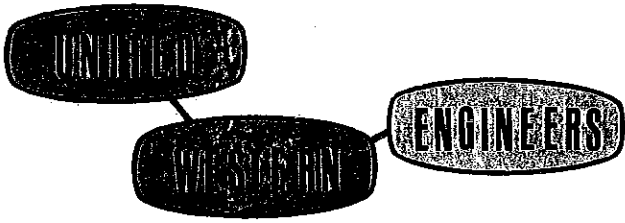
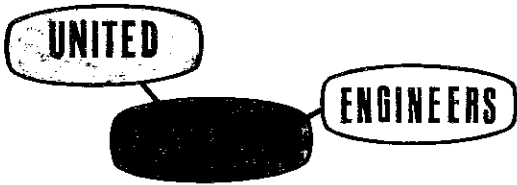


*Approved R. H. ...*



planners · consultants · engineers

HOMESTEAD PHASE III  
MASTER DRAINAGE PLAN



planners · consultants · engineers  
Suite 200  
4525 Northpark Drive  
Colorado Springs, Colo. 80907  
(303) 598-3222

June 28, 1973

Mr. DeWitt Miller  
City Hall  
P.O. Box 1575  
Colorado Springs, Colorado

Subject: Homestead Phase III  
Master Drainage Plan

Dear Deke:

Transmitted herewith is subject drainage report.

Please feel free to contact me if you have any questions.

Respectfully,

UNITED WESTERN ENGINEERS

O. E. Watts  
Engineering Director

/dst

Enclosures

HOMESTEAD PHASE III

MASTER DRAINAGE PLAN

Certifications and Approvals

Registered Engineer

I, Oliver E. Watts, a Registered Engineer in the State of Colorado, hereby certify that the attached drainage plan and report were prepared under my direction and supervision and are correct to the best of my knowledge and belief. I further certify that said drainage report is in accordance with all City of Colorado Springs Ordinances and specifications and criteria.

*Oliver E. Watts*

Colorado PE - LS No. 9853



Owner or developer of the site:

"The developer has read and will comply with all of the requirements specified in this drainage report as approved by the City Engineer".

By

*George J. Jurg*

Title

*Project Engineer*

Approved:

City of Colorado Springs, Department of Public Works

\_\_\_\_\_  
City Engineer

\_\_\_\_\_  
Date

1. Description of Location:

a. The Homestead Phase III development is located as shown on the vicinity map on the enclosed drainage plan, occupying a portion of the East one-half of Section 25, Township 13 South, Range 66 North, in the City of Colorado Springs, Colorado. The development is bounded by Barnes Road on the North, Powers Boulevard on the East, part of the Villa Loma development on the South and previous Homestead filings on the West.

b. The area enclosed by the development not covered by previous filings with Homestead is approximately 195.779 acres.

c. The development lies in the Sand Creek Drainage Basin. The Master Drainage Study for this basin has been consulted and this report is in compliance therewith.

d. Natural drainage, as defined by the topography as shown, is generally to the Southeast towards Powers Boulevard and the Sand Creek Channel with minor flows to the West in the Templeton Gap Basin.

2. Method of Computations:

The method of computations is the SCS synthetic hydrograph method, using the prescribed 50 year storm of 2 inches intensity, duration one hour.

3. External Water Entering the Subdivision:

Barnes Road has inflows from the North of 52.4 cfs and 80.0 cfs which are picked up by storm sewers. 40.2 cfs enters along Powers Boulevard as a street flow at the Northeast corner of the development. Minor sheet flow enters the lineal park, at the South end of the West edge of the development. No other external water enters the development.

4. Flow Through the Subdivision:

Concentrated inflows from the North are routed by a storm sewer East along Barnes Road and then South along Powers Boulevard to an outfall point. Another storm sewer system connects at Barnes Road and Rio Vista Drive which carries a portion of the flows generated within the development. A storm sewer system along Rio Vista Drive and Carefree Circle drains the Central and Southeast portion,

and an open channel drains the Southern edge to an outfall point into Villa Loma East per the Leigh-Whitehead plan. Individual lot flows are generally sheet flow to adjacent streets where flows are transported by streets and the above storm sewer systems to outfall points.

