El Paso County
STORMWATER MANAGEMENT PLAN

Short Stop Restaurant
Part of Lot 1, Powers Centre Filing No. 3
Section 6, Township 14 South, Range 65 West of the 6th P.M.
5819 Palmer Park Boulevard

October 2, 2017

Revised
November 28, 2018

prepared for

Short Stop Restaurant

Oliver E. Watts, Consulting Engineer, Inc.
Colorado Springs, Colorado

OLIVER E. WATTS, PE-LS
OLIVER E. WATTS, CONSULTING ENGINEER, INC.
CIVIL ENGINEERING AND SURVEYING
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olliewatts@aol.com
Celebrating over 39 years in business

November 28, 2018

El Paso County D.O.T.
2880 International Circle
suite 110
Colorado Springs, CO 80910

ATTN: Daniel Torres

SUBJECT: Stormwater Management Plan
            Short Stop Restaurant

Transmitted herewith for your review and approval is the SWMP for the Short Stop Restaurant, located at 5819 Palmer Park Boulevard. It has been revised per the County review comments / letter dated 11-15-18.

Please contact our office if we may provide any further information.

Oliver E. Watts, Consulting Engineer, Inc.

BY: _____
     Erik S. Watts, Authorized Representative
      Erosion Control Supervisor

The developer / owner has read and will comply with all of the requirements specified in this stormwater management report.

By: _____
Ted Vong
Short Stop Restaurant
485 N Circle Drive
Colorado Springs, CO 80909

Table of Contents

1. SITE DESCRIPTION:

The Short Stop Restaurant Site is located on the east side of Powers Boulevard just south of the Palmer Park, in the 'old K-Mart Shopping Center'. 5819 Palmer Park Boulevard: Section 6, Township 14 South, Range 65 West of the 6th P.M., in El Paso County. It is a portion of Lot 1, Powers Centre Filing No. 3.The overall Site totals 5.5 acres. Grading is also to occur on 0.067 acres of the existing, paved, parking lot.

a) **Construction activity description**: Construction activity will include; overlot grading, curb/ gutter installation, utility installation and building construction. The erosion control pond will be installed in the southwest portion of the site, during said overlot grading, to mitigate any runoff associated with overlot grading construction activities. The site will be landscaped once all construction has been completed.

b) **Sequence / time line of activities:** The site will be graded in compliance with El Paso County Code. Grading for the site is scheduled to be completed by December 2018. Total site disturbance will be 0.067 acres / 2951 square feet.

c) **Site area:** Lot 1 is 5.55 acres total. The portion of the site that is to experience grading is approximately 0.0.67 acres. The Site is not vegetated; it is an existing paved parking.

d) **Runoff:** Overall runoff from the Site will remain at historic levels. Attached is the "Description of Runoff" section from the sites drainage letter:

This Site was previously platted as Powers Center Filing no. 3. At that time a drainage report was submitted and approved by El Paso County, Colorado. The portion of the parking lot to be occupied by the restaurant is totally asphalt paved at this time. The construction of the drive in could arguably have less impervious cover that that of the existing parking, although for the sake of computations the impervious ratio is assumed to be 80% in keeping with the existing zoning. The entire lot area associated with the construction occupies 0.469 acre on an approximate slope of four percent. The runoff from the entire area is computed to be 2.0 cfs / 3.6 cfs, not including potential inflows from the north.

A sand filter basin is proposed to mitigate the placement of the restaurant, as required by County regulations. Based on the 2951 square foot footprint of the total disturbed area, the required storage is 90 cubic feet. The basin will be placed in an existing parking island in the southwest corner of the site, and is proposed be constructed of vertical masonry walls with the sand filter floor of 32 square feet, as shown in the enclosed computations. A curb outlet will route the runoff into the basin.

This parcel is not within the limits of a designated flood plain or flood hazard area, as identified on FEMA Panel No.'s 08041C0751 F 08041C0752 F, both dated March 17, 1997, a copy of which is enclosed for reference. The portions to be graded, are outside the flood plain, as shown on the drainage plan.

Please revise the text so that it matches the design shown on the drainage report.

4

The method used for all computations is that specified in the City-County Drainage Criteria Manual, using the rational method for areas of the size of the site and the SCS method for the review of the major basin involved. All computations are enclosed for reference and review.

The local USDA/SCS office has mapped the soils in the area. A soils map interpretation sheet is enclosed for reference. All soils in this area are of hydrologic group "B", Blendon. It has moderate to high erosion hazards with both water and wind and is listed as having high potential for successful reseeding, especially with 'native' grasses. Potential erosion impacts would affect the parking lot and sediment pond. Silt fencing and/or hay bales will serve to mitigate this hazard.

e) Existing vegetation: As stated previously; Item 1, C "Site Area," the site is current a paved parking lot: The area is to be developed as listed in this report implemented.

f) Potential pollution sources: None are known to exist.

g) Non stormwater discharge: No springs are known to exist. Any additional discharge is confined to the surface and runoff routed to the aforementioned detention pond. As such, water flowing in Sand Creek will not be affected by this project.

h) Receiving water(s), size, type and description of outfall(s): Sand Creek and ultimately Fountain Creek is the receiving water for stormwater discharge from this Site. Outfalls are shown on the enclosed drainage plan.

2. SITE MAP:
Enclosed are a vicinity map and drainage plan for review. Details for the BMP's are listed in the rear of this report.

3. BMPs FOR STORMWATER POLLUTION PREVENTION:

a) Erosion and sediment controls:

1) Structural practices: Erosion will be contained through the use of silt fencing, and hay bale check dams.

2) Non-Structural practices: Permanent stabilization practices will be implemented on this Site through landscaping. See the approved landscape plan for details.

b) Materials handling and Spills Prevention: There are no plans to have any On-Site batch plant(s).

Vehicle refueling will take place away from areas containing or conveying water in accordance with State approved practices. Should a fuel or fluid spill occur, the contractor will County and State guidelines concerning spills such as; berming the area around the spill and remove all contaminated soil in an approved container and disposing of said containing at a County / State approved facility / Site.

4. FINAL STABILIZATION AND LONG TERM STORMWATER MANAGEMENT:

As stated earlier, copies of the drainage plan is submitted for your review. This Plan should adequately address this section. Our office will have inspectors monitoring the Site during construction to insure compliance with applicable State and El Paso County Code(s). The Permittee will contact your office upon final stabilization, once the silt fencing and/or hay bales have been removed and the vegetation in the landscaped parking medians is established.

5. OTHER CONTROLS:

Please review the enclosed Grading Plan. It details said controls. Waste disposal will be in accordance with El Paso County standards. The existing parking lot will serve as a rock mat to remove any soil from vehicles before entering Palmer Park Boulevard.

6. INSPECTION AND MAINTENANCE:

The owner, the architect, John Nelson, as well as this office will monitor the day to day Site activities during the construction. A copy of this report will be kept in the vehicle of said inspector. Inspections will occur and reports will be filled out every 14 days, and/or after a precipitation event as required, to ensure adequate operation and design of selected BMP's. Copies of said inspection reports will be kept in the site trailer and at this office. Silt fencing and/or hay bales will need to be replaced and/or repaired as need be. The sediment basin / pond will need to be inspection to insure the inlet and outlet structures have not been clogged or been damaged / collapsed. All liter and debris should be removed form the pond and disposed off of the site (i.e. in a trash bag, trash can, dumpster).

7. SWMP REVISION PROCEDURES:

This SWMP should be revised as necessary to address changing site conditions and BMP needs.
The need for revision could include the following: Stabilization, continued overlot grading, removal of one of more BMP as items are completed, the weather and precipitation could affect and cause a needed revision in the SWMP. This office will revise accordingly.

