

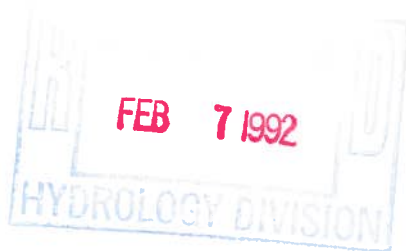
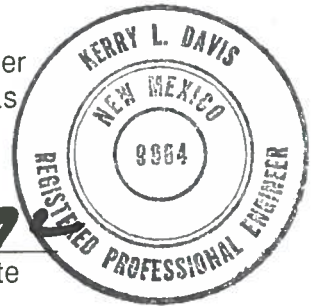
DRAINAGE REPORT
FOR
CACTUS RIDGE
FORMERLY CONGRESS HEIGHTS
TRACT 16-B

February 1992



I certify that I am a registered professional engineer
in the State of New Mexico and that this report was
prepared by me or under my supervision.

Kerry L. Davis 2/4/92
Kerry L. Davis, P.E. Date



DRAINAGE REPORT
FOR
CACTUS RIDGE SUBDIVISION
FORMERLY CONGRESS HEIGHTS - TR 16B

February 6, 1992

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AND DESIGN PLANS FOR EXISTING
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PURPOSE

The purpose of this report is to present the drainage management plan for preliminary plat and rough grading approval for the Proposed Cactus Ridge Subdivision, formerly Tract 16-B, Congress Heights Subdivision. The Drainage Ordinance and the Development Process Manual are utilized to develop the plan.

SITE LOCATION AND EXISTING CONDITIONS

The property is located north of Paradise Boulevard and bordered by an existing subdivision, Congress Heights, on the north and west and an undeveloped parcel, Tract 17, on the east.

The parcel generally slopes from the northwest to southeast at slopes of 6-8%. The site vegetation consists of native grasses and weeds. There is an existing soil cement channel which runs the length of property along the southerly boundary adjacent to Paradise Blvd. The channel carries runoff from a portion of the Knolls of Paradise Hills and a part of the Congress Heights Subdivision to a temporary desiltation pond located at the southeast corner of the property. The outlet of the desiltation basin discharges into the existing Eagle Ranch Road storm sewer. (Refer to excerpts from existing reports and as-builts in Appendix 3.)

HYDROLOGIC ANALYSIS

Initially, the new rational method hydrologic procedures identified within the proposed revision to Chapter 22, Section 22.2 of the Development Process Manual dated August, 1991, (DPM Update), were utilized to determine peak flow rates for design of the storm drainage improvements within the project. The 100 year, 6 hour storm has been used as the design event. Investigation of the design of the Eagle Ranch Storm Sewer identifies that downstream capacity is limited.

Subsequent to the discovery that the Eagle Ranch Storm Sewer was designed under the previously accepted hydrologic methods, a comparison of the two procedures was undertaken. The results of this analysis indicated that the Eagle Ranch Storm Sewer is inadequate to convey runoff from the basins which drain to it. Therefore, ponding must be incorporated into the development. Due to the fact that all of the drainage facilities within this area were designed under previously accepted hydrologic analysis methods it was determined that the Mayor's Emergency Rule would be used to analyze the runoff generated by the development and the offsite basins.

The computerized hydrologic model HYMO (revision 9/90) was then used to route flows form a model of the hydrology of this

development to identify routed flow rates at various points in the basins. HYMO input parameters were adjusted to match peak flow rates obtained by the Mayor's Emergency Rule rational method procedures.

The peak flow rate computed by the Mayor's Emergency Rule Rational method after development is 44.1 cfs, compared to 17.3 CFS under existing conditions. Applying the new rational method identified within the referenced DPM update for total onsite peak flow is 53.1 CFS. Please refer to Tables 1 and 2 in Appendix 1 for a detailed summary of hydrologic parameters and basin characteristics.

OFFSITE RUNOFF

There are three offsite basins which impact the drainage management plan for this subdivision (see plate 2 in appendix IV). These basins were identified within two previously approved drainage reports: 1) the Master Drainage plan for Eagle Ranch and Portion of Paradise Hills prepared by Community Sciences Corporation for Bellamah Community Development dated March, 1983, as well as 2) the approved Drainage Management Plan for Congress Heights Subdivision prepared by Tierra Engineering consultants, Inc. for Bellamah Community Development dated January 19, 1987.

