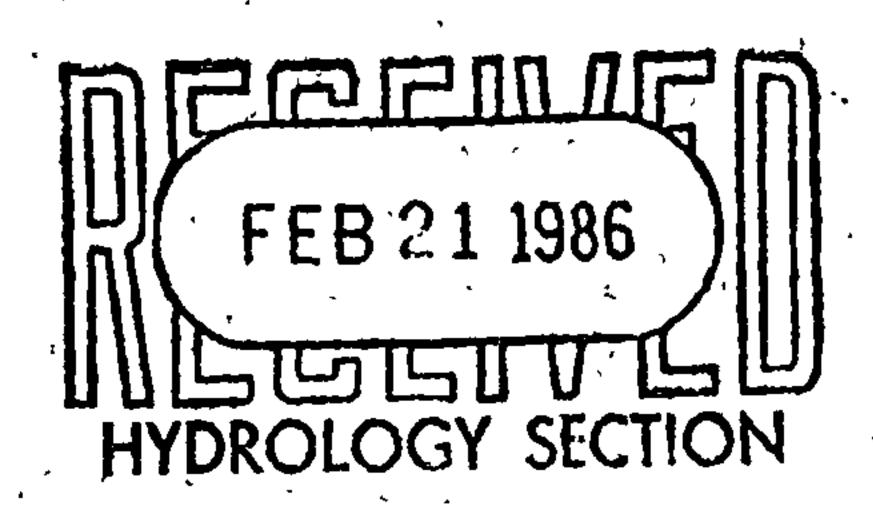
PARK SQUARE - PHASE II DRAINAGE STUDY

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HINES INDUSTRIAL 2700 POST OAK BOULEVARD, N.E. HOUSTON, TEXAS 77056

FEBRUARY 1986



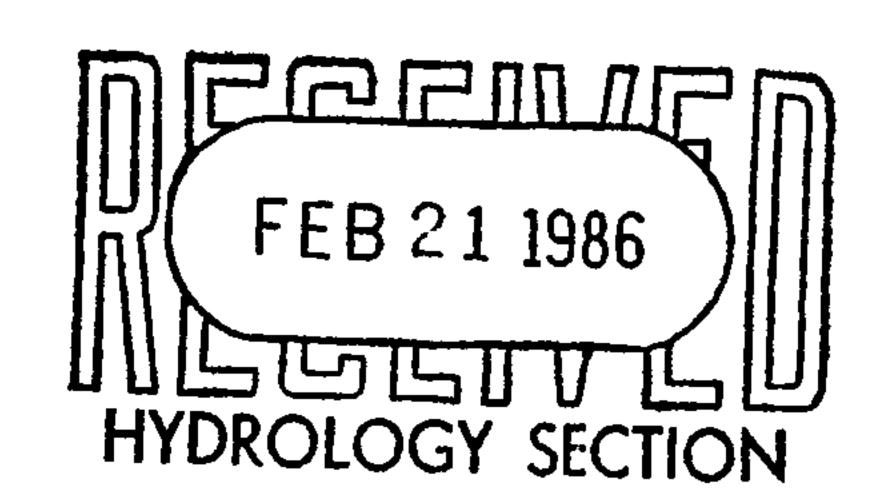


HOLMES & NARVER, INC.
6501 AMERICAS PARKWAY, N.E. SUITE 700
ALBUQUERQUE, NEW MEXICO 87110



February 19, 1986 AL-1974.00-L-1

Mr. Billy J. Goolsby, P.E. City/County Flood Plain Administration City of Albuquerque Municipal Development Department Design Hydrology Section 123 Central, NW Albuquerque, New Mexico 87102



PARK SQUARE - PHASE II DRAINAGE STUDY

Dear Mr. Goolsby:

Transmitted herewith is one (1) copy of the PARK SQUARE - PHASE II DRAINAGE STUDY. The stormwater management plan outlined within this study is in conformance with previous agreements made with the Albuquerque City Engineer's Office regarding management of the anticipated runoff from the 100-year storm event at Park Square. Specifics regarding proposed Phase II improvements, and the impacts these improvements will have upon site drainage, are identified within this study.

