

Kelly Development Services, LLC

July 14, 2022

Mr. Kevin Buffington
Drainage Engineer
Town of Castle Rock
100 North Wilcox Street
Castle Rock, CO 80104

RE: Drainage Conformance Letter
Moore Lumber at The Meadows
CD22-0019



PREPARED UNDER THE DIRECT SUPERVISION OF
GREGORY S. KELLY, PE COLORADO LIC. #15813
FOR AND ON BEHALF OF KELLY DEVELOPMENT SERVICES, LLC



Dear Mr. Buffington:

The purpose of this letter is to demonstrate that the proposed development of the Moore Lumber at The Meadows project will be in conformance with the approved *Phase III Drainage Report for The Meadows Filing No. 17, Lot 8*, Castle Rock Project No. CD15-0021 prepared by Core Consultants dated September 3, 2015.

A Drainage Plan of the proposed development and runoff calculations are attached to this letter.

The Moore Lumber at The Meadows project is located on Regent Street, north of Meadows Parkway. It is subdivided as Meadows Filing 17, Area 2, Lot 1. The lot is 1.63 acres, and the proposed development will consist of a 16,800 sq. ft. building with associated access drive, parking area, truck court and landscaped areas. It should be noted that approximately 0.40 acres of the site (25%) will remain undeveloped and landscaped with native grasses and shrubs.

The site is not located within a floodway as shown on FEMA FIRM Panel 08035C01676 effective 3/16/2016. It is located within the "Area of Minimal Flood Hazard, Zone X.

From a review of the approved drainage report, the site (1.63 acres) is most of Basin H (1.83 acres). Just west of the site, an off-site area identified as OS-3 in the report flows onto Basin H. This off-site basin is Town of Castle Rock Open Space and will remain undeveloped. Basin H and Basin OS-3 were included in the design calculations for the existing water quality and detention pond that is located immediately northeast of the site. In the design, a percent Impervious of 95% was used for all of Basin H. The calculated % Impervious for the proposed development is 57.3%. Therefore, the water quality and detention pond has adequate capacity for this site.

Per the approved drainage report, "Runoff generated from Basin H will drain north to Design Point 11. In the interim condition, runoff will sheet flow into the proposed detention pond. Ultimately, runoff collected will enter the proposed storm sewer system through future inlets and will discharge into the proposed detention pond once the pad is developed". Runoff to Design Point 11 was calculated at 6.7 cfs in the 5-year event and 13.3 cfs in the 100-year. Calculations for this site, which are attached to this letter, show that the proposed connection to the existing 36" storm sewer (Design Point 8, see attached drainage plan) will convey 3.78 cfs in the 5-year storm and 8.24 cfs in the 100-year. This is significantly less than the

design flows contributing to the existing 36" storm sewer. Therefore, the existing 36" storm sewer has adequate capacity to accept the flows from the site.

A small portion of the site (Basin D) will drain directly to the street and will flow to the existing Type 16 Combination Inlet at the end of the cul-de-sac. This inlet was designed as Design Points 12 & 13 serving Basins I & J. The inlet has a capacity of 17 cfs at a 6" depth. Actual flow to the inlet at Design Points 12 & 13 is 6.6 cfs for the 100-year. The 100-year runoff for Basin D is calculated at 0.26 cfs. Therefore, the existing inlet has adequate capacity to accept the flow from this basin.

The Town of Castle Rock has adopted The Four Step Process for selecting and implementing Best Management Practices for water quality, which consists of the following for this site:

1. Step 1: Reduce Runoff Volume to the Maximum Extent Practicable
Reducing runoff volume is accomplished by reducing the amount of pavement and roof that is directly connected to inlets and storm sewer, while maximizing the pervious area that receives runoff from unconnected pavement and roofs. The site layout along with the need for the runoff to be conveyed to the existing storm sewer is not conducive to conveying runoff via grass buffers or swales or other pervious areas. However, as previously noted, the proposed development does not maximize the site coverage. Only 75% of the site will be impervious materials and the percent impervious will be 57.3%, thus reducing the runoff rates and volumes.
2. Step 2: Provide Water Quality Capture Volume and Flood Control Detention Via Full-Spectrum Detention
Water quality capture volume and flood control detention is provided in the existing Extended Detention Basin BMP. This stormwater management facility was designed using the full spectrum method.
3. Step 3: Utilize Stream Channel Stabilization Techniques
There are no drainageways or streams crossing the site requiring stabilization.
4. Step 4: Undertake Source Control
Source control will in part be dictated by the requirements of the Site Development Plans and current Town of Castle Rock zoning requirements. Good housekeeping methods will be observed by the owners to maintain an attractive appearance to the site. Outdoor storage will be for lumber products only. Paints and stain products will be stored indoors. A spill prevention program will be in place for the facility. An outdoor screened trash enclosure is provided for proper trash and waste disposal for the building. Vehicle maintenance or fueling will not take place on-site. The landscaping on-site will be maintained by a competent landscaping company that will control the use of pesticides, herbicides, and fertilizers per local and state requirements. Snow and ice management will be provided by a qualified property management company. Shoveled or plowed snow will be relocated to landscaped areas, to the maximum extent possible, that will drain to the storm sewer system. It is likely that some snow and ice melt chemicals will be used on a limited basis, but the runoff carrying these pollutants will flow to the stormwater management facility.

The on-site private stormwater conveyance facilities consist of a 12" roof leader pipe, 18" RCP storm sewers, a Type C Inlet, a Type R inlet and a 4' diameter manhole. The on-site stormwater facilities will be maintained by the property owner, or his assigns and heirs. Inspections of the facilities should occur bi-annually or after any major rainfall event. Proper safety measures need to be observed for any inspections taking place within the inlets or manholes.

Inspections should be for:

1. Trash and debris clogging the grates or inlet throat openings.
2. Proper installation and seating of grates and manhole lids on the frames.
3. Loose or damaged grates, manhole lid and frames on the concrete structures.
1. Erosion around or over the pipes or adjacent to the manholes and inlets.
2. Settlement of inlets and manholes or fill over pipes.
3. Damage to the concrete and joints with the inlets and manholes.
4. Build up of sediment or debris within the inlet structures, manholes or pipes.
5. Long term inspection could include pipe settlement, collapse, or joint separation via video inspection methods.

Short term maintenance should include:

1. Removal of trash and other debris from the grates and throat opening on the inlets, as needed.
2. Removal of sediment, trash and debris build-up in the inlets, manholes and pipes.
3. Repair of loose or damaged grates, manhole lids and frames.
4. Replacement of eroded materials around the inlets and manholes.

Long term maintenance should include:

1. Raising settled inlets or manholes.
2. Repair and/or replacement of settled or damaged pipe.
3. Repair or replacement of damaged concrete inlets or manholes.

