Preliminary Drainage Study

Dhir Residence
Coastal Development Permit

3821 Via del Mar
San Diego, CA 92130

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December 15, 2020

PTS No. 670393

Introduction

This project is located at 3821 Via del Mar, on Parcel 2 of Parcel Map 10227, in the City of San Diego. The project proposes the removal of existing remnants of prior development including walls and a concrete slab and their replacement with a new single-family residence and accessory dwelling unit with landscaping, and hardscape. This is a discretionary project for a Coastal Development Permit.

The site, in its existing pre-construction condition, conveys offsite runoff from the north and west through the property, discharging to the south and southeast. The discharge southerly is onto a neighboring property with the easterly discharge onto Via del Mar. Runoff southerly decreases by 0.54 cfs and easterly increases by 0.85 cfs. The project as a whole has an increase in runoff of 0.31 cfs. Due to the requirement to detain runoff, due to the project being a Priority Development project, for storm water purposes, the actual runoff increase will be less. The slight change in runoff volumes is negligible and will have no adverse effect on the public storm drain system.

Existing site imperviousness is 1,230 sf (2.8%). Proposed site imperviousness is 16,618 sf (38.2%). The two proposed curb outlets are adequate to convey the proposed runoff (see Appendix).

Section 404 of CWA regulates the discharge of dredged or fill material into waters of the United States. Section 404 is regulated by the Army Corps of Engineers. Section 401 of CWA requires that the State provide certification that any activity authorized under Section 404 is in compliance with effluent limits, the state's water quality standards, and any other appropriate requirements of state law. Section 401 is administered by the State Regional Water Quality Control Board. The project does not require a Federal CWA Section 404 permit nor Section 401 Certification because it does not cause dredging or filling in waters of the United States and is in compliance with the State Water Quality Standards.

The Rational Method was used to calculate the anticipated flow for the 100-year storm return frequency event using the method outlined in the City of San Diego Drainage Design Manual.

The proposed project will have no adverse effects on the neighboring properties nor the public storm drain system.

_____ 12-15-20

Antony K. Christensen Date
RCE 54021
Exp. 12-31-21
JN A2020-40

Calculations

1. Intensity Calculation

(From the City of San Diego Drainage Design Manual)
Tc = Time of concentration

$Tc = 1.8\ (1.1\text{-}C)\ (D)^{1/2} / S^{1/3}$

Since the difference in elevation is 43' (300'-257') and the distance traveled is 370' (S=11.6%). C=0.55.

Tc = 8.4 minutes

From table in Manual:

I_{100} = 3.8 inches

2. Coefficient Determination

This is a single family residential with no offsite that will contribute to runoff:

Pre-Construction:
Onsite is vacant with some offsite Single-Family

C= 0.45 / C=0.55

Post construction:
Single-Family

C= 0.55

3. Volume calculations

Q = CIA

Areas of Drainage

Pre-Construction

Area of site draining easterly	ON-E = 0.1515 Ac
Area of site draining southerly	ON-S = 0.8482 Ac
Area offsite draining onsite from the west	OS-4 = 0.2175 Ac
Area offsite draining onsite from the north	OS-3 = 0.5222 Ac
Area offsite draining onsite from the north (west of OS—3)	OS-2 = 0.0877 Ac
Area offsite draining from the north to Via del Mar	OS-1 = 0.1921 Ac

Post-Construction

Area offsite draining to ON-2	OS-4 = 0.2175 Ac
Area offsite draining to ON-3	OS-3N = 0.4325 Ac
Area offsite draining to ON-2	OS-3S = 0.0897 Ac
Area offsite draining to ON-3	OS-2 = 0.0877 Ac
Area offsite draining from the north to Via del Mar	OS-1 = 0.1921 Ac
Area of site draining to southerly curb outlet to Via del Mar	ON-1 = 0.4439 Ac
Area of site draining southerly by sheet flow	ON-2 = 0.4570 Ac

Area of site draining to northerly curb outlet to Via del Mar	ON-3 = 0.0824 Ac
Area of site draining to northerly curb outlet to Via del Mar	ON-4 = 0.0697 Ac
Area of site with pool Runoff abstracted	P = 0.0345 Ac

Pre-Construction

$Q_{100ON-E}$ = (0.45) (3.8) (0.1515)
$Q_{100ON-S}$ = (0.45) (3.8) (0.8482)
$Q_{100OS-4}$ = (0.45) (3.8) (0.2175)
$Q_{100OS-3}$ = (0.55) (3.8) (0.5222)
$Q_{100OS-2}$ = (0.55) (3.8) (0.0877)
$Q_{100OS-1}$ = (0.55) (3.8) (0.1921)

