City of Albuquerque
P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

December 3, 2001

Kerry Davis, P.E.
Bohannan Huston, Inc.
7500 Jefferson NE
Albuquerque, New Mexico 87109

RE: **JOURNAL CENTER- PHASE 2 UNIT 1 (D-17/D3AA)**
Engineers Certification For Release of Financial Guaranty
Engineers Stamp dated 10/2/2000 Rev. 10/25/2000
Engineer's Certification dated 11/15/2001

Dear Mr. Davis:

Based upon the information provided in your submittal dated 11/16/2001, the above referenced plan is adequate to satisfy the Grading and Drainage Certification requirements for release of financial guaranty for the above mentioned project.

If you have any questions, please call me at 924-3981.

Sincerely,

Teresa A. Martin

Teresa A. Martin
Hydrology Plan Checker
Public Works Department
BLB

C: Arlene Portillo, PWD – #651781
File

DRAINAGE REPORT

FOR

JOURNAL CENTER - PHASE 2

OFFICE & OFFICE WAREHOUSE PROPERTIES

AUGUST 25, 2000

Prepared for:

TIBURON INVESTMENT COMPANY
c/o ALBUQUERQUE ACADEMY
6400 WYOMING BOULEVARD NE
ALBUQUERQUE, NEW MEXICO 87109

Prepared by:

BOHANNAN HUSTON, INC.
COURTYARD I
7500 JEFFERSON NE
ALBUQUERQUE, NEW MEXICO 87109

PREPARED BY:

10/02/00

Colleen M. Ruiz, E.I. [Date]

UNDER THE SUPERVISION OF:

KERRY L. DAVIS NEW MEXICO 9924 REGISTERED PROFESSIONAL ENGINEER

10/02/00

Kerry L. Davis, P.E. [Date]

I. INTRODUCTION

Journal Center - Phase 2 is a proposed office/office warehouse subdivision consisting of 63 non-residential lots on approximately 71.3 acres to be developed in two phases. This report is in compliance with the City of Albuquerque Subdivision Standards and is consistent with the drainage criteria set forth by the Revised Drainage Management Plan for Journal Center (October 1994).

Detailed drainage and grading plans are included in the Plates section of this report.

This subdivision is located south of the North Pino Arroyo Concrete Channel, west of Jefferson Street and east of the AMAFCA North Diversion Channel. The land is zoned for industrial park development. Please refer to the Location Map enclosed in the Appendices for the specific location.

This report outlines the study methodologies used and summarizes the existing and proposed drainage conditions. Calculations and supporting data are presented in the Appendices. The Drainage Management Plan, drainage basin maps, grading plans and a copy of the Preliminary Plat are included in the pockets of the Plates section at the end of the report.

The purpose of this report is to obtain approval for the Preliminary and Final Plat, Grading Plans and Public Infrastructure Construction Plans of the Journal Center - Phase 2 Office and Office/Warehouse properties.

II. STUDY METHODOLOGIES

The City of Albuquerque standards for drainage analyses have been incorporated by this report. Proposed flows are greater, from 337 cfs as identified in the original DMP, to 392 cfs in this analysis. The increase is due to the implementation of modified drainage standards in the Development Process Manual since 1992 (larger peak discharge rates). The concepts, equations and impervious areas in the proposed development all match the original Drainage Management

Plan. This drainage report contains all applicable calculations, per Section 22.2 of the Development Process Manual for deriving the following values using the rational method analysis:

LAND TREATMENT	PEAK DISCHARGE (CFS/ACRE)	EXCESS PRECIPITATION (INCHES)
A	1.56	0.53
B	2.28	0.78
C	3.14	1.13
D	4.70	2.12

ZONE 2

Flow rate references in this report are 6-hour, 100-year storm event values.

Street hydraulics and capacities were analyzed using Manning's equation. Spreadsheets for street capacities are provided in Appendix 3. Streets are designed to convey the energy grade line of the design storm event within the width of the street right-of-way. Normal flow depth is confined to the top of the curb.

Basin analysis comparisons and calculations are in Appendix 2. Manning's equation was used to size pipes. Inlets were designed using the spreadsheets and rating curves in Appendix 4. Swales were calculated and designed for the 100-year storm event as shown in Appendix 5.

III. EXISTING CONDITIONS

A. Onsite Drainage Basins

The existing site slopes in a westward direction with grades ranging from 1-3%. Vegetation consists of native grasses, weeds, and small trees within the several existing drainage swales that cross the site.

