



CITY OF
WICHITA

Wichita Airport Authority

INTEROFFICE MEMORANDUM

Airport Engineering & Planning Division

TO: Scott Lindebak
COPY: Victor White, Mike Carter
FROM: John Oswald
SUBJECT: North Shuttle Lot and Storm Water Detention
DATE: August 22, 2007

Scott,

PEC has prepared the attached report regarding storm water detention for pending construction for our North shuttle Parking Lot.

The conclusion of the report, which reviewed prior PEC studies, is that the existing detention pond to the west of the site is capable of handling the excess runoff from the project.

Please call me at 946-4715 if there are questions.

John



Professional Engineering Consultants, P.A.

August 17, 2007

Wichita Airport Authority
2173 Air Cargo Road
P.O. Box 9130
Wichita, KS 67277

Attention: Mr. John Oswald, P.E.

Reference: TARP – North Shuttle Parking Lot Drainage
PEC Project No. 32-06481-001-5568

Dear Mr. Oswald:

This letter serves to explain the drainage of the proposed North Shuttle Parking Lot at Mid-Continent Airport that is part of the Terminal Area Redevelopment Plan. The stormwater drainage, as currently designed in the 90% project plans, is directed to curb inlets and area drains that will be tied to existing storm drains which discharge to the large detention basin lying directly west of the proposed parking lot. It is our understanding that the City of Wichita's stormwater management engineer, Mr. Scott Lindebak, has indicated that he requires engineering data to support this concept of allowing undetained stormwater runoff from the project to drain to the detention basin.

PEC prepared a study entitled, "Storm Water Runoff and Surface Drainage Report", dated August, 1976 for the Wichita Airport Authority and provided copies of this report to the Authority. This report was prepared pursuant to the publication of the Airport Master Plan in March 1975, which projected significant increase in use of the airport and additions to the airside and landside facilities. The report, in addition to studying areas of known drainage problems at the time, also studied and made recommendations for drainage improvements to accommodate the planned growth of the airport. Portions of that report, in support of the current plan to drain the runoff from the north shuttle lot directly to the existing detention basin, have been copied and included within this report as follows.

Figure 1 shows the location of the planned North Shuttle Parking Lot, west of Mid-Continent Drive and South of Learjet Way (Harry Street).

Figure 2 is a map of the airport showing the land use that existed at the time of the study (1976). The four use classes (1 through 4) as shown in the legend are described in Appendix A.

Figure 3 is a map of the airport showing the land use that was projected (future) at that time

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Airport
Engr.

Mr. John Oswald
August 15, 2007
Page 2

Figure 4 is an enlargement of a portion of Figure 3 that has been annotated to show the locations of the existing detention basins and the planned North Shuttle Parking Lot. This figure shows that the planned parking lot is located primarily on land that was projected to be developed to a Class 2 level; but a small portion of the east side of the lot is in an area projected to be Class 3.

Appendix 1, as mentioned, is two pages from the report that describe the land use classes used to develop hydrology for the study. Class 1 was the least intensive in terms of development, while Class 4 was the most intensive.

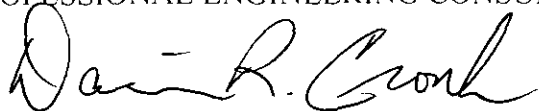
Appendix 2 contains calculations showing that the proposed North Shuttle Parking Lot will result in approximately 64% of the project area being made impervious by construction of concrete and asphalt pavements.

Another study report was prepared for the Authority in August, 2004 to study the possibility of filling in the detention basin south of Learjet Way (Harry Street) for future Air Cargo Apron expansion. This report is included in its entirety as Appendix 3, and clearly demonstrates that there currently exist more than adequate storage volumes within the two detention basins to accommodate the continued development of areas within the watershed without additional or expanded detention facilities. In fact, as long as the development continues to follow the original land use map (Figure 3), the detention basin south of Learjet Way could be eliminated entirely without causing increased flows downstream, or even increasing water surface elevations within the detention basin.

Please let me know if further information or explanation of the data contained herein is needed in order to obtain project approval from the Stormwater Management Office.