From revised hydrologic calculations, the 100-year peak flow from this development is anticipated to be approximately 189 cfs, under completely developed conditions. As demonstrated within previous calculations (Park Square Drainage Study, May 1984), the Marriott parking lot drainage structure is not capable of conveying storm flows in excess of 179.35 cfs without modification. In light of the interim nature of this problem, introduction of a side-channel weir within the curb wall along the west side of the Marriott parking lot drainage easement was approved by the City of Albuquerque, Design Hydrology Section. The off-site peak flow which enters the site from Winrock Shopping Center will be dramatically reduced with implementation of Albuquerque Master Drainage Study Project 357-01D.

The side channel weir within the Marriott parking lot drainage easement will safely divert approximately 10.0 cfs onto the Louisiana Cinema I, II, and III parcel. Downstream impacts from this diversion will be minimal, based on the lag in travel time between the Cinema and Park Square drainage areas and the conveyance capacity of the drainage swale along the north side of Interstate 40.

Mr. Billy J. Goolsby, P.E. City/County Flood Plain Administration PARK SQUARE - PHASE II DRAINAGE STUDY February 19, 1986 AL-1974.00-L-1 Page 2

Updated calculations and comments are included for your consideration. We request an expeditious response to this matter so that we may proceed with Phase II design. Should you have any questions, do not hesitate to contact this office.

Sincerely,

James L. Hewitt, Jr., P.E.

Senior Engineer II

JLH:dsm:0319H

encls. as cited

cc: T. McEwan

D. Newman

R. Booth

M. Kramm

S. Fritz

Project File Master File

PARK SQUARE PHASE II DRAINAGE STUDY

FEBRUARY 1985

HOLMES & NARVER, INC.

AMERIWEST FINANCIAL CENTER

6501 AMERICAS PARKWAY, NE, SUITE #700

ALBUQUERQUE, NEW MEXICO 87110

James L. Hewitt, Jr., P.E/

Roni G. Booth, P.E.

I hereby certify that the drainage calculations included herein were prepared under my direction and are in conformance with previous agreements made with the Albuquerque City Engineer's Office in lieu of the normal requirements of Drainage Resolution 1972-2 and City Ordinance 56-176, are true and correct to the best of my knowledge and are, otherwise, in substantial compliance with those drainage, erosion, and flood control criteria, guidelines and standards outlined within the City of Albuquerque Development Process Manual. The drainage calculations included herein append to the Park Square Drainage Study submitted May 3, 1984.

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Roni G. Booth

NM P.E. No. 5853

Approved:

For the City of Albuquerque

0318H

PARK SQUARE PHASE II DRAINAGE STUDY

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PARK SQUARE PHASE II

DRAINAGE STUDY

I. OBJECTIVE

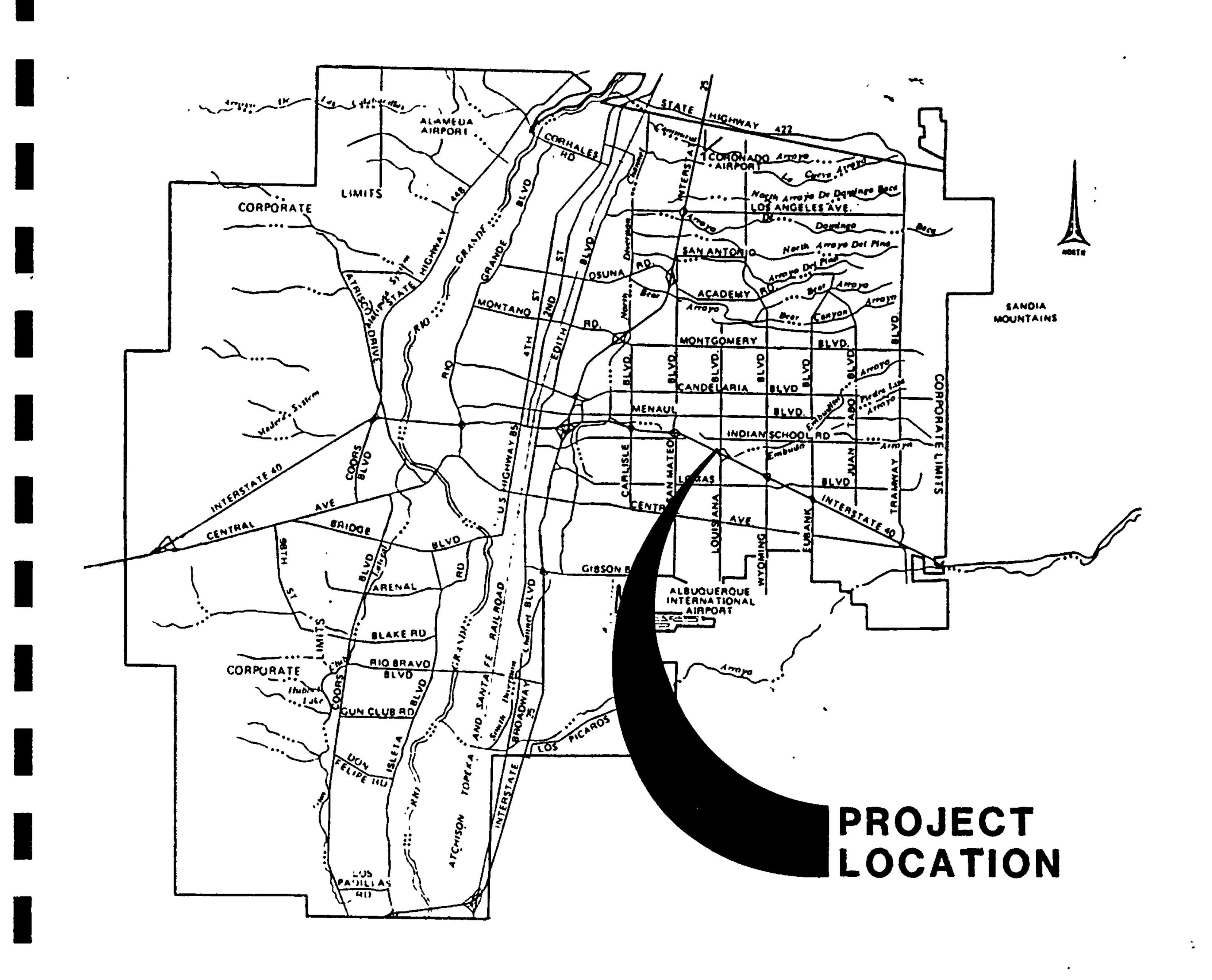
This study examines existing and proposed site drainage conditions at Park Square, a commercial development for the Hines Industrial Corporation. Proposed Phase II improvements, site grading and drainage, adequacy of existing drainage structures and necessary drainage modifications and/or improvements are among the primary topics addressed within this report. Upon completion, the Park Square Addition will be in substantial compliance with the drainage, erosion, and flood control criteria, guidelines and standards outlined within the City of Albuquerque Development Process Manual.²

II. SITE LOCATION AND DESCRIPTION

Park Square is situated near the intersection of Louisiana Boulevard N.E. and Interstate 40 (Coronado Freeway). The Phase II Park Square development will occupy portions of Tracts 1-A, 1-C, 1-D, 1-E, 1-F, 1-G, and 1-H, of the Park Square Addition (Section 13, T. 10 N., R. 3 E.), a subdivision to the City of Albuquerque, Bernalillo County, New Mexico (Vicinity Map, Figure 1).

The current Phase II development plan considers one 10-story office building, one 7-story parking structure, two 1-story retail structures and one 2-story retail/office building.

