City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

December 6, 2000

'Mark Holstad, PE
URS
6565 Americas Pkwy, NE, Ste 610
Albuquerque, NM 87110

Re: Alternative Fuels Station Conceptual Grading and Drainage Report, Engineer's Stamp dated 10-4-00, (M15/D37)

Dear Mr. Holstad,

Based on information provided in your submittal dated 10-4-00, the above referenced site is approved for a Bulk Land Variance to your Plat. Normally, Grading Permit is issued once Site Plan is signed off by DRB. I will release the Grading Permit prior to Site Plan signoff if you can provide approval from City of Albuquerque Planning Department and Environmental Health. Prior to Building Permit or Work Order, please provide verification of capacity for developed flows for the onsite, 24" pipe and provide the latest grading plan that more closely matches what you will be building.

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

Sincerely,

Bradley L. Bingham

Bradley L. Bingham, PE
Sr. Engineer, Hydrology

C: file

DRAINAGE INFORMATION SHEET

APPLICANT'S NAME: URS ALTERNATE FUELS STATION ZONE ATLAS/DRNG. FILE #: M-15/D037 &

PROJ # DRB #: 100818\\00460-00000 - 01336 EPC #: N/A WORK ORDER #: N/A

LEGAL DESCRIPTION: T10N, R3E, MUNICIPAL ADDITION No. 9, ALB. INT'L AIRPORT

CITY ADDRESS: UNIVERSITY BLVD. BETWEEN GEORGERD & SUNPORT BLVD.

ENGINEERING FIRM: URS CONTACT: MARK HOLSTAD | SHEILA JOHNSON

ADDRESS: 6565 AMERICAS PKWY. NE SUITE 610 ALB. NM 87110 PHONE: 855-5209 | 855-5214

OWNER: CITY - AVIATION DEPT. CONTACT: DENNIS PARKER

ADDRESS: 2200 SUNPORT BLVD. S.E PHONE: 842-4366

ARCHITECT: N/A CONTACT: -

ADDRESS: - PHONE: -

SURVEYOR: URS CONTACT: SANTIAGO ROMERO

ADDRESS: SEE ABOVE PHONE: 345-3995

CONTRACTOR: N/A CONTACT: -

ADDRESS: - PHONE: -

TYPE OF SUBMITTAL:
- ___ DRAINAGE REPORT
- ___ DRAINAGE PLAN
- X CONCEPTUAL GRADING & DRAINAGE PLAN
- ___ GRADING PLAN
- ___ EROSION CONTROL PLAN
- ___ ENGINEER'S CERTIFICATION
- ___ OTHER

PRE-DESIGN MEETING:
- X YES
- ___ NO
- X COPY PROVIDED

CHECK TYPE OF APPROVAL SOUGHT:
- ___ SKETCH PLAT APPROVAL
- ___ 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
- X GRADING PERMIT APPROVAL
- ___ PAVING PERMIT APPROVAL
- ___ S.A.D. DRAINAGE REPORT
- ___ DRAINAGE REQUIREMENTS
- ___ SUBDIVISION CERTIFICATION
- X OTHER BULK LAND PLAT (SPECIFY)

DATE SUBMITTED: 4 OCTOBER 2000

BY: MARK HOLSTAD

Revised 02/98

RECEIVED
OCT 04 2000
HYDROLOGY SECTION

CITY OF ALBUQUERQUE
PUBLIC WORKS DEPARTMENT
DEVELOPMENT SERVICE / HYDROLOGY SECTION

CONFERENCE RECAP

DRAINAGE FILE/ZONE ATLAS PAGE NO. M15 DATE: 8/25/00.
PLANNING DIVISION NO'S: EPC: ZONING:SU-1 DRB:
SUBJECT: Service Station / Grocery Store (NE corner of University and George Rd)
STREET ADDRESS (IF KNOWN):
SUBDIVISION NAME: Municipal Addittion Tract A4

APPROVAL REQUESTED: Site Plan for Subdivision / Bulk Land Plat

ATTENDANCE: Fred J. Aguirre, PE-City Engineer
Sheila K. Johnson, AET; Richard J. Tietgens, PE; Kent Whitman, PE

FINDINGS:

1. An approved conceptual grading and drainage plan is required for Site Plan for Subdivision and Bulk Land Plat sign-off by the City Engineer / AMAFCA. This plan must address the following:
   - Allowable discharge from the proposed development per the approved Airport Master Plan by Molzen & Corbin.
   - Off-site flows
2. Address the landfill condition per the *Interim Guidelines for Development within 1000 Feet of Landfills (revised 8-21-00)*
3. Recommend a Sketch Plat/Plan meeting with the DRB to discuss platting and infrastructure requirements.
4. Recommend a meeting with Loren Meinz to discuss on-site water quality issues.
5. The old University Blvd alignment must be vacated thru DRB.

THE UNDERSIGNED AGREES THAT THE ABOVE FINDINGS ARE SUMMARIZED ACCURATELY AND ARE SUBJECT TO CHANGE IF FURTHER INVESTIGATION REVEALS THAT THEY ARE NOT REASONABLE OR THAT THEY ARE BASED ON INACCURATE INFORMATION.

SIGNED: Fred J. Aguirre
TITLE : City Engineer

SIGNED: Sheila K Johnson
TITLE : Drainage Designer

RECEIVED
OCT 04 2000
HYDROLOGY SECTION

NOTE PLEASE PROVIDE A COPY OF THIS RECAP WITH YOUR DRAINAGE SUBMITTAL.

CONCEPTUAL
DRAINAGE REPORT
FOR
ALTERNATE FUELS STATION
SITE DESIGN

October 4, 2000

URS Job No. E300001482.04

Daniel L. Morehead, PE&PS
Associate Vice President

Rick Tietgens, P.E.
Project Manager

Mark S. Holstad, P.E.
Drainage Engineer

URS
6565 Americas Parkway NE, Suite 610
Albuquerque, New Mexico 87110
(505)884-2611

10/4/2000

Prepared for:

Aviation Department
City of Albuquerque

TABLE OF CONTENTS

1.0 INTRODUCTION/DESCRIPTION

This report presents the drainage analysis for a proposed Alternate Fuels Station on the east side of University Boulevard, between Sunport Boulevard and George Road. A Vicinity Map is shown on Figure 1. The site will have a convenience store, a fast food restaurant, car wash capable of servicing airport fleet vehicles as well as the general public, and several types of fuel service. In addition to gasoline, facilities for propane, compressed natural gas and E85 will be provided. The site plan is shown on Figure 5 in the map pocket at the end of the report.

The Alternate Fuels site falls within the area included under *Sunport Boulevard Final Drainage Report*, dated March 1996, by Molzen–Corbin & Associates. The project area is also included in the *Albuquerque International Airport Storm Drainage Master Plan, City of Albuquerque Aviation Department*, (DMP) dated May 1995, also by Molzen–Corbin & Associates. It lies within the large watershed called "Sunport Basin".

The Sunport Boulevard Drainage Report was generated with the construction of Sunport Boulevard and includes associated storm drain and drainage features. It analyzes the watershed in the detail required for construction, functioning as a master plan for entire "Sunport Basin". The Airport DMP is more conceptual. This fueling station site will need to comply with the Sunport Master Plan and also meet the City of Albuquerque Development Process Manual (DPM) criteria.

Two conditions are analyzed – Ultimate development of the entire area matching the Sunport master plan and, where necessary, an interim condition is checked with the offsite basins undeveloped.

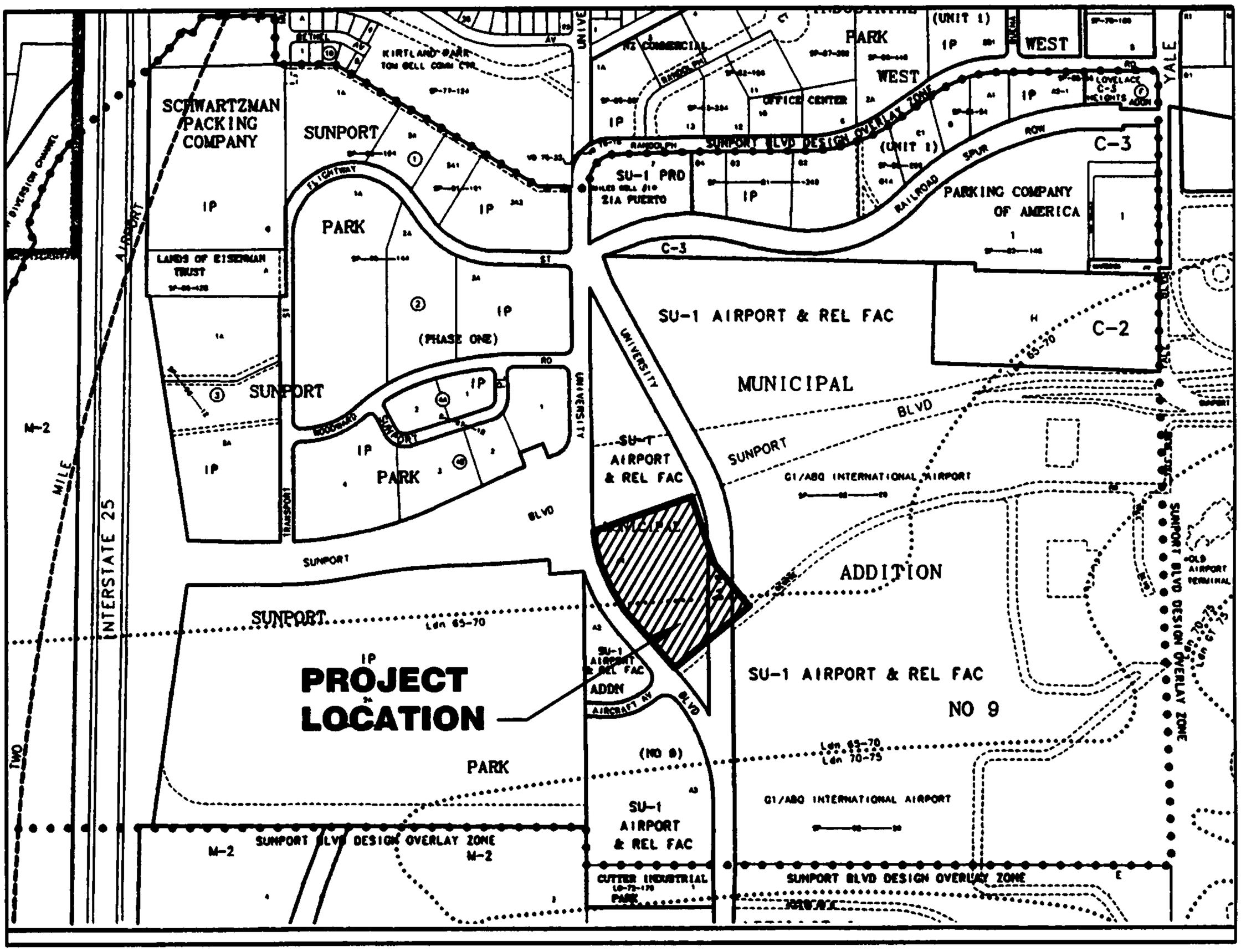
A conceptual drainage report and grading plan for the fully developed site is presented. However the only construction to be done now is the street work in University Boulevard, utility connections, storm drain lines, rough grading, driveways and sidewalks. Trash from the landfill will be removed within the limits of the project and a new liner will be placed at the edge of the project site connecting to the existing liner. Monitoring wells and vents will be relocated. Everything to prepare the site for development is to be built now. In the next phase, construction of the development itself will be done.

2.0 EXISTING CONDITIONS

The site is currently undeveloped and it sits on an existing landfill. Borings have shown a trash layer from 0 to 25 feet thick. An existing liner encloses the landfill. Monitoring wells and vents exist throughout the area.

The project does not fall within any FEMA flood zones.

The project site and contributing offsite areas to the east sit quite a bit higher than the adjacent roads. Existing Basins B22, E2 and E4 form this higher area. (See the Basin Map on Figure 2.) Side slopes graded at 3H:1V drop down to the roads. The high area seems comparatively flat, but actually slopes at about 5% dropping to the north. The high ground runoff drains generally east to west, turning north as it nears University to an inlet on the northwest corner of this project site, near University Boulevard and Sunport Boulevard. The side slope areas drain to the adjacent roadways and runoff is collected in the existing storm drains.



VICINITY MAP

GRAPHIC SCALE IN FEET

800 0 800 1600

N

FIGURE 1

A 42-inch storm drain is constructed at the downstream, west end of offsite Basin B22 and extends to George Road, then on to a detention basin. The Sunport master plan includes the developed runoff from Basin B22 in this storm drain, but no inlets currently exist to collect the B22 flow. Under existing conditions, the basin is not developed, and this water is included in the offsite flow to the existing inlet in the northwest corner of the project site. Runoff from Basin B22 was calculated using Land Treatment type A and included in the interim condition flow to the existing inlet. Land treatment definitions are shown in the Appendix.

A large detention pond has been constructed under the Sunport Boulevard project on the west side of University Boulevard at George Road. The pond detains the flow from the storm drain in George Road. The only flow from the project site entering the pond is incidental runoff draining to the road.

3.0 CRITERIA

The drainage parameters as stated above are as shown in the "Sunport Boulevard Final Drainage Report", dated March 1996, by Molzen–Corbin & Associates which acts as the Master Plan for this watershed. This report also adheres to City DPM criteria and states that all storm drain facilities are designed to carry the 100 year – 6 hour storm event. Detention facilities are designed to carry the 100 year – 24 hour storm event. Ultimate development is assumed except where necessary to check drainage features under the interim condition.

4.0 PROPOSED DRAINAGE

4.1 On-Site Flow

The fueling station will be built on the east side of University Boulevard as described in the introduction and as shown on Figures 4 and 5. The entire site will be curbed with six inch concrete curb or curb and gutter at flowlines.

Proposed development will need to be cut well into the existing ground – varying from near zero on the north side to approximately 24 feet on the south side. The extreme cut on the south and center portions of the site are needed to allow driveways to be constructed at reasonable slopes, and so the site grading can accommodate all the differing vehicles that will use it. A 3H:1V catch slope will be graded on the east side to match existing ground. A new liner will be placed along the 3H:1V slope at a minimum of two feet deep to contain the landfill. Vents and monitoring wells will be placed. All landfill related work will be addressed per *Interim Guidelines for Development within 1000 Feet of Landfills (revised 8-21-00)*. See Figure 3 for a typical liner location.

As required by the Sunport master plan, all on site flow will go to the existing inlet and storm drain in the northwest corner of the site. Master plan land treatments on the "high ground" basins (E4, E2 and B22) vary from 85% -90% impervious. Type C land treatment is shown in the master plan on the slope areas. This fits very closely with the proposed development. See Figure 2 for the Basin Map. Sunport master plan basins are shown with proposed basins superimposed. The sloped areas in the master plan will no longer be so steeply sloped and will be landscaped using land treatment B.

Due to the large cut on the south side, the developed site will be lower than George Road. Two driveways will be constructed on the south side and will drop into the site. Water blocks will be

incorporated into them so flow in George Road will remain there. Eighteen-inch culverts will be placed under the driveways to pass offsite flows through the project to the existing drop inlets, where they currently drain. On site paving will direct the runoff around the gas pump islands to the single D type inlet in the northwest corner. The Q100 from the proposed site draining to the existing inlet is 18.3 cfs plus 17 cfs offsite flow. The Q100 per the master plan is 33.3cfs. See Table 1 below for developed flows compared to Master Plan Flows.

IS THIS SIZED FOR EXISTING

A 24-inch storm drain line will be extended from the existing inlet in the northwest corner, paralleling the north side of the paved area and extending up the 3H:1V slope. A triangular swale will be constructed at the base of the 3H:1V catch slope. It will carry runoff from the slope face to the new storm drain line. The swale is sized for interim condition flow with the slope covered with gravel mulch. When or if Basin E2-Ra is developed, an alternate method of conveying the flow to the storm drain will be needed – possibly just enlarging the ditch somewhat.

4.2 Off-site flow

Offsite flow from the east will be intercepted at the top of the 3H:1V catch slope. See the Typical Ditch Section on Figure 3. The ditch slope will vary from 0.5% to approximately 2% and will be unlined. It will drain to a new inlet at the north – downstream end – of the ditch and connect to the new 24-inch storm drain.

Table 1
Flow Comparison – Master Plan and Proposed Development

Basin ID Master Plan	Q peak Master Plan (cfs)	Revised Basin ID this project	Q 10 this project (cfs)	Q 100 this project (cfs)	Comments
E-1	5.6	E1- R	2.99	5.49	
E-2	See below	E2-Ra	3.20	4.91	E2-Ra flow assuming ultimate development
E-2	21.2	E2-Rb	11.26	17.24	Remaining undeveloped area
E-4	12.1	E4-R	8.92	13.43	
E-8	2.8	E8-R	1.38	2.46	
E-9	4.9	E9-Ra	1.27	2.28	Basin E-9 was divided by proposed driveway
E-9	See above	E9-Rb	0.65	1.17	
B-30	2.0	B30-R	0.95	1.67	
B-34	0.9	B34-R	0.26	0.61	
E-2	N/A	E2-Rb	1.48	6.08	Interim condition – basin is undeveloped
E-2	N/A	E2-RA	1.81	3.38	Interim condition – basin has gravel mulch
B-22	N/A	B22.R	1.05	4.30	Interim condition – basin is undeveloped

5.0 CONCLUSION

The Aviation Department wishes to develop an alternate fueling station. This proposed development complies with the Master Drainage Plan for the area and meets City DPM criteria.

EB SUNPORT BLVD

RAMP E

D14

D11

E7

E11

E6

E8-R

E8

E3

E1-R

E1

B21

B22

B24

42" SD

24" SD

24" SD

24" SD

8" SD

ABANDONED

SEE FIGURE 3 FOR TYPICAL DITCH SECTION

E2

E2-Ra

E2-Rb

B30-R

SEE GRADING & DRAINAGE PLAN FOR PROPOSED CONTOURS WITHIN REVISED BASINS

18" D.I.P.