A portion of the Knolls of Paradise Hills, referred to as basin O1, contains approximately 16.5 acres of developed residential lots. Basin O1 is routed through Congress Heights subdivision, referred to as basin O2, containing 18.5 acres of developed residential lots. The combined runoff from basins O1 and O2 enter the site at the southwest corner of the property through an existing 36" RCP storm sewer. The approved drainage plan for Congress Heights identifies the quantity of runoff as being 77 cfs at the location the flow enters the proposed subdivision. Applying the Mayor's Emergency Rule hydrologic criteria to these basins, the runoff quantity increases to 84.7 (the new rational method combined peak discharge is 109.5 cfs). However, the maximum discharge based on the analysis of the existing storm drain out of this basin is 78.3 cfs (the new rational method is 88.1 cfs) assuming orifice control at the inlet to this storm sewer. See appendices 2 and 3 for hydrologic and hydraulic computations, respectively.

The third basin, O3 contains a portion of the Sandia Vista Subdivision (subbasin O3A) and the discharge conveyed by Paradise Blvd (subbasin O3B), for a total $Q = 32.0$ cfs (53.2 cfs new rational method). This discharge will be intercepted by a battery of inlets which will connect to the existing Eagle Ranch Storm Sewer.

In addition to the three documented offsite drainage basins, it has been determined from field investigation that a fourth source of offsite surface flows enter the site from the existing Congress Heights Subdivision. These flows occur due to non-compliance with the approved drainage plan for said subdivision on file with the City of Albuquerque, caused by rear yard ponding

areas that were not constructed or were eliminated. This causes sheet flow to pass through an existing cedar fence onto the project site.

The Cactus Ridge project is unable to provide a conveyance system for the offsite runoff generated by the non-compliance of these properties, due the minimum public infrastructure requirements for a conveyance system and the conflicts with the Department of Housing and Urban Development requirements for the purpose of insured financing. The Department of Housing and Urban Development requirements does not permit lot to lot drainage within a private conveyance system. Therefore a barrier wall to prevent any of the existing lots' runoff to cross onto the proposed subdivision is proposed to be constructed.

Due to the private ownership of the Congress Heights lots under consideration, the analysis of the runoff is based strictly on visual inspection from public right of way and the proposed subdivision. No survey information was available except for the limited aerial topographic mapping identified on the plan, which was recently supplemented by a limited field survey of lots 186 and 187.

The lots in question are all developed with completed single family residential homes. The lots (Congress Heights lots 39 thru 28) fronting B. Cutting, which were required to drain to the street per the accepted drainage plan, all appear to have side yard swales along the property lines. The only exception is between 4720 B. Cutting and 4716 B. Cutting, which appear to have individual side swales on both sides of the property line.

Upon field investigation no noticeable erosion along the backyard fences was found for Congress Heights lots 39 thru 29. There was slight evidence of erosion on the proposed Cactus Ridge property behind lot 28 of the existing Congress Heights Subdivision, but it was unclear if the erosion was due to the backyard flow or onsite flows. The only noticeable backyard runoff crossing an adjacent property was from lots 27 and 26, which impacted Parcel 17 to the southeast. This discharge does not impact Cactus Ridge project based on field observation. The lots along the north boundary of the proposed Cactus Ridge project fronting B. Cutting appear to be in compliance with the approved plan and a barrier wall was not required. However, the developer for the proposed Cactus Ridge Subdivision has committed to install the barrier wall along these properties at the request of residents present at the February 3, 1992 public meeting.

The approved drainage plan for the lots fronting B. Anderson call for backyard ponds sized to contain 275 cf (based on required pond size of 55' x 10' x 0.5'). Upon visual inspection only lot 189 appeared to have an identifiable pond. The majority of the rest of the properties appeared to have backyards which slope to low spots 2' to 3' lower than the existing homes. The one exception is lot 186 which has a 4' high wall which has been filled

with approximately 2' of additional dirt in relation to the neighboring lots. The majority of the lots backyards are landscaped with a mixture of grass and gravel. The gravel being placed along the back fence line and within the low areas.

