Standards listed on page 2 of this form. If you answered **YES** to either A, B, or C, but **NO** to D and E, a Notice of Intent is required. If you answered **YES** to either A, B, or C, and **YES** to D or E, a full Grading Permit is required. If you answered **YES** to *any* of the questions in Part 1, please answer the following exemption questions:

CASE STUDY- MOUNTAIN MODERN RESIDENCE



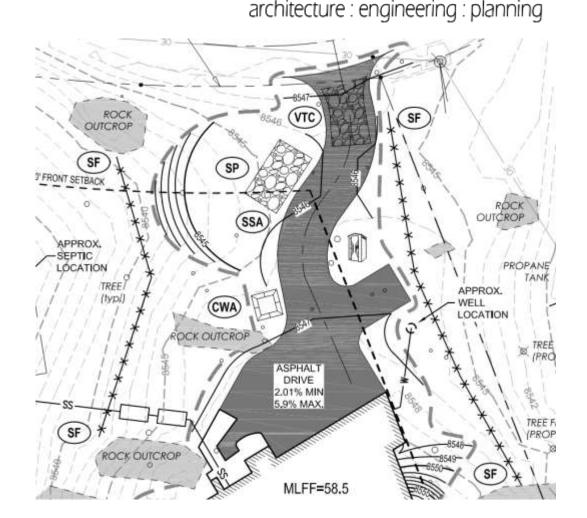
MPLD – MOUNTAIN POROUS LANDSCAPE DEVICE

- GESC GRADING, EROSION, AND SEDIMENT CONTROL PLAN
- SLOPE (3H:1V) VS. GRADE (%) --- 3:1 = 33%
- BMP BEST MANAGEMENT PRACTICES
- SWMP STORM WATER MANAGEMENT PLAN
- NOI NOTICE OF INTENT
- LOMA & LOMA-F --- LETTER OF MAP AMENDMENT – FILL (FEMA RELATED)

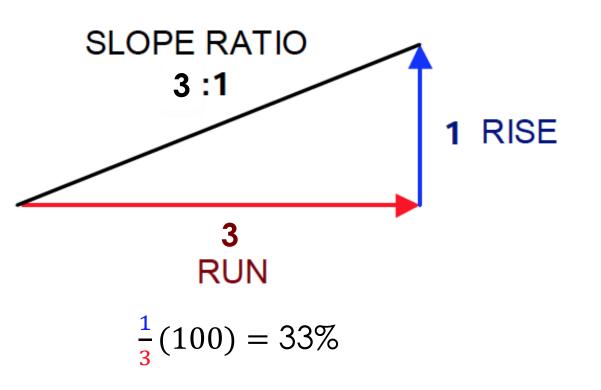


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Hydrologic Processes

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	Hyd	rologic Pro	cesses	Treatment Processes						
	Peak	Vo	lume	P	hysical		Chemical	Biological		
UDFCD BMP	Flow Attenuation	Infiltration	Evapo- transpiration	Sedimentation	Filtration	Straining	Adsorption/ Absorption	Biological Uptake		
Grass Swale	1	S	1	s	s	Р	s	s		
Grass Buffer	1	s	I	S	s	Р	s	s		
Constructed Wetland Channel	1	N/A	Р	Р	s	р	S	Р		
Green Roof	Р	s	Р	N/A	Р	N/A	1	Р		
Permeable Pavement Systems	р	р	N/A	s	р	N/A	N/A	N/A		
Bioretention	Р	Р	s	Р	Р	s	S ¹	Р		
Extended Detention Basin	Р	1	I	Р	N/A	s	s	1		
Sand Filter	Р	р	1	Р	р	N/A	S ¹	N/A		
Constructed Wetland Pond	Р	1	Р	Р	s	s	Р	р		
Retention Pond	Р	1	р	Р	N/A	N/A	Р	s		
Underground BMPs	Variable	N/A	N/A	Variable	Variable	Variable	Variable	N/A		

