City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

December 12, 2000

Kevin Patton, PE
Bohannan Huston, Inc
7500 Jefferson NE
Albuquerque, NM 87109

Re: Grading and Drainage Certification – Oxbow Village (G-11/D014B),
Engineer's Stamp dated 11-2-1999
Engineering Certification dated 12-11-2000

Dear Mr. Patton:

Based upon the information provided in your submittal dated 12-12-2000, Engineering Certification for the above referenced subdivision is approved for Release of Financial Guaranty.

If I can be of further assistance, please contact me at 924-3986

Sincerely,

Bradley L. Bingham

Bradley L. Bingham, PE
Hydrology Review Engineer

C: Arlene Portillo, PWD – #628981
file

DRAINAGE INFORMATION SHEET

PROJECT TITLE: Oxbow Village ZONE MAP/DRG. FILE #: G11/D14B
DRB #: 99-293 EPC#: WORK ORDER#: 628881

LEGAL DESCRIPTION: Oxbow Village
CITY ADDRESS:

ENGINEERING FIRM: Bohannan Huston CONTACT: Kevin Patten
ADDRESS: Courtyard I 7500 Jefferson Street PHONE: 823-1000
CITY, STATE: Albuq. NM ZIP CODE: 87109

OWNER: Altura West CONTACT: TOM KELEHER
ADDRESS: PHONE: 346-4646
CITY, STATE: ZIP CODE:

ARCHITECT: CONTACT:
ADDRESS: PHONE:
CITY, STATE: ZIP CODE:

SURVEYOR: CONTACT:
ADDRESS PHONE:
CITY, STATE: ZIP CODE:

CONTRACTOR: CONTACT:
ADDRESS: PHONE:
CITY, STATE: ZIP CODE:

TYPE OF SUBMITTAL:
____ DRAINAGE REPORT
____ DRAINAGE PLAN
____ CONCEPTUAL GRADING & DRAINAGE PLAN
____ GRADING PLAN
____ EROSION CONTROL PLAN
_X_ ENGINEER'S CERTIFICATION
____ CLOMR/LOMR
____ OTHER

WAS A PRE-DESIGN CONFERENCE ATTENDED:
____ YES
____ NO
____ COPY PROVIDED

CHECK TYPE OF APPROVAL SOUGHT:
_X_ SIA / FINANCIAL GUARANTEE RELEASE
____ PRELIMINARY PLAT APPROVAL
____ S. DEV. PLAN FOR SUB'D. APPROVAL
____ S. DEV. PLAN FOR BLDG. PERMIT APPROVAL
____ SECTOR PLAN APPROVAL
____ FINAL PLAT APPROVAL
____ FOUNDATION PERMIT APPROVAL
____ BUILDING PERMIT APPROVAL
____ CERTIFICATE OF OCCUPANCY APPROVAL
____ GRADING PERMIT APPROVAL
____ PAVING PERMIT APPROVAL
____ WORK ORDER APPROVAL
____ OTHER (SPECIFY)

DATE SUBMITTED: BY:

Requests for approvals of Site Development Plans and/or Subdivision Plats shall be accompanied by a drainage submittal. The particular nature , location and scope ot the proposed development defines the degree of drainage detail. One or more of the following levels of submittal may be required based on the following:

1. **Conceptual Grading and Drainage Plan**: Required for approval of Site Development Plans greater than five (5) acres and Sector Plans.
2. **Drainage Plans**: Required for building permits, grading permits, paving permits and site plans less than five (5) acres.
3. **Drainage Report**: Required for subdivisions containing more than ten (10) lots or constituting five (5) acres or more.

RECEIVED
DEC 12 2000
HYDROLOGY SECTION

FILE CO 184 B-9 2400

Bill Vreeke
Tom Kelehor
Jim Rogers

1/10/26/00 mailed

City of Albuquerque

P.O. Box 1293 Albuquerque, NM 87103
Public Works Department

October 18, 2000

Certificate of Work Order Completion

City Engineer
600 Second St.
Plaza Del Sol
Albuquerque, NM 87102

Re: **Oxbow Village Subdivision (Tract E) Project No. 6289.81**
Map No. K-20

Dear Sir:

This is to certify that Project No. 6289.81 has been completed according to approved plans and construction specifications. Please be advised this Certificate of Work-Order Completion does not constitute acceptance of the city infrastructure until all requirements of the subdivision improvements agreement have been satisfied and a Certificate of Completion and Acceptance is issued by the City Engineer.

PRIVATE ROADWAY IMPROVEMENTS – (OXBOW VILLAGE) – 20' F-F/IN/OUT residential paving w/PCC mountable median curb & roll or standard curb on both sides and a 4' wide with PCC sidewalk on the west side* on Oxbow Village Lane from Oxbow Drive to transition from divided entrance to 28" F-F, and 28' F-F residential paving with PCC standard or mountable roll curb on both sides and a PCC 4' wide sidewalk on the west side* on Oxbow Village Lane from transition from divided entrance to 28' F-F to south cul-de-sac terminus, and 24' F-F residential paving with PCC standard or mountable roll curb on both sides; no sidewalk on Oxbow Village lane stub street from south cul-de-sac terminus to south end of stub street.

*Sidewalks to be deferred.

PUBLIC DRAINAGE IMPROVEMENTS – (OXBOW VILLAGE) – 48" DIA RCP with necessary manholes and inlets on public easement between Lots 27 and 28 from east boundary to Oxbow Village Lane, on Oxbow Village Lane) public easement) from public easement between Lots 27 and 28 to public easement between Lots 8 and 9, and on public easement between Lots 8 and 9 from Oxbow Village Lane to Tract E-1.

Construction of a PCC ribbon channel along the eastern boundary within a private drainage easement. Grading and drainage certification of Oxbow Village is required prior to release of Financial Guaranty(s).

PUBLIC SANITARY SEWER IMPROVEMENTS – (OXBOW VILLAGE) – 8" DIA sanitary sewer with necessary manholes and services on Oxbow Village Lane (public easement) from public easement between Lots 27 & 28 to north entrance and on Oxbow Village lane stub street (public easement on south cul-de-sac terminus to south end of stub street, 6" DIA waterline with necessary valves FHs, MJs and RJs on Oxbow Village Lane (public easement) from public easement between Lots 27 and 28 to Lot 1, 8" DIA waterline with necessary valves FHs, MJs and RJs on Oxbow Village Lane (public easement) from public easement between Lots 27 and 28 to public easement between lots 16 and 17, 6" DIA waterline with necessary valves FHs, MJs and RJs on Oxbow Village Lane stub street (public easement) on public easement between Lots 16 and 17 to south end of stub street, 8" DIA waterline with necessary valves FHs, MJs and RJs on public easement between Lots 16 and 17 from south cul-de-sac terminus to Alamogordo Drive and on public easement between Lots 27 and 28 from Oxbow village Lane (public easement) to Mourning Dove Place (Oxbow Bluff Subdivision).

All as shown on sheets 1-13 of City approved project plans.

The contractor's correction period will begin the date of the City Engineers Certificate of Completion and Acceptance letter and is effective for a period of one (1) year.