5250

5230

5220

5210

check capacity

EXISTING INLET

FUELING ISLAND

E9-Ra

E4-R

E5

E4

E9

PROPOSED CONVENIENCE STORE / RESTAURANT

FUELING ISLAND

E10

18" RCP

5160

5170

5160

UNIVERSITY BLVD.

E9-Rb

B33

B34

B30

B25

GEORGE ROAD

18" RCP

B34-R

18" RCP

EXISTING DETENTION POND

5190

5200

5210

5220

5230

5240

5250

5260

MASTER PLAN BASIN MAP IS FROM "SUNPORT BLVD FINAL DRAINAGE REPORT" MARCH 1996, MOLZEN-CORBIN AND ASSC.

LEGEND

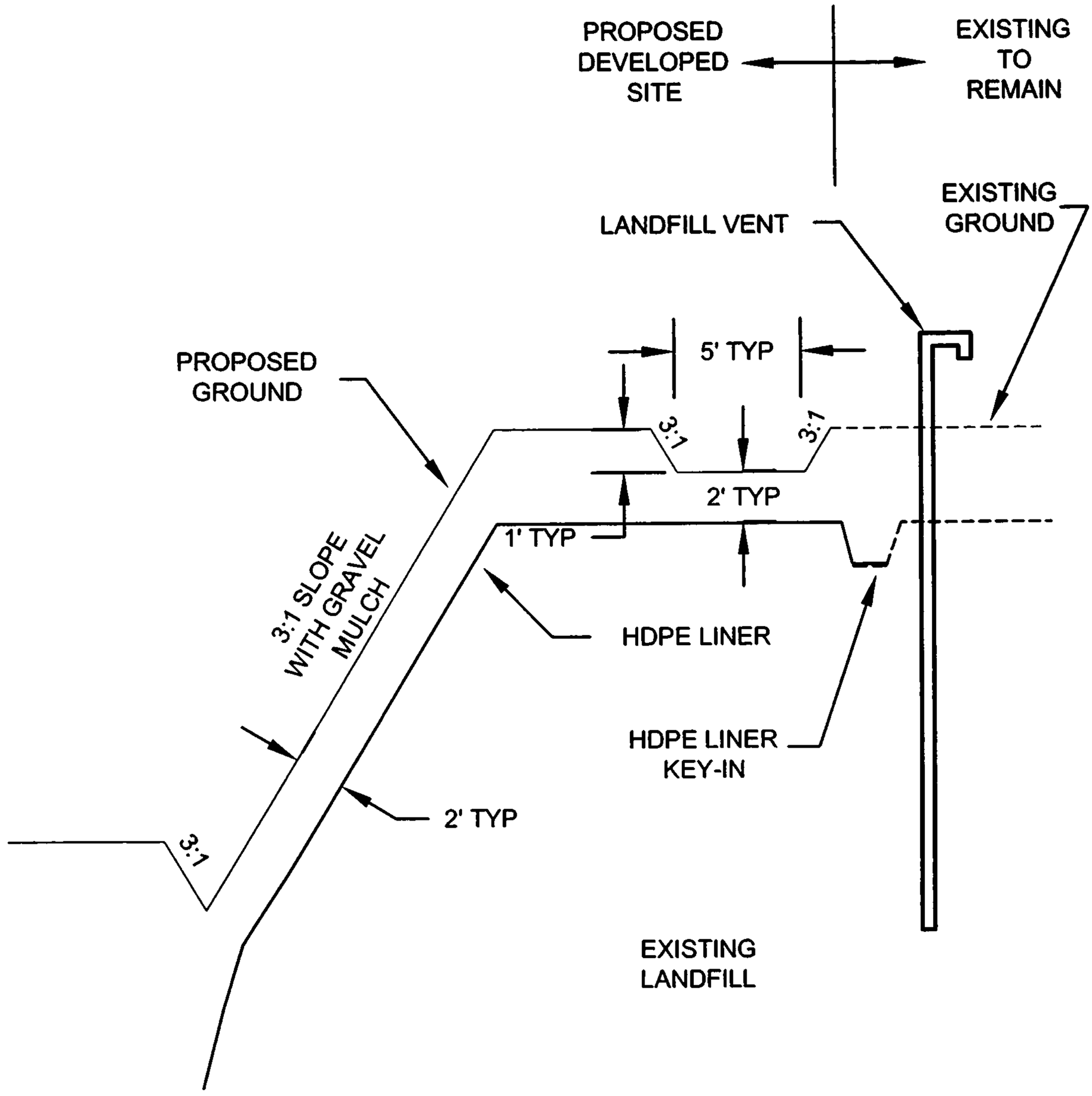
- MASTER PLAN BASIN BOUNDRY
- ADJUSTED BASIN BOUNDRY
- PRINCIPLE FLOW DIRECTION
- B30 — MASTER PLAN BASIN LABEL
- B30-R — REVISED BASIN LABEL

GRAPHIC SCALE IN FEET

100 0 100 200

DRAINAGE BASIN MAP
FIGURE 2

NOTE: SEE FIGURE 2 FOR LOCATION DITCH.



TYPICAL DITCH SECTION

FIGURE 3
NOT TO SCALE

APPENDIX

BASIN HYDROLOGY

INLET CAPACITY CALCULATIONS

DITCH / SWALE CAPACITIES

CULVERT PIPE SIZING

GEORGE ROAD FLOW DEPTH

URS

Job TBASIN HYDROLOGY Page ___ of ___

Description SUMMARY TABLE Sheet ___ of ___

Project No. E2000143204 Date 5-CFS-2006

Computed by CSR Date 27 Sept 2006

Checked by SKG Date

Reference

Q peak (master plan)

Revised basin	Q 100 (cfs)	Q 10 (cfs)	Master Plan basin	Q peak as per F.D.R	Comments
E1-R	5.49	2.99	E1	5.60	
E2-Ra	4.91 ✓	3.20	E2		Combine a & b 22.1 cfs
E2-Rb	17.24 ✓	11.26	E2	21.2	Basin E-2 split by proposed ditch
E4-R	13.43 ✓	8.92	E4	12.1	
E8-R	2.46	1.38	E8	2.8	
E9-Ra	2.32 2.28	1.10 1.27	E9	4.9 cfs	A & B split by Drive
E9-Rb	1.17	.55 0.65	E9	"	a & b total = 4.49
B30-R	1.67	0.95	B30	2.0	
B34-R	0.61	0.26	B34	0.9	
E2-Rb	6.08*	1.48*			* Represents interim Conditions - No upstream
B22-R	4.30*	1.05*			Developement
E2-Ra	3.38*	1.81*			

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Job AT-Fuel STATION — Project No. E30000148204 — Page ____ of ____

Description Areas — Computed by CSR — Date 5-25-2006 — Sheet 1 of 1

Checked by [signature] — Date 9/27/06 — Reference

A list of Revised basins and their Areas

Revised basin	F.D.R (m-c 3-96) Areas (ac)	Area (ft^2)	Area (ac)
✓ E1-R	1.77	76,154	1.7483
✓ E2-Ra	4.79 (E-2 TOTAL)	48,327	1.1094
✓ E2-Rb		169,800	3.8981
✓ E4-R	2.68	126,433	2.9025
✓ E8-R	0.84	32,465	0.7453
✓ E9-Ra	1.56 (E9 TOTAL)	38,913	0.8947
✓ E9-Rb		19,561	0.4491
✓ B30-R	0.59	21,501	0.4936
✓ B34-R	0.28	11,722	0.2691
	Σ 12.51 AC ✓	Σ 544936 ✓	Σ 12.5101 ✓

REVISE BASIN FLOW RATES USING SAME METHOD AS SUPPORT BLVD FINAL DRAINAGE REPORT MARCH 1996

- DPM - PART A procedure

URS

Job Alt. Fuel STA. Project No.

Description Basin Q's Computed by CSR Date 5-15-2001

Checked by SLG Date 9/27/00

Page ___ of ___

Sheet 1 of ___

Reference

Basin E1-R

Area = 76,154 ft² = 1.7483 Ac

Find Q using Master Plan & COA DPM

E1 Land Treatment:	type	%	Ac
A	0	—	
B	0	—	
C	100	1.7483	
D	0	—	
	100	1.7483	

Peak discharge table A-9- DPM

peak discharge (cfs/Ac) Zone 2 =	100 yr	10 yr
	3.14 cfs	1.71

$Q_{100} = 1.7483 (3.14 \frac{cfs}{Ac}) = 5.4897$ cfs → 5.49 cfs ⇐

$Q_{10} = 1.7483 (1.71) = 2.9896$ → 2.99 cfs ⇐

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Job ALT Fuel STA — Project No. — Page ____ of ____

Description Basin Q's — Computed by CEL — Sheet 2 of ____

Checked by SKG — Date 9/27/00 — Date 9-25-2000

Reference

Basin: E2-Ra

Area = 1.1054 AC

Land treatment	Type	%	AC
	A	0	0
	B	5%	0.0555
	C	10%	0.1109
	D	85%	0.9430
		100	1.1094 AC ←

Peak discharge	Treatment	100yr	10yr
	B	2.28	0.95
	C	3.14	1.71
	D	4.70	3.14

Find Q_{100} & Q_{10}

$Q_{100} = 0.0555(2.28) + 0.1109(3.14) + 0.9430(4.70) =$

$= 4.9069 \rightarrow$ 4.91 CFS ←

$Q_{10} = 0.0555(0.95) + 0.1109(1.71) + 0.9430(4.70)$

$= 3.2034 \rightarrow$ 3.20 cfs ←

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Job Hot Spell STA. Project No. Page ____ of ____

Description Basin Qs - Interim Period - Computed by CSR Date 5-25-2000

Checked by SLG Date 9/27/00

Reference Sheet 2A of ____

Basin E2-2a

INTERIM - PROJECT SITE DEVELOPED
THIS OFFSITE BASIN UNDEVELOPED
FOR SIZING DITCH ON EAST EDGE
OF PROJECT SITE

Area = 1.1094 AC

Land Treatment	Type	%	Ac
	A	0	0
	B	10	0.1109
	C	90	0.9985
	D	0	0
		Σ 100	Σ 1.1094

Peak Q's	Treatment	100yr	10yr
	B	2.28	0.95
	C	3.14	1.71

Q_{100} = 2.28 (.1109) + 3.14 (.9985) = 3.38 CFS

Q_{10} = 0.95 (0.1109) + 1.71 (0.9985) = 1.81 CFS

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Job ALT FUEL STATION | Project No. | Page ___ of ___

Description OFFSITE FLOW TO UPPER DITCH (EAST of SITE) | Computed by SJ | Sheet 3 of ___

Checked by CSR | Date 23 Sept 2002 | Date 9-27-2002

Reference

BASIN E2-R6 R = REVISED AREA

AREA = 169,800 SF = 3.8981 AC ✓
= 0.0061 Sq.mi ✓

FIND Q_{100} - per Master Plan use COA DPM

		%	ACRES
E_2 Land Treatments	A=0	0	
	B=5	0.1949	✓
	C=10	0.3898	✓
	D=85	3.3134	✓

PEAK DISCHARGE - TABLE A-9 DPM

		100 YR	10 YR
ZONE 2	PEAK DISCH.	B 2.28	0.95
		C 3.14	1.71
		D 4.70	3.14

Q_{100} = .1949(2.28) + 0.3898(3.14) + 3.3134(4.70)

= 17.24 cfs ✓

Q_{10} = .1949 (.95) + .3898 (1.71) + 3.3134 (3.14)

= 11.26 cfs ✓

URS

Job Jet Fuel STA — Project No. — Page ___ of ___

Description Basin Q's — Computed by CSR — Date 5-25-2000

Checked by SKQ — Date 9/27/00

Reference

Basin G4-2

Area = 2.9025 AC

Land Treatment	Type	%	AC
	B	3	0.0871
	D	97	2.8154

Peak Q's

Treatment	100yr	10yr
B	2.28	0.95
D	4.70	3.14

$Q_{100} = 2.28(0.0871) + 4.10(2.8154) = 13.4310$
$= 13.43$

$Q_{10} = 0.95(0.0871) + 3.14(2.8154) = 8.9231$
$= 8.92$

URS

Job ALT. Fuel STA. Project No. _____ Page ____ of ____

Description Basin Qs Computed by CSR Date 9-25-2000

Checked by SKD Date 9/27/00 Sheet 5 of ____

Reference

Basin EB-R

Area = 0.7453 Ac

land Treatment	Type	%	Ac
	A	0	0
	B	0	0
	C	90	.6708
	D	10	0.0745
		100	0.7453 Ac ✓

· Peak discharge

Treatment	100yr	10yr
C	3.14	1.71
D	4.70	3.14

$Q_{100} = 0.6708\ (3.14) + 0.0745(4.70) = 2.4565$

$Q_{100} = 2.46$ cfs

$Q_{10} = 0.6708\ (1.71) + 0.0745(3.14) = 1.3810$

$Q_{10} = 1.38$ cfs

URS

Job #L' - Fuel sta — Project No. — Page ___ of ___

Description Basin Qs — Computed by CSR — Date 8-25-2000

Checked by SKJ — Date 9/27/00

Reference — Sheet 6 of ___

Basin E9-Ra

Area = 0.8947 Ac

Land Treatment	Type	%	Ac
	B	87	0.7784
	D	13	0.1163

Peak discharge	Treatment	100yr	10yr
	B	2.28	0.95
	D	4.70	3.14

Q_{100} $0.7784(2.28) + 0.1163(4.70) = 2.3213$

$= 2.32$ cfs ←

$Q_{10} = 0.7784(0.95) + 0.1163(3.14) = 1.1046$

$= 1.10$ cfs ←

URS

Job AUT Fuel STA — Project No. — Page ___ of ___

Description Basin Q's — Computed by CSR — Date 9-25-2000 — Sheet 1 of ___

Checked by SKO — Date 27 Sept 2000 — Reference

Basin EQ-Rb

Area = 0.4491 AC

Land treatment	Type	%	Ac
	B	87	0.3907
	D	13	0.0584

Peak discharge —

Treatment	100yr	10yr
B	2.28	0.95
D	4.70	3.14

$Q_{100} = 0.3907\ (2.28) + 0.0584\ (4.70)$

$Q = 1.1652 \rightarrow 1.17 cfs$

$Q_{10} = 0.3907\ (0.95) + 0.0584\ (3.14) = 0.6531$

$= 0.5545 \rightarrow \underline{0.55 cfs}$

URS

Job #5 Fuel STA — Project No. — Page ___ of ___

Description Basin Q's — Computed by CSK — Date 9-25-2000

Checked by SKD — Date 9/27/00

Reference

Basin B30-B

Area = 0.4936

Land Treatment	Type	%	AC
C		85	0.4196
D		15	0.0740
		100	0.4936

Peak Q

Treatment	100 yr	10 yr
C	3.14	1.71
D	4.70	3.14

$Q_{100} = 0.4196(3.14) + 0.0740(4.70) = 1.6653$

$Q = 1.67$ CFS ←

$Q_{10} = 0.4196(1.71) + 0.0740(3.14) = 0.9499$

$Q = 0.95$ CFS ←

URS

Job Air Fuel STA — Project No. — Page ___ of ___

Description Basin Qs — Computed by CSR — Date 6-25-2000

Checked by SKJ — Date 27 Sept 2000

Reference

Basin B34-TC

Area = 0.2691

Land Treatment	Type	%	Ac
	B	100	0.2691

Peak Q	Treatment	100yr	10yr
	C	2.28	0.95

Q_{100} = 0.2691 (2.28) = 0.6135 → 0.61 cfs ✓

Q_{10} = 0.2691 (0.95) = 0.2556 → 0.26 cfs ✓

URS

Job HCT Fuel facility — Project No. — Page ___ of ___

Description Basin Q's — Computed by CSR — Date 9-25-2000

Interim Period - no development — Checked by SLC — Date 9/27/00

Reference — Sheet 10 of ___

Basin 62-Rb

Area = 3.8981 Ac.

Land treatment	type	%	Ac
	A	100	3.8981

Peak Q_5 -

Treatment	100 yr	10 yr
A	1.56	0.38

Q_{100} = 1.56 * 3.8981 = 6.0810 cfs → 6.08cfs ✓

Q_{10} = 0.38 X 3.8981 = 1.4813 cfs → 1.48cfs ✓

URS

Job HCI Fuel Station — Project No. — Page ___ of ___

Description Basin Q's — Computed by CSR — Sheet 11 of ___

Interim Period - Undeveloped — Checked by SKJ — Date 21 Sept 2005

Reference

Date 9-25-2006

Basin B22-R

Area = 120125 Ft^2 = 2.7577 AC

Land treatment	type	%	AC
A	100	2.7577	
B	0	0	
C	0	0	
D	0	0	
	100	2.7577	

Peak Q	type A	100 yr	10 yr
		1.56	0.38

Q_{100} = 1.56 * 2.7577 = 4.3020 cfs

= 4.30 cfs ←

✓

Q_{10} = 0.38 * 2.7577 = 1.0479

Q = 1.05 cfs ←

✓

TABLE A-4. LAND TREATMENTS	
Treatment	**Land Condition**
A	Soil uncompacted by human activity with 0 to 10 percent slopes. Native grasses, weeds and shrubs in typical densities with minimal disturbance to grading, groundcover and infiltration capacity.
B	Irrigated lawns, parks and golf courses with 0 to 10 percent slopes. Native grasses, weeds and shrubs, and soil uncompacted by human activity with slopes greater than 10 percent and less than 20 percent.
C	Soil compacted by human activity. Minimal vegetation. Unpaved parking, roads, trails. Most vacant lots. Gravel or rock on plastic (desert landscaping). Irrigated lawns and parks with slopes greater than 10 percent. Native grasses, weeds and shrubs, and soil uncompacted by human activity with slopes at 20 percent or greater. Native grass, weed and shrub areas with clay or clay loam soils and other soils of very low permeability as classified by SCS Hydrologic Soil Group D.
D	Impervious areas, pavement and roofs.
Most watersheds contain a mix of land treatments. To determine proportional treatments, measure respective subareas. In lieu of specific measurement for treatment D, the areal percentages in TABLE A-5 may be employed.	

