Calculations for the
Runoff Rate

The following calculations are based on Zone 2 from Table A-9 found in the Albuquerque Development Process Manual, Section 22.2 page 15.

| 100 YEAR PEAK DISCHARGE - TABLE A-9 | | | | |
|---|---|---|---|---|
| ZONE | A | B | C | D |
| 1 | 1.290 | 2.030 | 2.870 | 4.370 |
| 2 | 1.560 | 2.280 | 3.140 | 4.700 |
| 3 | 1.870 | 2.600 | 3.450 | 5.020 |
| 4 | 2.200 | 2.920 | 3.730 | 5.250 |

Treatment Type Areas for Proposed Conditions:

$Area_{A1} := 0 \quad Area_{B1} := 0 \quad Area_{C1} := 1.00 \quad Area_{D1} := 5.66 \quad Ac$

$Q_{w1} := 1.870 \cdot Area_{A1} + 2.600 \cdot Area_{B1} + 3.450 \cdot Area_{C1} + 5.020 \cdot Area_{D1} = 31.863 \quad cfs$

Treatment Type Areas for Future Conditions Per RTI Report:

$Area_{A1} := 0 \quad Area_{B1} := 0 \quad Area_{C1} := 2.00 \quad Area_{D1} := 4.66 \quad Ac$

$Q_{w1} := 1.870 \cdot Area_{A1} + 2.600 \cdot Area_{B1} + 3.450 \cdot Area_{C1} + 5.020 \cdot Area_{D1} = 30.293 \quad cfs$

Treatment Type Areas for Offsite Flows:

$Area_{A1} := 2.02 \quad Area_{B1} := 0 \quad Area_{C1} := 1.26 \quad Area_{D1} := 0 \quad Ac$

$Q_{w1} := 1.870 \cdot Area_{A1} + 2.600 \cdot Area_{B1} + 3.450 \cdot Area_{C1} + 5.020 \cdot Area_{D1} = 8.124 \quad cfs$

Treatment Type Areas for Existing Flow to San Pedro Inlet:

$Area_{A1} := 0 \quad Area_{B1} := 0 \quad Area_{C1} := 0 \quad Area_{D1} := 0.0786 \quad Ac$

$Q_{w1} := 1.870 \cdot Area_{A1} + 2.600 \cdot Area_{B1} + 3.450 \cdot Area_{C1} + 5.020 \cdot Area_{D1} = 0.395 \quad cfs$

Treatment Type Areas for Existing Flow to Palomas Inlets:

$Area_{A1} := 0 \quad Area_{B1} := 0 \quad Area_{C1} := 0 \quad Area_{D1} := 1.70 \quad Ac$

$Q_{w1} := 1.870 \cdot Area_{A1} + 2.600 \cdot Area_{B1} + 3.450 \cdot Area_{C1} + 5.020 \cdot Area_{D1} = 8.534 \quad cfs$

Treatment Type Areas for Proposed Onsite Flow to San Pedro Inlet:

$Area_{A1} := 0 \quad Area_{B1} := 0 \quad Area_{C1} := 0.39 \quad Area_{D1} := 2.21 \quad Ac$

$Q_{w1} := 1.870 \cdot Area_{A1} + 2.600 \cdot Area_{B1} + 3.450 \cdot Area_{C1} + 5.020 \cdot Area_{D1} = 12.44 \quad cfs$

Treatment Type Areas for Proposed Onsite Flow to Beehive Inlet:

$Area_{A1} := 0 \quad Area_{B1} := 0 \quad Area_{C1} := 0.609 \quad Area_{D1} := 3.451 \quad Ac$

$Q_{w1} := 1.870 \cdot Area_{A1} + 2.600 \cdot Area_{B1} + 3.450 \cdot Area_{C1} + 5.020 \cdot Area_{D1} = 19.425 \quad cfs$

**Water Quality First Flush Volumes Required**

**Subsasin Areas:**

$Area_{D1} := 0.631 \quad Area_{D2} := 0.236 \quad Area_{D3} := 1.240 \quad Ac$

$Area_{D4} := 0.162 \quad Area_{D5} := 0.806 \quad Area_{D6} := 2.683 \quad Ac$

**Subsasin 1:**

$PVol_1 := Area_{D1} \cdot 43560 \cdot \frac{0.34}{12} = 778.78 \quad cu.\ ft.$

**Subsasin 2:**

$PVol_2 := Area_{D2} \cdot 43560 \cdot \frac{0.34}{12} = 291.271 \quad cu.\ ft.$

**Subsasin 3:**

$PVol_3 := Area_{D3} \cdot 43560 \cdot \frac{0.34}{12} = 1530.408 \quad cu.\ ft.$

**Subsasin 4:**

$PVol_4 := Area_{D4} \cdot 43560 \cdot \frac{0.34}{12} = 199.94 \quad cu.\ ft.$

**Subsasin 5:**

$PVol_5 := Area_{D5} \cdot 43560 \cdot \frac{0.34}{12} = 994.765 \quad cu.\ ft.$

**Subsasin 6:**

$PVol_6 := Area_{D6} \cdot 43560 \cdot \frac{0.34}{12} = 3311.359 \quad cu.\ ft.$

