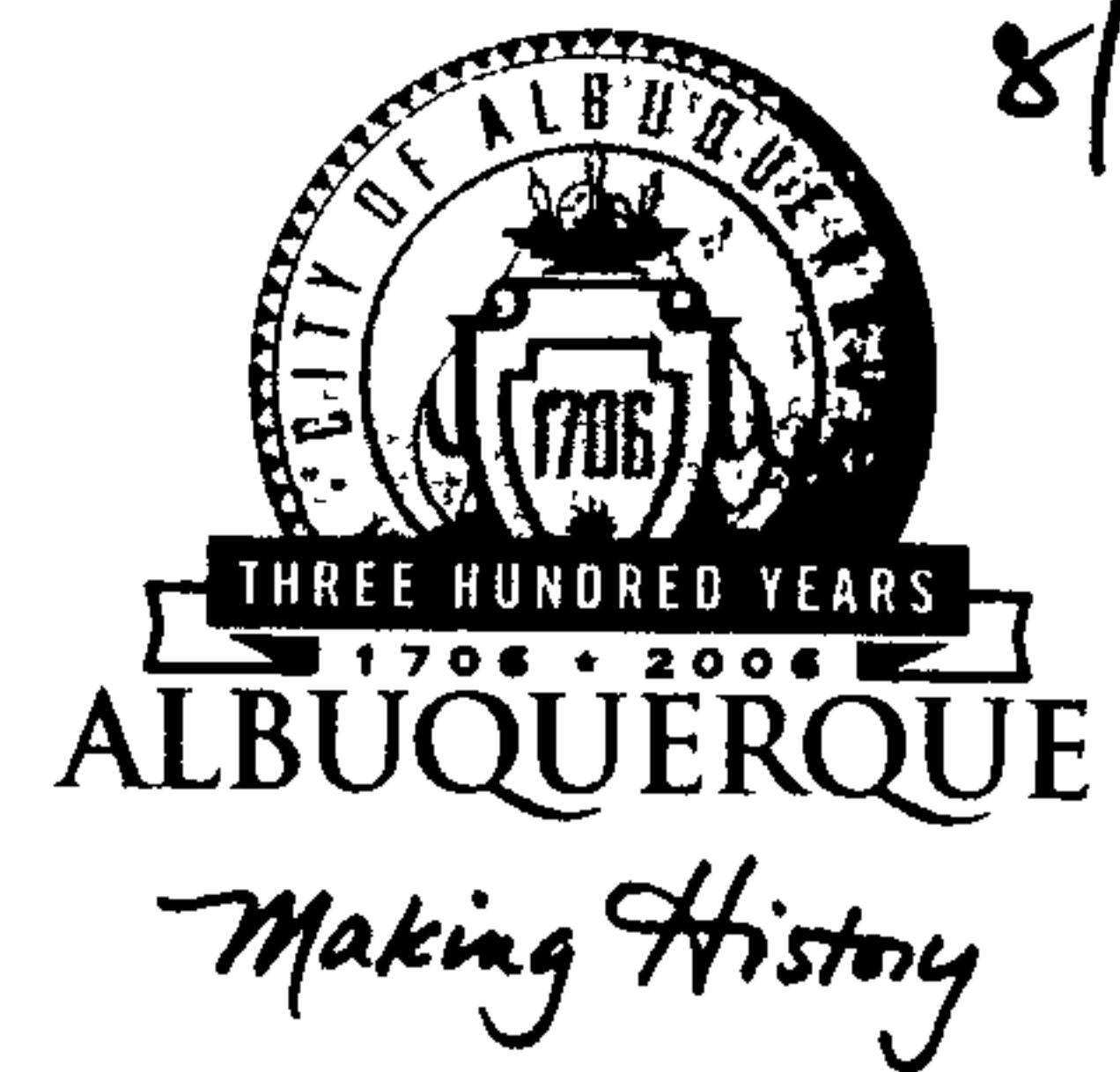


CITY OF ALBUQUERQUE



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8/22/14

August 11, 2004

Genevieve Donart, P.E.
Isaacson & Arfman, P.A.
128 Monroe St. NE
Albuquerque, NM 87108

**Re: The Reserve at the Trails Subdivision, Preliminary Plat
Engineer's Stamp dated 7-26-04 (C9-D3)**

Dear Ms. Donart,

Based upon the information provided in your submittal received 7-27-04, the above referenced plan is approved for Preliminary Plat action by the DRB. Once the DRB has approved the plan, please submit a mylar copy to me in order to obtain rough grading approval.