Very truly yours,

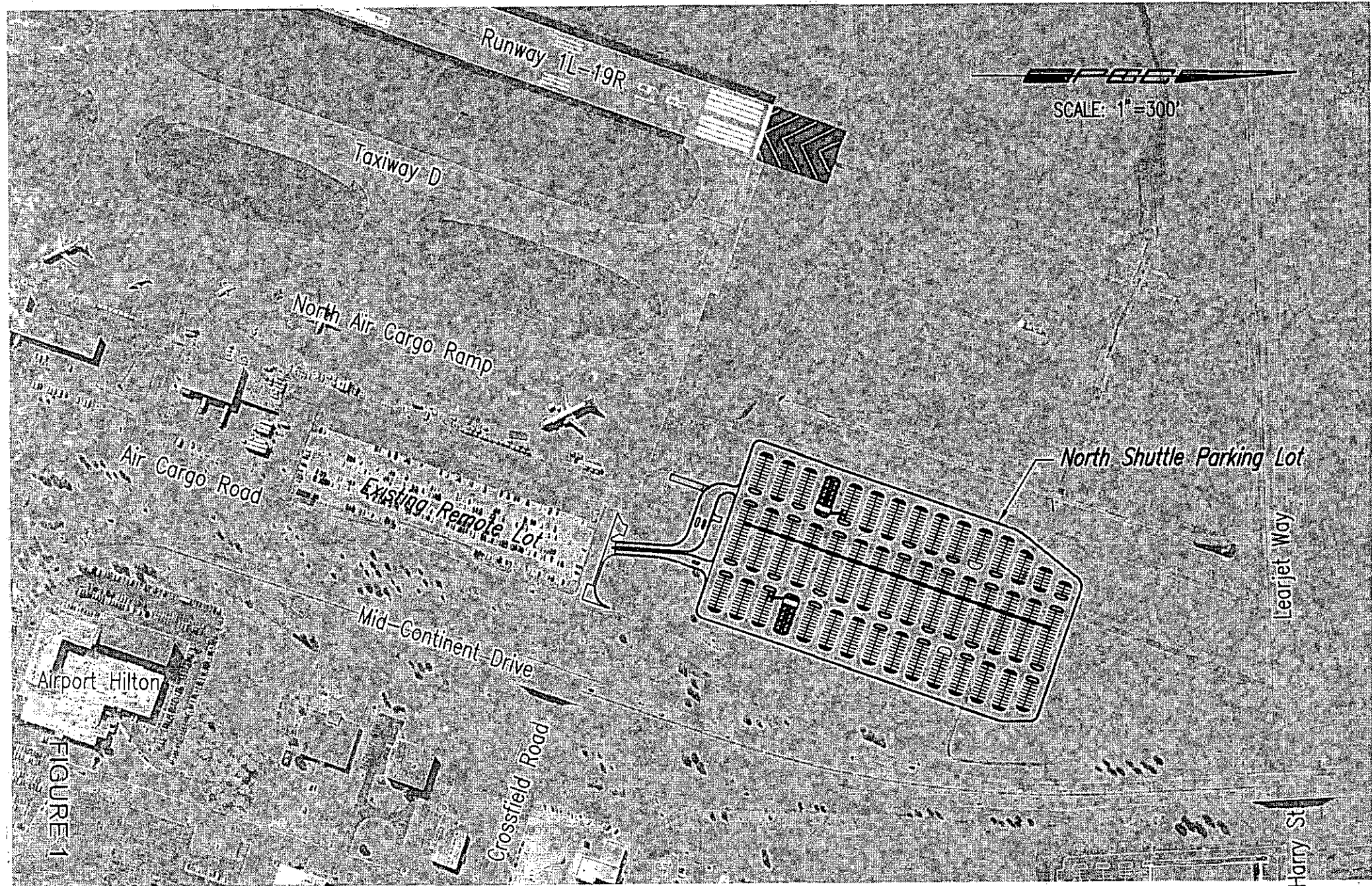
PROFESSIONAL ENGINEERING CONSULTANTS, P.A.



