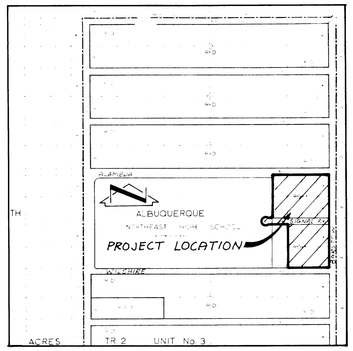
142347



VICINITY MAP C-19

SCALE: 1" = 800' (APPROX.)

PROJECT BENCHMARK

CITY OF ALBUQUERQUE BENCHMARK "HEAVEN", A STANDARD USC & GS BRASS TABLET STAMPED, "HEAVEN 1969", SET IN TOP OF A CONCRETE POST FLUSH WITH THE GROUND. LOCATED AT THE ENTRANCE WAY TO THE "GATE OF HEAVEN" CEMETERY 0.15 MILE WEST OF THE INTERSECTION OF PASEO DEL NORTE N.E. AND WYOMING BLVD. N.E. STATION IS LOCATED ON THE SOUTH SIDE OF PASEO DEL NORTE.
ELEVATION = 5378.78' (M.S.L.D.)

LEGAL DESCRIPTION

LOTS 14-19, INCLUSIVE, BLOCK 15, NORTH ALBUQUERQUE ACRES, TRACT 2, UNIT 3.

TEMPORARY BENCHMARK

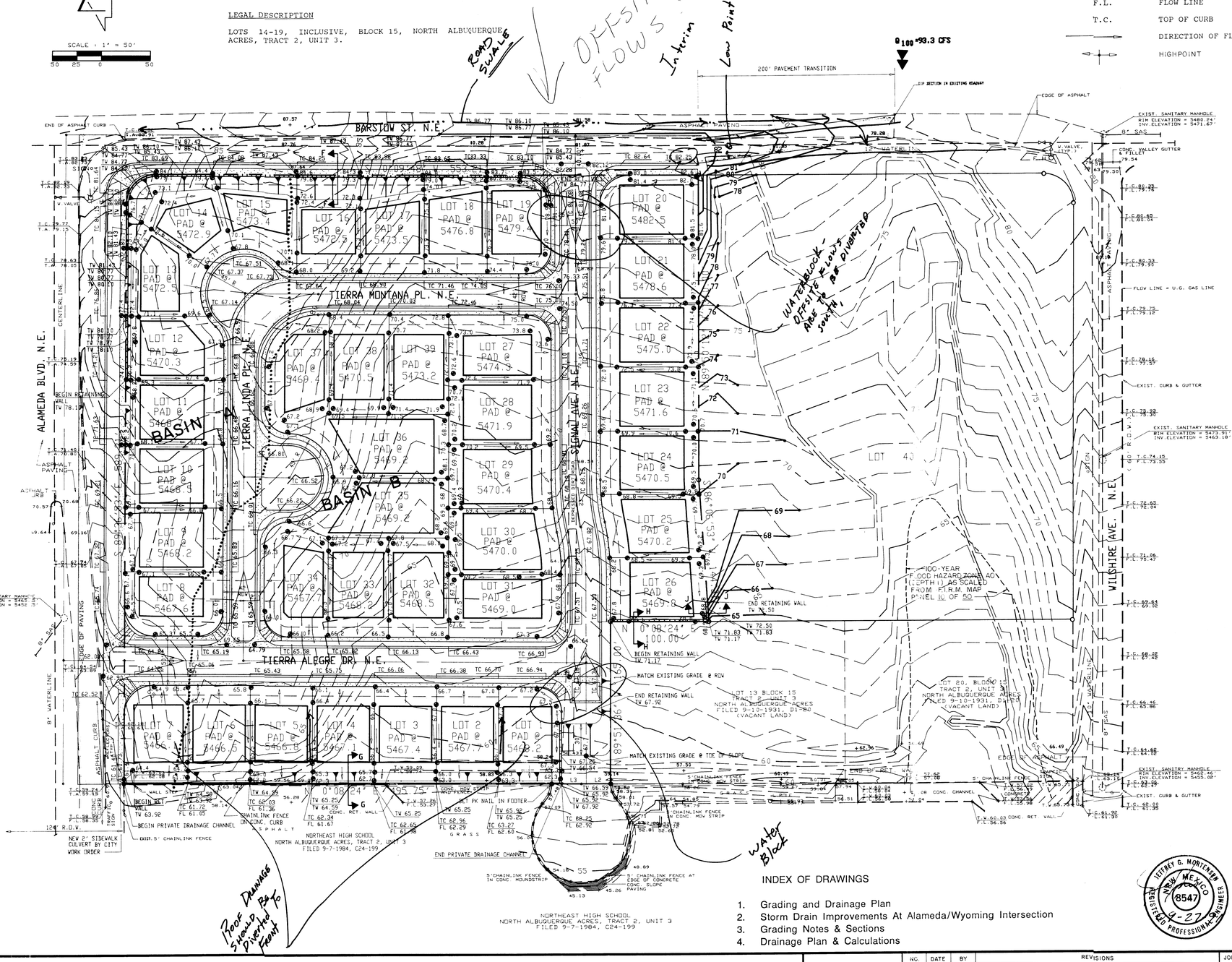
A CHISELED " □ ", ON TOP OF AN EXISTING END WALL AS SHOWN BELOW.
ELEVATION = 5465.72' (M.S.L.D.)