Two different locations currently receive run-off from the site:

1) **North Pino Arroyo**

The majority of the run-off from the site flows through graded swales into an existing AMAFCA Desilting Basin in the northwest corner of the site. The flows are then routed into the North Pino Arroyo. Portions of the flows from the northeastern corner of the subdivision also enter the North Pino Arroyo through a swale in the west-central side of the subdivision (proposed Lot 1 of Unit II). All of these flows then converge into the AMAFCA North Diversion Channel.

2) **AMAFCA North Diversion Channel**

33 cfs from the westernmost corner of the subdivision currently passes directly into the AMAFCA North Diversion Channel through an existing side channel surface inlet.

B. Offsite Drainage Basins

There is a battery of inlets at the intersection of Jefferson and Masthead. The flows from these inlets (15.0 cfs) are channeled through a 24" RCP into the proposed site past Tiburon where the RCP daylights in a graded drainage swale that routes the flows to the AMAFCA desilting basin.

IV. PROPOSED DEVELOPED CONDITIONS

Please refer to the Proposed Conditions/Drainage Basins Map (Plate 2) and Preliminary Plat (Plate 4) provided in the pockets at the end of this report for a graphical depiction of the proposed conditions. The Proposed Conditions/Drainage Basins Map identifies the individual basins and their respective flow rates resulting from the 6-hour, 100-year storm event. The Proposed Conditions Map also identifies the street slope directions and the extent of construction to be included with the subdivision. The drainage plan is summarized in the following two sections.

V. SUBDIVISION DEVELOPMENT

A. Onsite Drainage Basins

For the purpose of analysis, Journal Center - Phase 2 is subdivided into several sub-basins, as shown on the Proposed Basins Map (Plate 2). Sub-basins route the flows from the subdivision and offsite basins to three culverts and into the North Pino Arroyo.

1. Culvert 1 (C1) collects flows from Basin B (52.9 cfs), Basin E (11.9 cfs) and Offsite 2 (1.8 cfs). These flows are collected in 2 batteries of inlets. The first series is located in Basin E. These inlets collect 13.7 cfs of flows from Basin E and Offsite 2 and transport them via storm drain toward Analysis Point 1. Between Unit I and Unit II construction these flows will be temporarily routed through a designed swale into an existing drainage swale that leads to the AMAFCA desilting pond. Basin B's flow will be collected at a sump in line with the 60' AMAFCA drainage easement. These flows, along with Basin E's, and Offsite 2's are combined in a storm drain that daylights within the existing AMAFCA Desiltation Pond.

2. Culvert 2 (C2) collects flows from Basin C at a battery of inlets between lots 11 and 30 is at a sump in Unit II. These flows are then transported via storm drain and a channel connection in the North Pino Arroyo. A proposed pipe penetration into the channel will convey flows from the pipes into the channel.

3. Culvert 3 (C3) collects flows from several locations also. The storm drain systems ties to an existing storm drain from the Masthead/Jefferson intersection and absorbs 15 cfs from Offsite Basin 1. Then an additional 8.6 cfs are picked up at the Tiburon/Mastead intersection. Finally, Basin F (102.1 cfs) is collected at as sump between Units I and II west of the intersection between Masthead and Washington. These flows are then collected and added to the North Pino Arroyo via a proposed pipe penetration channel connection.

4. Basin D (76.0 cfs) contains lots that are adjacent to the North Pino Arroyo. These all drain north individually and directly into the arroyo.

5. Basin A (41.9 cfs) is designed to flow in a southwest direction through an existing drainage way into the AMAFCA North Diversion Channel.

Street capacities have been calculated at several analysis points (reference the Proposed Conditions Basin Map in Appendix 2 of this report). The data for street capacities can be found in Appendix 3. Normal depth of flow is contained below the top of curb elevation, and the energy grade line is contained within the street right-of-way.

Individual master lot grading has been identified on the Grading Plan located in the rear pockets. Typical lot drainage configurations are used, as shown on the Grading Plan. More detailed grading of each lot is required, in conformance with this Master Plan, at the time of building permit review and approval. Due to the natural grade of the land and layout of the subdivision, there are several cross-lot drainage easements. These are identified on both the Preliminary Plat and Grading Plan.