Sincerely,

Greg S. Kelly, P. E.
President

APPENDIX 1

HYDROLOGIC COMPUTATIONS

COMPOSITE 'C' FACTORS (DEVELOPED)																							
LOCATION: Moore Lumber, The Meadows Town of Castle Rock								Soil Type: B		Drainage Compliance Letter								BY: GSK		DATE: 5/27/2022			
SUB-BASIN	Acreage				PAVED				ROOFS				LAWNS				COMPOSITE C FACTOR				PERCENT IMPERVIOUS		
DESIGNATION	PAVED	ROOFS	LAWNS	TOTAL	2YR	5 YR	10 YR	100 YR	2YR	5 YR	10 YR	100 YR	2YR	5 YR	10 YR	100 YR	2YR	5 YR	10 YR	100 YR			
Imperviousness =					100				90				2										
A	0.34	0.00	0.18	0.52	0.84	0.86	0.86	0.89	0.74	0.76	0.78	0.84	0.01	0.01	0.07	0.44	0.55	0.57	0.59	0.73	66.1%		
B	0.00	0.39	0.00	0.39	0.84	0.86	0.86	0.89	0.74	0.76	0.78	0.84	0.01	0.01	0.07	0.44	0.74	0.76	0.78	0.84	90.0%		
C	0.22	0.00	0.04	0.26	0.84	0.86	0.86	0.89	0.74	0.76	0.78	0.84	0.01	0.01	0.07	0.44	0.72	0.73	0.74	0.82	85.4%		
D	0.01	0.00	0.05	0.06	0.84	0.86	0.86	0.89	0.74	0.76	0.78	0.84	0.01	0.01	0.07	0.44	0.15	0.16	0.21	0.52	18.7%		
E	0.00	0.00	0.40	0.40	0.84	0.86	0.86	0.89	0.74	0.76	0.78	0.84	0.01	0.01	0.07	0.44	0.01	0.01	0.07	0.44	2.0%		
OS-1	0.00	0.00	0.66	0.66	0.84	0.86	0.86	0.89	0.74	0.76	0.78	0.84	0.01	0.01	0.07	0.44	0.01	0.01	0.07	0.44	2.0%		
OS-2	0.00	0.00	0.03	0.03	0.84	0.86	0.86	0.89	0.74	0.76	0.78	0.84	0.01	0.01	0.07	0.44	0.01	0.01	0.07	0.44	2.0%		
Overall Site	0.57	0.39	0.67	1.63	0.84	0.86	0.86	0.89	0.74	0.76	0.78	0.84	0.01	0.01	0.07	0.44	0.47	0.49	0.52	0.69	57.3%		

TIME OF CONCENTRATION (DEVELOPED)															REMARKS	
LOCATION: Moore Lumber, The Meadows				Drainage Compliance Letter								BY: GSK		DATE: 5/27/2022		FORMULAS: Ti = 0.395 (1.1-C5)L^0.5/S/100^1/3 V=Cv*(S/100)^0.5 Tc=(26-17i)+L/60(14i+9)(S/100)^0.5
SUB-BASIN DATA				INIT./OVERLAND TIME (Ti)			TRAVEL TIME (Tt)					TOTAL	Tc Check (Urbanized Basins)		FINAL Tc	
DESIGNATION	Cs	AREA (AC)	Impervious i	LENGTH (FT)	SLOPE %	Ti (Min.)*	GRASS/PAVED	LENGTH (FT)	SLOPE %	VEL (FPS)**	Tt (Min.)	Ti+Tt (Min.)	LGTH. (FT)		(minutes)	
A	0.57	0.52	0.66	60	20.00	2.80	PAVED	105	2.27	3.01	0.58	3.4	165	15.4	5.0	
B	0.76	0.39	0.90	0	1.00	0.00	PAVED	120	8.33	5.77	0.35	0.3	120	11.0	5.0	
C	0.73	0.26	0.85	10	25.00	0.73	PAVED	125	1.84	2.71	0.77	1.5	135	12.2	5.0	
D	0.16	0.06	0.19	50	2.90	8.59	PAVED	0	1.00	2.00	0.00	8.6	50	22.8	8.6	
E	0.01	0.40	0.02	220	9.09	14.20	GRASS	0	1.00	0.70	0.00	14.2	220	25.7	14.2	
OS-1	0.01	0.66	0.02	140	15.00	9.59	GRASS	0	1.00	0.70	0.00	9.6	140	25.7	9.6	
OS-2	0.01	0.03	0.02	40	27.50	4.19	GRASS	0	1.00	0.70	0.00	4.2	40	25.7	5.0	

Table 603
Storm Drainage System Design
(Rational Method Procedure)

Subdivision Moore Lumber, The Meadows
 Designer GSK
 Date 5/27/2022
 Design Storm 5 -YR DEVELOPED

$$I = \frac{28.5 \cdot P_1}{(10 + T_C)^{0.786}}$$

Where: $P_1 = 1.43$

Design Point	Direct Runoff							Total Runoff				Comment
	Subbasin Designation	Area	Runoff Coefficient	t_c	$C \times A$	I	Q	t_c	$C \times A$	I	Q	
		ac.		min.	ac.	in/hr	cfs	min.	ac.	in/hr	cfs	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	
7	OS-2	0.03	0.01	5.0	0.00	4.85	0.001				0.00	Flow into Basin A
1	A	0.52	0.57	5.0	0.30	4.85	1.43	5.0	0.30	4.85	1.43	Flow to Type C Inlet
2	B	0.39	0.76	5.0	0.29	4.85	1.43				1.43	Flow to Roof Leader
3	C	0.26	0.73	5.0	0.19	4.85	0.92				0.92	Flow to Type R Inlet
8								5.0	0.78	4.85	3.78	Flow to Exst 36" Storm Sewer
4	D	0.06	0.16	8.6	0.01	4.10	0.04				0.04	Flow to Street
6	OS-1	0.66	0.01	9.6	0.01	3.93	0.03				0.03	Flow into Basin E
5	E	0.40	0.01	14.2	0.00	3.33	0.01	14.2	0.01	3.33	0.04	Flow Directly to Detention Pond

Table 603
Storm Drainage System Design
(Rational Method Procedure)

Subdivision	<u>Moore Lumber, The Meadows</u>
Designer	<u>GSK</u>
Date	<u>5/27/2022</u>
Design Storm	100-YR DEVELOPED

$$I = \frac{28.5 \cdot P_1}{(10 + T_C)^{0.786}}$$

Where: $P_1 = 2.60$

[illegible]

BASIN RUNOFF SUMMARY TABLE							
Basin Designation	Basin Area (ac)	Impervious %	C ₅	C ₁₀₀	T _c (min)	Q ₅ (cfs)	Q ₁₀₀ (cfs)
A	0.52	66%	0.57	0.73	5.0	1.43	3.49
B	0.39	90%	0.76	0.84	5.0	1.43	2.87
C	0.26	85%	0.73	0.82	5.0	0.92	1.88
D	0.06	19%	0.16	0.52	8.6	0.04	0.25
E	0.40	2%	0.01	0.44	14.2	0.04	2.81
OS-1	0.66	2%	0.01	0.44	9.6	0.03	2.06
OS-2	0.03	2%	0.01	0.44	5.0	0.00	0.11

DESIGN POINT RUNOFF SUMMARY TABLE					
Design Point	Contributing Basins	Contributing Area (acres)	T _c (min)	Q ₅ (cfs)	Q ₁₀₀ (cfs)
1	A + OS-2	0.55	5.0	1.43	3.49
2	B	0.39	5.0	1.43	2.87
3	C	0.26	5.0	0.92	1.88
4	D	0.06	8.6	0.04	0.25
5	E + OS-1	1.06	14.2	0.04	2.81
6	OS-1	0.66	9.6	0.03	2.06
7	OS-2	0.03	5.0	0.001	0.11
8	A + B + C + OS-2	1.20	5.0	3.78	8.24

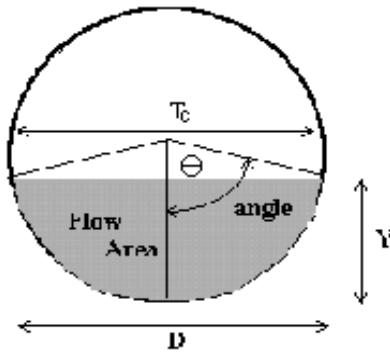
APPENDIX 2

HYDRAULIC COMPUTATIONS

CIRCULAR CONDUIT FLOW (Normal & Critical Depth Computation)

Project: **Moore Lumber**

Pipe ID: **Flow from DP 1 to DP 3 - 5 YR**



Design Information (Input)

Pipe Invert Slope	So =	0.0200	ft/ft
Pipe Manning's n-value	n =	0.0130	
Pipe Diameter	D =	18.00	inches
Design discharge	Q =	1.43	cfs

Full-flow Capacity (Calculated)

Full-flow area	Af =	1.77	sq ft
Full-flow wetted perimeter	Pf =	4.71	ft
Half Central Angle	Theta =	3.14	radians
Full-flow capacity	Qf =	14.90	cfs