Table 2-1. Primary, Secondary and Incidental Treatment Process Provided by BMPs

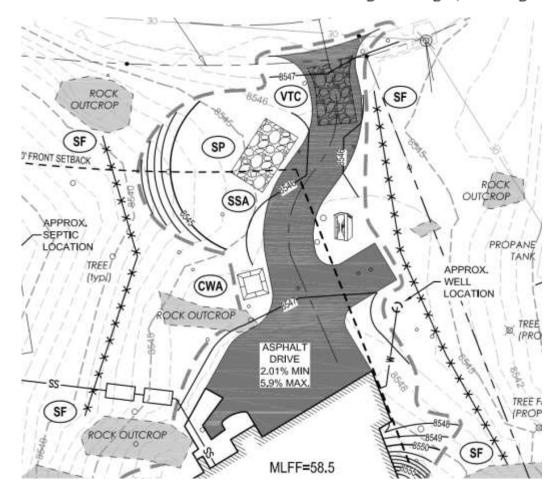
Notes

P = Primary; S = Secondary, I = Incidental; N/A = Not Applicable

1 Depending on media

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roject Location (Street Address)	Notice of Intent Number	Parcel ID #	GP
ubdivision Name	Filing Ø	Lat #	Block #
urpose of Land Disturbance nticipated Start Date	Anticipated Completion Date	e.	



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- LIMITS THE MAXIMUM SLOPE OF THE FINAL SURFACE AFTER CONSTRUCTION
 - HITTING ROCK MAY ALLOW STEEPER SLOPES DETERMINED BY GEOTECHNICAL ENGINEER
- AMOUNT OF DIRT MOVED MAY TRIGGER BMPs OR DIFFERENT PERMITS.
- ROOF AREA DETERMINES NEED FOR MPLDs (JEFFCO, CLEAR CREEK)
- AREA OF DISTRUBANCE DETERMINES NEED FOR ADDITIONAL BMP MEASURES



CASE STUDY-BUCHANAN DRIVE

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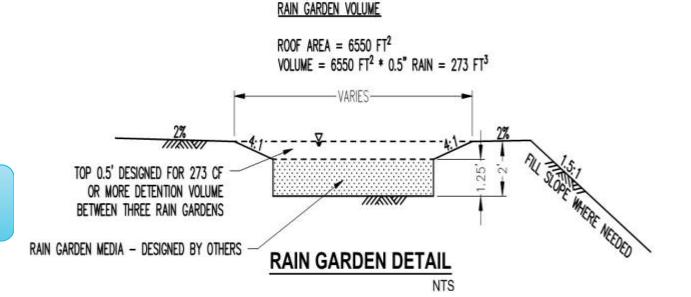


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UNADJUSTED E	ARTHWORK VOLUMES
CUT	4100 C.Y.
FILL	4100 C.Y.
NET	0 C.Y. (FILL)

ARE	EAS	
IMPERVIOUSNESS	13,682 S.F.	
DISTURBED AREA	42,505 S.F. (0.97 AC.)	

