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

December 3, 2002

Lyle Losack, PE
QuikDraw Engineering
PO Box 1328
Corrales, NM 87048

Re: Ridgeview Village Unit 2 Street Section Calculation for Work Order Engineer's Stamp dated 10-21-02, (A11/D7)

Dear Mr. Losack,

Based on information contained in your submittal dated 11-1-02, the above referenced calculation is approved for Work Order signoff by Hydrology.

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

DRAINAGE REPORT

FOR

RIDGEVIEW VILLAGE SUBDIVISION
AND LANDS OF ZOLIN/KUNATH, TRES ESQUINAS, LLC AND CURB, INC.
BULK LAND PLAT
ALBUQUERQUE, NEW MEXICO

COA Project No. 1000893

November 13, 2001

Prepared For:

Curb Inc.
6301 Indian School, NE, Suite 208
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Lyle C. Losack P.E.
Lyle C. Losack PE
11/13/01
12/4/01
12/17/01

TABLE OF CONTENTS

APPENDICES

1. PURPOSE AND SCOPE

This Drainage Study will address the developed storm runoff of the properties described as Ridgeview Village Subdivision and Lands of Zolin/Kunath, Tres Esquinas, LLC and Curb, Inc. Bulk land Plat.

The purpose is to provide a feasible solution for drainage on the west side of Unser Blvd. Presently, there is a master drainage plan being reviewed for this area by Bohannon Houston, Inc. and the City of Albuquerque. See attached.

Historically, the majority of the flows migrate to the northeast across county lines towards the Black Arroyo. To separate the drainage at the county line has proved to be feasible but very expensive. The choice being a very large pipe storm drain system along the county line.

2. SITE LOCATION

The Ridgeview Village Subdivision (Zoned R-1) is bounded by McMahon Blvd. on the south, presently under development land on the west (Los Suenos Subdivision). Rio Rancho (Unit 10) to the north, and Unser Blvd. to the east.

This Drainage study is necessary in order to establish a comprehensive drainage plan that manages development, with respect to drainage, and allows for a well-planned project.

3. FIRM AND SOIL CONDITIONS

Topography and Existing Drainage Patterns

Ridgeview Village will be sited on undeveloped land with slopes ranging from approximately 2% to 10%. Soils are highly absorptive sandy soils with occasional silt lenses. Vegetation is light, consisting of chamisa, weeds and desert grasses. The site is not located within a FEMA floodplain as shown on FIRM map C0104D. The existing drainage conditions are shown graphically on the Existing Drainage Basin Map. **(See Plate E1 of 1.)**

4. DESIGN CRITERIA

In accordance with COA criteria, all hydrological analyses are based on the 100-year frequency, 6- hour storm, as represented in Section 22.2, Hydrology of the "Development Process Manual, Volume 2, Design Criteria for the City of Albuquerque, New Mexico, January 1997".

The rainfalls pertinent to the study are as follows:

	Frequency (Zone 1)
1 Hour	1.87
6 Hour	2.20
24 Hour	2.66

5. COMPUTATIONAL PROCEDURES

The analysis follows standard engineering practice for the Albuquerque area. Key points of confluence were selected (Control Points) and the associated individual and aggregate contributing basins were subsequently defined.

Hydrological computations were accomplished by means of the January 1997 version of the AHYMO Computer Program as developed by AMAFCA. Detailed AHYMO printouts are contained in Appendices B, C, and D.

Flow characteristics for conveyance swales, channels, and streets were analyzed based on the AHYMO rating curves. Streets are assumed to have a 2% cross slope per City of Albuquerque Standard details.

6. ADJACENT DEVELOPMENT

Zone Atlas pages A – 12 - Z have been marked to show the location of the adjacent subdivision drainage plans and reports that were reviewed in preparation of this drainage report and are listed in Appendix A - 3. The following summary indicates the current status of the subdivisions and the land treatments used in their calculations:

Subdivision	Status	Land Treatment Types (%)			
		A	B	C	D
Ridgeview	Approved	0	20	20	60
Los Suenos	Approved	0	20	20	60
Dunlop Subdivision	Pending	0	25	25	50
Rio Rancho		30	20	23	27

Rio Rancho N = 1 D.U./.05 Acre = 2

D = 7 * SQ RT [2 (2) + 5 (2)] = 26.19 (Use 27 above)

7. LAND TREATMENT TYPES

The COA Development Process Manual (DPM) in Table A – 5, equation a – 4, at page 22-11 provides land treatment Type D values for residential densities less than 6 residences per acre. The Ridgeview Village Subdivision has a proposed density of 150 residential lots within a 27.27-acre site. An average land treatment type D value of 56.15% is calculated.