Darwin Cronk, P.E.
Project Engineer

DAR/mml

Encl: As noted



Runway 1L-19R

Taxiway D

North Air Cargo Ramp

Air Cargo Road

Existing Remote Lot

North Shuttle Parking Lot

Mid-Continent Drive

Learjet Way

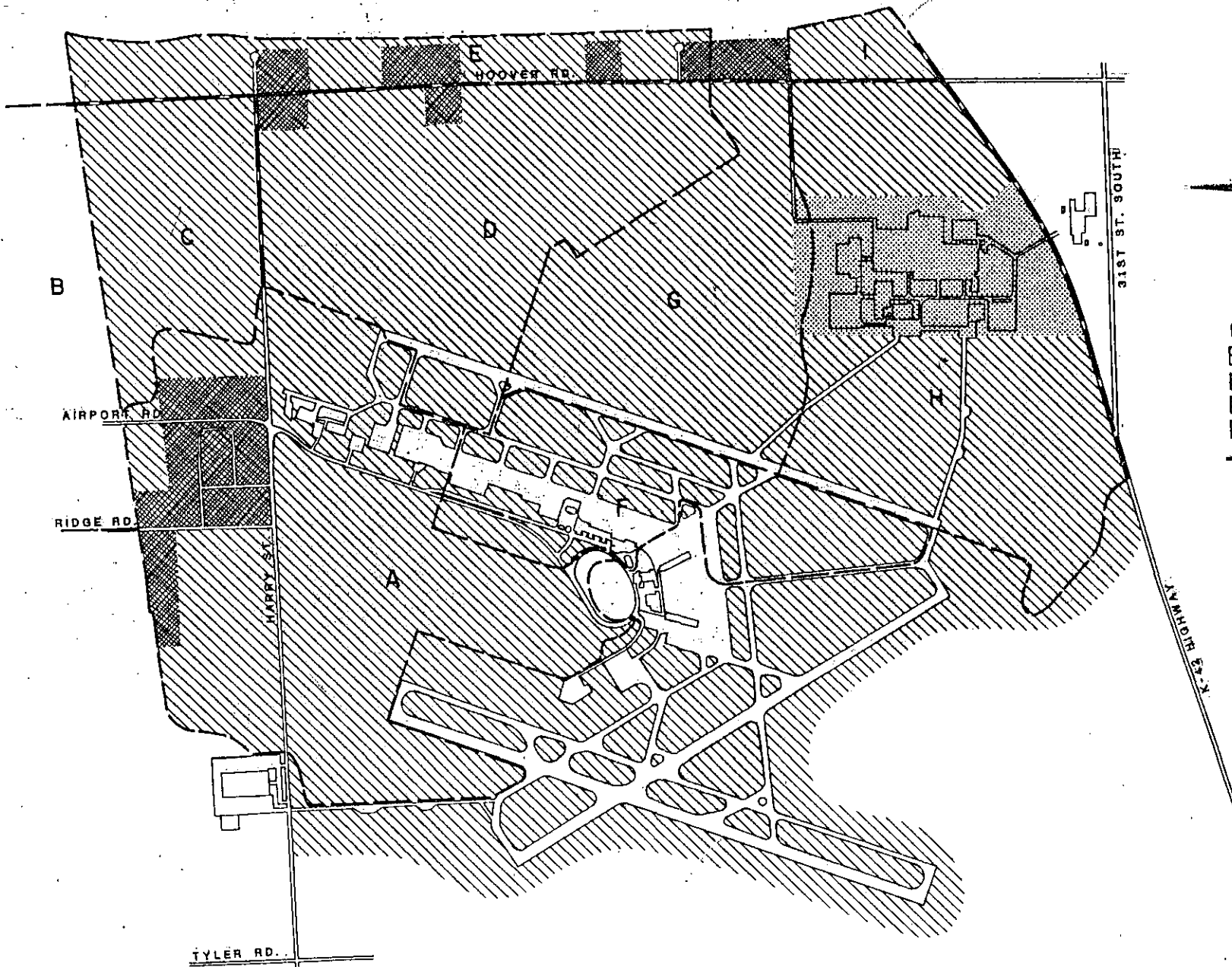
Airport Hilton





Crossfield Road

Harry St

SCALE: 1"=300'

