

**FINAL DRAINAGE LETTER
FOR
LOT 1, WOODMEN HILLS FIL NO. 12**

December 2020

Prepared for:
WD Construction
Attention: Bill Tibbitt
919 W. Cucharras Street, Ste 100
Colorado Springs, CO 80905
719-465-2519

Prepared By:



321 W. Henrietta Ave.
SUITE 2A
Woodland Park, CO 80863
719-426-2124

PCD Filing No:PPR-2049

**FINAL DRAINAGE LETTER for
LOT 1, WOODMEN HILLS FIL NO. 12**

Design Engineer's Statement:

The attached drainage plan and report were prepared under my direction and supervision and are correct to the best of my knowledge and belief. Said drainage report has been prepared according to the criteria established by the County for drainage reports and said report is in conformity with the applicable master plan of the drainage basin. I accept responsibility for any liability caused by any negligent acts, errors or omissions on my part in preparing this report.

David L. Mijares, Colorado PE #40510
For and on behalf of Catamount Engineering

Date

Owner/Developer's Statement:

I, the owner/developer have read and will comply with all of the requirements specified in this drainage report and plan.

Name/Title

Date

WD Construction
Business Name

Address: _____
919 W. Cucharras Street, Ste 100

Colorado Springs, CO 80905

El Paso County:

Filed in accordance with the requirements of the Drainage Criteria Manual, Volumes 1 and 2, El Paso County Engineering Criteria Manual and Land Development Code as amended.

Jennifer Irvine, P.E.
County Engineer / ECM Administrator

Date

Conditions:
:

DRAINAGE LETTER for LOT 1, WOODMEN HILLS FIL NO. 12

PURPOSE

The purpose of this drainage letter is to confirm that the proposed development of the Falcon Eye Care Commercial building proposed on Lot 1, Woodmen Hills Filing No. 12 conforms to the concepts presented in the “Final Drainage Report for Falcon Eye Care, Woodmen Hills Filing 7. Lot 4” prepared by Kiowa Engineering Corporation. The site layout developed with the replat is being used in final site design and concepts presented in the final drainage report are being followed in final site design submittal.

GENERAL LOCATION AND DESCRIPTION

The parcel is located within the southwest quarter of section 6, township 13S, range 64 west of the 6th principal meridian in El Paso County. The overall parcel previously platted as Lot 4, Woodmen Hills Filing No. 7 is being replatted into Lots 1 and 2, Woodmen Hills Filing No. 12. Lot 1, Woodmen Hills Filing No. 12, proposed for development of Falcon Eye Care, contains 0.79 acres of the overall 1.63-acre replat.

The parcel is located within the Woodmen Hills commercial development and is located East of McLaughlin Road, North of Midnight Road, South of Greenough Road, and West of the existing Safeway grocery store. The parcel was previously overlot graded with the development of the overall commercial center. The site has been revegetated and contains moderate cover of grasses and a small number of perimeter shrubs and small trees. The site drains overland to the southeast at approximately 1.5% slope to the existing commercial drive aisle. Underlying soils within the site consists of Columbine gravelly sandy loam and Blakeland loamy sand, Hydrologic Group A soils, as delineated by the USDA Web Soil Survey developed in the Final Drainage Report for Falcon Eye Care Woodmen Hills Filing No. 7H Lot 4, prepared by Kiowa Engineering currently in review.

The development lies within the Falcon drainage basin and runoff from the developed Lot 4 was anticipated in and is tributary to detention pond 4 as defined in the “Phase III Preliminary and Filing 7 Final Drainage and Erosion Control Report for Woodmen Hills Subdivision”, prepared by URS Greiner Woodward Clyde, dated December 23, 1998.

EXISTING DRAINAGE BASINS

Drainage patterns as detailed in previous reports will remain and outlet points maintained.

DEVELOPED DRAINAGE BASINS

The final drainage report identifies Lots 1 and 2 of Woodmen Hills Filing No. 12 as basin D1 indicated as 1.63 acres of graded commercial land. Graded to approximately 1-2%. The “Area Drainage Summary” provided in the appendix of the FDR indicates composite C values of 0.9 for both the 5-year and 100-year recurrence events, a total time of concentration of 7.6 minutes, and anticipates total flows of $Q_5=7$ cfs and $Q_{100}=12$ cfs.