Calculation of Normal Flow Condition

Half Central Angle ($0 < \text{Theta} < 3.14$)	Theta =	0.95	radians
Flow area	An =	0.27	sq ft
Top width	Tn =	1.22	ft
Wetted perimeter	Pn =	1.43	ft
Flow depth	Yn =	0.31	ft
Flow velocity	Vn =	5.32	fps
Discharge	Qn =	1.43	cfs
Percent Full Flow	Flow =	9.6%	of full flow
Normal Depth Froude Number	Fr _n =	2.00	supercritical

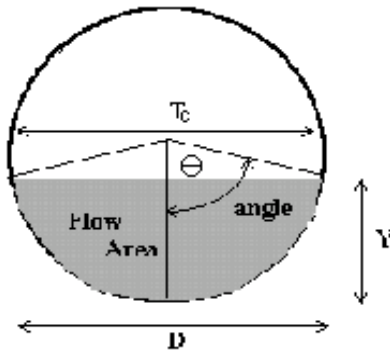
Calculation of Critical Flow Condition

Half Central Angle ($0 < \text{Theta-c} < 3.14$)	Theta-c =	1.16	radians
Critical flow area	Ac =	0.44	sq ft
Critical top width	Tc =	1.37	ft
Critical flow depth	Yc =	0.45	ft
Critical flow velocity	Vc =	3.22	fps
Critical Depth Froude Number	Fr _c =	1.00	

CIRCULAR CONDUIT FLOW (Normal & Critical Depth Computation)

Project: **Moore Lumber**

Pipe ID: **Flow from DP 1 to DP 3 - 100 YR**



Design Information (Input)

Pipe Invert Slope	So =	0.0200	ft/ft
Pipe Manning's n-value	n =	0.0130	
Pipe Diameter	D =	18.00	inches
Design discharge	Q =	3.49	cfs

Full-flow Capacity (Calculated)

Full-flow area	Af =	1.77	sq ft
Full-flow wetted perimeter	Pf =	4.71	ft
Half Central Angle	Theta =	3.14	radians
Full-flow capacity	Qf =	14.90	cfs

Calculation of Normal Flow Condition

Half Central Angle ($0 < \theta < 3.14$)	Theta =	1.22	radians
Flow area	An =	0.51	sq ft
Top width	Tn =	1.41	ft
Wetted perimeter	Pn =	1.83	ft
Flow depth	Yn =	0.49	ft
Flow velocity	Vn =	6.88	fps
Discharge	Qn =	3.49	cfs
Percent Full Flow	Flow =	23.4%	of full flow
Normal Depth Froude Number	Fr _n =	2.02	supercritical

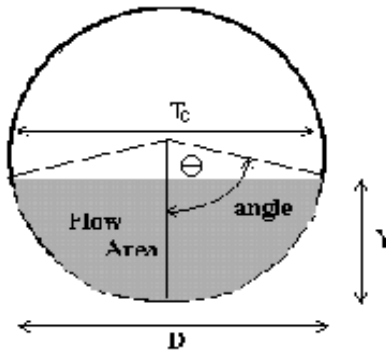
Calculation of Critical Flow Condition

Half Central Angle ($0 < \theta_c < 3.14$)	Theta-c =	1.52	radians
Critical flow area	Ac =	0.83	sq ft
Critical top width	Tc =	1.50	ft
Critical flow depth	Yc =	0.71	ft
Critical flow velocity	Vc =	4.22	fps
Critical Depth Froude Number	Fr _c =	1.00	

CIRCULAR CONDUIT FLOW (Normal & Critical Depth Computation)

Project: **Moore Lumber**

Pipe ID: **Flow from DP 3 to DP 8 5 YR**



Design Information (Input)

Pipe Invert Slope	So =	0.0200	ft/ft
Pipe Manning's n-value	n =	0.0130	
Pipe Diameter	D =	18.00	inches
Design discharge	Q =	3.78	cfs

Full-flow Capacity (Calculated)

Full-flow area	Af =	1.77	sq ft
Full-flow wetted perimeter	Pf =	4.71	ft
Half Central Angle	Theta =	3.14	radians
Full-flow capacity	Qf =	14.90	cfs

Calculation of Normal Flow Condition

Half Central Angle ($0 < \theta < 3.14$)	Theta =	1.25	radians
Flow area	An =	0.54	sq ft
Top width	Tn =	1.42	ft
Wetted perimeter	Pn =	1.88	ft
Flow depth	Yn =	0.52	ft
Flow velocity	Vn =	7.03	fps
Discharge	Qn =	3.78	cfs
Percent Full Flow	Flow =	25.4%	of full flow
Normal Depth Froude Number	Fr _n =	2.02	supercritical

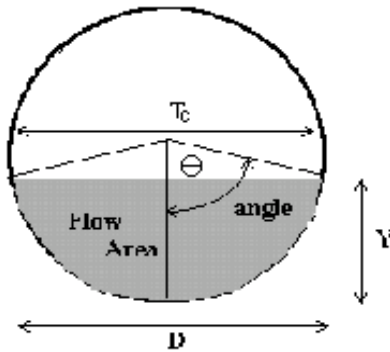
Calculation of Critical Flow Condition

Half Central Angle ($0 < \theta_c < 3.14$)	Theta-c =	1.56	radians
Critical flow area	Ac =	0.87	sq ft
Critical top width	Tc =	1.50	ft
Critical flow depth	Yc =	0.74	ft
Critical flow velocity	Vc =	4.33	fps
Critical Depth Froude Number	Fr _c =	1.00	

CIRCULAR CONDUIT FLOW (Normal & Critical Depth Computation)

Project: **Moore Lumber**

Pipe ID: **Flow from DP 3 to DP 8 100 YR**



Design Information (Input)

Pipe Invert Slope	So =	0.0200	ft/ft
Pipe Manning's n-value	n =	0.0130	
Pipe Diameter	D =	18.00	inches
Design discharge	Q =	8.24	cfs

Full-flow Capacity (Calculated)

Full-flow area	Af =	1.77	sq ft
Full-flow wetted perimeter	Pf =	4.71	ft
Half Central Angle	Theta =	3.14	radians
Full-flow capacity	Qf =	14.90	cfs

