CITY OF ALBUQUERQUE

November 8, 2005

James Hughes, P.E.
Mark Goodwin & Associates, PA
P.O. Box 90606
Albuquerque, NM 87199

Re: Eagle Ridge Subdivision, SIA/Financial Guarantee Release
Engineer's Stamp dated 1-16-03 (C13-D5)
Certification dated 11-04-05

Dear Mr. Hughes,

Based upon the information provided in your submittal received 11-07-05, the above referenced certification is approved for release of SIA and Financial Guarantee.

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

Sincerely,

Kristal D. Metro, P.E.
Senior Engineer, Planning Dept.
Development and Building Services

C: Marilyn Maldonado, COA# 702181
File

P.O. Box 1293
Albuquerque
New Mexico 87103
www.cabq.gov

City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

January 27, 2003

James D Hughes, PE
Mark Goodwin & Associates
P.O. 90606
Albuquerque, NM 87199

Re: Eagle Ridge Subdivision Revised Grading Plan
Engineer's Stamp dated 12-13-02 (C13/D5)

Dear Mr. Hughes,

Based upon the information provided in your submittal dated 12-16-02, the above referenced plan is approved for Grading Permit and Work Order approval. The plan dated 9-5-02 is now void.

If you have any questions, you can contact me at 924-3986.

Sincerely,

Bradley L. Bingham, PE
Sr. Engineer, Planning Dept.
Development and Building Services

C: file

City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

January 30, 2004

James D Hughes, PE
Mark Goodwin & Associates
P.O. 90606
Albuquerque, NM 87199

Re: Eagle Ridge Subdivision Pond Change Order Plans
Engineer's Stamp dated 1-26-04 (C13/D5)

Dear Mr. Hughes,

Based upon the information provided in your submittal dated 1-27-04, the above referenced plan is approved for Change Order to the Work Order. The plan submitted may be constructed and certified by the as-builts or proceed through the Change Order process.

If you have any questions, you can contact me at 924-3986.

Sincerely,

Bradley L. Bingham, PE
Sr. Engineer, Planning Dept.
Development and Building Services

C: Jane Rael, CoA# 702181
file

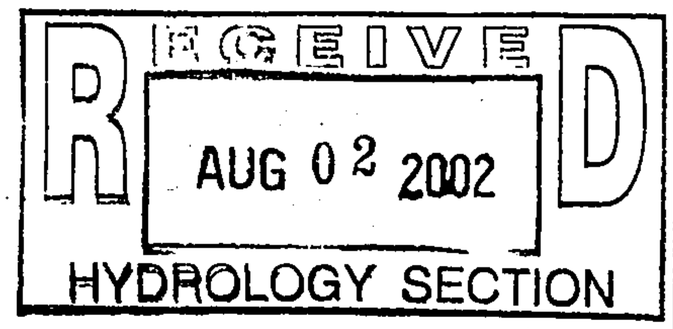
DRAINAGE REPORT

for

EAGLE RIDGE SUBDIVISION

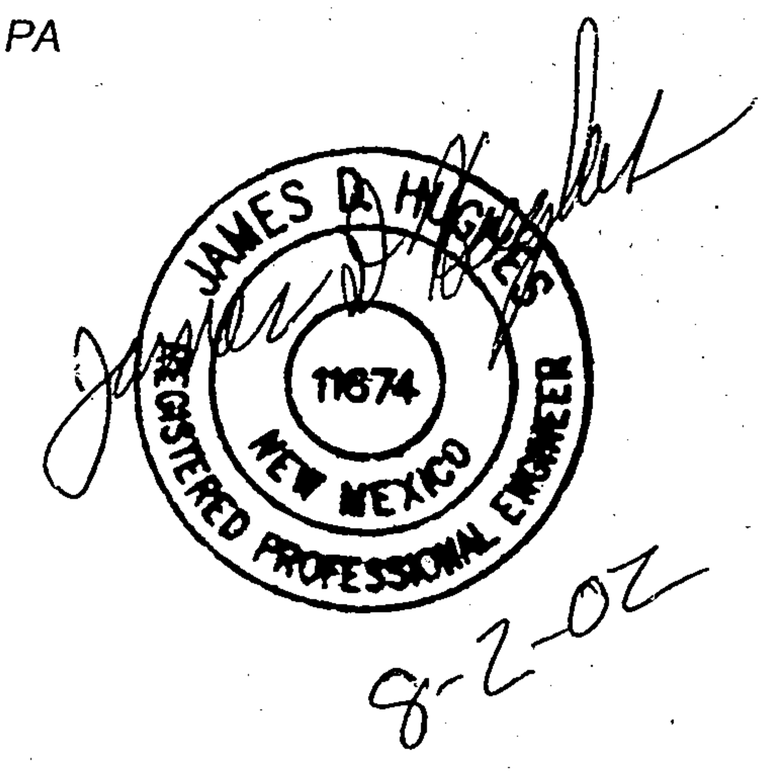
Prepared for:

STV Investments LLC
400 Gold SW, Suite 700
Albuquerque, NM 87102



Prepared by:

Mark Goodwin & Associates, PA
P.O. Box 90606
Albuquerque, NM 87199



August 2, 2002

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PURPOSE

The primary purpose of this report is to demonstrate the adequacy of the proposed drainage to allow this 32.59 ac. site to be subdivided into about 173 single-family, detached, residential lots, and so associated public drainage infrastructure can be constructed and turned over to the City of Albuquerque for maintenance.

EXISTING CONDITIONS

This property drains to the Corrales Main Canal east of Coors and is surrounded by developed land on all sides which intercepts off-site drainage. The terrain is steep and slopes from west to east at about 10% grade. Two electrical transmission lines run north/south through the middle of the site in a 100' wide easement and the emergency overflow spillway from the Piedras Mercadas Dam is in an AMAFCA easement on the southern portion of the site. Two drainage easements were previously platted on this property in anticipation fo ponding developed flows so as not to exceed the capacity of the Corrales Main Canal in accordance with the 1997 North Coors Drainage Management Plan and earlier versions of that same drainage management plan. The Rancho Sereno Subdivison west of Eagle Ranch Road, diverted as much drainage as possible into the Piedras Mercadas Dam. The lower portion of Eagle Ranch Road is to drain to a culvert under Coors located 750' south of the intersection in accordance with the Bosque Del Pueblo final Grading and Drainage Plan. The Albuquerque West development north of All Saints Road requires individual private ponds on each lot and discharges all drainage including All Saints Road to the intersection of Coors and Paseo Del Norte.

PROPOSED MANAGEMENT PLAN

Outside drainage discharge is limited to 12cfs combined peak flow from the pond in the northeast corner plus the sheet flow from the east slope in accordance with the North Coors Drainage Management Plan (NCDMP), 1997. All off-site drainage is diverted by All Saints Road and Eagle Ranch Road in accordance with the Master Drainage Plan for Albuquerque West (MDMPAW), 1995, and the Drainage Report for Rancho Sereno Subdivision respectively, so no off-site drainage enters this site. Basin 12.2 includes developed flows form about 5 on-site lots plus Eagle Ranch Road, plus the AMAFCA right-of-way east of Eagle Ranch Road and will free discharge 15 cfs to the culvert under Coors that is located approximately 750' south of Eagle Ranch Road in accordance with the Bosque del Pueblo final Grading and Drainage Plan .

TABLE 1 — SUMMARY OF HYDROLOGY

	Area (Acres)	A	B	C	D	100 yr Peak Flow Incremented cfs	100 yr Peak Flow Cumulative minus Inlet Interception
PN-2 (1)	1.181	0	21.8	21.8	56.4	4.19	4.19
QZ-1 (1)	3.495	0	15	15	70	13.26	24.04
QZ-2W (1)	1.575	0	5	5	90	6.59	10.78
QZ-ZE (1)	0.581	0	9.7	9.7	80.6	2.34	3.96
AWest	1.9	0	0	55	45	6.73	10.69
ER-1W (1)	0.771	0	6.5	6.5	86.9	3.18	18.24
ER-1E	0.771	0	6.5	6.5	86.9	3.18	10.54
ER-2W (1)	0.242	0	5.2	5.2	89.6	1.03	19.27
ER-2E	0.242	0	5.2	5.2	89.6	1.03	11.57
12.1A (2)	27.7	0	15	28	57	99.52	11.05
12.1B (2)	2.1	0	0	100	0	6.04	11.54
12.2A (2)	1.2	0	0	13	87	5.04	5.04
12.2B (2)	4.1	0	61	30	9	10.17	15.21
13.1A (2)	4.4	0	0	75	25	14.31	14.31
13.1B (2)	7.6	10	10	30	50	25.5	18.45
14.1 (2)	23.3	60	10	15	15	46.79	65.19