5. Outfall Points:

Three outfall points occur along the East edge of the development at Powers Boulevard. These outflows will be handled under the Powers Road Agreement between the City of Colorado Springs and the Col-Terra Investments Company. An outfall point near the Southeast corner of the development, with a flow of 75.1 cfs, will flow into a concrete lined channel which is a part of the Villa Loma North East Master Plan. This channel was approved to accommodate 235.1 cfs in the Villa Loma East Master Plan on February 22, 1972.

6. Internal Design Computations:

a. Streets: All computations are enclosed, streets have 40 and 60 feet wide mats except Powers Boulevard which is a major arterial with a 210' R.O.W.

| <u>Street</u> | <u>Location</u> | <u>R/W Width</u> | <u>Curb Type</u> | <u>Min Slope</u> | <u>CFS Runoff</u> | <u>CFS Capacity</u> |
|---------------|-----------------|------------------|------------------|------------------|-------------------|---------------------|
| Barnes Rd.    | IC              | 80'              | Ramp             | 1.8%             | 26.1              | 29.4                |
| Rio Vista Dr. | IB-C            | 80'              | Vert             | 1.7%             | 21.6              | 30.0                |
| Rio Vista Dr. | IIF             | 80'              | Vert             | 0.7%             | 29.3              | 30.0                |
| N. Carefree   | Rio Vista       | 100'             | Vert             | 4.6%             | 28.1              | 28.7                |
| N. Carefree   | IIIH            | 100'             | Vert             | 3.8%             | 26.3              | 30.0                |
| Rio Vista Dr. | IIIE            | 80'              | Vert             | 2.3%             | 24.5              | 30.0                |

b. Channel Sections: Channels are concrete lined (n=0.015) with wwf reinforcing.

| <u>Basin Location</u> | <u>Size</u> | <u>Slope</u> | <u>Runoff</u> | <u>Capacity</u> | <u>Freeboard</u> |
|-----------------------|-------------|--------------|---------------|-----------------|------------------|
| III I                 | 2.0' x 2.0' | 4.37%        | 29.5          | 170.1           | 1' +             |
| III I                 | 2.0' x 2.0' | 2.04%        | 38.5          | 116.2           | 1'               |
| III I-J               | 2.0' x 2.5' | 0.97%        | 46.9          | 126.7           | 1'               |
| III J                 | 2.0' x 2.5' | 1.67%        | 54.9          | 166.2           | 1'               |

c. Concrete Pipe: Min. RCP (n=0.013) size is 18". Calculations pertaining to pipe size and capacity are enclosed and summarized as follows: All RCP will be Class II or III with a minimum 1' of cover.

| <u>Location</u> | <u>Size<br/>In</u> | <u>Slope<br/>Min %</u> | <u>Flow<br/>CFS</u> | <u>Capacity<br/>CFS</u> |
|-----------------|--------------------|------------------------|---------------------|-------------------------|
| Rio Vista Dr.   | 24                 | 0.77%                  | 20.0                | 20.0                    |
| Rio Vista Dr.   | 30                 | 0.93%                  | 40.0                | 40.0                    |
| Rio Vista Dr.   | 30                 | 1.83%                  | 55.5                | 55.5                    |
| Barnes Rd.      | 30                 | 1.60%                  | 52.4                | 52.4                    |
| Barnes Rd.      | 36                 | 1.41%                  | 80.0                | 80.0                    |
| Basin ID        | 30                 | 0.46%                  | 28.0                | 28.0                    |
| Rio Vista Dr.   | 24                 | 0.80%                  | 20.0                | 20.0                    |
| Rio Vista Dr.   | 30                 | 1.50%                  | 49.3                | 50.2                    |
| N. Carefree     | 30                 | 3.00%                  | 69.3                | 70.0                    |
| N. Carefree     | 36                 | 1.20%                  | 69.3                | 70.0                    |
| Basin III K     | 36                 | 2.50%                  | 102.6               | 105.4                   |

d. CMP (n=0.025): CMP is to be of standard corrugations and bands, gage will be determined by resistivity testing.

| <u>Street</u> | <u>Location</u> | <u>Size<br/>In</u> | <u>Slope<br/>Min %</u> | <u>Flow<br/>CFS</u> | <u>Capacity<br/>CFS</u> |
|---------------|-----------------|--------------------|------------------------|---------------------|-------------------------|
| Barnes Rd.    | Rio Vista       | 48                 | 1.92%                  | 107.9               | 107.9                   |
| Barnes Rd.    | Basin ID        | 54                 | 2.66%                  | 187.9               | 187.9                   |
| Basin ID      | Outfall         | 54                 | 3.96%                  | 214.0               | 214.0                   |

e. Curb outlets were sized in accordance with catch basin opening and capacity standards.