The Final Drainage Report for Woodmen Hills Filing No. 12 indicates that *“The 5 and 100-year runoff are 7 and 12 cfs respectively. The runoff on site flows south east overland in sheet flow and curb & gutter to a five foot type R inlet behind the shopping center to the south. This inlet has a 30” RCP storm sewer that conveys the flows south east to pond 4. This inlet and storm sewer were sized for these flows in the previously mentioned filing 7 drainage report.”*

Flows generated within basin D1 are tributary to Detention Pond #4 installed with Filing No. 7 improvements. Detention pond #4 provides WQCV with 40 hour drain time and staged outlet structure to control peak outflows from the 2-year, 5-year, and 100-year recurrence storm events.

Lot 1, Woodmen Hills Filing No. 12 will sheetflow to the southeast into existing Filing No. 7 parking and drive aisle improvements. Developed commercial density flows were anticipated from basin 33b and are collected within inlet and pipe systems and conveyed to Detention Pond #4 which provides WQCV and storm detention for the parcel. The northerly portion of Lot 1 is directed easterly to sheetflow into future development of Lot 2 and are indicated in the Final Drainage Report for Woodmen Hills Filing No. 12. A future drive aisle connection between the northern parking lot and future development of Lot 2 in the Final Drainage Report for Woodmen Hills Filing No. 12. A temporary asphalt curb and riprap energy dissipator is proposed in the interim condition.

FLOODPLAIN STATEMENT

No portion of the parcel lies within a FEMA designated Floodplain per FIRM panel 08041C0553G, Effective Date 12/07/2018. The parcel is located in unshaded Zone X, described as “Area of Minimal Flood Hazard.”

COST ESTIMATE

No drainage improvements are proposed with the development of Lot 1, Woodmen Hills Filing No. 12.

WATER QUALITY (4-STEP PROCESS)

1. Runoff Reduction Process

The development will include perimeter grassed areas along the north south and east sides providing sediment capture and reduction in runoff.

2. Implement BMP's that slowly release the water quality capture volume

Lot 1, Filing no. 12 is tributary to detention pond 4 developed with Filing No. 7 infrastructure improvements. Pond 4 provides 4.65 acre feet of WQCV.

3. Stabilize Drainageways

The parcel is not directly tributary to drainageways. No drainageways will be modified with development of Lot 1, Filing No. 12.

4. Implement Site Specific & Source Control BMP's

There are no potential sources proposed with site use that would impact the County's MS4, other than temporary construction BMPs. Construction runoff will be controlled through the use of perimeter control, inlet protection, vehicle tracking control, and concrete washout to be monitored throughout construction activities.

DRAINAGE FEE CALCULATION

The proposed Lot 1, Woodmen Hills Filing No. 12 was previously platted as Lot 4, Woodmen Hills Filing No. 7 and drainage fees were provided at original platting. There are no drainage fees associated with the replat.

Please revise this paragraph. Drainage fees will be due with Woodmen Hills Filing No. 12.

SUMMARY

The proposed development of Lot 1, Woodmen Hills Filing No. 12 was previously anticipated in infrastructure development of Woodmen Hills Filing No. 7. Lot 1 is a portion of Basin 33 (Filing No. 7 report) and is tributary to Pond 4. Water Quality and Detention was developed for anticipated commercial development on the parcel and the proposed development will not adversely affect downstream and surrounding developments. No changes are proposed to drainage pattern or runoff quantity from the Filing 7 Final Drainage Report and this report is in conformance with that report.

The site was included in the following drainage studies:

“Final Drainage Report Falcon Eye Care, Woodmen Hills Filing 7, Lot 4, El Paso County, Colorado,” prepared by Kiowa Engineering Corporation, dated September 17, 2020.

“Phase III Preliminary and Filing 7 Final Drainage and Erosion Control Report for Woodmen Hills Subdivision”, prepared by URS Greiner Woodward Clyde, dated December 23, 1998

“Master Development Drainage Plan for Woodmen Hills Subdivision,” prepared by URS Greiner, dated October 7, 1998.