P.O. Box 1293

This project requires a National Pollutant Discharge Elimination System (NPDES) permit. If you have any questions regarding this permit please feel free to call the DMD Storm Drainage Design section at 768-3654 (Charles Caruso).

Albuquerque

If you have any questions, you can contact me at 924-3981.

New Mexico 87103

Sincerely,

Kristal D. Metro
Engineering Associate, Planning Dept.
Development and Building Services

www.cabq.gov

C: Charles Caruso, DMD Storm Drainage Design
Bradley Bingham, DRB
file

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8/22/14

**ERRATA
JULY 2004**

**DRAINAGE REPORT
FOR
THE RESERVE AT THE TRAILS**

**A SINGLE-FAMILY
RESIDENTIAL SUBDIVISION**

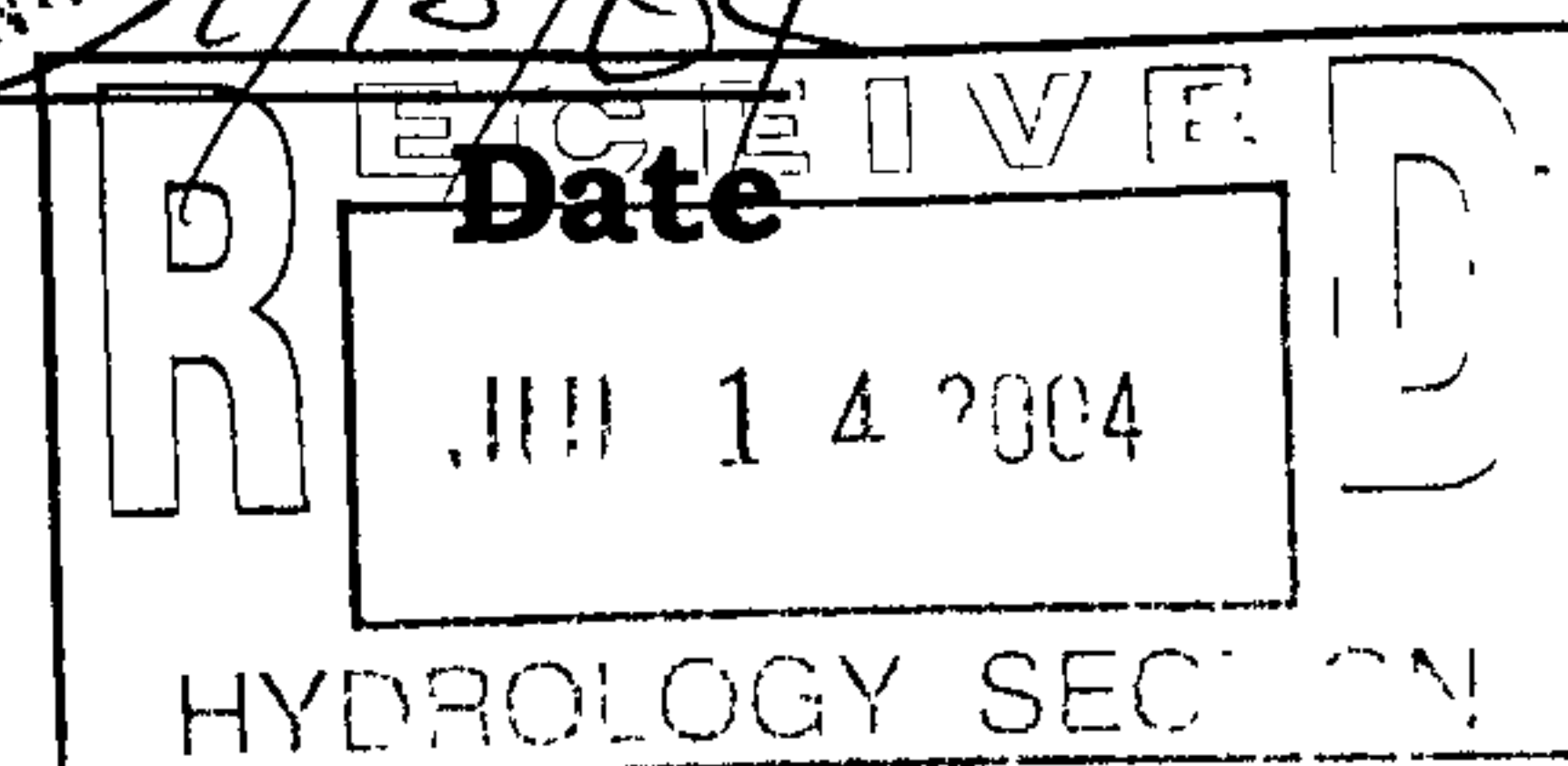
**ALBUQUERQUE, NEW MEXICO
APRIL 2004**

Prepared by:

**ISAACSON & ARFMAN, P.A.
128 Monroe Street NE
Albuquerque, NM 87108