8. FINAL STABILIZATION:
Re-seed mixture
The area is current a paved parking area. No reseeding will be done.
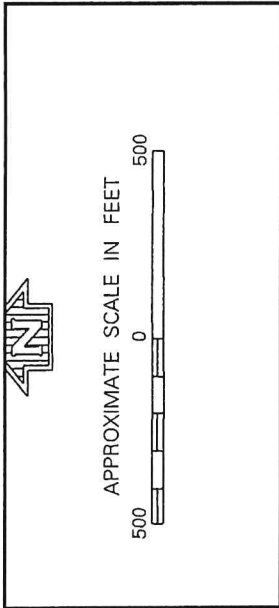
APPROXIMATE SCALE IN FEET

500   0   500

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

EL PASO COUNTY,
COLORADO AND
INCORPORATED AREAS

PANEL 751 OF 1300
(SEE MAP INDEX FOR PANELS NOT PRINTED)

CONTAINS:
COMMUNITY

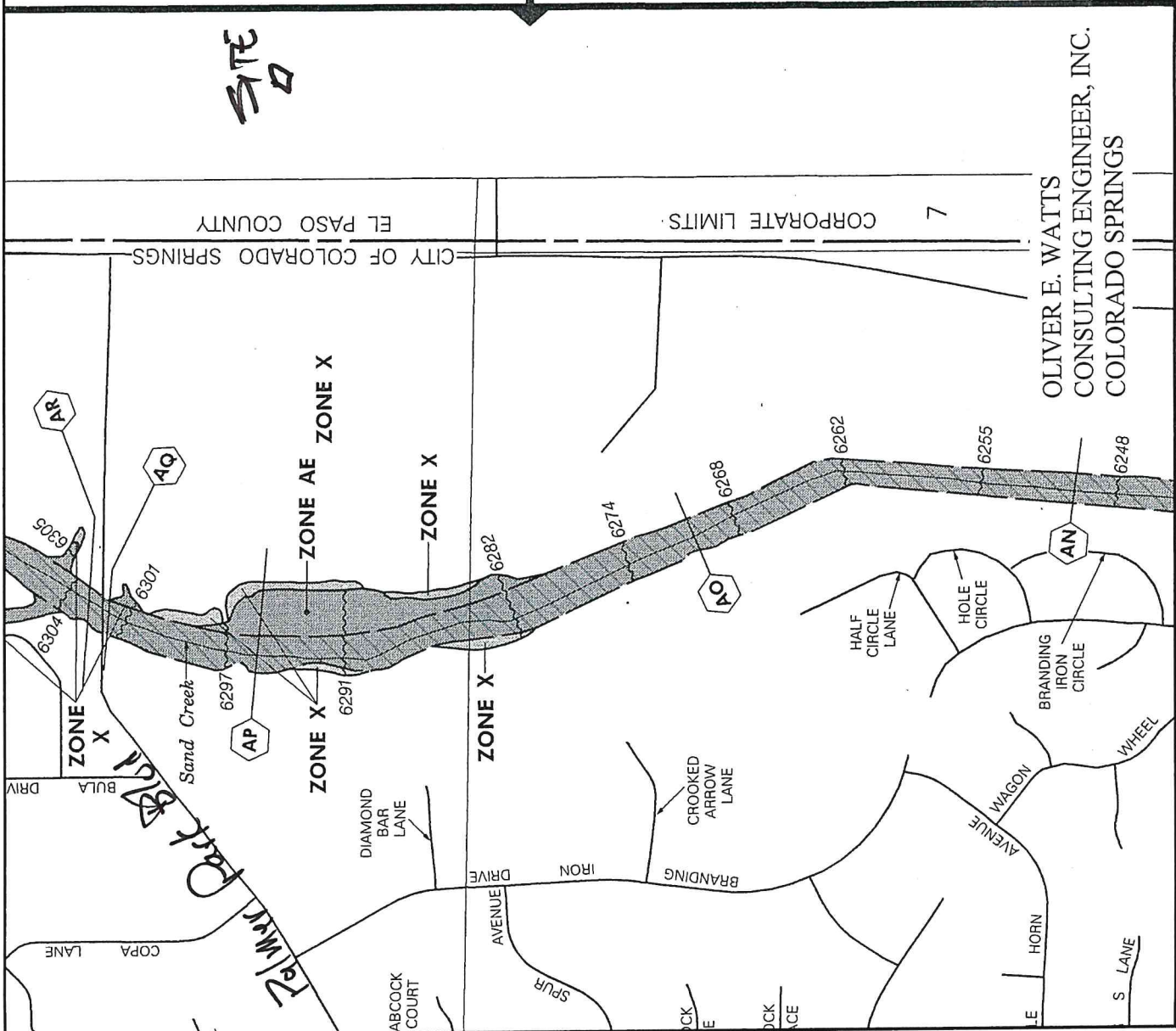|	NUMBER	PANEL	SUFFIX
COLORADO SPRINGS, CITY OF	080060	0751	F
EL PASO COUNTY, UNINCORPORATED AREAS	080059	0751	F

6819 PALMER PARK BLVD.
FEMA MAP PANEL
1"=500'

MAP NUMBER
0804C0751 F

EFFECTIVE DATE:
MARCH 17, 1997

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

SITE

EL PASO COUNTY
CITY OF COLORADO SPRINGS

CORPORATE LIMITS

7

OLIVER E. WATTS
CONSULTING ENGINEER, INC.
COLORADO SPRINGS

AR

AQ

6305

6301

6304

ZONE X

Sand Creek

6297

AP

6291

ZONE X

ZONE AE   ZONE X

ZONE X

ZONE X

6282

6274

6268

AO

6262

6255

6248

AN

DIAMOND BAR LANE

CROOKED ARROW LANE

HALF CIRCLE LANE

HOLE CIRCLE

BRANDING IRON CIRCLE

WHEEL

WAGON

AVENUE

HORN

S LANE

BRANDING IRON DRIVE

AVENUE

SPUR

COPA LANE

BULA DRIV

BABCOCK COURT

APPROXIMATE SCALE IN FEET

500   0   500

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

EL PASO COUNTY,
COLORADO AND
INCORPORATED AREAS

PANEL 752 OF 1300
(SEE MAP INDEX FOR PANELS NOT PRINTED)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
COLORADO SPRINGS, CITY OF	080060	0752	F
EL PASO COUNTY, UNINCORPORATED AREAS	080059	0752	F

6819 PALMER PARK BLVD.
FEMA MAP PANEL
1''=500'

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08041C0752 F

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EL PASO COUNTY
UNINCORPORATED AREAS
080059

ZONE X

ZONE AE

ZONE X

ZONE AE

LIMIT OF DETAILED STUDY

LIMIT OF DETAILED STUDY

Sand Creek Center Tributary

OLIVER E. WATTS
CONSULTING ENGINEER, INC.
COLORADO SPRINGS

Omaha Blvd

JOINS PANEL 0751

| MAJOR BASIN | SUB BASIN | AREA | | BASIN | | T_c MIN | I | SOIL GRP | DEV. TYPE | C | FLOW | | RETURN PERIOD |
		PLANIM READ	ACRES	LENGTH	HEIGHT						qp	qp	
EXISTING	A	COGO	0.469	100	4	3.3							5
													100
				+20	V=4	+0.1							
						3.4	5.2	B	80%	0.81	2.0		5
							8.8			0.88		3.6	100

HYDROLOGICAL COMPUTATION – BASIC DATA BY: O.E. WATTS
PROJ: 5819 PALMER PARK BLVD.   DATE: September 27, 2018
RATIONAL METHOD

OLIVER E. WATTS, CONSULTING ENGINEER, INC.
614 ELKTON DRIVE COLORADO SPRINGS, CO 80907

STREET AND STORM SEWER CALCULATIONS

STREET	LOCATION	DISTANCE	ELEVATION & SLOPE	TOTAL RUNOFF	STREET FLOW / CAPACITY	PIPE FLOW	TYPE PIPE, CATCH BASIN & SLOPE %
PRIVATE	BASIN A		2.4%	2.0/3.6		2.0	4' CURB OUTLET
							SAND FILTER BASIN SEE ATTACHED