APPENDIX

**PHASE III PRELIMINARY & FILING 7 FINAL
DRAINAGE and EROSION CONTROL
REPORT FOR WOODMEN HILLS SUBDIVISION,
FALCON, COLORADO,
EL PASO COUNTY**

December 23, 1998

Prepared for:

**FALCON PROPERTIES AND INVESTMENTS, LLP
P.O. BOX 62039
COLORADO SPRINGS, CO 80962**

Prepared by:

**URS GREINER WOODWARD CLYDE
8415 EXPLORER DR, SUITE 110
COLORADO SPRINGS, CO 80920**

URSGWC Project No. 67-00042238.07

east of Midnight result in a combined captured 100-year design flow of 50.4 cfs.

In the event of any or all of these inlets clogging, excess runoff will pond in the McLaughlin gutter before flowing into the Safeway parking lot. A swale will be graded in the parking lot to provide an emergency overland flow path to Detention Pond #4 following the proposed storm sewer route.

Subbasins 34a, 34c, and 33d drain to the low point in McLaughlin Road at the second access to the Safeway commercial area (Drain points 7 and 8). 5-year and 100-year design flows for subbasins 34a are 57.26 cfs and 98.07 cfs; for subbasin 34c, 2.72 cfs and 4.80 cfs; and for subbasin 33d, 2.63 cfs and 4.64 cfs. 15-ft. sump inlets will also be located at the low point at the second access to the Safeway area. With future commercial development, the storm sewer lateral will need to be extended upstream into the commercial area of sub-basin 34a in order to sufficiently capture runoff from this area. These parking lot inlets will be designed by the site engineer as part of the final grading and parking lot layout. They should be designed to capture a total of approximately 31.8 cfs for the 100-year Storm. Design flow at the 15-sump inlets is 84.0 cfs. These inlets will connect to storm sewer #1 via a 48" RCP to Design Point 4, ultimately discharging to Pond #4.

Subbasins 33b, 33c, 33e, and 33f are on-site within the Safeway commercial area. 5-year and 100-year design flows for subbasin 33b are 11.55 cfs and 20.67 cfs; for subbasin 33c, 22.10 cfs and 38.67 cfs; for subbasin 33e, 16.8 cfs and 30.39 cfs; for subbasin 33f, 29.41 cfs and 52.36 cfs. The site engineer has designed the parking lot inlets to capture and convey these flows to the storm sewer trunk line and their design has been submitted for your information under a separate cover.

Subbasins 34b and 35g are tributary to design point 9 on Woodmen Road. Subbasins 33g and 35f are tributary to Woodmen Road at design point 10. 5-year and 100-year design flows for subbasin 34b are 3.78 cfs and 6.68 cfs respectively; for subbasin 35g, 3.18 cfs and 5.61 cfs; for subbasin 33g, 7.06 cfs and 12.63; for subbasin 35f, 9.17 cfs and 16.17 cfs. Runoff from the Woodmen Road extension will be captured by four 15-ft. on grade inlets. Because only the southern portion of Woodmen Road will be constructed initially, only the two inlets on the south/west side of the street will be constructed at this time. Two, 15-ft. inlets will be constructed with the ultimate alignment of Woodmen Road on the northeast curb to capture the additional runoff. These four inlets will discharge to a swale at the toe of the slope of the roadway, ultimately draining to Detention Pond #4 via a grass-lined swale. The swale will cross the pond embankment through a single 36-inch CMP. The grass-lined swale will have a minimum slope 0.5%, a trapezoidal cross-section with a 5-ft bottom and 4-1 side slopes. A maximum depth of 2.25 ft. provides the necessary freeboard for a 100-year design flow of 36 cfs.

Bypass flow from the on-grade inlets in Woodmen Rd. will be discharged to the existing roadside ditch along U.S. Highway 24. Maximum bypass under ultimate conditions will be approximately 3.86 cfs. This is less than the existing condition runoff from this area to the ditch.

Subbasins 34d and 35h drain west towards Meridian Road. 5-year and 100-year design flows for subbasin 34d are 6.24 cfs and 11.01 cfs; for subbasin 35h design flows are 2.84 cfs and 5.02 cfs for the 5-year and 100-year storms respectively.