(1) *Hydrologic Data from page A2-1 of Rancho Sereno, 1994*

(2) *Watersheds below the Piedras Marcadas Dam, some with limited / controlled discharge in accordance with the North Coors Drainage Management Plan (NCDMP), 1997.*

(3) *Note Tp is 0.133 hr for all basins in all reports.*

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TABLE 2 — STREET DRAINAGE CAPACITIES

Basin No.	Area (Acre)	% of Total	Increment	Cumm.	Curb Type/Slope	Flow Depth ft[1]	Velocity fps	Energy Depth ft[2]	Location
100YR CAPACITY IN LOCAL STREETS									
1	3.08	11.12%	11.07	11.07	roll 26' 5.0%	0.22	4.40	0.52	Sleeping Bear Dr. Sta 16+50
2	3.80	13.72%	13.65	24.72	std 26' 1.23 %	0.46	3.30	0.63	Ophelia Ave. Sta 23+00
3	2.50	9.03%	8.98	33.70	roll 26' 0.50%	0.33	1.90	0.39	Bluffs Edge St. Sta 22+50
4	0.98	3.54%	3.52	37.22	std 28' @ 0.5%	0.61	3.10	0.76	Bluffs Edge St. Sta 22+50
5	1.87	6.75%	6.72	43.94	roll 26' @ 8.0%	0.18	4.90	0.55	Antonia Ct Sta 12+50
6	0.93	3.36%	3.34	47.28	std 28' @ 0.5%	0.67	3.50	0.86	Bluffs Edge St. Sta 12+50
7	0.88	3.18%	3.16	3.16	roll 28' 8.0%	0.13	4.10	0.39	Wolverine Dr. Sta 15+00
8	2.15	7.76%	7.72	10.89	Std 28' 8.0%	0.25	5.10	0.65	Wolverine Dr. Sta 17+25
9	3.06	11.05%	10.99	69.16	std 28' @ 0.5%	0.63	3.10	0.78	Bluffs Edge St. Sta 9+50
10	1.55	5.60%	5.57	5.57	roll 26' 5.0%	0.18	3.80	0.40	Crystalaire Ave Sta 12+50

Basin No.	Area (Acre)	% of Total	Increment	Cumm.	Curb Type/Slope	Flow Depth ft(1)	Velocity fps	Energy Depth ft(2)	Location
11	0.90	3.25%	3.23	8.80	Std 26' 5.0%	0.21	5.10	0.61	Crystalaire Ave Sta 14+50
12	1.42	5.13%	5.10	13.90	roll 26' 2.29%	0.21	2.80	0.33	Petosky St. Sta 10+50
13	1.86	6.71%	6.68	20.59	Std 26' 8.0%	0.33	7.30	1.16	Crystalaire Ave Sta 18+00
14	1.40	5.05%	5.03	25.62	std 28' @ 0.5%	0.60	3.00	0.74	Bluffs Edge St. Sta 22+50
15	1.32	4.77%	4.74	30.36	N/A	N/.A	N/A	N/A	N/A
TOTAL	27.70	100.00%	99.52						
16	0.69	2.49%	2.48	2.48	roll 20' 9.29%	0.12	4.00	0.37	Bluffs Edge St. Sta 28+50

(1) Flow depths are taken from Plate 22.3 D-1 and 22.3 D-2 of the DPM and reduced by 3/4" for roll curb types to account for the differences in gutter depression. Allowable depths may not exceed curb heights which are 0.33' for roll curb and gutter and 0.67' for standard curb and gutter.

(2) Energy depth is calculated as flow depth plus energy head. Allowable depths are 0.20' above top of curb.

INLETS ON GRADE

Inlets on Bluffs Edge Street, South of Wolverine Drive
Inlets 1, 2, 3 & 4

Inlets #1 and #2 are single grates on a 0.5% grade flowing at a depth of 0.67'. Each inlet intercepts 8.1 cfs where the approaching flow is 47.28 cfs, leaving 31.08 cfs bypass flow. The bypass flow is joined by 10.89 cfs from Wolverine Drive for a total of 41.97 cfs flowing at a depth of 0.65' where two more single grates (inlets #4 & #5) intercept 7.8 cfs each leaving 26.37 cfs bypass, which is joined by 10.99 cfs from basin #9 for a total of 37.36 cfs approaching Crystalaire Avenue.