STREET AND STORM SEWER CALCULATIONS
PROJECT: 5819 PALMER PARK BLVD.
BY: O.E. WATTS
DATE: September 27, 2018

OLIVER E. WATTS, CONSULTING ENGINEER, INC.
614 ELKTON DRIVE COLORADO SPRINGS, CO 80907

Design Procedure Form: Sand Filter (SF)

Designer:	O.E. Watts
Company:	OEW Cons. Engr. Inc
Date:	September 27, 2018
Project:	5819 Palmer Park
Location:	

3/4

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1. Basin Storage Volume

A) Effective Imperviousness of Tributary Area, I_a
(100% if all paved and roofed areas upstream of sand filter)

I_a = 80.0 %

B) Tributary Area's Imperviousness Ratio ($i = I_a/100$)

i = 0.800

C) Water Quality Capture Volume (WQCV) Based on 12-hour Drain Time
$WQCV = 0.8 * (0.91 * i^3 - 1.19 * i^2 + 0.78 * i)$

WQCV = 0.26 watershed inches

D) Contributing Watershed Area (including sand filter area)

Area = 2,951 sq ft

E) Water Quality Capture Volume (WQCV) Design Volume
$V_{WQCV} = WQCV / 12 * Area$

V_{WQCV} = 65 cu ft

F) For Watersheds Outside of the Denver Region, Depth of
Average Runoff Producing Storm

d_6 = 0.60 in

G) For Watersheds Outside of the Denver Region,
Water Quality Capture Volume (WQCV) Design Volume

$V_{WQCV\ OTHER}$ = 90 cu ft

H) User Input of Water Quality Capture Volume (WQCV) Design Volume
(Only if a different WQCV Design Volume is desired)

$V_{WQCV\ USER}$ = _____ cu ft

2. Basin Geometry

A) WQCV Depth

D_{WQCV} = 1.0 ft

B) Sand Filter Side Slopes (Horizontal distance per unit vertical,
4:1 or flatter preferred). Use "0" if sand filter has vertical walls.

Z = 0.00 ft / ft

C) Minimum Filter Area (Flat Surface Area)

A_{Min} = 30 sq ft

D) Actual Filter Area

A_{Actual} = **32.02** sq ft

E) Volume Provided

V_T = _____ cu ft

3. Filter Material

Choose One
- ● 18" CDOT Class B or C Filter Material
- ○ Other (Explain):

_____

_____

4. Underdrain System

A) Are underdrains provided?

Choose One
- ○ YES
- ● NO

B) Underdrain system orifice diameter for 12 hour drain time

i) Distance From Lowest Elevation of the Storage
Volume to the Center of the Orifice

y = N/A ft

ii) Volume to Drain in 12 Hours

Vol_{12} = N/A cu ft

iii) Orifice Diameter, 3/8" Minimum

D_o = N/A in

Please provide the new revised calculation that has been submitted with the drainage report.

Design Procedure Form: Sand Filter (SF)

Designer:	O.E. Watts
Company:	OEW Cons. Engr. Inc
Date:	September 27, 2018
Project:	5819 Palmer Park
Location:	

4/4

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5. Impermeable Geomembrane Liner and Geotextile Separator Fabric

   A) Is an impermeable liner provided due to proximity
      of structures or groundwater contamination?

Choose One

○ YES   ○ NO

6-7. Inlet / Outlet Works

   A) Describe the type of energy dissipation at inlet points and means of
      conveying flows in excess of the WQCV through the outlet

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Notes:

Table 6-6. Runoff Coefficients for Rational Method
(Source: UDFCD 2001)

Land Use or Surface Characteristics	Percent Impervious	Runoff Coefficients											
		2-year		5-year		10-year		25-year		50-year		100-year	
		HSG A&B	HSG C&D	HSG A&B	HSG C&D	HSG A&B	HSG C&D	HSG A&B	HSG C&D	HSG A&B	HSG C&D	HSG A&B	HSG C&D
Business													
Commercial Areas	95	0.79	0.80	0.81	0.82	0.83	0.84	0.85	0.87	0.87	0.88	0.88	0.89
Neighborhood Areas	70	0.45	0.49	0.49	0.53	0.53	0.57	0.58	0.62	0.60	0.65	0.62	0.68
Residential													
1/8 Acre or less	65	0.41	0.45	0.45	0.49	0.49	0.54	0.54	0.59	0.57	0.62	0.59	0.65
1/4 Acre	40	0.23	0.28	0.30	0.35	0.36	0.42	0.42	0.50	0.46	0.54	0.50	0.58
1/3 Acre	30	0.18	0.22	0.25	0.30	0.32	0.38	0.39	0.47	0.43	0.52	0.47	0.57
1/2 Acre	25	0.15	0.20	0.22	0.28	0.30	0.36	0.37	0.46	0.41	0.51	0.46	0.56
1 Acre	20	0.12	0.17	0.20	0.26	0.27	0.34	0.35	0.44	0.40	0.50	0.44	0.55
Industrial													
Light Areas	80	0.57	0.60	0.59	0.63	0.63	0.66	0.66	0.70	0.68	0.72	0.70	0.74
Heavy Areas	90	0.71	0.73	0.73	0.75	0.75	0.77	0.78	0.80	0.80	0.82	0.81	0.83
Parks and Cemeteries	7	0.05	0.09	0.12	0.19	0.20	0.29	0.30	0.40	0.34	0.46	0.39	0.52
Playgrounds	13	0.07	0.13	0.16	0.23	0.24	0.31	0.32	0.42	0.37	0.48	0.41	0.54
Railroad Yard Areas	40	0.23	0.28	0.30	0.35	0.36	0.42	0.42	0.50	0.46	0.54	0.50	0.58
Undeveloped Areas													
Historic Flow Analysis-- Greenbelts, Agriculture	2	0.03	0.05	0.09	0.16	0.17	0.26	0.26	0.38	0.31	0.45	0.36	0.51
Pasture/Meadow	0	0.02	0.04	0.08	0.15	0.15	0.25	0.25	0.37	0.30	0.44	0.35	0.50
Forest	0	0.02	0.04	0.08	0.15	0.15	0.25	0.25	0.37	0.30	0.44	0.35	0.50
Exposed Rock	100	0.89	0.89	0.90	0.90	0.92	0.92	0.94	0.94	0.95	0.95	0.96	0.96
Offsite Flow Analysis (when landuse is undefined)	45	0.26	0.31	0.32	0.37	0.38	0.44	0.44	0.51	0.48	0.55	0.51	0.59
Streets													
Paved	100	0.89	0.89	0.90	0.90	0.92	0.92	0.94	0.94	0.95	0.95	0.96	0.96
Gravel	80	0.57	0.60	0.59	0.63	0.63	0.66	0.66	0.70	0.68	0.72	0.70	0.74
Drive and Walks	100	0.89	0.89	0.90	0.90	0.92	0.92	0.94	0.94	0.95	0.95	0.96	0.96
Roofs	90	0.71	0.73	0.73	0.75	0.75	0.77	0.78	0.80	0.80	0.82	0.81	0.83
Lawns	0	0.02	0.04	0.08	0.15	0.15	0.25	0.25	0.37	0.30	0.44	0.35	0.50

3.2   Time of Concentration

One of the basic assumptions underlying the Rational Method is that runoff is a function of the average rainfall rate during the time required for water to flow from the hydraulically most remote part of the drainage area under consideration to the design point. However, in practice, the time of concentration can be an empirical value that results in reasonable and acceptable peak flow calculations.

