HYDROLOGY G13/D3 TWO PLANS

G 13 - D3

2 PLANS

LEVERTON ENGINEERING, INC.

5629 Paradise Blvd. N.W.
Albuquerque, New Mexico 87114
(505) 898-8021

February 5, 1981

RECEIVED
FEB 19 1981
CITY ENGINEER

Mr. Richard S. Heller
City Engineer
City of Albuquerque, New Mexico

Re: Drainage Report
" The Colonnade"
@ SW Corner of Candelaria Road @ Rio Grande Blvd. NW
Zone Atlas Map G-13
H.L. Cleff Construction Co., Developer

Dear Mr. Heller;

The following drainage report on the subject development is presented for your review, comments, and approval.

Attached for your reference are:

1. Plat
2. Development drawing showing proposed dwelling units, drives, access street, grading plan, water and sewer layout, and existing elements affecting design.
3. Proposed street, sanitary sewer, and water main plan and profile drawing.

The project has received preliminary approval of the SRB.

General Considerations:

1. Design rainfall -- 2"
2. Gross Area = 1.66 Ac = 72,310 sq. ft.
3. Coefficients of runoff:
   Yards and lawns = 0.50
   Street, sidewalks, & drives = 0.95
   Roofs = 0 for a 2" rainfall.
   The developer, having extensive experience in the effect of the nuisance value and destructive result of runoff from roof drains has elected to store 2-3/8 " of rainfall on the roofs of these units. Any depth of water greater than that will be discharged over weirs at each roof canale.

   Roof areas available for storage & used in the calculations that follow were calculated as net areas between parapet walls as shown on architectural plans.
4. A one year storm used in the calculations, is defined by local sources as follows:

Time	Rainfall (inches)	Intensity (inches per hour)
5 minutes	0.18	2.16
10 "	0.27	1.62
15 "	0.35	1.40
30 "	0.48	0.96
60 "	0.61	0.61
2 hours	0.63	0.32
3 "	0.64	0.21
6 "	0.68	0.11
12 "	0.71	0.06
24 "	0.75	0.03

Drainage Analysis:

1. The areas as developed, classified in accordance with their respective coefficients of runoff, are tabulated as follows: Areas chown are in sq. ft.

C = 0.95 Paving, curb & gutter, sidewalks, drives, and flat-work.	C = 0 Roofs, Net	C = 0.5 Front Yards	C = 0.5 Rear Yards
18,478	28,592	7,550	17,690

Total area of site = 72,310

The weighted coefficient of runoff, "C", derived from the above = 0.42

2. The developer, Mr. H. L. Cleff, and the engineer, both of whom are long time residents of the valley area and with extensive experience in valley developments, recommend, in recognition of the findings of the drainage analysis presented by this study, that the requirement that the rear yard detention swales be discharged to the street be waived. The desirability of discharging these swales is not obvious and the methods available for doing so,namely, a small diameter pipe which will impose unrealistic maintenance procedures on the residents, is not good engineering practice. Please see paragraph 4-B, below.

   If the rear yards are not discharged then the coefficient of runoff, "C", after development becomes = 0.29.

3. "Q" and volume of runoff from Colonnade Ct. at Candelaria Road:

   A. t = 10 minutes ---50 year storm I = 4.87
   B. Streets, drives, sidewalks, & flatwork Area = 18748 @ c = 0.95
      Front yards area = 7550 @ c = 0.50
      Composite C = 0.82
   C. Q = 0.60 x 0.82 x 4.87 = 2.41 cfs

   Discussion:
   2.41 cfs becomes the 50 year discharge from the site if the rear yards become retention ponds as recommended.

   This is compared to the discharge of the site in an "historic" condition calculated using the reasonable coefficient of "C" of 0.35 and an intensity of 4.87 as above of:
   Q = 1.66 x 0.35 x 4.87 = 2.83 cfs.
   D. Volume discharged (developed) by Colonnade Ct. (2" rain) = 26298 x 2/12 x 0.82 = 3594 cu. ft.

Compared as above to the V olume generated by the runoff from the entire site in 72310 x 2/12 x 0.35 = 4218 cu. ft., the historical condition.