INLET CAPACITY CALCS.

URS

Job MT Fuel STA

Description Exist. Grate Capacity for Developed Site.

Project No.

Computed by C. A.

Checked by SKJ

Page ___ of ___

Sheet 1 of 13

Date 9-25-2009

Date 27 Sept 2009

Reference

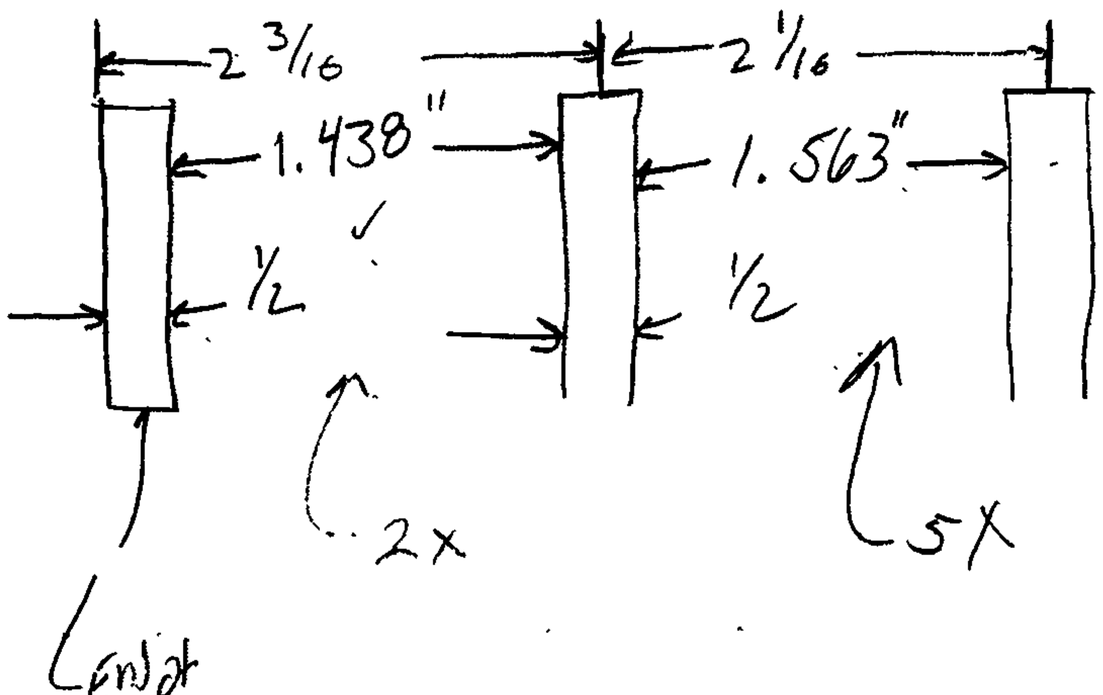
- Given -

- an existing DropInlet Drains the site on which the fuel facility is to sit.

- As Built Plans indicate a single inlet : Type D - Structure. as per Con std dwg 2206 Inlet as per 2220

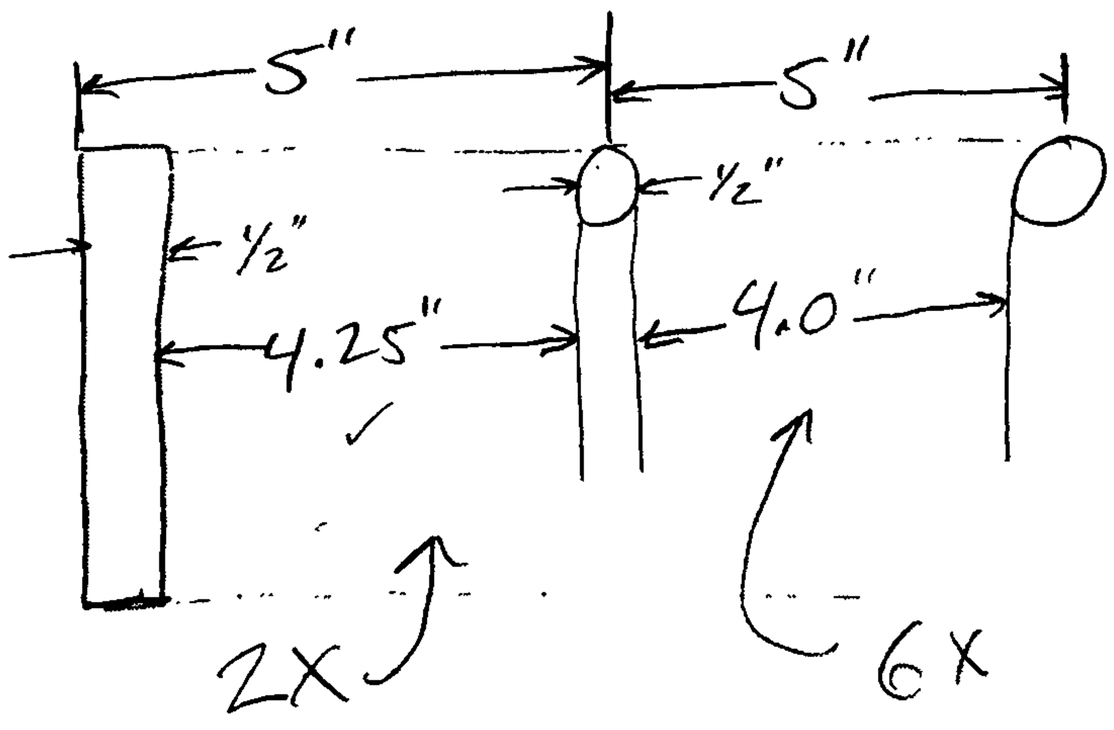
- Find: the capacity of this grate.

for Single grate -



from sect B-B see std dwg 2220 attached

Length of grate



from sect A-A see std dwg 2220 attached

URS

Job ACT fuel STA | Project No. | Page ___ of ___
Description ENSI Grate Capacity for developed site | Computed by CSM | Sheet 2 of 13
Checked by SKG | Date 27 Sept 2006
Reference

Determine open Area

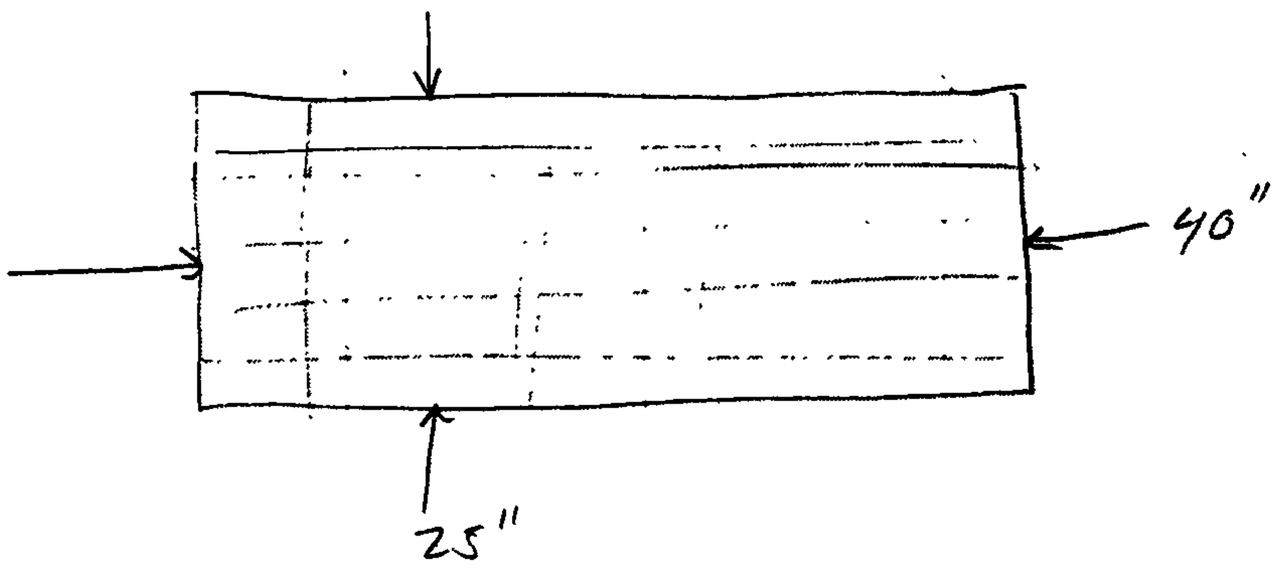
$$A = 4(4.25 * 1.438)^{in^2} + 12(4.0 * 1.438)^{in^2} + 20(4.25 * 1.563) + 60(4.0 * 1.563) =$$

$A = 601.445\ in^2 = 4.18\ FT^2$ ←

take out 3" lip along Both 25" Long sides – see std dwg 2206

$4.18\ FT^2 - ((2(3 \times 25))/144) = 3.14\ FT^2$ ←

Determine Weir Perimeter. (See Attached std dwg 2206)



$$W_p = 2(40" - [(7 \times 0.5") - 2(0.5")]) + 2(25 - (11 \times 0.5") - (2(0.5)]) =$$

(7' = 37")

$W_p = 108" = 9'$ ←

Plot capacity vs head for Both orifice & weir operation.

3/13

Plot d vs Q

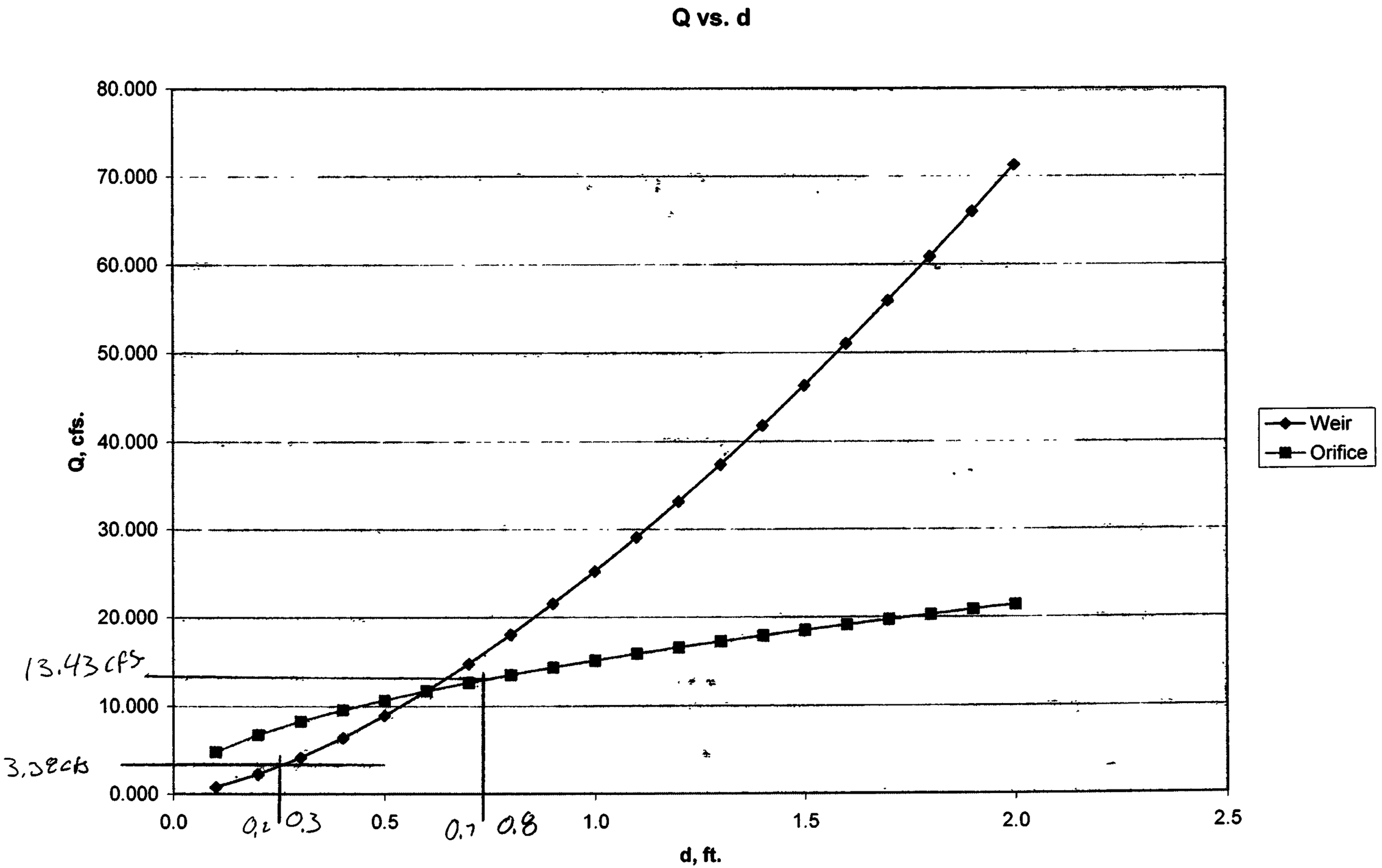
Wier Perimeter=	9	ft
Ag 1 grate=	3.14	sq-ft
Cw=	2.8	
Co=	0.6	

	Q, cfs	
d	Weir	Orifice
0.1	0.797	4.781
0.2	2.254	6.761
0.3	4.141	8.281
0.4	6.375	9.562
0.5	8.910	10.691
0.6	11.712	11.711
0.7	14.759	12.649
0.8	18.032	13.523
0.9	21.516	14.343
1.0	25.200	15.119
1.1	29.073	15.857
1.2	33.126	16.562
1.3	37.352	17.238
1.4	41.744	17.889
1.5	46.295	18.517
1.6	51.001	19.124
1.7	55.857	19.713
1.8	60.857	20.284
1.9	65.998	20.840
2.0	71.276	21.382
2.1	76.688	21.910
2.2	82.231	22.425
2.3	87.901	22.929
2.4	93.695	23.422
2.5	99.612	23.905
2.6	105.648	24.379
2.7	111.801	24.843
2.8	118.069	25.299
2.9	124.451	25.747
3.0	130.943	26.187
3.1	137.544	26.620
3.2	144.253	27.046
3.3	151.068	27.465
3.4	157.986	27.878
3.5	165.007	28.285
3.6	172.129	28.686
3.7	179.351	29.082
3.8	186.671	29.472
3.9	194.087	29.858
4.0	201.600	30.238

E2-R, Q_{100} (interim) = 3.38 CFS

E4-R, Q_{100} = 13.43 CFS

Q = 17.24 CFS


Q vs. d
80.000
70.000
60.000
50.000
40.000
30.000
20.000
13.43 cfs
10.000
3.38cfs
0.000
Q, cfs.
0.0
0.2
0.3
0.5
0.7
0.8
1.0
1.5
2.0
2.5
d, ft.
Weir
Orifice

4/13

5/13

Plot d vs Q, 1 inlet, 10% clogged

Wier Perimeter=	9	ft
Ag 1 grate=	2.83	sq-ft
Cw=	2.8	
Co=	0.6	

	Q, cfs	
d	Weir	Orifice
0.1	0.797	4.309
0.2	2.254	6.094
0.3	4.141	7.463
0.4	6.375	8.618
0.5	8.910	9.635
0.6	11.712	10.555
0.7	14.759	11.401
0.8	18.032	12.188
0.9	21.516	12.927
1.0	25.200	13.626
1.1	29.073	14.291
1.2	33.126	14.927
1.3	37.352	15.536
1.4	41.744	16.123
1.5	46.295	16.689
1.6	51.001	17.236
1.7	55.857	17.767
1.8	60.857	18.282
1.9	65.998	18.783
2.0	71.276	19.271
2.1	76.688	19.747
2.2	82.231	20.211
2.3	87.901	20.665
2.4	93.695	21.110
2.5	99.612	21.545
2.6	105.648	21.972
2.7	111.801	22.390
2.8	118.069	22.801
2.9	124.451	23.205
3.0	130.943	23.602
3.1	137.544	23.992
3.2	144.253	24.376
3.3	151.068	24.754
3.4	157.986	25.126
3.5	165.007	25.493
3.6	172.129	25.854
3.7	179.351	26.211
3.8	186.671	26.563
3.9	194.087	26.910
4.0	201.600	27.253

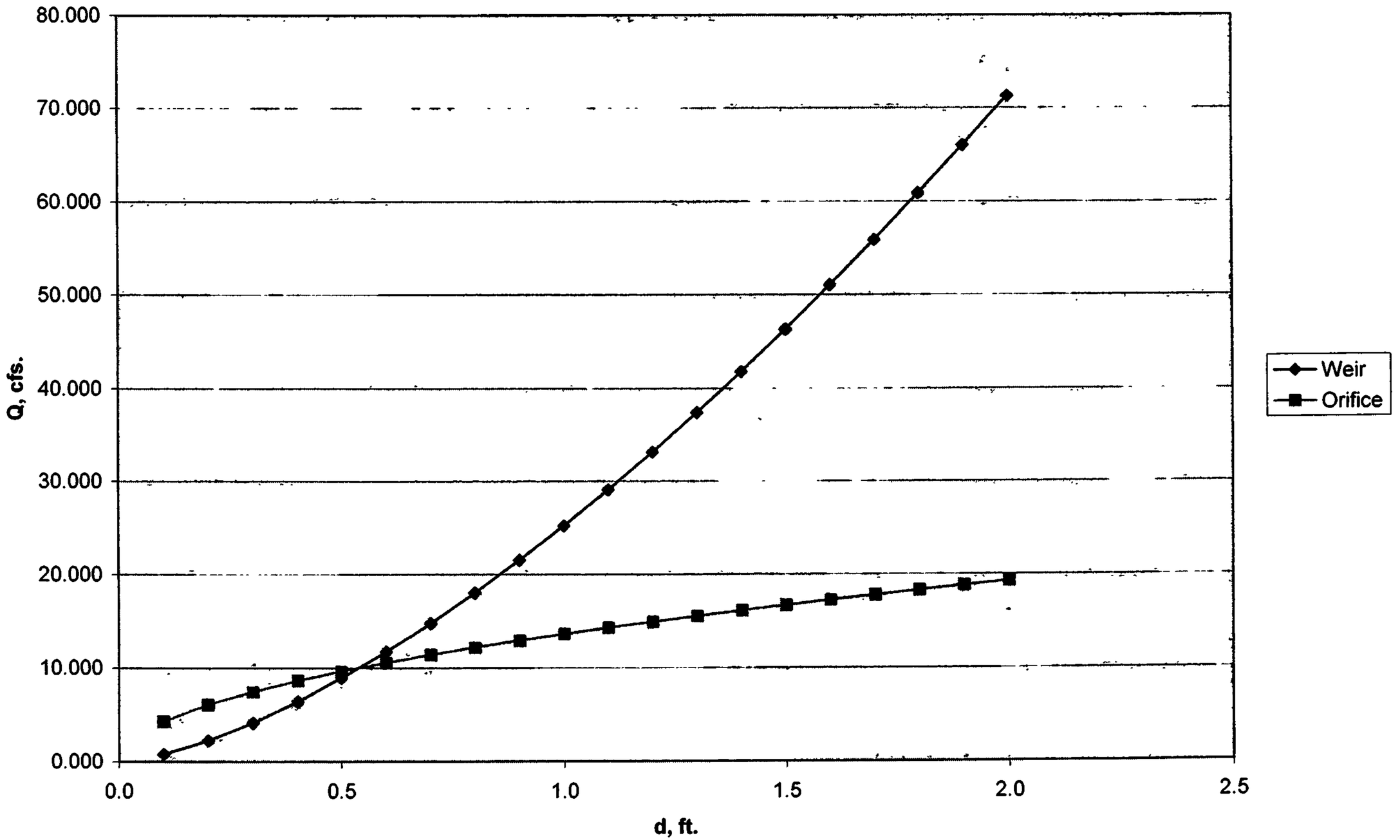
Q=3.38cfs

Q=13.43cfs

0.9Ld40

Q vs. d

1 grate 10 % closed.