(505) 268-8828**



Genevieve L. Donart, PE



IV. PROPOSED CONDITIONS

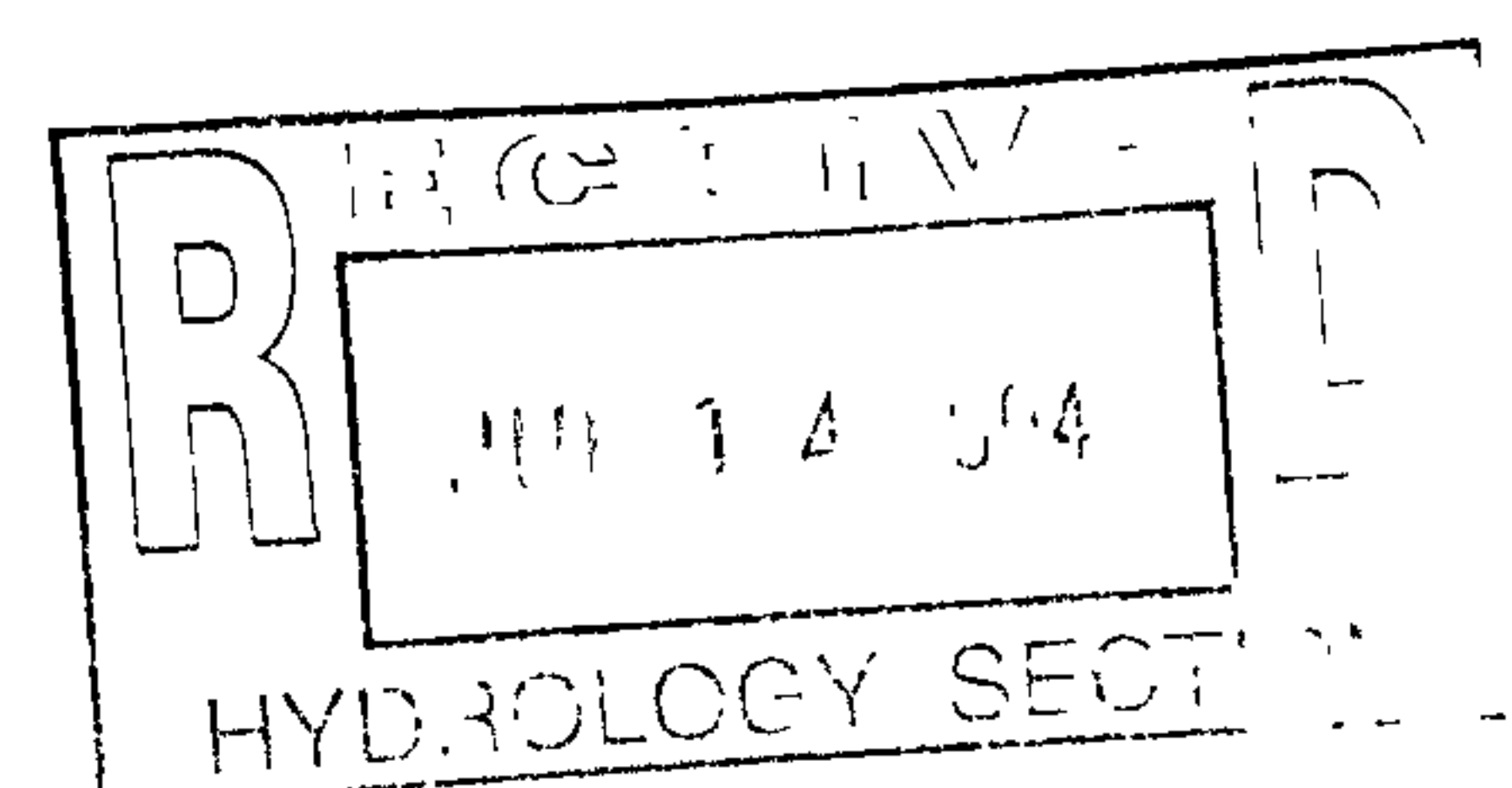
Most of The Reserve at the Trails is contained within Basin G of the BHI Study. The northern row of lots that faces Tree Line Ave and the south half of Tree Line Ave (Basins F10 & F11) drain to Basin F of the BHI Study. No flows from Rainbow Blvd. enter the site. Proposed flows for individual sub-basins are determined based on an area percentage of the overall Basin G and Basin F flows. The overall Basin G has an area of 34.1 acres and a fully-developed 100-year flow of 113.2 cfs. This plan develops 46.4% (15.8 acres) of the 34.1 acres. The overall Basin F has an area of 96.5 acres and a fully-developed 100-year flow of 319.7 cfs. This plan develops 3.6% (3.5 acres) of the 96.5 acres. See the Proposed Runoff Calculations in Appendix A.