#### 7. Cost Estimate:

| <u>Item</u>                | <u>Quantity</u> | <u>Unit Cost</u> | <u>Total</u> |
|----------------------------|-----------------|------------------|--------------|
| 18" RCP                    | 335 LF          | \$ 9.00          | \$ 3,015.00  |
| 21" RCP                    | 259 LF          | 11.00            | 2,849.00     |
| 24" RCP                    | 432 LF          | 13.00            | 5,616.00     |
| 30" RCP                    | 2459 LF         | 16.50            | 40,573.50    |
| 36" RCP                    | 1100 LF         | 20.00            | 22,000.00    |
| 48" CMP                    | 260 LF          | 19.00            | 4,940.00     |
| 54" CMP                    | 842 LF          | 22.00            | 18,524.00    |
| 4' catch basin             | 8 ea            | 700.00           | 5,600.00     |
| 6' catch basin             | 7 ea            | 900.00           | 6,300.00     |
| 8' catch basin             | 3 ea            | 1250.00          | 3,750.00     |
| 10' catch basin            | 2 ea            | 1450.00          | 2,900.00     |
| 2.0'x2.0' concrete channel | 620 LF          | 11.00            | 6,820.00     |
| 2.0'x2.5' concrete channel | 610 LF          | 12.00            | 7,320.00     |
| Sub total                  |                 |                  | \$130,207.50 |
| 10% Engr. & Cont.          |                 |                  | 13,020.75    |
| TOTAL                      |                 |                  | \$143,228.25 |

8. Drainage Fees:

|                                       |                   |
|---------------------------------------|-------------------|
| Sand Creek \$1242.72/ac x 195.779 ac. | \$243,298.48      |
| Cost of Facilities                    | <u>143,228.25</u> |
| Under-run                             | \$100,070.23      |

Acceptance of a letter of credit is requested for the  
drainage ~~fees~~ **FACILITIES**

Composite Curve #s.  
Major basin Sub basin

| Major basin | Sub basin | Plant. reading | C. No.       | % of area    | Cx%          | Use       |
|-------------|-----------|----------------|--------------|--------------|--------------|-----------|
| I           | A         | 8.97           | 97           | 79.80        | 77.41        |           |
|             |           | 2.47           | 70           | 20.20        | 14.14        |           |
|             |           |                | <u>11.44</u> |              | <u>91.55</u> | <u>92</u> |
|             | B         | 42.49          | 97           | 73.66        | 71.46        |           |
|             |           | 15.19          | 70           | 26.34        | 18.43        |           |
|             |           |                | <u>57.68</u> |              | <u>89.89</u> | <u>90</u> |
|             | C         | 16.23          | 97           | 100          | 97           | 97        |
|             | D         | 25.83          | 97           | 100          | 97           | 97        |
|             | E         | 21.22          | 97           | 100          | 97           | 97        |
|             | F         | 1.39           | 70           | 1.68         | 1.17         |           |
| 82.78       |           | 97             | 98.32        | 95.37        |              |           |
|             |           | <u>84.17</u>   |              | <u>96.54</u> | <u>97</u>    |           |
| G           | 58.52     | 97             | 100          | 97           | 97           |           |
| H           | 52.28     | 97             | 100          | 97           | 97           |           |
| II          | A         | 16.37          | 97           | 100          | 97           |           |
|             |           |                |              |              |              |           |
|             | B         | 12.87          | 70           | 56.72        | 39.70        |           |
|             |           | 9.82           | 97           | 43.28        | 41.98        |           |
|             |           |                | <u>22.69</u> |              | <u>81.68</u> | <u>82</u> |
|             | C         | 3.46           | 70           | 66.90        | 46.83        |           |
|             |           | 4.68           | 97           | 33.10        | 32.10        |           |
|             |           |                | <u>14.14</u> |              | <u>78.93</u> | <u>79</u> |
|             | D         | 5.07           | 70           | 3.59         | 6.71         |           |
|             |           | 47.80          | 97           | 90.41        | 87.70        |           |
|             |           | <u>52.87</u>   |              | <u>94.41</u> | <u>94</u>    |           |
| E           | 17.96     | 97             | 100          | 97           | 97           |           |
| F           | 41.57     | 97             | 100          | 97           | 97           |           |
| G           | 47.05     | 97             | 100          | 97           | 97           |           |
| III         | A         | 4.26           | 70           | 18.66        | 13.06        |           |
|             |           | 0.86           | 50           | 3.77         | 1.88         |           |
|             |           | 9.05           | 97           | 39.64        | 38.45        |           |
|             |           | 8.66           | 94           | 37.93        | 35.66        |           |
|             |           |                | <u>22.83</u> |              | <u>89.05</u> | <u>89</u> |
|             | B         | 1.60           | 50           | 8.97         | 4.48         |           |
|             |           | 12.35          | 94           | 69.22        | 65.07        |           |
|             |           | 3.89           | 97           | 21.81        | 21.15        |           |
|             |           |                |              | <u>17.84</u> | <u>90.70</u> |           |