6/13

7/13

Plot d vs Q, 1 inlet, 30% clogged

Wier Perimeter=	9	ft
Ag 1 grate=	2.2	sq-ft
Cw=	2.8	
Co=	0.6	

	Q, cfs	
d	Weir	Orifice
0.1	0.797	3.350
0.2	2.254	4.737
0.3	4.141	5.802
0.4	6.375	6.700
0.5	8.910	7.490
0.6	11.712	8.205
0.7	14.759	8.863
0.8	18.032	9.475
0.9	21.516	10.049
1.0	25.200	10.593
1.1	29.073	11.110
1.2	33.126	11.604
1.3	37.352	12.078
1.4	41.744	12.534
1.5	46.295	12.974
1.6	51.001	13.399
1.7	55.857	13.812
1.8	60.857	14.212
1.9	65.998	14.601
2.0	71.276	14.981
2.1	76.688	15.351
2.2	82.231	15.712
2.3	87.901	16.065
2.4	93.695	16.411
2.5	99.612	16.749
2.6	105.648	17.081
2.7	111.801	17.406
2.8	118.069	17.725
2.9	124.451	18.039
3.0	130.943	18.348
3.1	137.544	18.651
3.2	144.253	18.949
3.3	151.068	19.243
3.4	157.986	19.532
3.5	165.007	19.818
3.6	172.129	20.099
3.7	179.351	20.376
3.8	186.671	20.649
3.9	194.087	20.919
4.0	201.600	21.186

Q = 3.38 cfs
0.2 < d < 0.3

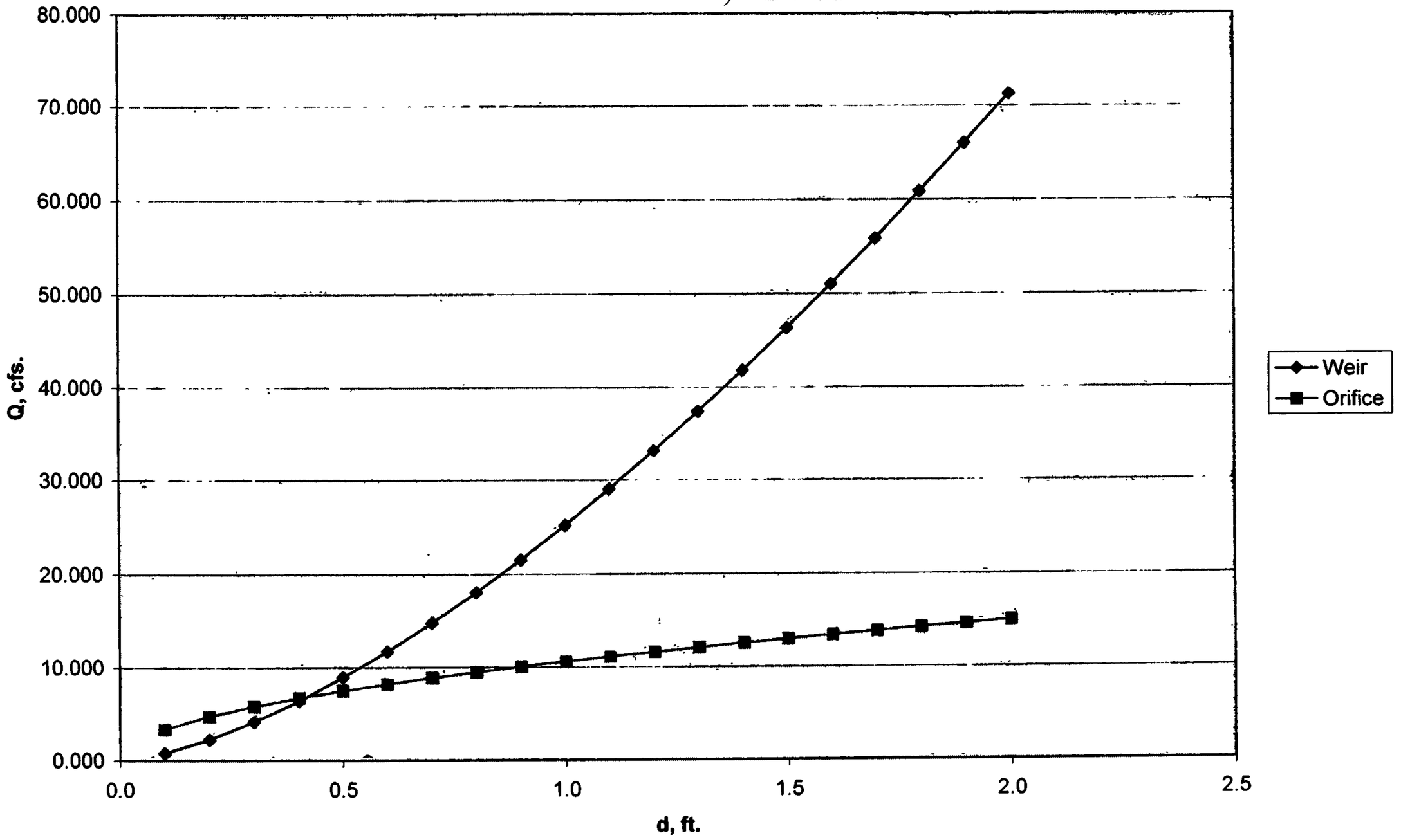
Q = 10.36 cfs
0.5 < d < 0.6

Q = 13.43
1.6 < d < 1.7

Q = 17.24

Q vs. d

1 Inlet, 30%



URS

Job PLT Fuels Station - Project No. _____ Page ___ of ___

Description Exist. grate capacity Computed by CSR Sheet 9 of 13

For developed site Checked by SKQ Date 27 Sept 2010

Reference

- The existing grate must handle the Q100 runoff from Basin E4-R, the site Location.

$Q_{100} = 13.43$ cfs ←

From weir-orifice wksh, attached $0.7' < d < 0.8'$

In addition, if a similar inlet ad grate were used at the downstream end of the proposed triangular swale at the base of the 3:1 slope on the east end of the site it would have to handle Q_{100} (Interim Period) = 3.38 CFS ←

From weir-orifice wksht

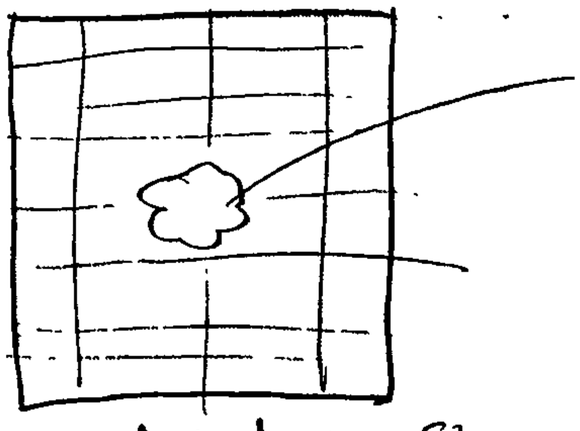
$0.2' < d < 0.3'$

Now assume that the grate is clogged w/ debris resulting in a reduced Area for water to enter the grate.

- Assume 10% Clogged for developed conditions

From weir-orifice Worksheet, $Q = 13.43$ cfs

$0.9 < d < 1.0$ FT ←



* assume that most debris is floating type, leaves grass twigs ect and settles at center of of grate during early Runoff while grate is in weir operation.

URS Greiner Woodward Clyde

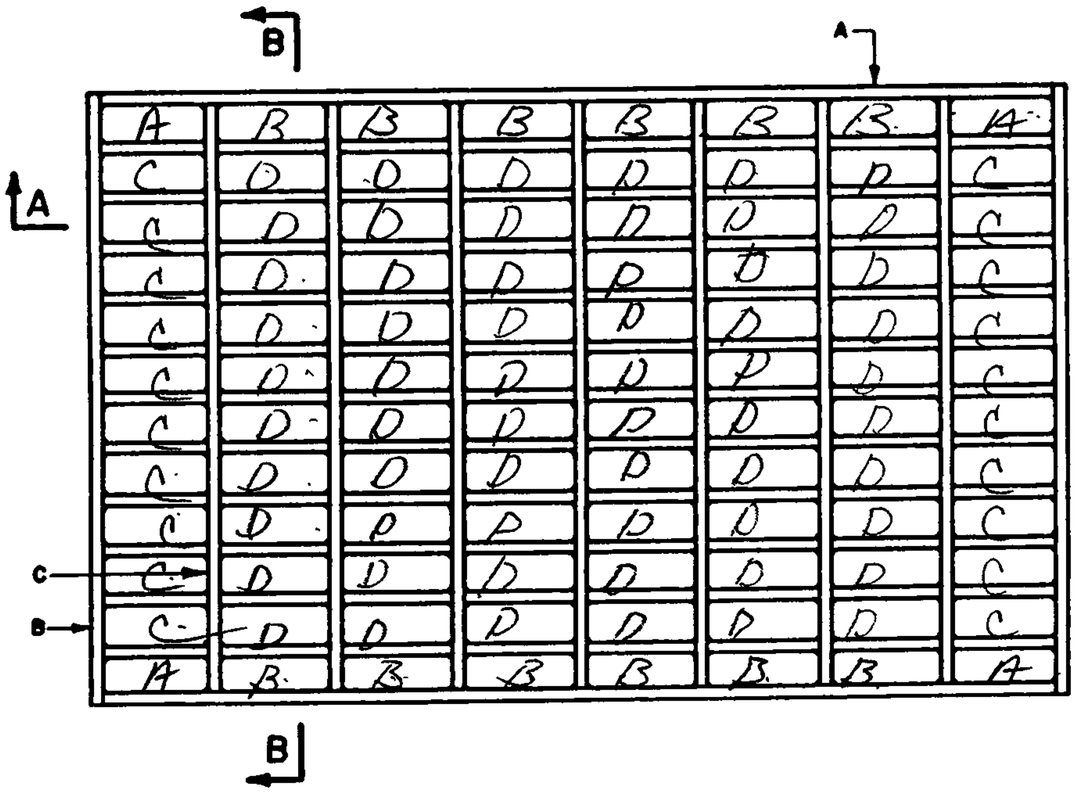
Job: Act - Fuels sta Project No.: Page ___ of ___
Description: Existing 1 grate type D - Summary Computed by: CSA Sheet 10 of 13 Date: 9-25-200
Checked by: Date:

Reference

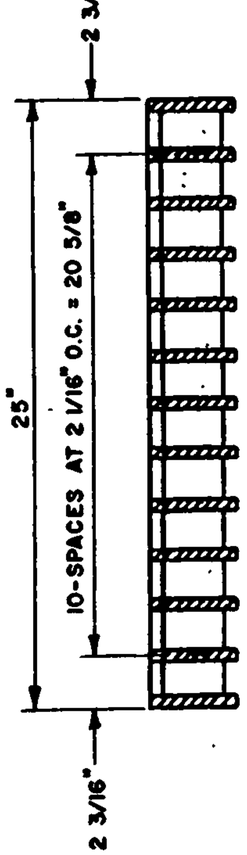
Basin to Contribut	Q	No of grates	% Clogged	depth, d: Orifice or Weir	Comments
E4-R	13.43cfs	1	0	0.7 < d < 0.8 orifice	— full developed Cond
E2-Ra	3.38cfs	1	0	0.2 < d < 0.3 weir	— interum conditions
E4-R	13.43cfs	1	10	0.9 < d < 1.0 orifice	— full developed Cond.
E2-Ra	3.38cfs	1	10	0.2 < d < 0.3 weir	— interum cond.
E4-R	13.43cfs	1	30	1.6 < d < 1.7	— full developed Cond
E2-Ra	3.38cfs	1	30	0.2 < d < 0.3	interum.

Conclusion - This single inlet grate should continue to work in this application up to about 10% clogging occurs.

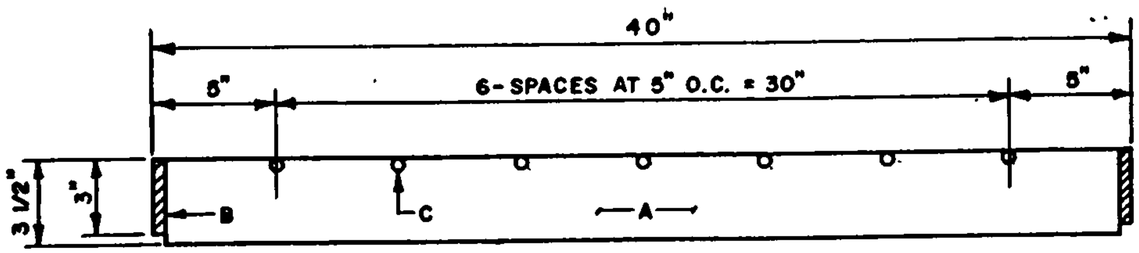
A = 4.25" X 1.438"
B = 4.00" X 1.438"
C = 4.25" X 1.031"
D = 4.00" X 1.031"



PLAN



SECTION B-B



SECTION A-A

GENERAL NOTES:

1. ALL BARS SHALL BE STRUCTURAL GRADE STEEL, GRADE A36.
2. THE GRATE SHALL BE WELDED WITH 1/8" FILLET WELD AROUND BOTH SIDES OF CROSS BARS, 1/4". FILLET WELD BOTH SIDES OF BEARING BARS TO END BARS.
3. AFTER CLEANING SURFACE OF SCALE, RUST, OILS, ETC., PAINT GRATE WITH ONE SHOP COAT RED OXIDE, TWO FINISH COATS ALUMINUM PAINT (AASHTO M 69).
4. TOP OF CROSS BARS SHALL BE FLUSH WITH TOP OF GRATE.
5. GRIND WELDS FLUSH WITH BEARING BARS.
6. WHEN INSTALLED IN FRAME, PUSH TIGHT TO ONE SIDE, OTHER SIDE SHALL HAVE 1/2" MAX. OPENING. SPACERS WELDED TO FRAME MAY BE USED IF REQUIRED TO KEEP 1/2" SPACE OR LESS.