Inlets on Crystalaire Avenue, West of Bluffs Edge Street
Inlets 5, 6, 7 & 8

Inlets #5 & #6 are single grates on an 8.0% grade flowing at a depth of 0.33'. Each inlet intercepts 6.2 cfs where the approaching flow is 20.59 cfs, leaving 8.19 cfs bypass flow to join the 37.36 cfs in Bluffs Edge Street for a total of 45.55 cfs flowing north from the intersection at a depth of 0.67' where inlets #7 & #8 each intercept 8.1 cfs leaving 29.35 cfs flowing into Basin #14.

SUMP INLETS CAPACITIES

Bluffs Edge Street
Sta 10 + 00

The approaching flow is 30.17 cfs fully developed 100 yr flow.

*Capacity is measured by the weir equation at the lope of the gutter, assuming an allowable ponding elevation equal to the lowest adjacent right-of-way elevation. The length of the double grate facing the street is 6.5' ± and the depth is 0.745' * at the lip of the gutter. The sides are each 2' long (4' total) and the average depth is 0.912' *. From the weir equation:*

(front) Q cap = $3.0 \times 6.5 \times 0.745^{1.5} = 12.54$ cfs
(sides) Q cap = $3.0 \times 4.0 \times 0.912^{1.5} = 10.45$ cfs
(total) Q cap = 12.54 cfs + 10.45 cfs = 22.99 cfs

*The length of single grate facing the street is 3.25' and the depth is 0.745' * at the lip of the gutter. The sides are each 2' long (4' total), and the average depth is 0.912' *. From the weir equation:*

(front) Q cap = $3.0 \times 3.25 \times 0.745^{1.5} = 6.27$ cfs
(sides) Q cap = $3.0 \times 4.0 \times 0.912^{1.5} = 10.45$ cfs
(total) Q cap = 6.27 cfs + 10.45 cfs = 16.72 cfs

** Note: These depths assume standard 8" curb with the right-of-way 10' behind the curb and 0.20' above the top of the curb.*

The 100 yr flow to the sump inlets 9 & 10 is 30.17 cfs. There is one single grate inlet and one double grate inlet with a combined capacity of 39.71 cfs, thus providing a safety factor that would allow 50% of the inlets to clog without exceeding the normal design criteria. The HGL calculations, each inlet is assumed to take one fourth of the 100 yr flow (10.05 cfs each).

South End of Bluffs Edge Street
Inlet # 11

*Capacity is measured by the weir equation at the lip of the gutter, assuming an allowable ponding elevation equal to the lowest adjacent right-of-way elevation. The length of single grate facing the street is 3.25' and the depth is 0.745' * at the lip of the gutter. The sides are each 2' long (4' total) and the average depth is 0.912'*. From the weir equation:*

(front) Q cap = 3.0 x 3.25 x $0.745^{1.5}$ = 6.27 cfs
(sides) Q cap = 3.0 x 4.0 x $0.912^{1.5}$ = 10.45 cfs
(total) Q cap = 6.27 cfs + 10.45 cfs = 16.72 cfs

Note: These depths assume standard 8" curb with the right-of-way 10' behind the curb and 0.20' above the top of the curb.

The 100 yr flow to the sump inlet #11 is 2.48 cfs. There is one single grate inlet with a capacity of 16.72 cfs, thus providing a safety factor that would allow 85% of the inlets to clog without exceeding the normal design criteria.

DIVIDED FLOW ANALYSIS
Intersection of All Saints Road and Eagle Ranch Road

Flow approaching on the west half will continue south as long as it does not exceed the crown which is only 0.2' high and 25' wide. The flow continuing south is approximated by mannings normal depth calculation as follows:

So = 2.35%
n = 0.20
R = depth - 0.15'
Area = R x 25'
$Q = (1.49/0.02) \times AxR^{2/3} \times So^{1/2} = 285\ R^{5/3}$

Flow crossing over the crown to the south half of the road is approximated by the weir equation as follows:

L = 70'
h = Depth - 0.20'
$Q = 2.7\ L\ h^{1.5}$

Depth (ft)	Q (cfs) Manning's	Q (cfs) Weir	Q Total
0.0	0.0	0.0	0.0
0.2	1.33	0.0	1.33
0.3	10.76	5.98	16.74
0.4	26.42	16.9	43.32
0.5	47.20	31.06	78.26

The split flow (weir flow) that crosses over to the east half of the road is then split again with approximately 18% going east on All Saints Road and the remaining 82% continuing south in the east half of Eagle Ranch Road.