N = Residential Units/Acres

N = 161/27.27 = 5.90 Units/Acres < 6 Units/Acre

D = 7*SQ RT [(N*N) + (5*N)] = 7*SQ RT[(5.90)(5.90) + 5(5.90)]

D = 56.15% for proposed density

Use 56

The land treatment types utilized for proposed site:

	Land Treatment Type (Zone 1)			
Land Use	A	B	C	D
Existing	95	5	0	0
Ultimate	0	22	22	56

8. EXISTING DRAINAGE CONDITIONS

No offsite flows impact this subdivision. Study of 1' contours reveals an isolated subdivision. The majority drainage in this area presently flows northeast across the Bernalillo/Sandoval county line. It is collected through 3 – 58" x 38" arch pipes under Unser Blvd. from the west side. **(See Plate E1 of 1.)**

McMahon Blvd. is bladed and drains towards Unser Blvd. isolating the south side. A ridge cuts flows from the west and drains to Rio Rancho via Los Suenos Subdivision. All other flows north and east inherently flowing away from the site.

9. INTERIM OFFSITE DRAINAGE MANAGEMENT PLAN

Temporary sediment control ponds are to be constructed to control the historic flows coming from the Phase II area. These ponds will be removed upon ultimate conditions. Ponding will then shift exclusively to commercial lots in which flows can be held to historic rates per DPM and discharge will be per proposed future storm drain in Unser Blvd.

An interim temporary retention pond will be provided in the northeast corner of the site. The pond will be sized to accommodate the DPM – 10-day volume requirements. A temporary asphalt emergency spillway will be established to control head cutting and erosion.

Water blocks have been strategically located throughout the site. Temporary control swales will be graded to drain and direct Phase II flows prior to construction of said Phase.

The entire storm drain system for Ridgeview Village is to be completed under Phase I construction. Phase II will be accommodated by the Phase I construction. **(See Plate I1 of 1.)**

10. ULTIMATE DRAINAGE MANAGEMENT PLAN

It is proposed to collect Ridgeview Village drainage via storm drain pipe system along Black Arroyo Road/Unser Boulevard and route it to the Black Dam. McMahon Blvd. developed flows west of Unser Blvd. are to be routed along Unser Blvd. through the proposed storm drain pipes to Black Arroyo Dam also.

Upon development of the commercial areas to the west side of Unser Boulevard, drainage from said sites can be restricted to historical rate per DPM and routed to the future Unser storm drain

system presently under review by C.O.A. Should the city allow full discharge to the commercial properties, ponding on these sites can be eliminated.

11. EROSION CONTROL

Control of excessive soil erosion into City streets and drainage improvements during construction will be accomplished by use of temporary lot line, water-trap berms. These will be windrowed into place following mass grading operations and left in place until drainage is provided. Berms will also be located along boundaries common to City rights-of-way or public easements.

A national Pollutant Discharge Elimination System (NPDES) storm water discharge permit and a Stormwater Pollution Prevention Plan (SWPP) will be required by the contractor prior to the start of any site grading.

12. CONCLUSION

No adverse drainage impacts downstream should occur after construction of the Ridgeview Village Subdivision and Lands of Zolin/Kunath, Tres Esquinas, LLC and Curb, Inc. Bulk land Plat. A retention pond mitigates outflow downstream on the interim condition and ultimate flows will be channeled, ponded, and/or piped to the Black Dam. The Bulk land properties will have to submit a final Drainage Report upon development.

It is requested to achieve approval despite the unresolved ultimate outfall and to come to some compromise solution.

AHYMO PROGRAM SUMMARY TABLE (AHYMO_97) - - VERSION: 1997.02c RUN DATE (MON/DAY/YR) =05/03/2001
INPUT FILE = F:\N291\33\130\EXHIBITS\EXIST.DAT USER NO.= AHYMO-I-9702c01000Q29-AH

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION	
START										TIME=	.00
RAINFALL TYPE= 1										RAIN6=	2.200
COMPUTE NM HYD	E1	-	1	.04190	35.71	1.003	.44896	1.532	1.332	PER IMP=	.00
COMPUTE NM HYD	E2	-	2	.05830	49.68	1.396	.44896	1.532	1.332	PER IMP=	.00
COMPUTE NM HYD	E3	-	3	.06210	52.92	1.487	.44896	1.532	1.332	PER IMP=	.00
COMPUTE NM HYD	E4A	-	4	.00160	1.37	.038	.44896	1.532	1.337	PER IMP=	.00
COMPUTE NM HYD	E4B	-	5	.01340	11.42	.321	.44896	1.532	1.332	PER IMP=	.00
COMPUTE NM HYD	E4C	-	6	.00770	6.57	.184	.44896	1.532	1.333	PER IMP=	.00
COMPUTE NM HYD	E4D	-	7	.00940	8.02	.225	.44896	1.532	1.332	PER IMP=	.00
COMPUTE NM HYD	E4E	-	8	.01080	9.21	.259	.44896	1.532	1.332	PER IMP=	.00
COMPUTE NM HYD	E4F	-	9	.00410	3.50	.098	.44896	1.532	1.334	PER IMP=	.00
COMPUTE NM HYD	E5A	-	10	.00290	2.48	.069	.44896	1.532	1.335	PER IMP=	.00
COMPUTE NM HYD	E5B	-	11	.00510	4.35	.122	.44896	1.532	1.333	PER IMP=	.00
COMPUTE NM HYD	E5C	-	12	.00380	3.24	.091	.44896	1.532	1.334	PER IMP=	.00
COMPUTE NM HYD	E6	-	13	.18640	169.45	4.463	.44896	1.532	1.420	PER IMP=	.00
FINISH											