Sincerely,

Peter Chang 10-20-00

Peter Chang, P.E. RBB-O
Chief Construction Engineer
Public Works Department

c: Sparling Construction
Bohannon-Huston
Master Scheduler
Project Administrator
Martin Barker, Materials Testing Lab
Sam Hall, Water Systems
Dave Harmon, Traffic Engineering, PWD
Josie Jaramillo, New Meter Sales, PWD
Richard Zamora, Maps & Records, PWD
Project No. 6289.81
Warranty:Contract

Bohannan ▲ Huston

CLIENT/COURIER TRANSMITTAL

To: SUSAN CALOGNE
HYDROLOGY SECTION
PLAZA DEL SOL
LOBBY - WEST

Requested By: KEVIN PATTON

Date: November 2, 1999

Time Due: This A.M. X This P.M.
❒ Rush ____ By Tomorrow

BOHANNAN HUSTON
Courtyard One
7500 JEFFERSON NE
Albuquerque
NEW MEXICO 87109
voice 505.823.1000
fax 505.821.0892

Job No.:

Job Name: OXBOW PARK AND OXBOW VILLAGE SUBDIVISIONS

DELIVERY VIA

✠ Courier Federal Express
Mail ❒ UPS
❒ Other _____

PICK UP

Item: _____
_____
_____

ITEM NO.	QUANTITY	DESCRIPTION
1	1 SET	REVISED INFRASTRUCTURE LIST
2	1	REVISED PRELIMINARY PLAT
3	1	SITE PLAN FOR SUBDIVISION AND BUILDING PERMIT

COMMENTS / INSTRUCTIONS

DRB-99-293

REC'D BY: _____ ***DATE:*** _____ ***TIME:*** _____

Bohannan ▲ Huston

CLIENT/COURIER TRANSMITTAL

BOHANNAN HUSTON

Courtyard One

7500 JEFFERSON NE

Albuquerque

NEW MEXICO 87109

voice 505.823.1000

fax 505.821.0892

To: SUSAN CALOGNE
HYDROLOGY SECTION
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Item: _____

_____

_____

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2	1	REVISED PRELIMINARY PLAT
3	1	SITE PLAN FOR SUBDIVISION AND BUILDING PERMIT

COMMENTS / INSTRUCTIONS

DRB-99-293

REC'D BY: _____ ***DATE:*** _____ ***TIME:*** _____

City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

November 4, 1999

Kevin Patton, P.E.
Bohannan Huston
7500 Jefferson St. NE
Albuquerque, New Mexico 87111

14C

RE: Drainage Reports and Grading and Drainage Plans for The Oxbow Park and Oxbow Village Subdivision (G11/D14B), Submitted for Preliminary and Final Plat Approval and Grading Permit Release, Reports Dated 10/1/99 and Engineer's Stamp Dated 11/2/99 on the Plans.

14B

Dear Mr. Patton:

Based on the information provided, the above referenced reports, and Grading and Drainage Plans dated November 2, 1999, are approved for Site Development Plan and Preliminary Plat approval by the DRB.

The above referenced plans are also approved for Rough Grading provided that they are approved at the DRB. A separate top-soil disturbance permit must be obtained prior to grading on this site.

Prior to Final Plat sign-off, the Subdivision Improvements Agreement (SIA) must be in place. The Grading and Drainage certification is required prior to release of the SIA for these subdivisions.

If you have any questions, or if I may be of further assistance to you, please call me at 924-3982.

Sincerely,

Susan M. Calongne, P.E.
City/County Floodplain Administrator

c: Whitney Reierson, City Hydrology
Tom Keleher, Altura West Development
File

January 18, 2000

Susan Calongne, P.E.
City/County Floodplain Administrator
City of Albuquerque - Hydrology Division
P. O. Box 1293
Albuquerque, NM 87103

G-11
D14B

Re: Oxbow Village – Minor Storm Drain Revisions
COA Project No. 628981, DRB No. 99-293

Dear Susan:

The purpose of this letter is to request your concurrence concerning a few isolated revisions to the above referenced project.

Sparling Construction is the Oxbow Park and Oxbow Village Grading and Retaining Wall Contractor. Sparling Construction has also been selected to perform the work order construction (COA Project No. 628881 & 628981) for the Oxbow Park and Oxbow Village as well. In order to continue on schedule with the grading and retaining wall construction, the contractor has requested that we make some minor revisions to the storm drain construction on the work order plans so they may construct the walls within the utility easement areas.

I have enclosed sheet 7 of 13 detailing the requested revisions. These revisions reflect keeping the existing 54" RCP storm drain and adding a manhole in place of the 48"x18" Wye, and then constructing another 6'-diameter manhole at Station 3+04.64 as indicated in the plans before.

If you are in agreement with the above requested revisions, please indicate by signing the space provided below.

If you have any questions or require additional information, please call me at 823-1000.

Sincerely,
Bohannan Huston, Inc.

Kevin Patton, P.E.
Project Manager
Community Development
and Planning Group

KP/am
Enclosure

ACCEPTED:

BY_____

TITLE_____

DATE_____

R D
JAN 1 8 2000
HYDROLOGY SECTION

cc: Pat Wylie, Sparling Construction
Bill Vreeke, Bohannan Huston, Inc.
Dave Perko, Bohannan Huston, Inc.

P:\00192\cdp\corres\b10-onsite_infra_dsgn\Calongne,ltr.doc

BOHANNAN-HUSTON, INC.

Courtyard One

7500 JEFFERSON NE

Albuquerque

NM 87109-4335

voice 505.823.1000

fax 505.821.0892

City of Albuquerque

February 11, 2000

Kevin Patton, P.E.
Bohannan Huston
7500 Jefferson St. NE
Albuquerque, New Mexico 87111

RE: Minor Revisions to the DRC Plans for Oxbow Village Subdivision (G11/D14B), Engineer's Stamp Not Dated on the Plans.

Dear Mr. Patton:

The concept of replacing the proposed 48" x 18" Wye with a 6' diameter manhole in the storm drain system is acceptable to City Hydrology. This revision should appear on the Work Order drawings.

If you have any questions, or if I may be of further assistance to you, please call me at 924-3982.

Sincerely,

Susan M. Calongne, P.E.
City/County Floodplain Administrator

C: File

DRAINAGE INFORMATION SHEET

PROJECT TITLE: OXBOW VILLAGE ZONE ATLAS/DRNG. FILE # G-11/D014 & B (TR E)

DRB #: _____ EPC #: 2-97-103-1 WORK ORDER #: _____

LEGAL DESCRIPTION: TRACT E OXBOW SUBDIVISION

CITY ADDRESS: OXBOW DRIVE AND ALAMOGORDO BLVD

ENGINEERING FIRM: BOHANNAN-HUSTON INC. CONTACT: KEVIN PATTON

ADDRESS: 7500 JEFFERSON NE, ALB. NM 87109 PHONE: (505) 823-1000

OWNER: ALTURA WEST DEVELOPMENT CONTACT: TOM KELEHER

ADDRESS: DRAWER AA, ALBUQUERQUE 87103 PHONE: 396-9696

ARCHITECT: _____ CONTACT: _____

ADDRESS: _____ PHONE: _____

SURVEYOR: _____ CONTACT: _____

ADDRESS: _____ PHONE: _____

CONTRACTOR: _____ CONTACT: _____

ADDRESS: _____ PHONE: _____

TYPE OF SUBMITTAL:

- X DRAINAGE REPORT
- _____ DRAINAGE PLAN
- _____ FINAL GRADING & DRAINAGE PLAN
- X GRADING PLAN
- _____ EROSION CONTROL PLAN
- _____ ENGINEER'S CERTIFICATION
- _____ OTHER

PRE-DESIGN MEETING:

- X YES
- _____ NO
- _____ COPY PROVIDED

CHECK TYPE OF APPROVAL SOUGHT:

- _____ SKETCH PLAT APPROVAL
- X PRELIMINARY PLAT APPROVAL
- _____ S. DEV. PLAN FOR SUBD. APPROVAL
- _____ S. DEV. PLAN FOR BLDG. PERMIT APPROVAL
- _____ SECTOR PLAN APPROVAL
- X FINAL PLAT APPROVAL
- _____ FOUNDATION PERMIT APPROVAL
- _____ BUILDING PERMIT APPROVAL
- _____ CERTIFICATE OF OCCUPANCY APPROVAL
- X GRADING PERMIT APPROVAL
- _____ PAVING PERMIT APPROVAL
- _____ S.A.D. DRAINAGE REPORT
- _____ DRAINAGE REQUIREMENTS
- _____ SUBDIVISION CERTIFICATION
- _____ OTHER _____ (SPECIFY)

DATE SUBMITTED: 10/1/99

BY: _____

Revised 02/98

RECEIVED
OCT 1 1999
HYDROLOGY SECTION

DRAINAGE REPORT FOR OXBOW VILLAGE SUBDIVISION (TRACT E)

G-11/D14B

BOHANNAN-HUSTON, INC.