Composite Curve # S  
Major basin : Sub basin  
III C

D

E

F

G

H

I

J

K

| Planim. reading | C. No. | % of area | Cx%          | Use |
|-----------------|--------|-----------|--------------|-----|
| 2.52            | 94     | 20.95     | 19.69        |     |
| 0.90            | 50     | 7.48      | 3.74         |     |
| <u>8.61</u>     | 97     | 71.57     | <u>69.42</u> |     |
| 12.03           |        |           | 92.85        | 93  |
| 19.00           | 97     | 88.58     | 85.92        |     |
| 2.45            | 50     | 11.42     | 5.71         |     |
|                 |        |           | <u>91.63</u> | 92  |
| 10.18           | 50     | 14.43     | 7.22         |     |
| 6.12            | 94     | 8.68      | 8.16         |     |
| <u>54.23</u>    | 97     | 76.89     | <u>74.58</u> |     |
| 70.53           |        |           | 89.96        | 90  |
| 31.21           | 97     | 100       | 97           | 97  |
| 34.28           | 97     | 100       | 97           | 97  |
| 21.09           | 97     | 100       | 97           | 97  |
| 42.16           | 97     | 100       | 97           | 97  |
| 53.67           | 97     | 100       | 97           | 97  |
| 47.80           | 97     | 100       | 97           | 97  |

50 Yrs. - 1 Hr. storm.

Rainfall = 2"

| MAJOR BASIN | SUB BASIN | AREA         |         | BASIN  |        | Tc    | curved DITCH # |       | V | TPO   | FLOW |       | Tb    |
|-------------|-----------|--------------|---------|--------|--------|-------|----------------|-------|---|-------|------|-------|-------|
|             |           | Planim. Read | MILE    | LENGTH | HEIGHT |       | LENGTH         | SLOPE |   |       | Q    | qp    |       |
| I           | A         | 11.44        | 0.00410 | 1230   | 125    | 0.072 | 92             |       |   | 0.543 | 1.24 | 4.53  | 1.450 |
|             | B         | 57.68        | 0.02069 | 1390   | 137    | 0.078 | 90             |       |   | 0.547 | 1.09 | 19.95 | 1.460 |
|             | C         | 16.23        | 0.00582 | 470    | 36     | 0.039 | 97             |       |   | 0.523 | 1.67 | 8.99  | 1.396 |
|             | D         | 25.83        | 0.00927 | 670    | 30     | 0.064 | 97             |       |   | 0.538 | 1.67 | 13.91 | 1.436 |
|             | E         | 21.22        | 0.00761 | 670    | 86     | 0.042 | 97             |       |   | 0.525 | 1.67 | 11.72 | 1.402 |
|             | F         | 84.17        | 0.03019 | 1100   | 128    | 0.062 | 97             |       |   | 0.537 | 1.67 | 45.44 | 1.434 |
|             | G         | 58.52        | 0.02099 | 850    | 96     | 0.052 | 97             |       |   | 0.531 | 1.67 | 31.95 | 1.418 |
|             | H         | 52.28        | 0.01875 | 1300   | 68     | 0.095 | 97             |       |   | 0.557 | 1.67 | 27.21 | 1.487 |
| II          | A         | 16.37        | 0.00587 | 840    | 82     | 0.055 | 97             |       |   | 0.533 | 1.67 | 8.90  | 1.423 |
|             | B         | 22.69        | 0.00814 | 675    | 67     | 0.046 | 82             |       |   | 0.528 | 0.65 | 4.85  | 1.410 |
|             | C         | 14.14        | 0.00507 | 730    | 78     | 0.048 | 79             |       |   | 0.529 | 0.52 | 2.41  | 1.412 |
|             | D         | 52.87        | 0.01896 | 1330   | 116    | 0.080 | 94             |       |   | 0.548 | 1.40 | 23.44 | 1.463 |
|             | E         | 17.96        | 0.00644 | 765    | 43     | 0.064 | 97             |       |   | 0.538 | 1.67 | 9.68  | 1.436 |
|             | F         | 41.57        | 0.01491 | 1520   | 105    | 0.095 | 97             |       |   | 0.557 | 1.67 | 21.64 | 1.487 |
|             | G         | 47.05        | 0.01688 | 1075   | 60     | 0.083 | 97             |       |   | 0.550 | 1.67 | 24.81 | 1.469 |