4. Adequacy of rear yards as either detention or as retention swales: See attached development plan for reference.

   A. Cross sectional area of swale with water surface at a point 8" below finish floor = 5.03 sq. ft. with a total volume of 4675 cu. ft.
   This is a minimum computed using the smallest section available which is controlled by the width of the rear yards.

   B. Volume of runoff required to be contained in rear yard swales: 2" rainfall = 17690 x 2/12 x 0.50 = 1474 cu. ft.
   This volume, under static conditions, results in a required sectional area of the rear yard swales of 1.60 sq. ft. with a depth of 0.38 ft. = about 4-5/8"

   C. If these swales bevome detention ponds and can be discharged then the flow with respect to the Sections, under conditions of unrestricted outlets is calculated as:
   Parallel to Rio Grande Blvd. with discharge into Candelaria: S = 0.001- V = 0.29 ft/sec. and Q = 0.47 cfs
   Along the south and western boundaries and discharging to Candelaria S = 0.00168- V = 0.39 ft/sec and Q = 0.63 cfs
   N was taken as 0.050 in these calculations.

5. The "Q" resulting from a 1 year storm from the site in the undeveloped condition is calculated as:
   1.66 x 0.35 x 2.16 = 1.25 cfs
   This is the limiting Q, exclusive of that delivered by the street, of the discharge from the detention ponds.

6. Q within 4" VCP discharge pipes at S = 0.03 (from plan) assumed to be flowing full depth: The inlet and outlet conditions un under the influence of a major rain storm are not predictable. The inlet restriction & loss will vary from unknown at time of construction to variable during the life of the system depending unon maintenance.

   $N = 0.015$, $A = 0.087$, $R^{2/3} = 0.19$, $S^{1/2} = 0.17$
   $Q = 0.09 \times 99.1 \times 0.17 \times 0.19 = 0.29$ cfs (V = 3.2 ft/sec)
   The actual Q will be reduced as discussed above. The Q for these two outlets shown will be 0.58 cfs.

7. The development plan shows that these swales will, in the event the design storm is greatly exceeded, overflow on the sufface to the streets at each of the handicapped ramps shown at Colonnade Ct. @ Candelaria.

8. The finish floors of all units are shown as being above the top of the curbs on both Candelaria and Rio Grande.

Conclusions:

1. The requirement that the rear yard swales be discharged to the street should be removed.
   If this recommendation is approved the grading plan must be revised so that the elevation of the bottom of the swale is constant throughout.

2. The development plan as presented is appropriate to and consistant with the concepts presented by the developer and the drainage management plan fulfills the current requirements of the City Engineer.

John G. Leverton
P.E. # 1874
New Mexico

LEVERTON ENGINEERING, INC.

5629 Paradise Blvd. N.W.
Albuquerque, New Mexico 87114
(505) 898-8021

March 12, 1981

Mr. Richard S. Heller
City Engineer
Albuquerque, New Mexico

RECEIVED
MAR 13 1981
CITY ENGINEER

Re: Drainage
The " Colonnade Addition"
Rio Grande Blvd. @ Candelaria Rd. NW
H. L. Cleff, Developer

Dear Mr. Heller;

Presented herewith is our revised drainage plan for the subject addition.

Mr. H. L. Cleff and I met with Mr. Bruno Conegliano, Assistant City Engineer - Hydrology, on March 9, 1981 to review his comments on the drainage plan for the subject addition.

Mr. Conegliano's comments and discussion:

1. " Consider the possibility of discharging the accumulated rainfall from the roofs of the buildings by means of a certain roof inlet drain fitting having a controlled rate of discharge."

Cleff's initial reaction was unfavorable because of the adverse effect of all roof drains and canales as expressed by home buyers in his experience. His roofing contractor has no objection the storing rainfall on the roofs. However, Cleff is considering the matter further.

For the purposes of the drainage plan the question of discharging the roof water to the rear yards is not material ,and, either way, will have no effect on the total discharge from the subdivision. The rear yard retention ponds have sufficient volume to contain the runoff from a 50 year storm falling on the rear yards plus a surplus of at least and at the minimum of 100%. The roof water then could be delivered to the rear yards at a rate somewhat greater than the rate of loss through evaporation -- exfiltration.