For urban areas, the time of concentration (t_c) consists of an initial time or overland flow time (t_i) plus the travel time (t_t) in the storm sewer, paved gutter, roadside drainage ditch, or drainage channel. For non-urban areas, the time of concentration consists of an overland flow time (t_i) plus the time of travel in a concentrated form, such as a swale or drainageway. The travel portion (t_t) of the time of concentration can be estimated from the hydraulic properties of the storm sewer, gutter, swale, ditch, or drainageway. Initial time, on the other hand, will vary with surface slope, depression storage, surface cover, antecedent rainfall, and infiltration capacity of the soil, as well as distance of surface flow. The time of concentration is represented by Equation 6-7 for both urban and non-urban areas.

$$t_c = t_i + t_t \qquad\qquad\qquad\qquad \text{(Eq. 6-7)}$$

Where:

t_c = time of concentration (min)

t_i = overland (initial) flow time (min)

t_t = travel time in the ditch, channel, gutter, storm sewer, etc. (min)

3.2.1   Overland (Initial) Flow Time

The overland flow time, t_i, may be calculated using Equation 6-8.

$$t_i = \frac{0.395(1.1 - C_5)\sqrt{L}}{S^{0.33}} \qquad\qquad \text{(Eq. 6-8)}$$

Where:

t_i = overland (initial) flow time (min)
C_5 = runoff coefficient for 5-year frequency (see Table 6-6)
L = length of overland flow (300 ft <u>maximum</u> for non-urban land uses, 100 ft <u>maximum</u> for urban land uses)
S = average basin slope (ft/ft)

Note that in some urban watersheds, the overland flow time may be very small because flows quickly concentrate and channelize.

3.2.2   Travel Time

For catchments with overland and channelized flow, the time of concentration needs to be considered in combination with the travel time, t_t, which is calculated using the hydraulic properties of the swale, ditch, or channel. For preliminary work, the overland travel time, t_t, can be estimated with the help of Figure 6-25 or Equation 6-9 (Guo 1999).

$$V = C_v S_w^{0.5} \qquad\qquad\qquad\qquad \text{(Eq. 6-9)}$$

Where:

V = velocity (ft/s)

C_v = conveyance coefficient (from Table 6-7)

S_w = watercourse slope (ft/ft)

Table 6-7. Conveyance Coefficient, C_v

Type of Land Surface	C_v
Heavy meadow	2.5
Tillage/field	5
Riprap (not buried)[*]	6.5
Short pasture and lawns	7
Nearly bare ground	10
Grassed waterway	15
Paved areas and shallow paved swales	20

[*] For buried riprap, select C_v value based on type of vegetative cover.

The travel time is calculated by dividing the flow distance (in feet) by the velocity calculated using Equation 6-9 and converting units to minutes.

The time of concentration (t_c) is then the sum of the overland flow time (t_i) and the travel time (t_t) per Equation 6-7.

3.2.3   First Design Point Time of Concentration in Urban Catchments

Using this procedure, the time of concentration at the first design point (typically the first inlet in the system) in an urbanized catchment should not exceed the time of concentration calculated using Equation 6-10. The first design point is defined as the point where runoff first enters the storm sewer system.

$$t_c = \frac{L}{180} + 10 \qquad\qquad\qquad \text{(Eq. 6-10)}$$

Where:

t_c = maximum time of concentration at the first design point in an urban watershed (min)

L = waterway length (ft)

Equation 6-10 was developed using the rainfall-runoff data collected in the Denver region and, in essence, represents regional "calibration" of the Rational Method. Normally, Equation 6-10 will result in a lesser time of concentration at the first design point and will govern in an urbanized watershed. For subsequent design points, the time of concentration is calculated by accumulating the travel times in downstream drainageway reaches.

3.2.4   Minimum Time of Concentration

If the calculations result in a t_c of less than 10 minutes for undeveloped conditions, it is recommended that a minimum value of 10 minutes be used. The minimum t_c for urbanized areas is 5 minutes.

3.2.5   Post-Development Time of Concentration

As Equation 6-8 indicates, the time of concentration is a function of the 5-year runoff coefficient for a drainage basin. Typically, higher levels of imperviousness (higher 5-year runoff coefficients) correspond to shorter times of concentration, and lower levels of imperviousness correspond to longer times of

Figure 6-5. Colorado Springs Rainfall Intensity Duration Frequency
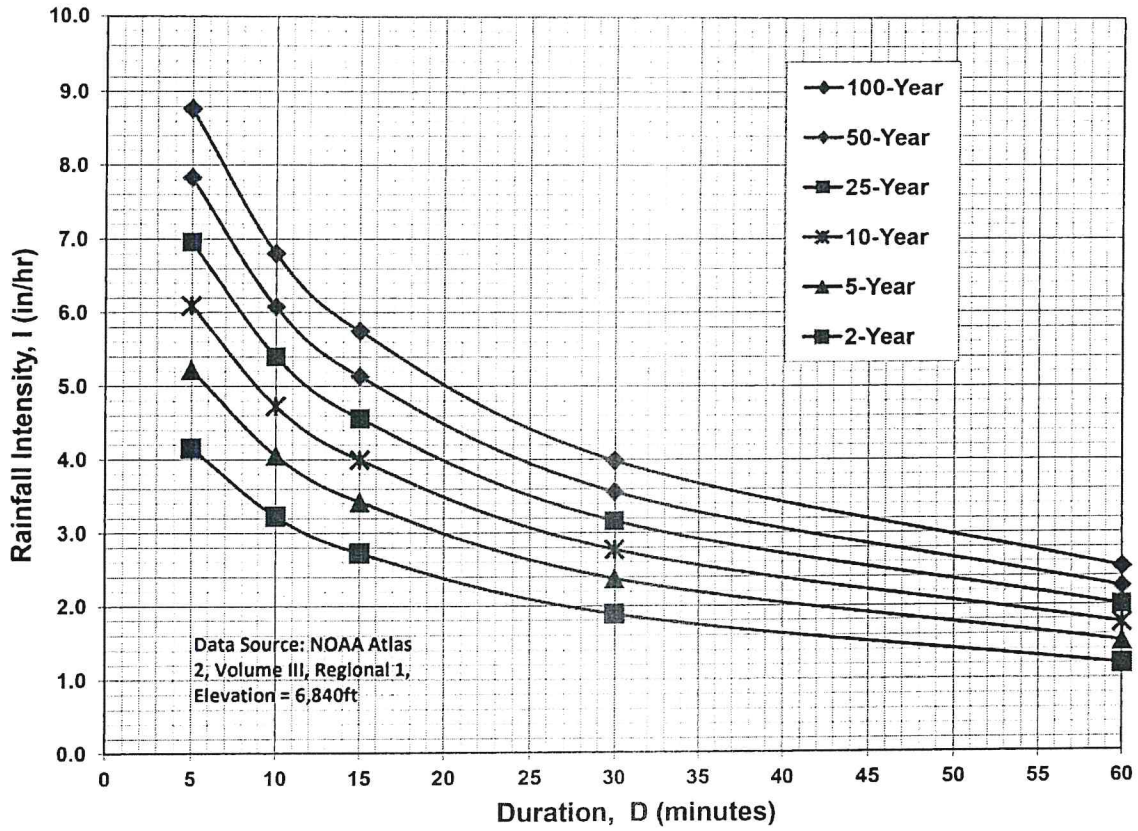
IDF Equations