Calculation of Normal Flow Condition

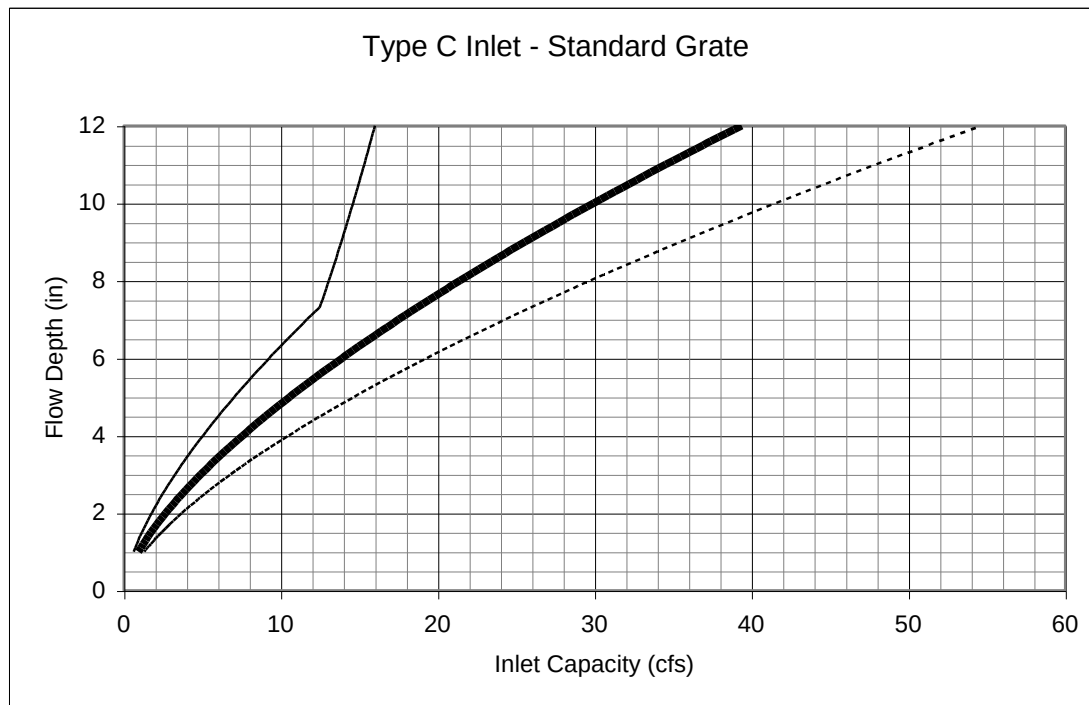
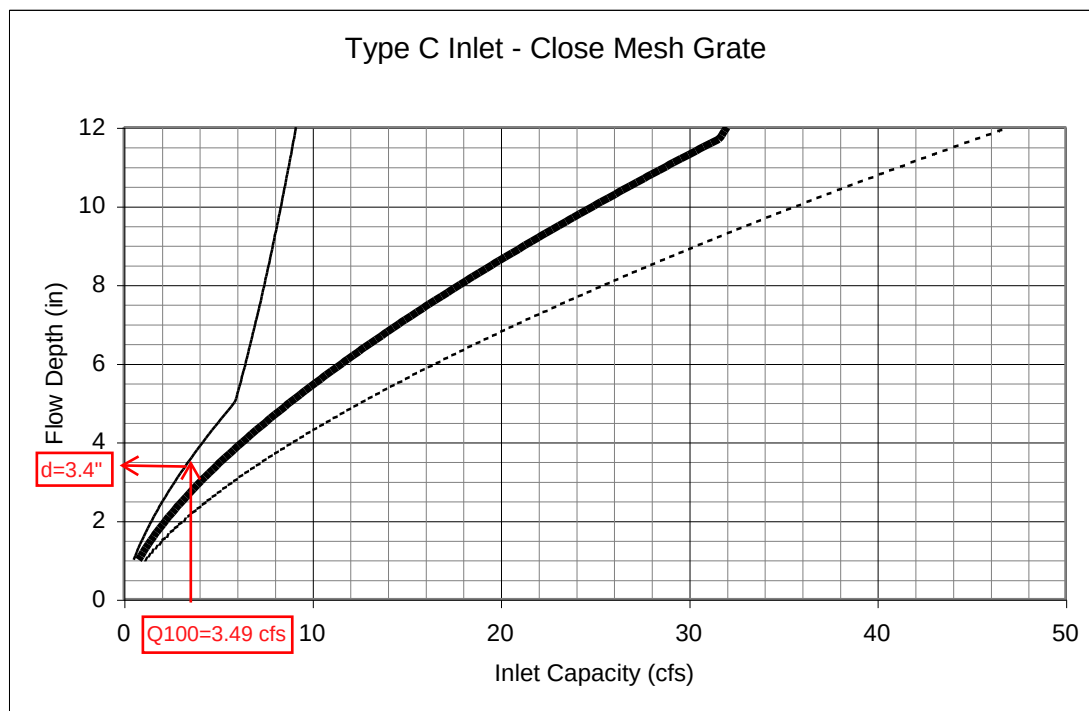
Half Central Angle ($0 < \theta < 3.14$)	Theta =	1.63	radians
Flow area	An =	0.95	sq ft
Top width	Tn =	1.50	ft
Wetted perimeter	Pn =	2.45	ft
Flow depth	Yn =	0.80	ft
Flow velocity	Vn =	8.64	fps
Discharge	Qn =	8.24	cfs
Percent Full Flow	Flow =	55.3%	of full flow
Normal Depth Froude Number	Fr _n =	1.91	supercritical

Calculation of Critical Flow Condition

Half Central Angle ($0 < \theta_c < 3.14$)	Theta-c =	2.07	radians
Critical flow area	Ac =	1.40	sq ft
Critical top width	Tc =	1.31	ft
Critical flow depth	Yc =	1.11	ft
Critical flow velocity	Vc =	5.87	fps
Critical Depth Froude Number	Fr _c =	1.00	

Chapter 8. Inlets

FIGURE 8-9, INLET CAPACITY CHART SUMP CONDITIONS
AREA (TYPE C) INLET



One Grate	Two Grates	Three Grates
-----------	------------	--------------

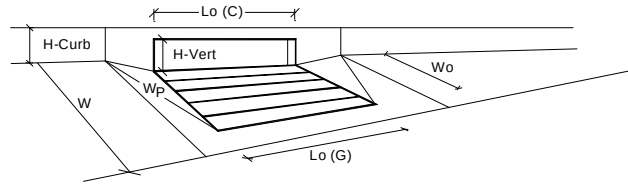
Notes:

1. The Town of Castle Rock standard inlet parameters must apply to use these charts.

INLET IN A SUMP OR SAG LOCATION

Project = **Moore Lumber at The Meadows**

Inlet ID = **Design Point 2**



Design Information (Input)

Type of Inlet

Local Depression (additional to continuous gutter depression 'a' from 'Q-Allow')

Number of Unit Inlets (Grate or Curb Opening)

Water Depth at Flowline (outside of local depression)

Grate Information

Length of a Unit Grate

Width of a Unit Grate

Area Opening Ratio for a Grate (typical values 0.15-0.90)

Clogging Factor for a Single Grate (typical value 0.50 - 0.70)

Grate Weir Coefficient (typical value 2.15 - 3.60)

Grate Orifice Coefficient (typical value 0.60 - 0.80)

Curb Opening Information

Length of a Unit Curb Opening

Height of Vertical Curb Opening in Inches

Height of Curb Orifice Throat in Inches

Angle of Throat (see USDCM Figure ST-5)

Side Width for Depression Pan (typically the gutter width of 2 feet)

Clogging Factor for a Single Curb Opening (typical value 0.10)

Curb Opening Weir Coefficient (typical value 2.3-3.7)

Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)

Total Inlet Interception Capacity (assumes clogged condition)

Inlet Capacity IS GOOD for Minor and Major Storms (>Q PEAK)

	MINOR	MAJOR	
Inlet Type =	CDOT Type R Curb Opening		
a_{local} =	3.00	3.00	inches
No =	1	1	
Ponding Depth =	6.0	6.0	inches
☐ Override Depths			
	MINOR	MAJOR	
$L_o (G)$ =	N/A	N/A	feet
W_o =	N/A	N/A	feet
A_{ratio} =	N/A	N/A	
$C_r (G)$ =	N/A	N/A	
$C_w (G)$ =	N/A	N/A	
$C_o (G)$ =	N/A	N/A	
	MINOR	MAJOR	
$L_o (C)$ =	5.00	5.00	feet
H_{vert} =	6.00	6.00	inches
H_{throat} =	6.00	6.00	inches
Theta =	63.40	63.40	degrees
W_p =	2.00	2.00	feet
$C_r (C)$ =	0.10	0.10	
$C_w (C)$ =	3.60	3.60	
$C_o (C)$ =	0.67	0.67	
	MINOR	MAJOR	
Q_a =	5.4	5.4	cfs
$Q_{PEAK REQUIRED}$ =	1.43	2.87	cfs

APPENDIX 3

REFERENCED INFORMATION

National Flood Hazard Layer FIRMMette



104°53'5"W 39°24'41"N



0 250 500 1,000 1,500 2,000 Feet 1:6,000

Basemap: USGS National Map: Orthoimagery: Data refreshed October, 2020

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS		Without Base Flood Elevation (BFE) Zone A, V, A99
		With BFE or Depth Zone AE, AO, AH, VE, AR
		Regulatory Floodway
OTHER AREAS OF FLOOD HAZARD		0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile Zone X
		Future Conditions 1% Annual Chance Flood Hazard Zone X
		Area with Reduced Flood Risk due to Levee. See Notes. Zone X
		Area with Flood Risk due to Levee Zone D
OTHER AREAS		NO SCREEN Area of Minimal Flood Hazard Zone X
		Effective LOMRs
GENERAL STRUCTURES		Area of Undetermined Flood Hazard Zone D
		Channel, Culvert, or Storm Sewer
		Levee, Dike, or Floodwall
OTHER FEATURES		20.2 Cross Sections with 1% Annual Chance Water Surface Elevation
		17.5
		Coastal Transect
		Base Flood Elevation Line (BFE)
		Limit of Study
		Jurisdiction Boundary
		Coastal Transect Baseline
		Profile Baseline
		Hydrographic Feature
MAP PANELS		Digital Data Available
		No Digital Data Available
		Unmapped



The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on **3/24/2022 at 12:03 PM** and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.