B. Offsite Drainage Basins

The existing 24" RCP from the intersection of Masthead and Jefferson will be connected to at the intersection of the new Tiburon/Masthead intersection. These flows will be combined with proposed surface flows at a sump just east of the phase boundary. From this point, a channel connection will be made and the flows will be directed into the North Pino Arroyo per the Journal Center Drainage Management Plan.

VI. CONCLUSION

This report requests approval for the Preliminary and Final Plat and site Grading Plans. Upon approval of the preliminary plat, the Public Infrastructure Construction Plans will be submitted and processed for DRC review and approval. The drainage management plan presented in this revised report for Journal Center - Phase 2 provides a workable solution to the drainage issues created by the development of this property. It is recommended that this plan is approved for the Preliminary and Final Plat, as well as for grading and infrastructure plans.

HYDROLOGY FLOW RATE BASINS CALCULATION FOR JOURNAL CENTER - PHASE 2
PER REVISED DRAIANGE MANAGEMENT PLAN FOR JOURNAL CENTER: 10-31-94
(FOR COMPARISON)

JOURNAL CENTER MANAGEMENT PLAN:
'C' for 85% Impervious = 0.80

Basin Analysis

Basin	Q100 (cfs)	Area (acres)	Destination
Gst	12	3.0	North Pino Arroyo
J	17	4.6	North Pino Arroyo
Jst	3	0.6	North Pino Arroyo
K	59	15.6	North Pino Arroyo
Kst	5	1.3	North Pino Arroyo
L	58	15.4	North Pino Arroyo
Lst	5	1.4	North Pino Arroyo
M	96	25.5	North Pino Arroyo
N	49	13.0	North Pino Arroyo
Nch	13	3.4	AMAFCA North Diversion Channel
O	20	5.3	AMAFCA North Diversion Channel
TOTAL:	**337.0**	**89.1**	

PROPOSED DRAINAGE PLAN:
(revised per new hydrology section in DPM)
'C' for 85% Impervious = 0.87
Peak Discharge = 4.40 cfs/acre
Basin Analsysis

Basin	Q100 (cfs)	Area (acres)	Destination
A	70.4	16.0	AMAFCA North Diversion Channel
B	56.32	12.8	North Pino Arroyo
C	52.36	11.9	North Pino Arroyo
D	80.96	18.4	North Pino Arroyo
E	12.76	2.9	North Pino Arroyo
F	109.12	24.8	North Pino Arroyo
G	10.12	2.3	North Pino Arroyo
TOTAL:	**392.04**	**89.1**	

Conclusion: Hydraulic analysis and acreage is the same. Peak flow rates have increased due to revised hydrologic analysis methods.
Proposed Storm drains and inlets are designed to handle the greater flows.

ANALYSIS POINT 1

MANNING'S N= .013 SLOPE= .005

POINT	DIST	ELEV	POINT	DIST	ELEV	POINT	DIST	ELEV
1	0.00	0.95	4	36.00	0.44	7	72.00	0.95
2	14.00	0.67	5	58.00	0.00	8	0.00	0.00
3	14.00	0.00	6	58.00	0.67	9	0.00	0.00

WSEL (FT)	DEPTH INC (FT)	FLOW AREA SQ.FT.	FLOW RATE (CFS)	WETTED PER (FT)	FLOW VEL (FPS)	TOPWID (FT)	VEL HEAD (FT)	ENERGY HEAD (FT)
0.10	0.10	0.50	0.5	10.20	1.08	10.00	0.02	0.12
0.20	0.20	2.00	3.4	20.40	1.72	20.00	0.05	0.25
0.30	0.30	4.50	10.1	30.61	2.25	30.00	0.08	0.38
0.40	0.40	8.00	21.8	40.81	2.73	40.00	0.12	0.52
0.50	0.50	12.32	42.0	45.01	3.41	44.00	0.18	0.68
0.60	0.60	16.72	69.6	45.21	4.16	44.00	0.27	0.87
0.70	0.70	21.16	98.6	48.38	4.66	47.00	0.34	1.04
0.80	0.80	26.36	125.3	58.48	4.75	57.00	0.35	1.15
0.90	0.90	32.56	160.2	68.58	4.92	67.00	0.38	1.28
0.95	0.95	36.04	180.9	73.63	5.02	72.00	0.39	1.34