$$I_{100} = -2.52 \ln(D) + 12.735$$

$$I_{50} = -2.25 \ln(D) + 11.375$$

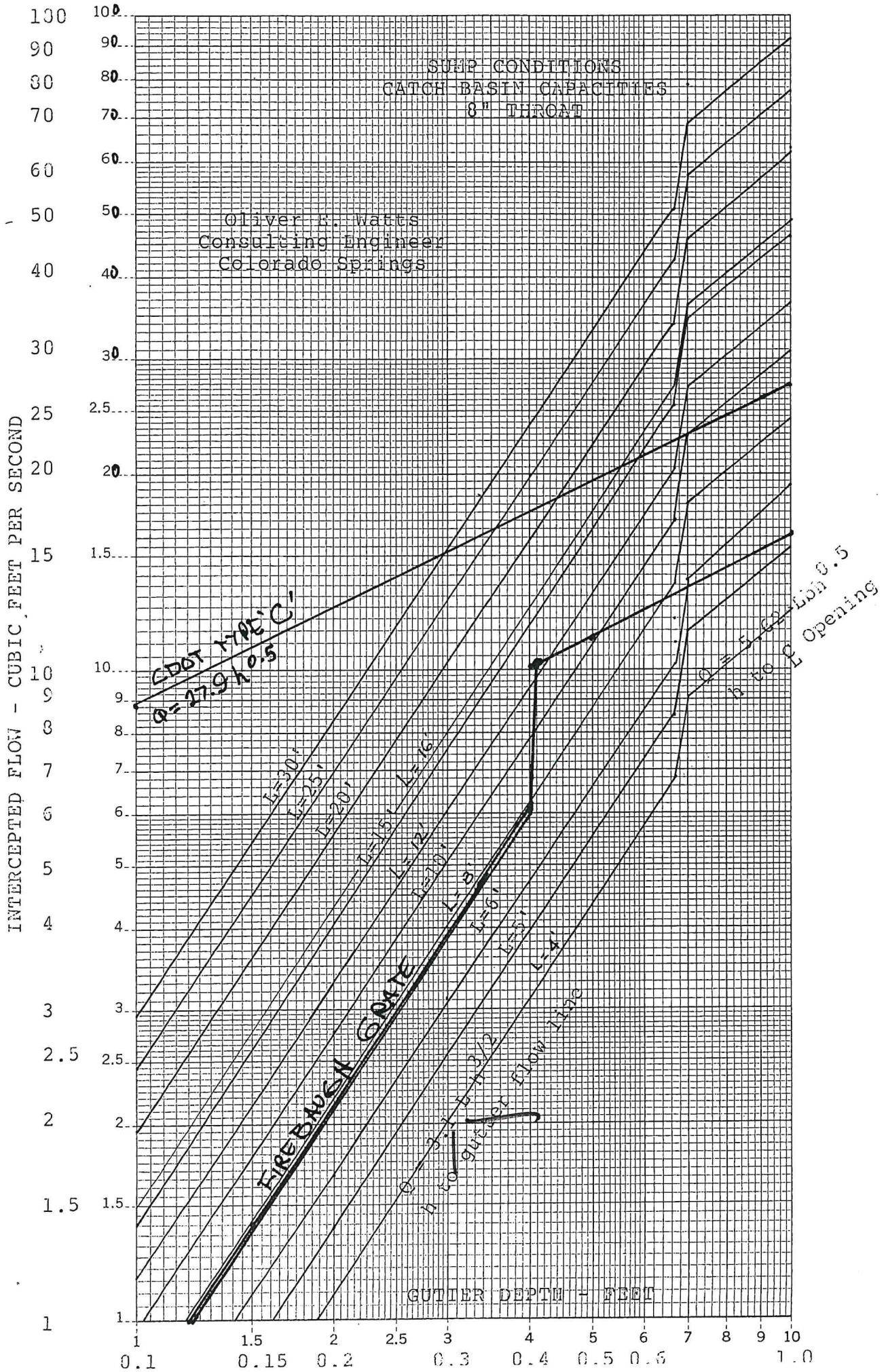$$I_{25} = -2.00 \ln(D) + 10.111$$

$$I_{10} = -1.75 \ln(D) + 8.847$$

$$I_{5} = -1.50 \ln(D) + 7.583$$
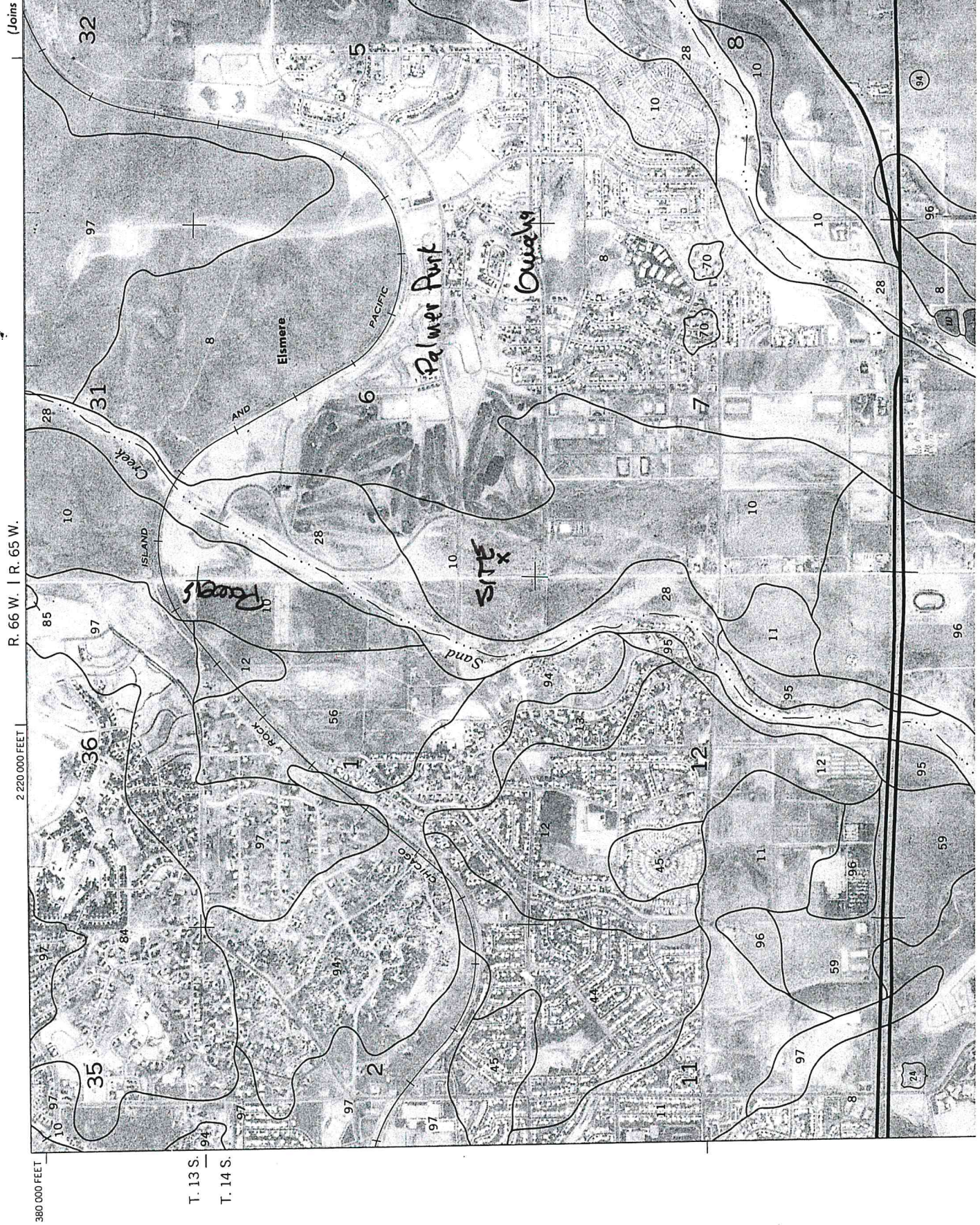
$$I_{2} = -1.19 \ln(D) + 6.035$$

Note: Values calculated by equations may not precisely duplicate values read from figure.