AHYMO PROGRAM SUMMARY TABLE (AHYMO_97) - - VERSION: 1997.02c RUN DATE (MON/DAY/YR) =04/30/2001
INPUT FILE = F:\N291\33\130\EXHIBITS\INTERIM.DAT USER NO.= AHYMO-I-9702c01000Q29-AH

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION	
START										TIME=	.00
RAINFALL TYPE= 1										RAIN6=	2.200
COMPUTE NM HYD	D1	-	1	.00630	14.20	.490	1.45960	1.499	3.523	PER IMP=	56.00
COMPUTE NM HYD	D2	-	2	.00380	8.57	.296	1.45960	1.499	3.525	PER IMP=	56.00
COMPUTE NM HYD	D3	-	3	.00560	12.63	.436	1.45960	1.499	3.524	PER IMP=	56.00
COMPUTE NM HYD	E4A	-	4	.00160	1.37	.038	.44896	1.532	1.337	PER IMP=	.00
COMPUTE NM HYD	E4B	-	5	.01340	11.42	.321	.44896	1.532	1.332	PER IMP=	.00
COMPUTE NM HYD	E4F	-	6	.00410	3.50	.098	.44896	1.532	1.334	PER IMP=	.00
COMPUTE NM HYD	E5A	-	7	.00290	2.48	.069	.44896	1.532	1.335	PER IMP=	.00
COMPUTE NM HYD	E5B	-	8	.00510	4.35	.122	.44896	1.532	1.333	PER IMP=	.00
COMPUTE NM HYD	E5C	-	9	.00380	3.24	.091	.44896	1.532	1.334	PER IMP=	.00
COMPUTE NM HYD	D7	-	10	.00260	5.87	.202	1.45960	1.499	3.529	PER IMP=	56.00
COMPUTE NM HYD	D8	-	11	.00160	3.11	.093	1.09142	1.499	3.037	PER IMP=	10.00
COMPUTE NM HYD	D9	-	12	.00330	7.45	.257	1.45960	1.499	3.527	PER IMP=	56.00
COMPUTE NM HYD	D12	-	13	.00300	8.12	.299	1.86834	1.499	4.229	PER IMP=	90.00
COMPUTE NM HYD	D13	-	14	.00160	3.11	.093	1.09142	1.499	3.037	PER IMP=	10.00
FINISH											

AHYMO PROGRAM SUMMARY TABLE (AHYMO_97) - - VERSION: 1997.02c RUN DATE (MON/DAY/YR) =04/30/2001
INPUT FILE = F:\N291\33\130\EXHIBITS\ULTIMATE.DAT USER NO.= AHYMO-I-9702c01000Q29-AH

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	PAGE = 1 NOTATION
START										TIME= .00
RAINFALL TYPE= 1										RAIN6= 2.200
COMPUTE NM HYD	D1	-	1	.00630	14.20	.490	1.45960	1.499	3.523	PER IMP= 56.00
COMPUTE NM HYD	D2	-	2	.00380	8.57	.296	1.45960	1.499	3.525	PER IMP= 56.00
COMPUTE NM HYD	D3	-	3	.00560	12.63	.436	1.45960	1.499	3.524	PER IMP= 56.00
COMPUTE NM HYD	D4	-	4	.00340	7.67	.265	1.45960	1.499	3.526	PER IMP= 56.00
COMPUTE NM HYD	D5	-	5	.00330	7.45	.257	1.45960	1.499	3.527	PER IMP= 56.00
COMPUTE NM HYD	D5A	-	6	.00290	7.85	.289	1.86834	1.499	4.229	PER IMP= 90.00
COMPUTE NM HYD	D5B	-	7	.00510	13.79	.508	1.86834	1.499	4.226	PER IMP= 90.00
COMPUTE NM HYD	D5C	-	8	.00380	10.28	.379	1.86834	1.499	4.227	PER IMP= 90.00
COMPUTE NM HYD	D6	-	9	.00330	7.45	.257	1.45960	1.499	3.527	PER IMP= 56.00
COMPUTE NM HYD	D7	-	10	.00260	5.87	.202	1.45960	1.499	3.529	PER IMP= 56.00
COMPUTE NM HYD	D8	-	11	.00160	3.11	.093	1.09142	1.499	3.037	PER IMP= 10.00
COMPUTE NM HYD	D9	-	12	.00330	7.45	.257	1.45960	1.499	3.527	PER IMP= 56.00
COMPUTE NM HYD	D10	-	13	.00060	1.64	.060	1.86834	1.499	4.264	PER IMP= 90.00
COMPUTE NM HYD	D11	-	14	.00440	9.93	.343	1.45960	1.499	3.525	PER IMP= 56.00
COMPUTE NM HYD	D12	-	15	.00300	8.12	.299	1.86834	1.499	4.229	PER IMP= 90.00
COMPUTE NM HYD	D13	-	16	.00160	3.11	.093	1.09142	1.499	3.037	PER IMP= 10.00
COMPUTE NM HYD	D4F	-	17	.00410	11.09	.409	1.86834	1.499	4.227	PER IMP= 90.00
FINISH										