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III. AVAILABLE INFORMATION

A. Previous Drainage Studies

Previous drainage studies performed for the Park Square Addition have included the Engineer's Drainage Report for the Louisiana Boulevard Cinema I, II and III (Wilson & Company Engineers, January 1973), the Engineer's Report on Storm Drainage for Park Square (Gordon Herkenhoff & Associates, Inc., July 1979), the Albuquerque Master Drainage Study (January 1981), the Marriott Hotel Site "As-Built" and Drainage Improvements (Armstrong Engineering, Inc., August 1982), the Park Square Drainage Study (Holmes & Narver, Inc., December 1983) and the Park Square Drainage Study - Revised Calculations (Holmes & Narver, Inc., May 1984).

As described within the Engineer's Report prepared by Gordon Herkenhoff & Associates, Inc., 5 the Marriott parking lot drainage structure was designed to convey the total anticipated runoff (205 cfs) from the 100-year storm under the westbound lanes of Interstate 40 and into the median channel. As stipulated within correspondence to the City Engineer dated May 4, 1979, 3 this peak flow was based on completely developed conditions, without ponding.

Hydrologic site conditions were re-evaluated within the Park Square Drainage Study performed by Holmes & Narver, Inc. in December 1983. Revised hydrologic calculations included within that study yield a peak flow of approximately 188 cfs for the 100-year storm event. Calculations also revealed that the Marriott parking lot drainage structure is not capable of conveying storm flows in excess of approximately 179 cfs.

Revised calculations included within the Park Square Drainage Study update, submitted in May 1984, supported a proposal to introduce a side-channel weir within the curb wall along the west side of the

Marriott parking lot drainage easement which would reduce the peak flow at the drainage structure. This proposal was approved in June 1984, and subsequently implemented.

B. Flood Hazard Boundary Map

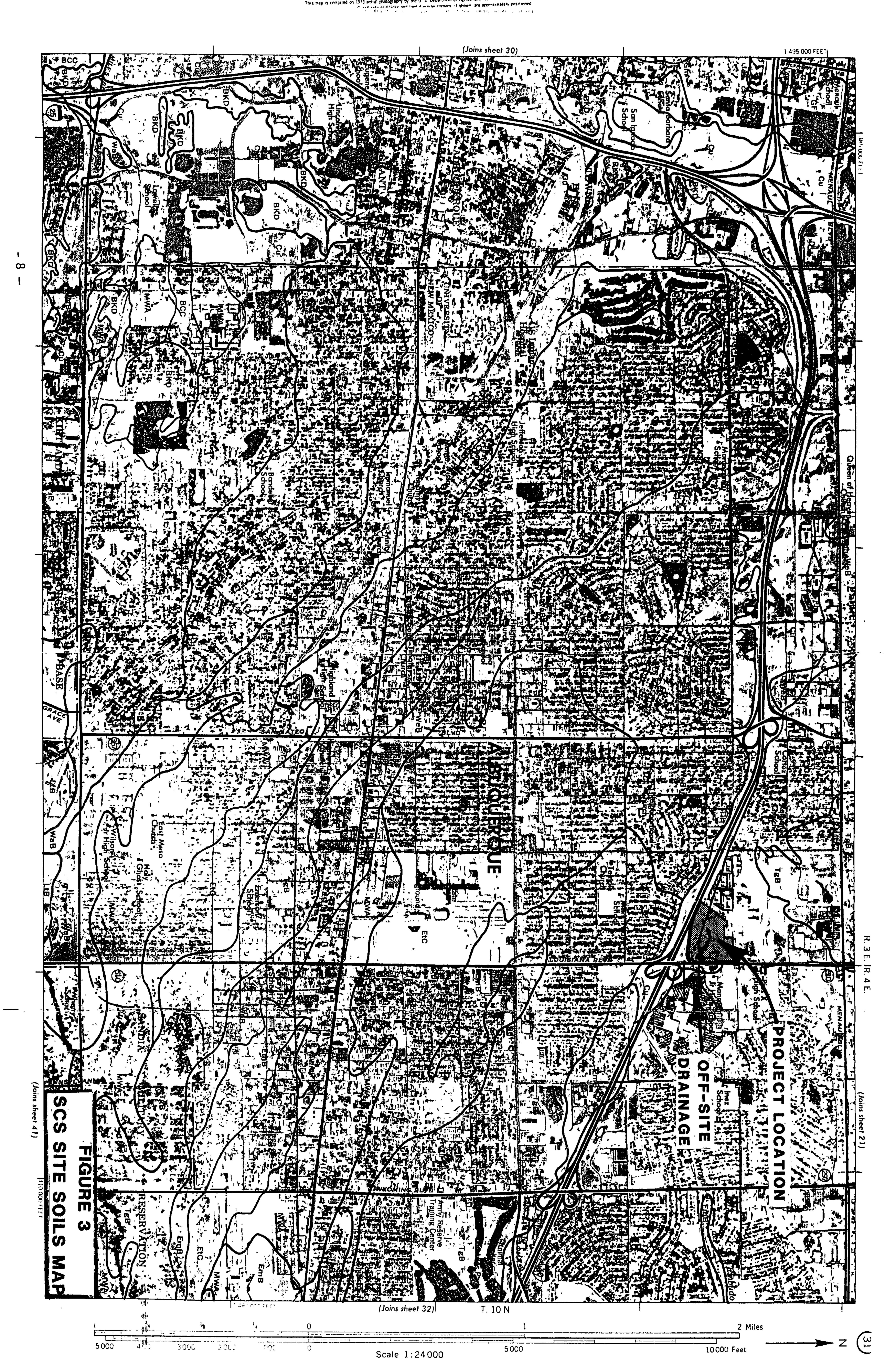
The Park Square Addition is delineated on the Flood Boundary and Floodway Map¹² (Panel 30) which accompanies this report (Figure 2). As further described within Volume III of the Albuquerque Master Drainage Study¹, implementation of Projects 356-01C and 357-01D will mitigate flooding, on Louisiana Boulevard, NE and along Indian School Road, NE, which occurs as the result of off-site drainage following localized storm events. Project 357-01D will reduce the peak flow which enters onto the Park Square site. Project 356-01C will reduce peak flow which occurs along the southern frontage of Indian School Road. Implementation of these projects is strongly recommended at this time.