FIGURE 1



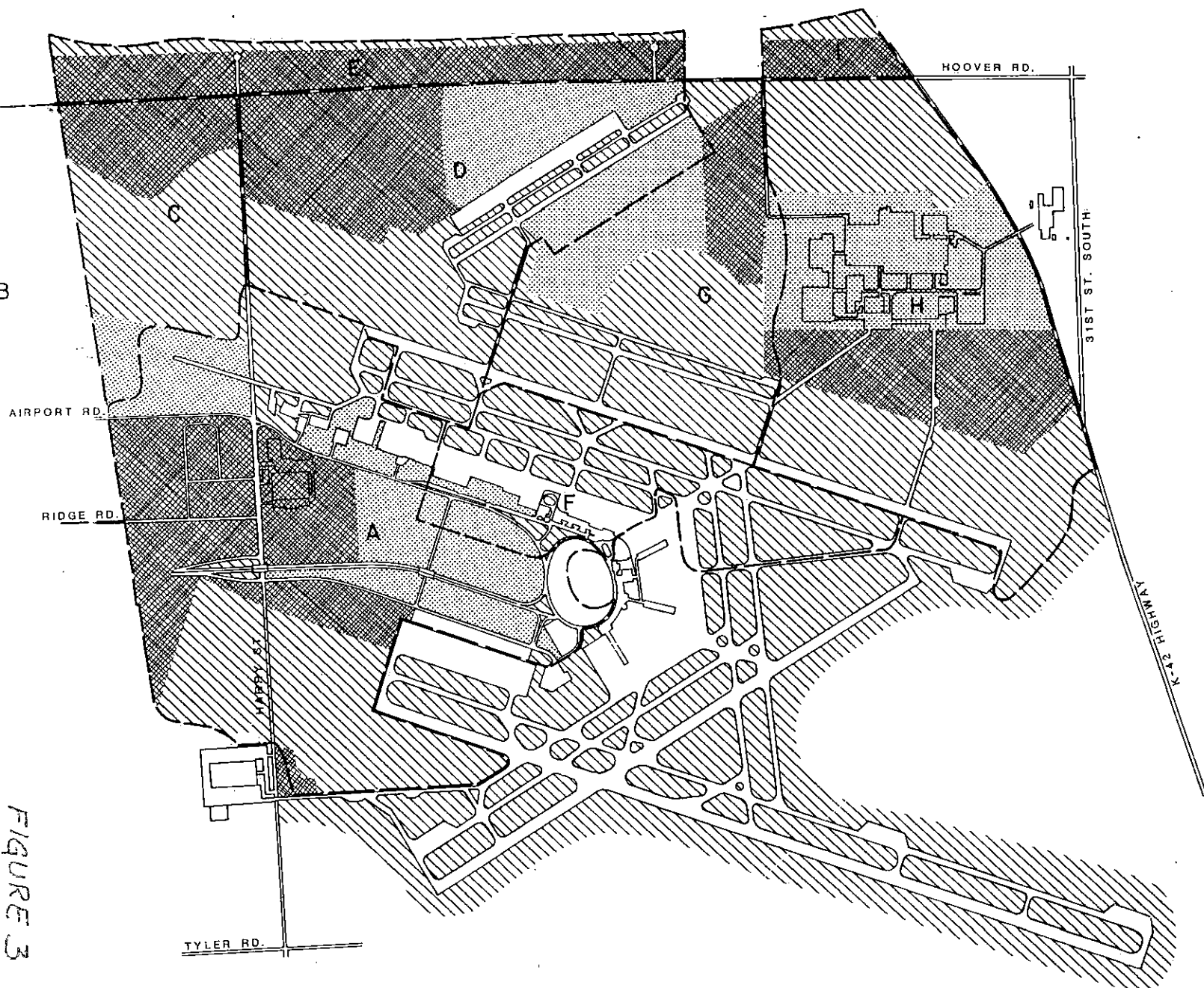
- LAND CLASSES**
-  CLASS 1
 -  CLASS 2
 -  CLASS 3
 -  CLASS 4
- — — — —** DRAINAGE AREA BOUNDARIES
- D** DRAINAGE AREA No.






**DRAINAGE STUDY
WICHITA MID-CONTINENT
AIRPORT**

PRESENT LAND USE

PROFESSIONAL ENGINEERING CONSULTANTS, P.A.
ENGINEERS
WICHITA, KANSAS
FIG. 2.4

FIGURE 2



- LAND CLASSES**
-  CLASS 1 .3
 -  CLASS 2 .7
 -  CLASS 3 .9
 -  CLASS 4 .95
 -  DRAINAGE AREA BOUNDARIES
 - D** DRAINAGE AREA No.

DRAINAGE STUDY
 WICHITA MID-CONTINENT
 AIRPORT
PROJECTED LAND USE
 PROFESSIONAL ENGINEERING CONSULTANTS, P.A.
 ENGINEERS
 WICHITA, KANSAS
 FIG. 3.1

FIGURE 3

B

AIRPORT RD.