CONSTRUCTION NOTES:

A. BEARING BARS, (13) 1/2" X 3 1/2" X 39".

B. END BARS, (2) 1/2" X 3" X 25".

C. CROSS BARS, (7) 1/2" DIA. X 24.

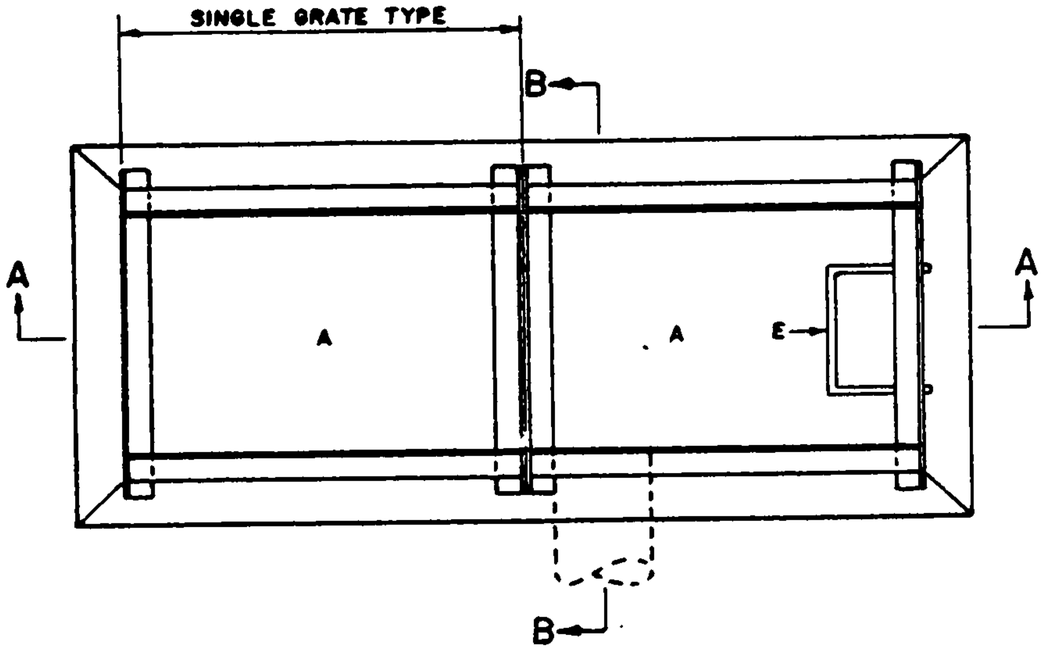
CITY OF ALBUQUERQUE

REVISIONS

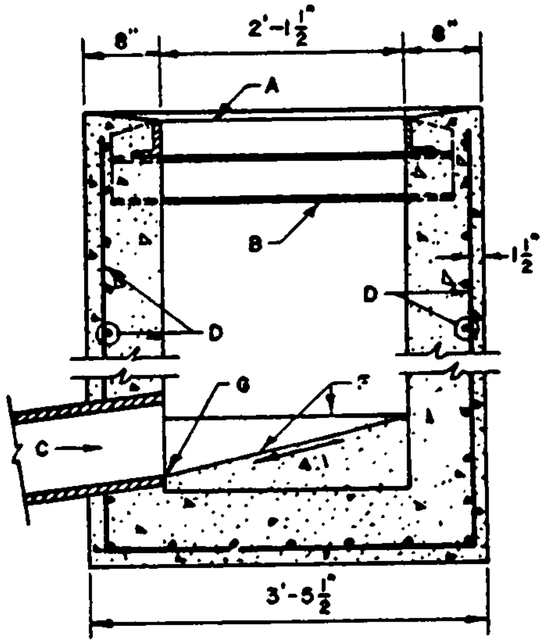
DRAINAGE
STORM INLET
ALBUQUERQUE GRATE

DWG. 2220 AUG. 1986

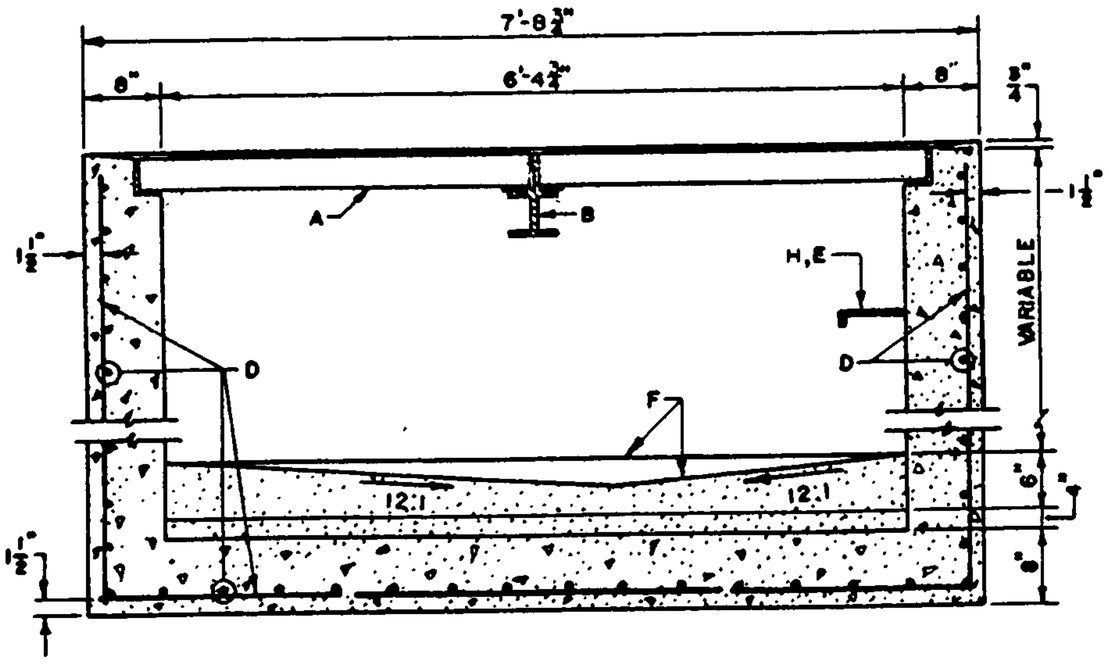
11/15



PLAN



SECTION B-B



SECTION A-A

GENERAL NOTES:

1. FOR SINGLE GRATE TYPE STORM INLET, DELETE CENTER SUPPORT AND MOVE ONE END WALL TO FORM NEW SINGLE GRATE INLET.
2. STORM INLET GUTTER TRANSITION WILL BE SHOWN ON THE CONSTRUCTION PLANS.
3. OUTLET PIPE SIZE, PER DESIGN REQUIREMENT.
4. FOR FRAME & GRATING, SEE DWG 2216, 2220 & 2221.
5. FOR CENTER SUPPORT ASSEMBLY, SEE DWG 2215.

CONSTRUCTION NOTES:

A. FRAME & GRATE

B. CENTER SUPPORT ASSEMBLY.

C. CUT ONE HORIZONTAL AND ONE VERTICAL BAR MAX. AT PIPE OPENING.

D. NO. 4 BARS A 6" O.C. EACH WAY.

E. USE STANDARD STEPS, SEE DWG 2229.

F. CONC. FILL, SEE NOTE C DWG 2201.

G. INVERT PER DESIGN.

H. INSTALL STEPS ON DOWNSTREAM FACE

REVISIONS
12-21-92

CITY OF ALBUQUERQUE

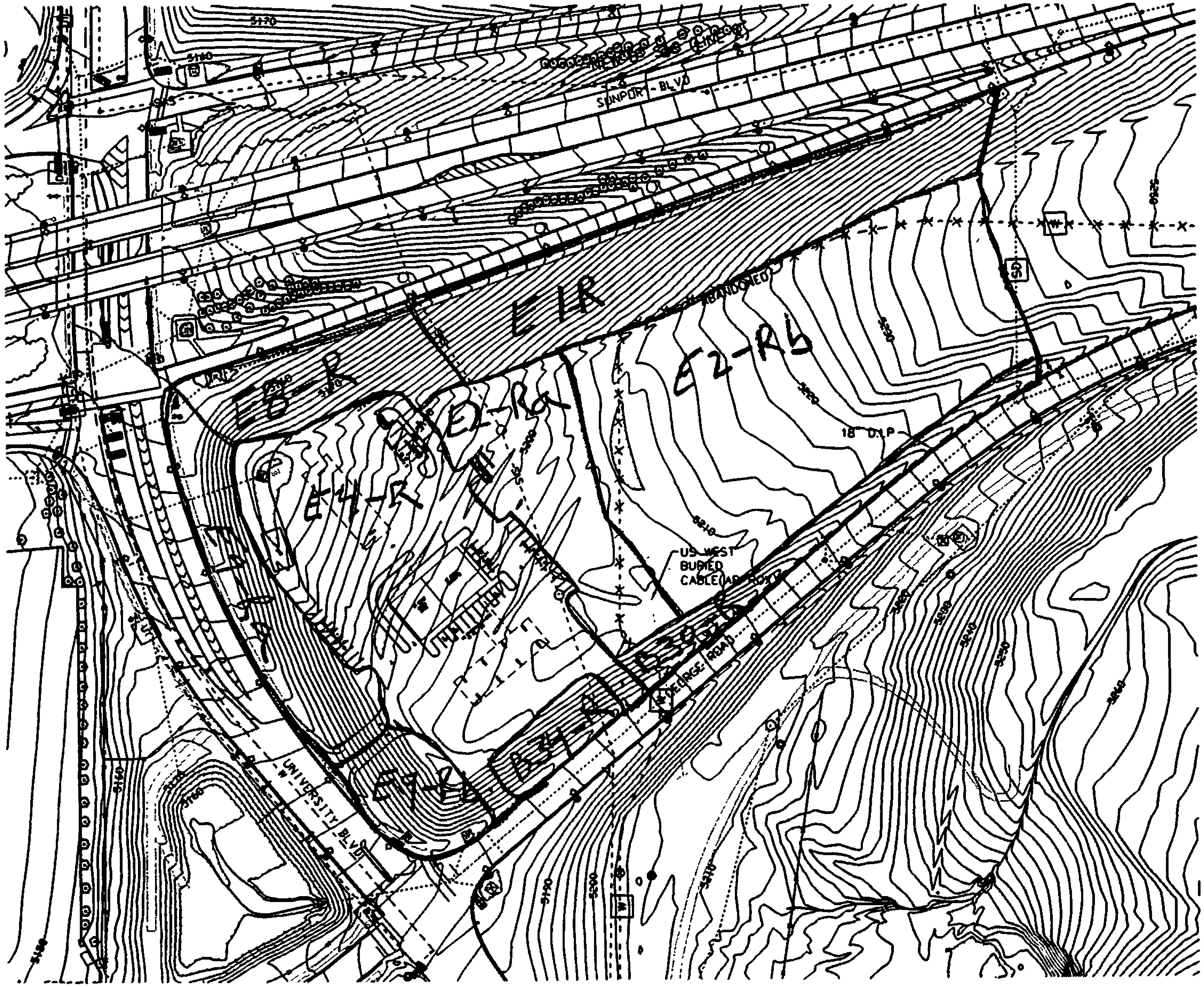
DRAINAGE

STORM INLET DOUBLE "D"

DWG. 2206

AUG 1986

N



1:200
Revised Basins

URS Greiner Woodward Clyde

Job Ft Irwin SFA — Project No. — Page ___ of ___

Description Inlet Capacity - 2 Grates — Computed by CSR — Sheet 1 of 12

Type D - 0, 10 & 30% Clogged — Checked by SKJ — Date 10-3-2000

Date 4 oct 2000

Reference

Now Consider 2 grates for the Downstream (North) end of the trapazadal Ditch atop the 3:1 slope on the east side of the proposed fueling facility.

Under ultimate development the expected Flow, Q, from basin E2-Rb will be 17.24 cfs. During the Interim condition, the period after the fuels facility and its Related work is complete, but before any additional upstream development occurs, the expected flow is 6.08 cfs. from E2-Rb and, 4.30 cfs from B22-R, an upstream Basin which currently Drains thru E2-Rb.

Given: - the Type "D" inlet and grate as per Con std dwgs 2206 & 2220,

- the estimated Q's from Basin E2-Rb in = 17.3 cfs
  Both Interim and Developed states.

- the estimated Q from Basin B22-R in an interim - state = 10.4 cfs

Find: Determine the capacity of a Type D inlet with Double grates

assume: - combined flows hit the inlet at same time, small basins
- 10% Clogging factor - Developed,
- 30% Clogging factor during interim period

URS

Page ____ of ____

Job ALT final STA — Project No. ____ — Sheet 2 of 12

Description Inlet Capacity - 2 grate type D, 0, 10 & 30% Clogged — Computed by CSR — Date 9-25-2008

Checked by SKJ — Date 27 Sept 2008

Reference

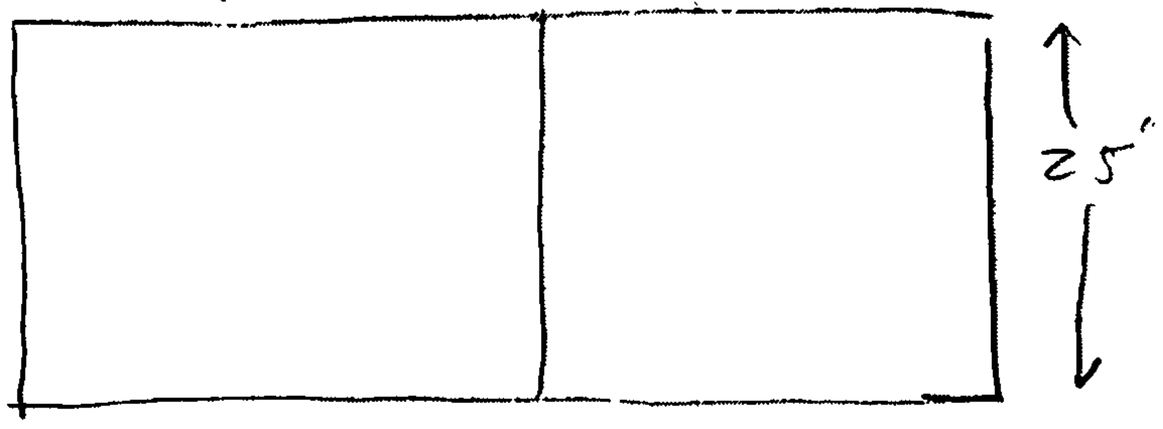
Clogged

- Single inlet capacity @ 0%, 10% & 30% Clogged calculated Previously, see existing grate capacity for developed site.

Find A & W_p for 2 grate inlet

$A_2 = 2 * A = 2.979 * 2 = 5.958$ cfs

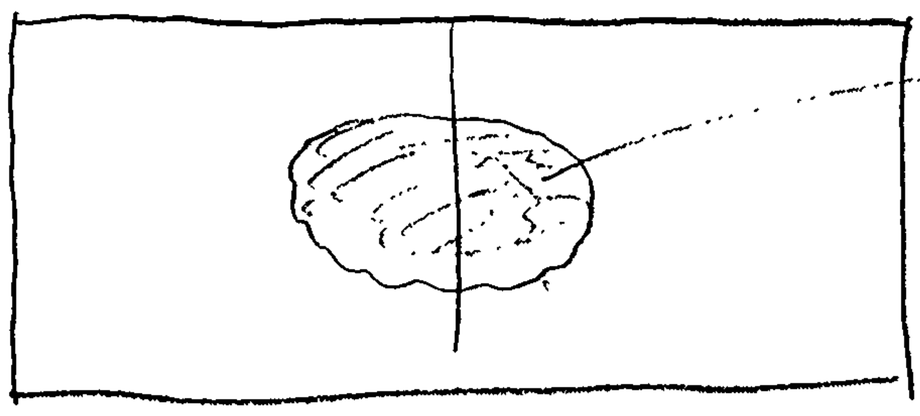
W_p - (WEIR PERIMETER



$W_p = 4[40 - (9 * 0.5)] + 2(25 - (13 * 0.5)) = 179"$

$W_p = 14.92'$ ✓

During the interim. This double grate inlet may be Clogged Due to Undeveloped conditions upstream. assume Grate area is 30% Clogged



30% clogged w/ debris *

$A_g = 4.17 FT^2$

During interim period, this grate would Recieve Flow from Both E2-Rb and B22-2

$Q = 6.08 + 4.30 = 10.38$ cfs

* See assumptions for Clogging in Existing grate capacity for developed site

3/12

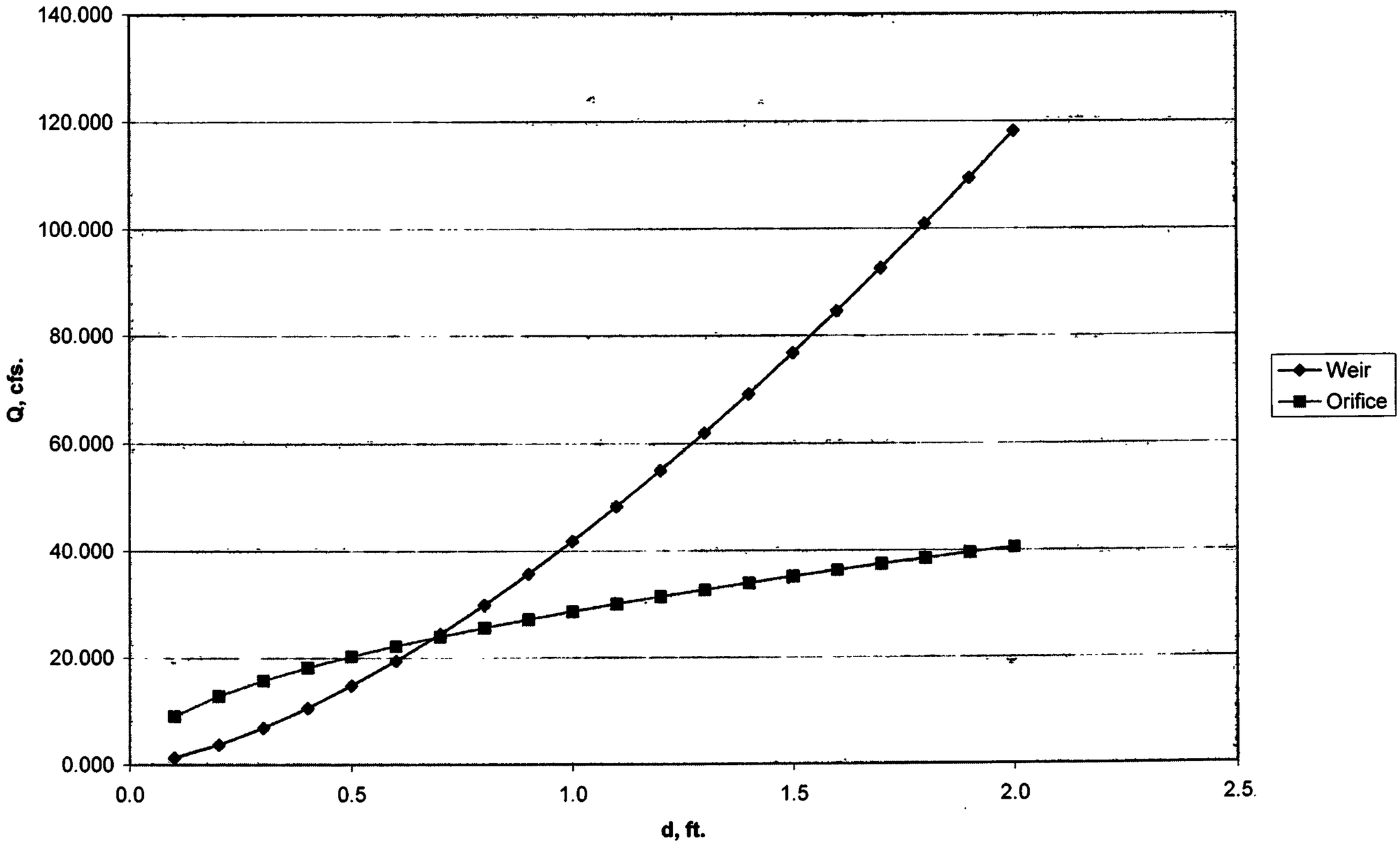
Plot d vs Q, 2 grates, 0% clogged

Wier Perimeter=	14.92	ft
Ag 2 grates=	5.958	sq-ft
Cw=	2.8	
Co=	0.6	

	Q, cfs	
d	Weir	Orifice
0.1	1.321	9.072
0.2	3.737	12.829
0.3	6.864	15.713
0.4	10.569	18.144
0.5	14.770	20.285
0.6	19.416	22.221
0.7	24.467	24.002
0.8	29.892	25.659
0.9	35.669	27.215
1.0	41.776	28.688
1.1	48.197	30.088
1.2	54.916	31.426
1.3	61.922	32.709
1.4	69.202	33.944
1.5	76.747	35.135
1.6	84.549	36.287
1.7	92.598	37.404
1.8	100.887	38.488
1.9	109.410	39.543
2.0	118.160	40.570
2.1	127.132	41.572
2.2	136.320	42.551
2.3	145.720	43.507
2.4	155.326	44.443
2.5	165.134	45.359
2.6	175.141	46.257
2.7	185.341	47.139
2.8	195.733	48.004
2.9	206.312	48.853
3.0	217.074	49.688
3.1	228.018	50.510
3.2	239.140	51.318
3.3	250.437	52.114
3.4	261.906	52.897
3.5	273.545	53.670
3.6	285.352	54.431
3.7	297.324	55.182
3.8	309.458	55.922
3.9	321.754	56.654
4.0	334.208	57.375