COMMERCIAL PONDING CALCS

DSA

EXIST = 0.069 AC-FT
ULTIMATE = 0.289 AC-FT

DIFF = 0.289 - 0.069 = 0.22 AC-FT

PER D.P.M. pg 22-14, EQN. 9-7

$V_{1440} = V_{360} + A_d * (P_{1440} - P_{360})/12$ "/FT

$= 0.22 + .0029(640)[2.66 - 2.20/12]$

$= \underline{0.291}$ AC-FT

DSB

EXIST = 0.122 AC-FT
ULTI. = 0.508 AC-FT
DIFF. = 0.508 - 0.122 = 0.386 AC-FT

$V_{1440} = 0.22 + 0.0051(640)[2.66 - 2.2/12]$

$= \underline{0.345}$ AC-FT

D5C + D4F

EXIST = 0.091 + 0.098 = 0.189 AC-FT

ULTI = 0.379 + 0.409 = 0.788 AC-FT

DIFF = 0.788 - 0.189 = 0.599 AC-FT

$V_{1440} = .22 + 0.0079(640)[2.66 - 2.2/12]$

$= 0.414$ AC-FT

RET. POND CALCS

$V_{6(SITE)} = 3.049$ AC-FT

$A_D = 25.57$ ACRES $(56\%) = 14.32$ ACRES IMPERVIOUS

$P_{2*} = 2.66''$

$P_{10} = 10 - [24.9/2.66)^{1.47}] = 3.67$

$P_6 = 2.2''$

$V_{10} = @3.049 + 14.32(3.67 - 2.2)/12$

$V_{10\,DAY} = 4.8$ A.F. REQ'D

RET. POND VOLUME CALCS

VOLUME AVER. $= \dfrac{33169.97 + 21504.72}{2(43560)} = 0.63$

$\dfrac{@\,4.8\ \text{REQD}}{0.63/1'\ \text{FOOT}} = 7.6'\ \text{DEEP}$

PINION GRANDE (WEST)
Worksheet for Irregular Channel

D1 = 14.20 cfs

Project Description	
Worksheet	PINION HIEGHTS
Flow Element	Irregular Channel
Method	Manning's Formul
Solve For	Channel Depth

Input Data		
Slope	0.009100	ft/ft
Discharge	14.20	cfs

Options	
Current Roughness Method	mproved Lotter's Method
Open Channel Weighting Metho	mproved Lotter's Method
Closed Channel Weighting Met	Horton's Method

Results		
Mannings Coefficient	0.017	
Water Surface Elevatio	0.41	ft
Elevation Range	0.00 to 0.86	
Flow Area	5.3	ft²
Wetted Perimeter	28.74	ft
Top Width	28.02	ft
Actual Depth	0.41	ft
Critical Elevation	0.42	ft
Critical Slope	0.007456	ft/ft
Velocity	2.69	ft/s
Velocity Head	0.11	ft
Specific Energy	0.52	ft ←
Froude Number	1.09	
Flow Type	Supercritical	

DEPTH + VEL HD = MAX DEPTH (MUST BE < R ELEV.)