Courtyard One

7500 JEFFERSON NE

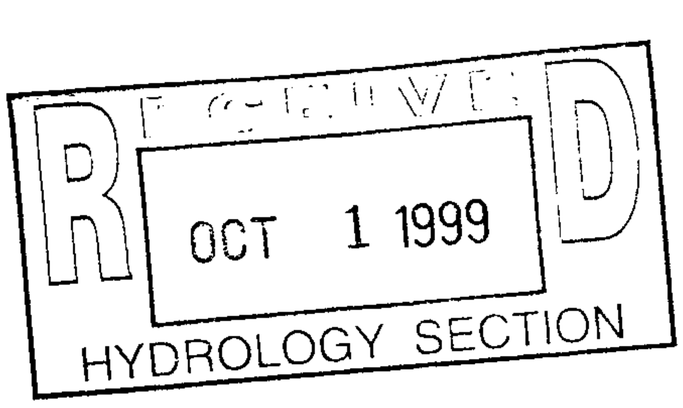
Albuquerque

NM 87109-4335

voice 505.823.1000

fax 505.821.0892

OCTOBER 1, 1999



PREPARED FOR:

ALTURA WEST LTD
P.O. DRAWER AA
ALBUQUERQUE, NEW MEXICO 87107

40 YEARS

DRAINAGE REPORT
FOR
OXBOW VILLAGE SUBDIVISION
(TRACT E)

OCTOBER 1, 1999

PREPARED BY:

BOHANNAN HUSTON
COURTYARD I, 7500 JEFFERSON STREET N.E.
ALBUQUERQUE, NM 87109

PREPARED FOR:

Altura West Ltd.
P.O. DRAWER AA
Albuquerque, NM 87107

PREPARED BY:

Yolanda Padilla 10/1/99

Yolanda Padilla **Date**

UNDER THE SUPERVISION OF:

Kevin Patton 10/1/99

Kevin Patton, P.E. **Date**

KEVIN G. PATTON
NEW MEXICO
13685
REGISTERED PROFESSIONAL ENGINEER

Table of Contents

TABLE OF CONTENTS

PAGE

APPENDICES

EXHIBITS

I. PURPOSE

The purpose of this report is to present historic and proposed drainage conditions for the area pertaining to this site, and to obtain work order, preliminary and final plat approvals.

II. METHODOLOGIES

Site conditions will be analyzed for a 10-year and 100-year, 6-hour storm event in accordance with the City of Albuquerque Drainage Ordinance and the Development Process Manual (DPM) Volume 2, Design Criteria, Section 22.2, Hydrology, for the City of Albuquerque, January 1993.

The site, as described in the 'Site Location and Characteristics' section below, is approximately 9.62 acres. Therefore, Part A of the DPM, Section 22.2, which provides a simplified procedure for projects with sub-basins smaller than 40 acres was used.

This report will reference the following City of Albuquerque approved studies prepared for Altura West LTD: 1) *Master Drainage Plan for Altura West and Archdiocese of Santa Fe Properties* dated October, 1997; 2) *Drainage Report for Oxbow Bluff Subdivision (Tract F)*, dated October 17, 1997.

The *Master Drainage Plan for Altura West and Archdiocese of Santa Fe Properties* dated October, 1997 (hereafter referred to as the Master Plan), which was prepared for Altura West LTD. and Archdiocese of Santa Fe and approved by the City of Albuquerque. That report was prepared to support future drainage plans submitted for the development of individual land parcels within Altura West Development, and to provide design guidance for the installation of major drainage infrastructure to be constructed in advance of, or simultaneously with individual parcel development. In addition, it provides fully developed flow rates for basins within the Altura West and Archdiocese of Santa Fe Properties.

The *Drainage Report for Oxbow Bluff Subdivision (Tract F)*, dated October 17, 1997 was prepared for Altura West LTD to support the development of the 63 lot subdivision located directly to the east of this development (Oxbow Village Subdivision – Tract E). The report for the Oxbow Bluff Subdivision constructed a temporary detention pond on Tract E and provided a storm drain extension for future development.

III. SITE LOCATION AND CHARACTERISTICS

Please refer to the proposed Bulk Land Plat enclosed with this report and the A.G.I.S. vicinity map page G-11.

The Site, Oxbow Village Subdivision, Tract E Altura West Development, is bounded by St. Pius High School and Oxbow Drive to the north, Alamogordo Boulevard (future Oxbow Park Subdivision) to the west, Oxbow Bluff Subdivision to the east, and Northern Heights Subdivision to the South. The 9.62-acre site proposes to be developed into 40 lots of single family dwelling units. The main road, Oxbow Village Lane (private roadway), is oriented through the center of the development and will provide access to the subdivision from Oxbow Drive.

Vegetation on the site consists primarily of Mesa Dropseed, Indian Ricegrass, Blace Gramma and Sand Sagebrush. The soil at the site has been given the SCS soil classification of BKD (Bluepoint-Kokan association, hilly) and MWA (Madurez-Wink Association, gently sloping). The BKD soils are in the hydrologic soil Group A, which have the highest rate of rainfall absorption. The MWA soils are in the hydrologic soil Group B, which also absorb more water than typical.

IV. EXISTING HYDRAULIC AND HYDROLOGIC CONDITIONS

The existing drainage basins and patterns are shown graphically on the Existing Drainage Conditions Map (Exhibit 3) located in the plates section of this report. Please note that the Existing Drainage Basin Map was taken from the approved Oxbow Bluff Subdivision Report and is labeled as

the "Oxbow Bluff Subdivision Proposed Conditions Basin Map". This map adequately depicts the existing condition of this site.

The existing site consists of Basin M, that flows to an existing temporary detention pond, which was built with Oxbow Bluff Subdivision, see Exhibit 3. The runoff from the on-site basins is approximately 27.82cfs in the 100-year, 6-hour storm event.

For additional information regarding the existing drainage conditions, please refer to the approved Master Plan (October 1997).

V. PROPOSED HYDRAULIC AND HYDROLOGIC CONDITIONS

For Additional assistance throughout this section, please refer to the Grading and Drainage Plan (Exhibit 6) and/or the Proposed On-Site Conditions Map (Exhibit 5) enclosed within the plate's section of this report.

The proposed site will be divided into six on site basins (Basins A through F) and one off-site basin (a portion of Tract E-1). On-site Basins A and B will drain to the roadway below referred to as Oxbow Village Lane. This private roadway slopes to the center of the development where the site has provided off-street parking. This parking area contains a double grate Type "A" inlet in a sump condition to capture this runoff. The inlet has been designed to capture 2 x 100-year runoff. The runoff from On-site Basin "C" drains to Oxbow Village Lane as well, where it is then redirected to Oxbow Drive. Oxbow Drive is an existing roadway that was constructed with the Oxbow Bluff Subdivision. Runoff within Oxbow Drive is conveyed to the existing inlets located at the entrance to the Oxbow Bluff Subdivision (Mourning Dove Place). The runoff from On-site Basins D, E and F drain to a concrete ribbon channel along the retaining walls adjacent to the eastern subdivision boundary. The ribbon channel then directs runoff to center of development along the eastern boundary. A double grate Type "C" inlet has been designed to capture 2 x 100 year storm event. The Off-site Basin within a portion of Tract E-1 will convey a small amount of the existing and/or the proposed fully developed runoff into a concrete ribbon channel along the retaining wall proposed along the western

boundary to Oxbow Village Subdivision. The runoff is directed down the ribbon channel where is captured by a double grate Type "D" inlet that has been designed to capture 2 x 100 year storm event.

A cross lot drainage easement outside of the building areas allows runoff to be conveyed to the roadway and ribbon channel. Due to the erosiveness of the soil in this area and the steep grades, each lot owner and/or homebuilder should take additional care in order to convey all developed runoff in a non-erosive manner to the roadway or ribbon channel below. This can be accomplished with cobble swales, piping and other non-erosive solutions. A breakdown of the On-site Basins is provided below.

A. On-Site Basins

The proposed site is broken into six (6) basins. Basin A (2.00ac, Q_{100}=6.62cfs) is located on the west side of Oxbow Village Lane and is in far southwest corner of the Oxbow Village Subdivision. Basin A consists of eight (8) lots, 12 through 19. Run-off flows from this basin drain to the front of the lot and into Oxbow Village Lane and discharge into inlets at the lowpoint.

Basin B (1.78ac, Q_{100}=5.89cfs) is located on the west side of Oxbow Village Lane and is adjacent to and northwest of Basin A. Basin B consists of eight (8) lots, 4 through 11. Run-off flows from this basin drain to the front of the lot and into Oxbow Village Lane and discharge into inlets at the lowpoint.