Q = 10.38
0.3 < d < 0.4

Q = 17.24 cfs
0.5 < d < 0.6 ft


Q vs. d, 2 grates, 0% clogged
140.000
120.000
100.000
80.000
60.000
40.000
20.000
0.000
Q, cfs.
0.0
0.5
1.0
1.5
2.0
2.5
d, ft.
Weir
Orifice

5/12

Plot d vs Q, 2 grates, 10% clogged

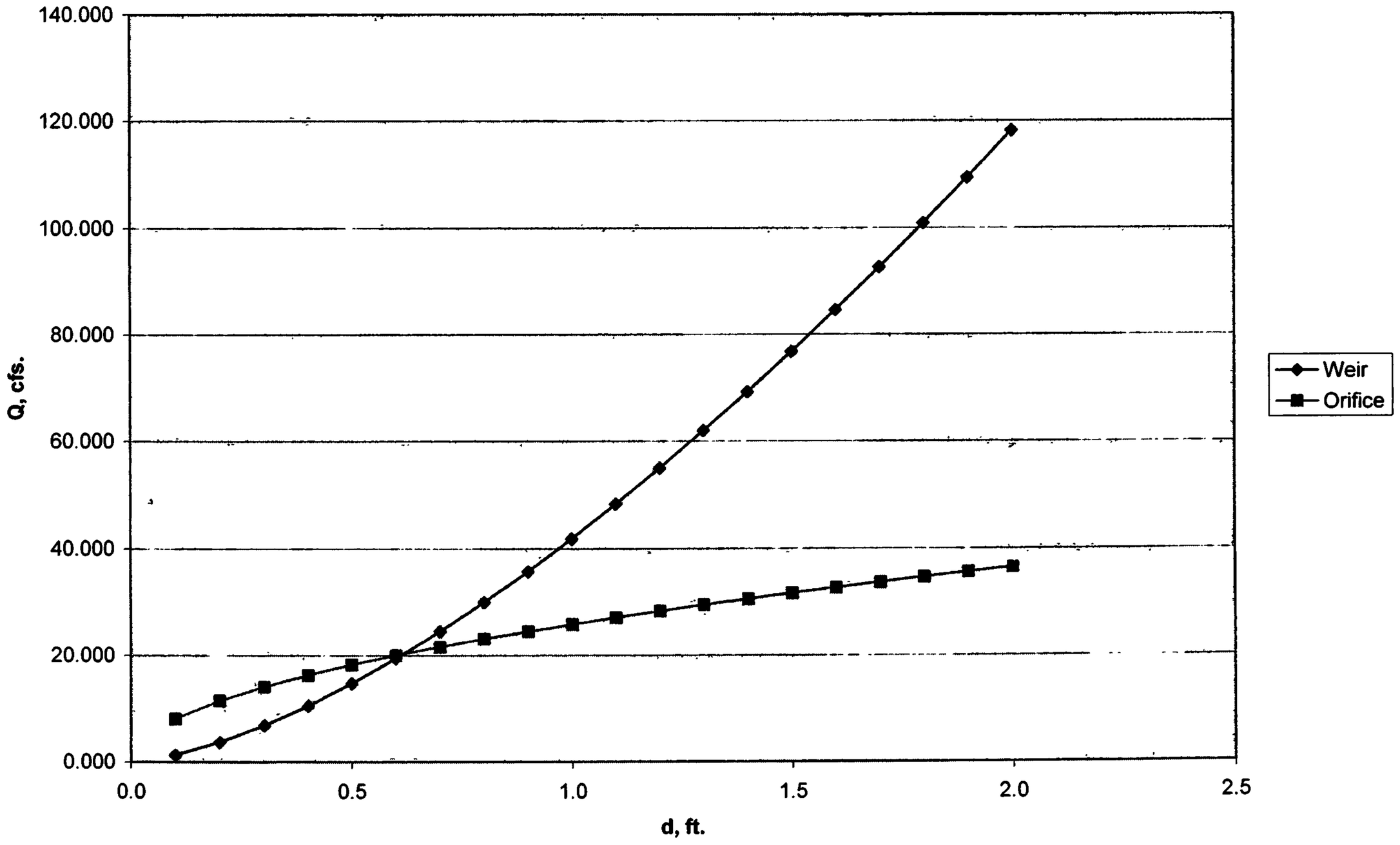
Wier Perimeter=	14.92	ft
Ag 2 grates=	5.36	sq-ft
Cw=	2.8	
Co=	0.6	

	Q, cfs	
d	Weir	Orifice
0.1	1.321	8.161
0.2	3.737	11.542
0.3	6.864	14.136
0.4	10.569	16.323
0.5	14.770	18.249
0.6	19.416	19.991
0.7	24.467	21.593
0.8	29.892	23.084
0.9	35.669	24.484
1.0	41.776	25.808
1.1	48.197	27.068
1.2	54.916	28.272
1.3	61.922	29.426
1.4	69.202	30.537
1.5	76.747	31.609
1.6	84.549	32.645
1.7	92.598	33.650
1.8	100.887	34.625
1.9	109.410	35.574
2.0	118.160	36.498
2.1	127.132	37.400
2.2	136.320	38.280
2.3	145.720	39.140
2.4	155.326	39.982
2.5	165.134	40.806
2.6	175.141	41.615
2.7	185.341	42.407
2.8	195.733	43.186
2.9	206.312	43.950
3.0	217.074	44.701
3.1	228.018	45.440
3.2	239.140	46.167
3.3	250.437	46.883
3.4	261.906	47.588
3.5	273.545	48.283
3.6	285.352	48.968
3.7	297.324	49.643
3.8	309.458	50.310
3.9	321.754	50.967
4.0	334.208	51.617

Q = 10.380 cfs

Q = 17.240 cfs

0.5 < d < 0.6 ft


Q vs. d, 2 grates, 10% clogged
140.000
120.000
100.000
80.000
60.000
40.000
20.000
0.000
Q, cfs.
0.0
0.5
1.0
1.5
2.0
2.5
d, ft.
Weir
Orifice

7/12

Plot d vs Q, 2 grates, 30% clogged

Wier Perimeter=	14.92	ft
Ag 2 grates=	4.17	sq-ft
Cw=	2.8	
Co=	0.6	

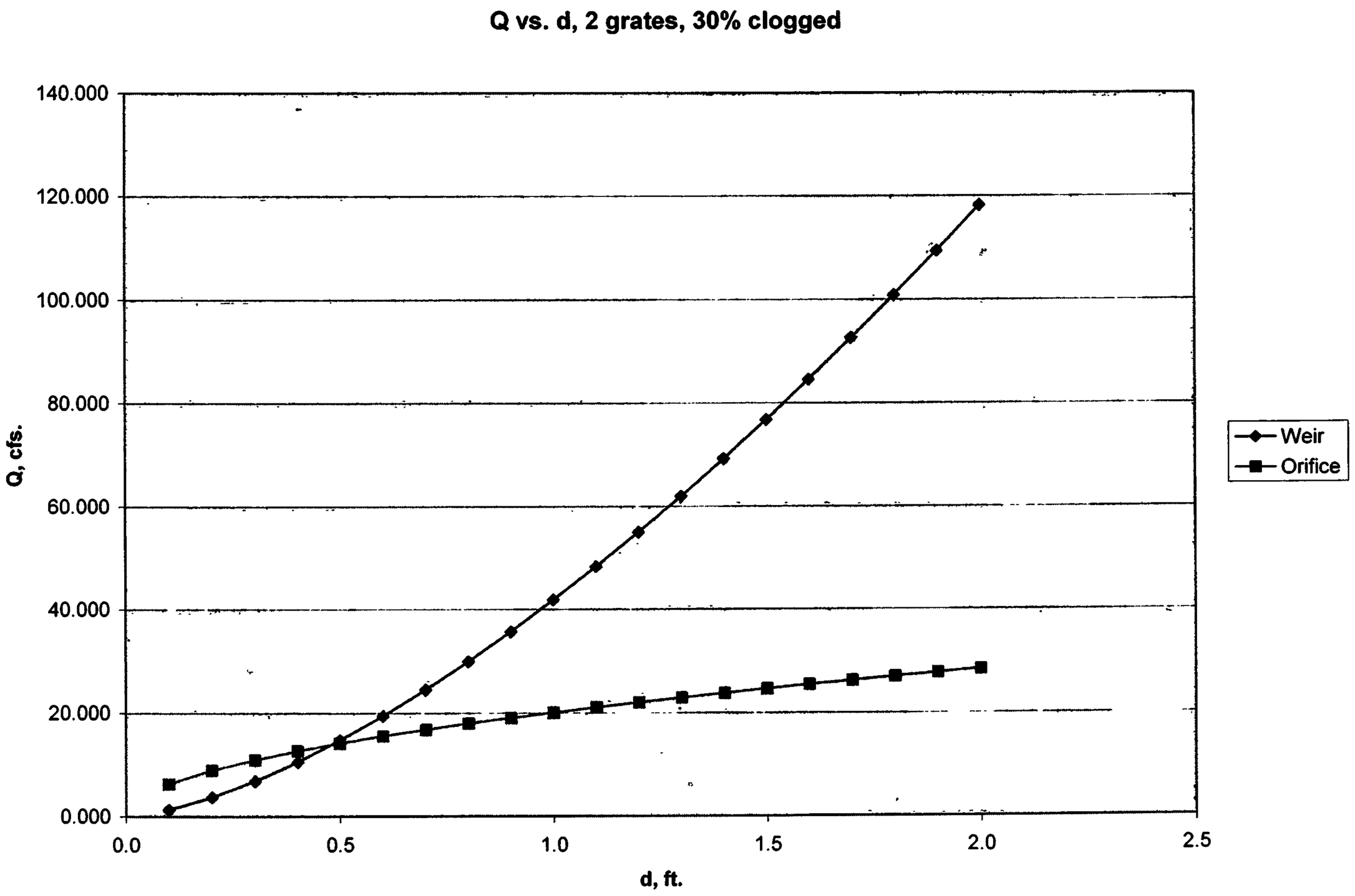
	Q, cfs	
d	Weir	Orifice
0.1	1.321	6.349
0.2	3.737	8.979
0.3	6.864	10.997
0.4	10.569	12.699
0.5	14.770	14.198
0.6	19.416	15.553
0.7	24.467	16.799
0.8	29.892	17.959
0.9	35.669	19.048
1.0	41.776	20.078
1.1	48.197	21.058
1.2	54.916	21.995
1.3	61.922	22.893
1.4	69.202	23.757
1.5	76.747	24.591
1.6	84.549	25.397
1.7	92.598	26.179
1.8	100.887	26.938
1.9	109.410	27.676
2.0	118.160	28.395
2.1	127.132	29.096
2.2	136.320	29.781
2.3	145.720	30.450
2.4	155.326	31.105
2.5	165.134	31.747
2.6	175.141	32.376
2.7	185.341	32.992
2.8	195.733	33.598
2.9	206.312	34.192
3.0	217.074	34.777
3.1	228.018	35.352
3.2	239.140	35.917
3.3	250.437	36.474
3.4	261.906	37.023
3.5	273.545	37.563
3.6	285.352	38.096
3.7	297.324	38.622
3.8	309.458	39.140
3.9	321.754	39.652
4.0	334.208	40.157

Q = 10.38 CFS, interim undeveloped state.

0.4 < d < 0.5 Ft

Q = 17.24 cfs, developed

0.7 < d < 0.8 ft


Q vs. d, 2 grates, 30% clogged
140.000
120.000
100.000
80.000
60.000
40.000
20.000
0.000
Q, cfs.
0.0
0.5
1.0
1.5
2.0
2.5
d, ft.
Weir
Orifice

URS Greiner Woodward Clyde

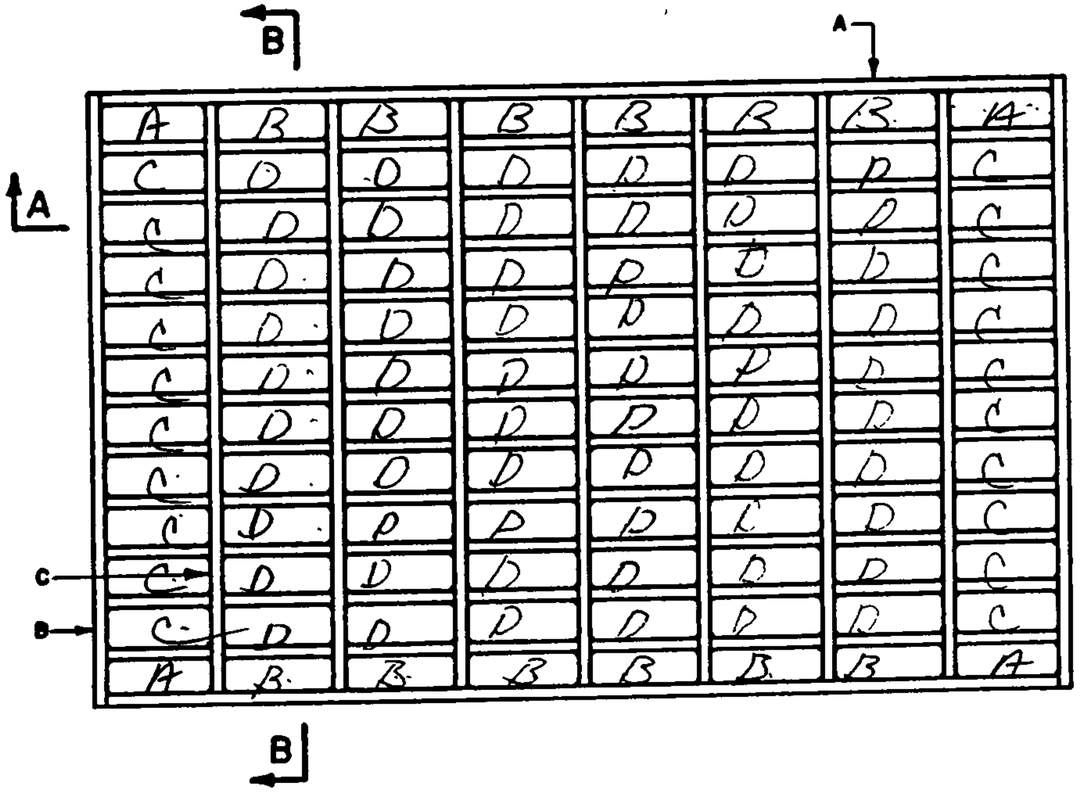
Job: AIT Fuels Sta
Description: Inlet Capacity - 2 grate type D, 0, 10 & 30% Clossed
Project No.:
Computed by: ESR
Checked by: SKG

Date: 10/3/2000
Date: 4 Oct 2000
Reference

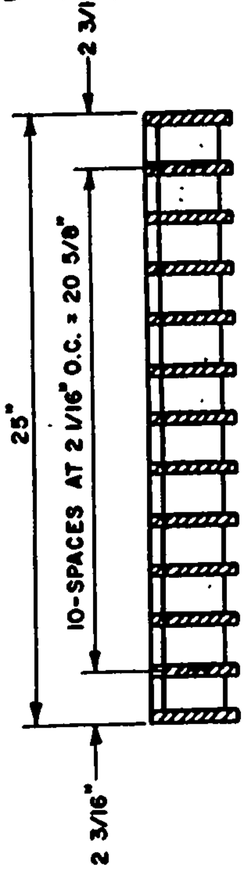
Basin to contribute	Q	No. of Grates	% Clossed	depth, d orifice/weir	Comments
E2-Rb	17.24	2	0	0.5 < d < 0.6 weir	Full developed condition
E2-Rb w/ B22	10.38	2	0	0.3 < d < 0.4 weir	Interum Condition
E2-Rb	17.24	2	10	0.5 < d < 0.6 weir	Full developed condition
E2-Rb w/ B22	10.38	2	10	0.3 < d < 0.6	Interum Condition
E2-Rb	17.24	2	30	0.7 < d < 0.8	Full developed Condition
E2-Rb w/ B22	10.38	2	30	0.4 < d < 0.2	Interum Condition

Conclusion - a double grate type d inlet will be plenty sufficient to handle this flow. a single grate require head depths, d of between 1.3 ft for 0% clossed to 2.7 ft for 30% clossed and may result in undesirable water depth condition.