The existing residents sharing a property line with the proposed subdivision were notified and a public meeting was hosted by the City to clarify the residents responsibilities to install backyard ponds in order to bring their lots into compliance with the approve plan. One resident at the meeting recommended to his neighbors in lieu of digging a pond, they should consider installing roof gutters and drains directing the runoff from the roof to the street, suggesting the backyard could handle what should happen to fall on it. Another recommendation discussed at the public meeting was to install side yard barriers consisting of 2 to 3 block high filled CMU walls (plus footing) above existing ground level at the lowest corner of their property to contain their own runoff and protect their next door neighbor's down stream property from runoff.

However, under the assumption that none of the lot owners decide to act on any of these recommendations the backyards of lots 187 thru 197 were evaluated for a worst case scenario which would result from lot to lot drainage. Based on the recommended ponding requirement on the approved existing grading plan the expected volume from the total 11 lots ($275 \text{ cf} \times 11$) is 3025 cf. Applying August 1991 DPM recommended requirements and assuming 50% of the lot drains to the backyard including 50% of the roof, the total volume from the backyards is 3,257 cf, with a maximum discharge of 2.33 cfs. (Due to varying floor plans the typical lot layout used in the original drainage report for the Congress Heights subdivision was also used for this evaluation.)

Under this worst case situation a cross-section of lot 187 was assumed and the flow velocity was calculated to determine possible erosion around the proposed barrier wall. The resulting velocity would be less than 3.3 fps. Based on the maintain landscaped condition this flow is not anticipated to cause any considerable erosion. (See appendix 3).

The final condition reviewed considered the impact once again at lot 187. If no reduction of flows occur on the other lots the resulting volume on lot 187 would be the 3,257 cf, due to the block wall on lot 186 and the proposed barrier wall. Based on an assumed cross-section, supplemented by spot elevations, the amount of storage in the backyard within 24' from the barrier wall is 1,440 cf. From spot elevation taken with the permission of the owner of lot 186, the property line between lots 186 & 187 is approximately 1' +/- below the home on lot 187. However, the property line is at the same elevation as the garage on lot 186 and a side yard swale is not well developed on this lot. If runoff were to pond in the backyard to the extent under consideration, the flow would eventually cross onto lot 186 and possibly into the garage

before flowing toward the street. Based on the spot elevations taken the water would cross lot 186 before over topping the 4' high barrier wall. The barrier wall at along lot 187 is recommended to match the existing height of block wall on lot 186, at a height of approximately 4' above grade for the protection of the proposed subdivision, as shown on the sketch included in appendix 3.

DRAINAGE MANAGEMENT PLAN

The Eagle Ranch Storm Sewer was designed to allow a total flow of 116 cfs from the three offsite basins and the developed onsite flow from Cactus Ridge. Applying the new hydrologic criteria to these basins, the total discharge obtained is 201.6 cfs and the need for a pond and controlled release is inevitable. Utilizing the Mayor's Emergency Rule rational method yields a peak developed flow of 158.6 cfs, which is also in excess of the design flow for the Eagle ranch Storm Sewer of 116 cfs, therefore requiring a reduction in the peak developed flow of 42.7 cfs.

A proposed pond is to be located at the point where the offsite storm sewer enters the property on the westerly boundary. This pond will be sized with adequate volume to reduce the peak flow rate from offsite basins O1 and O2 of 78.3 to a peak flow rate of 38.5 cfs (see HYMO Print out in appendix II for inflow and outflow hydrographs). This attenuated peak flow rate, when added to the peak discharge from onsite basins and basin O3, falls within the peak design flow for the Eagle Ranch Storm Sewer.

Under developed conditions, the site will be graded to deliver runoff from the developed lots into the street sections which will convey runoff to inlets which will be located at the intersections of internal streets with Paradise Boulevard. These proposed inlet batteries will be connected to the Eagle Ranch Storm Sewer outfall.

CONCLUSIONS

Based on the facts that the currently accepted hydrology is the Mayor's 1986 Emergency Rule and the existing downstream structures were design following these accepted hydrologic methods, the analysis and design of this project utilizes the Mayor's 1986 Emergency Rule. The proposed new rational method was applied for comparison purposes and the results are include in the following tables. The drainage infrastructure in this report utilizing these analysis methods are adequate to convey developed discharges within existing facilities without damage to downstream properties.