C. Site Soil Conditions

The Park Square Addition and the contributing drainage area to the east are delineated on the SCS Soil Survey Map 17 (Sheet 31) which accompanies this report (Figure 3). Site soils are of the Embudo-Tijeras Complex and are further described as gravelly, fine sandy loams. These soils fall within Hydrologic Soil Group B. Runoff is medium and the hazard of water erosion on these soils is moderate.

A geotechnical investigation⁷ performed by Sergent, Hauskins and Beckwith in October 1983 revealed that silty, clayey, and relatively clean sands, interbedded with lesser amounts of sandy clays and silt, predominate at the Park Square site. The silty soils are generally nonplastic, while the clayey soils are

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generally of low to medium plasticity. These soils generally range from firm to hard or dense to very dense with occasional zones of moderately firm soils at the ground surface.

The Park Square soils have exhibited low to moderate moisture content throughout their extent; however, some of the clay and silt soils, near or above their plastic limits, exhibited high moisture contents.

Some of the low density native soils which underlie the site are moisture sensitive; therefore, positive site drainage should be provided during construction and maintained thereafter. The ground surface adjacent to proposed structures should be sloped away from the structures at a minimum grade of 2 percent to a point at least 15 feet from their perimeters to ensure positive drainage. Stormwater collected in this fashion should be conveyed away from these points and into adjacent streets or drainage easements.

Roof runoff should be conveyed away from the structures in a manner which will minimize erosion. Long-term ponding of stormwater near building perimeters must be avoided. Special precautions must be taken to ensure that soils beneath structural foundations will not be saturated by stormwater or moisture from other sources.

The edge of controlled fill embankments must be graded to the contours shown on the drawings. Earth embankments with slopes steeper than 1 vertical to 3 horizontal must be protected from erosion.