SCALE : 1" = 50'

50 25 0 50

LEGEND

- EXISTING BASIN BOUNDARY LINE
- NEW ASPHALT
- NEW CONCRETE
- F.L. FLOW LINE
- T.C. TOP OF CURB
- DIRECTION OF FLOW
- HIGHPOINT



APPROVED FOR ROUGH GRADING

HYDROLOGY SECTION DATE

INDEX OF DRAWINGS

JEFFREY G. MORTENSEN NEW MEXICO 8547 REGISTERED PROFESSIONAL ENGINEER 9-27-91

SEP 27 1991

JEFF MORTENSEN & ASSOCIATES, INC.
6010-B MIDWAY PARK BLVD. N.E.
ALBUQUERQUE, NEW MEXICO 87109
ENGINEERS & SURVEYORS (505)345-4250

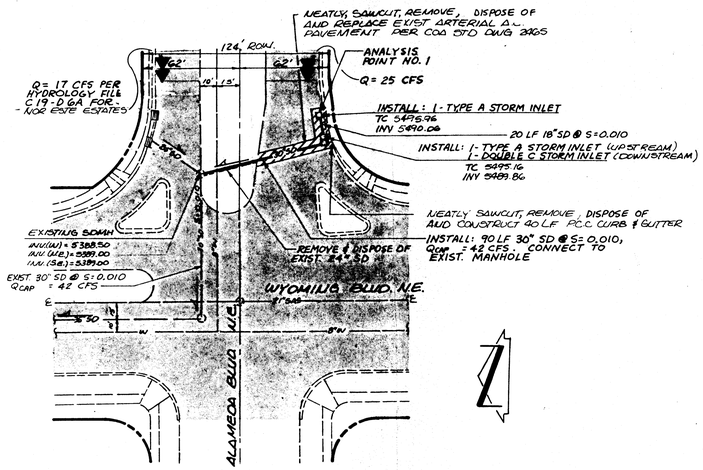
GRADING & DRAINAGE PLAN

TIERRA LA CUEVA
UNIT I

DESIGNED BY J.P.K.
DRAWN BY ACAD
APPROVED BY J.G.M.

NO.	DATE	BY	REVISIONS

JOB NO. 910117
DATE 09 / 91
SHEET 1 OF 4



STORM DRAIN IMPROVEMENT PLAN
SCALE: 1" = 50'

STREET HYDRAULICS AT ANALYSIS POINT #1

1. 100-Year, Half-Street Capacity (See Figure 1)

Manning's Equation: $Q_{cap} = (1.486/n)A(R)^{(2/3)}(S)^{(1/2)}$
n = [6(0.017) + 3.5(0.025) + 35.5(0.017)]/45 = 0.0176
A = 0.5(0.20')10' + 0.5(0.87' + 0.17')35' = 19.2 sf
P = 45' + 0.67' + 0.17' = 45.84'
R = A/P = 19.2/45.84 = 0.419'
S = 0.0350
$Q_{cap} = (1.486/0.176)19.2(0.419)^{(2/3)}(0.0350)^{(1/2)} = 170$ cfs
$Q_{cap} > Q_{100}$ in every case (See Table)

2. 10-Year, Half-Street Capacity (One Lane Open)

Use a form of Manning's Equation for Triangular Gutters:

$Q = (0.468/n)Z(D)^{(8/3)}(S)^{(1/2)}$

Where:
n = 0.017 Per DPM
Z = Reciprocal of Cross Slope = 50
D = Depth at Gutter
S = Street Slope = 0.0350
Leaving one travel lane open, the width of flow is 25'.
Therefore, D = 25'(0.02) = 0.50'
So $Q_{cap} = (0.468/0.017)50(0.50)^{(8/3)}(0.0350)^{(1/2)} = 40.6$ cfs
$Q_{cap} > Q_{10}$ in every case (see Table)

3. Depth of Flow per DPM Requirements.

Use Manning's Equation for Triangular Gutters to calculate D
$D_{100} < 0.87'$ and $D_{10} < 0.50'$, per DPM Requirements
D_{100} and D_{10} meet DPM Requirements in every case (See Table)

4. Depth of Flow for Storm Inlet Capacities.

Use Manning's Equation for Triangular Gutters to calculate D.
(See Table for results)

5. Width of Flow, Given D_{10}

$W_{10} = D_{10}/0.02$
The DPM requires that one travel lane be open.
Because the street width (one-way) at Analysis Point #1 is 35', the ten-year width of flow, W_{10}, must be less than 25'.
$W_{10} < 25'$ in every case (see Table)

6. Velocity of Flow, Given Q_{10} and D_{10}

$V = Q/A$
$A = 25D^2$
$V = Q/(25D^2)$
(See Table for results)

7. $D_{10} \times V_{10} < 6.5$ per DPM Requirements.
$D_{10} \times V_{10} < 6.5$ in every case (see Table)

SUMMARY OF STREET HYDRAULICS AT ANALYSIS POINT NO. 1

CONDITION	Q_{100}(CFS)	Q_{CAP}(CFS)	D_{100}(FT)	Q_{10}(CFS)	Q_{CAP}(CFS)	D_{10}(FT)	W_{10}(FT)	V_{10}(FPS)	$D_{10}XV_{10}$
Existing	28.9	170	0.44	19.0	40.6	0.38	19.0	5.3	2.0
→ Interim (and Inlet 1)	46.8	170	0.53	30.7	40.6	0.45	22.5	6.1	2.7
Ultimate	36.5	170	0.48	24.0	40.6	0.41	20.5	5.7	2.3
Inlet 2	38.2		0.48						

STORM DRAIN CAPACITIES AT ANALYSIS POINT #1

Inlets

Use the Grating Capacity Charts to determine the quantity of runoff discharged

Q_{100} In Street (cfs)	D_{100} (ft)	Inlet Type	Discharge (cfs)	Q_{100} Remaining (cfs)
46.8	0.53	Single A	8.6	38.2
38.2	0.48	Sgl A + Dbl C	7.4 + 9.0	21.8
TOTAL INTO SYSTEM			25	

The Q_{100} into the existing storm drain system via the new inlets on the southeast corner is 25 cfs. The Q_{100} into the existing storm drain system via the existing inlets on the northeast corner is 17 cfs. Thus the total Q_{100} discharged into the system at Analysis Point #1 is 42 cfs.