Basin C (0.83ac, Q_{100}=2.75cfs) is located on the west side of Oxbow Village Lane and is adjacent to and northwest of Basin B. Basin C consists of three (3) lots, 1 through 3. Run-off from this basin will drain to the front of the lot and into Oxbow Village Lane where it is directed into Oxbow Drive and collected by inlets at the intersection of Oxbow Drive and Mourning Dove Place. The runoff is then conveyed to the Rio Grande Storm Drain, which was built with the Oxbow Bluff Subdivision.

Basin D (1.10ac, Q_{100}=3.64cfs) is on the east side of Oxbow Village Lane and is the northeast corner of Oxbow Village Subdivision. Basin D consists of five (5) lots, 36 through 40. Run-off flows from this basin drain to the back of the lot and into a concrete ribbon channel, which will then be collected by a double grate Type "C" inlet. However the front portion of Lot 40 will flow north through a turned block and into Oxbow Drive.

Basin E (1.54ac, Q_{100}=5.11cfs) is on the east side of Oxbow Village Lane and is adjacent to and southeast of Basin D. Basin E consists of eight (8) lots, 28 through 35. Run-off flows from this basin drain to the back of the lot and into a concrete ribbon channel, which will then be collected by a double grate Type "C" inlet.

Basin F (1.74ac, Q_{100}=5.76cfs) is on the east side of Oxbow Village Lane and is adjacent to and southeast of Basin E. Basin E consists of eight (8) lots, 20 through 27. Run-off flows from this basin drain to the back of the lot and into a concrete ribbon channel, which will then be collected by a double grate Type "C" inlet.

A 48" RCP storm drain will connect the existing 54" storm drain that was constructed with the Oxbow Bluff Subdivision. This storm drain is located in the center of the development along the eastern boundary. The proposed 48" storm drain will continue westward through the Oxbow Village Subdivision in order to serve future development in accordance with the Master Drainage Report. The analysis of this storm drain can be found in the appendix of this report, see Appendix E.

VI. CONCLUSION

This report has provided hydrologic and hydraulic considerations of the proposed development of Altura West Tract E, the Oxbow Village Subdivision. This information provides adequate supporting documentation and guidance for approval of this report and to guide future development and phasing of the properties previously mentioned. It is recommended that this plan be approved as requested.

APPENDICES

APPENDIX A: BASINS

APPENDIX B: STREET HYDRAULICS

APPENDIX C: INLET ANALYSIS

APPENDIX D: RIBBON CHANNEL ANALYSIS

APPENDIX E: STORM DRAIN ANALYSIS

APPENDIX A

BASINS

OXBOW VILLAGE (TRACT E)

BASIN I.D.	AREA (AC)	UNITS #	% LAND TREATMENT A	B	C	D[2]	RUNOFF (AC-FT) 10 YR	100 YR	DISCHARGE (CFS) 10 YR	100YR
HYRDOLOGICAL VOLUMETRIC & DISCHARGE DATA (EXISTING CALCULATED)										
Tract E	9.62		97.0%	0.0%	0.0%	3.0%	0.00	0.00	3.2	13.1
HYRDOLOGICAL VOLUMETRIC & DISCHARGE DATA (EXISTING)[1]										
Tract E	9.62		97.0%	0.0%	0.0%	3.0%				20.4
HYRDOLOGICAL VOLUMETRIC & DISCHARGE DATA (DEVELOPED)										
A	2.00	8	0.0%	27.5%	27.5%	45.0%	0.12	0.22	3.8	6.62
B	1.78	8	0.0%	27.5%	27.5%	45.0%	0.11	0.20	3.4	5.89
C	0.83	3	0.0%	27.5%	27.5%	45.0%	0.05	0.09	1.6	2.75
D	1.10	5	0.0%	27.5%	27.5%	45.0%	0.07	0.12	2.1	3.64
E	1.54	8	0.0%	27.5%	27.5%	45.0%	0.10	0.17	3.0	5.11
F	1.74	8	0.0%	27.5%	27.5%	45.0%	0.11	0.19	3.3	5.76
TOTAL	8.99	40								29.8

NOTES: 1) In the "Master Drainage Plan for Altura West and Archdiocese of Santa Fe Properties Near St. Pius High School" is shows that Tract E lies primarily within existing Basins M. The existing 100yr discharge was also taken from this report w/ approximately 73% of the Tract in Basin M. See Exhibit 3.

2) Impervious percentages for developed flows were calculated from the DPM equation a-4. The remaining percentages were distributed evenly between land treatment types B and C, except for Basin G which were divided accordingly.

N=UNITS/ACRES = 4.4

%D= 7*SQRT((N*N)+(5*N)) = 45 %

A-1

APPENDIX B

STREET HYDRAULICS

SUMMARY OF THE ROADWAY CAPACITY ANALYSIS FOR OXBOW VILLAGE SUBDIVISION - TRACT E

Oxbow Village Lane - Drainage Basins A, B, & C

Max Q (cfs)=11.66

Roadway Grade (%)	Q(100 YR) in roadway (cfs)	Depth of water in roadway (ft)	Velocity of storm water in roadway (ft/s)	$V^2/2*g$ (ft)	EGL (ft)	ROW Elevation (ft)	COMMENTS
0.70	15.26	0.34	2.56	0.10	0.44	1.00	OK
0.72	15.26	0.34	2.69	0.11	0.45	1.00	OK
1.20	15.26	0.31	3.01	0.14	0.45	1.00	OK
2.64	15.26	0.27	3.80	0.22	0.49	1.00	OK

NOTE:
There is a inverted 2% crown in the roadway, which transistions to a 2% cross-slope to the lowpoint.

B-1

***** PC PROGRAM STREAM SEPTEMBER 1994 *****

STREET @ S=2.64%

MANNING'S N= .017 SLOPE= .0264

POINT	DIST	ELEV	POINT	DIST	ELEV	POINT	DIST	ELEV
1	0.00	0.70	5	7.00	0.24	9	33.17	0.44
2	4.17	0.78	6	19.00	0.00	10	33.83	0.44
3	4.63	0.78	7	31.00	0.24	11	38.00	0.52
4	5.00	0.11	8	33.00	0.11	12	0.00	0.00

WSEL	DEPTH INC	FLOW AREA	FLOW RATE	WETTED PER	FLOW VEL	TOPWID	VEL HEAD	ENERGY HEAD
(FT)	(FT)	SQ.FT.	(CFS)	(FT)	(FPS)	(FT)	(FT)	(FT)
0.05	0.05	0.13	0.2	5.00	1.21	5.00	0.02	0.07
0.10	0.10	0.50	1.0	10.00	1.93	10.00	0.06	0.16
0.15	0.15	1.15	2.8	16.33	2.42	16.27	0.09	0.24
0.20	0.20	2.13	6.2	22.98	2.91	22.87	0.13	0.33
0.25	0.25	3.43	11.9	28.33	3.48	28.15	0.19	0.44
0.30	0.30	4.84	21.1	28.44	4.36	28.20	0.30	0.60
0.35	0.35	6.25	32.2	28.56	5.16	28.26	0.41	0.76
0.40	0.40	7.66	45.2	28.67	5.89	28.31	0.54	0.94
0.45	0.45	9.08	59.1	29.29	6.51	29.54	0.66	1.11
0.50	0.50	10.63	71.5	32.62	6.73	32.17	0.70	1.20
0.55	0.55	12.28	89.0	33.72	7.25	33.24	0.82	1.37
0.60	0.60	13.95	109.9	33.77	7.88	33.27	0.96	1.56
0.65	0.65	15.61	132.4	33.83	8.48	33.30	1.12	1.77
0.70	0.70	17.28	156.6	33.89	9.06	33.33	1.28	1.98