Storm Sewer System #2

Subbasins 35a and 35b are tributary to design point 13 on McLaughlin Road. Subbasin 35c is tributary to design point 14. 5-year and 100-year design flows for subbasin 35a are 23.77 cfs and 42.33 cfs for subbasin 35b, 8.22 cfs and 14.51 cfs; for subbasin 35c, 8.87 and 15.65 cfs. Combined runoff at design point 13 is 30.38 cfs and 54.10 cfs for the 5-year and 100-year design storms respectively. Much of the runoff from subbasin 35a will be collected by inlets and storm sewer to be designed by the site engineer in conjunction with development of the commercial site. It was assumed that at least half of the 100-year runoff from basin 35a would be captured by the on-site system, i.e. 21.1 cfs would be captured within basin 35a and the new 100-year design flow at design point 13 is 35.7 cfs. 15 foot on grade inlets will be located on McLaughlin Road at design points 13 and 14.

A 42-inch RCP storm sewer will convey runoff from design points 13 and 14, though the commercial area subbasin 35d, to Detention Pond #5. Again, on-site inlets will be required to capture runoff from subbasin 35d and convey it to the storm or directly to pond #5. The on-site system will be designed by the site engineer for this commercial area. 5-year and 100-year design flows from subbasin 35d are 71.51 cfs and 125.15 cfs respectively.

D. Detention Pond Design

Detention Ponds 1 and 2 (Filing Numbers 5 and 6) have 17.47 and 18.50 acre-feet of storage, respectively. They release the 5-year and 100-year storms to at or near existing condition peak flows.

Detention Pond 3 at Eastonville Rd. will have approximately 29 acre-feet of storage including the Water Quality Capture Volume, and is proposed to be a Regional Detention Pond. The pond will have multiple outlet riser pipes with trash racks to control peak discharges.

Detention Pond #4 at Hwy 24 will have 33 Ac-ft of storage to the emergency spillway crest. 4.65 Ac-ft of storage is required for the WQCV, to an elevation of approximately 6852.84 ft. The WQCV outlet structure consists of a single 18-inch CMP "riser" with 1 row of 2-inch orifice openings (10 openings per row) at elevation 6851.0. The outlet will be packed in 4-inch rock to help prevent clogging of the orifice openings. The design discharge rate from the WQCV outlet is 1.4 cfs, which will drain the WQCV in approximately 40 hours. The discharge pipe from the WQCV outlet will be a 12" CMP at 0.5%, discharging to the stilling basin. The remainder of the outlet structure consists of three 36-inch riser pipes with trash racks designed to control peak outflows from the 2-year, 5-year and 100-year storms. The risers are at elevations 6854.0, 6854.5 and 6855.0. The outlet pipes are at a minimum slope of 3.0%, discharging to the stilling basin. Detention Pond design calculations follow in Appendix E.

Downstream impacts should be minimal, comparable to existing conditions.

The emergency spillway for Pond #4 is at elevation 6857.5; the pond bottom is at 6850.5. The bottom slopes toward the outlet at a minimum slope of 0.5%. A 15-ft gravel access road to the emergency spillway along the top of the western portion of the pond embankment also serves as the connection to the El Paso County Trail. Access to the pond bottom can be achieved from an access

**Final Drainage Report
Falcon Eye Care
Woodmen Hills Filing 7, Lot 4
El Paso County, Colorado**

Prepared for:
T- Bone Construction
Colorado Springs, Colorado 80911

Prepared by:

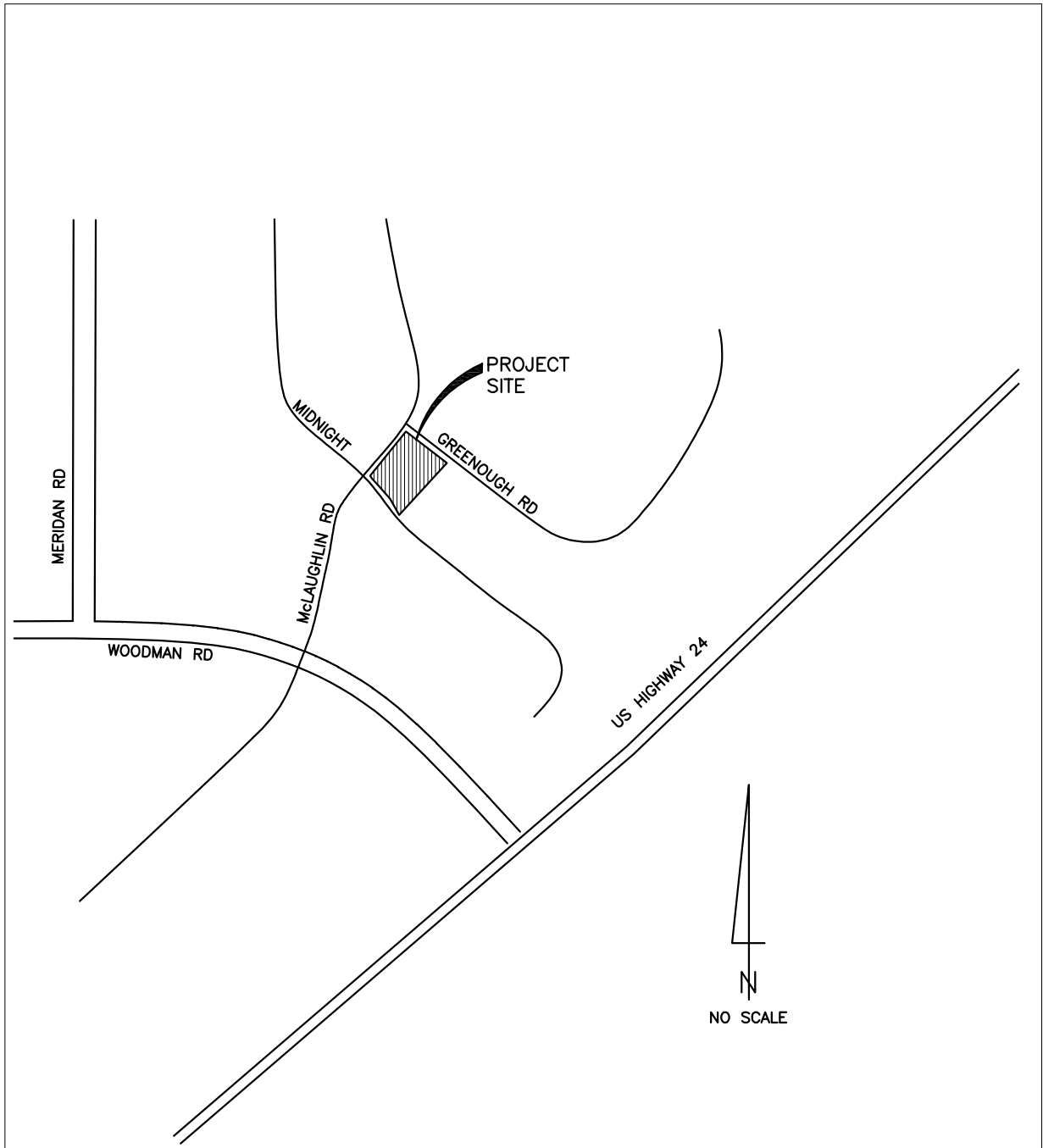
Kiowa
Engineering Corporation

1604 South 21st Street
Colorado Springs, Colorado 80904
Ph: (719)630-7342

Kiowa Project No. 20034

Sept 17, 2020

PCD Project No. SF-XXXX



VICINITY MAP

Figure 1

Falcon Eye Care - Woodmen Hills Filing 7, Lot 4
Final Drairage Report
Area Runoff Coefficient Summary - PROPOSED

BASIN	TOTAL AREA		DEVELOPED			UNDEVELOPED			WEIGHTED	
	(SF)	(Acres)	AREA (Acres)	C ₅	C ₁₀₀	AREA (Acres)	C ₅	C ₁₀₀	C ₅	C ₁₀₀
D-1	71,334	1.6	1.6	0.90	0.90	0.0	0.15	0.20	0.90	0.90
				0.90	0.90	0.0	0.15	0.20	#DIV/0!	#DIV/0!

Calculated by: TAC
Date: 9/15/2020
Checked by: _____

Falcon Eye Care - Woodmen Hills Filing 7, Lot 4
Final Drainage Report
Area Drainage Summary - PROPOSED

BASIN	WEIGHTED		OVERLAND				STREET / CHANNEL FLOW				CA		INTENSITY		TOTAL FLOW				
	AREA TOTAL (Acres)	C ₅	C ₁₀₀	C ₅	Length (ft)	Height (ft)	T _c (min)	Grass/Paved	Length (ft)	Slope (%)	Velocity (fps)	T _t (min)	T _t TOTAL (min)	CA ₅	CA ₁₀₀	I ₅ (in/hr)	I ₁₀₀ (in/hr)	Q ₅ (c.f.s.)	Q ₁₀₀ (c.f.s.)
D-1	1.6	0.90	0.90	0.15	10	1	3.3	Paved	360	1.0%	1.4	4.3	7.6	1.47	1.47	4.5	7.9	7	12
				0.15			0.0					0.0	#DIV/0!			#DIV/0!	#DIV/0!		
							0.0					0.0	#DIV/0!						