30" RCP

Use Field's Hydraulic Calculator (Manning's Equation)

Given: n = 0.013, S = 0.01, D = 30",
Then Q = 42 cfs

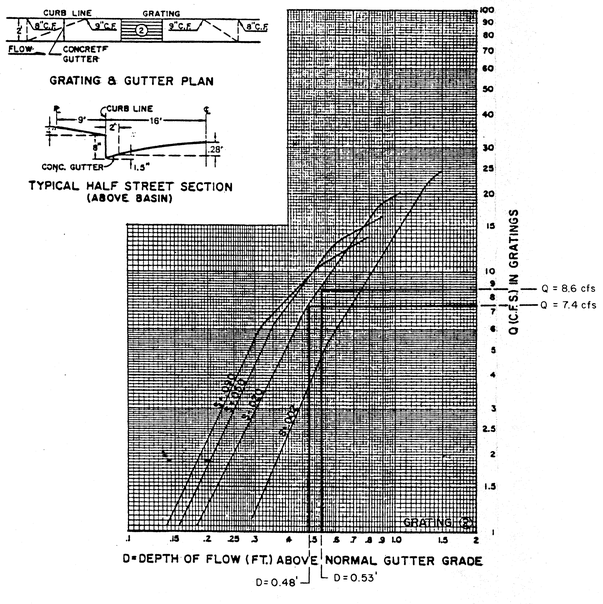
The existing storm drain main line on Alameda at Analysis Point #1 is a 30" RCP pipe at S = 0.01. Thus its capacity is 42 cfs, which is the total Q_{100} introduced by the inlets. The new storm drain connector pipe at Analysis Point #1 also has a 42 cfs capacity, and thus is capable of accepting the 25 cfs introduced by the new inlets.

RUNOFF COMPARISON AT ANALYSIS POINT #1

Condition	Q_{10}	Q_{100}	Q into S.D.	Q_{100} Remaining	Q_{10} Remaining
Existing	19.0	28.9	0	28.9	19.0
Interim	30.7	46.8	25	21.8	5.7
Ultimate	24.0	36.5	25	15.5	0

22.3

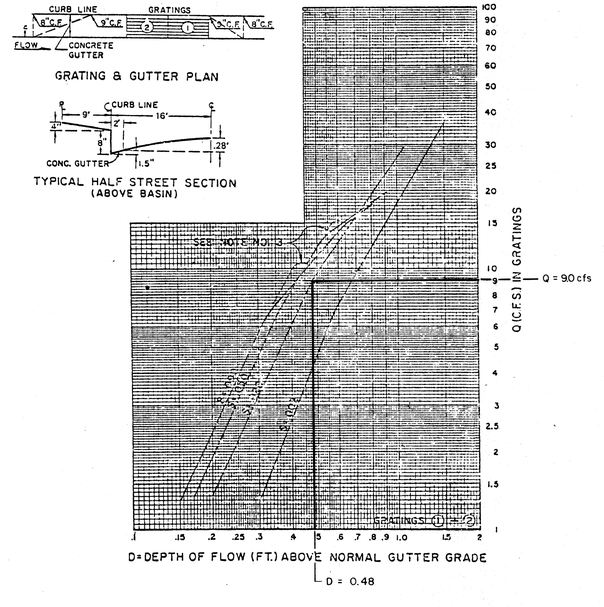
GRATING CAPACITIES FOR TYPE "A", "C" and "D"



REV. 3-83 74 PLATE 22.3 D-5

22.3

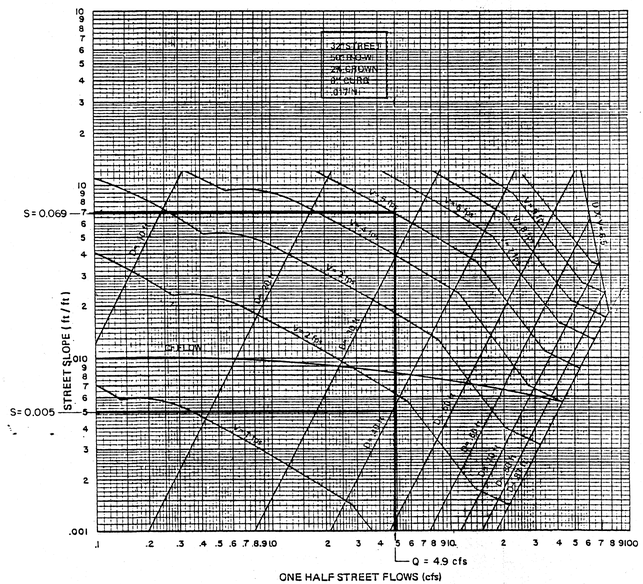
GRATING CAPACITIES FOR TYPE DOUBLE "C," AND "D"



REV. 3-83 75 PLATE 22.3 D-6

22.3

STREET CAPACITY



REV. 3-83 70 PLATE 22.3 D-1

910117

AS BUILT INFORMATION

BENCH MARKS
CITY OF ALBUQUERQUE BENCHMARK "HEAVEN", A STAINLESS USC & GS BRASS TABLET STAMPED "HEAVEN 1991" SET IN TOP OF A CONCRETE POST FLUSH WITH THE GROUND LOCATED AT THE ENTRANCE WAY TO THE "GATE OF HEAVEN" CEMETARY 0.15 MILE WEST OF THE INTERSECTION OF PASEO DEL NORTE N.E. AND WYOMING BLVD N.E. STATION IS LOCATED ON THE SOUTH SIDE OF PASEO DEL NORTE ELEVATION = 5378.78' (M.S.L.D.)