***** PC PROGRAM STREAM SEPTEMBER 1994 *****

STREET @ S=.70%

MANNING'S N= .017 SLOPE= .007

POINT	DIST	ELEV	POINT	DIST	ELEV	POINT	DIST	ELEV
1	0.00	0.70	5	7.00	0.24	9	33.17	0.44
2	4.17	0.78	6	19.00	0.00	10	33.83	0.44
3	4.63	0.78	7	31.00	0.24	11	38.00	0.52
4	5.00	0.11	8	33.00	0.11	12	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)
0.05	0.05	0.13	0.1	5.00	0.63	5.00	0.01	0.06
0.10	0.10	0.50	0.5	10.00	0.99	10.00	0.02	0.12
0.15	0.15	1.15	1.4	16.33	1.25	16.27	0.02	0.17
0.20	0.20	2.13	3.2	22.98	1.50	22.87	0.03	0.23
0.25	0.25	3.43	6.1	28.33	1.79	28.15	0.05	0.30
0.30	0.30	4.84	10.9	28.44	2.25	28.20	0.08	0.38
0.35	0.35	6.25	16.6	28.56	2.66	28.26	0.11	0.46
0.40	0.40	7.66	23.3	28.67	3.04	28.31	0.14	0.54
0.45	0.45	9.08	30.4	29.29	3.35	29.54	0.17	0.62
0.50	0.50	10.63	36.8	32.62	3.46	32.17	0.19	0.69
0.55	0.55	12.28	45.8	33.72	3.73	33.24	0.22	0.77
0.60	0.60	13.95	56.6	33.77	4.06	33.27	0.26	0.86
0.65	0.65	15.61	68.2	33.83	4.37	33.30	0.30	0.95
0.70	0.70	17.28	80.6	33.89	4.67	33.33	0.34	1.04

***** PC PROGRAM STREAM SEPTEMBER 1994 *****

STREET @ S=.72%

MANNING'S N= .017 SLOPE= .0072

POINT	DIST	ELEV	POINT	DIST	ELEV	POINT	DIST	ELEV
1	0.00	0.70	5	7.00	0.24	9	33.17	0.44
2	4.17	0.78	6	19.00	0.00	10	33.83	0.44
3	4.63	0.78	7	31.00	0.24	11	38.00	0.52
4	5.00	0.11	8	33.00	0.11	12	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)
0.05	0.05	0.13	0.1	5.00	0.63	5.00	0.01	0.06
0.10	0.10	0.50	0.5	10.00	1.01	10.00	0.02	0.12
0.15	0.15	1.15	1.5	16.33	1.27	16.27	0.02	0.17
0.20	0.20	2.13	3.2	22.98	1.52	22.87	0.04	0.24
0.25	0.25	3.43	6.2	28.33	1.82	28.15	0.05	0.30
0.30	0.30	4.84	11.0	28.44	2.28	28.20	0.08	0.38
0.35	0.35	6.25	16.8	28.56	2.69	28.26	0.11	0.46
0.40	0.40	7.66	23.6	28.67	3.08	28.31	0.15	0.55
0.45	0.45	9.08	30.9	29.29	3.40	29.54	0.18	0.63
0.50	0.50	10.63	37.4	32.62	3.51	32.17	0.19	0.69
0.55	0.55	12.28	46.5	33.72	3.78	33.24	0.22	0.77
0.60	0.60	13.95	57.4	33.77	4.11	33.27	0.26	0.86
0.65	0.65	15.61	69.1	33.83	4.43	33.30	0.30	0.95
0.70	0.70	17.28	81.8	33.89	4.73	33.33	0.35	1.05

***** PC PROGRAM STREAM SEPTEMBER 1994 *****

STREET @ S=1.20%

MANNING'S N= .017 SLOPE= .012

POINT	DIST	ELEV	POINT	DIST	ELEV	POINT	DIST	ELEV
1	0.00	0.70	5	7.00	0.24	9	33.17	0.44
2	4.17	0.78	6	19.00	0.00	10	33.83	0.44
3	4.63	0.78	7	31.00	0.24	11	38.00	0.52
4	5.00	0.11	8	33.00	0.11	12	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)
0.05	0.05	0.13	0.1	5.00	0.82	5.00	0.01	0.06
0.10	0.10	0.50	0.6	10.00	1.30	10.00	0.03	0.13
0.15	0.15	1.15	1.9	16.33	1.63	16.27	0.04	0.19
0.20	0.20	2.13	4.2	22.98	1.96	22.87	0.06	0.26
0.25	0.25	3.43	8.0	28.33	2.34	28.15	0.09	0.34
0.30	0.30	4.84	14.2	28.44	2.94	28.20	0.13	0.43
0.35	0.35	6.25	21.7	28.56	3.48	28.26	0.19	0.54
0.40	0.40	7.66	30.5	28.67	3.97	28.31	0.25	0.65
0.45	0.45	9.08	39.9	29.29	4.39	29.54	0.30	0.75
0.50	0.50	10.63	48.2	32.62	4.54	32.17	0.32	0.82
0.55	0.55	12.28	60.0	33.72	4.88	33.24	0.37	0.92
0.60	0.60	13.95	74.1	33.77	5.31	33.27	0.44	1.04
0.65	0.65	15.61	89.3	33.83	5.72	33.30	0.51	1.16
0.70	0.70	17.28	105.6	33.89	6.11	33.33	0.58	1.28

APPENDIX C

INLET ANALYSIS

P=5080.50

82.50

S=7.9%

82.30

27

P=5082.00

C-1

Oxbow Village

ANALYSIS OF AN INLET IN A SUMP CONDITION - **Oxbow Village Lane**

INLET TYPE: Double Grate Type "A" with curb opening wings on both sides on inlet.

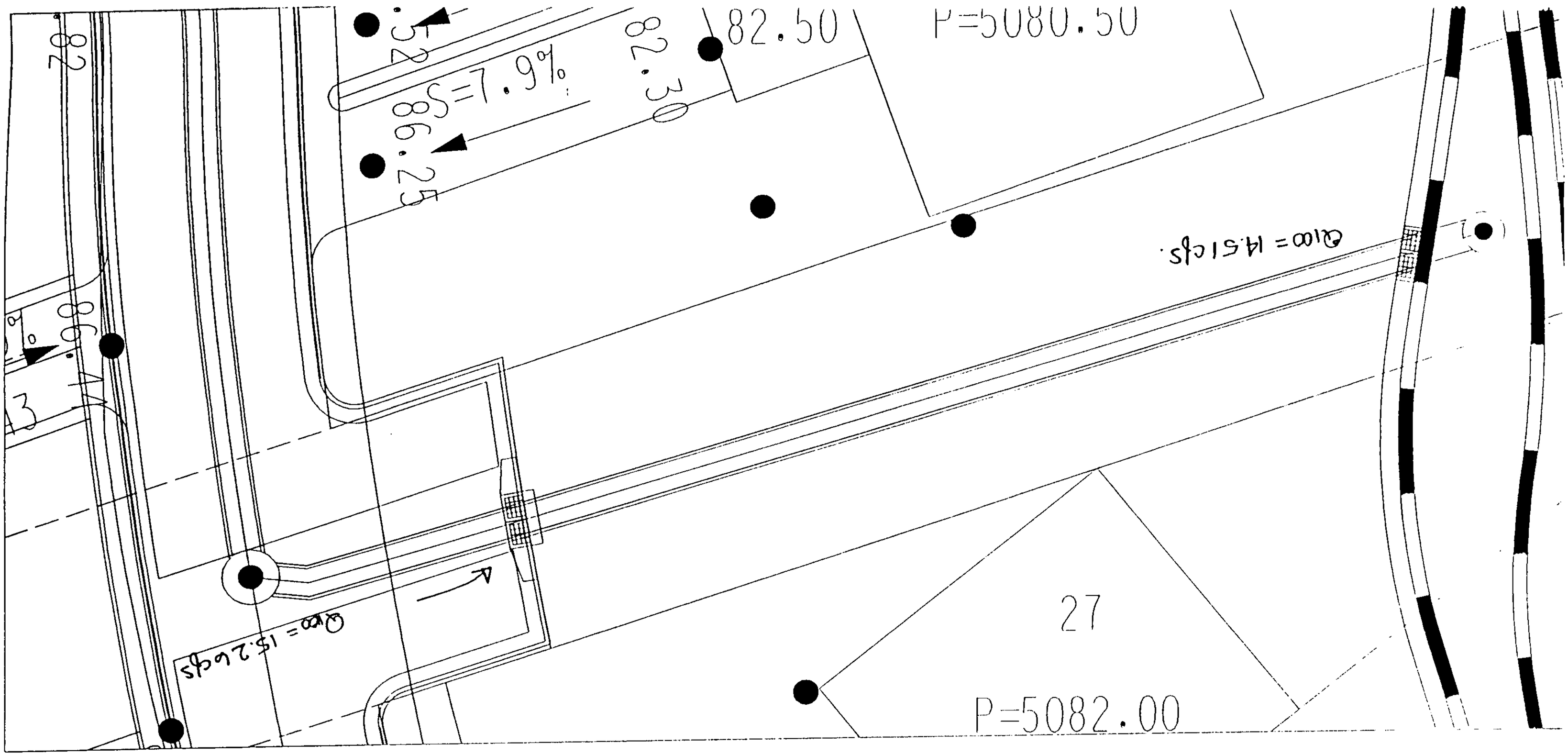
WEIR: Q=C*L*H^1.5		ORIFICE: Q=C*A*(2*G*H)**0.5	
Wing opening	Grate opeining	Grate opening	Wing opening
C= 3.0	C=3.0	C=0.6	C=0.6
L= 4.0 ft	L(double grate)=[2(2.67')+2(1.8')]=8	A(double grate)=8.19 sf	A=2.0 sf
Q=3.0(4.0')H**1.5= 12.0H**1.5	Q=3.0(8.94)H^1.5=26.82*H^1.5	Q=4.194*(64.4*H)^0.5	Q=1.2*(64.4*H)^0.5

