PUBLIC WORKS/HYDROLOGY

D20/D3G

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D20/D3G

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

October 31, 1991

Michael J. Yost, P.E.
Community Sciences Corporation, Inc.
Post Office Box 1328
Corrales, New Mexico 87048

RE: REVISED DRAINAGE REPORT FOR RICHFIELD SUBDIVISION
(D-20/D3G) (REVISED PAD SIZE) UPDATE DATED 10/91
RECEIVED OCTOBER 24, 1991

Dear Mr. Yost:

The revised drainage report and grading plan is approved. The justification provided in your letter dated October 24, 1991, satisfied our main concern that the downstream system would not be overtaxed as a result of the increased pad sizes.

Regarding your grading permit request, Sheets 3 of 12 and 4 of 12 are approved for Rough Grading. Please forward the original mylars to my office for sign-off.

If you should have any questions, please feel free to call me at 768-2650.

Cordially,

Fred J. Aguirre, P.E.
Hydrologist

FJA/bsj
(WP+254)

25×10

0000 0000 0900

DRAINAGE INFORMATION SHEET

PROJECT TITLE: RICHFIELD SUBDIVISION (formerly Heritage East7) ZONE ATLAS/DRNG. FILE#: D-20-D36

LEGAL DESCRIPTION:

CITY ADDRESS: Ventura at Palomas

ENGINEERING FIRM: Community Sciences Corporation CONTACT: Michael J. Yost, P.E.

ADDRESS: PO BOX 1328, Corrales, NM 87048 PHONE: (505) 897-0000

OWNER: Argus Development Company CONTACT: Ben Spencer

ADDRESS: 6501 Americas Pkwy., Suite 660 Albuquerque, New Mexico 87110 PHONE: (505) 889-3061

ARCHITECT: N/A CONTACT:

ADDRESS: PHONE:

SURVEYOR: Same as Engineer CONTACT:

ADDRESS: PHONE:

CONTRACTOR: N/A CONTACT:

ADDRESS: PHONE:

PRE-DESIGN MEETING:

____ YES

X NO

____ COPY OF CONFERENCE RECAP SHEET PROVIDED

DRB NO. 87-363

EPC NO.

PROJ. NO. 3464

TYPE OF SUBMITTAL:

X DRAINAGE REPORT (*REVISED 10/91)

____ DRAINAGE PLAN

____ CONCEPTUAL GRADING & DRAINAGE PLAN

____ GRADING PLAN

____ EROSION CONTROL PLAN

____ ENGINEER'S CERTIFICATION

X WORK ORDER DRAWINGS

X COVER LETTER

CHECK TYPE OF APPROVAL SOUGHT:

____ SKETCH PLAT APPROVAL

____ PRELIMINARY PLAT APPROVAL

____ SITE DEVELOPMENT PLAN APPROVAL

____ FINAL PLAT APPROVAL

____ BUILDING PERMIT APPROVAL

____ FOUNDATION PERMIT APPROVAL

____ CERTIFICATE OF OCCUPANCY APPROVAL

X ROUGH GRADING PERMIT APPROVAL

____ GRADING/PAVING PERMIT APPROVAL

X OTHER WORK ORDERS (SPECIFY)

RECEIVED OCT 24 1991 HYDROLOGY DIVISION

DATE SUBMITTED: 10/24/91

BY: Michael J. Yost

* (PAD SIZES INCREASED) SEE LETTER DATED 10/24/91

25 X

0000 0000 0901

community sciences corporation

October 24, 1991

RECEIVED
OCT 24 1991

Mr. Fred Aguirre, P.E.
Hydrology Section/Public Works Department
City of Albuquerque
Post Office Box 1263
Albuquerque, New Mexico 87103-1263

SUBJECT: Richfield Subdivision (formerly Heritage East Unit 7), Albuquerque, New Mexico - DRB No. 87-363, DRC No. 3464

RE: Recent conversations with Doug Reynolds

Dear Mr. Aguirre:

Please find enclosed a set of plans for the subject project. The plans have been submitted to the DRC and the "sign-off" session has been scheduled for Wednesday, October 30, 1991.

Please note that we have revised the final grading plan (sheet 3 of 12) to reflect the developer's request for larger pad sizes. I believe Mr. Reynolds has discussed this issue with you. These larger pads are not intended to necessarily reflect larger houses, but rather to provide greater flexibility concerning the size and shape of the floor plans that the lots can sustain. In any case, we have reviewed the impact these layer pads will have on the hydrology if we conservatively assume that the entire pad would be occupied by roof area. To demonstrate the impact this assumption would have I modeled "Basin A" (reference Drainage Management Plan for Heritage East Unit 7, prepared and approved in 1987). The results of our comparison can be summarized as follows:

DATE	MODEL	AREA (SQ. MI.)	IMPERVIOUS AREA (%)	TC (MIN.)	Q100 (CFS)
1987	MODSCS	.0095	51	6	18.6
1991	AHYMO991	.0095	67	12	27.5

The 18 inch RCP that drains this basin has a 29.8 CFS capacity. Therefore, in my opinion, the more conservative assumption (and the more conservative model) does not yield an expected peak flow that adversely affects the drainage scheme.

Please advise me as soon as you have had an opportunity to examine the material enclosed. If you have any questions or wish to discuss this matter further, please do not hesitate to call m at 897-0000.

Very truly yours,

Michael J. Yost

Michael J. Yost, P.E.

Enclosures: Drainage Information Sheet
DRC Plan Set

CC: Ben Spencer
Doug Reynolds

MJY:jbb

CSC#252-02-605 - OCT-019.DOC

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CIVIL ENGINEERING
DEVELOPMENT CONSULTANTS

P.O. Box 1328
Corrales, New Mexico 87048
(505) 897-0000

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FILE COPY

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

Ken Schultz
Mayor

UTILITY DEVELOPMENT DIVISION
HYDROLOGY SECTION
(505) 768-2650

August 24, 1987

Kent Whitman, P.E.
Community Sciences Corporation
Post Office Box 1328
Corrales, New Mexico 87048

RE: FINAL GRADING & EROSION CONTROL PLAN SUBMITTAL OF HERITAGE EAST, UNIT 7, RECEIVED AUGUST 11, 1987 FOR WORK ORDER AND FINAL PLAT APPROVAL (D-20/D3G)

Dear Kent:

The above referenced submittal dated July 23, 1987 is approved as the Final Grading Plan for inclusion with the Work Order construction set. Drawings can be signed off by Hydrology at the D.R.C.