United States
Department of
Agriculture

NRCS

Natural
Resources
Conservation
Service

A product of the National
Cooperative Soil Survey,
a joint effort of the United
States Department of
Agriculture and other
Federal agencies, State
agencies including the
Agricultural Experiment
Stations, and local
participants

Custom Soil Resource Report for Castle Rock Area, Colorado



February 9, 2022

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (<http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/>) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (<https://offices.sc.egov.usda.gov/locator/app?agency=nrcs>) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require

alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

Contents

Preface	2
How Soil Surveys Are Made	5
Soil Map	8
Soil Map.....	9
Legend.....	10
Map Unit Legend.....	11
Map Unit Descriptions.....	11
Castle Rock Area, Colorado.....	13
NeE—Newlin gravelly sandy loam, 8 to 30 percent slopes.....	13
References	15

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

Custom Soil Resource Report

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report Soil Map



MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)

Soils

 Soil Map Unit Polygons

 Soil Map Unit Lines

 Soil Map Unit Points

Special Point Features

 Blowout

 Borrow Pit

 Clay Spot

 Closed Depression

 Gravel Pit

 Gravelly Spot

 Landfill

 Lava Flow

 Marsh or swamp

 Mine or Quarry

 Miscellaneous Water

 Perennial Water

 Rock Outcrop

 Saline Spot

 Sandy Spot

 Severely Eroded Spot

 Sinkhole

 Slide or Slip

 Sodic Spot

 Spoil Area

 Stony Spot

 Very Stony Spot

 Wet Spot

 Other

 Special Line Features

Water Features

 Streams and Canals

Transportation

 Rails

 Interstate Highways

 US Routes

 Major Roads

 Local Roads

Background

 Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Castle Rock Area, Colorado
Survey Area Data: Version 14, Aug 31, 2021

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jul 24, 2018—Nov 19, 2018

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
NeE	Newlin gravelly sandy loam, 8 to 30 percent slopes	0.9	100.0%
Totals for Area of Interest		0.9	100.0%

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Custom Soil Resource Report

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Castle Rock Area, Colorado

NeE—Newlin gravelly sandy loam, 8 to 30 percent slopes

Map Unit Setting

National map unit symbol: jqzg
Elevation: 5,500 to 6,600 feet
Mean annual precipitation: 15 to 19 inches
Mean annual air temperature: 49 to 51 degrees F
Frost-free period: 120 to 135 days
Farmland classification: Not prime farmland

Map Unit Composition

Newlin and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Newlin

Setting

Landform: Terraces, mesas, plateaus
Landform position (three-dimensional): Riser
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Unconformable sandy and gravelly and/or mixed source alluvium

Typical profile

H1 - 0 to 8 inches: gravelly sandy loam
H2 - 8 to 17 inches: gravelly sandy clay loam
H3 - 17 to 22 inches: gravelly sandy loam
H4 - 22 to 60 inches: very gravelly sand

Properties and qualities

Slope: 8 to 30 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high
(0.20 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 3.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: B
Ecological site: R049XY214CO - Gravelly Foothill
Hydric soil rating: No

Minor Components

Bresser

Percent of map unit: 5 percent
Hydric soil rating: No

Satanta

Percent of map unit: 4 percent

Hydric soil rating: No

Stapleton

Percent of map unit: 4 percent

Hydric soil rating: No

Aquic haplustolls

Percent of map unit: 2 percent

Landform: Swales

Hydric soil rating: Yes

References

- American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.
- American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.
- Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.
- Federal Register. July 13, 1994. Changes in hydric soils of the United States.
- Federal Register. September 18, 2002. Hydric soils of the United States.
- Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.
- National Research Council. 1995. Wetlands: Characteristics and boundaries.
- Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_054262
- Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service, U.S. Department of Agriculture Handbook 436. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053577
- Soil Survey Staff. 2010. Keys to soil taxonomy. 11th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053580
- Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.
- United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.
- United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053374
- United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. <http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelprdb1043084>