IV. METHOD OF INVESTIGATION

The hydrologic calculations presented within Appendix A of this report are based on information included within previous drainage studies and are consistent with methods outlined in Volume II of the City of Albuquerque Development Process Manual. The hydraulic capacity (179 cfs) of the Marriott parking lot drainage structure was established within the Park Square Drainage Study submitted in May 1984.

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V. PRESENTATION OF RESULTS

Revised hydrologic calculations for the Park Square Addition (Phase II) yield an anticipated 100-year peak flow of approximately 189 cfs, under completely developed conditions. Implementation of Project 357-01D would reduce this anticipated peak flow to approximately 149.5 cfs. As demonstrated within previous studies, the Marriott parking lot drainage structure is incapable of conveying storm flows in excess of 179 cfs. A slight amount of additional capacity has been provided by elevating the inlet headwall and training wall at this structure. Diversion of a small portion of the 100-year peak flow (approximately 10 cfs) onto the adjacent Cinema parking lot via a side-channel spillway will facilitate safe conveyance of the remaining flow by the Marriott parking lot drainage structure.

Previous studies ^{5,11} have demonstrated that the hydraulic capacities of existing streets within the Park Square Addition are sufficient to convey the anticipated 100-year peak flows to the Marriott parking lot drainage structure. The proposed widening of Americas Parkway will also enhance this capability.

The transverse drop inlet, which crosses Americas Parkway at its intersection with the southern entrance to the Louisiana Boulevard Cinema, has silted in and is ineffective. This structure should be modified during the widening of Americas Parkway. A sidewalk culvert has been provided at the north end of this drop inlet to ensure that storm flow which originates on—site is safely conveyed across Americas Parkway.

Existing elevations within the Park Square Addition are presented on the Phase II Grading/Drainage Plan which accompanies this report. Park Square frontage along Indian School Road was graded to drain northward in a manner sufficient to preclude entrance of off-site storm flows. The remainder of the site has been graded to drain to the southwest.

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The revised site hydrology is presented on the Grading/Drainage Plan which accompanies this report. Anticipated peak flows, without implementation of Project 357-01D, are presented on this plan.

The Park Square Addition will be completed in three phases. Phase I included one 10-story office building, four 1-story retail structures, one 6-story parking structure, and parking lots to the north and south of Retail "C." Phase II will include one 10-story office building, one 7-story parking structure, two 1-story retail structures and one 2-story retail/office building. Phase III will include a third 10-story building and an additional parking structure. Storm flow which originates on-site is conveyed by sheet flow, or private storm drain, onto internal streets. Site soil conditions preclude ponding of stormwater near building perimeters. During Phase II construction, the contractor will be responsible for effective management of on-site drainage and for street clean-up following local storm events.

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VI. DISCUSSION, CONCLUSION, AND RESULTS

As discussed within the preceding section, Flood Mitigation Project 357-01D will reduce the off-site flow which originates from the Winrock Shopping Center. Flood Mitigation Project 356-01C will reduce flooding along the southern frontage of Indian School Road. Implementation of both of these projects is, therefore, recommended.

On-site drainage improvements, beyond those identified within the Park Square Drainage Study submitted in May 1984, will not be required to accommodate Phase II development. Erosion control measures implemented during Phase II construction will preclude damage to the site and/or adjacent facilities.

Site conditions and drainage improvements which are identified in this study are in substantial compliance with drainage, erosion, and flood control criteria, guidelines, and standards outlined within the City of Albuquerque Development Process Manual.²