This report divides Basins F and G into sub-basins. (See the Proposed Basin Map in Appendix D.) Drainage basin boundaries were determined based on the grades established in the Grading & Drainage Plan, and by street flow capacity and storm drain requirements. (See the Grading & Drainage Plans in Appendix E and Street Flow Capacity Calculations in Appendix B.) Grading was strongly affected by the subsurface basalt layer, as well as sewer and storm drain bury depths.

Proposed flows from Basins G1 through G9 are directed east through a storm drain system from Hallston Trail to Pond G. The storm drain system is sized to also carry future developed flows from the adjacent portions of Woodmont Rd. (See the HydraFlow Storm Drain Calculations and Inlet Capacity Calculations in Appendix C.)

Proposed flows from Basins F10 and F11 are directed to Tree Line Ave, where they are captured by inlets that drain to the system as part of the Taos at the Trails subdivision. This storm system also outlets to Pond G.

Pond G was sized as a detention facility at 8.9 Ac-ft by the BHI Study, but the downstream storm drain and pond system required to discharge stormwater from the Pond is not yet designed or constructed. The pond acts as a retention pond until such time as the downstream improvements are constructed. This report sizes the pond at 3.55 Ac-ft to accept the volume of a 100-year, 10-day storm for the developed flows from this project, which is less than the 8.9 Ac-ft required for the final detention pond size. (See the Volume Calculations for Proposed Conditions in Appendix A.) A Covenant & Agreement will be required for this pond.



V. SUMMARY & CONCLUSIONS

Based on information in previous sections, it is recommended that the following items be constructed with The Reserve at the Trails:

1. Mountable curb on Winncrest Trail, Winterset Trail, and the portions of Crosswinds Trail west of Lot 40 and Glyndon Trail west of Lot 67.
2. Standard curb on Woodmont Rd, Tree Line Avenue, Hallston Trail, and the portions of Crosswinds Trail east of Lot 41 and Glyndon Trail east of Lot 68.
3. 2 type 'A' single-grate storm inlets at the east end of Crosswinds Trail.
4. 2 type 'C' double-grate sump inlets at the low point in Hallston Trail north of the intersection with Crosswinds Trail.
5. 2 type 'C' single-grate sump inlets at the low point in Woodmont Rd.
6. 1 type 'A' single-grate storm inlet and 1 type 'C' double-grate inlet at the east end of the adjacent portion of Tree Line Ave that connects to a storm drain manhole designed as part of Taos at the Trails.
7. Storm drain as shown on the Grading & Drainage Plan.
8. A temporary retention pond east of the project with appropriate Covenant & Agreements and temporary drainage easement.