Contractor is approved to proceed with grading of the site in accordance with these approved plans.

Final Plat sign-off by the City Engineer will require an executed Subdivision Improvements Agreement.

If you have any further questions, call me at 768-2650.

Cordially,

Roger A. Green, P.E.
C.E./Hydrology

cc: Allen Ortega, BCD

RAG/bsj

PUBLIC WORKS DEPARTMENT
Walter Nickerson, P.E., City Engineer
ENGINEERING GROUP
Telephone (505) 768-2500

AN EQUAL OPPORTUNITY EMPLOYER

25 × 10

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FILE COPY

City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

Ken Schultz
Mayor

UTILITY DEVELOPMENT DIVISION
HYDROLOGY SECTION
(505) 768-2650

August 12, 1987

Kent Whitman, P.E.
Community Sciences Corporation
P. O. Box 1328
Corrales, New Mexico 87048

RE: GRADING PLAN SUBMITTAL FOR HERITAGE EAST, UNIT SEVEN, FOR ROUGH GRADING PERMIT (D20/D3G)

Dear Kent:

The grading plan referred to above, with an engineer's stamp date of July 23, 1987, and received by us on July 24, 1987, is approved for rough grading permit. The contractor will need to secure a Topsoil Disturbance Permit before beginning work.

If you have any questions, or if I can be of any further help, please call me at 768-2650.

Cordially,

Stuart Reeder

G. Stuart Reeder, P.E.
C.E./Hydrology Section

XC: Alan Ortega, BCD
Becky Sandoval, Permits

gsr:eh

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DRAINAGE INFORMATION SHEET

PROJECT TITLE: Heritage East, Unit 7 ZONE ATLAS/DRNG. FILE#: D-20 / D36

LEGAL DESCRIPTION: Heritage East, Unit 7, Tract C

CITY ADDRESS: Palomas & Ventura, N.E.

ENGINEERING FIRM: Community Sciences Corporation CONTACT: Kent M. Whitman

ADDRESS: Box 1328, Corrales, N.M. 87048 PHONE: 897-0000

OWNER: Bellamah Community Development CONTACT: Allen Ortega

ADDRESS: Box 3300, Albuquerque, N.M. 87190 PHONE: 884-6606

ARCHITECT: N/A CONTACT:

ADDRESS: PHONE:

SURVEYOR: Community Sciences Corporation CONTACT: Skip Carleton

ADDRESS: Box 1328, Corrales, N.M. 87048 PHONE: 897-0000

CONTRACTOR: N/A CONTACT:

ADDRESS: PHONE:

PRE-DESIGN MEETING:

____ YES

X NO

____ COPY OF CONFERENCE RECAP SHEET PROVIDED

RECEIVED AUG 11 1987 HYDROLOGY SECTION

DRB NO. 87-363

EPC NO.

PROJ. NO.

TYPE OF SUBMITTAL:

____ DRAINAGE REPORT

____ DRAINAGE PLAN

____ CONCEPTUAL GRADING & DRAINAGE PLAN

X GRADING PLAN

X EROSION CONTROL PLAN

____ ENGINEER'S CERTIFICATION

CHECK TYPE OF APPROVAL SOUGHT:

____ SKETCH PLAT APPROVAL

____ PRELIMINARY PLAT APPROVAL

____ SITE DEVELOPMENT PLAN APPROVAL

____ FINAL PLAT APPROVAL

____ BUILDING PERMIT APPROVAL

____ FOUNDATION PERMIT APPROVAL

____ CERTIFICATE OF OCCUPANCY APPROVAL

____ ROUGH GRADING PERMIT APPROVAL

____ GRADING/PAVING PERMIT APPROVAL

X OTHER FINAL GRADING

DATE SUBMITTED: 6/16/87

BY: Kent M. Whitman

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DRAINAGE INFORMATION SHEET

PROJECT TITLE: HERITAGE EAST UNIT 7 ZONE ATLAS/DRNG. FILE #: D-20/D3G

LEGAL DESCRIPTION: T11N, R4E, SECTION 20; PARCEL C of HERITAGE EAST UNIT 5

CITY ADDRESS: SE CORNER of INTERSECTION of PALOMAS & VENTURA

ENGINEERING FIRM: COMMUNITY SCIENCES CORP. CONTACT: KENT WHITMAN

ADDRESS: BOX 1328; CORRALES, NM 87048 PHONE: 897-0000

OWNER: BELLAMAH COMMUNITY DEVELOPMENT CONTACT: ALAN ORTEGA

ADDRESS: BOX 3300; ALBUQUERQUE 87190 PHONE: 884-6606

ARCHITECT: N/A CONTACT: _____

ADDRESS: _____ PHONE: _____

SURVEYOR: COMMUNITY SCIENCES CORP CONTACT: SKIP CARLETON

ADDRESS: BOX 1328; CORRALES, NM PHONE: 897-0000

CONTRACTOR: N/A CONTACT: _____

ADDRESS: _____ PHONE: _____

RECEIVED
JUL 27 1987
HYDROLOGY SECTION

PRE-DESIGN MEETING:

___ YES

X NO

___ COPY OF CONFERENCE RECAP SHEET PROVIDED

DRB NO. 87-363

EPC NO. _____

PROJ. NO. _____

TYPE OF SUBMITTAL:

___ DRAINAGE REPORT

___ DRAINAGE PLAN

___ CONCEPTUAL GRADING & DRAINAGE PLAN

X GRADING PLAN

X EROSION CONTROL PLAN

___ ENGINEER'S CERTIFICATION

CHECK TYPE OF APPROVAL SOUGHT:

___ SKETCH PLAT APPROVAL

___ PRELIMINARY PLAT APPROVAL

___ SITE DEVELOPMENT PLAN APPROVAL

___ FINAL PLAT APPROVAL

___ BUILDING PERMIT APPROVAL

___ FOUNDATION PERMIT APPROVAL

___ CERTIFICATE OF OCCUPANCY APPROVAL

X ROUGH GRADING PERMIT APPROVAL

___ GRADING/PAVING PERMIT APPROVAL

___ OTHER _____ (SPECIFY)

DATE SUBMITTED: 7-23-87

BY: [signature]

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community sciences corporation

RECEIVED
JUL 17 1987
HYDROLOGY SECTION

July 16, 1987

D20/D3G
D3E

Roger A. Green, P.E.
Hydrology Section
City of Albuquerque
P. O. Box 1293
Albuquerque, New Mexico 87103

Re: Heritage East, Units 6 and 7 Grading Plans

Dear Roger:

Please find attached a proposed revision to the grading plan for Heritage East, Units 6 and 7. We are suggesting this change to avoid cross-lot drainage (and the required private drainage easements).