Calculated by: TAC
Date: 9/15/2020
Checked by: _____

DRAINAGE MAPS

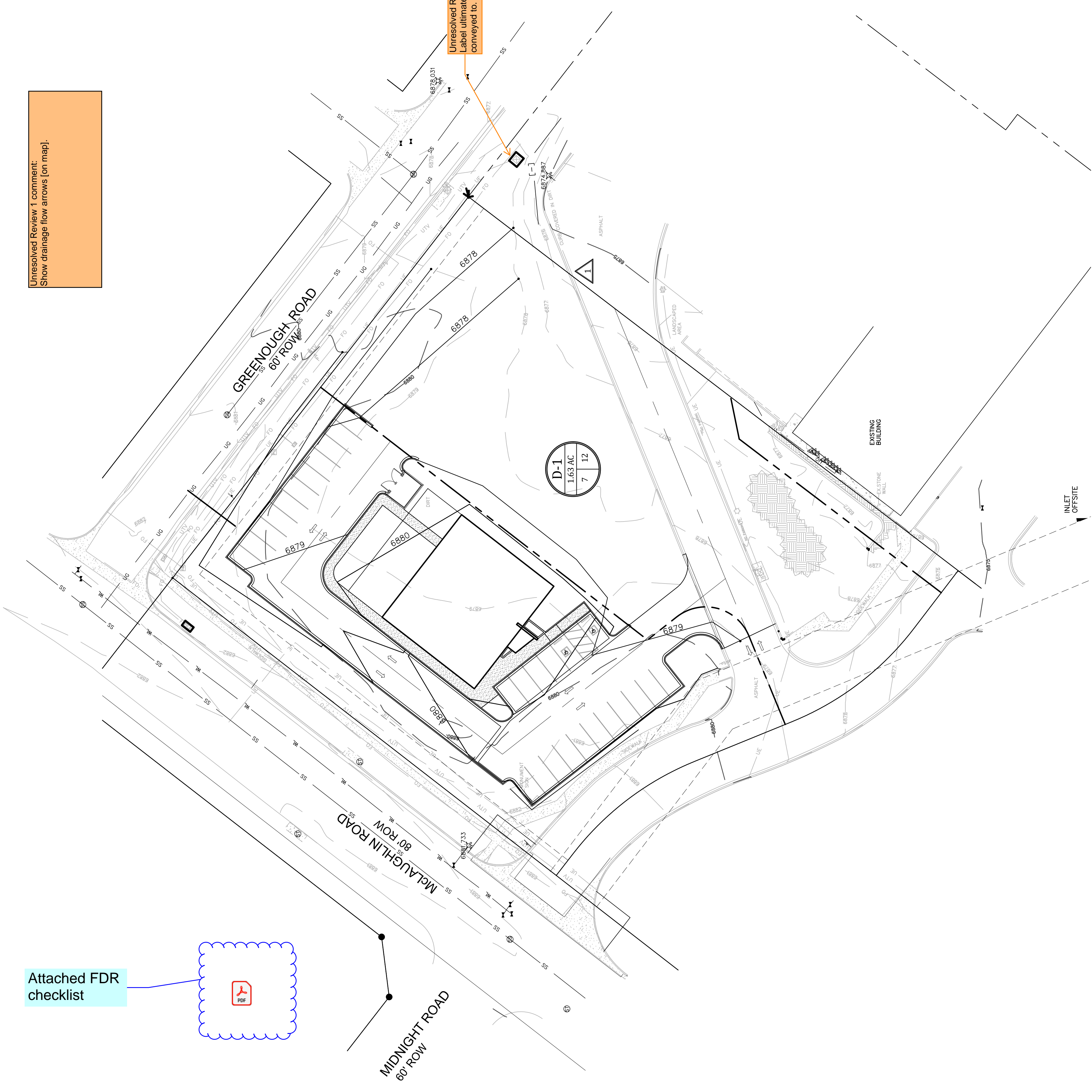
NOTES:
1) ALL ELEVATIONS ARE FLOW LINE UNLESS OTHERWISE INDICATED.
2) ADD 6800 TO SPOT ELEVATIONS.