APPENDIX A

Runoff & Volume Calculations

| PROPOSED RUNOFF CALCULATIONS FOR THE RESERVE AT THE TRAILS* | | | | |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|-------------------------|-------------------------------|--------------------------------------|
| | | | | |
| | | | | |
| BASIN ID | AREA (Ac) | AREA (mi ²) | % AREA OF TOTAL BASIN G | Q ₁₀₀ (Calc'd by %) |
| TOTAL Q100 BASIN G* = | | 113.2 | | |
| TOTAL AREA BASIN G* = | | 34.1 | | |
| Proposed Reserve at the Trails in Basin G | | | | |
| G1 | 1.8414 | 0.0029 | 5.4% | 6.11 |
| G2 | 1.0852 | 0.0017 | 3.2% | 3.60 |
| G3 | 1.8757 | 0.0029 | 5.5% | 6.23 |
| G4 | 1.2863 | 0.0020 | 3.8% | 4.27 |
| G5 | 2.2240 | 0.0035 | 6.5% | 7.38 |
| G6 | 1.0768 | 0.0017 | 3.2% | 3.57 |
| G7 | 3.4780 | 0.0055 | 10.2% | 11.55 |
| G8 | 0.7540 | 0.0012 | 2.2% | 2.50 |
| G9 | <u>2.2000</u> | <u>0.0046</u> | <u>6.5%</u> | <u>7.30</u> |
| | 15.8215 | 0.0260 | 46.4% | 52.52 |
| | | | | |
| | | | | |
| BASIN ID | AREA (Ac) | AREA (mi ²) | % AREA OF TOTAL BASIN F | Q ₁₀₀ (Calc'd by %) |
| TOTAL Q100 BASIN F* = | | 319.7 | | |
| TOTAL AREA BASIN F* = | | 96.5 | | |
| Proposed Reserve at the Trails in Basin F | | | | |
| F10 | 3.0120 | 0.0042 | 3.1% | 9.98 |
| F11 | <u>0.4880</u> | <u>0.0042</u> | <u>0.5%</u> | <u>1.62</u> |
| | 3.5000 | 0.0085 | 3.6% | 11.60 |
| | | | | |
| | | | | |
| TOTAL AREA = | 19.3215 | TOTAL FLOW = | | 64.12 |
| | | | | |
| * Q ₁₀₀ quantities and basin areas based on a percentage of the flows calculated for Basins F & G in the "Master Drainage Study for The Trails Subdivision" dated 12/10/03 prepared by Bohannon-Huston, Inc. | | | | |

VOLUME CALCULATIONS FOR DEVELOPED CONDITIONS (V_{100})

100-YEAR, 6-HOUR STORM

Per the City of Albuquerque D.P.M. Section 22.2

PROJECT NAME: Reserve at the Trails

JOB NUMBER: 1325

| PRECIP ZONE | E ₃₆₀ EXCESS PRECIPITATION (in.) | | | |
|----------------|---------------------------------------------|------|------|------|
| | A | B | C | D |
| 1 | 0.44 | 0.67 | 0.99 | 1.97 |
| 2 | 0.53 | 0.78 | 1.13 | 2.12 |
| 3 | 0.66 | 0.92 | 1.29 | 2.36 |
| 4 | 0.80 | 1.08 | 1.46 | 2.64 |

| % LAND TREATMENTS | | | | |
|-------------------|-----------------|-----------------|-----------------|-----------------|
| | TREAT TYPE 1 | TREAT TYPE 2 | TREAT TYPE 3 | TREAT TYPE 4 |
| A | 0 | 0 | 0 | 0 |
| B | 25 | 25 | 25 | 0 |
| C | 25 | 25 | 25 | 0 |
| D | 50 | 50 | 50 | 0 |
| Σ% = | 100 | 100 | 100 | 0 |

PRECIPITATION ZONE:

1

| TREATMENT TYPE 1 | | | | | | | | |
|------------------|---------------------------|----------------|----------------|----------------|----------------|----------------------|-----------------------|---------|
| BASIN # | LAND TREATMENT AREAS (Ac) | | | | | V_{100} (Ac-ft) | V_{100} (cu.ft.) | REMARKS |
| | A _{TOTAL} | A _A | A _B | A _C | A _D | | | |
| G1 | 1.8414 | 0 | 0.46 | 0.46 | 0.92 | 0.2148 | 9358.0 | |
| G2 | 1.0852 | 0 | 0.27 | 0.27 | 0.54 | 0.1266 | 5515.0 | |
| G3 | 1.8757 | 0 | 0.47 | 0.47 | 0.94 | 0.2188 | 9532.3 | |
| G4 | 1.2863 | 0 | 0.32 | 0.32 | 0.64 | 0.1501 | 6537.0 | |
| G5 | 2.224 | 0 | 0.56 | 0.56 | 1.11 | 0.2595 | 11302.4 | |
| G6 | 1.0768 | 0 | 0.27 | 0.27 | 0.54 | 0.1256 | 5472.3 | |
| G7 | 3.478 | 0 | 0.87 | 0.87 | 1.74 | 0.4058 | 17675.2 | |
| G8 | 0.754 | 0 | 0.19 | 0.19 | 0.38 | 0.0880 | 3831.8 | |
| G9 | 2.200 | 0 | 0.55 | 0.55 | 1.10 | 0.2567 | 11180.4 | |
| F10 | 3.012 | 0 | 0.75 | 0.75 | 1.51 | 0.3514 | 15307.0 | |
| F11 | 0.488 | 0 | 0.12 | 0.12 | 0.24 | 0.0569 | 2480.0 | |
| | 19.3214 | | | | 9.66 | 2.2542 | 98191.4 | |

RETENTION POND VOLUMES
FOR 100-YEAR, 10-DAY STORM

PROJECT NAME: Reserve at the Trails
JOB NUMBER: 1325

POND G

$$P_{360} = \boxed{2.25} \text{ in} \quad (\text{from Fig. C-2, COA DPM})$$

$$P_{1440} = \boxed{2.72} \text{ in} \quad (\text{from Fig. C-3, COA DPM})$$

$$V_{360} = \boxed{2.25} \text{ Ac-ft} \quad (\text{from Volume calcs})$$

$$A_D = \boxed{9.66} \text{ Ac}$$

$$P_{10\text{day}} = 10 - [24.9/(P_{1440})^{1.4}]$$

$$P_{10\text{day}} = 3.865165 \text{ in}$$

$$V_{10\text{day}} = V_{360} + A_D(P_{10\text{day}} - P_{360})/12$$

$$V_{10\text{day}} = \boxed{3.5502} \text{ Ac-ft} \quad \Rightarrow \quad 154647 \text{ cu. ft.}$$

APPENDIX B

Street Flow Capacity

THE RESERVE AT THE TRAILS

STREET FLOW DEPTH SUMMARY

| STREET | LOCATION | STREET WIDTH | CURB TYPE | SLOPE (ft/ft) | Q ₁₀₀ (cfs) | DEPTH (ft) |
|---------------|----------|--------------|-----------|---------------|------------------------|------------|
| GLYNDON TR | AP1 | 28' F-F | MTBL | 0.0650 | 6.1 | 0.17 |
| GLYNDON TR | AP2 | 28' F-F | MTBL | 0.0400 | 9.7 | 0.22 |
| GLYNDON TR | AP3 | 28' F-F | STD | 0.0400 | 15.9 | 0.34 |
| HALLSTON TR | AP4 | 28' F-F | STD | 0.0050 | 32.2 | 0.59 |
| WINNCREST TR | AP5 | 28' F-F | MTBL | 0.0050 | 7.4 | 0.29 |
| CROSSWINDS TR | AP5 | 28' F-F | MTBL | 0.0400 | 7.4 | 0.20 |
| CROSSWINDS TR | AP6 | 28' F-F | MTBL | 0.0400 | 11 | 0.23 |
| CROSSWINDS TR | AP7 | 28' F-F | STD | 0.0247 | 22.6 | 0.41 |
| WOODMONT RD | AP8 | 76' F-F | STD | 0.0050 | 7.3 | 0.37 |
| TREE LINE AVE | AP9 | 48' F-F | STD | 0.0564 | 20 | 0.35 |
| TREE LINE AVE | AP10 | 48' F-F | STD | 0.0072 | 7.2 | 0.35 |