If you find this scheme acceptable, please give us a call at your earliest convenience and we will adjust the originals accordingly as a formal change order to Unit 6 and a revision to Unit 7.

If you have any questions, or wish to discuss this matter further, please do not hesitate to call me at 897-0000.

Sincerely,

Kate Shattuck

MKS/bjc

Enclosure: as stated

cc: Alan Ortega, BCD

CSC# 73-37-062
HE-050

7/17/87
No Objection. Make required submittals.
(Talked to Mike Yost by phone)
RAGreen

P.O. Box 1328
Corrales, New Mexico 87048
(505) 897-0000

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CIVIL ENGINEERING
DEVELOPMENT CONSULTANTS

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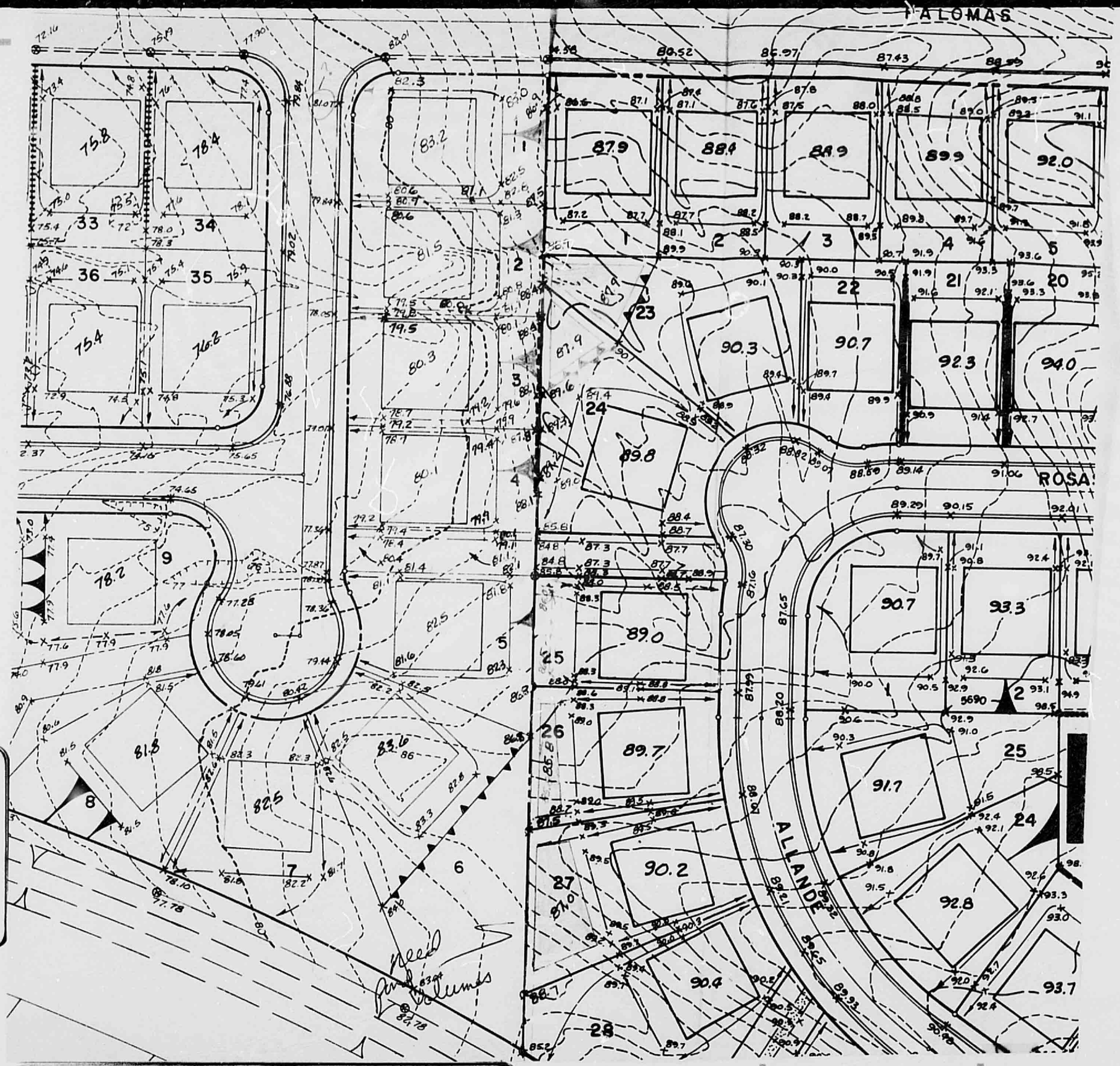
PALOMAS
ROSA
ALLANDE
Need for Volumes

0000 0000 0908

FILE COPY

City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

Ken Schultz
Mayor

UTILITY DEVELOPMENT DIVISION
HYDROLOGY SECTION
(505) 768-2650

July 7, 1987

Kent Whitman, P.E.
Community Sciences Corporation
Post Office Box 1328
Corrales, New Mexico 87048

RE: DRAINAGE REPORT SUBMITTAL OF HERITAGE EAST, UNIT 7 SUBDIVISION RECEIVED JULY 6, 1987 FOR PRELIMINARY PLAT APPROVAL (D-20/D3G)

Dear Kent:

The above referenced submittal, revised July 6, 1987, is approved for Preliminary Plat and infrastructure list sign-off by the City Engineer.

A Final detailed Grading Plan and storm drain hydraulic calculations must be submitted to this office for review and approval prior to Hydrology's sign-off on the Work Order construction drawings.

Prior to Final Plat sign-off by the City Engineer, an executed Subdivision Improvements Agreement is required.

If you have any questions, call me at 768-2650.