.41 + .11 = .52 < .86 OK

STD CURB

Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+00	0+47	0.017

Mr. Lyle Losack

37 Brookside Road Waterbury, CT 06708 USA (203) 755-1666

PINION GRANDE (WEST)
Worksheet for Irregular Channel

Natural Channel Points	
Station (ft)	Elevation (ft)
0+00	0.86
0+10	0.67
0+10	0.00
0+12	0.13
0+24	0.37
0+36	0.13
0+38	0.00
0+38	0.67
0+47	0.86

Mr. Lyle Losack
 37 Brookside Road Waterbury, CT 06708 USA (203) 755-1666

PINION GRANDE (EAST)
Worksheet for Irregular Channel

Project Description	
Worksheet	PINION HIEGHTS
Flow Element	Irregular Channel
Method	Manning's Formul
Solve For	Channel Depth

Input Data		
Slope	0.007600	ft/ft
Discharge	33.33	cfs

Options	
Current Roughness Method	mproved Lotter's Method
Open Channel Weighting Metho	mproved Lotter's Method
Closed Channel Weighting Met	Horton's Method

Results		
Mannings Coefficient	0.017	
Water Surface Elevatio	0.55	ft
Elevation Range	0.00 to 0.86	
Flow Area	9.3	ft²
Wetted Perimeter	29.03	ft
Top Width	28.06	ft
Actual Depth	0.55	ft
Critical Elevation	0.57	ft
Critical Slope	0.006246	ft/ft
Velocity	3.57	ft/s
Velocity Head	0.20	ft
Specific Energy	0.75	ft
Froude Number	1.09	
Flow Type	Supercritical	

Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+00	0+47	0.017

D1 = 14.20 cfs
D2 = 8.59 cfs
D8 = 3.11 cfs
D9 = 7.45 cfs
33.33 cfs

.55 + .20 = .75 < .86 OK

STD

Mr. Lyle Losack
 37 Brookside Road Waterbury, CT 06708 USA (203) 755-1666

PINION AZUL
Worksheet for Irregular Channel

Q7 = 5.87 cfs

Project Description	
Worksheet	PINION HIEGHTS
Flow Element	Irregular Channel
Method	Manning's Formul
Solve For	Channel Depth

Input Data		
Slope	0.009100	ft/ft
Discharge	5.87	cfs

Options	
Current Roughness Method	mproved Lotter's Method
Open Channel Weighting Metho	mproved Lotter's Method
Closed Channel Weighting Met	Horton's Method

Results		
Mannings Coefficient	0.017	
Water Surface Elevatio	0.32	ft
Elevation Range	0.00 to 0.86	
Flow Area	2.9	ft²
Wetted Perimeter	23.89	ft
Top Width	23.33	ft
Actual Depth	0.32	ft
Critical Elevation	0.32	ft
Critical Slope	0.008703	ft/ft
Velocity	2.04	ft/s
Velocity Head	0.06	ft
Specific Energy	0.38	ft
Froude Number	1.02	
Flow Type	Supercritical	

.32 + .06 = .38 < .86 OK

MTB

Calculation Messages:
Flow is divided.

Mr. Lyle Losack
 37 Brookside Road Waterbury, CT 06708 USA (203) 755-1666

PINION VERDE
Worksheet for Irregular Channel

Project Description	
Worksheet	PINION HIEGHTS
Flow Element	Irregular Channel
Method	Manning's Formul
Solve For	Channel Depth

Input Data		
Slope	0.012500	ft/ft
Discharge	24.21	cfs

Options	
Current Roughness Method	mproved Lotter's Method
Open Channel Weighting Metho	mproved Lotter's Method
Closed Channel Weighting Met	Horton's Method

Results		
Mannings Coefficient	0.017	
Water Surface Elevatio	0.46	ft
Elevation Range	0.00 to 0.86	
Flow Area	6.6	ft²
Wetted Perimeter	28.84	ft
Top Width	28.04	ft
Actual Depth	0.46	ft
Critical Elevation	0.51	ft
Critical Slope	0.006670	ft/ft
Velocity	3.66	ft/s
Velocity Head	0.21	ft
Specific Energy	0.67	ft
Froude Number	1.33	
Flow Type	Supercritical	

Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+00	0+47	0.017

D4 = 7.67
D5 = 7.45
D6 = 7.45
D10 = 1.64
24.21

.46 + .21 = .67 < .86 OK
STD

Mr. Lyle Losack
 37 Brookside Road Waterbury, CT 06708 USA (203) 755-1666

NIGHT WHISPER(WEST)
Worksheet for Irregular Channel

D3 = 12.63
D11 = 9.93
22.56

Project Description	
Worksheet	PINION HIEGHTS
Flow Element	Irregular Channel
Method	Manning's Formul
Solve For	Channel Depth

Input Data		
Slope	0.009100	ft/ft
Discharge	22.56	cfs

Options	
Current Roughness Method	mproved Lotter's Method
Open Channel Weighting Metho	mproved Lotter's Method
Closed Channel Weighting Met	Horton's Method