REFERENCES

- Albuquerque Master Drainage Study, Volume III. Bohannan-Huston, Inc.,
 Albuquerque, New Mexico (January 1981).
- 2. Development Process Manual, Volume 2: Design Criteria. City of Albuquerque Municipal Development Department, Albuquerque, New Mexico (March 1982).
- 3. Drainage Management Park Square. Correspondence, Gordon Herkenhoff & Associates, Albuquerque, New Mexico (May 4, 1979).
- 4. Engineer's Drainage Report for Proposed Theater Near Indian School Road and Georgia Street, N.E. Wilson & Company Engineers, Albuquerque, New Mexico (February 1973).
- 5. Engineer's Report on Storm Drainage for Park Square. Gordon Herkenhoff & Associates, Inc., Albuquerque, New Mexico (July 1979).
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- 7. Geotechnical Investigation Report, Proposed Office & Parking Structures, Louisiana Boulevard & Loop Road, N.E. Sergent, Hauskins, & Beckwith, SHB Job No. E83-1126, Albuquerque, New Mexico (October 25, 1983).
- 8. HEC-2 Water Surface Profiles Users Manual (Computer Program 723-X6-L202A). U.S. Army Corps of Engineers Hydrologic Engineering Center, Davis, California (November 1976).
- 9. Hydraulic Charts for the Selection of Highway Culverts, Hydraulic Engineering Circular No. 5. U.S. Department of Commerce, Bureau of Public Roads (April 1964).

-13 -

- 10. Hydraulic Design of Improved Inlets for Culverts, Hydraulic Engineering Circular No. 13. U.S. Department of Transportation, Federal Highway Administration (August 1972).
- 11. Marriott Hotel Site As-Built and Drainage Improvements. Armstrong Engineering, Inc., Albuquerque, New Mexico (August 1982).
- 12. National Flood Insurance Program, Floodway Flood Boundary and Floodway Map, City of Albuquerque, New Mexico, Bernalillo County. Federal Emergency Management Agency, Community Panel Number 350002 0030 (October 1983).
- 13. Open Channel Flow. Henderson, F.M. The Macmillian Company, New York (1966).
- 14. Park Square Drainage Study. Holmes & Narver, Inc., Albuquerque, New Mexico (December 1983).
- 15. Park Square Drainage Study (Revised Calculations). Holmes & Narver, Inc., Albuquerque, New Mexico (May 1984).
- 16. Preliminary Drainage Analysis of Park Plaza. Holmes & Narver, Inc., Albuquerque, New Mexico (September 1983).
- 17. Soil Survey of Bernalillo County and Parts of Sandoval and Valencia Counties, New Mexico. U.S. Department of Agriculture Soil Conservation Service (June 1977).

APPENDIX "A"
CALCULATIONS

NOTE: For further information, refer to Park Square Drainage Study April 1984.

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 $= 130.12 \text{ cfs}$

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(2.81 AL. HARD SURFACE + 0.43 AC. GRASS +
AREA#1 & #2)