Cordially,

Roger A. Green, PE

Roger A. Green, P.E.
C.E./Hydrology

cc: Andre Houle, DRC
Allen Ortega, BCD

RAG/bsj

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community sciences corporation

July 6, 1987

RECEIVED
JUL 06 1987
HYDROLOGY SECTION

Mr. Roger Green
City Hydrology
City of Albuquerque
P.O. Box 1293
Albuquerque, New Mexico 87103

Re: Heritage East, Unit 7

Dear Roger:

Enclosed please find revised copies of Table 1, Table 2, Table 3, and Plate 2 of the Drainage Management Plan for the above referenced project. I have attempted to address each of your comments with these revisions. Please note that we evaluated the Palomas storm sewer performance for 10 year conditions and found flows to be 100% intercepted, thereby eliminating any overflow for 10 year conditions.

I hope you will find these revisions in order. Please advise as soon as you have had an opportunity to examine the material enclosed.

Sincerely yours,

Kent M. Whitman

Kent M. Whitman, P.E.

KMW/vo

cc: Allen Ortega

CSC #73-51-062
HE-048

P.O. Box 1326
Corrales, New Mexico 87048
(505) 897-0000

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DEVELOPMENT CONSULTANTS

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```
*** DESIGN SUMMARY TABLE FOR INLET *** TYPE C
PLANE SECTION
COMBINATION, SUMP
INCLINED THROAT - THROAT ANGLE  80
HEIGHT OF INLET OPENING =  6
P-1-7/8-4