CONTRACTOR
WORK STARTED BY
INSPECTORS
ACCEPTANCE BY
FIELD REVISIONS BY
AS BUILT DRAWINGS CORRECTED BY
MICRO-FILM INFORMATION RECORDED BY
NO.
DATE

SURVEY INFORMATION
FIELD NOTES

NO.	BY	DATE
N/A	JMA	6/91

ENGINEER'S SEAL
STANLEY E. MONTOYA NEW MEXICO 8547 REGISTERED PROFESSIONAL ENGINEER
9-27-91

NO.	DATE	REMARKS	BY
		REVISIONS	
		DESIGN	

DESIGNED BY J.P.K. DATE 9/91
DRAWN BY C.L.B. DATE 9/91
CHECKED BY J.G.M. DATE 9/91

RECEIVED
SEP 27 1991

CITY OF ALBUQUERQUE
PUBLIC WORKS DEPARTMENT
ENGINEERING GROUP

TITLE: TIERRA LA CUEVA UNIT I
STORM DRAIN IMPROVEMENTS
ALAMEDA / WYOMING INTERSECTION

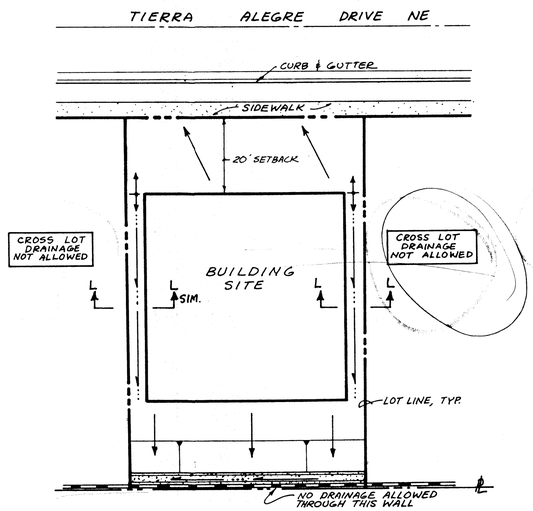
APPROVALS	ENGINEER	DATE	APPROVALS	ENGINEER	DATE
DRC CHAIRMAN			WATER		
TRANSPORTATION			WASTE WATER		
HYDROLOGY					

PROJECT NO. | MAP NO. C-19 | SHEET 2 OF 4

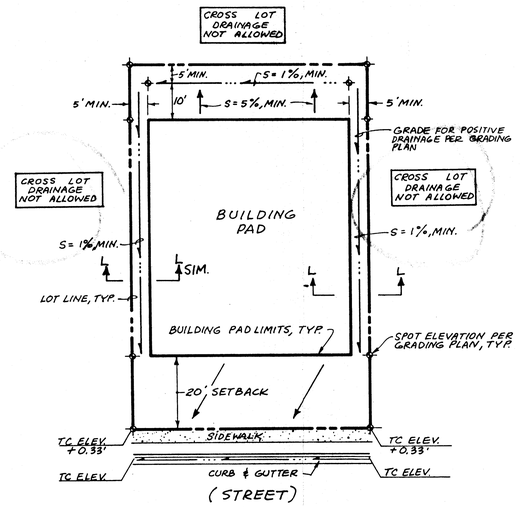
142347

GRADING NOTES:

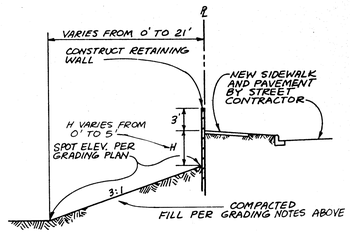
1. ALL FILL SHALL BE COMPACTED TO A MINIMUM OF 90% ASTM D-1557; HOUSE PADS SHALL BE COMPACTED AT 95% ASTM D-1557.
2. THE PAD ELEVATIONS SHOWN HEREON ARE FOR ROUGH GRADING PURPOSES.
3. FINISHED FLOOR ELEVATIONS MAY VARY FROM THE PAD ELEVATIONS AND WILL BE DETERMINED AS A FUNCTION OF INDIVIDUAL HOUSE DESIGN.
4. FINISHED FLOOR ELEVATIONS SHOULD BE ESTABLISHED AT A MINIMUM OF 6 INCHES ABOVE PAD ELEVATIONS; DEVIATIONS FROM THESE GUIDELINES MUST BE BASED ON THE RECOMMENDATIONS AND/OR DESIGN OF A COMPETENT DESIGN PROFESSIONAL.
5. NO CROSS-LOT DRAINAGE WILL BE ALLOWED.
6. PERIMETER WALLS SHALL BE CONSTRUCTED BY THE DEVELOPER.
7. YARD (GARDEN) WALLS SHALL BE CONSTRUCTED BY THE LOT OWNER OR ITS BUILDER.
8. THE FINISHED GRADING OF EACH LOT SHALL BE ACCOMPLISHED BY THE LOT OWNER OR ITS BUILDER. RUNOFF SHOULD BE DIRECTED TO THE STREETS OR SAFELY RETAINED ONSITE, IF NECESSARY. REAR YARD PONDING MAY BE UTILIZED PROVIDED THAT ALL OVERFLOW RUNOFF IS CONVEYED BY THE SIDEYARD TO THE FRONT OF THE LOT FROM WHENCE IT WILL FLOW TO THE STREET.
9. MAXIMUM SLOPES SHALL BE 3:1; MINIMUM SLOPES SHALL BE 1%.
10. LOTS 1 THROUGH 7, INCLUSIVE, SHALL BE GRADED PER THE TYPICAL UPHILL LOT GRADING PLAN. LOTS 8 THROUGH 39, INCLUSIVE, SHALL BE GRADED PER THE TYPICAL DOWNHILL LOT GRADING PLAN.
11. TWO (2) WORKING DAYS PRIOR TO ANY EXCAVATION, CONTRACTOR MUST CONTACT NEW MEXICO ONE CALL SYSTEM, 260-1990, FOR LOCATION OF EXISTING UTILITIES.
12. IF ANY UTILITY LINES, PIPELINES, OR UNDERGROUND UTILITY LINES ARE SHOWN ON THESE DRAWINGS, THEY ARE SHOWN IN AN APPROXIMATE MANNER ONLY, AND SUCH LINES MAY EXIST WHERE NONE ARE SHOWN. IF ANY SUCH EXISTING LINES ARE SHOWN, THE LOCATION IS BASED UPON INFORMATION PROVIDED BY THE OWNER OF SAID UTILITY, AND THE INFORMATION MAY BE INCOMPLETE, OR MAY BE OBSOLETE BY THE TIME CONSTRUCTION COMMENCES. THE ENGINEER HAS CONDUCTED ONLY PRELIMINARY INVESTIGATION OF THE LOCATION, DEPTH, SIZE, OR TYPE OF EXISTING UTILITY LINES, PIPELINES, OR UNDERGROUND UTILITY LINES. THIS INVESTIGATION IS NOT CONCLUSIVE, AND MAY NOT BE COMPLETE, THEREFORE, MAKES NO REPRESENTATION PERTAINING THERETO, AND ASSUMES NO RESPONSIBILITY OR LIABILITY THEREFOR. THE CONTRACTOR SHALL INFORM ITSELF OF THE LOCATION OF ANY UTILITY LINE, PIPELINE, OR UNDERGROUND UTILITY LINE IN OR NEAR THE AREA OF THE WORK IN ADVANCE OF AND DURING EXCAVATION WORK. THE CONTRACTOR IS FULLY RESPONSIBLE FOR ANY AND ALL DAMAGE CAUSED BY ITS FAILURE TO LOCATE, IDENTIFY AND PRESERVE ANY AND ALL EXISTING UTILITIES, PIPELINES, AND UNDERGROUND UTILITY LINES. IN PLANNING AND CONDUCTING EXCAVATION, THE CONTRACTOR SHALL COMPLY WITH STATE STATUTES, MUNICIPAL AND LOCAL ORDINANCES, RULES AND REGULATIONS, IF ANY, PERTAINING TO THE LOCATION OF THESE LINES AND FACILITIES.
13. THE CONTRACTOR SHALL ENSURE THAT NO SOIL ERODES FROM THE SITE INTO PUBLIC RIGHT-OF-WAY OR ONTO PRIVATE PROPERTY. THIS CAN BE ACHIEVED BY CONSTRUCTING TEMPORARY BERMS AT THE PROPERTY LINES AND WETTING THE SOIL TO KEEP IT FROM BLOWING.
14. THE CONTRACTOR SHALL PROMPTLY CLEAN UP ANY MATERIAL EXCAVATED WITHIN THE PUBLIC RIGHT-OF-WAY SO THAT THE EXCAVATED MATERIAL IS NOT SUSCEPTIBLE TO BEING WASHED DOWN THE STREET.
15. THE CONTRACTOR SHALL SECURE "TOPSOIL DISTURBANCE PERMIT" PRIOR TO BEGINNING CONSTRUCTION.



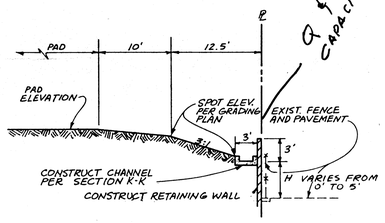
TYPICAL LOT GRADING - LOTS 1-7
SCALE: 1" = 20'



TYPICAL LOT GRADING - LOTS 8-39
SCALE: 1" = 20'



SECTION F-F
SCALE: 1" = 10'



SECTION G-G
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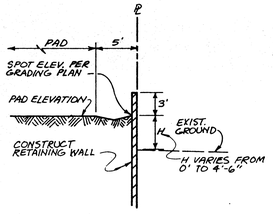

SECTION H-H
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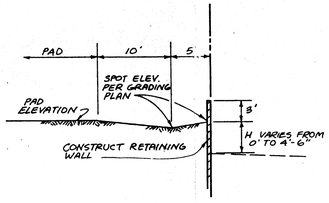

SECTION J-J
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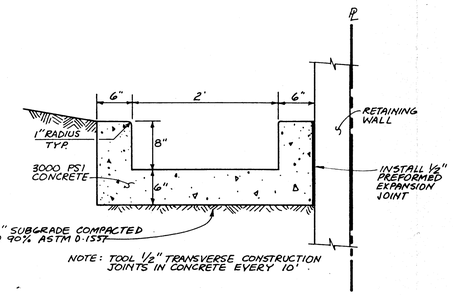