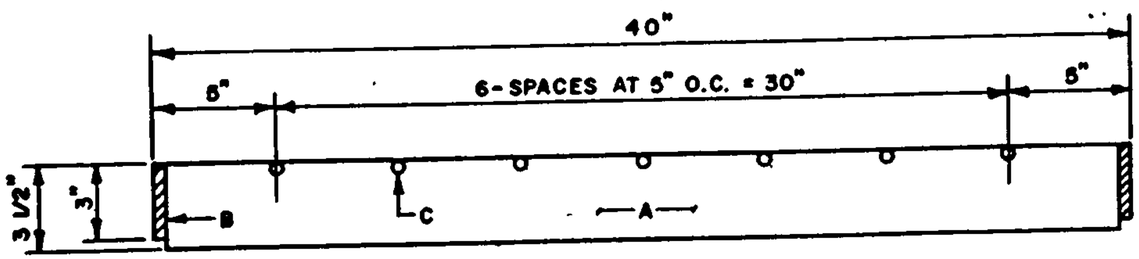
A = 4.25 X 1.438"
B = 4.00" X 1.438
C = 4.25 X 1.031"
D = 4.00" X 1.03"



PLAN



SECTION B-B



SECTION A-A

GENERAL NOTES:

1. ALL BARS SHALL BE STRUCTURAL GRADE STEEL, GRADE A36.
2. THE GRATE SHALL BE WELDED WITH 1/8" FILLET WELD AROUND BOTH SIDES OF CROSS BARS, 1/4". FILLET WELD BOTH SIDES OF BEARING BARS TO END BARS.
3. AFTER CLEANING SURFACE OF SCALE, RUST, OILS, ETC., PAINT GRATE WITH ONE SHOP COAT RED OXIDE, TWO FINISH COATS ALUMINUM PAINT (AASHTO M 69).
4. TOP OF CROSS BARS SHALL BE FLUSH WITH TOP OF GRATE.
5. GRIND WELDS FLUSH WITH BEARING BARS.
6. WHEN INSTALLED IN FRAME, PUSH TIGHT TO ONE SIDE, OTHER SIDE SHALL HAVE 1/2" MAX. OPENING. SPACERS WELDED TO FRAME MAY BE USED IF REQUIRED TO KEEP 1/2" SPACE OR LESS.

CONSTRUCTION NOTES:

A. BEARING BARS, (13) 1/2" X 3 1/2" X 39".

B. END BARS, (2) 1/2" X 3" X 25".

C. CROSS BARS, (7) 1/2" DIA. X 24.

REVISIONS

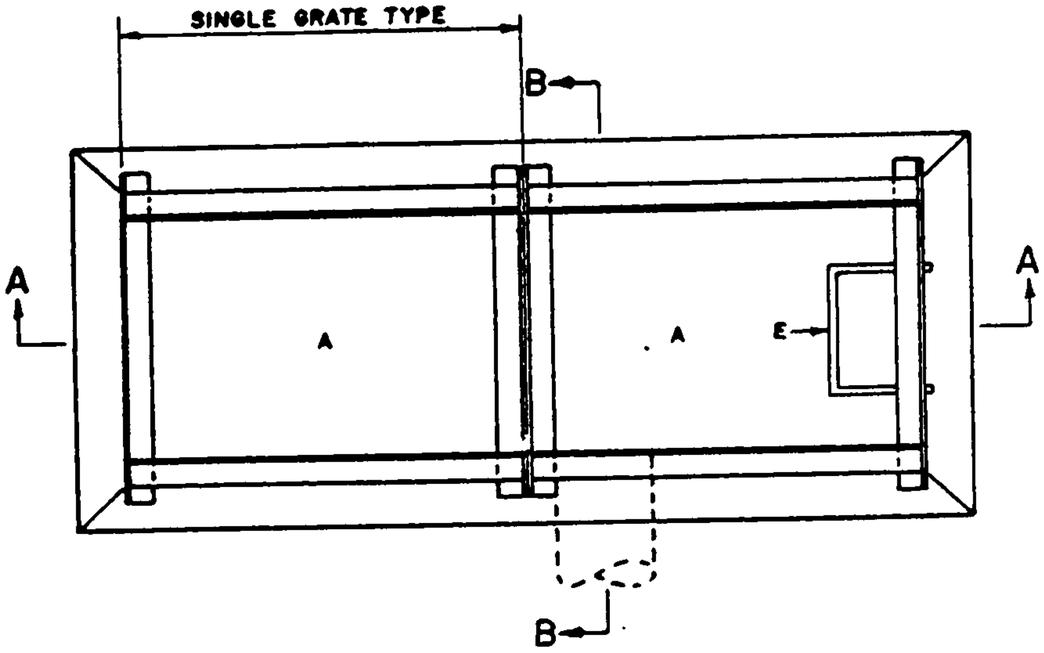
CITY OF ALBUQUERQUE

DRAINAGE
STORM INLET
ALBUQUERQUE GRATE

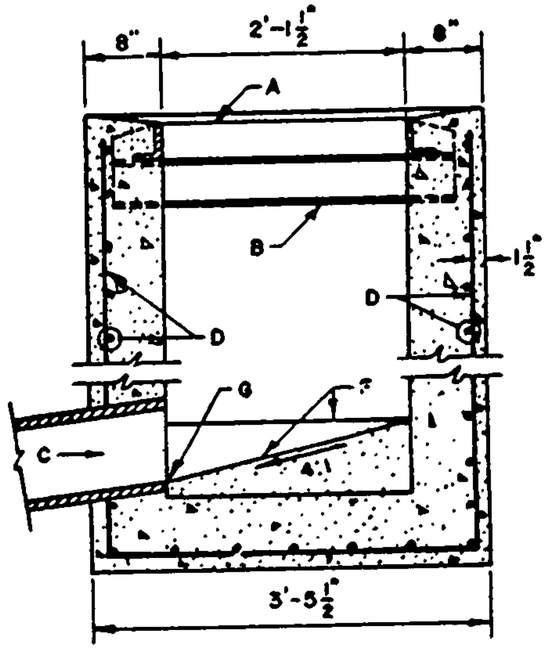
DWG. 2220

AUG. 1986

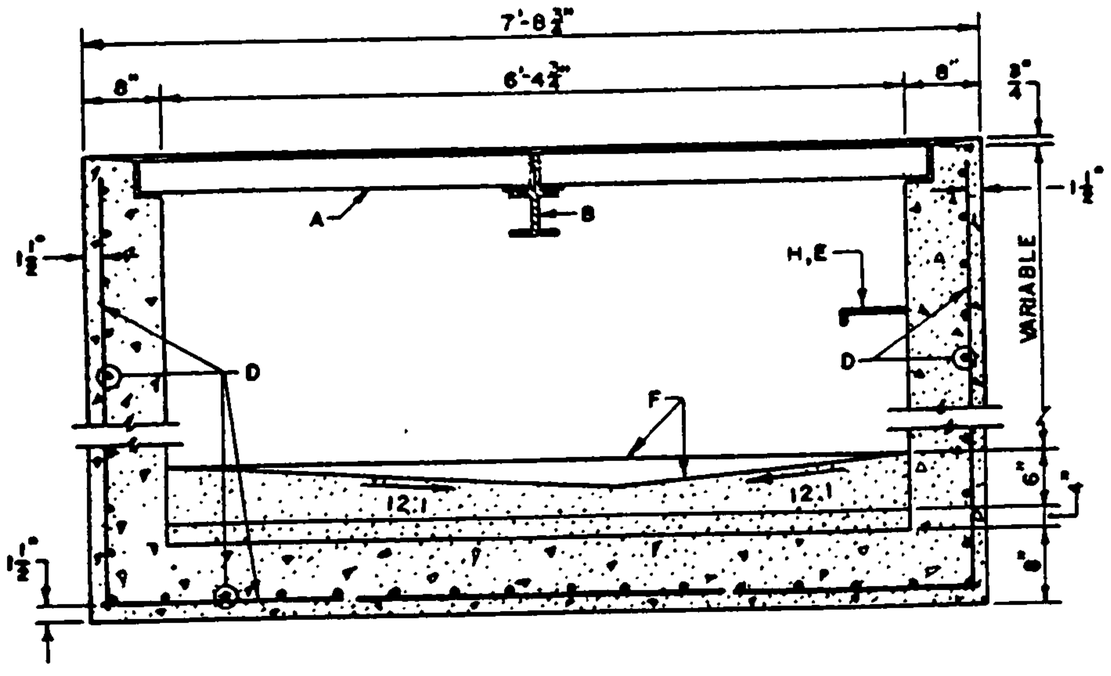
2/19



PLAN



SECTION B-B



SECTION A-A

GENERAL NOTES:

1. FOR SINGLE GRATE TYPE STORM INLET, DELETE CENTER SUPPORT AND MOVE ONE END WALL TO FORM NEW SINGLE GRATE INLET.
2. STORM INLET GUTTER TRANSITION WILL BE SHOWN ON THE CONSTRUCTION PLANS.
3. OUTLET PIPE SIZE, PER DESIGN REQUIREMENT.
4. FOR FRAME & GRATING, SEE DWG 2216, 2220 & 2221.
5. FOR CENTER SUPPORT ASSEMBLY, SEE DWG 2215.

CONSTRUCTION NOTES:

A. FRAME & GRATE

B. CENTER SUPPORT ASSEMBLY.

C. CUT ONE HORIZONTAL AND ONE VERTICAL BAR MAX. AT PIPE OPENING.

D. NO. 4 BARS A 6" O.C. EACH WAY.

E. USE STANDARD STEPS, SEE DWG 2229.

F. CONC. FILL, SEE NOTE C DWG 2201.

G. INVERT PER DESIGN.

H. INSTALL STEPS ON DOWNSTREAM FACE

CITY OF ALBUQUERQUE

DRAINAGE

STORM INLET DOUBLE "D"

DWG. 2206

AUG 1986

REVISIONS
12-21-92

14/12

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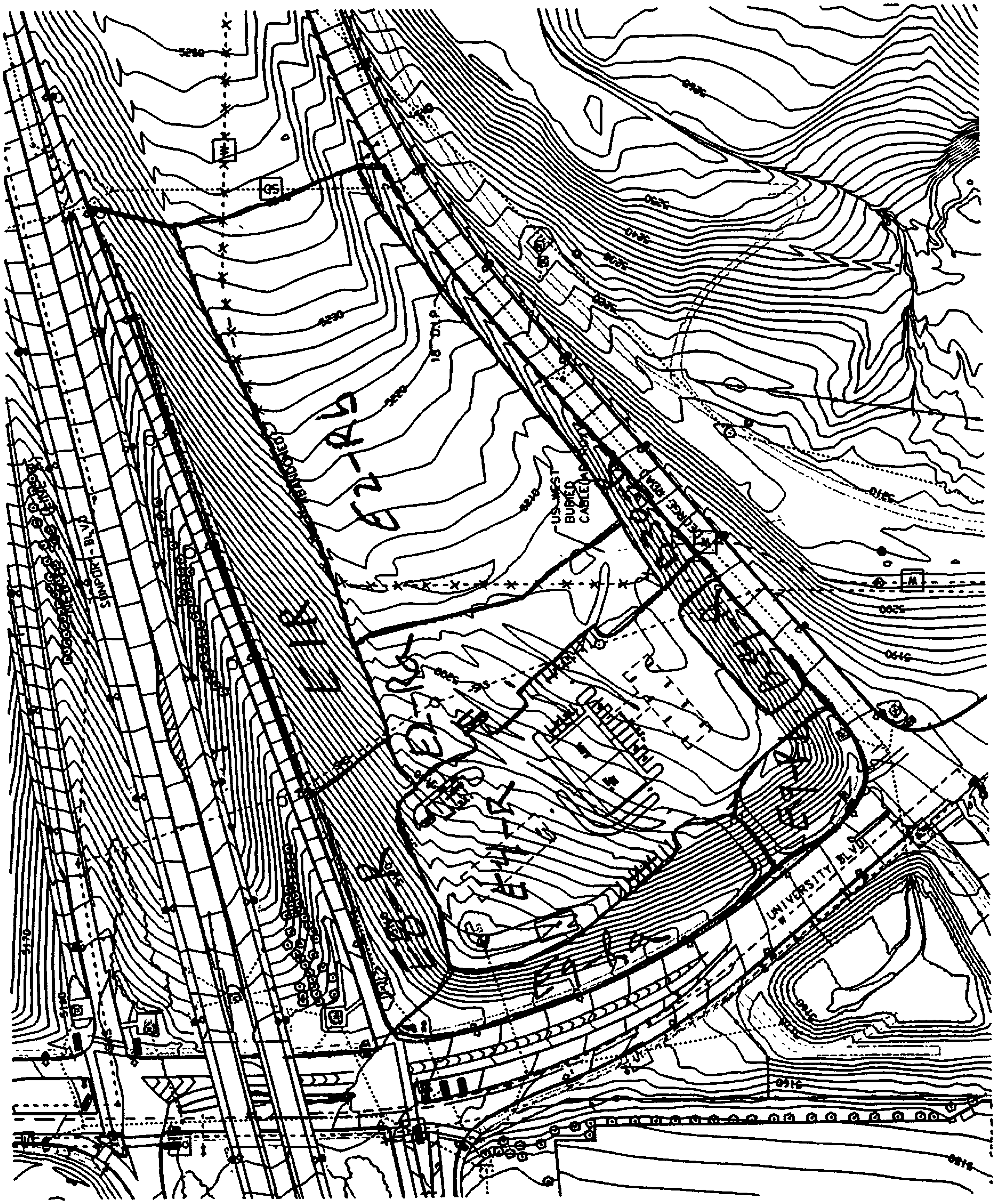


1:200
Revised Basins

URS

Job Hill Fuel STA — Project No. E30001482.04 — Page ___ of ___

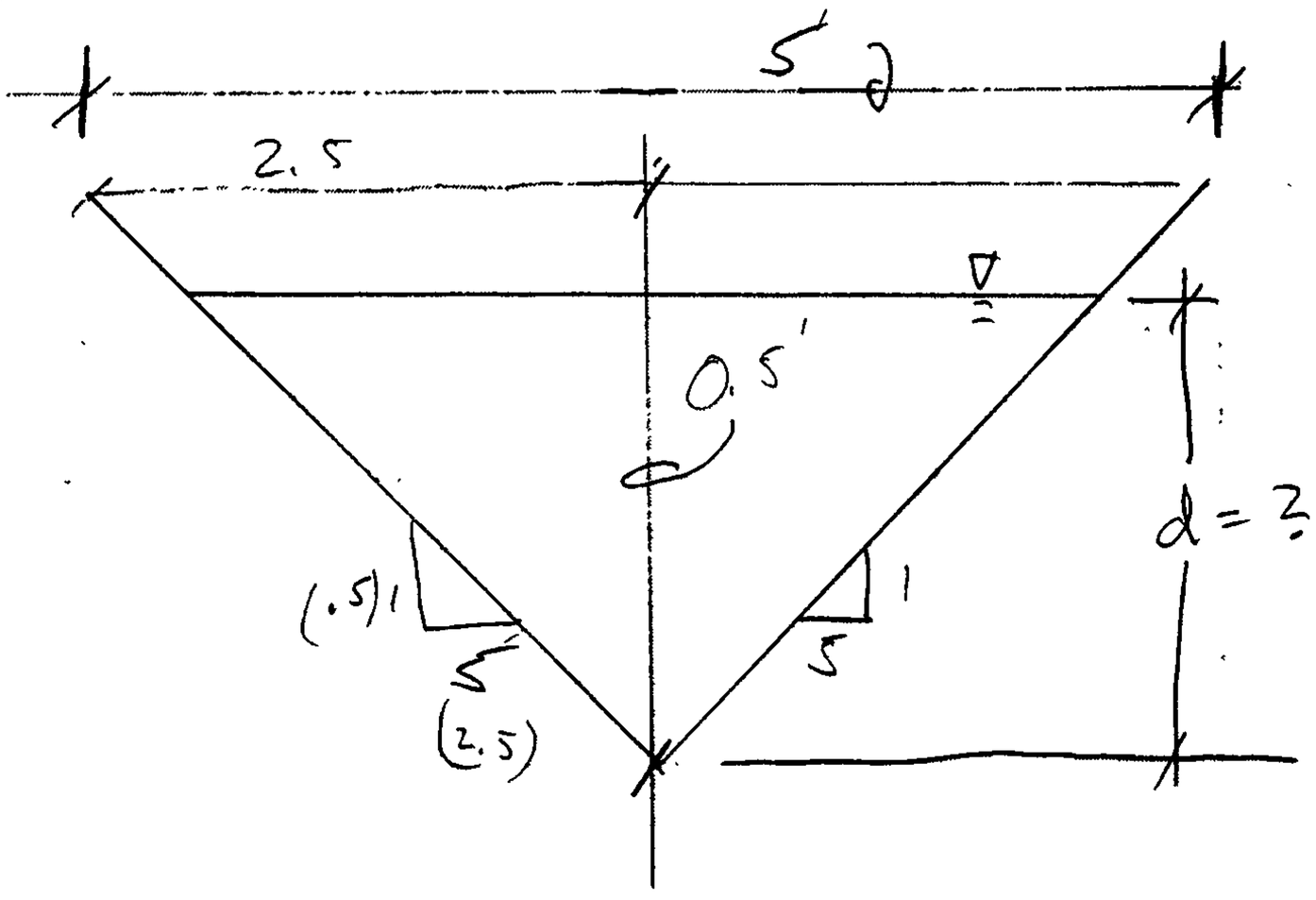
Description Basin E2-Ra Drainage Swale sizing — Computed by CSR — Date 8-26-2009

Checked by SKJ — Date 27 Sept 2009

Reference

Given:
- The Grading Plan for site
- Q_{100} from Basin E2-Ra = 4.91
- ditch depth - 0.5 FT

Find: Flow depth in ditch.