HYDROLOGIC COMPUTATION - BASIC DATA

PROJ: Homestead Phase III

By: N.H. Patel

Date: 4-18-73



planners · consultants · engineers  
Suite 200  
4525 Northpark Drive  
Colorado Springs, Colo. 80907

| MAJOR<br>BASIN | SUB<br>BASIN | AREA            |         | BASIN  |        | Tc    | curve<br>No. | DITCH  |       | V | TPO   | FLOW |       | Tb    |
|----------------|--------------|-----------------|---------|--------|--------|-------|--------------|--------|-------|---|-------|------|-------|-------|
|                |              | Planim.<br>Read | MILE    | LENGTH | HEIGHT |       |              | LENGTH | SLOPE |   |       | Q    | qp    |       |
| <u>III</u>     | A            | 22.83           | 0.00819 | 1100   | 100    | 0.068 | 89           |        |       |   | 0.541 | 1.03 | 7.55  | 1.444 |
|                | B            | 17.84           | 0.00640 | 730    | 62     | 0.053 | 91           |        |       |   | 0.532 | 1.16 | 6.75  | 1.420 |
|                | C            | 12.03           | 0.00432 | 750    | 73     | 0.058 | 93           |        |       |   | 0.535 | 1.31 | 5.12  | 1.428 |
|                | D            | 21.45           | 0.00769 | 750    | 70     | 0.060 | 92           |        |       |   | 0.536 | 1.24 | 8.61  | 1.431 |
|                | E            | 70.53           | 0.02530 | 1060   | 76     | 0.075 | 90           |        |       |   | 0.545 | 1.09 | 24.49 | 1.455 |
|                | F            | 31.21           | 0.01120 | 1260   | 67     | 0.092 | 97           |        |       |   | 0.555 | 1.67 | 16.31 | 1.482 |
|                | G            | 34.28           | 0.01230 | 970    | 58     | 0.075 | 97           |        |       |   | 0.545 | 1.67 | 18.24 | 1.455 |
|                | H            | 21.09           | 0.00756 | 1035   | 57     | 0.081 | 97           |        |       |   | 0.549 | 1.67 | 11.13 | 1.466 |
|                | I            | 42.16           | 0.01512 | 1000   | 60     | 0.076 | 97           |        |       |   | 0.546 | 1.67 | 22.38 | 1.458 |
|                | J            | 53.67           | 0.01925 | 1160   | 63     | 0.086 | 97           |        |       |   | 0.552 | 1.67 | 28.12 | 1.474 |
|                | K            | 47.80           | 0.01715 | 1030   | 44     | 0.090 | 97           |        |       |   | 0.554 | 1.67 | 25.02 | 1.479 |
|                |              |                 |         |        |        |       |              |        |       |   |       |      |       |       |
|                |              |                 |         |        |        |       |              |        |       |   |       |      |       |       |
|                |              |                 |         |        |        |       |              |        |       |   |       |      |       |       |
|                |              |                 |         |        |        |       |              |        |       |   |       |      |       |       |
|                |              |                 |         |        |        |       |              |        |       |   |       |      |       |       |

HYDROLOGIC COMPUTATION - BASIC DATA

PROJ: Homestead Phase III

By: N.H. Patel  
Date: 4-18-73



planners · consultants · engineers  
Suite 200  
4525 Northpark Drive  
Colorado Springs, Colo. 80907