2. " Undeniably, the developed "Q" exceeds the 1 year "Q" which is the criteria set out in the November 1979 Interim Guidelines. Developed "Q" must be reduced."

The revised drainage plan presnted here does reduce the developed discharge by swaling the front yards, by reducing the longitudinal slope of the rear yard retention ponds to zero, and by removing the 4" outfalls to Candelaria Rd. The only flow from the addition will be from the low slope streets and sidewalk, from the low slope drives, and from a small overflow quantity from the swaled front yards. The front and rear yards will be grassed and otherwise landscaped.

Summary of plan: (draft form calculations attached)

1. The 50 year storm developed "Q" and Volume will be less than the outfall from a 50 year storm in the historical and undeveloped condition.

2. The developed Q_{50} will be greater than Q_1 undeveloped. (2.1 cfs as opposed to 0.7 cfs)

Conclusions:

1. The requirement of the Interim Guidelines with respect to retaining the 50 year developed runoff volume is fulfilled. The criteria of meeting the Q_1 is not fulfilled. However, the scale of the excess Q must be considered along with the inconsequential effect this might have on the drainage basin as a whole.

Discussion:

I have first hand knowledge of the City Engineer's objection to "estate type street sections" that might be employed to reduce the Q. This factor, plus the fact that the developer's concept cannot be met if lateral side street ponding should be required rules out the possibility of reducing the developed "Q" to undeveloped Q_1.

It is not credible to believe that the drainage guideline require a total solution at any cost. Rather, the intent is is to require an economically reasonable degree of compliance.

It is demonstrated that the violation of the drainage guidelines is minor,and in that light,some sacrifice of requirements is acceptable to further other community goals. The reasonable compromise presented is a satisfactory solution.

We respectfully request your approval at an early date in order that the developer may proceed with his plan to begin construction as soon as the plat and plans have approved by The City.

John Leverton, PE

Attachments

cc; H. L. Cleff

3-11-81

Draft - Calcs - Colonnade Subd. - Drainage

Undeveloped Condition - 1.66 Acres

1 Year Storm: $I = 1.40$, $C = 0.3$

$Q = 1.66 \times 1.40 \times 0.3 = \underline{0.70 \text{ cfs}}$

$Vol\ 1.66 \times 43560 \times 0.3 \times \frac{0.75}{12} = \underline{1356 \text{ ft}^3}$

50 year storm: $t = 10 \text{ min}$, $I = 4.27$; $C = 0.3$

$Q = 1.66 \times 0.3 \times 4.27 = \underline{2.13 \text{ cfs}}$

$Vol = 1.66 \times 1350 \times 0.3 \times \frac{2}{12} = \underline{3615 \text{ ft}^3}$

Developed Condition

With Roofs & Rear Yards contained on site.

50 year storm:

Street & sidewalks	11,100 ft²	@ C = 0.95
Drives & flat-work	7,100 ft²	@ C = 0.90
Front yards - pooled	7,850 ft²	@ C = 0.20
Total Area	26,050 ft²	

$\underline{C = 0.72}$

$Q_{T=10} = \frac{26050}{43560} \times 0.72 \times 4.27 = \underline{2.10 \text{ cfs}}$

$Vol = 26050 \times 0.72 \times \frac{2}{12} = \underline{3126 \text{ ft}^3}$

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April 6, 1981

Mr. Richard S. Heller
City Engineer
Albuquerque, New Mexico

Re: Drainage
The Colonnade Addition
@ SW corner of Candelaria Rd. at Rio Grande Blvd. NW
Zone Atlas Map G-13
Developer: H. L. Cleff

Dear Mr. Heller;

Attached is a set of the revised construction drawings for the subject project.

Thedrainage plan has been revised in accordance with the suggestions made by you and Bruno Conegliano in our meeting and discussion of the previously submitted plans in your office on March 12, 1981.

The storm water management plan reflected by the attached construction drawings is in conpliance with the "November 1979 Guidelines As To Drainage" and is consistant with the previously mentioned suggestions as to a practicable method of compliance.

Therefore, your approval of the revised plan is respectfully requested.

John Leverton

John Leverton, PE

CC: Mr. Bruno Conegliano
Mr. H. L. Cleff

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