Q100 = 28.7 CFS
DEPTH LOWER THAN CURB
ENERGY HEAD LOWER THAN RIGHT OF WAY
OK

ANALYSIS POINT 2

MANNING'S N= .013 SLOPE= .005

POINT	DIST	ELEV	POINT	DIST	ELEV	POINT	DIST	ELEV
1	0.00	0.95	4	36.00	0.44	7	72.00	0.95
2	14.00	0.67	5	58.00	0.00	8	0.00	0.00
3	14.00	0.00	6	58.00	0.67	9	0.00	0.00

WSEL (FT)	DEPTH INC (FT)	FLOW AREA SQ.FT.	FLOW RATE (CFS)	WETTED PER (FT)	FLOW VEL (FPS)	TOPWID (FT)	VEL HEAD (FT)	ENERGY HEAD (FT)
0.10	0.10	0.50	0.5	10.20	1.08	10.00	0.02	0.12
0.20	0.20	2.00	3.4	20.40	1.72	20.00	0.05	0.25
0.30	0.30	4.50	10.1	30.61	2.25	30.00	0.08	0.38
0.40	0.40	8.00	21.8	40.81	2.73	40.00	0.12	0.52
0.50	0.50	12.32	42.0	45.01	3.41	44.00	0.18	0.68
0.60	0.60	16.72	69.6	45.21	4.16	44.00	0.27	0.87
0.70	0.70	21.16	98.6	48.38	4.66	47.00	0.34	1.04
0.80	0.80	26.36	125.3	58.48	4.75	57.00	0.35	1.15
0.90	0.90	32.56	160.2	68.58	4.92	67.00	0.38	1.28
0.95	0.95	36.04	180.9	73.63	5.02	72.00	0.39	1.34

Q100 = 33.7 CFS
DEPTH LOWER THAN CURB
ENERGY HEAD LOWER THAN RIGHT OF WAY
OK

ANALYSIS POINT 3

MANNING'S N= .013 SLOPE= .0089

POINT	DIST	ELEV	POINT	DIST	ELEV	POINT	DIST	ELEV
1	0.00	1.03	4	30.00	0.24	7	60.00	0.71
2	18.00	0.67	5	50.00	-0.16	8	0.00	0.00
3	18.00	0.00	6	50.00	0.51	9	0.00	0.00

WSEL (FT)	DEPTH INC (FT)	FLOW AREA SQ.FT.	FLOW RATE (CFS)	WETTED PER (FT)	FLOW VEL (FPS)	TOPWID (FT)	VEL HEAD (FT)	ENERGY HEAD (FT)
-0.06	0.10	0.25	0.4	5.10	1.44	5.00	0.03	0.13
0.04	0.20	1.04	2.2	12.24	2.08	12.00	0.07	0.27
0.14	0.30	2.74	7.3	22.44	2.65	22.00	0.11	0.41
0.24	0.40	5.44	17.8	32.65	3.27	32.00	0.17	0.57
0.34	0.50	8.64	38.3	32.85	4.43	32.00	0.30	0.80
0.44	0.60	11.84	64.4	33.05	5.44	32.00	0.46	1.06
0.54	0.70	15.06	93.1	34.72	6.18	33.50	0.59	1.29
0.64	0.80	18.66	121.4	39.82	6.51	38.50	0.66	1.46
0.74	0.90	22.86	152.8	46.85	6.68	45.50	0.69	1.59
0.84	1.00	27.66	196.2	51.85	7.09	50.50	0.78	1.78
0.94	1.10	32.96	247.2	56.85	7.50	55.50	0.87	1.97
1.03	1.19	38.16	299.9	61.35	7.86	60.00	0.96	2.15

Q100=18.6 CFS
DEPTH LOWER THAN CURB
ENGERGY HEAD LOWER THAN RIGHT OF WAY

OK

ANALYSIS POINT 4

MANNING'S N= .013 SLOPE= .0194

POINT	DIST	ELEV	POINT	DIST	ELEV	POINT	DIST	ELEV
1	0.00	0.95	4	36.00	0.44	7	72.00	0.95
2	14.00	0.64	5	58.00	0.00	8	0.00	0.00
3	14.00	0.00	6	58.00	0.67	9	0.00	0.00