Results		
Mannings Coefficient	0.017	
Water Surface Elevatio	0.47	ft
Elevation Range	0.00 to 0.86	
Flow Area	7.0	ft²
Wetted Perimeter	28.86	ft
Top Width	28.04	ft
Actual Depth	0.47	ft
Critical Elevation	0.49	ft
Critical Slope	0.006767	ft/ft
Velocity	3.23	ft/s
Velocity Head	0.16	ft
Specific Energy	0.63	ft
Froude Number	1.14	
Flow Type	Supercritical	

.47+.16 = .63 < .86 OK
STD

Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+00	0+47	0.017

Mr. Lyle Losack
 37 Brookside Road Waterbury, CT 06708 USA (203) 755-1666

NIGHT WHISPER(EAST)
Worksheet for Irregular Channel

Project Description	
Worksheet	NIGHT WHISPER(E/
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Slope	0.009300	ft/ft
Discharge	49.88	cfs

Options	
Current Roughness Method	Improved Lotter's Method
Open Channel Weighting Method	Improved Lotter's Method
Closed Channel Weighting Metho	Horton's Method

Results		
Mannings Coefficient	0.017	
Water Surface Elevation	0.45	ft
Elevation Range	0.00 to 0.91	
Flow Area	12.8	ft²
Wetted Perimeter	40.67	ft
Top Width	40.06	ft
Actual Depth	0.45	ft
Critical Elevation	0.50	ft
Critical Slope	0.006035	ft/ft
Velocity	3.90	ft/s
Velocity Head	0.24	ft
Specific Energy	0.69	ft
Froude Number	1.22	
Flow Type	Supercritical	

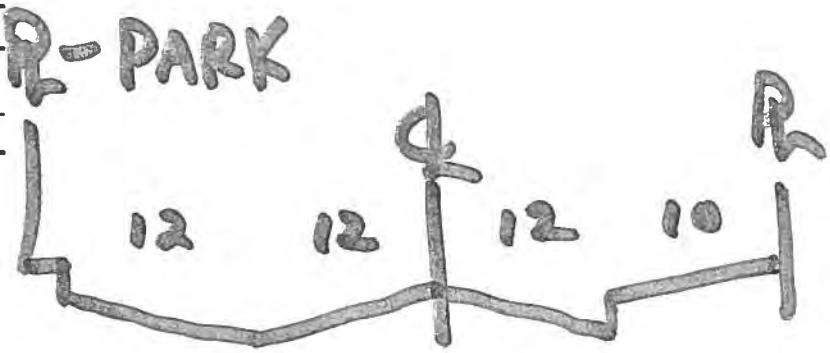
D3 = 12.63
D4 = 7.67
D5 = 7.45
D6 = 7.45
D10 = 1.64
D11 = 9.93
D13 = 3.11
49.88

STD

.55+.24=.79<.86 OK

Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+00	0+50	0.017

Natural Channel Points	
Station (ft)	Elevation (ft)
0+00	0.91
0+00	0.24
0+12	0.00
0+26	0.28
0+40	0.00
0+40	0.67
0+50	0.87



ROAD SECTION

Mr. Lyle Losack
37 Brookside Road Waterbury, CT 06708 USA (203) 755-1666
Project Engineer: Mr. Lyle Losack

BLACK ROAD
Worksheet for Irregular Channel

Q12 = 8.12 cfs

Project Description	
Worksheet	PINION HIEGHTS-BLAC
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Slope	0.005000	ft/ft
Discharge	8.12	cfs

Options	
Current Roughness Method	mproved Lotter's Method
Open Channel Weighting Metho	mproved Lotter's Method
Closed Channel Weighting Met	Horton's Method

Results		
Mannings Coefficient	0.017	
Water Surface Elevatio	0.38	ft
Elevation Range	0.00 to 0.86	
Flow Area	4.5	ft²
Wetted Perimeter	28.59	ft
Top Width	27.91	ft
Actual Depth	0.38	ft
Critical Elevation	0.36	ft
Critical Slope	0.008324	ft/ft
Velocity	1.80	ft/s
Velocity Head	0.05	ft
Specific Energy	0.43	ft
Froude Number	0.79	
Flow Type	Subcritical	

.38+.05 = .43 < .86 OK

STD

Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+00	0+47	0.017

Mr. Lyle Losack
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BLACK RD WEST
Worksheet for Circular Channel

w/ ALL DEVELOPERS

8.12
35.33
5.87
91.21
130.47
115.52
384.53

3 PER PROPOSED MSTR DRAIN PLAN (ATTACHED)

Project Description	
Worksheet	Circular Channel - 1
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Full Flow Diameter

Input Data		
Mannings Coefficient	0.013	
Slope	0.020000	ft/ft
Discharge	384.58	cfs