SUMP CONDITIONS
CATCH BASIN CAPACITIES
8" THROAT

Oliver R. Watts
Consulting Engineer
Colorado Springs

INTERCEPTED FLOW – CUBIC FEET PER SECOND

CDOT TYPE 'C'
Q = 27.9 h 0.5

FIREBAUGH GRATE

L=30' L=25' L=20' L=15' L=16' L=12' L=10' L=8' L=6' L=5' L=4'

Q = 3, L = h 3/2
h to gutter flow line

Q = .5 L(2g h)h 0.5
h to Þ Opening

GUTTER DEPTH – FEET

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

OLIVER E. WATTS
CONSULTING ENGINEER, INC.
COLORADO SPRINGS

6819 PALMER PARK BLVD
SCS SOILS MAP
1"=2000'

TABLE 16.--SOIL AND WATER FEATURES

[Absence of an entry indicates the feature is not a concern. See "flooding" in Glossary for definition of
terms as "rare," "brief," and "very brief." The symbol > means greater than]

Soil name and map symbol	Hydro-logic group	Flooding			Bedrock		Potential frost action
		Frequency	Duration	Months	Depth	Hardness	
					_In_		
Alamosa: 1---------------	C	Frequent------	Brief---------	May-Jun	>60	---	High.
Ascalon: 2, 3------------	B	None----------	---	---	>60	---	Moderate:
Badland: 4---------------	D	---	---	---	---	---	---
Bijou: 5, 6, 7----------	B	None----------	---	---	>60	---	Low.
Blakeland: 8---------------	A	None----------	---	---	>60	---	Low.
[1]9: Blakeland part-	A	None----------	---	---	>60	---	Low.
Fluvaquentic Haplaquolls part---------	D	Common--------	Very brief----	Mar-Aug	>60	---	High.
Blendon: 10-------------	B	None----------	---	---	>60	---	Moderate.
Bresser: 11, 12, 13------	B	None----------	---	---	>60	---	Low.
Brussett: 14, 15----------	B	None----------	---	---	>60	---	Moderate.
Chaseville: 16, 17----------	A	None----------	---	---	>60	---	Low.
[1]18: Chaseville part	A	None----------	---	---	>60	---	Low.
Midway part----	D	None----------	---	---	10-20	Rippable	Moderate.
Columbine: 19-------------	A	None to rare	---	---	>60	---	Low.
Connerton: [1]20: Connerton part-	B	None----------	---	---	>60	---	High.
Rock outcrop part---------	D	---	---	---	---	---	---
Cruckton: 21-------------	B	None----------	---	---	>60	---	Moderate.
Cushman: 22, 23----------	C	None----------	---	---	20-40	Rippable	Moderate.
[1]24: Cushman part---	C	None----------	---	---	20-40	Rippable	Moderate.
Kutch part-----	C	None----------	---	---	20-40	Rippable	Moderate.
Elbeth: 25, 26----------	B	None----------	---	---	>60	---	Moderate.
[1]27: Elbeth part----	B	None----------	---	---	>60	---	Moderate.

See footnote at end of table.

SF — SF — SF

SF

1 ½" x 1 ½"
(RECOMMENDED) WOODEN
FENCE POST WITH 10' MAX
SPACING

SILT FENCE
GEOTEXTILE

A

COMPACTED
BACKFILL

FLOW

EXISTING
GROUND

6" MIN

36"–48"
TYP.

AT LEAST 10"
OF SILT FENCE
"TAIL" SHALL BE
BURIED

4" MIN

18"
MIN

SILT FENCE

JOIN
FIRST

ROTATE
SECOND

POSTS SHALL BE JOINED AS
SHOWN, THEN ROTATED 180 DEG.
IN DIRECTION SHOWN AND DRIVEN
INTO THE GROUND
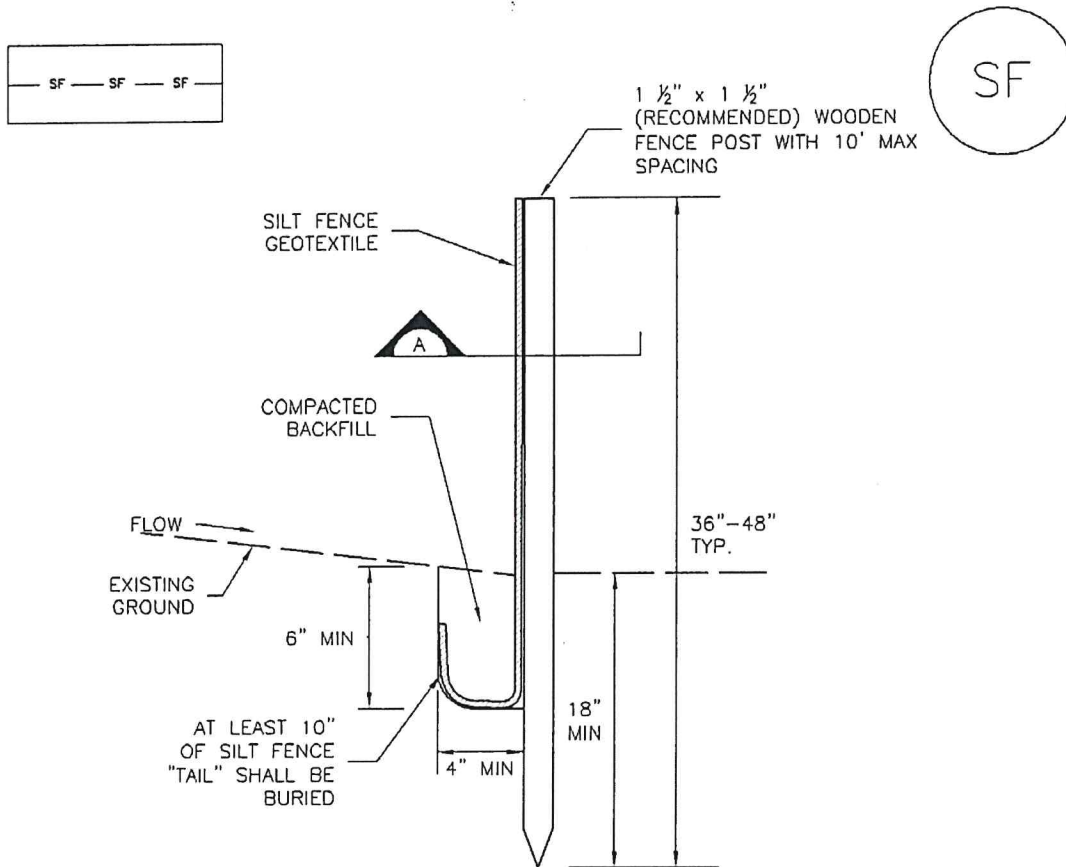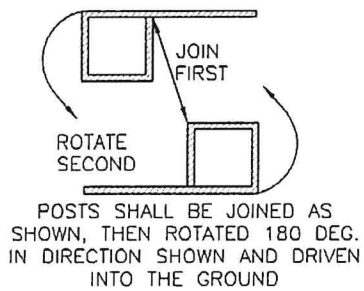
POSTS SHALL OVERLAP
AT JOINTS SO THAT NO GAPS
EXIST IN SILT FENCE

THICKNESS OF GEOTEXTILE HAS
BEEN EXAGGERATED, TYP
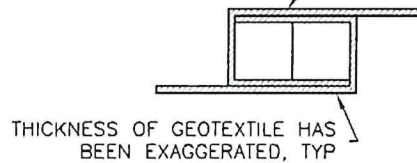
SECTION A

SF–1. SILT FENCE

SILT FENCE INSTALLATION NOTES

1. SILT FENCE MUST BE PLACED AWAY FROM THE TOE OF THE SLOPE TO ALLOW FOR WATER PONDING. SILT FENCE AT THE TOE OF A SLOPE SHOULD BE INSTALLED IN A FLAT LOCATION AT LEAST SEVERAL FEET (2-5 FT) FROM THE TOE OF THE SLOPE TO ALLOW ROOM FOR PONDING AND DEPOSITION.

2. A UNIFORM 6" X 4" ANCHOR TRENCH SHALL BE EXCAVATED USING TRENCHER OR SILT FENCE INSTALLATION DEVICE. NO ROAD GRADERS, BACKHOES, OR SIMILAR EQUIPMENT SHALL BE USED.

3. COMPACT ANCHOR TRENCH BY HAND WITH A "JUMPING JACK" OR BY WHEEL ROLLING. COMPACTION SHALL BE SUCH THAT SILT FENCE RESISTS BEING PULLED OUT OF ANCHOR TRENCH BY HAND.

4. SILT FENCE SHALL BE PULLED TIGHT AS IT IS ANCHORED TO THE STAKES. THERE SHOULD BE NO NOTICEABLE SAG BETWEEN STAKES AFTER IT HAS BEEN ANCHORED TO THE STAKES.

5. SILT FENCE FABRIC SHALL BE ANCHORED TO THE STAKES USING 1" HEAVY DUTY STAPLES OR NAILS WITH 1" HEADS. STAPLES AND NAILS SHOULD BE PLACED 3" ALONG THE FABRIC DOWN THE STAKE.