	WS ELEVATION	HEIGHT ABOVE INLET	Q (CFS) WEIR "A" OPENING	Q (CFS) WEIR DOUBLE GRATE	Q (CFS) ORIFICE DOUBLE GRATE	TOTAL Q (CFS)	COMMENTS:
~FL @ INLET	0.00	0.00	0.00	0.00	0.00	0.00	Flow at double "A" inlet w/ two wing openings
	0.10	0.10	0.38	0.85	12.47	1.61	Weir controls on grate analysis
	0.20	0.20	1.07	2.40	17.64	4.55	
	0.30	0.30	1.97	4.41	21.60	8.35	
	0.40	0.40	3.04	6.78	24.94	12.86	
	0.50	0.50	4.24	9.48	27.88	17.97	Q(100 yr) = 15.26 cfs is provided at this depth
	0.60	0.60	5.58	12.46	30.55	23.62	
TOP OF CURB	0.70	0.70	7.03	15.71	32.99	29.76	
	0.80	0.80	8.59	19.19	35.27	36.36	Q(2x100 yr) = 30.50 cfs is provided at this depth
	0.90	0.90	10.25	22.90	37.41	43.39	
ROW LIMIT	1.00	1.00	12.00	26.82	39.43	50.82	

NOTE: The total runoff intercepted by the inlet at the low point in the road is:
Qr(100) = 2*[(runoff of the wing opening) + (the lesser of the weir or orifice amount taken by the double grate)].
THE 100 YR STORM EVENT = 15.26 CFS at the sump condition
THE 2 x 100 YR STORM EVENT = 30.50 at the sump condition

APPENDIX D

RIBBON CHANNEL ANALYSIS



D-1

Oxbow Village

ANALYSIS OF AN INLET IN A SUMP CONDITION - **Ribbon Channel**

INLET TYPE: Double Grate Type "C" inlet.

WEIR: Q=C*L*H^1.5		ORIFICE: Q=C*A*(2*G*H)**0.5	
Wing opening	Grate opeining	Grate opening	Wing opening
C= 3.0	C=3.0	C=0.6	C=0.6
L= 4.0 ft	L(double grate)=[2(2.67')+2(1.8')]=8	A(double grate)=8.19 sf	A=2.0 sf
Q=3.0(4.0')H**1.5= 12.0H**1.5	Q=3.0(8.94)H^1.5=26.82*H^1.5	Q=4.194*(64.4*H)^0.5	Q=1.2*(64.4*H)^0.5

	WS ELEVATION	HEIGHT ABOVE INLET	Q (CFS) WEIR "A" OPENING	Q (CFS) WEIR DOUBLE GRATE	Q (CFS) ORIFICE DOUBLE GRATE	TOTAL Q (CFS)	COMMENTS:
~FL @ INLET	0.00	0.00	0.00	0.00	0.00	0.00	Flow at double "C" inlet
	0.10	0.10	0.38	0.85	12.47	1.61	Weir controls on grate analysis
	0.20	0.20	1.07	2.40	17.64	4.55	
	0.30	0.30	1.97	4.41	21.60	8.35	
	0.40	0.40	3.04	6.78	24.94	12.86	
	0.50	0.50	4.24	9.48	27.88	17.97	Q(100 yr) = 14.51 cfs is provided at this depth
	0.60	0.60	5.58	12.46	30.55	23.62	
TOP OF CURB	0.70	0.70	7.03	15.71	32.99	29.76	
	0.80	0.80	8.59	19.19	35.27	36.36	Q(2x100 yr) = 29.02 cfs is provided at this depth
	0.90	0.90	10.25	22.90	37.41	43.39	
ROW LIMIT	1.00	1.00	12.00	26.82	39.43	50.82	

NOTE: The total runoff intercepted by the inlet at the low point in the road is:
Qr(100) = (the lesser of the weir or orifice amount taken by the double grate)].
THE 100 YR STORM EVENT = 14.51 CFS at the sump condition
THE 2 x 100 YR STORM EVENT = 29.02 at the sump condition

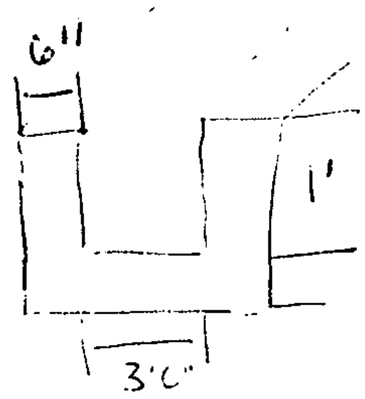
D-4

***** PC PROGRAM STREAM SEPTEMBER 1994 *****

Ribbon Channel @ S=0.50%
MANNING'S N= .017 SLOPE= .005

POINT	DIST	ELEV	POINT	DIST	ELEV	POINT	DIST	ELEV
1	0.00	1.00	4	3.00	0.00	7	0.00	0.00
2	0.50	1.00	5	3.00	1.00	8	0.00	0.00
3	0.50	0.00	6	3.50	1.00	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)
0.05	0.05	0.13	0.1	2.60	0.82	2.50	0.01	0.06
0.10	0.10	0.25	0.3	2.70	1.27	2.50	0.02	0.12
0.15	0.15	0.38	0.6	2.80	1.62	2.50	0.04	0.19
0.20	0.20	0.50	1.0	2.90	1.91	2.50	0.06	0.26
0.25	0.25	0.63	1.4	3.00	2.17	2.50	0.07	0.32
0.30	0.30	0.75	1.8	3.10	2.40	2.50	0.09	0.39
0.35	0.35	0.88	2.3	3.20	2.60	2.50	0.11	0.46
0.40	0.40	1.00	2.8	3.30	2.79	2.50	0.12	0.52
0.45	0.45	1.13	3.3	3.40	2.96	2.50	0.14	0.59
0.50	0.50	1.25	3.9	3.50	3.11	2.50	0.15	0.65
0.55	0.55	1.38	4.5	3.60	3.25	2.50	0.16	0.71
0.60	0.60	1.50	5.1	3.70	3.39	2.50	0.18	0.78
0.65	0.65	1.63	5.7	3.80	3.51	2.50	0.19	0.84
0.70	0.70	1.75	6.3	3.90	3.62	2.50	0.20	0.90
0.75	0.75	1.88	7.0	4.00	3.73	2.50	0.22	0.97
0.80	0.80	2.00	7.7	4.10	3.83	2.50	0.23	1.03
0.85	0.85	2.13	8.3	4.20	3.92	2.50	0.24	1.09
0.90	0.90	2.25	9.0	4.30	4.01	2.50	0.25	1.15
0.95	0.95	2.38	9.7	4.40	4.10	2.50	0.26	1.21
1.00	1.00	2.50	10.4	4.50	4.18	3.50	0.27	1.27