WSEL (FT)	DEPTH INC (FT)	FLOW AREA SQ.FT.	FLOW RATE (CFS)	WETTED PER (FT)	FLOW VEL (FPS)	TOPWID (FT)	VEL HEAD (FT)	ENERGY HEAD (FT)
0.10	0.10	0.50	1.1	10.20	2.13	10.00	0.07	0.17
0.20	0.20	2.00	6.8	20.40	3.38	20.00	0.18	0.38
0.30	0.30	4.50	20.0	30.61	4.44	30.00	0.31	0.61
0.40	0.40	8.00	43.0	40.81	5.37	40.00	0.45	0.85
0.50	0.50	12.32	82.7	45.01	6.71	44.00	0.70	1.20
0.60	0.60	16.72	137.2	45.21	8.20	44.00	1.04	1.64
0.70	0.70	21.22	192.1	49.53	9.05	48.21	1.27	1.97
0.80	0.80	26.52	247.6	59.05	9.34	57.73	1.35	2.15
0.90	0.90	32.77	318.9	68.56	9.73	67.24	1.47	2.37
0.95	0.95	36.25	360.9	73.32	9.95	72.00	1.54	2.49

Q100=45.9 CFS
DEPTH LOWER THAN CURB
ENGERGY HEAD LOWER THAN RIGHT OF WAY

OK

ANALYSIS POINT 5

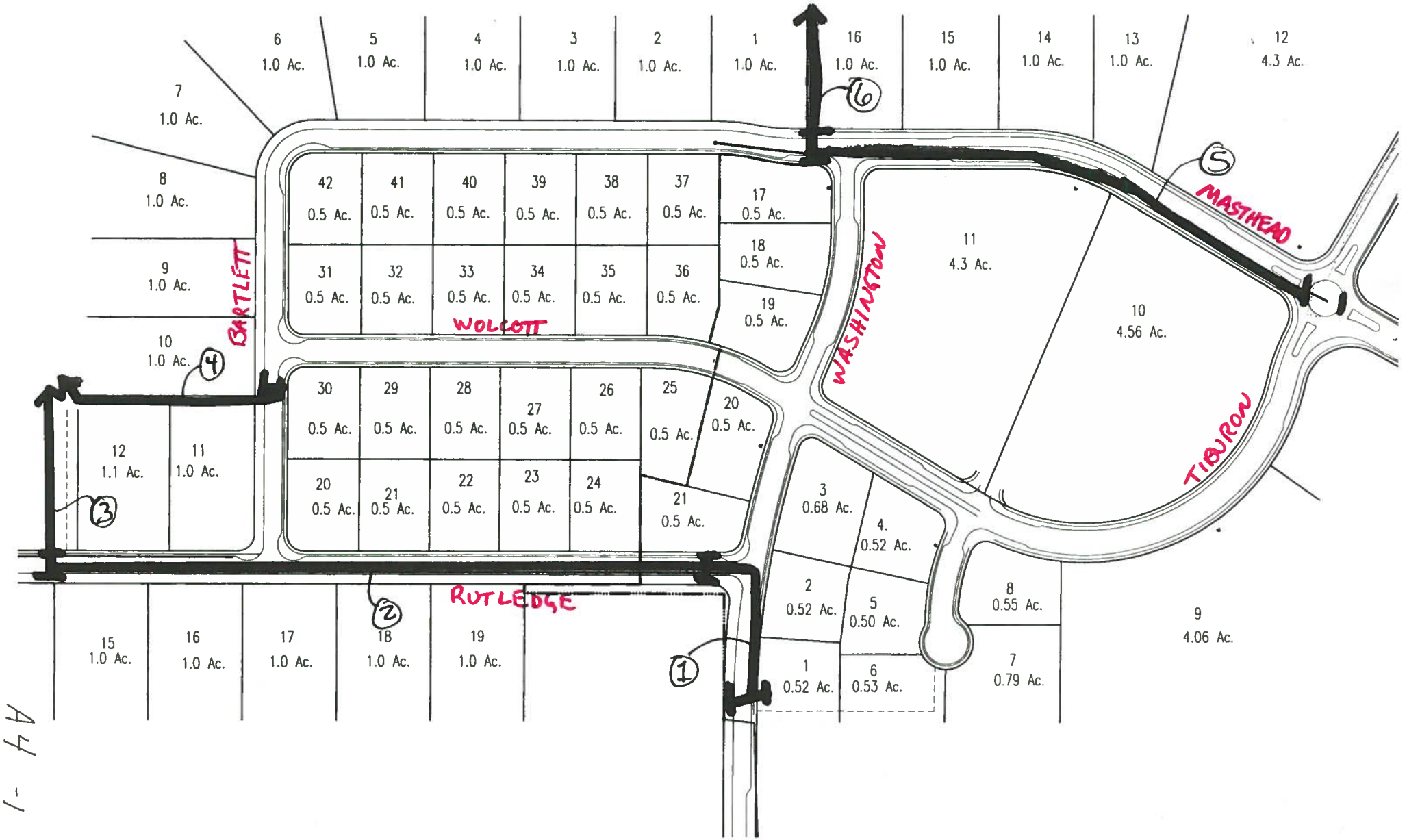
MANNING'S N= .013 SLOPE= .005

POINT	DIST	ELEV	POINT	DIST	ELEV	POINT	DIST	ELEV
1	0.00	0.95	4	36.00	0.44	7	72.00	0.95
2	14.00	0.67	5	58.00	0.00	8	0.00	0.00
3	14.00	0.00	6	58.00	0.67	9	0.00	0.00

WSEL (FT)	DEPTH INC (FT)	FLOW AREA SQ.FT.	FLOW RATE (CFS)	WETTED PER (FT)	FLOW VEL (FPS)	TOPWID (FT)	VEL HEAD (FT)	ENERGY HEAD (FT)
0.10	0.10	0.50	0.5	10.20	1.08	10.00	0.02	0.12
0.20	0.20	2.00	3.4	20.40	1.72	20.00	0.05	0.25
0.30	0.30	4.50	10.1	30.61	2.25	30.00	0.08	0.38
0.40	0.40	8.00	21.8	40.81	2.73	40.00	0.12	0.52
0.50	0.50	12.32	42.0	45.01	3.41	44.00	0.18	0.68
0.60	0.60	16.72	69.6	45.21	4.16	44.00	0.27	0.87
0.70	0.70	21.16	98.6	48.38	4.66	47.00	0.34	1.04
0.80	0.80	26.36	125.3	58.48	4.75	57.00	0.35	1.15