SECTION K-K
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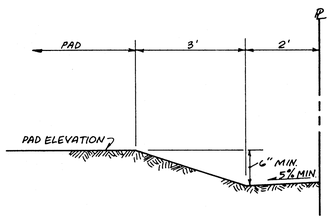

SECTION L-L
SCALE: 1" = 2'

SEP 27 1991

JEFFREY G. MORTENSEN NEW MEXICO 8547 REGISTERED PROFESSIONAL ENGINEER 9-27

JEFF MORTENSEN & ASSOCIATES, INC.
6010-B MIDWAY PARK BLVD. N.E.
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GRADING NOTES & SECTIONS
TIERRA LA CUEVA
UNIT I

DESIGNED BY J.P.K.
DRAWN BY C.E.N.
APPROVED BY J.G.M.

NO.	DATE	BY	REVISIONS

JOB NO. 910117
DATE 09 / 91
SHEET 3 OF 4

142347

DRAINAGE PLAN

The following items concerning the Tierra La Cueva, Unit I Drainage Plan are contained hereon:

1. Vicinity Map
2. Grading Plan
3. Grading Notes
4. Calculations
5. Sections and Details

As shown by the Vicinity Map, the site is located at the southwest corner of the intersection of Barstow Street N.E. and Alameda Boulevard N.E. The site is bounded on the west by La Cueva High School, on the north by Alameda Boulevard N.E., on the east by Barstow Street N.E., and on the south by Tierra La Cueva, Unit II. The bordering streets are designated arterials with temporary paving. The area lying north of the site is the Nor Este Estates Subdivision, which is developing residentially, while the area east of the site is undeveloped. Tierra La Cueva Unit II, abutting the site on the south, is currently undeveloped, but is planned for development upon completion of Unit I. The Drainage Plan for Unit II will be addressed by separate submittal.

According to the "Northeast Heights Drainage Management Plan", Unit I in its existing state drains to two drainage basins: the La Cueva Basin on the north, and an unnamed South Local Basin on the south. This division is reflected by the existing basin boundary dividing the site into Basins A and B. Drainage to the South Local Basin (Basin B) will be eliminated by this grading plan. Thus the south boundary of Unit 1 will also be a Drainage Basin boundary, and the drainage of each unit can be addressed by separate submittals.

As shown by Panel 10 of 50 of the National Flood Insurance Program Flood Boundary and Floodway Maps for the City of Albuquerque, New Mexico, dated October 14, 1983, this site does not lie within a designated Flood Hazard Zone. Ultimately the runoff from the site will discharge into the La Cueva Arroyo, which is a designated Flood Hazard Zone. Runoff will be conveyed to the west on Alameda, a paved surface, and will then be discharged into an existing storm drain system at Wyoming. This system discharges runoff into the La Cueva Arroyo.

The Grading Plan shows 1) existing and proposed grades indicated by spot elevations and contours at 1'0" intervals; 2) the limit and character of the existing improvements; 3) the limit and character of the proposed improvements; and 4) continuity between existing and proposed grades. As shown by this Plan, the project consists of the development of a 40-lot residential subdivision. Included in this development is the construction of onsite paving improvements, perimeter retaining walls, a rear yard trickle channel, and grading improvements. Offsite improvements to be accomplished by City Work Order as part of this project include: the construction of permanent paving on the west half of Barstow Street N.E. adjacent to the site; the construction of the southerly portion (24') of permanent paving on Alameda Boulevard N.E. adjacent to the site; the construction of storm drain improvements at the intersection of Alameda and Wyoming, west of the site. The storm drain improvements consist of storm inlets and pipe which will be connected to an existing system on Wyoming. The existing system was constructed as part of Nor Este Estates (City Project No. 3786, Hydrology File C19-D6A), but was designed with the capacity to discharge runoff from the subject site.

Runoff quantities and drainage requirements at the Wyoming/Alameda intersection (Analysis Point #1) have been analyzed under a sequence of conditions. The first step in the sequence is an analysis of the runoff under existing conditions. The runoff which presently drains to Analysis Point #1 includes the runoff from the south half of the Alameda right-of-way (Basin C), the runoff from the existing onsite Basin A, and the runoff from Basin EA-5, east of Barstow. (The boundaries and area of Basin EA-5 have been copied from the Vineyard Estates Subdivision Watershed Map prepared by this office, dated February 16, 1989, and approved by the City of Albuquerque).

The second step in the sequence is an analysis of runoff during interim development conditions. Interim conditions will exist when the subject property is developed, and Offsite Basin EA-5 will continue to drain to the Alameda/Wyoming intersection. The Vineyard Conceptual Drainage Plan prepared by this office in 1987 proposed that the runoff from Basin EA-5 be discharged to the north into the La Cueva Arroyo via a future storm drain on Barstow. (This proposed alignment for the diversion of the Basin EA-5 drainage is most likely due to the close proximity of the La Cueva Arroyo to the north where it crosses Barstow). Regardless of future storm drain alignment, storm inlets will be required at the Alameda/Barstow intersection when Basin EA-5 is developed because no storm runoff is permitted to cross arterial streets, per the DPM. Thus, Basin EA-5 runoff ultimately will not cross Barstow. In the interim, runoff from Basin EA-5 will continue to drain to the west to the Alameda/Wyoming intersection. During this same period of time, the increased runoff from onsite Basin A will also drain to the Wyoming intersection.