APPENDIX E

STORM DRAIN ANALYSIS

48" @ 4.3%

CULVERT RATING TABLE

48. INCH DIAMETER PIPE

N = 0.01300 INCREMENT = 0.50 SLOPE = 0.04300

FLOW DEPTH (IN)	FLOW AREA (SQ FT)	DISCHARGE (CFS)	VELOCITY (FPS)
0.50000	0.02260	0.04898	2.16667
1.00000	0.06374	0.21854	3.42851
1.50000	0.11673	0.52272	4.47789
2.00000	0.17915	0.96862	5.40664
2.50000	0.24957	1.56055	6.25293
3.00000	0.32701	2.30125	7.03731
3.50000	0.41073	3.19242	7.77253
4.00000	0.50017	4.23499	8.46714
4.50000	0.59484	5.42930	9.12726
5.00000	0.69437	6.77523	9.75743
5.50000	0.79839	8.27225	10.36116
6.00000	0.90662	9.91953	10.94125
6.50000	1.01879	11.71597	11.49993
7.00000	1.13465	13.66019	12.03907
7.50000	1.25401	15.75064	12.56021
8.00000	1.37665	17.98552	13.06467
8.50000	1.50240	20.36294	13.55357
9.00000	1.63109	22.88074	14.02786
9.50000	1.76256	25.53674	14.48842
10.00000	1.89666	28.32852	14.93597
10.50000	2.03326	31.25362	15.37118
11.00000	2.17222	34.30937	15.79461
11.50000	2.31342	37.49311	16.20680
12.00000	2.45673	40.80195	16.60820
12.50000	2.60206	44.23300	16.99925
13.00000	2.74927	47.78323	17.38031
13.50000	2.89828	51.44952	17.75173
14.00000	3.04898	55.22869	18.11383
14.50000	3.20127	59.11745	18.46688
15.00000	3.35506	63.11246	18.81116
15.50000	3.51025	67.21028	19.14688
16.00000	3.66675	71.40740	19.47429
16.50000	3.82449	75.70026	19.79357
17.00000	3.98336	80.08516	20.10491
17.50000	4.14330	84.55841	20.40847
18.00000	4.30421	89.11620	20.70442
18.50000	4.46602	93.75468	20.99289
19.00000	4.62865	98.46993	21.27402
19.50000	4.79201	103.25796	21.54792
20.00000	4.95604	108.11466	21.81471
20.50000	5.12066	113.03595	22.07449
21.00000	5.28579	118.01762	22.32734
21.50000	5.45135	123.05542	22.57337
22.00000	5.61728	128.14499	22.81263
22.50000	5.78350	133.28195	23.04519
23.00000	5.94994	138.46187	23.27114
FLOW DEPTH (IN)	FLOW AREA (SQ FT)	DISCHARGE (CFS)	VELOCITY (FPS)

E-1

23.50000	6.11652	143.68015	23.49050
24.00000	6.28318	148.93219	23.70333
24.50000	6.44983	154.21336	23.90967
25.00000	6.61641	159.51894	24.10958
25.50000	6.78285	164.84396	24.30305
26.00000	6.94907	170.18359	24.49012
26.50000	7.11500	175.53288	24.67081
27.00000	7.28057	180.88675	24.84514
27.50000	7.44570	186.23996	25.01310
28.00000	7.61031	191.58730	25.17469
28.50000	7.77434	196.92343	25.32991
29.00000	7.93771	202.24292	25.47875
29.50000	8.10034	207.54016	25.62117
30.00000	8.26215	212.80952	25.75717
30.50000	8.42306	218.04524	25.88670
31.00000	8.58300	223.24139	26.00973
31.50000	8.74187	228.39197	26.12620
32.00000	8.89961	233.49066	26.23606
32.50000	9.05612	238.53130	26.33925
33.00000	9.21131	243.50723	26.43569
33.50000	9.36509	248.41190	26.52530
34.00000	9.51738	253.23836	26.60798
34.50000	9.66808	257.97943	26.68362
35.00000	9.81709	262.62793	26.75212
35.50000	9.96431	267.17621	26.81332
36.00000	10.10963	271.61633	26.86709
36.50000	10.25295	275.94009	26.91325
37.00000	10.39414	280.13907	26.95162
37.50000	10.53310	284.20404	26.98198
38.00000	10.66970	288.12570	27.00410
38.50000	10.80380	291.89398	27.01771
39.00000	10.93527	295.49835	27.02249
39.50000	11.06396	298.92737	27.01811
40.00000	11.18971	302.16895	27.00418
40.50000	11.31236	305.20984	26.98022
41.00000	11.43171	308.03555	26.94571
41.50000	11.54758	310.63022	26.90003
42.00000	11.65975	312.97598	26.84243
42.50000	11.76798	315.05286	26.77205
43.00000	11.87200	316.83746	26.68779
43.50000	11.97152	318.30273	26.58833
44.00000	12.06620	319.41611	26.47198
44.50000	12.15563	320.13705	26.33652
45.00000	12.23936	320.41388	26.17898
45.50000	12.31679	320.17709	25.99516
46.00000	12.38721	319.32672	25.77874
46.50000	12.44963	317.70551	25.51927
47.00000	12.50262	315.02682	25.19686
47.50000	12.54376	310.59998	24.76131
48.00000	12.56637	297.86487	23.70334

Reach 1

$Q_{100} = 149.80$

$d = 24.08$ in

48" @ 1.4 %

CULVERT RATING TABLE

48. INCH DIAMETER PIPE

N = 0.01300 INCREMENT = 0.50 SLOPE = 0.01400

FLOW DEPTH (IN)	FLOW AREA (SQ FT)	DISCHARGE (CFS)	VELOCITY (FPS)
0.50000	0.02260	0.02795	1.23630
1.00000	0.06374	0.12470	1.95630
1.50000	0.11673	0.29827	2.55507
2.00000	0.17915	0.55269	3.08501
2.50000	0.24957	0.89044	3.56790
3.00000	0.32701	1.31309	4.01547
3.50000	0.41073	1.82159	4.43499
4.00000	0.50017	2.41647	4.83133
4.50000	0.59484	3.09795	5.20799
5.00000	0.69437	3.86593	5.56756
5.50000	0.79839	4.72012	5.91205
6.00000	0.90662	5.66006	6.24305
6.50000	1.01879	6.68510	6.56183
7.00000	1.13465	7.79447	6.86946
7.50000	1.25401	8.98727	7.16683
8.00000	1.37665	10.26249	7.45467
8.50000	1.50240	11.61904	7.73363
9.00000	1.63109	13.05569	8.00426
9.50000	1.76256	14.57120	8.26706
10.00000	1.89666	16.16418	8.52243
10.50000	2.03326	17.83324	8.77076
11.00000	2.17222	19.57684	9.01236
11.50000	2.31342	21.39347	9.24756
12.00000	2.45673	23.28149	9.47660
12.50000	2.60206	25.23923	9.69973
13.00000	2.74927	27.26499	9.91716
13.50000	2.89828	29.35696	10.12909
14.00000	3.04898	31.51335	10.33570
14.50000	3.20127	33.73227	10.53715
15.00000	3.35506	36.01181	10.73360
15.50000	3.51025	38.35001	10.92516
16.00000	3.66675	40.74488	11.11198
16.50000	3.82449	43.19437	11.29416
17.00000	3.98336	45.69638	11.47181
17.50000	4.14330	48.24881	11.64502
18.00000	4.30421	50.84948	11.81389
18.50000	4.46602	53.49618	11.97849
19.00000	4.62865	56.18669	12.13890
19.50000	4.79201	58.91873	12.29519
20.00000	4.95604	61.68995	12.44742
20.50000	5.12066	64.49802	12.59565
21.00000	5.28579	67.34055	12.73993
21.50000	5.45135	70.21510	12.88031
22.00000	5.61728	73.11920	13.01683
22.50000	5.78350	76.05034	13.14953
23.00000	5.94994	79.00598	13.27845
FLOW DEPTH (IN)	FLOW AREA (SQ FT)	DISCHARGE (CFS)	VELOCITY (FPS)