**Total Pond Volume:**

$PVol := PVol_1 + PVol_2 + PVol_3 + PVol_4 + PVol_5 + PVol_6 = 7106.524 \quad cu.\ ft.$

## *Pond Outlet Pipe into San Pedro Inlet*

**Circular Channel**

**Input**

| | |
|---|---|
| Flow | 12.5 cfs |
| Slope | 0.19 ft/ft |
| Manning's n | 0.011 |
| Diameter | 18 in |

**Output**

| | |
|---|---|
| Depth | 0.490 ft |
| Flow Area | 0.502 sf |
| Velocity | 24.9 fps |
| Velocity Head | 9.63 ft |
| Top Width | 1.41 ft |
| Froude Number | 7.35 |
| Critical Depth | 1.334 ft |
| Critical Slope | 0.00903 ft/ft |

## *San Pedro 24" Storm Drain*

**Circular Channel**

**Input**

| | |
|---|---|
| Flow | 13 cfs |
| Slope | 0.0129 ft/ft |
| Manning's n | 0.013 |
| Diameter | 24 in |

**Output**

| | |
|---|---|
| Depth | 1.007 ft |
| Flow Area | 1.58 sf |
| Velocity | 8.20 fps |
| Velocity Head | 1.05 ft |
| Top Width | 2.00 ft |
| Froude Number | 1.62 |
| Critical Depth | 1.297 ft |
| Critical Slope | 0.00581 ft/ft |

## *San Pedro 30" Storm Drain*

**Circular Channel**

**Input**

| | |
|---|---|
| Flow | 13 cfs |
| Slope | 0.00955 ft/ft |
| Manning's n | 0.013 |
| Diameter | 30 in |

**Output**

| | |
|---|---|
| Depth | 0.979 ft |
| Flow Area | 1.78 sf |
| Velocity | 7.29 fps |
| Velocity Head | 0.826 ft |
| Top Width | 2.44 ft |
| Froude Number | 1.50 |
| Critical Depth | 1.212 ft |
| Critical Slope | 0.00447 ft/ft |

## *Orifice Calculations for San Pedro Outlet*

Pipe size for runoff discharged to the San Pedro inlet

Head Water Depth= h

$h := 2.15 \cdot ft$

$Cl := 0.6$

Max flow rate calculated using dpm 22.2 blah

$Qmax := 12.44 \cdot \frac{ft^3}{s}$

Area of Orifice

$Aorif := \frac{Qmax}{Cl \cdot \sqrt{2 \cdot g \cdot h}} = 1.763 \ ft^2$

$Aorif = 253.831 \ in^2$

$Dorif := 2 \cdot \sqrt{\frac{Aorif}{\pi}} = 17.977 \ in$

## *Orifice Calculations into 84" Storm Drain*

Pipe size for runoff discharged to the Beehive inlet

Head Water Depth= h

$h := 3.35 \cdot ft$

$Cl := 0.6$

Max flow rate calculated using dpm 22.2 blah

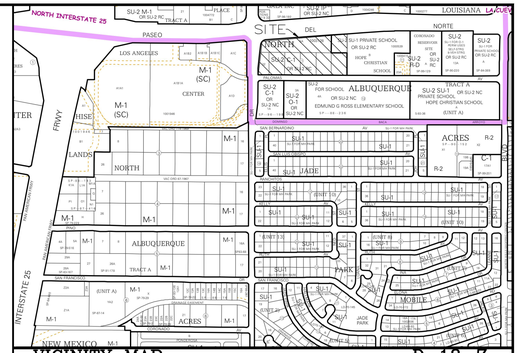
$Qmax := 27.549 \cdot \frac{ft^3}{s}$

Area of Orifice

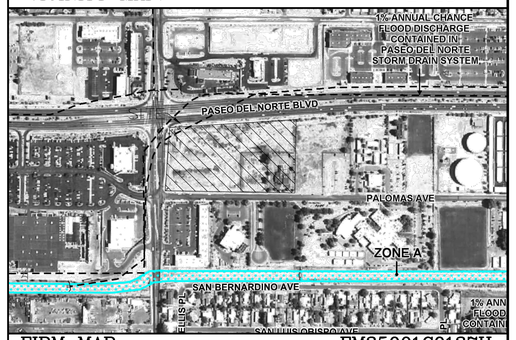
$Aorif := \frac{Qmax}{Cl \cdot \sqrt{2 \cdot g \cdot h}} = 3.127 \ ft^2$