6. AT THE END OF A RUN OF SILT FENCE ALONG A CONTOUR, THE SILT FENCE SHOULD BE TURNED PERPENDICULAR TO THE CONTOUR TO CREATE A "J-HOOK." THE "J-HOOK" EXTENDING PERPENDICULAR TO THE CONTOUR SHOULD BE OF SUFFICIENT LENGTH TO KEEP RUNOFF FROM FLOWING AROUND THE END OF THE SILT FENCE (TYPICALLY 10' - 20').

7. SILT FENCE SHALL BE INSTALLED PRIOR TO ANY LAND DISTURBING ACTIVITIES.

SILT FENCE MAINTENANCE NOTES

1. INSPECT BMPs EACH WORKDAY, AND MAINTAIN THEM IN EFFECTIVE OPERATING CONDITION. MAINTENANCE OF BMPs SHOULD BE PROACTIVE, NOT REACTIVE. INSPECT BMPs AS SOON AS POSSIBLE (AND ALWAYS WITHIN 24 HOURS) FOLLOWING A STORM THAT CAUSES SURFACE EROSION, AND PERFORM NECESSARY MAINTENANCE.

2. FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION. INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.

3. WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.

4. SEDIMENT ACCUMULATED UPSTREAM OF THE SILT FENCE SHALL BE REMOVED AS NEEDED TO MAINTAIN THE FUNCTIONALITY OF THE BMP, TYPICALLY WHEN DEPTH OF ACCUMULATED SEDIMENTS IS APPROXIMATELY 6".

5. REPAIR OR REPLACE SILT FENCE WHEN THERE ARE SIGNS OF WEAR, SUCH AS SAGGING, TEARING, OR COLLAPSE.

6. SILT FENCE IS TO REMAIN IN PLACE UNTIL THE UPSTREAM DISTURBED AREA IS STABILIZED AND APPROVED BY THE LOCAL JURISDICTION, OR IS REPLACED BY AN EQUIVALENT PERIMETER SEDIMENT CONTROL BMP.

7. WHEN SILT FENCE IS REMOVED, ALL DISTURBED AREAS SHALL BE COVERED WITH TOPSOIL, SEEDED AND MULCHED OR OTHERWISE STABILIZED AS APPROVED BY LOCAL JURISDICTION.

(DETAIL ADAPTED FROM TOWN OF PARKER, COLORADO AND CITY OF AURORA, NOT AVAILABLE IN AUTOCAD)
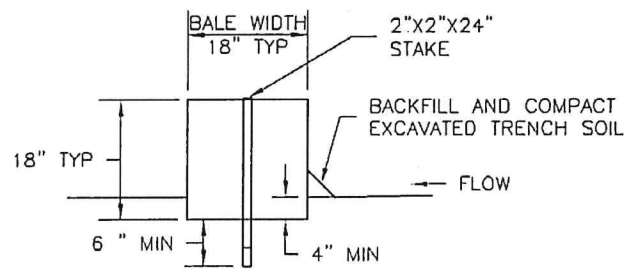
NOTE: MANY JURISDICTIONS HAVE BMP DETAILS THAT VARY FROM UDFCD STANDARD DETAILS. CONSULT WITH LOCAL JURISDICTIONS AS TO WHICH DETAIL SHOULD BE USED WHEN DIFFERENCES ARE NOTED.

BALE LENGTH
36" TYP

2"X2"X24"
STAKE

FLOW

BACKFILL AND COMPACT
EXCAVATED TRENCH SOIL

BINDING WIRE
OR TWINE

STRAW BALE

4" MIN

BALE WIDTH
18" TYP

TRENCH FOR STRAW BALE

BALE WIDTH
18" TYP

2"X2"X24"
STAKE

BACKFILL AND COMPACT
EXCAVATED TRENCH SOIL

FLOW

18" TYP

6 " MIN

4" MIN
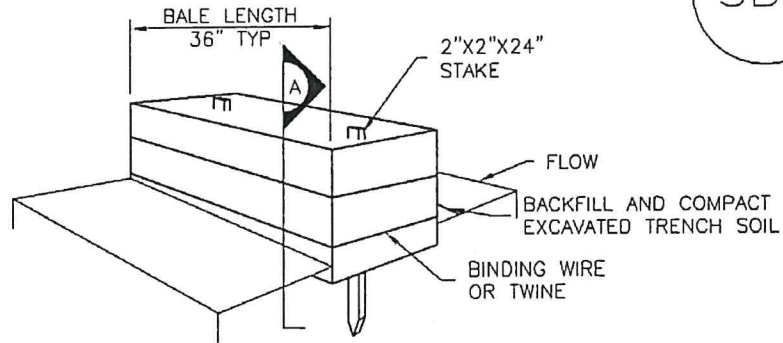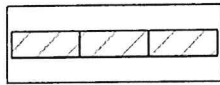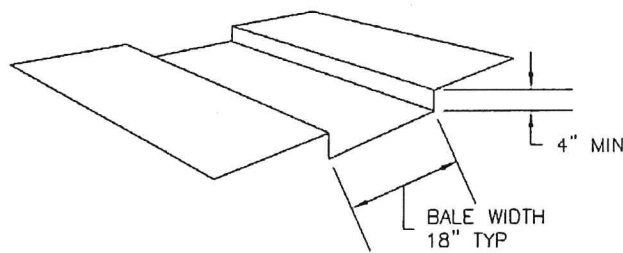
SECTION A

SBB-1. STRAW BALE

STRAW BALE INSTALLATION NOTES

1. SEE PLAN VIEW FOR:
   -LOCATION(S) OF STRAW BALES.

2. STRAW BALES SHALL CONSIST OF CERTIFIED WEED FREE STRAW OR HAY. LOCAL JURISDICTIONS MAY REQUIRE PROOF THAT BALES ARE WEED FREE.

3. STRAW BALES SHALL CONSIST OF APPROXIMATELY 5 CUBIC FEET OF STRAW OR HAY AND WEIGH NOT LESS THAN 35 POUNDS.

4. WHEN STRAW BALES ARE USED IN SERIES AS A BARRIER, THE END OF EACH BALE SHALL BE TIGHTLY ABUTTING ONE ANOTHER.

5. STRAW BALE DIMENSIONS SHALL BE APPROXIMATELY 36"X18"X18".

6. A UNIFORM ANCHOR TRENCH SHALL BE EXCAVATED TO A DEPTH OF 4". STRAW BALES SHALL BE PLACED SO THAT BINDING TWINE IS ENCOMPASSING THE VERTICAL SIDES OF THE BALE(S). ALL EXCAVATED SOIL SHALL BE PLACED ON THE UPHILL SIDE OF THE STRAW BALE(S) AND COMPACTED.

7. TWO (2) WOODEN STAKES SHALL BE USED TO HOLD EACH BALE IN PLACE. WOODEN STAKES SHALL BE 2"X2"X24". WOODEN STAKES SHALL BE DRIVEN 6" INTO THE GROUND.

STRAW BALE MAINTENANCE NOTES

1. INSPECT BMPs EACH WORKDAY, AND MAINTAIN THEM IN EFFECTIVE OPERATING CONDITION. MAINTENANCE OF BMPs SHOULD BE PROACTIVE, NOT REACTIVE. INSPECT BMPs AS SOON AS POSSIBLE (AND ALWAYS WITHIN 24 HOURS) FOLLOWING A STORM THAT CAUSES SURFACE EROSION, AND PERFORM NECESSARY MAINTENANCE.

2. FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION. INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.

3. WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.

4. STRAW BALES SHALL BE REPLACED IF THEY BECOME HEAVILY SOILED, ROTTEN, OR DAMAGED BEYOND REPAIR.

5. SEDIMENT ACCUMULATED UPSTREAM OF STRAW BALE BARRIER SHALL BE REMOVED AS NEEDED TO MAINTAIN FUNCTIONALITY OF THE BMP, TYPICALLY WHEN DEPTH OF ACCUMULATED SEDIMENTS IS APPROXIMATELY ¼ OF THE HEIGHT OF THE STRAW BALE BARRIER.