E-3

23.50000	6.11652	81.98351	13.40361
24.00000	6.28318	84.98033	13.52506
24.50000	6.44983	87.99375	13.64280
25.00000	6.61641	91.02109	13.75686
25.50000	6.78285	94.05954	13.86726
26.00000	6.94907	97.10632	13.97400
26.50000	7.11500	100.15862	14.07710
27.00000	7.28057	103.21351	14.17657
27.50000	7.44570	106.26804	14.27241
28.00000	7.61031	109.31921	14.36461
28.50000	7.77434	112.36401	14.45318
29.00000	7.93771	115.39928	14.53811
29.50000	8.10034	118.42188	14.61938
30.00000	8.26215	121.42856	14.69697
30.50000	8.42306	124.41605	14.77088
31.00000	8.58300	127.38097	14.84108
31.50000	8.74187	130.31987	14.90754
32.00000	8.89961	133.22917	14.97023
32.50000	9.05612	136.10535	15.02911
33.00000	9.21131	138.94461	15.08414
33.50000	9.36509	141.74318	15.13527
34.00000	9.51738	144.49715	15.18244
34.50000	9.66808	147.20241	15.22561
35.00000	9.81709	149.85483	15.26469
35.50000	9.96431	152.45004	15.29961
36.00000	10.10963	154.98357	15.33029
36.50000	10.25295	157.45071	15.35663
37.00000	10.39414	159.84662	15.37853
37.50000	10.53310	162.16609	15.39585
38.00000	10.66970	164.40376	15.40847
38.50000	10.80380	166.55396	15.41623
39.00000	10.93527	168.61058	15.41896
39.50000	11.06396	170.56720	15.41647
40.00000	11.18971	172.41681	15.40851
40.50000	11.31236	174.15193	15.39484
41.00000	11.43171	175.76428	15.37515
41.50000	11.54758	177.24481	15.34909
42.00000	11.65975	178.58328	15.31622
42.50000	11.76798	179.76834	15.27606
43.00000	11.87200	180.78664	15.22799
43.50000	11.97152	181.62273	15.17123
44.00000	12.06620	182.25800	15.10484
44.50000	12.15563	182.66937	15.02755
45.00000	12.23936	182.82735	14.93766
45.50000	12.31679	182.69223	14.83277
46.00000	12.38721	182.20702	14.70928
46.50000	12.44963	181.28195	14.56123
47.00000	12.50262	179.75349	14.37726
47.50000	12.54376	177.22755	14.12874
48.00000	12.56637	169.96094	13.52507

Reach 2

$Q_{100} = 165.06$

$d = 38.15$ in

48" @ 11.6%

CULVERT RATING TABLE

48. INCH DIAMETER PIPE

N = 0.01300 INCREMENT = 0.50 SLOPE = 0.11600

FLOW DEPTH (IN)	FLOW AREA (SQ FT)	DISCHARGE (CFS)	VELOCITY (FPS)
0.50000	0.02260	0.08044	3.55867
1.00000	0.06374	0.35895	5.63119
1.50000	0.11673	0.85855	7.35476
2.00000	0.17915	1.59091	8.88019
2.50000	0.24957	2.56314	10.27018
3.00000	0.32701	3.77971	11.55850
3.50000	0.41073	5.24343	12.76608
4.00000	0.50017	6.95580	13.90694
4.50000	0.59484	8.91741	14.99116
5.00000	0.69437	11.12804	16.02618
5.50000	0.79839	13.58684	17.01780
6.00000	0.90662	16.29244	17.97056
6.50000	1.01879	19.24301	18.88818
7.00000	1.13465	22.43632	19.77369
7.50000	1.25401	25.86979	20.62965
8.00000	1.37665	29.54049	21.45819
8.50000	1.50240	33.44530	22.26119
9.00000	1.63109	37.58070	23.04021
9.50000	1.76256	41.94308	23.79666
10.00000	1.89666	46.52846	24.53174
10.50000	2.03326	51.33282	25.24655
11.00000	2.17222	56.35176	25.94201
11.50000	2.31342	61.58093	26.61902
12.00000	2.45673	67.01557	27.27831
12.50000	2.60206	72.65093	27.92059
13.00000	2.74927	78.48204	28.54647
13.50000	2.89828	84.50377	29.15651
14.00000	3.04898	90.71091	29.75124
14.50000	3.20127	97.09805	30.33111
15.00000	3.35506	103.65969	30.89657
15.50000	3.51025	110.39021	31.44799
16.00000	3.66675	117.28380	31.98574
16.50000	3.82449	124.33463	32.51014
17.00000	3.98336	131.53667	33.02150
17.50000	4.14330	138.88380	33.52010
18.00000	4.30421	146.36980	34.00618
18.50000	4.46602	153.98833	34.47998
19.00000	4.62865	161.73291	34.94172
19.50000	4.79201	169.59706	35.39160
20.00000	4.95604	177.57401	35.82979
20.50000	5.12066	185.65701	36.25646
21.00000	5.28579	193.83922	36.67177
21.50000	5.45135	202.11359	37.07585
22.00000	5.61728	210.47301	37.46883
22.50000	5.78350	218.91026	37.85081
23.00000	5.94994	227.41805	38.22190
FLOW DEPTH (IN)	FLOW AREA (SQ FT)	DISCHARGE (CFS)	VELOCITY (FPS)

Reach 3
Q100=79.77
d = 20.14 in

23.50000	6.11652	235.98888	38.58220
24.00000	6.28318	244.61516	38.93176
24.50000	6.44983	253.28928	39.27068
25.00000	6.61641	262.00345	39.59901
25.50000	6.78285	270.74960	39.91678
26.00000	6.94907	279.51974	40.22404
26.50000	7.11500	288.30576	40.52083
27.00000	7.28057	297.09921	40.80715
27.50000	7.44570	305.89166	41.08301
28.00000	7.61031	314.67444	41.34842
28.50000	7.77434	323.43884	41.60336
29.00000	7.93771	332.17587	41.84782
29.50000	8.10034	340.87643	42.08175
30.00000	8.26215	349.53113	42.30512
30.50000	8.42306	358.13058	42.51787
31.00000	8.58300	366.66507	42.71994
31.50000	8.74187	375.12466	42.91124
32.00000	8.89961	383.49905	43.09168
32.50000	9.05612	391.77811	43.26117
33.00000	9.21131	399.95090	43.41956
33.50000	9.36509	408.00659	43.56674
34.00000	9.51738	415.93387	43.70255
34.50000	9.66808	423.72089	43.82678
35.00000	9.81709	431.35587	43.93928
35.50000	9.96431	438.82617	44.03981
36.00000	10.10963	446.11893	44.12812
36.50000	10.25295	453.22058	44.20394
37.00000	10.39414	460.11719	44.26696
37.50000	10.53310	466.79376	44.31683
38.00000	10.66970	473.23489	44.35316
38.50000	10.80380	479.42416	44.37550
39.00000	10.93527	485.34421	44.38337
39.50000	11.06396	490.97626	44.37617
40.00000	11.18971	496.30038	44.35328
40.50000	11.31236	501.29489	44.31393
41.00000	11.43171	505.93604	44.25725
41.50000	11.54758	510.19769	44.18222
42.00000	11.65975	514.05054	44.08762
42.50000	11.76798	517.46167	43.97202
43.00000	11.87200	520.39282	43.83363
43.50000	11.97152	522.79950	43.67027
44.00000	12.06620	524.62817	43.47916
44.50000	12.15563	525.81226	43.25667
45.00000	12.23936	526.26697	42.99792
45.50000	12.31679	525.87805	42.69601
46.00000	12.38721	524.48138	42.34055
46.50000	12.44963	521.81860	41.91439
47.00000	12.50262	517.41895	41.38483
47.50000	12.54376	510.14804	40.66947
48.00000	12.56637	489.23114	38.93179

Exhibits

EXHIBITS

EXHIBIT 1:	BULK LAND PLAT
EXHIBIT 2:	PRELIMINARY PLAT
EXHIBIT 3	EXISTING DRAINAGE BASIN MAP
EXHIBIT 4	PROPOSED DRAINAGE BASIN MAP
EXHIBIT 5	PROPOSED ON-SITE BASIN MAP
EXHIBIT 6	GRADING AND DRAINAGE PLAN

EXHIBIT 1

BULK LAND PLAT

EXHIBIT 2

PRELIMINARY PLAT

EXHIBIT 3

EXISTING DRAINAGE BASIN MAP

EXHIBIT 4

PROPOSED DRAINAGE BASIN MAP

EXHIBIT 5

PROPOSED ON-SITE BASIN MAP

EXHIBIT 6

GRADING AND DRAINAGE PLAN

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