Q_{100N-E} = 0.26 cfs
Q_{100N-S} = 1.45 cfs
Q_{100S-4} = 0.37 cfs
Q_{100S-3} = 1.09 cfs
Q_{100S-2} = 0.18 cfs
Q_{100S-1} = 0.40 cfs

Post-Construction

$Q_{100ON-1}$ = (0.55) (3.8) (0.4439)
$Q_{100ON-2}$ = (0.55) (3.8) (0.3692)
$Q_{100ON-3}$ = (0.55) (3.8) (0.0824)
$Q_{100ON-4}$ = (0.55) (3.8) (0.0697)
Q_{100P} = (0.00) (3.8) (0.0345) (abstracted)
$Q_{100OS-4}$ = (0.45) (3.8) (0.2175)
$Q_{100OS-3N}$ = (0.55) (3.8) (0.4325)
$Q_{100OS-3S}$ = (0.55) (3.8) (0.0897)
$Q_{100OS-2}$ = (0.55) (3.8) (0.0877)
$Q_{100OS-1}$ = (0.55) (3.8) (0.1921)

$Q_{100ON-1}$ = 0.93 cfs
$Q_{100ON-2}$ = 0.77 cfs
$Q_{100ON-3}$ = 0.17 cfs
$Q_{100ON-4}$ = 0.15 cfs
Q_{100P} = 0.00 cfs (abstracted)
Q_{100S-4} = 0.37 cfs

$Q_{100S-3N}$ = 0.90 cfs
$Q_{100S-3S}$ = 0.19 cfs
Q_{100S-2} = 0.18 cfs
Q_{100S-1} = 0.40 cfs

Site Area	Pre-Construction				Post-Construction			
	Q_{100} (CFS)	V_{100} (FPS)	C	Area (Ac)	Q_{100} (CFS)	V_{100} (FPS)	C	Area (Ac)
ON-E	0.26	< 2	0.45	0.1515				
ON-S	1.45	< 2	0.45	0.8482				
OS-4	0.37	< 2	0.45	0.2175	0.37	< 2	0.45	0.2175
OS-3	1.09	< 2	0.55	0.5222				
OS-3N					0.90	< 2	0.55	0.4325
OS-3S					0.19	< 2	0.55	0.0897
OS-2	0.18	< 2	0.55	0.0877	0.18	< 2	0.55	0.0877
OS-1	0.40	< 2	0.55	0.1921	0.40	< 2	0.55	0.1921
ON-1					0.93		0.55	0.4439
ON-2					0.77	< 2	0.55	0.3692
ON-3					0.17		0.55	0.0824
ON-4					0.15	< 2	0.55	0.0697
P					0.00	N/A	N/A	0.0345
Total	3.75			2.0192	4.06			2.0192

4. Discussion

Runoff to a southerly neighboring property, from offsite (areas OS-3 & OS-4) and onsite (area ON-S) prior to construction is 2.91 cfs. Following construction, runoff to the southerly property is conveyed from offsite (areas OS-3S & OS-4) and onsite (area ON-2) and decreases to 1.33 cfs. Runoff to Via del Mar, from offsite (areas OS-1 & OS-2) and onsite (area ON-E) prior to construction is 0.84 cfs. Following construction, runoff to Via del Mar conveyed from offsite (areas OS-1,2 & 3N) and onsite (areas ON-1,3 & 4) and increases to 2.73 cfs. Precipitation falling on the pool area will not leave the site, being abstracted from the site runoff. Therefore, runoff southerly decreases by 1.58 cfs and easterly increases by 1.89 cfs . The project, as a whole has an increase in runoff of 0.31 cfs. Due to the requirement to detain runoff, due to the project being a Priority Development project, for storm water purposes, the actual runoff increase will be less. The slight change in runoff volumes is negligible and will have no adverse effect on the public storm drain system.

Runoff from Areas OS-2, OS-3N and ON-3 flow to the northerly curb outlet (1.25 cfs) and from Area ON-1 flows to the southerly curb outlet (0.93 cfs). See Appendix for calculations.