3.7 CFS NORTH SIDE

10 CFS SOUTH SIDE

3.6 CFS SOUTH SIDE

Storm Drain Inlet Table

| Inlet ID | Q Upstream (cfs) | Street Grade (%) | Flow Depth (ft) | Inlet Type | Inlet Capacity (cfs) | Q Downstream (cfs) |
|---------------------------------------------------------|---------------------------------------------------|-------------------------|------------------------|-------------------|-------------------------------|---------------------------|
| 1 & 2--Crosswinds @ Hallston | 22.6 | 2.47 | 0.41 | 'A' | 2 @ 6.5 ** | 9.6 |
| 3 & 4--Hallston | 32.2 | Low Pt | 0.59 | DBL 'C' | 2 @ 16.2 * | 0 |
| 5 & 6--Woodmont Road (Inlet 6 on south side--future) | 7.3 (3.7 north side 3.7 south side--future) | Low Pt | 0.37 | SGL 'C' | 1 @ 3.7 * 1 future @ 3.7 * | 0 |
| 7--Tree Line West inlet | 10 | 5.64 | 0.35 | 'A' | 1 @ 6.4 ** | 3.6 |
| 8--Tree Line East inlet | 3.6 | 0.72 | 0.35 | DBL 'C' | 1 @ 5.0 ** | 0 |

* See Sump Inlet Calculations

** Capacity from COA DPM Plate 22.3 D-5

SUMP INLET CALCULATIONS

GRATE OPEN AREA:

(per COA std dwg #2220, single grate)

$$\begin{aligned}\text{GROSS AREA FOR ONE GRATE} &= (25 \text{ in}/12)(40 \text{ in}/12) = & 6.94 \text{ SF} \\ \text{LESS BEARING BARS} &= (0.5 \text{ in}/12)(3.33 \text{ ft})(13) = & 1.80 \text{ SF} \\ \text{LESS CROSS BARS} &= (0.5 \text{ in}/12)(7)[(25 \text{ in}/12)-(13)(0.5 \text{ in}/12)] = & 0.45 \text{ SF}\end{aligned}$$

$$\text{NET GRATE OPEN AREA} = 4.69 \text{ SF}$$

$$\text{GRATE OPEN AREA (assuming 50\% clogging factor)} = 2.35 \text{ SF}$$

ORIFICE EQUATION:

$$Q = CA(2gh)^{1/2}$$

Where:

$$C = 0.67$$

$$A = 2.35 \text{ ft}^2$$

$$g = 32.2 \text{ ft/sec}^2$$

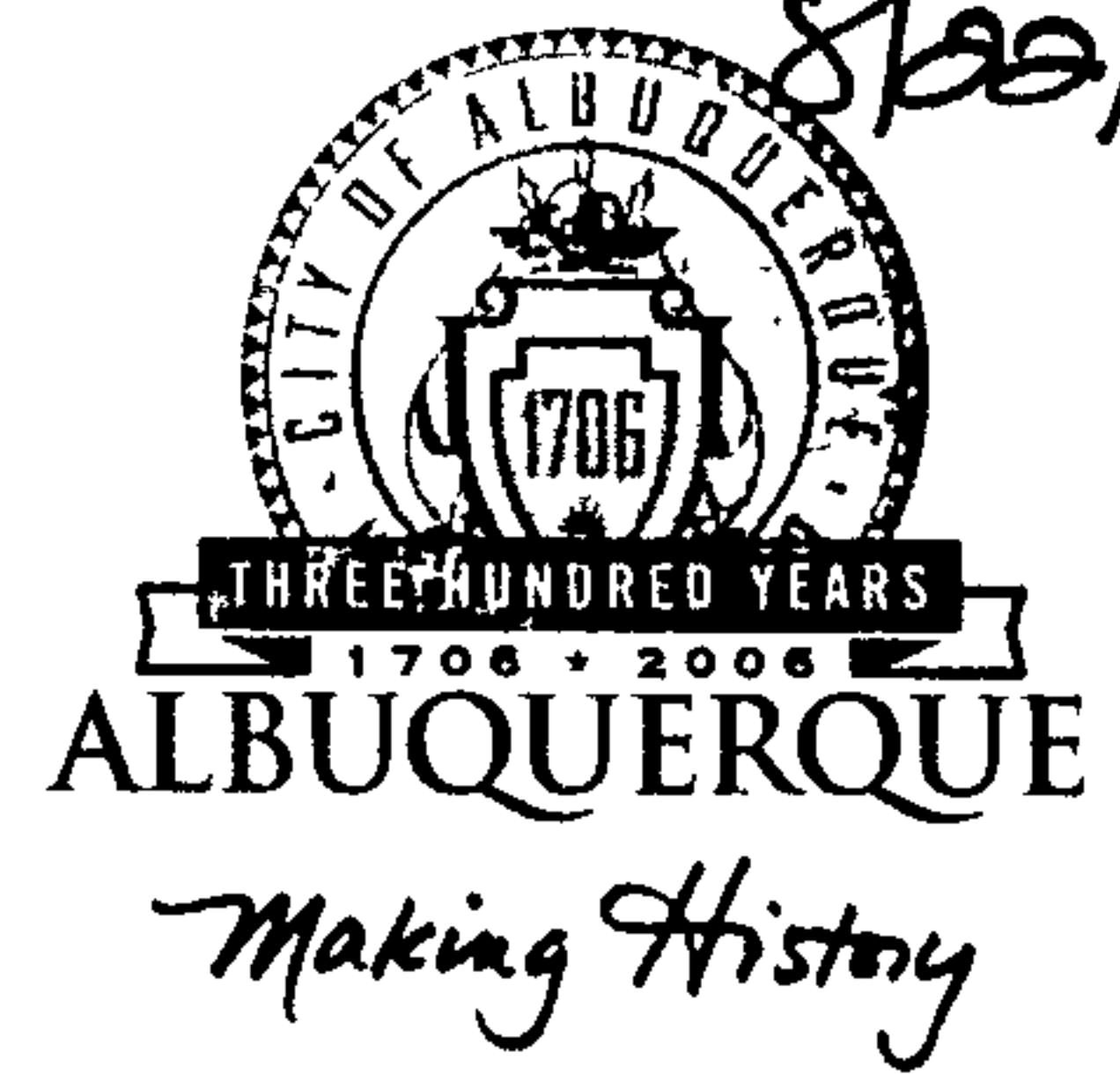
$$h = \text{height of the water surface above the grate}$$

CAPACITY CALCULATIONS:

| | |
|---------------------------------------------|----------------------------------------------------|
| INLET # 3 & 4 | |
| LOCATION: Hallston Trail | |
| $h = $ <input type="text" value="0.67"/> ft | |
| $Q_{(\text{capacity})} = $ 10.32 cfs | REQUIRED Q = <input type="text" value="16.2"/> cfs |
| NUMBER OF GRATES REQUIRED = <u>2</u> | |

| | |
|---------------------------------------------|---------------------------------------------------|
| INLET # 5 & 6 (6=future) | |
| LOCATION: Woodmont Rd | |
| $h = $ <input type="text" value="0.67"/> ft | |
| $Q_{(\text{capacity})} = $ 10.32 cfs | REQUIRED Q = <input type="text" value="3.7"/> cfs |
| NUMBER OF GRATES REQUIRED = <u>1</u> | |

CITY OF ALBUQUERQUE



February 1, 2006

Ms. Genny Donart, PE
ISAACSON & ARFMAN, PA
128 Monroe St. NE
Albuquerque, NM 87108

RE: THE RESERVE AT THE TRAILS, (C-9/D3)
Engineers Certification for Release of Financial Guaranty
Engineers Stamp dated 07/26/2004
Engineers Certification dated 02/01/2006

Dear Genny:

P.O. Box 1293

Based upon the information provided in your Engineer's Certification Submittal dated 01/31/2006, the above referenced plan is adequate to satisfy the Grading and Drainage Certification for Release of Financial Guaranty.

Albuquerque

If you have any questions, you can contact me at 924-3982

New Mexico 87103

Sincerely,

Arlene V. Portillo

Arlene V. Portillo
Plan Checker, Planning Dept.- Hydrology
Development and Building Services

www.cabq.gov

C: Marilyn Maldonado, COA #738483
File