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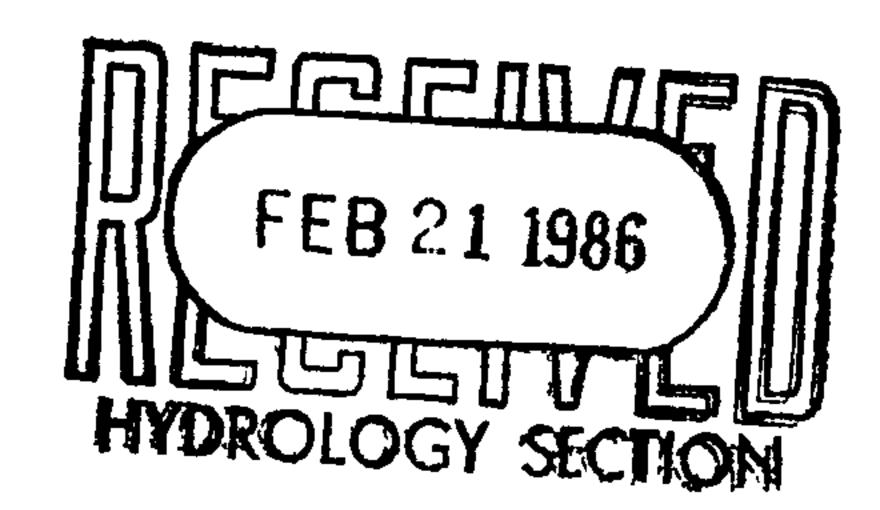
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|--|---|--|--|--|
| LEGAL DESCRIPTION Redivision of Tract 1, Park Square Addition, Albuquerque, New Mexico, as filed with Bernalillo County Clerk on November 18, 1985 in Volume C28, Folio 171. | | | | |
| CITY ADDRESS Park Square, Albuquerque | · <u></u> | | | |
| ENGINEERING FIRM Holmes & Narver, Inc. ADDRESS 6501 Americas Parkway NE Albuquerque, New Mexico 87110 | CONTACT James Hewitt PHONE (505) 889-4100 | | | |
| OWNER Hines Industrial, Inc. ADDRESS 2700 Post Oak Boulevard Houston, Texas 77056 | CONTACT Tim McEwan PHONE (713) 629-8400 | | | |
| ARCHITECT Skidmore, Owings & Merrill ADDRESS 400 One Shell Plaza Houston, Texas 77002-4906 | CONTACT Chris Jons PHONE (713) 222-1555 | | | |
| SURVEYOR Albuquerque Surveying Co. ADDRESS 2119 Menual Blvd. NE Albuquerque, New Mexico 87110 | CONTACT Fred Sanchez PHONE (505) 265-5611 | | | |
| CONTRACTOR IBS Inc. ADDRESS 3884 W. 12th Street Houston, Texas 77008 PRE-DESIGN MEETING | CONTACT Jim Metzger PHONE (713) 956-0098 FEB 21 1986 | | | |
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| DATE SUBMITTED February 20, 1986 | | | | |

BY Holmes & Narver, Inc. - J. Hewitt



February 19, 1986 AL-1974.00-L-1

Mr. Billy J. Goolsby, P.E. City/County Flood Plain Administration City of Albuquerque Municipal Development Department Design Hydrology Section 123 Central, NW Albuquerque, New Mexico 87102



PARK SQUARE - PHASE II DRAINAGE STUDY

Dear Mr. Goolsby:

Transmitted herewith is one (1) copy of the PARK SQUARE - PHASE II DRAINAGE STUDY. The stormwater management plan outlined within this study is in conformance with previous agreements made with the Albuquerque City Engineer's Office regarding management of the anticipated runoff from the 100-year storm event at Park Square. Specifics regarding proposed Phase II improvements, and the impacts these improvements will have upon site drainage, are identified within this study.

From revised hydrologic calculations, the 100-year peak flow from this development is anticipated to be approximately 189 cfs, under completely developed conditions. As demonstrated within previous calculations (Park Square Drainage Study, May 1984), the Marriott parking lot drainage structure is not capable of conveying storm flows in excess of 179.35 cfs without modification. In light of the interim nature of this problem, introduction of a side-channel weir within the curb wall along the west side of the Marriott parking lot drainage easement was approved by the City of Albuquerque, Design Hydrology Section. The off-site peak flow which enters the site from Winrock Shopping Center will be dramatically reduced with implementation of Albuquerque Master Drainage Study Project 357-01D.

The side channel weir within the Marriott parking lot drainage easement will safely divert approximately 10.0 cfs onto the Louisiana Cinema I, II, and III parcel. Downstream impacts from this diversion will be minimal, based on the lag in travel time between the Cinema and Park Square drainage areas and the conveyance capacity of the drainage swale along the north side of Interstate 40.

Mr. Billy J. Goolsby, P.E. City/County Flood Plain Administration PARK SQUARE - PHASE II DRAINAGE STUDY February 19, 1986 AL-1974.00-L-1 Page 2

Updated calculations and comments are included for your consideration. We request an expeditious response to this matter so that we may proceed with Phase II design. Should you have any questions, do not hesitate to contact this office.

Sincerely,

James L. Hewitt, Jr., P.E.

Senior Engineer II

JLH:dsm:0319H

encls. as cited

cc: T. McEwan

D. Newman

R. Booth

M. Kramm

S. Fritz

Project File

Master File