0.90	0.90	32.56	160.2	68.58	4.92	67.00	0.38	1.28
0.95	0.95	36.04	180.9	73.63	5.02	72.00	0.39	1.34

Q100 = 40.8CFS
DEPTH LOWER THAN CURB
ENERGY HEAD LOWER THAN RIGHT OF WAY
OK

TIBURON PARK
PIPE ID SHEET
SEE NEXT SHEET FOR SIZES, CAPACITIES, ETC.



Tiburon Park

RCP-Sizing

RCP ID	CONTRIB. BASINS	FLOW (CFS)	SLOPE (%)	DIA. (INCHES)	CAPCITY (CFS)
1	OFFSITE 2	1.8	0.50	18	7.4
2	E, OFFSITE 2	14.6	2.00	24	22.7
3	B, E, OFFSITE 2	70.9	1.50	36	81.9
4	C	52.3	1.00	36	66.9
5	OFFSITE 1	25.1	1.94	24	31.6
6	F, OFFSITE 1	134.2	1.00	48	144.0

Basin E + Offsite 2 Sump on Washington
Emergency outfall = Washington-- Designed for 100 year storm
Q100 = 14.6 cfs

Use 2 Single A Inlets-Capacity = 34.90 cfs > 14.6 cfs

Single A inlet, in sump condition with curb openings on both sides:
Open Area (for orifice calc in sq. ft.): 3.9314236
Length of Weir (feet): 11.354167

Head (ft)	Head (in)	Weir Q	Orifice Q	Control Q
0.05	0.6	0.34	4.23	0.34
0.1	1.2	0.96	5.99	0.96
0.15	1.8	1.77	7.33	1.77
0.2	2.4	2.72	8.47	2.72
0.25	3	3.80	9.46	3.80
0.3	3.6	5.00	10.37	5.00
0.35	4.2	6.30	11.20	6.30
0.4	4.8	7.70	11.97	7.70
0.45	5.4	9.19	12.70	9.19
0.5	6	10.76	13.39	10.76
0.55	6.6	12.41	14.04	12.41
0.6	7.2	14.14	14.66	14.14
0.65	7.8	15.95	15.26	15.26
0.7	8.4	17.82	15.84	15.84
0.75	9	19.76	16.39	16.39
0.8	9.6	21.77	16.93	16.93
0.85	10.2	23.85	17.45	**17.45**
0.9	10.8	25.98	17.96	17.96
0.95	11.4	28.18	18.45	18.45
1	12	30.43	18.93	18.93

Calculation of open area:

	(in^2)	(ft^2)
Total Grate Area	1000	6.9444444
Cross Bar Area	-366	-2.541667
Supports (ends)	-115.625	-0.802951
Areas Counted Twice	47.75	0.3315972
	566.125	3.9314236

Calculation of Length of Weir:

	(in)	(ft)
Total Perimeter of Grate	90	7.5
Short Cross Bars	-3.5	-0.291667
End Supports	-9.25	-0.770833
Bearing Bars	-13	-1.083333
Curb Openings	72	6
	136.25	11.354167

C1-Culvert between Lots 12 & 13
Emergency outfall = Street to Snaproll Sump-- Designed for 100 year storm
Q100 = 56.3 cfs

Use 2 Double A Inlets-Capacity = 75.14 cfs > 56.3 cfs

Double A inlet, in sump condition:

Open Area (for orifice calc in sq. ft.):	7.7977431
Length of Weir (feet):	7.9791667
Orifice Coeficient	0.6
Weir Coeficient	3

Head (ft)	Head (in)	1 Wing Weir Q (cfs)	Grate Weir Q (cfs)	Grate Orifice Q (cfs)	Control Q Sgl Wing (cfs)	Control Q Dbl Wing (cfs)
0.05	0.6	0.13	0.27	8.40	0.40	0.54
0.1	1.2	0.38	0.76	11.87	1.14	1.52
0.15	1.8	0.70	1.39	14.54	2.09	2.78
0.2	2.4	1.07	2.14	16.79	3.21	4.29
0.25	3	1.50	2.99	18.77	4.49	5.99
0.3	3.6	1.97	3.93	20.56	5.91	7.88
0.35	4.2	2.48	4.96	22.21	7.44	9.93
0.4	4.8	3.04	6.06	23.75	9.09	12.13
0.45	5.4	3.62	7.23	25.19	10.85	14.47
0.5	6	4.24	8.46	26.55	12.71	16.95
0.55	6.6	4.89	9.76	27.84	14.66	19.55
0.6	7.2	5.58	11.13	29.08	16.70	22.28
0.65	7.8	6.29	12.54	30.27	18.83	25.12
0.667	8.0	6.54	13.04	30.66	19.58	26.11
0.7	8.4	7.03	14.02	31.41	21.05	28.08
0.75	9	7.79	15.55	32.52	23.34	31.14
0.8	9.6	8.59	17.13	33.58	25.71	34.30
0.85	10.2	9.40	18.76	34.62	28.16	**37.57**
0.9	10.8	10.25	20.44	35.62	30.68	40.93
0.95	11.4	11.11	22.16	36.60	33.28	44.39
1	12	12.00	23.94	37.55	35.94	47.94
1.05	12.6	12.91	25.76	38.47	38.67	51.58
1.1	13.2	13.84	27.62	39.38	41.46	55.31

Calculation of open area:

Total Grate Area	2000	13.888889
Cross Bar Area	-732	-5.083333
Supports (ends)	-115.625	-0.802951
(middle)	-100	-0.694444
Areas Counted Twice	70.5	0.4895833
	1122.875	7.7977431

Calculation of Length of Weir:

Total Perimeter of Grate	130	10.833333
Short Cross Bars	-7	-0.583333
Bearing Bars	-13	-1.083333
End Supports	-9.25	-0.770833
Middle Supports	-5	-0.416667
	110	7.9791667

4-44

C2- between lots 11 & 30
Emergency Outfall-street
Q100=52.3 cfs
Use 2 Single Inlets-Capacity = 56.32 > 52.3 cfs

Double A inlet, in sump condition:

Open Area (for orifice calc in sq. ft.):	7.7977431
Length of Weir (feet):	7.9791667
Orifice Coeficient	0.6
Weir Coeficient	3