6. STRAW BALES ARE TO REMAIN IN PLACE UNTIL THE UPSTREAM DISTURBED AREA IS STABILIZED AND APPROVED BY THE LOCAL JURISDICTION.

7. WHEN STRAW BALES ARE REMOVED, ALL DISTURBED AREAS SHALL BE COVERED WITH TOPSOIL, SEEDED AND MULCHED OR OTHERWISE STABILIZED AS APPROVED BY LOCAL JURISDICTION.

(DETAILS ADAPTED FROM TOWN OF PARKER, COLORADO, NOT AVAILABLE IN AUTOCAD)

NOTE: MANY JURISDICTIONS HAVE BMP DETAILS THAT VARY FROM UDFCD STANDARD DETAILS. CONSULT WITH LOCAL JURISDICTIONS AS TO WHICH DETAIL SHOULD BE USED WHEN DIFFERENCES ARE NOTED.

PALMER PARK BOULEVARD

POWERS BOULEVARD

PAONIA STREET

SITE

OMAHA BOULEVARD

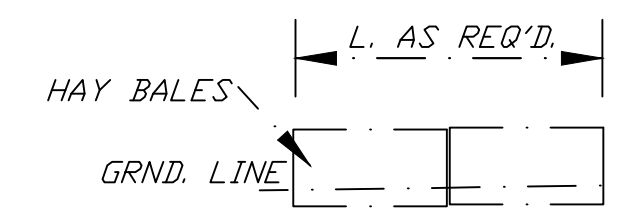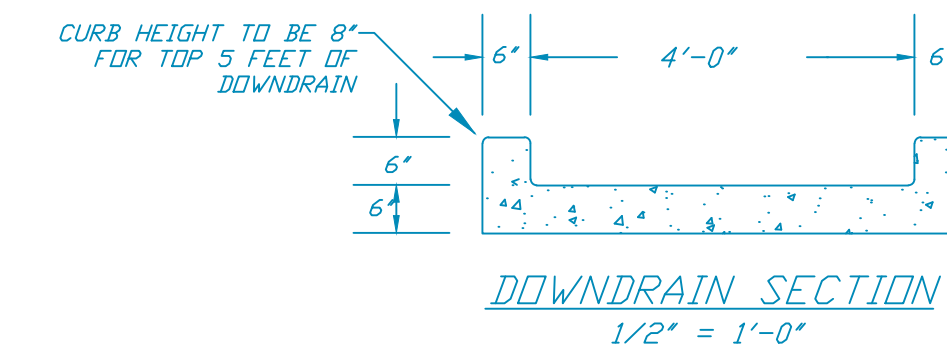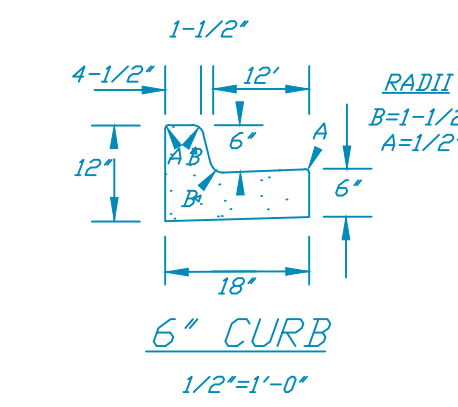VICINITY MAP
N.T.S.

Scale 1" = 20'

20 0 20 40 60

N

•Please provide a complete Grading and Erosion Control Plan with El Paso County Standard Grading and Erosion Control Plan notes and standard signature blocks.

•The Grading and Erosion control plan is required to meet all items on the El Paso County Grading and Erosion Control submittal checklist found in appendix E of the ECM. If an item from the checklist is not applicable please state it on the plans.

Show concrete washout area on the plan and provide a detail of it. Also please show the staging area.
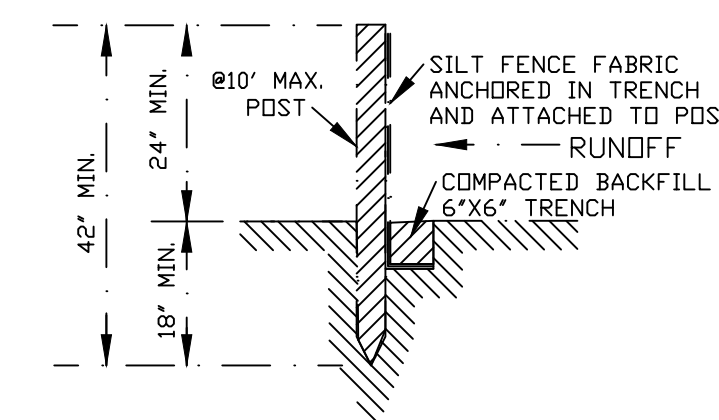
EROSION CONTROL LEGEND:

━ ‐ ━ SILT FENCE

▬▬▬ SILT DAM

N00°28'24"E-91.36'(P)

41.0'

10.0'

20.0'

10.0'

20.0'

(5883-B)

(5883-A)

(5881)

N89°31'36"W-217.81' (P)

6310

08.85   09.70

08.75   09.94

09.94   FF EL. 6310.00   09.94

09.94   09.11

09.94   09.94

08.26 08.50   08.64

07.76   08.00

4' CURB OUTLET

07.25

SAND FILTER BASIN
A=45 SF V=90 CF
D=2.0'
TOP = 07.25
INV. = 05.25

ACCESS EASEMENT

315.00'(P)

20' UTILITY EASEMENT
BK 5172, PG 1380

6306

ASPHALT PARKING

ASPHALT PARKING

35' ACCESS EASEMENT

LOT 1

S

W

10'

12' CONC

CONC

CONC

140.00'(P)

6304

20' UTILITY EASEMENT

ASPHALT PARKING

CONC

CONC

CONC

LP

ASPHALT

6" CURB
1/2"=1'-0"

RADII
B=1-1/2"
A=1/2"

DOWNDRAIN SECTION
1/2" = 1'-0"

CURB HEIGHT TO BE 8" FOR TOP 5 FEET OF DOWNDRAIN

HAY BALES

GRND. LINE

L. AS REQ'D.

SILT DAM
1/8" = 1'-0"

CURB OUTLET

AC. PAV'T.

1'-0" WATER DEPTH

CONC. BLOCK

1'-11" MIN.

4'X2' RIPRAP
6" DIA., T=1'

CDOT CLASS B OR C FILTER MATERIAL

SAND FILTER SECTION
1/2" = 1'-0"

@10' MAX. POST

42" MIN.

24" MIN.

18" MIN.

SILT FENCE FABRIC ANCHORED IN TRENCH AND ATTACHED TO POST
RUNOFF
COMPACTED BACKFILL
6"X6" TRENCH

SILT FENCE INSTALLATION
1/2"=1'-0"

Markup Summary

Daniel Torres (4)

Subject: Text Box
Page Label: 24
Lock: Unlocked
Author: Daniel Torres
Date: 12/13/2018 3:22:26 PM
Color: ■

•Please provide a complete Grading and Erosion Control Plan with El Paso County Standard Grading and Erosion Control Plan notes and standard signature blocks.

•The Grading and Erosion control plan is required to meet all items on the El Paso County Grading and Erosion Control submittal checklist found in appendix E of the ECM. If an item from the checklist is not applicable please state it on the plans.

Subject: Callout
Page Label: 4
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Author: Daniel Torres
Date: 12/13/2018 4:35:13 PM
Color: ■

Please revise the text so that it matches the design shown on the drainage report.

Subject: Text Box
Page Label: 24
Lock: Unlocked
Author: Daniel Torres
Date: 12/13/2018 5:13:13 PM
Color: ■

Show concrete washout area on the plan and provide a detail of it. Also please show the staging area.

Subject: Callout
Page Label: 11
Lock: Unlocked
Author: Daniel Torres
Date: 12/13/2018 7:21:04 AM
Color: ■

Please provide the new revised calculation that has been submitted with the drainage report.