Results		
Depth	5.08	ft
Diameter	61	in ← 66
Flow Area	20.3	ft²
Wetted Perimeter	0.00	ft
Top Width	0.00	ft
Critical Depth	4.92	ft
Percent Full	100.0	%
Critical Slope	0.017583	ft/ft
Velocity	18.96	ft/s
Velocity Head	5.59	ft
Specific Energy	10.67	ft
Froude Number	0.00	
Maximum Dischar	413.70	cfs
Discharge Full	384.58	cfs
Slope Full	0.020000	ft/ft
Flow Type	N/A	

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OUTLET TO UNSER BLVD
Worksheet for Circular Channel

Project Description	
Worksheet	Circular Channel - 1
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Full Flow Diameter

Input Data		
Mannings Coefficient	0.013	
Slope	0.020000	ft/ft
Discharge	49.88	cfs

Results		
Depth	2.36	ft
Diameter	28	in
Flow Area	4.4	ft²
Wetted Perimeter	0.00	ft
Top Width	0.00	ft
Critical Depth	2.24	ft
Percent Full	100.0	%
Critical Slope	0.017322	ft/ft
Velocity	11.38	ft/s
Velocity Head	2.01	ft
Specific Energy	4.37	ft
Froude Number	0.00	
Maximum Dischar	53.66	cfs
Discharge Full	49.88	cfs
Slope Full	0.020000	ft/ft
Flow Type	N/A	

30"

INLETS ON BLACK ROAD AT LOWER MANHOLES PER DRAWING AND BHI MSTR DRAW PLAN + CONSTR. DOCUMENTS.

OUTLET TO BLACK RD
Worksheet for Circular Channel

Project Description	
Worksheet	Circular Channel - 1
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Full Flow Diameter

Input Data		
Mannings Coefficient	0.013	
Slope	0.010000	ft/ft
Discharge	39.20	cfs

Results		
Depth	2.46	ft
Diameter	29	in
Flow Area	4.7	ft²
Wetted Perimeter	0.00	ft
Top Width	0.00	ft
Critical Depth	2.11	ft
Percent Full	100.0	%
Critical Slope	0.009271	ft/ft
Velocity	8.26	ft/s
Velocity Head	1.06	ft
Specific Energy	3.52	ft
Froude Number	0.00	
Maximum Dischar	42.17	cfs
Discharge Full	39.20	cfs
Slope Full	0.010000	ft/ft
Flow Type	N/A	

30"

Mr. Lyle Losack
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D5A
Worksheet for Circular Channel

Project Description	
Worksheet	Circular Channel - 1
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Full Flow Diameter

Input Data		
Mannings Coefficient	0.013	
Slope	0.010000	ft/ft
Discharge	2.48	cfs

Results		
Depth	0.87	ft
Diameter	10	in
Flow Area	0.6	ft²
Wetted Perimeter	0.00	ft
Top Width	0.00	ft
Critical Depth	0.70	ft
Percent Full	100.0	%
Critical Slope	0.010528	ft/ft
Velocity	4.14	ft/s
Velocity Head	0.27	ft
Specific Energy	1.14	ft
Froude Number	0.00	
Maximum Dischar	2.67	cfs
Discharge Full	2.48	cfs
Slope Full	0.010000	ft/ft
Flow Type	N/A	

10"

Mr. Lyle Losack
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D5B
Worksheet for Circular Channel

Project Description	
Worksheet	Circular Channel - 1
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Full Flow Diameter

Input Data		
Mannings Coefficient	0.013	
Slope	0.010000	ft/ft
Discharge	6.83	cfs

Results		
Depth	1.28	ft
Diameter	15	in
Flow Area	1.3	ft²
Wetted Perimeter	0.00	ft
Top Width	0.00	ft
Critical Depth	1.05	ft
Percent Full	100.0	%
Critical Slope	0.009977	ft/ft
Velocity	5.34	ft/s
Velocity Head	0.44	ft
Specific Energy	1.72	ft
Froude Number	0.00	
Maximum Dischar	7.35	cfs
Discharge Full	6.83	cfs
Slope Full	0.010000	ft/ft
Flow Type	N/A	

18"

Mr. Lyle Losack
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D5C
Worksheet for Circular Channel

Project Description	
Worksheet	Circular Channel - 1
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Full Flow Diameter

Input Data		
Mannings Coefficient	0.013	
Slope	0.010000	ft/ft
Discharge	6.74	cfs

Results		
Depth	1.27	ft
Diameter	15	in
Flow Area	1.3	ft²
Wetted Perimeter	0.00	ft
Top Width	0.00	ft
Critical Depth	1.04	ft
Percent Full	100.0	%
Critical Slope	0.009983	ft/ft
Velocity	5.32	ft/s
Velocity Head	0.44	ft
Specific Energy	1.71	ft
Froude Number	0.00	
Maximum Dischar	7.25	cfs
Discharge Full	6.74	cfs
Slope Full	0.010000	ft/ft
Flow Type	N/A	

Mr. Lyle Losack
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PINION GRANDE (EAST)

$Q = 33.33$ cfs
$S = 0.76\%$

@ THIS SLOPE STREET CONVEYS
@ 0.55' DEEP + 0.20 VEL. HD. = 0.75 < .86 OK

ALL 33.33 cfs TO BE PICKED UP BY S.D.