APPENDIX

Table A-1. Runoff Coefficients for Rational Method

Land Use	Runoff Coefficient (C)
	Soil Type [1]
Residential:	
Single Family	0.55
Multi-Units	0.70
Mobile Homes	0.65
Rural (lots greater than ½ acre)	0.45
Commercial [2]	
80% Impervious	0.85
Industrial [2]	
90% Impervious	0.95

Note:
[1] Type D soil to be used for all areas.
[2] Where actual conditions deviate significantly from the tabulated imperviousness values of 80% or 90%, the values given for coefficient C, may be revised by multiplying 80% or 90% by the ratio of actual imperviousness to the tabulated imperviousness. However, in case shall the final coefficient be less than 0.50. For example: Consider commercial property on D soil.

Actual imperviousness = 50%
Tabulated imperviousness = 80%
Revised C = (50/80) x 0.85 = 0.53

The values in Table A–1 are typical for urban areas. However, if the basin contains rural or agricultural land use, parks, golf courses, or other types of nonurban land use that are expected to be permanent, the appropriate value should be selected based upon the soil and cover and approved by the City.

A.1.3. Rainfall Intensity

The rainfall intensity (I) is the rainfall in inches per hour (in/hr.) for a duration equal to the T_c for a selected storm frequency. Once a particular storm frequency has been selected for design and a T_c calculated for the drainage area, the rainfall intensity can be determined from the Intensity-Duration-Frequency Design Chart (Figure A-1).