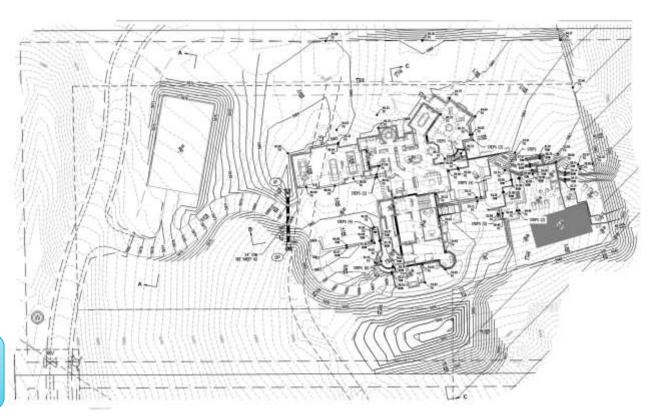
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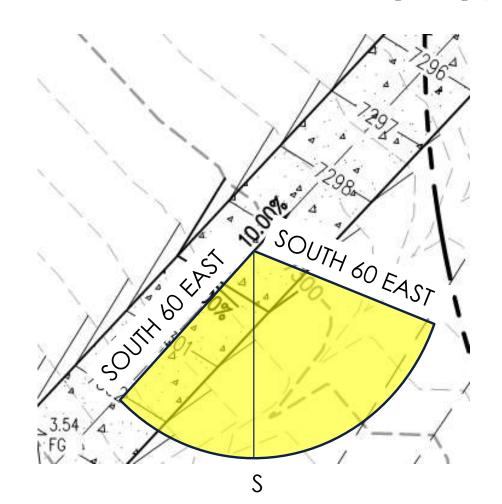


OVER 1 ACRE OF DISTURBANCE – TRIGGERED DRAINAGE REPORT AND LARGER DETENTION BASIN

CASE STUDY – DIAMOND BUILDING



- MAXIMUM SLOPE
 - ANGLE OF EXPOSURE
- MINIMUM WIDTH (SHOULDER REQUIREMENTS)
 - CLEAR SPACE
- MINIMUM RADIUS
- MAXIMUM LENGTH
 - EMERGENCY TURNAROUNDS
 - PULLOUTS
 - SPRINKLER SYSTEMS



CASE STUDY – KERR GULCH





- MAXIMUM SLOPE
 - ANGLE OF EXPOSURE
- MINIMUM WIDTH (SHOULDER REQUIREMENTS)
 - CLEAR SPACE
- MINIMUM RADIUS
- MAXIMUM LENGTH
 - EMERGENCY TURNAROUNDS
 - PULLOUTS
 - SPRINKLER SYSTEMS

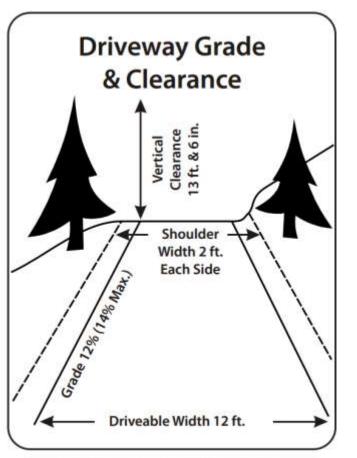
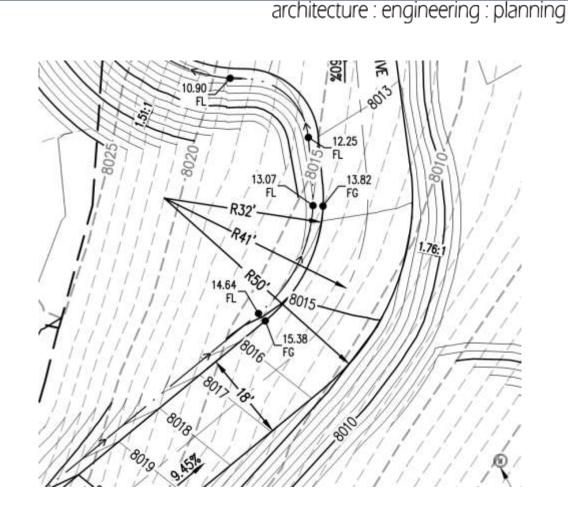


Figure 1: Driveway Grade & Clearance.