Custom Soil Resource Report

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053624

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052290.pdf

EXCERPT FROM APPROVED DRAINAGE PLAN
MEADOWS FILING 17, LOT 8

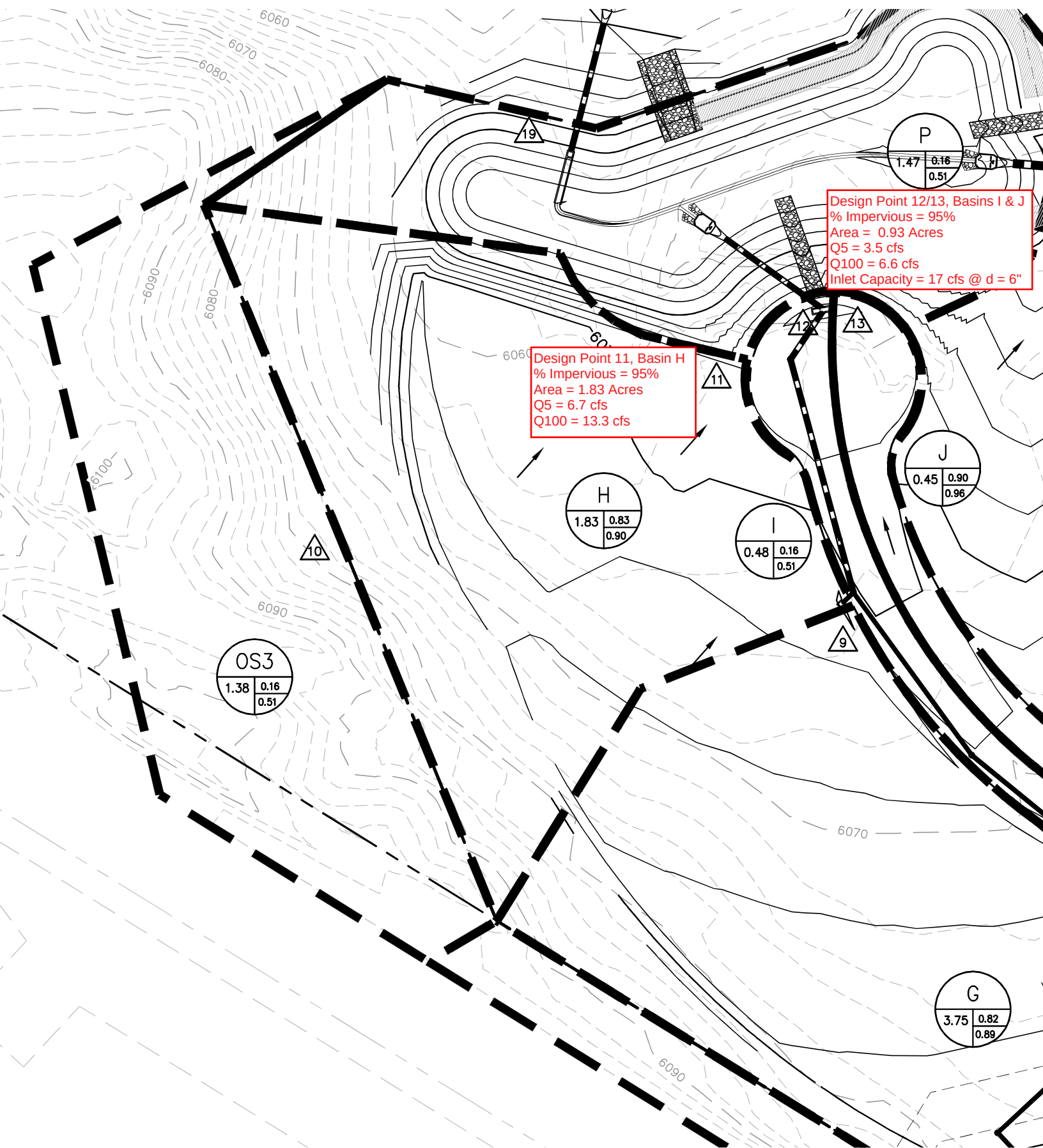
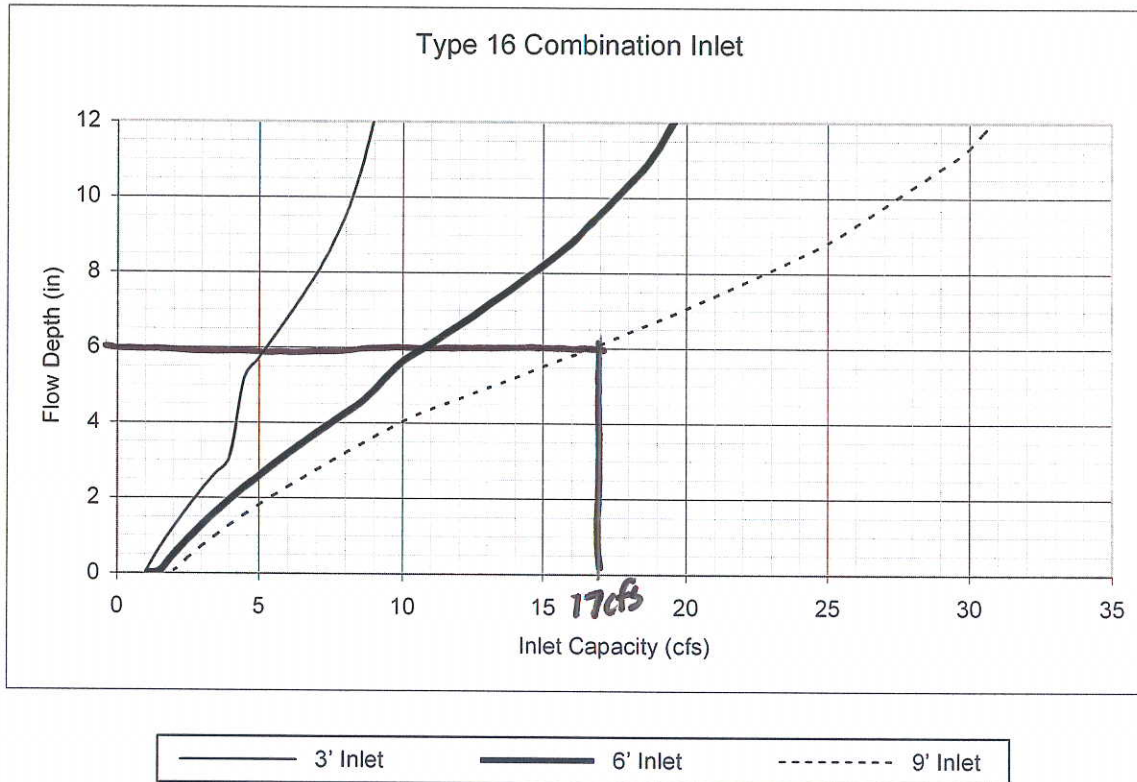


FIGURE 8-11, INLET CAPACITY CHART SUMP CONDITIONS
COMBINATION (TYPE 16) INLET



Notes:

1. The Town of Castle Rock standard inlet parameters must apply to use this chart.



Summary of Water Quality Conformance to MS4 Permit

The purpose of this worksheet is to document conformance with the Town of Castle Rock's MS4 permit with regard to permanent water quality on land disturbance projects.

Project Name Moore Lumber at The Meadows

Project Owner Castle Rock Development Company

Project Location Lot 1, The Meadows Filing No 17, Area No. 2, Amendment No. 1

ToCR Project Number CD22-0019

Total Site Area 1.63 acres

Total Size of Common Plan of Development 1.63 acres

Check all that apply:

☒ **Project within Plum Creek Basin**

☐ **Project within Cherry Creek Basin**

Estimated construction completion date _____

1. The water quality control measure(s) for applicable development sites shall meet one of the following base design standards as per the SDDTCM Section 14.4. Please select all design standards that were applied to meet conformance with the MS4 on this site.

- ☐ WQCV standard
- ☐ Pollutant removal standard
- ☐ Runoff reduction standard
- ☐ Applicable site draining to regional WQVC control measure (accepts drainage prior to discharging to WOTS)
- ☐ Applicable site draining to regional WQVC control facility (with receiving pervious area control measure upstream of WOTS)
- ☐ Constrained redevelopment sites standard
 - Imperviousness of existing site _____/_____ (Imp. Ac/Site Ac) = ____%
 - Variance required TCV No. _____
- ☒ Existing control measure with WQCV per previous criteria standards
 - Reference Construction Permit No. CD15-0021
- ☐ Cherry Creek Basin only, choose one: ☐ Tier 1 ☐ Tier 2 ☐ Tier 3
- ☐ No control measures provided (See Permanent WQ Worksheet for applicability)

Summary of Water Quality Conformance to MS4 Permit

2. Was an exclusion to water quality applied as per SDDTCM Section 13.1.5? ☐ Yes ☒ No

i. If yes, please select all that apply, provide total excluded impervious area(s) and submit variance, as applicable: TCV No. _____

- ☐ Pavement management site
Excluded impervious area: _____ acres
- ☐ Excluded roadway redevelopment
Excluded impervious area: _____ acres
- ☐ Excluded existing roadway areas
Excluded impervious area: _____ acres
- ☐ Above ground and below ground utilities
- ☐ Large lot single family home
- ☐ Non-residential and non-commercial infiltration
Excluded impervious area: _____ acres
- ☐ Land disturbance for land to remain undeveloped
Excluded impervious area: _____ acres
- ☐ Stream Stabilization Sites
Excluded impervious area: _____ acres
- ☐ Trails
Excluded impervious area: _____ acres
- ☐ Oil and Gas Exploration

3. For Development and Redevelopment sites, following any exclusions claimed above, was any portion of the site excluded up to 20% of the site and not to exceed one acre? ☐ Yes ☒ No

If yes, complete the following:

Excluded area: _____ acres
Total Site area: _____ acres, _____ % site excluded

4. For Constrained sites, was any portion of the site excluded up to 50% of the site and not to exceed 50% of the impervious area? ☐ Yes ☒ No

If yes, complete the following:

Excluded area: _____ acres
Excluded impervious area: _____ acres
Total Site area: _____ acres, _____ % site excluded
Total Impervious area: _____ acres, _____ % impervious excluded

Permanent Water Quality Determination Worksheet (Taken from 2019 SDDTCM Sections 13.1.4 and 13.1.5)