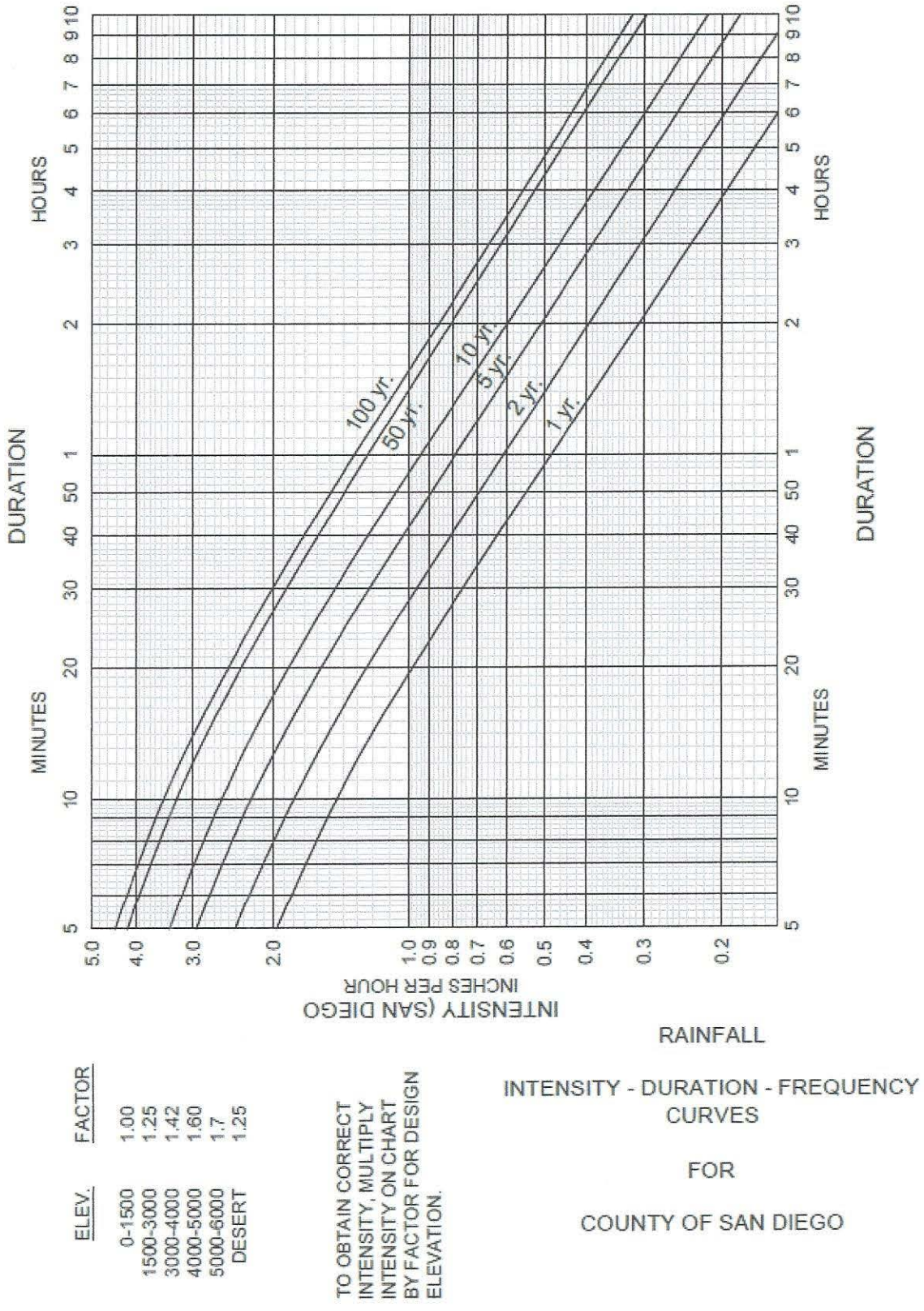

Figure A-1. Intensity-Duration-Frequency Design Chart

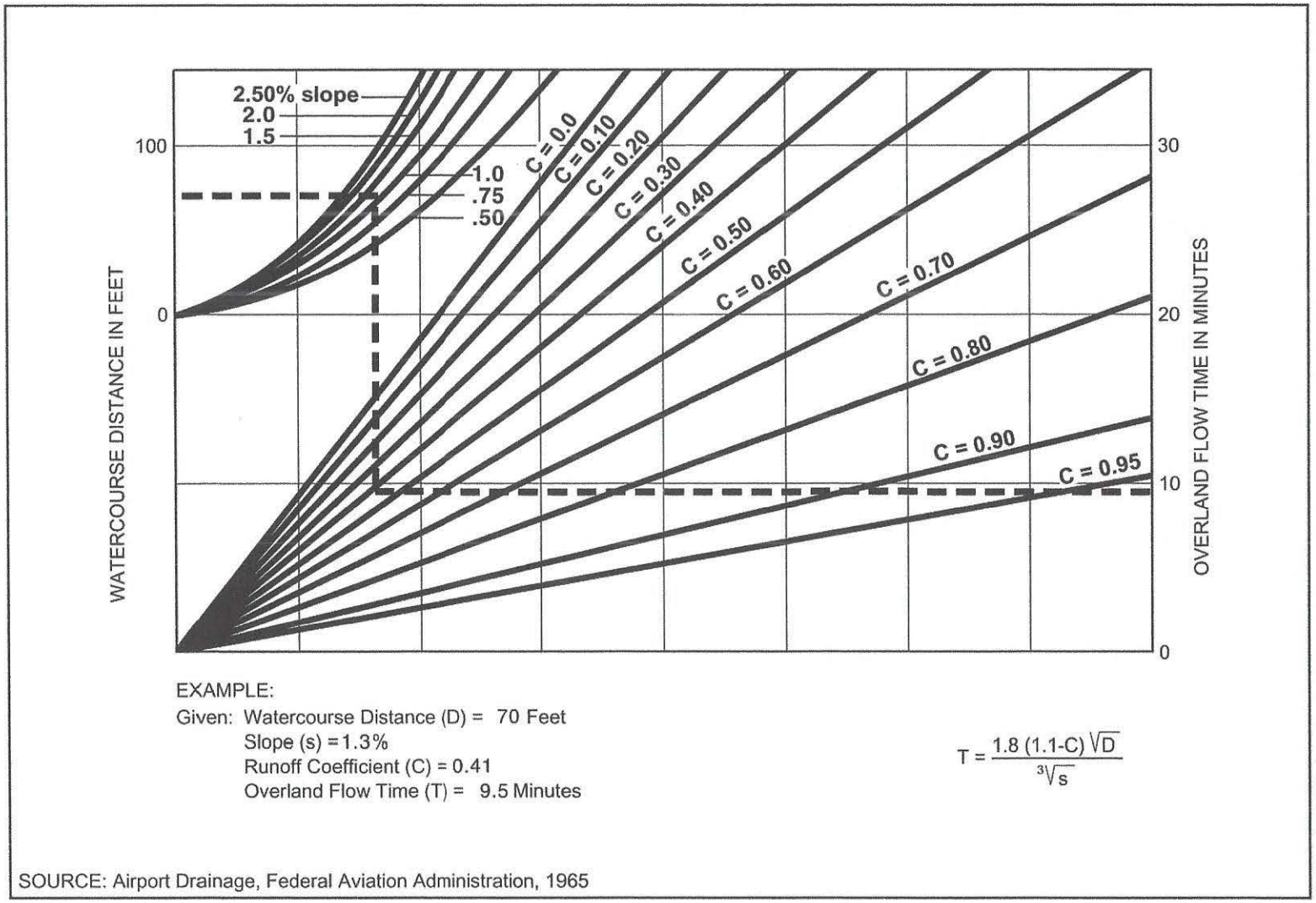

Figure A-4. Rational Formula – Overland Time of Flow Nomograph

Note: Use formula for watercourse distances in excess of 100 feet.