$Aorif = 450.326 \ in^2$

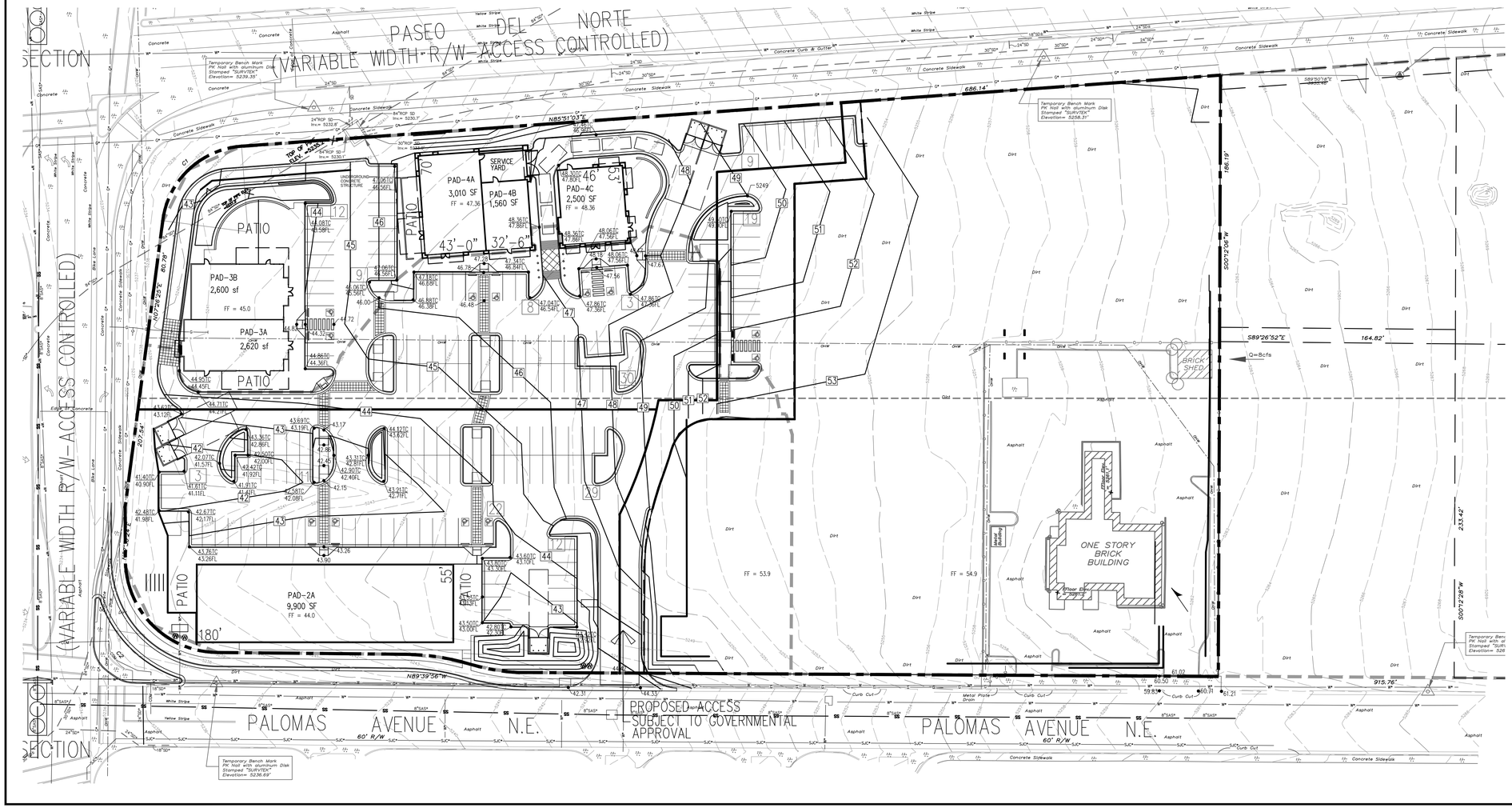
$Dorif := 2 \cdot \sqrt{\frac{Aorif}{\pi}} = 23.945 \ in$




VICINITY MAP: D-18-Z




FIRM MAP: FM35001C0137H




## *Legend*

- WQ SUBBASIN BOUNDARY
- SUBBASIN BOUNDARY
- 5255 EXISTING CONTOURS
- PROPOSED CONTOURS

N

GRAPHIC SCALE

40 0 20 40 80 160

( IN FEET )
1 inch = 40 ft.

ENGINEER'S SEAL

HUGH W. FLOYD
NEW MEXICO
16633
11-13-15
LICENSED PROFESSIONAL ENGINEER

HUGH W. FLOYD
P.E. 16633

**Lots 5A & 27 Thru 32 of North Albuquerque Acres**

## CONCEPTUAL DRAINAGE


FLOYD DEVELOPMENT SERVICES, LLC
DEVELOPMENT, ENGINEERING, & WATERSHED CONSULTING
918 PINEHURST RD SE, SUITE 102
RIO RANCHO, NM 87124
HUGH@DEVELOPNM.COM
505-366-4187


DRAWN BY: JS

DATE
11-13-2015

SHEET
C-1

JOB #
018-15-200