The third and final step in the sequence is an analysis of runoff during the ultimate state of development in which Basin EA-5 will be diverted to the La Cueva Arroyo via Barstow as previously outlined. At this time, the runoff discharged to the Alameda/Wyoming intersection will be decreased due to the Barstow diversion. Each of these stages in the sequence of development has been analyzed, and the street and storm drain capacities at the Alameda/Wyoming intersection have been computed and shown to meet the requirements of the DPM.

Two onsite drainage concerns are worth noting. First of all, an analysis of the site revealed one hydraulic jump. The jump occurs in the middle of the block on Signal Avenue. Analysis of the jump shows that it complies with DPM criteria. The remainder of the flows on Signal Avenue and Tierra Alegre are subcritical. Due to the minimal street grades at the intersection of Signal Avenue and Tierra Alegre Drive, and due to the crown in the street, it is felt that 100-year runoff will be confined to the paved surfaces at that intersection.

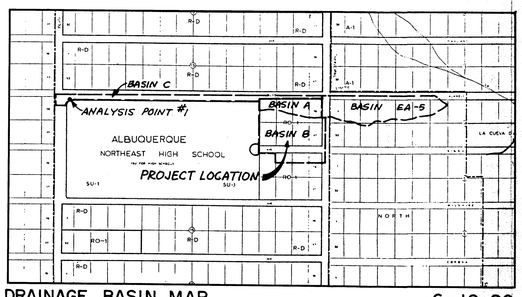
Secondly, a trickle channel has been provided at the rear of the lots on the west side of the subdivision. Due to the large grade difference between the existing improvements at the rear of the lots and the new street at the front of the lots, it was determined that drainage to the rear of the lots was the only feasible option. To drain the entirety of the lots to the facing street would have required rear yard retaining walls of 12' in height, which exceeds the guidelines of the DPM. Mr. Fred Aguirre and Mr. Gilbert Aldaz of City Hydrology concurred with this conclusion, and a trickle channel in a 5' easement at the rear of the lots has been provided per their recommendation.

The calculations which appear hereon analyze both the existing and developed conditions for the 100-year, 6-hour rainfall event. The peak discharge of runoff has been calculated using the Rational Method while the SCS Method has been used to quantify the volume of runoff generated. Both Methods have been used in accordance with the City of Albuquerque Development Process Manual, Volume II, coupled with the Mayor's Emergency Rule adopted January 14, 1986. As shown by these calculations, the proposed development will result in an increase in runoff generated by the site. The development will, however, result in a net benefit to downstream properties as follows:

1. The existing runoff which drains onto the La Cueva High School property will be diverted to the public right-of-way on Alameda. This will reduce the runoff which is conveyed through the school property, and will benefit the general public.

2. The public storm drain improvements at the Wyoming/Alameda intersection will provide a greater discharge of runoff from the intersection than was originally proposed with the development of Nor Este Estates. This will result in the conveyance of less runoff in the paved streets than had been planned. In fact, all of the ultimate ten-year runoff will be discharged by the new storm drain system, leaving the intersection dry during the ten-year event.

3. The temporary pavement adjacent to the site will be replaced with permanent pavement and curb which will reduce erosion and channelize public runoff on paved surfaces.



DRAINAGE BASIN MAP
SCALE: 1" = 800' (APPROX.)

C-19,20

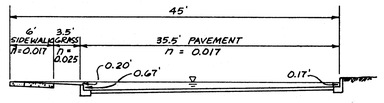


FIGURE 1: 100 YEAR CAPACITY AT A.P. #1
SCALE: 1" = 10'

CALCULATIONS

Ground Cover Information

From SCS Bernalillo County Soil Survey,
Plate 11: Embudo - Tijeras Complex
Hydrologic Soil Group: B
Existing Pervious CN = 79 (DPM Plate 22.2 C-3
Pasture or Range Land: poor condition)
Developed Pervious CN = 69 (DPM Plate 22.2 C-3
Open space: fair condition)

Time of Concentration/Time to Peak

$T_c = 0.0078\ L^{0.77}/S^{0.385}$ (Kirpich Equation)

$T_p = T_c = 10$ min.

Point Rainfall

$P_6 = 2.38$ in. (DPM Plate 22.2 D-1)

Rational Method

Discharge: Q = CiA

where C varies
$i = P_6\ (6.84)\ T_c^{-0.51} = 5.03$ in/hr
$P_6 = 2.38$ in (DPM Plate 22.2D-1)
$T_c = 10$ min (minimum)
A = area, acres

SCS Method

Volume: V = 3630(DRO) A

Where DRO = Direct runoff in inches
A = area, acres

Existing Condition

1. Basin A (Onsite)
A_{total} = 96,000 sf = 2.21 Ac
Undeveloped Area = 96,000 sf (1.00)
C = 0.40 (Weighted average per Emergency Rule, 1/14/86)
Q_{100} = CiA = 0.40(5.03)2.21 = 4.4 cfs
% impervious = ~0~%
Composite CN = 79 (DPM Plate 22.2 C-3)
DRO = 0.8 in (DPM Plate 22.2 C-4)
V_{100} = 3630 (DRO)A = 6400 cf

2. Basin B (Onsite)
A_{total} = 275,000 sf = 6.31 Ac
Undeveloped Area = 275,000 sf (1.00)
C = 0.40 (Weighted average per Emergency Rule, 1/14/86)
Q_{100} = CiA = 0.40(5.03)6.31 = 12.7 cfs
% impervious = ~0~%
Composite CN = 79 (DPM Plate 22.2 C-3)
DRO = 0.8 in (DPM Plate 22.2 C-4)
V_{100} = 3630 (DRO)A = 18,000 cf