Type of conveyance is a: North Curb Outlet
Depth of channel equals .25 Feet
Bottom Width Equals 3
Side slope equals .01
Slope of conveyance equals 2 %
Roughness equals .0135
Flow quantity equals 1.264691 CFS
Area equals .3541394 Square Feet
Velocity equals 3.529683 FPS
Depth of flow equals .1180001 Feet

Type of conveyance is a: South Curb Outlet
Depth of channel equals .25 Feet
Bottom Width Equals 3
Side slope equals .01
Slope of conveyance equals 2 %
Roughness equals .0135
Flow quantity equals .9356445 CFS
Area equals .2940961 Square Feet
Velocity equals 3.162231 FPS
Depth of flow equals 9.800002E-02 Feet

DRAINAGE AREA MAPS

PRE-DEVELOPMENT DRAINAGE AREA MAP

PRE-CONSTRUCTION DRAINAGE AREA MAP

AREA OS-3
0.5222 AC (C=0.55)
FLOWS FROM OFFSITE
BY SHEET FLOW (RED)
SOUTHERLY

AREA OS-4
0.2175 AC (C=0.45)
FLOWS FROM OFFSITE
BY SHEET FLOW (BLUE)
SOUTHEASTERLY

AREA OS-2
0.0877 AC (C=0.55)
FLOWS FROM OFFSITE
BY SHEET FLOW (ORANGE)
SOUTH/SOUTHEASTERLY

VIA DEL MAR
DEDICATED PER MAP PARCEL MAP 10227

AREA ON-E
0.1515 AC (C=0.45)
FLOWS SOUTHEASTERLY
BY SHEET FLOW (YELLOW)

AREA OS-1
0.1921 AC (C=0.55)
FLOWS SOUTHERLY
BY SHEET FLOW (BLUE)

AREA ON-S
0.8482 AC (C=0.45)
FLOWS SOUTHERLY
BY SHEET FLOW (GREEN)

SCALE: 1" = 40'

0 20 40 60 80

POST-DEVELOPMENT DRAINAGE AREA MAP

POST-CONSTRUCTION DRAINAGE AREA MAP

AREA OS-3N
0.4325 AC (C=0.55)
FLOWS FROM OFFSITE
BY SHEET FLOW (RED)
SOUTHERLY

AREA OS-2
0.0877 AC (C=0.55)
FLOWS FROM OFFSITE
BY SHEET FLOW (ORANGE)
SOUTHERLY

AREA OS-1
0.1921 AC (C=0.55)
FLOWS FROM OFFSITE
BY SHEET FLOW (BLUE)
SOUTHERLY/SOUTHEASTERLY

AREA OS-4
0.2175 AC (C=0.45)
FLOWS FROM OFFSITE
BY SHEET FLOW (BLUE)
SOUTHEASTERLY

AREA ON-3
0.0824 AC (C=0.55)
FLOWS TO NORTHERLY
CURB OUTLET (CYAN)

AREA OS-3S
0.0897 AC (C=0.55)
FLOWS FROM OFFSITE
BY SHEET FLOW (YELLOW)
SOUTHERLY

PARCEL 1
PARCEL MAP 10227

W 1/2, NW 1/4, SEC 30
5.14S, R3W SBBM

PORSE 1/4, NW 1/4, SEC 30
5.14S, R3W SBBM

VIA DEL MAR
DEDICATED PER MAP PARCEL MAP 10227

10" P/C WATER PER
DWG 29132-9-D

278.25 FF
268.0 FF LL

269.0 FF

PARCEL 4
PARCEL MAP 21689

AREA P
0.0345 AC (C=0.55)
ABSTRACTED BY POOL
(BLUE)

AREA ON-2
0.3692 AC (C=0.55)
FLOWS SOUTHERLY
BY SHEET FLOW (GREEN)

AREA ON-1
0.4439 AC (C=0.55)
FLOWS TO SOUTHERLY
CURB OUTLET (RED)

AREA ON-4
0.0697 AC (C=0.55)
FLOWS SOUTHERLY
AND EASTERLY
BY SHEET FLOW (YELLOW)

SCALE: 1" = 40'

0 20 40 60 80