DEPTH OF FLOW (FT) =  .76
WIDTH OF SPREAD =  37.83

LENGTH OF INLET =  3
GRATE WIDTH =  2
CURB OPENING LENGTH =  3
WIDTH OF SPECIAL SHAPING =  3
DEPRESSION OF INLET =  3.75
MANNINGS N =  .017
STREET GRADE =  .0258
STREET WIDTH =  72
CROSS SLOPE =  .02
TOTAL DISCHARGE =  18.6
INTERCEPTED FLOW =  18.6
BY-PASS FLOW =  0
INLET INTERCEPTION EFFICIENCY =  1
GRATE CLOGGING FACTOR =  .85
CURB OPENING CLOGGING FACTOR =  1
 0  OF GRATE OF APPLIED TO REDUCE LENGTH
```

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FILE COPY

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

Ken Schultz
Mayor

UTILITY DEVELOPMENT DIVISION
HYDROLOGY SECTION
(505) 768-2650

July 2, 1987

Kent Whitman, P.E.
Community Sciences Corporation
Post Office Box 1328
Corrales, New Mexico 87048

RE: DRAINAGE REPORT SUBMITTAL OF HERITAGE EAST, UNIT 7 SUBDIVISION RECEIVED JUNE 15, 1987 FOR PRELIMINARY PLAT APPROVAL (D-20/D3G)

Dear Kent:

I have reviewed the above referenced submittal dated June 1987, and have the following items to be addressed prior to Preliminary Plat approval at the DRB:

1. In your report, Section E - off-site drainage, and on Plate 2, the method of accepting and conveying off-site flows from the east across and through the residential lots is not addressed. Private Drainage Easements will be required along with the method of conveyance identified.

2. The 18" storm drain for Drainage Basin A should be within a Public Drainage Easement. A Public Right-of-Way is not required due to the small discharge rate. This was not labeled on Plate 2 or mentioned in the report.

3. Table 2 of Report - Ventura is a minor arterial street, therefore provide calculations that the driving lane is free of flowing water under the ten year runoff condition.

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4. Table 3 of Report - flows from Palomas Avenue are not allowed to cross the intersection with Ventura, since Ventura is a minor arterial. Provide calculations for the ten year conditions to show that the jump depth or pool depth is less than the crown in the intersection.

5. Provide the hydrology printouts for analysis point C showing how the Q peak of 32.9 cfs was determined. The information provided adds up to a Q peak of 51.5 cfs.

6. What temporary construction is required to convey the flows off from Ventura into the arroyo until the bridge is in place?

If you have any questions, call me at 768-2650.

Cordially,

Roger A Green, PE

Roger A. Green, P.E.
C.E./Hydrology Section

cc: Allen Ortega, BCD

RAG/bsj

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Bellamah Community Development

6121 Indian School Road, N.E.
P.O. Box 3300
Albuquerque, New Mexico 87190
(505) 884-6606

HAND DELIVERED

SIGNED OFF PLAT 6/19/87

RECEIVED
JUN 19 1987
HYDROLOGY SECTION

June 19, 1987

Mr. Fred Aguirre
Hydrology Section
City of Albuquerque
P.O. Box 1293
Albuquerque, New Mexico 87103

RE: Heritage East Unit 6

Dear Fred:

In reference to Paragraph 2 of Roger Green's letter dated April 22, 1987, Bellamah Community Development, as owner of Parcel "C" of Heritage East, Unit 5, has submitted to the City of Albuquerque a Preliminary Plat and a Drainage Report showing how the drainage outfall of Heritage East Unit 6 can be accommodated. The Development Review Board is scheduled to act on this matter on June 30, 1987. BCD will then implement this drainage solution with the development of Heritage East Unit 7 (Parcel "C").

Sincerely,

BELLAMAH COMMUNITY DEVELOPMENT

Alan Ortega
Development Coordinator

AO/mls

D20-3G

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community sciences corporation

RECEIVED
JUN 1987
HYDROLOGY SECTION

DRAINAGE MANAGEMENT PLAN
FOR
HERITAGE EAST, UNIT 7, SUBDIVISION

PREPARED FOR:

BELLAMAH COMMUNITY DEVELOPMENT

PREPARED BY:

COMMUNITY SCIENCES CORPORATION

JUNE, 1987

KENT M. WHITMAN
NEW MEXICO
6170
REGISTERED PROFESSIONAL ENGINEER

Kent M. Whitman

KENT M. WHITMAN, P.E.

RECEIVED
JUN 1987
HYDROLOGY SECTION

P.O. Box 1326
Corrales, New Mexico 87048
(505) 897-0000

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DRAINAGE INFORMATION SHEET

PROJECT TITLE: Heritage East, Unit 7 ZONE ATLAS/DRNG. FILE#: D-20/036 3G

LEGAL DESCRIPTION: Heritage East, Unit 7, Tract C

CITY ADDRESS: Palomas & Ventura, N.E.

ENGINEERING FIRM: Community Sciences Corporation CONTACT: Kent M. Whitman

ADDRESS: Box 1328, Corrales, N.M. 87048 PHONE: 897-0000

OWNER: Bellamah Community Development CONTACT: Allen Ortega

ADDRESS: Box 3300, Albuquerque, N.M. 87190 PHONE: 884-6606

ARCHITECT: N/A CONTACT:

ADDRESS: PHONE:

SURVEYOR: Community Sciences Corporation CONTACT: Skip Carleton

ADDRESS: Box 1328, Corrales, N.M. 87048 PHONE: 897-0000

CONTRACTOR: N/A CONTACT:

ADDRESS: PHONE:

RECEIVED JUN 15 1987 HYDROLOGY SECTION

PRE-DESIGN MEETING:

____ YES

X NO

____ COPY OF CONFERENCE RECAP SHEET PROVIDED

DRB NO. 87-363

EPC NO.

PROJ. NO.

TYPE OF SUBMITTAL:

____ DRAINAGE REPORT

X DRAINAGE PLAN

____ CONCEPTUAL GRADING & DRAINAGE PLAN

____ GRADING PLAN

____ EROSION CONTROL PLAN

____ ENGINEER'S CERTIFICATION

CHECK TYPE OF APPROVAL SOUGHT:

____ SKETCH PLAT APPROVAL

X PRELIMINARY PLAT APPROVAL