Head (ft)	Head (in)	1 Wing Weir Q (cfs)	Grate Weir Q (cfs)	Grate Orifice Q (cfs)	Control Q Sgl Wing (cfs)	Control Q Dbl Wing (cfs)
0.05	0.6	0.13	0.27	8.40	0.40	0.54
0.1	1.2	0.38	0.76	11.87	1.14	1.52
0.15	1.8	0.70	1.39	14.54	2.09	2.78
0.2	2.4	1.07	2.14	16.79	3.21	4.29
0.25	3	1.50	2.99	18.77	4.49	5.99
0.3	3.6	1.97	3.93	20.56	5.91	7.88
0.35	4.2	2.48	4.96	22.21	7.44	9.93
0.4	4.8	3.04	6.06	23.75	9.09	12.13
0.45	5.4	3.62	7.23	25.19	10.85	14.47
0.5	6	4.24	8.46	26.55	12.71	16.95
0.55	6.6	4.89	9.76	27.84	14.66	19.55
0.6	7.2	5.58	11.13	29.08	16.70	22.28
0.65	7.8	6.29	12.54	30.27	18.83	25.12
0.667	8.0	6.54	13.04	30.66	19.58	26.11
0.7	8.4	7.03	14.02	31.41	21.05	28.08
0.75	9	7.79	15.55	32.52	23.34	31.14
0.8	9.6	8.59	17.13	33.58	25.71	34.30
0.85	10.2	9.40	18.76	34.62	28.16	37.57
0.9	10.8	10.25	20.44	35.62	30.68	40.93
0.95	11.4	11.11	22.16	36.60	33.28	44.39
1	12	12.00	23.94	37.55	35.94	47.94
1.05	12.6	12.91	25.76	38.47	38.67	51.58

Calculation of open area:

Total Grate Area	2000	13.888889
Cross Bar Area	-732	-5.083333
Supports (ends)	-115.625	-0.802951
(middle)	-100	-0.694444
Areas Counted Twice	70.5	0.4895833
	1122.875	7.7977431

Calculation of Length of Weir:

Total Perimeter of Grate	130	10.833333
Short Cross Bars	-7	-0.583333
Bearing Bars	-13	-1.083333
End Supports	-9.25	-0.770833
Middle Supports	-5	-0.416667
	110	7.9791667

A4-5

Basin F at Phase Boundary
Emergency outfall = Washington-- Designed for 100 year storm
Q100 = 109.1 cfs

Use 2 Double A Inlets at Sump Location
Also, use 4 Double Inlets - 2 on Washington at the return next to Lot 11 and 2 on Masthead at the return of Lot 11, and west side of Lot 15
Capacity of inlets on grade (4) = 42.4 cfs
Capacity of inlets in sump (2) = 75.14 cfs
Total required 109.1 cfs < 117.54 cfs OK

Double A inlet, in sump condition:

Open Area (for orifice calc in sq. ft.):	7.7977431
Length of Weir (feet):	7.9791667
Orifice Coeficient	0.6
Weir Coeficient	3

Head (ft)	Head (in)	1 Wing Weir Q (cfs)	Grate Weir Q (cfs)	Grate Orifice Q (cfs)	Control Q Sgl Wing (cfs)	Control Q Dbl Wing (cfs)
0.05	0.6	0.13	0.27	8.40	0.40	0.54
0.1	1.2	0.38	0.76	11.87	1.14	1.52
0.15	1.8	0.70	1.39	14.54	2.09	2.78
0.2	2.4	1.07	2.14	16.79	3.21	4.29
0.25	3	1.50	2.99	18.77	4.49	5.99
0.3	3.6	1.97	3.93	20.56	5.91	7.88
0.35	4.2	2.48	4.96	22.21	7.44	9.93
0.4	4.8	3.04	6.06	23.75	9.09	12.13
0.45	5.4	3.62	7.23	25.19	10.85	14.47
0.5	6	4.24	8.46	26.55	12.71	16.95
0.55	6.6	4.89	9.76	27.84	14.66	19.55
0.6	7.2	5.58	11.13	29.08	16.70	22.28
0.65	7.8	6.29	12.54	30.27	18.83	25.12
0.667	8.0	6.54	13.04	30.66	19.58	26.11
0.7	8.4	7.03	14.02	31.41	21.05	28.08
0.75	9	7.79	15.55	32.52	23.34	31.14
0.8	9.6	8.59	17.13	33.58	25.71	34.30
0.85	10.2	9.40	18.76	34.62	28.16	**37.57**
0.9	10.8	10.25	20.44	35.62	30.68	40.93

Calculation of open area:

Total Grate Area	2000	13.888889
Cross Bar Area	-732	-5.083333
Supports (ends)	-115.625	-0.802951
(middle)	-100	-0.694444
Areas Counted Twice	70.5	0.4895833
	1122.875	7.7977431

Calculation of Length of Weir:

Total Perimeter of Grate	130	10.833333
Short Cross Bars	-7	-0.583333
Bearing Bars	-13	-1.083333
End Supports	-9.25	-0.770833
Middle Supports	-5	-0.416667
	110	7.9791667

9-44