Flow from North of Barnes Road 50yr - 1 Hr.

| MAJOR BASIN | SUB BASIN | AREA            |         | BASIN  |        | Tc    | DITCH        |       | V | TPO   | FLOW |       | Tb |
|-------------|-----------|-----------------|---------|--------|--------|-------|--------------|-------|---|-------|------|-------|----|
|             |           | Planim.<br>Read | MILE    | LENGTH | HEIGHT |       | LENGTH       | SLOPE |   |       | Q    | qp    |    |
| ①           |           | 0.41            | 0.05882 | 1800   | 150    | 0.100 | C. No.<br>89 |       |   | 0.560 | 1.03 | 52.36 |    |
| ②           |           | 0.68            | 0.0756  | 3400   | 220    | 0.180 | 89           |       |   | 0.608 | 1.03 | 79.99 |    |
| ③           |           | 0.33            | 0.04734 | 2800   | 225    | 0.145 | 89           |       |   | 0.587 | 1.03 | 40.20 |    |
|             |           |                 |         |        |        |       |              |       |   |       |      |       |    |
|             |           |                 |         |        |        |       |              |       |   |       |      |       |    |
|             |           |                 |         |        |        |       |              |       |   |       |      |       |    |
|             |           |                 |         |        |        |       |              |       |   |       |      |       |    |
|             |           |                 |         |        |        |       |              |       |   |       |      |       |    |
|             |           |                 |         |        |        |       |              |       |   |       |      |       |    |
|             |           |                 |         |        |        |       |              |       |   |       |      |       |    |
|             |           |                 |         |        |        |       |              |       |   |       |      |       |    |
|             |           |                 |         |        |        |       |              |       |   |       |      |       |    |
|             |           |                 |         |        |        |       |              |       |   |       |      |       |    |
|             |           |                 |         |        |        |       |              |       |   |       |      |       |    |
|             |           |                 |         |        |        |       |              |       |   |       |      |       |    |
|             |           |                 |         |        |        |       |              |       |   |       |      |       |    |
|             |           |                 |         |        |        |       |              |       |   |       |      |       |    |
|             |           |                 |         |        |        |       |              |       |   |       |      |       |    |
|             |           |                 |         |        |        |       |              |       |   |       |      |       |    |
|             |           |                 |         |        |        |       |              |       |   |       |      |       |    |

HYDROLOGIC COMPUTATION - BASIC DATA  
 PROJ: *Homestead Phase III*  
 By: *N.H. Patel*  
 Date: *4-19-73.*



planners · consultants · engineers  
 Suite 200  
 4525 Northpark Drive  
 Colorado Springs, Colo. 80907