3. Basin C (Offsite Basin: Alameda from Wyoming to Barstow)
A_{total} = 147,000 sf = 3.37 Ac
Paved area = 70,000 sf (0.48)
Landscaped area = 77,000 sf (0.52)
C = 0.59 (Weighted average per Emergency Rule, 1/14/86)
Q_{100} = CiA = 0.59(5.03)3.37 = 10.0 cfs
$Q_{10} = 0.657Q_{100} = 6.6$ cfs
% impervious = 48 %
Composite CN = 83 (DPM Plate 22.2 C-3)
DRO = 0.97 in (DPM Plate 22.2 C-4)
V_{100} = 3630 (DRO)A = 12,000 cf

Developed Condition

1. Basin A
A_{total} = 371,000 sf = 8.52 Ac
Roof area = 91,000 sf (0.25)
Paved area = 113,000 sf (0.30)
Landscaped area = 167,000 sf (0.45)
C = 0.62 (Weighted average per Emergency Rule, 1/14/86)
Q_{100} = CiA = 0.62(5.03)8.52 = 26.6 cfs
$Q_{10} = 0.657Q_{100}$
Q_{10} = 17.5 cfs
% impervious = 55 %
Composite CN = 90 (DPM Plate 22.2 C-3)
DRO = 2.4 in (DPM Plate 22.2 C-4)
V_{100} = 3630 (DRO)A = 74,000 cf

2. Analysis Point 1 - Interim Condition (Basins A, C & EA-5)
A_{total} = 962,000 sf = 22.1 Ac
Roof area = 91,000 sf (0.09)
Paved area = 183,000 sf (0.19)
Landscaped area = 244,000 sf (0.25)
Undeveloped area = 444,000 sf (0.46)
C = 0.51 (Weighted average per Emergency Rule, 1/14/86)
i = 4.15 in/hr
Q_{100} = CiA = 0.51(4.15)22.1 = 46.8 cfs
$Q_{10} = 0.657Q_{100} = 30.7$ cfs
% impervious = 28 %
Composite CN = 77 (DPM Plate 22.2 C-3)
DRO = 0.67 in (DPM Plate 22.2 C-4)
V_{100} = 3630 (DRO)A = 54,000 cf

3. Analysis Point 1 - Ultimate Condition (Basins A & C)
A_{total} = 518,000 sf = 11.9 Ac
Roof area = 91,000 sf (0.18)
Paved area = 183,000 sf (0.35)
Landscaped area = 244,000 sf (0.47)
C = 0.61 (Weighted average per Emergency Rule, 1/14/86)
Q_{100} = CiA = 0.61(5.03)11.9 = 36.5 cfs
$Q_{10} = 0.657Q_{100} = 24.0$ cfs
% impervious = 53 %
Composite CN = 84 (DPM Plate 22.2 C-3)
DRO = 1.02 in (DPM Plate 22.2 C-4)
V_{100} = 3630 (DRO)A = 44,000 cf

Comparison

1. Basin A
ΔQ_{100} = 26.6 - 4.4 = 22.2 cfs (increase)
ΔV_{100} = 74,000 - 6,400 = 67,600 cf (increase)

2. Basin B (Discharge to La Cueva High School Property)
ΔQ_{100} = 12.7 - 0 = 12.7 cfs (decrease)
ΔV_{100} = 18,000 - 0 = 18,000 cf (decrease)

3. Analysis Point 1 - Interim Condition
ΔQ_{100} = 46.8 - 28.9 = 17.9 cfs (increase)
ΔQ_{10} = 30.7 - 19.0 = 11.7 cfs (increase)
ΔV_{100} = 54,000 - 27,000 = 27,000 cf (increase)

4. Analysis Point 1 - Ultimate Condition
ΔQ_{100} = 36.5 - 28.9 = 7.6 cfs (increase)
ΔQ_{10} = 24.0 - 19.0 = 5.0 cfs (increase)
ΔV_{100} = 44,000 - 27,000 = 17,000 cf (increase)

STREET HYDRAULICS - HYDRAULIC JUMPS ON SIGNAL AVENUE N.E.

1. Given: S = 0.0050 and Q = 4.9 cfs
Find on DPM Plate 22.3 D-1 (32' street):
D_2 = 0.40'
V_2 = 1.8 fps
Flow is subcritical.

2. Given: S = 0.0690 and Q = 4.9 cfs
Find:
D_1 = 0.29'
V_1 = 5 fps
Flow is supercritical; therefore, a hydraulic jump has occurred.

3. Determine height and length of jump
$F_1 = V_1/(gD_1)^{(1/2)}$ where g = 32.2 fps^2
F_1 = 1.6
From DPM Plate 22.3 E-1 find: $TW_{depth}/D_1 = 1.75$
So TW_{depth} = 0.51'
TW_{depth} < 0.87' per DPM criteria.

From DPM Plate 22.3 E-2 find: (Length of jump)/D_1 = 6

So Length of jump = 1.74'

This jump will occur some 250' east of the Signal/Tierra Alegre intersection in the vertical curve slope transition and thus will be contained in the right-of-way. Thereafter, flows will be subcritical and no more hydraulic jumps will occur.

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DRAINAGE PLAN & CALCULATIONS
TIERRA LA CUEVA
UNIT I

DESIGNED BY J.P.K.
DRAWN BY C.E.N
APPROVED BY J.G.M.

NO.	DATE	BY	REVISIONS

JOB NO. 910117
DATE 09 / 91
SHEET 4 OF 4