- MAXIMUM SLOPE
 - ANGLE OF EXPOSURE
- MINIMUM WIDTH (SHOULDER REQUIREMENTS)
 - CLEAR SPACE
- MINIMUM RADIUS
 - 30' RADIUS, 50' WITH GREATER SLOPES
- MAXIMUM LENGTH
 - EMERGENCY TURNAROUNDS
 - PULLOUTS
 - SPRINKLER SYSTEMS



- MAXIMUM SLOPE
 - ANGLE OF EXPOSURE
- MINIMUM WIDTH (SHOULDER REQUIREMENTS)
 - CLEAR SPACE
- MINIMUM RADIUS
- MAXIMUM LENGTH
 - FIRE REVIEW OF ALL DRIVEWAYS, REGARDLESS OF LENGTH
 - EMERGENCY TURNAROUNDS REQUIRED OVER 150' DRIVEWAY
 - PULLOUTS
 - SPRINKLER SYSTEMS

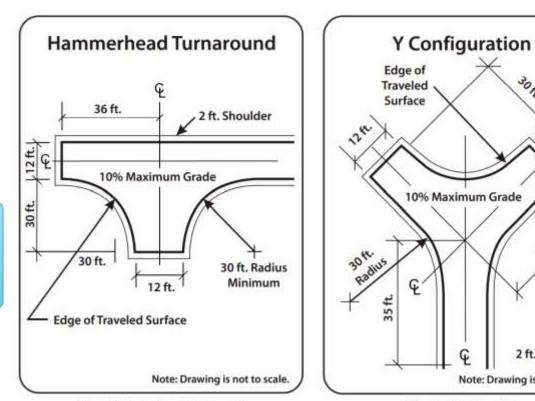


Figure 3: Hammerhead turnaround.

Figure 4: Y configuration.

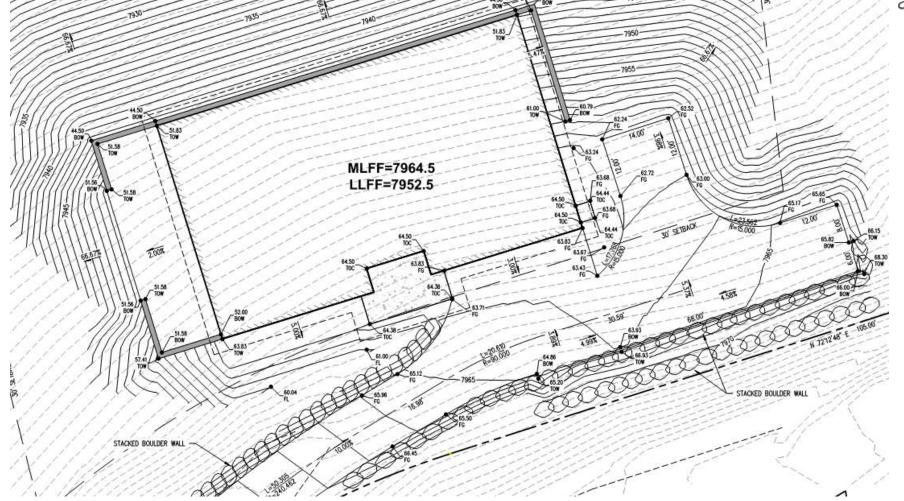
architecture : engineering : planning

305

2 ft. Shoulder

Note: Drawing is not to scale.

EXAMPLE OF TURNAROUND



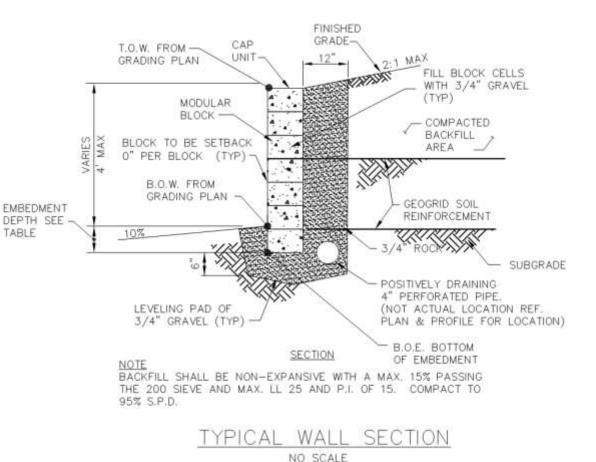
CASE STUDY – 350 PACKSADDLE



RETAINING WALLS



- EXPOSURE LOCATION, APPEARANCE, MATERIAL, AND COST
- TYPES OF WALLS
 - STRUCTURAL >3-4' EXPOSED WALL
 - NON-STRUCTURAL <3-4' EXPOSED WALL</p>