____ SITE DEVELOPMENT PLAN APPROVAL

____ FINAL PLAT APPROVAL

____ BUILDING PERMIT APPROVAL

____ FOUNDATION PERMIT APPROVAL

____ CERTIFICATE OF OCCUPANCY APPROVAL

____ ROUGH GRADING PERMIT APPROVAL

____ GRADING/PAVING PERMIT APPROVAL

____ OTHER _____ (SPECIFY)

DATE SUBMITTED: 6/16/87

BY: Kent M. Whitman

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Appendix B-	Sample Calculations	

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A) Purpose and Scope

Bellamah Community Development is currently planning development of their 10 acre, Heritage East, Unit 7, Subdivision in northeast Albuquerque. The Development will consist of approximately 40, one sixth acre, R1 lots intended for the tract home market. The purpose of this report is to present an overall drainage management plan for the project which is based on sound engineering practice and which is acceptable to both the City of Albuquerque and the Albuquerque Metropolitan Arroyo Flood Control Authority.

B) Site Location and Topography

Heritage East, Unit 7, is located in northeast Albuquerque at the southeasterly corner of the intersection of Palomas Ave. and Ventura Blvd. (see Plate 1).

The land slopes generally from east to west at an average rate of 2.6%. Soils consist largely of alluvial sands and silts, and decomposed granite is the major soil constituent. All soils within project boundaries and offsite watersheds fall into hydrologic soil group B.

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C) Design Criteria

1) Engineering Parameters

In accordance with AMAFCA and City of Albuquerque Drainage Criteria all hydrological analysis is based on the 100 year frequency - 6 hour duration storm as represented in the NOAA atlas for New Mexico. 10 year, six hour values are also pertinent to certain conditions in accordance with City drainage policies regarding 10 year street flow in residential, collector and arterial streets. The four rainfall values pertinent to the study are as follows:

	10 Year	100 Year
One Hour	1.35"	2.2"
Six Hour	1.85"	2.8"

A fraction impervious of 0.51 was calculated for onsite, R1 lots, and a curve number of 70 was selected for the balance of pervious areas. For offsite areas (composed of North Albuquerque Acres lots) a fraction impervious of 0.11 was estimated, while 75 was selected for the associated CN pervious.

2) Flood Control Regulations

The drainage plan presented in this report has been designed to comply with the current City of Albuquerque Drainage Ordinance (and associated technical criteria as published in the Development Process Manual).

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D) Computational Procedures

The analysis approach utilized follows standard engineering practice. Key points of confluence were selected, and subsequently the associated individual and aggregate contributing basins were defined.

Hydrological computations were accomplished by means of our MODSCS Computer model. This model is based upon the Soil Conservation Service Triangular unit hydrograph method, but the method has been modified to be more applicable to developed watershed conditions. The model avoids the common pitfall of grappling for an appropriate developed curve number by including percent impervious as an input variable. This fraction of the watershed is then modeled at a curve number of 95. An assigned curve number is applied to the balance of the watershed, and the runoffs are combined to yield the composite hydrograph.

In addition the model has the capacity to route hydrographs through reservoirs and channels, or to translate hydrographs in time for summation with other sub basins.

For basins with a mix of subcatchments and corresponding variations in fractions impervious, a composite value was calculated.

25×10

Times of concentration were estimated by using a combination of approximated street flow velocities and overland flow velocities (as applicable) from the upper subcatchment reaches to the confluence point of interest. A convenient formula for overland flow velocity takes the form:

$$Vo = KY^{0.5}$$

where Vo = overland flow velocity
Y = average ground slope in percent
K = a ground cover factor

Street velocities were estimated by use of the Manning equation for uniform flow.

For some watersheds with well defined stream beds the California Highways formula for time of concentration was used to estimate the parameter directly. The equation takes the form:

$$Tc = \left[\frac{11.9\ L^3}{H}\right]^{.385}$$

where

Tc is time of concentration in hours
L is reach length in miles
H is differential elevation in feet

All the characteristic hydrological parameters for each subcatchment of interest and each key point of confluence are contained in Appendix A as part of the computer model output, and a summary of parameters and peak flow rates are given in Table 1. For small subcatchments 10 year flows are typically estimated at 50% of 100 year values.

25×10