Project:	Moore Lumber at The Meadows	Project#	CD22-0019	Applicant:	POLO PROPERTIES HOLDINGS, LLC
Section	Questions	Response	Check those that apply	Instructions	
1	Non-applicable Sites				
1.1	Will the project result in a temporary disturbance of greater than one acre?	No Yes	☐ ☒	Proceed to section 1.2. Proceed to section 2.	
1.2	Is the project part of a larger common plan of development or sale where multiple separate and distinct construction activities may be taking place at different times on different schedules, but remain related and are within 1/4 mile of each other? (A common plan of development will generally be documented on a site development plan, master plan, or equivalent, for the property/project)	No Yes	☐ ☐	Proceed to section 1.3. Proceed to section 2.	
1.3	Is the project within the Cherry Creek Watershed?	Yes No	☐ ☐	Permanent water quality control measures may be required. Refer to Water Quality Control Regulation 72.7 for details and allowable exclusions. Permanent water quality control measures are not required.	
2	Applicable Site Types and Exclusions by Variance				
2.1	Does the project have more than 35% impervious area on the existing site?	No Yes	☒ ☐	Project is an applicable Development Site. Proceed to section 3. Proceed to 2.2.	
2.2	Does the project have greater than 75% impervious area on the existing site?	No Yes	☐ ☐	Project is an applicable Redevelopment Site. Proceed to section 3. Project is an applicable Constrained Redevelopment Site. Proceed to 2.3.	
2.3	Will 100% of the runoff from the existing and proposed site be captured and treated using one or more of the allowable design standards for permanent water quality?	Yes No	☐ ☐	No further action required. Proceed to 2.4.	
2.4	Do any other water quality exclusions apply to the site?	No Yes	☐ ☐	Portions of the project are excluded. Proceed with design in accordance with Constrained Redevelopment standards and apply for variance for <u>Constrained Redevelopment Sites</u> . Proceed to section 3. Following approval of other exclusions, design remaining site in accordance with Constrained Redevelopment standards and apply for variance for <u>Constrained Redevelopment Sites</u> .	
3	Applicable Sites with Other Exclusions by Variance				
3.1	Category 1: Roadways, bridges and trails only				
3.1.1	Is the project a bike or pedestrian trail?	Yes No	☐ ☐	Proceed to next line. Proceed to 3.1.2.	
	Is the trail for a roadway?	Yes No	☐ ☐	Proceed to 3.1.2. Project is excluded. Submit variance for <u>Trails Excluded from Permanent Water Quality Requirements</u> .	
3.1.2	Is the project primarily used for parking or access to parking?	Yes No	☐ ☐	This exclusion does not apply. Permanent water quality is required. Proceed to 3.1.3.	
3.1.3	Does the project add impervious area?	No Yes	☐ ☐	Project is excluded. Submit variance for <u>Pavement Management Sites Excluded from Permanent Water Quality Requirements</u> . Proceed to 3.1.4.	

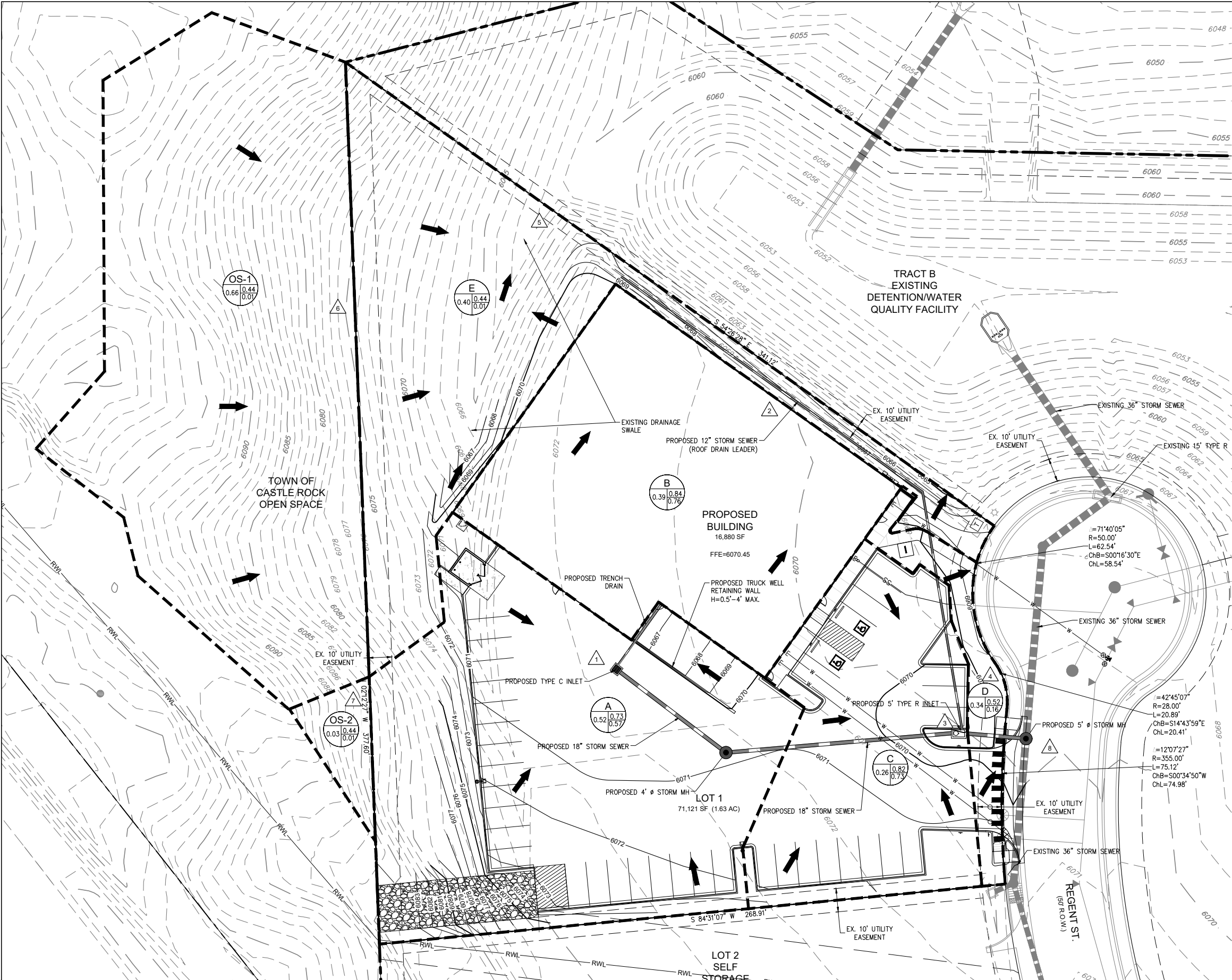
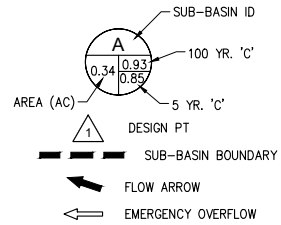
Section	Questions	Response	Check those that apply	Instructions
3.1.4	Does the project add more than 8.25 feet of paved width at any location to the existing roadway?	No Yes	☐ ☐	Project is excluded. Submit variance for <u>Roadway Redevelopment Sites Excluded from Permanent Water Quality Requirements</u> . Proceed to next line.
	Does the project add more than one acre of paved area per mile to an existing roadway?	No Yes	☐ ☐	Project is excluded. Submit variance for <u>Roadway Redevelopment Sites Excluded from Permanent Water Quality Requirements</u> . Proceed to next line.
	Does the project increase the width by two times or more, on average, of the original roadway area?	No Yes	☐ ☐	Existing areas of site are excluded only. Submit variance for <u>Existing Roadway Surfaces Only Excluded from Permanent Water Quality Requirements</u> . This exclusion does not apply. Permanent water quality is required.
3.2	Category 2: Non-residential and non-commercial projects only			
3.2.1	Is the project associated with oil and gas exploration, production, processing, or treatment operations or transmission facilities, including activities necessary to prepare a site for drilling and the movement and placement of drilling equipment?	Yes No	☐ ☐	Project is excluded. Submit variance for <u>Oil and Gas Exploration Sites Excluded from Permanent Water Quality Requirements</u> . Proceed to 3.2.2.
3.2.2	Is the project for stream stabilization?	Yes No	☐ ☐	Project is excluded. Submit variance for <u>Stream Stabilization Sites Excluded from Permanent Water Quality Requirements</u> . Proceed to 3.2.3.
3.2.3	Is the project for installation or maintenance of aboveground or underground utilities or infrastructure that does not permanently alter the terrain, ground cover, or drainage patterns from those present prior to the construction activity including activities to install, replace or maintain utilities under roadways or other paved areas that return the surface to the same condition?	Yes No	☐ ☐	Project is excluded. Submit variance for <u>Aboveground and Underground Utilities Excluded from Permanent Water Quality Requirements</u> . Proceed to 3.2.4.
3.2.4	Is the project on undeveloped land (land with no human-made structures such as buildings or pavement) that will remain undeveloped after the project?	Yes No	☐ ☐	Project is excluded. Submit variance for <u>Sites with Land Disturbances to Undeveloped Land that will Remain Undeveloped Excluded from Permanent Water Quality Requirements</u> . Proceed to 3.2.5.
3.2.5	Will the post-project condition result in surface water discharge during the 80th percentile storm runoff event?	No Yes	☐ ☐	Project is excluded. Submit study along with variance for <u>Non-residential and Non-commercial Infiltration Conditions Excluded from Permanent Water Quality Requirements</u> . This exclusion does not apply. Permanent water quality is required.
3.3	Category 3: Residential, Agricultural and Commercial projects			
3.3.1	Is the project a single-family residential lot, or agricultural zoned lands, greater than or equal to 2.5 acres in size per dwelling unit?	Yes No	☒ ☐	Proceed to next line. Proceed to 3.3.2.
	Is the project site greater than 10% impervious?	No Yes	☐ ☒	Project is excluded. Submit variance for <u>Large Lot Single Family Sites Excluded from Permanent Water Quality Requirements</u> . Proceed to next line.
	Is the project site greater than 20% impervious?	Yes No	☒ ☐	This exclusion does not apply. Permanent water quality is required. Proceed to next line.
	Will the post-project condition result in surface water discharge during the 80th percentile storm runoff event?	No Yes	☐ ☐	Project is excluded. Submit study along with variance for <u>Large Lot Single Family Sites Excluded from Permanent Water Quality Requirements</u> . This exclusion does not apply. Permanent water quality is required.