Ans ditch slope - $\frac{4' \text{ drop}}{375' \text{ length}}$ = 0.010667 → 1.07%

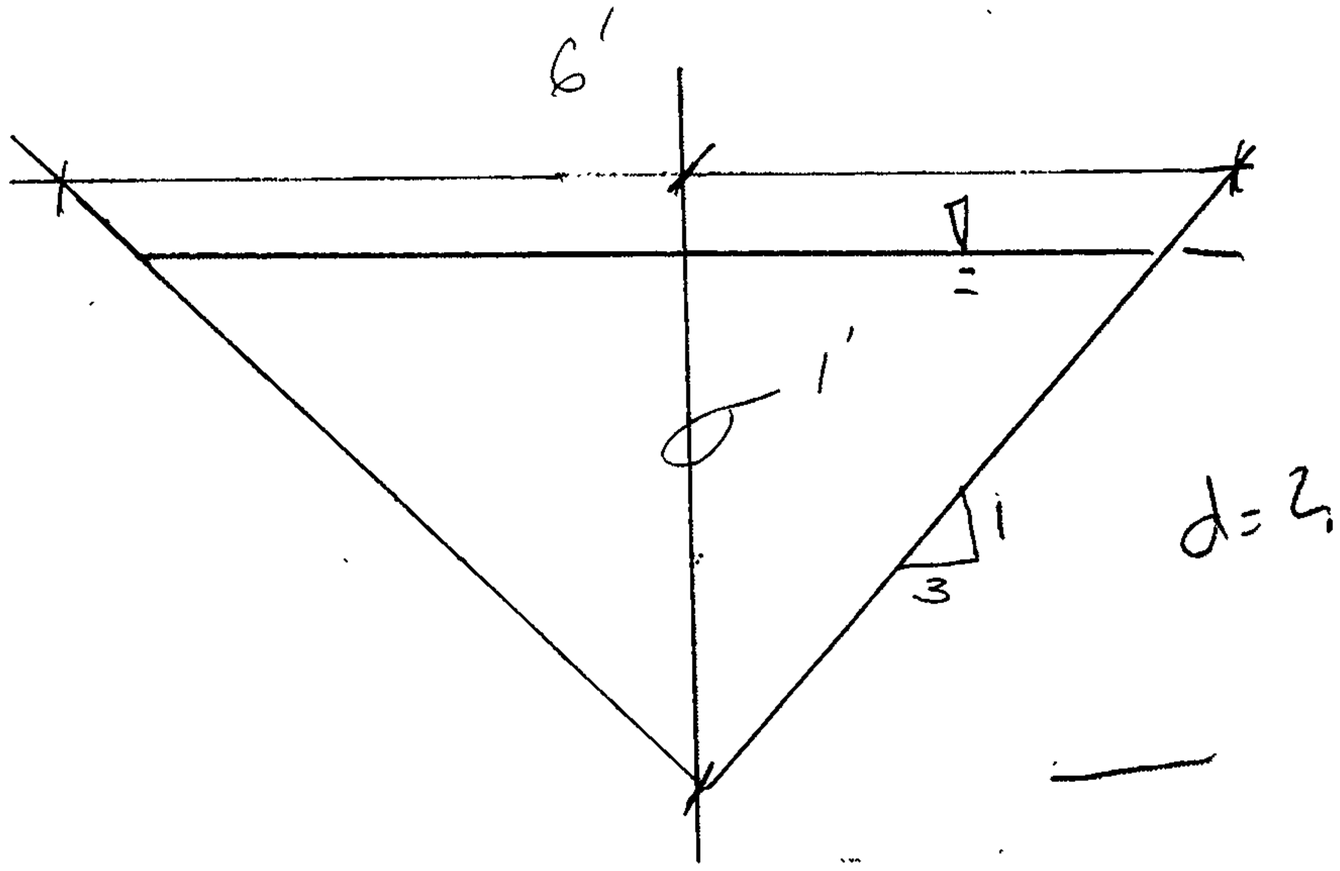
Per Flowmaster w/ Triangular ditch Parameters above - See attached.
Flow depth = 0.64 FT.

For 0.5' or less - Require 11.0 FT wide ditch - no good

URS

Job ACT Fuel STATION | Project No. | Page ___ of ___
Description Basin B2-Ra Swale | Computed by C.S.R | Sheet 3 of 6
| Checked by SKG | Date 5-26-2000
| | Date 27 Sept 2000
| | Reference

Try going deeper w/ Keep TOP width to about 6.0 ft.



d = 0.84 ft Per flowmaster. N=0.035
d = 0.80 ft , N = 0.030

Conclusion - a 1FT deep ditch w/ 3h:1V side slopes will Result in a TOP width of 6' and a full flow depth of 0.80 FT w/ n = 0.030

3/6

E2-Ra Drainage Ditch
Worksheet for Triangular Channel

Project Description	
Worksheet	Triangular Channel
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coeffic	0.030	
Slope	010700	ft/ft
Left Side Slope	5.00	ft/ft (H:V)
Right Side Slope	5.00	ft/ft (H:V)
Discharge	4.91	cfs

Results		
Depth	0.64	ft
Flow Area	2.1	ft²
Wetted Perime	6.559	ft
Top Width	6.432	ft
Critical Depth	0.57	ft
Critical Slope	0.020462	ft/ft
Velocity	2.37	ft/s
Velocity Head	0.09	ft
Specific Energ	0.73	ft
Froude Numbe	0.74	
Flow Type	ubcritical	

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4/6

E2-Ra Drainage Ditch
Worksheet for Triangular Channel

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

Input Data		
Mannings Coefficient	0.030	
Slope	0.010700	ft/ft
Left Side Slope	11.00	ft/ft (H:V)
Right Side Slope	11.00	ft/ft (H:V)
Discharge	4.91	cfs

Results		
Depth	0.48	ft
Flow Area	2.5	ft²
Wetted Perimeter	10.531	ft
Top Width	10.488	ft
Critical Depth	0.42	ft
Critical Slope	0.022265	ft/ft
Velocity	1.96	ft/s
Velocity Head	0.06	ft
Specific Energy	0.54	ft
Froude Number	0.71	
Flow Type	Subcritical	

5/6

E2-Ra Drainage Ditch
Worksheet for Triangular Channel

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

Input Data		
Mannings Coefficient	0.035	
Slope	0.010000	ft/ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Discharge	4.91	cfs

Results		
Depth	0.84	ft
Flow Area	2.1	ft²
Wetted Perimeter	5.331	ft
Top Width	5.057	ft
Critical Depth	0.70	ft
Critical Slope	0.027190	ft/ft
Velocity	2.30	ft/s
Velocity Head	0.08	ft
Specific Energy	0.93	ft
Froude Number	0.63	
Flow Type	Subcritical	

E2-Ra Drainage Ditch
Worksheet for Triangular Channel

6 / 6

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

Input Data		
Mannings Coefficient	0.030	
Slope	0.010000	ft/ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Discharge	4.91	cfs

Results		
Depth	0.80	ft
Flow Area	1.9	ft²
Wetted Perimeter	5.031	ft
Top Width	4.773	ft
Critical Depth	0.70	ft
Critical Slope	0.019976	ft/ft
Velocity	2.59	ft/s
Velocity Head	0.10	ft
Specific Energy	0.90	ft
Froude Number	0.72	
Flow Type	Subcritical	

Worksheet
Worksheet for Trapezoidal Channel

Project Description	
Worksheet	OFFSITE (EAST) (
Flow Element	Trapezoidal Chann
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coeffic	0.030	
Slope	005000	ft/ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Bottom Width	5.00	ft
Discharge	17.30	cfs

Results		
Depth	0.88	ft
Flow Area	6.7	ft²
Wetted Perim	10.55	ft
Top Width	10.26	ft
Critical Depth	0.63	ft
Critical Slope	0.017105	ft/ft
Velocity	2.59	ft/s
Velocity Head	0.10	ft
Specific Energ	0.98	ft
Froude Numb	0.56	
Flow Type	Subcritical	

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Job AUT Fuels STA — Project No. — Page ____ of ____

Description Culvert Pipe Sizing — Computed by CSR — Date 9-26-2000

Checked by SKJ — Date 27 Sept 2000

Reference

- given: - The Concept 3a Grading Plan (attached)
  - Calculated Q values For Each Contributing Basin (see Basin Q calcs dated 9-25-2000 by CSR)
  - Revised Basin Map - attached.

CULVERT @ East entrance to Gause Road.

Upstream - 5191'
downstream - 5190.
Length ~ 45 FT

$$\text{Slope} = \frac{1'}{45'} = 0.0222 \quad 2.22\%$$

Capacity* of 10" @ 2.22% slope - Q = 15.65 cfs
12" @ 2.22% slope Q = 5.31 CFS

@ West exit to Gause Rd

Upstream - 5169
downstream - 5166
Length - ~46'

Slope 3'/46' = 0.0652

Capacity of 12" @ 6.52% = 9.10 cfs
18" @ 6.52% = 26.82 cfs

* assume RCP for all culverts.

URS

Job ALT Evls Sta — Project No. — Page ___ of ___

Description Culvert Pipe Sizing — Computed by CSR — Sheet 2 of ___

Checked by SKJ — Date 27 Sept 2000

Reference

Culvert at Exit on University Blvd.

Upstream - 5140
Downstream - 5141
Length - 76'

Slope = 5'/76 = 0.0658 → 6.58%

Capacity of 18" @ 6.58% = 26.94 cfs
12" @ 6.58% = 9.14 cfs

Conclusion

Culvert Location	(Q100 ULT) What IT MUST Pull	What 12" RCP will Pull	What 18" RCP will Carry
George Rd East	1.67 cfs from B30-R	5.31 cfs	15.65 cfs
George Rd West	2.28 cfs From B30-R & B34-R	9.10 cfs	26.82 cfs
University	1.17 cfs From E9-Rb	9.14 cfs	26.94 cfs

In all cases. 18" RCP culverts will easily handle the flows Generated by each basin.

Worksheet

Worksheet for Circular Channel

EAST ENT. ON GARSE RD

Project Description	
Worksheet	Circular Channel
Flow Element	Circular Channel
Method	Manning's Formu
Solve For	Full Flow Capacit

Input Data		
Mannings Coeffic	0.013	
Slope	022200	ft/ft
Diameter	18	in

Results		
Depth	1.50	ft
Discharge	15.65	cfs
Flow Area	1.8	ft²
Wetted Perime	4.71	ft
Top Width	0.00	ft
Critical Depth	1.42	ft
Percent Full	100.0	%
Critical Slope	019202	ft/ft
Velocity	8.86	ft/s
Velocity Head	1.22	ft
Specific Energy	2.72	ft
Froude Numbe	0.00	
Maximum Disch	16.84	cfs
Discharge Full	15.65	cfs
Slope Full	022200	ft/ft
Flow Type	N/A	

Worksheet

Worksheet for Circular Channel

East Ent. on Goose Rd

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

Input Data		
Mannings Coefficient	0.013	
Slope	0.022200	ft/ft
Diameter	12	in

Results		
Depth	1.00	ft
Discharge	5.31	cfs
Flow Area	0.8	ft²
Wetted Perimeter	3.14	ft
Top Width	0.00	ft
Critical Depth	0.93	ft
Percent Full	100.0	%
Critical Slope	0.019198	ft/ft
Velocity	6.76	ft/s
Velocity Head	0.71	ft
Specific Energy	1.71	ft
Froude Number	0.00	
Maximum Discharg	5.71	cfs
Discharge Full	5.31	cfs
Slope Full	0.022200	ft/ft
Flow Type	N/A	

Worksheet

Worksheet for Circular Channel

WEST EXIT TO Goose Rd

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

Input Data		
Mannings Coefficient	0.013	
Slope	0.065200	ft/ft
Diameter	18	in

Results		
Depth	1.50	ft
Discharge	26.82	cfs
Flow Area	1.8	ft²
Wetted Perimeter	4.71	ft
Top Width	0.00	ft
Critical Depth	1.49	ft
Percent Full	100.0	%
Critical Slope	0.060867	ft/ft
Velocity	15.18	ft/s
Velocity Head	3.58	ft
Specific Energy	5.08	ft
Froude Number	0.00	
Maximum Discharg	28.85	cfs
Discharge Full	26.82	cfs
Slope Full	0.065200	ft/ft
Flow Type	N/A	

Worksheet

Worksheet for Circular Channel

West EXT to George Rd

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

Input Data		
Mannings Coefficient	0.013	
Slope	0.065200	ft/ft
Diameter	12	in

Results		
Depth	1.00	ft
Discharge	9.10	cfs
Flow Area	0.8	ft²
Wetted Perimeter	3.14	ft
Top Width	0.00	ft
Critical Depth	0.99	ft
Percent Full	100.0	%
Critical Slope	0.060307	ft/ft
Velocity	11.58	ft/s
Velocity Head	2.08	ft
Specific Energy	3.08	ft
Froude Number	0.00	
Maximum Discharg	9.79	cfs
Discharge Full	9.10	cfs
Slope Full	0.065200	ft/ft
Flow Type	N/A	

Worksheet

Worksheet for Circular Channel

University BLVD entrance.

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

Input Data		
Mannings Coefficient	0.013	
Slope	0.065800	ft/ft
Diameter	18	in

Results		
Depth	1.50	ft
Discharge	26.94	cfs
Flow Area	1.8	ft²
Wetted Perimeter	4.71	ft
Top Width	0.00	ft
Critical Depth	1 49	ft
Percent Full	100.0	%
Critical Slope	0.061463	ft/ft
Velocity	15.25	ft/s
Velocity Head	3.61	ft
Specific Energy	5.11	ft
Froude Number	0.00	
Maximum Discharg	28.98	cfs
Discharge Full	26.94	cfs
Slope Full	0.065800	ft/ft
Flow Type	N/A	

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Worksheet

Worksheet for Circular Channel

University Blvd entrance

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

Input Data		
Mannings Coefficient	0.013	
Slope	0.065800	ft/ft
Diameter	12	in

Results		
Depth	1.00	ft
Discharge	9.14	cfs
Flow Area	0.8	ft²
Wetted Perimeter	3.14	ft
Top Width	0.00	ft
Critical Depth	0.99	ft
Percent Full	100.0	%
Critical Slope	0.060901	ft/ft
Velocity	11.64	ft/s
Velocity Head	2.10	ft
Specific Energy	3.10	ft
Froude Number	0.00	
Maximum Discharg	9.83	cfs
Discharge Full	9.14	cfs
Slope Full	0.065800	ft/ft
Flow Type	N/A	

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

FIGURE 6

CITY OF ALBUQUERQUE

NOTICE OF D.R.C. MEETING

~~10/2~~ 11/2/00 ✓
(DATE)

DRB NO: _____
PROJECT NO: 652991
ZONE ATLAS: M-15

PROJECT NAME: Turn Bay on University at Sunport (ALT. FUELS STA)
LOCATION: University Blvd & Sunport.

TYPE OF PROJECT: AHBA ✓ CIP ____ PWC ____ SAD ____ ALL PRIVATE ____

Contact Person: Rick Tietgens **Phone:** 878-1019
Firm: URS/Griner

✓ Scheduled with the D.R.C. on 11/16 at 1:30 Plaza Del Sol/2nd Fl.
____ No DRC Meeting Scheduled. Please return any comments by _____

Commented 11/6/00

The Project Is Scheduled For:

/ / Design Report Review
/✓/ Pre-Design Meeting
/ / Preliminary Plan Review
/ / Final Plan Review
/ / Signoff of Plans
/ / _____

The Project Relates To:

/✓/ Water / / San. Sewer /✓/ Paving /✓/ Storm Drainage / / _____

The Attached Package Includes:

/D/ Drawings /S/ Spec's /E/ Estimate /R/ Report /M/ Memo Only

Indicated below are the Departments/Divisions that have received project documents and/or are invited to attend. It will be the Project Managers responsibility to notify consulting engineering firms of date and time of scheduled meetings.

D	DRC Chairman	Project Review Section	All Drawings
D	Traffic Repres.	Transportation Development	All Drawings
/ /	Utility Dev.	Utility Design	All AHBA Drawings
D	Utility Dev.(Billy G.)	Utility Design	All CIP Drawings
D	Hydro Repres. Murray	Hydrology	All Drawings
D	Const. Repres.	Construction	All Drawings
D	Dave Harmon	Traffic Operations	All Drawings
/ /	~~Sergio Miranda~~	Water (Shutoff Plan)	All Water Shutoff
D	Parks Repres!	Parks & Recreation	ALL Landscaping
/ /	~~Andre Houle~~	Street Maintenance	All Paving
/ /	Kevin Broderick	Utility Coordinator	ALL PWC & CIP
D	Tom Murphy	Transit Department	All Drawings
D	Joe Luehring	Construction Coordinator	CIP/Memo
/ /	Jim Fink	Line Maintenance	CIP & SAS/Memo
/ /	George Gee	City Architect	Arch. Drawings
/ /		SAD Engineer	SAD/Memo
/ /	Tom Ellis	Park Management	Parks/Community Ctrs/APS
/ /	Gene Bustamante	General Services Dept.	Arch. Drawings
/ /	Greg Smith	PWD/Legal	Specs Only
/ /	Richard Sertich	Planning Department	CIP/Memos
D	CIP Project Manager	CIP Jim Hinde	CIP/Memos
D	Donald Bartlett	Risk Management	Arch. Drawings
/ /	_____	_____	_____
/ /	_____	_____	_____

DRCNOTIC. UPD 5/03/00