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Following hydrological modeling street flow characteristics were analyzed by various methods. For uniform flow conditions the Manning equation with an n of 0.017 was applied by means of our normal street flow depths analysis program. At intersections the worst of two conditions was assumed. The theoretical hydraulic jump depth for upstream flow conditions was computed followed by the theoretical pool depth to accelerate the flow from 0 velocity head to downstream conditions. Whichever value was higher was assumed to be the potential flood depth. It should be noted that this approach is valid only for incoming supercritical flow conditions at tee intersections. Subcritical flow conditions are not considered critical at intersections unless normal flow depth is above required limits. Table 2 summarizes uniform street flow conditions at key locations while Table 3 presents computed parameter values at critical intersections. Sample calculations are included in Appendix B.

E) Offsite Drainage

Plate 2 illustrates the basins contributing runoff onto or toward Heritage East, Unit 7. Offsite areas lie within the platting limits of North Albuquerque Acres, a grid-iron subdivision of one acre lots which continues to develop slowly on a lot by lot basis into single family, custom residences. Inlet overflow of 14.1 cfs in Palomas Blvd. (from the Heritage East, Unit 6, project) will join runoff

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from Area B in Palomas Blvd. These flows will combine with runoff from Area C, which is composed largely of the Ventura Blvd. R.O.W., and be directed by Ventura Blvd. to rundowns in the Ventura bridge crossing of the Domingo Baca Arroyo.

How about Residential lots to the East?

F) Onsite Drainage

The key elements of the onsite drainage management plan are depicted on Plate 2. With the exception of lots fronting on Palomas, and the rears of yards backing up to the Domingo Baca channel, Palomas or Ventura, all onsite runoff is conveyed via the internal project streets to a cul de sac at the westerly end of the site. Here it will be intercepted by a single type C inlet and conveyed by an 18" storm sewer thru easement to an existing 36" reservoir overflow line in Ventura Blvd. This line discharges a few hundred feet west into the existing Domingo Baca Channel.

G) 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 each home is constructed and sold. Plate 3 illustrates the dimensions of these berms, and they will be located along those boundaries of each lot which are common to City rights of way or public easement.

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TABLE 1
HYDROLOGICAL FLOW PARAMETERS

AREA POINT DESIGNATION	AREA MI.^{2}	CONTRIBUTING AREAS	GROSS AREA MI.^{2}	FRACTION IMPERVIOUS	CN PERVIOUS	Tc MIN.	Q_{100} cfs (6 hr.)	Q_{10} cfs (6 hr.)	REMARKS
7	-	-	-	-	-	-	14.1	0.0	100 year storm inlet overflow amount - See Report for Heritage East, Unit 6. All 10 year flows intercepted by Storm Sewer at Point 7.
A	0.0095	A	.0095	0.51	70	6.0	18.6	9.2	
B	0.0091	7, B	.0091	0.29	73	5.0	29.1	6.5	Overflow from Heritage East Unit 6 added.
C	0.0018	7, B, C	.0018	.58	70	3.0	32.9	8.5	Overflow from Heritage East, Unit 6 and flow from Area B added.

Note: Flow for Point C was estimated by adding the individual flows from point 7, area B, and area C - See Appendix A

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TABLE 2
STREET FLOW CHARACTERISTICS
AT CRITICAL POINTS OF CONFLUENCE

POINT DESIGNATION	100 YEAR PEAK FLOW	10 YEAR PEAK FLOW	ESTIMATED STREET SLOPE	100 YEAR FLOW DEPTH	10 YEAR FLOW DEPTH	10 YEAR VELOCITY	10 YEAR V x D	REMARKS
A	18.6	9.2	0.0258	0.38	0.31	3.49	1.08	OK
B	29.1	8.5	0.005	0.56	0.33	3.81	1.26	OK
C	32.9	8.5	0.0082	0.56	0.43	2.51	1.08	Based on an estimated 7.5 cfs. held on east side leaving both west side lanes "dry"

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TABLE 3
FLOW CHARACTERISTICS AT KEY INTERSECTIONS

POINT DESIGNATION	INTERSECTION	LOCATION	Q	STREET WIDTH	SLOPE	D_N	V_N	F	D_C	V_C	JUMP DEPTH = $\frac{-Y_1}{2}+\sqrt{\left(\frac{Y_1}{2}\right)+\frac{2V_1^2Y_1}{G}}$	POOL DEPTH = $D+\frac{1.25\Delta V^2}{2G}$	SPECIAL REQUIREMENTS
B	I1	UPSTREAM	29.1	40	0.005	0.56	2.64	0.89	-	-	N/A		OK (100 yr.)
		DOWNSTREAM	29.1	50	0.0082	0.53	2.95	1.10	0.55	2.64		0.69	OK (100 yr.)
B	I1	UPSTREAM	6.5	40	0.005	0.35	1.71	0.80	-	-	N/A		OK (10 yr.)
		DOWNSTREAM	6.5	50	0.0082	0.39	2.31	1.04	0.33	2.01		0.41	OK (10 yr.)- flows held to east side assuming continuation of normal crown

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APPENDIX A

MODSCS OUTPUT

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AREA/POINT DESIGNATION = B
AREA = 9.099999E-03 SQ MI
1 HR RAIN = 2.2 INCHES
6 HR RAIN = 2.8 INCHES
TC= 5 MINUTES
FRAC IMPERV= .29
CN (PERVIOUS)= 73
CN (IMPERVIOUS)= 95

PEAK ONLY OUTPUTTED

TIME	Q(CFS)
238	15.0

VOL. = 24888.19 CF

POINT B ADDED TO MAIN FLOWS

TIME	Q(CFS)
185	0.1
190	0.2
195	0.2
200	0.8
205	0.9
210	0.9
215	2.7
220	3.0
225	3.0
230	13.2
235	15.0
240	15.0
245	5.6
250	3.9
255	3.9
260	1.4
265	0.9
270	0.9
275	0.8
280	0.7
285	0.7
290	0.7
295	0.7
300	0.7
305	0.5
310	0.5
315	0.5

14.1
15.0
29.1 ✓

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320	0.6
325	0.6
330	0.6
335	0.5
340	0.5
345	0.5
350	0.4
355	0.4
360	0.4

AREA/POINT DESIGNATION = C
AREA = .0018 SQ MI
1 HR RAIN = 2.2 INCHES
6 HR RAIN = 2.8 INCHES
TC= 3 MINUTES
FRAC IMPERV= .58
CN (PERVIOUS)= 70
CN (IMPERVIOUS)= 95

PEAK ONLY OUTPUTTED

TIME	Q(CFS)
238	3.8

VOL. = 6533.468 CF

29.1
3.8
32.9 ✓

POINT C ADDED TO MAIN FLOWS

TIME	Q(CFS)
170	0.1
175	0.1
180	0.1
185	0.2
190	0.2
195	0.2
200	1.1
205	1.2
210	1.2
215	3.6
220	4.0
225	4.0
230	16.6
235	18.8