Unresolved Review 1 comment:
Show drainage flow arrows (on map).

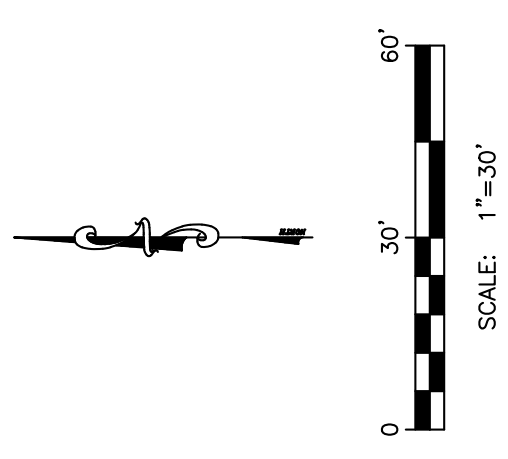
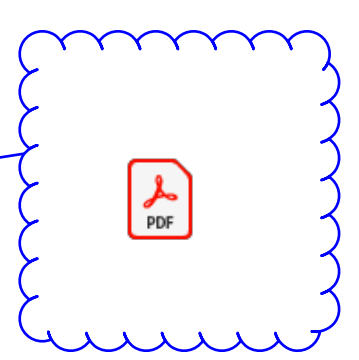
LEGEND

	DRAINAGE BASIN DESIGNATION
2.67 AC	DRAINAGE BASIN ACRES
0.31 0.50	C100 RUNOFF
	C5 RUNOFF
2.2 cfs	5-YEAR RUNOFF
4.3 cfs	100-YEAR RUNOFF
	DIRECTIONAL FLOW ARROW
	DRAINAGE BASIN C BOUNDARY
	DRAINAGE BASIN D BOUNDARY
	INTERIM (FLUNG 10) 100-YR W.S.E.L.
	ULTIMATE (FLUNG 10-12) 100-YR W.S.E.L.
	DESIGN POINT
	TIME OF CONCENTRATION PATH
	HYDRAULIC STRUCTURE IDENTIFIER
	STORM SEWER IDENTIFIER
	PROPOSED STORM SEWER PIPE
	PROPOSED STORM SEWER MANHOLE
	PROPOSED STORM DRAINAGE CURB INLET
	EXISTING CONTOURS
	PROPOSED CONTOURS

Unresolved Review 1 comment:
Label ultimate inlet that site runoff is conveyed to.



Attached FDR checklist



Drainage Letter_V2.pdf Markup Summary

tcartwright (1)

Figure 1

Subject: Text Box
Page Label: 12
Author: tcartwright
Date: 9/17/2020 9:46:15 AM
Status:
Color: ■
Layer:
Space:

Figure 1

Steve Kuehster (2)



Subject: File Attachment
Page Label: 16
Author: Steve Kuehster
Date: 11/3/2020 12:22:12 PM
Status:
Color: ■
Layer:
Space:

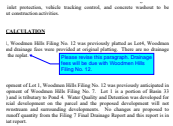
Attached FDR checklist



Subject: Cloud+
Page Label: 16
Author: Steve Kuehster
Date: 11/3/2020 12:22:39 PM
Status:
Color: ■
Layer:
Space:

Attached FDR checklist

lpackman (1)



Subject: Callout
Page Label: 5
Author: lpackman
Date: 3/22/2021 3:51:12 PM
Status:
Color: ■
Layer:
Space:

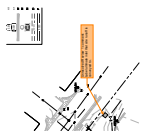
Please revise this paragraph. Drainage fees will be due with Woodmen Hills Filing No. 12.

GReese (2)



Subject: SW - Text Box
Page Label: 16
Author: GReese
Date: 3/4/2021 2:33:38 PM
Status:
Color: ■
Layer:
Space:

Unresolved Review 1 comment:
Show drainage flow arrows [on map].



Subject: SW - Comment
Page Label: 16
Author: GReese
Date: 3/4/2021 2:34:05 PM
Status:
Color: ■
Layer:
Space:

Unresolved Review 1 comment:
Label ultimate inlet that site runoff is conveyed to.