33.33/2 = 16.7 cfs/SIDE/6.5 (NOMO) = 2.56

USE 3 INLETS/SIDE

1 - SINGLE "A" UPSTREAM
2 - DBL "C" DOWNSTREAM

NOTE: INLETS PLACED TO DRAIN STREET DRY TO PREVENT FLOWS FROM LEAVING SITE AND TO PREVENT STREET CROSS FLOWS

PINION AZUL

$Q = 5.87$
$S = 0.91$

@ THIS SLOPE STREET CONVEYS
@ 0.32 DEEP + 0.06 VEL. HD. = 0.38 < .86 OK

ALL 5.87 cfs TO BE PICKED UP

$5.87/2 = 2.935$ cfs/SIDE

PER NOMO PICKS UP 2.75 cfs EACH

USE 2 INLETS PER SIDE

1 - SINGLE "A" & 1 SINGLE "C"

NOTE: INLETS PLACED TO DRAIN STREET DRY TO PREVENT FLOWS FROM LEAVING SITE.

NIGHT WHISPER

$Q = 49.88$ cfs
$S = 0.93\%$

@ THIS SLOPE STREET CONVEYS
@ 0.55' DEEP + .24 VEL HD. = .79 < .86 OK

ALL 49.88 cfs TO BE PICKED UP BY S.D.

$49.88/2 = 24.94$ / SIDE

PER NOMO $24.94/7 = 3.56$

USE 4 INLETS/SIDE

1 - SINGLE "A"
1 - SINGLE "C"
2 - DOL "C"

NOTE: INLETS PLACED TO DRAIN STREET DRY TO PREVENT FLOWS FROM LEAVING SITE.

BLACK ARROYO ROAD (WEST)

$Q = 8.12$ (LOS SUENOS FLOW CONTAINED BY STG VERTICAL @ P.L.)
$S = 0.5\%$

@ THIS SLOPE STREET CONVEYS
@ 0.38 DEEP + 0.05 VEL. HD. = 0.43 < .86 OK

ALL 8.12 cfs TO BE PICKED UP BY S.D.

@ $8.12/2 = 4.06$/SIDE

PER NOMO $4.06/2.25 = 1.48$

USE 2 INLETS/SIDE

1 - SINGLE "A"
1 - SINGLE "C"

NOTE: INLETS PLACED TO DRAIN STREET DRY TO PREVENT FLOWS FROM ENTERING UNSER BLVD. ADDITIONAL CAPACITY IS AVAILABLE FOR SOME OFFSTREET AND UPSTREET FLOWS.

Ridgview Unit II - Pinon Verde 100 year section
Worksheet for Irregular Channel

Project Description	
Worksheet	Irregular Channel - 1
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Slope	0.015100	ft/ft
Discharge	29.21	cfs

Options	
Current Roughness Method	Improved Lotter's Method
Open Channel Weighting Method	Improved Lotter's Method
Closed Channel Weighting Methc	Horton's Method

Results		
Mannings Coefficient	0.017	
Water Surface Elevation	0.09	ft
Elevation Range	-0.37 to 0.60	
Flow Area	7.1	ft²
Wetted Perimeter	30.09	ft
Top Width	29.51	ft
Actual Depth	0.46	ft
Critical Elevation	0.16	ft
Critical Slope	0.006399	ft/ft
Velocity	4.11	ft/s
Velocity Head	0.26	ft
Specific Energy	0.35	ft
Froude Number	1.47	
Flow Type	Supercritical	

Roughness Segments

Start Station	End Station	Mannings Coefficient
-0+25	0+25	0.017

Natural Channel Points

Station (ft)	Elevation (ft)
-0+25	0.60
-0+15	0.40
-0+15	-0.37
-0+14	-0.37
-0+12	-0.24
0+00	0.00
0+12	-0.24
0+14	-0.37
0+15	0.37
0+15	0.40
0+25	0.60

LYLE C. LOSACK NEW MEXICO 14925 REGISTERED PROFESSIONAL ENGINEER

10/21/02

RECEIVED NOV 01 2002 HYDROLOGY SECTION

Project Engineer: Mr. Lyle Losack

Cross Section
Cross Section for Irregular Channel

Project Description	
Worksheet	Irregular Channel - 1
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data		
Mannings Coefficient	0.017	
Slope	0.015100	ft/ft
Water Surface Elevation	0.09	ft
Elevation Range	-0.37 to 0.60	
Discharge	29.21	cfs