Section	Questions	Response	Check those that apply	Instructions
3.3.2	Will 100% of the runoff from the residential or commercial site be captured?	Yes No	☐ ☐	This exclusion does not apply. Permanent water quality is required. Proceed to next line.
	Is all or a portion of the site undeveloped or will it remain undeveloped after construction?	Yes No	☐ ☐	This portion of the project is excluded. Submit variance for <u>Sites with Land Disturbance to Undeveloped Land that will Remain Undeveloped Excluded from Permanent Water Quality Requirements</u> . Proceed to next line. Proceed to next line.
	Is the remaining untreated impervious area greater than 20% of the site?	Yes No	☐ ☐	This exclusion does not apply. Permanent water quality is required. Proceed to next line.
	Is the remaining untreated impervious area greater than one acre?	Yes No	☐ ☐	This exclusion does not apply. Permanent water quality is required. Proceed to next line.
	Is it practicable to capture runoff from portions of the site that will not drain to a control measure?	No Yes	☐ ☐	Document justification demonstrating that it is not practicable to capture runoff from this portion of the site in the drainage report . No further action is needed. This exclusion does not apply. Permanent water quality is required.

APPENDIX 4

DRAINAGE PLAN

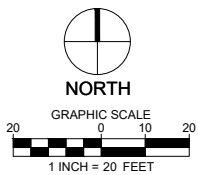
[V-M.dwg] [E:\M.dwg] [C-PN-L.dwg] [V-PN.dwg] [V-UT.dwg] [V-T.dwg] [C-TO-L.dwg] [V-UT.dwg] [LEGEND.dwg] [A-BG-L.dwg] [C-UT-L.dwg] [Tbh.dwg]
Drawing name: C:\Data\Projects\2110 MCR\330\Sheet\Drainage\Plan.dwg May 27, 2022 - 11:21am



PROPOSED	LEGEND	EXISTING
---	PROPERTY LINE	---
---	R.O.W. LINE	---
---	EASEMENT	---
---	SECTION LINE	---
---	GAS LINE	---
---	UGT	---
---	FO	---
---	CTV	---
---	FIRE HYDRANT	---
---	WATER MAIN	---
---	WATER METER	---
---	WATER SERVICE	---
---	WATER VALVE	---
---	IRRIGATION PIPE	---
---	TRANSFORMER	---
---	UNDERGROUND ELECTRIC	---
---	OHE	---
---	LIGHT POLE	---
---	POWER POLE	---
---	SANITARY MAIN	---
---	SANITARY CLEANOUT	---
---	SANITARY MANHOLE	---
---	SANITARY SERVICE	---
---	STORM INLET	---
---	STORM MANHOLE	---
---	STORM PIPE	---
---	BACK OF CURB	---
---	CONCRETE PATCH	---
---	EDGE OF PAVEMENT / PAV	---
---	FLOWLINE	---
---	SIDEWALK	---
---	PAVEMENT MARKING	---
---	TRAFFIC SIGN	---
---	BOLLARD	---
---	LIGHT POLE	---
---	MORUMENT SIGN	---
---	MAJOR CONTOUR	---
---	MINOR CONTOUR	---
---	SLOPE/GRADE	---

BASIN RUNOFF SUMMARY TABLE							
Basin Designation	Basin Area (ac)	Impervious %	C _s	C ₁₀₀	T _c (min)	Q ₅ (cfs)	Q ₁₀₀ (cfs)
A	0.52	66%	0.57	0.73	5.0	1.43	3.49
B	0.39	90%	0.76	0.84	5.0	1.43	2.87
C	0.26	85%	0.73	0.82	5.0	0.92	1.88
D	0.06	19%	0.16	0.52	8.6	0.04	0.25
E	0.40	2%	0.01	0.44	14.2	0.04	2.81
OS-1	0.66	2%	0.01	0.44	9.6	0.03	2.06
OS-2	0.03	2%	0.01	0.44	5.0	0.00	0.11

DESIGN POINT RUNOFF SUMMARY TABLE					
Design Point	Contributing Basins	Contributing Area (acres)	T _c (min)	Q ₅ (cfs)	Q ₁₀₀ (cfs)
1	A + OS-2	0.55	5.0	1.43	3.49
2	B	0.39	5.0	1.43	2.87
3	C	0.26	5.0	0.92	1.88
4	D	0.06	8.6	0.04	0.25
5	E + OS-1	1.06	14.2	0.04	2.81
6	OS-1	0.66	9.6	0.03	2.06
7	OS-2	0.03	5.0	0.001	0.11
8	A + B + C + OS-2	1.20	5.0	3.78	8.24



COLORADO 811
CAUTION NOTICE TO CONTRACTORS
THE CONTRACTOR IS SPECIFICALLY CAUTIONED THAT THE LOCATION AND/OR ELEVATION OF EXISTING UTILITIES AS SHOWN ON THESE PLANS IS BASED ON RECORDS OF THE VARIOUS UTILITY COMPANIES AND, WHERE POSSIBLE, MEASUREMENTS TAKEN IN THE FIELD. THE INFORMATION IS NOT TO BE RELIED ON AS BEING EXACT OR COMPLETE. THE CONTRACTOR MUST CALL 811 AT LEAST 72 HOURS BEFORE ANY EXCAVATION TO REQUEST EXACT FIELD LOCATIONS OF THE UTILITIES. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO RELOCATE ALL EXISTING UTILITIES WHICH CONFLICT WITH THE PROPOSED IMPROVEMENTS SHOWN ON THESE PLANS.

PREPARED FOR:		REVISION DESCRIPTION		BY
PILATUS MANAGEMENT LLC				
MIKE HUMPHREY				
2401 MORNINGVIEW TRAIL				
CASTLE ROCK, CO 80109				
PH: 303-360-6600				
FAX:				
project no.	2110.01	drawn by		
date	5/27/2022 - 11:21 am	designed by		
dwg.	Final Drainage Plan.dwg	approved by		

MOORE LUMBER AT THE MEADOWS

FINAL DRAINAGE PLAN

KELLY DEVELOPMENT SERVICES, LLC
9301 SCRUB OAK DR
LONE TREE, CO 80124
303-888-6338
greg@kellydev.com

SHEET NUMBER
1
SHEET
PROJECT NUMBER
2110.01