# Street and Storm Sewer Calculations

| STREET        | LOCATION                 | DIST | ELEVATION & SLOPE | TOTAL RUNOFF   | STREET FLOW CAPACITY | PIPE FLOW | TYPE PIPE, CATCH BASIN & SLOPE %                          |
|---------------|--------------------------|------|-------------------|----------------|----------------------|-----------|---|
| lio Vista Dr. | IF South                 | -    | 0.0438            |                | 29.7/46.0            | 0         |   |
| ✓ ✓ ✓         | IF North                 | 220' | 0.0119            | 29.7           | 23.5/24.0            | 20.0      | 2-4' C.B. with 18" R.C.P.<br>220'-24" R.C.P. - 0.77% Min. |
| ✓ ✓ ✓         | IF North                 | 170' | 0.0119            | 43.5           | 22.1/24.0            | 40.0      | 2-4' C.B. with 18" R.C.P.<br>170'-30" R.C.P. - 0.93% Min. |
| ✓ ✓ ✓         | IB                       | 100' | 0.0174            | 62.1           | 28.0/28.6            | 40.0      | ↓<br>100'-30" R.C.P. - 0.93% Min.                         |
| ✓ ✓ ✓         | IB                       | 160' | 0.0174            | 68.0           | 21.6/28.6            | 55.5      | 1-6' C.B. with 21" R.C.P.<br>160'-30" R.C.P. - 1.83% min. |
| ✓ ✓ ✓         | IB                       | 30'  | 0.06              | 77.1           | 26.1/28.6            | 55.5      | ↓<br>30'-30" R.C.P. - 1.83% Min.                          |
| Barnes Rd.    | IA Final                 | 260' | 6612<br>0.0192    | 81.6/<br>134.0 | 26.1/30.2            | 107.9     | ↓<br>260'-48" Cmp. - 1.92% Min.                           |
| ✓ ✓           | IC                       | 374' | 6607<br>0.0321    | 214.0          | 26.1/44.4            | 187.9     | 374'-54" Cmp. - 2.66% Min.                                |
| Powers Blvd.  | ID                       | 468' | 6595<br>0.0491    | 214.0          | -                    | 214.0     | 2-6' C.B. with 21" R.C.P.<br>468'-54" Cmp. - 3.96% Min.   |
| ✓ ✓           | IG                       | 75'  | 6572<br>-         | 214.0<br>242.0 | -                    | 268.9     | 10' C.B. with 30" R.C.P.<br>75'-72" Cmp. - 1.35% Min.     |
|               | IG (Rd. C/L)             |      |                   | 268.9          |                      |           |   |
|               | IG Powers Blvd. Boundary | 100' | 6574<br>0.005     | 28.0           | -                    | 28.0      | 1-10' C.B.<br>100'-30" R.C.P. - 0.46% Min.                |
|               | Powers Blvd.             |      | 6573.5            |                |                      |           |   |
| lio Vista Dr. | IID North                | 130' | 6618<br>0.0692    | 18.6+17.3      | 29.3/49.5            | 20.0      | 2-4' C.B. with 18" R.C.P.<br>130'-24" R.C.P. - 0.80% Min. |
|               | IID                      |      | 6609              | 49.3           |                      |           |   |

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# Street and Storm Sewer Calculations

| STREET           | LOCATION     | DIST | ELEVATION & SLOPE | TOTAL RUNOFF | STREET FLOW CAPACITY | PIPE FLOW | TYPE PIPE, CATCH BASIN & SLOPE % |
|------------------|--------------|------|-------------------|--------------|----------------------|-----------|----------------------------------|
| Rio Vista Dr.    | II D center  |      | 6609              | 49.3         |                      |           | 2-6' C.B., 21" RCP, S=1.0%       |
|                  |              | 1195 | 0.0192            |              | 19.5 / 42.8          | 49.3      | 1195'-30" RCP, S=1.50% min.      |
| N. Carefree Cir. |              |      | 6586              | 68.8         |                      |           |                                  |
|                  |              | 580  | 0.0448            |              | 26.3 / 32.5          | 69.3      | 580'-30" RCP, S=3.00% min.       |
| N. Carefree      | III G center |      | 6560              | 95.6         |                      |           |                                  |
|                  |              | 340  | 0.0235            |              | 33.3 / 33.6          | 69.3      | 340'-36" RCP, S=1.20% min.       |
|                  | III H center |      | 6552              | 102.6        |                      |           | 2-8' C.B., 24" RCP, S=1.0%       |
|                  |              | 700  | 0.0521            |              | 124.6                | 102.6     | 700'-36" RCP, S=2.50% min.       |
|                  | III K center |      | 6515.5            | 124.6        |                      |           | 1-8' C.B., 24" RCP, S=1.0%       |

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# Culvert & Channel Calculations

| AREA | LOCATION & DISTANCE | ELEV & S%      | S 1/2    | Q50  | b 8/3 | b    | S F AREA | USE DITCH | CULVERT ETC. | TIME HRS |
|------|---------------------|----------------|----------|------|-------|------|----------|-----------|--------------|----------|
| ①    | 400                 | 6538<br>4.37   | 0.209045 | 29.5 | 1.097 | 1.04 | 2.16     | 2' x 2'   | 170.1        | 1' +     |
| ②    | 220                 | 6520.5<br>2.04 | 0.142828 | 38.5 | 2.095 | 1.32 | 3.48     | 2' x 2'   | 116.2        | 1'       |
| ③    | 310                 | 6516<br>0.97   | 0.098488 | 46.9 | 3.701 | 1.64 | 5.38     | 2' x 2.5' | 126.7        | 1'       |
| ④    | 300                 | 6513<br>1.67   | 0.129228 | 54.9 | 3.302 | 1.57 | 4.93     | 2' x 2.5' | 166.2        | 1'       |
| ⑤    |                     | 6508           |          |      |       |      |          |           |              |          |

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