240	18.8
245	6.9
250	4.8
255	4.8

14.1
18.8
32.9 ✓

25×

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260	1.7
265	1.2
270	1.2
275	0.9
280	0.9
285	0.9
290	0.9
295	0.9
300	0.9
305	0.7
310	0.6
315	0.6
320	0.7
325	0.8
330	0.8
335	0.6
340	0.6
345	0.6
350	0.5
355	0.5
360	0.5

25×10

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AREA/POINT DESIGNATION = A
AREA = .0095 SQ MI
1 HR RAIN = 2.2 INCHES
6 HR RAIN = 2.8 INCHES
TC= 6 MINUTES
FRAC IMPERV= .51
CN (PERVIOUS)= 70
CN (IMPERVIOUS)= 95

PEAK ONLY OUTPUTTED

TIME	Q(CFS)
233	18.6

VOL = 31934.83 CF

POINT A ADDED TO MAIN FLOWS

TIME	Q(CFS)
140	0.1
145	0.1
150	0.1
155	0.1
160	0.1
165	0.1
170	0.2
175	0.2
180	0.2
185	0.3
190	0.3
195	0.3
200	1.4
205	1.6
210	1.6
215	4.4
220	4.9
225	4.9
230	16.6
235	18.6
240	18.6
245	6.6
250	4.5
255	4.5
260	1.6
265	1.1
270	1.1

18.6 A
18.8 C+B
14.1 OFFSITE
51.5

18.6
29.1 ?
47.7

where is printout
OK
for

25×10

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275	0.9
280	0.8
285	0.8
290	0.8
295	0.8
300	0.8
305	0.6
310	0.6
315	0.6
320	0.7
325	0.7
330	0.7
335	0.6
340	0.6
345	0.6
350	0.5
355	0.4
360	0.4

25×10

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AREA/POINT DESIGNATION = A
AREA = .0095 SQ MI
1 HR RAIN = 1.35 INCHES
6 HR RAIN = 1.85 INCHES
TC= 6 MINUTES
FRAC IMPERV= .51
CN (PERVIOUS)= 70
CN (IMPERVIOUS)= 95

PEAK ONLY OUTPUTTED

TIME	Q(CFS)
240	9.2

VOL = 17111.85 CF

POINT A ADDED TO MAIN FLOWS

TIME	Q(CFS)
170	0.1
175	0.1
180	0.1
185	0.2
190	0.2
195	0.2
200	0.7
205	0.8
210	0.8
215	2.3
220	2.6
225	2.6
230	8.2
235	9.2
240	9.2
245	3.3
250	2.3
255	2.3
260	1.0
265	0.8
270	0.8
275	0.6
280	0.6
285	0.6
290	0.6
295	0.6
300	0.6

25×10

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305	0.4
310	0.4
315	0.4
320	0.5
325	0.5
330	0.5
335	0.4
340	0.4
345	0.4
350	0.3
355	0.3
360	0.3

25×10

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AREA/POINT DESIGNATION = B
AREA = 9.099999E-03 SQ MI
1 HR RAIN = 1.35 INCHES
6 HR RAIN = 1.85 INCHES
TC= 5 MINUTES
FRAC IMPERV= .29
CN (PERVIOUS)= 73
CN (IMPERVIOUS)= 95

PEAK ONLY OUTPUTTED

TIME	Q(CFS)
237	6.5

VOL = 12068.22 CF

POINT B ADDED TO MAIN FLOWS

TIME	Q(CFS)
190	0.1
195	0.1
200	0.4
205	0.4
210	0.4
215	1.3
220	1.4
225	1.4
230	5.7
235	6.5
240	6.5
245	2.5
250	1.8
255	1.8
260	0.8
265	0.6
270	0.6
275	0.5
280	0.5
285	0.5
290	0.5
295	0.5
300	0.5
305	0.4
310	0.3
315	0.3
320	0.4

25×10

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325	0.4
330	0.4
335	0.3
340	0.3
345	0.3
350	0.3
355	0.3
360	0.3

AREA/POINT DESIGNATION = C
AREA = .0018 SQ MI
1 HR RAIN = 1.35 INCHES
6 HR RAIN = 1.85 INCHES
TC= 3 MINUTES
FRAC IMPERV= .58
CN (PERVIOUS)= 70
CN (IMPERVIOUS)= 95

PEAK ONLY OUTPUTTED

TIME	Q(CFS)
238	1.9

VOL. = 3580.07 CF

POINT C ADDED TO MAIN FLOWS

TIME	Q(CFS)
185	0.1
190	0.1
195	0.1
200	0.6
205	0.6
210	0.6
215	1.8
220	2.0
225	2.0
230	7.5
235	8.5
240	8.5
245	3.2
250	2.3
255	2.3
260	1.0
265	0.8
270	0.8
275	0.6

25×10

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280	0.6
285	0.6
290	0.6
295	0.6
300	0.6
305	0.5
310	0.4
315	0.4
320	0.5
325	0.5
330	0.5
335	0.4
340	0.4
345	0.4
350	0.3
355	0.3
360	0.3

25×10

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APPENDIX B

SAMPLE CALCULATIONS

25×10

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1. Capacity of Catch Basin

Use Type C

Agrate = 3.2 hgrate = 0.92
Acurb = 1.6 hcurb = 0.84

Use 15% clogging factor for grate

$Q_{grate} = 0.85\ (0.65)\ (3.2)\sqrt{2(32.2)(0.92)} = 13.61$ cfs

$Q_{curb} = 0.65\ (1.6)\sqrt{2(32.2)(0.84)} = 7.65$ cfs

$Q_{total} = Q_{grate} + Q_{curb} = 13.61 + 7.65 = 21.26$ cfs > 18.6 cfs OK

∴ use 1 - Type Single C Catch Basin ✓

2. Capacity of Storm Sewer pipe size

Assume Bottom of catch basin: 49.5'

INV. = 33.45' (36")
INV. = 34.20' (18")

estimate distance 58 + 121 + 4 = 183'

∴ estimate slope = $\frac{49.5 - 34.2}{183} = 0.084$ ft./ft.

Try Slope 0.08 ft./ft.

From Manning Equation:

$$Q = \frac{1.49\ A\ R^{2/3}\ S^{1/2}}{n}$$

Where: S = 0.08 ft./ft.
n = 0.013

Try 18" pipe

$$Q = \frac{1.49\ \pi\ (18/24)^2 (9/24)^{2/3} (0.08)^{1/2}}{0.013} = 29.79 \text{ cfs} > 18.6 \text{ cfs OK}$$

∴ Try 18" RCP pipe ✓

25×10

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HYDRAULIC Gradient Analysis

Project: HERITAGE EAST UNIT 7 (18" PIPE) 73-51-036

Initial Input			Locations From	Locations To	A Friction Losses			B Velocity Losses			C Bend Loss	D Side Flow Loss		E Orifice	Hyd. Grade	
Initial H.G.	Radius	Q_1	Downstream	Upstream	Pipe Length	h	Upstream Invert	Radius 2	Q_2	Junction Coeff.	Angle (Degree)	Q Sideflow	Junction Coeff	Loss Coeff	Elev.	Remarks
36	1.5	18.6	Channel	MH ①	44.54	0.013	33.45								36.45	
								0.75	18.6	1.0					35.42	
											45°				35.77	Rim = 53.02 ok
			MH ①	MH ②	58.	0.013	38.84								40.34	
								0.75	18.6	1.0					40.92	
											52°				41.31	Rim = 53.27 OK
			MH ②	CB	121.	0.013	48.84								50.34	
														0.65	51.97	TC = 54. OK

25 X

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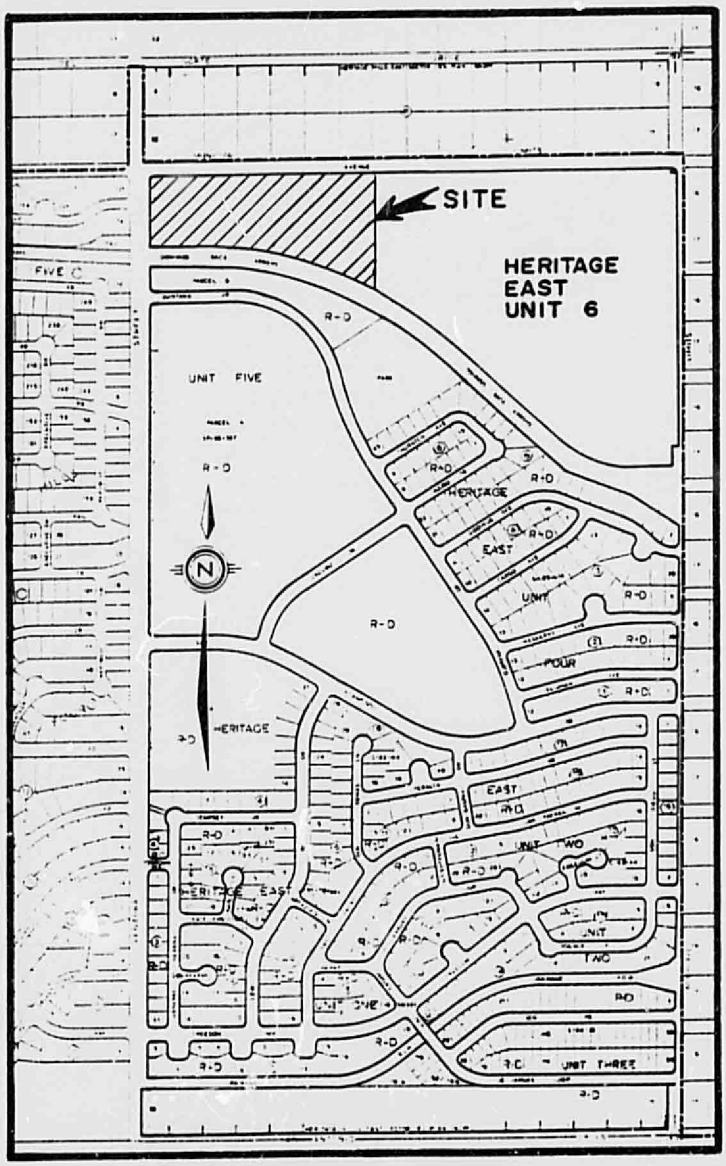
PLATE 1

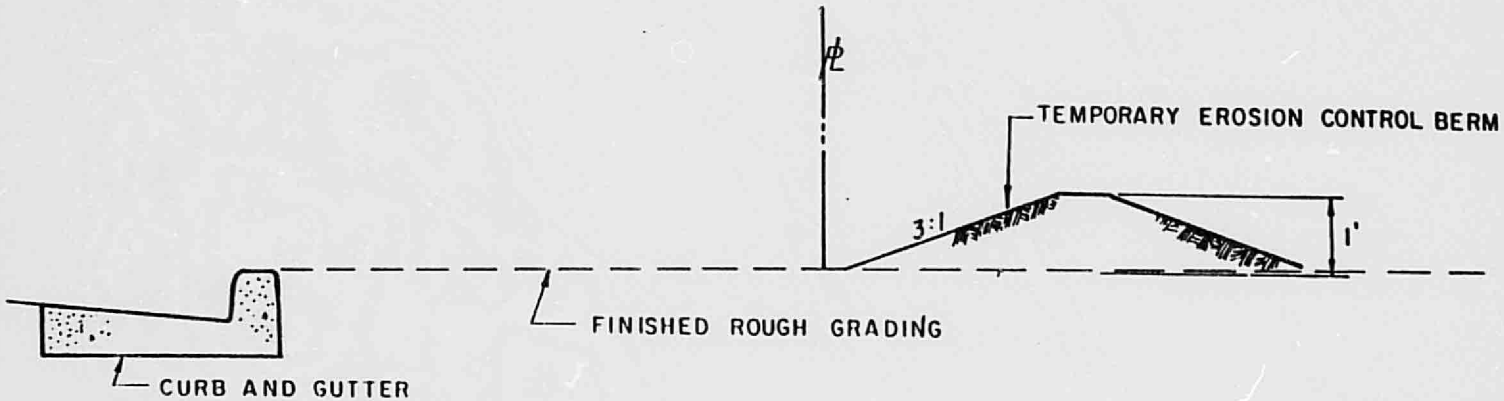


VICINITY MAP

25×10

PLATE 3

TYPICAL EROSION CONTROL BERM



Scale : 1" = 2'

25X

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PLANS/PLATS ON FILE

FILE DESC: D20/D3G

PLANS/PLATS 5

25×

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25×10