RETAINING WALLS



- TYPES OF WALLS
 - BOULDER
 - LANDSCAPE BRICK
 - CONCRETE
 - SOIL NAIL/SHOTCRETE
 - DRYSTACK OR MORTARED STONE
 - TIMBER/RAILROAD TIES
 - GABION BASKETS



CASE STUDY – EVERGREEN TERRACES

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WELLS AND SEPTIC SYSTEMS



WATER WELLS

PARCEL SIZE

SEPTIC SYSTEMS

- DISTANCE FROM STRUCTURES
- DISTANCE FROM WATER FEATURES
- DISTANCE FROM WELLS

- A. Ordinary household use inside one single-family dwelling (NO outside water use allowed): Generally, this is all that can be approved on parcels less than 35 acres.
- B. Ordinary household use in 1 to 3 single-family dwellings, irrigation of up to one acre of home garden and lawn, and watering of domestic animals: Generally, permits can be approved on parcels of land of 35 or more acres.

WELLS AND SEPTIC SYSTEMS

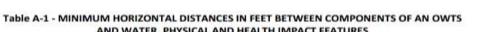


- DISTANCE FROM STRUCTURE
- DISTANCE FROM WATER FEATURES

SEPTIC SYSTEMS

- DISTANCE FROM STRUCTURES
- DISTANCE FROM WATER FEATURES
- DISTANCE FROM WELLS

AND	WATER, PHYSICAL AND HEALTH IMPACT FEATURES							
	Septic tank, higher level treatment unit, dosing tank, vault	Building Sewer or effluent lines	STA trench or bed, unlined sand filter, subsurface dispersal system or seepage pit	Lined sand filter, lined evapotranspiration field	Unlined sand filer in soil with a percolation rate slower than 60 MPL. unlined or partially lined evapotranspiration system, or systems not relying on 51A for treatment (other than aerosol)	Vaulited Privy	Existing Pit Privy	Aerosol dispersal methods
Wells, potable springs, suction lines	50 ¹	50 ¹	200 ² (100) ^{5,6}	60	100	50	200 ² (100) ⁵	200²
Springs	50 ¹	50 ¹	100 ²	60	100	50	100 ²	100 ²
Potable water supply lines	10 ¹	10 ¹	25 ¹	10¹	25 ¹	10 ¹	50 ¹	10 ¹
Potable water cisterns	25	25 ¹	25	25	25	25	25	50
Dwelling or occupied building	5	0	20	15	15	15	25	125
Property lines, piped or lined irrigation ditch	10	10 ¹	10	10	10	10	NA	10
Subsurface drain, intermittent irrigation lateral, drywell or storm water infiltration structure	10	10 ¹	25	10	25	10	25	o
Lake, watercourse, irrigation ditch, stream, wetland	50	50 ¹	50 ² (25) ³	25	25	25	100	25 ²
Dry gulch, cut bank, fill area (from crest)	10	10 ¹	25 (10) ⁴	10	15	10	25	10



BUILDING



architecture : engineering : planning

5. BUILDING

- SITE CONDITIONS DRIVE VARIATION AND ADJUSTMENTS TO PLANS
- CONTINUOUS COMMUNICATION WITH OWNER, CONTRACTOR, AND DESIGNERS
- COUNTY REQUIRED SITE CERTIFICATION POST CONSTRUCTION



QUESTIONS & ANSWERS

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