RIDGE RD.

A

G

RETENTION
BASIN

HABBY

Mid-Cont.

CARGO

T.W.D.

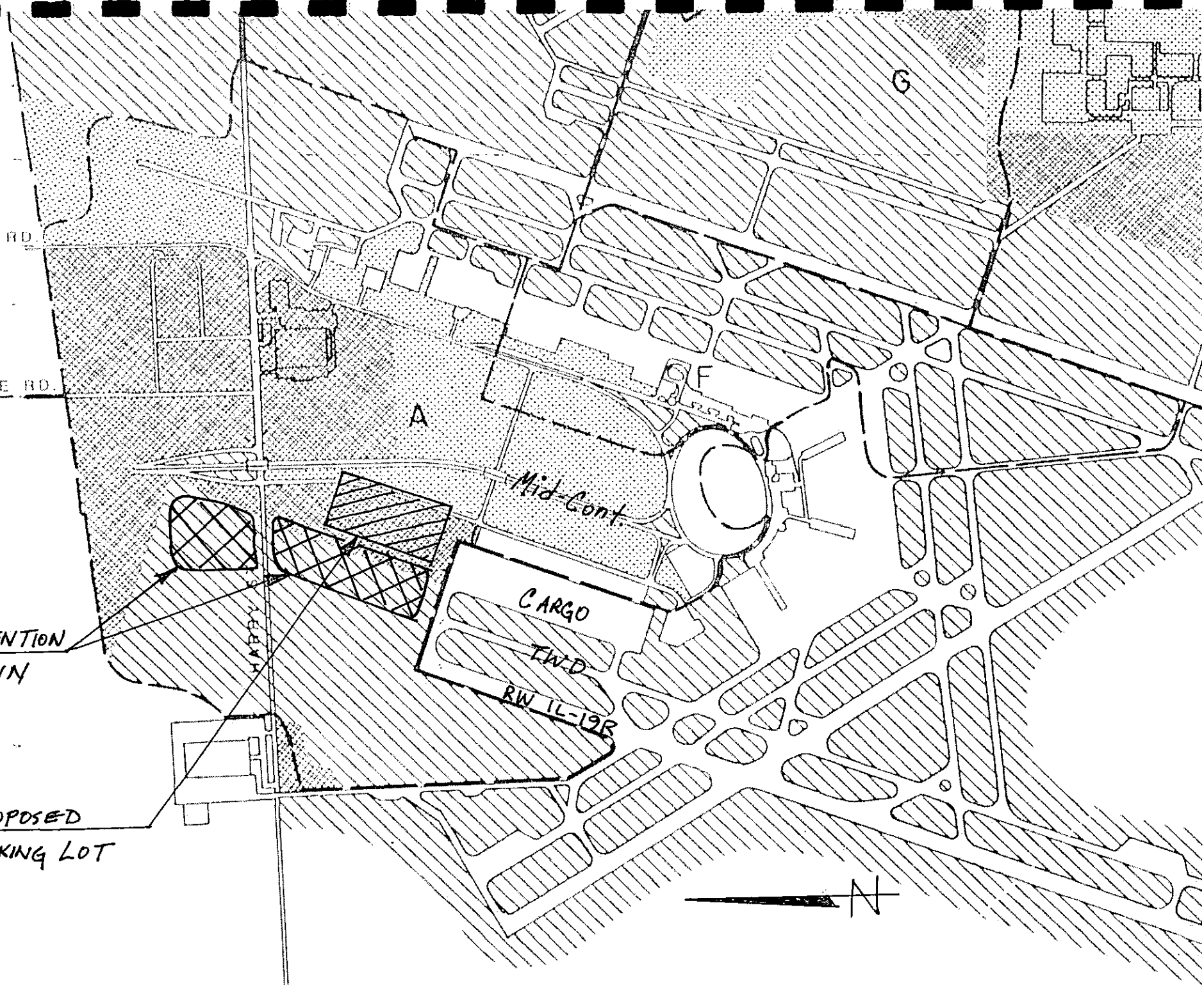
RW 1L-19R

PROPOSED
PARKING LOT

TYLER RD.



FIGURE 4



APPENDIX 1

LAND USE DESCRIPTIONS

A - is the area of land being investigated, measured in acres.

B. Projected Land Use and Runoff

As noted above, the runoff coefficient "C" is assigned various values dependent upon the character of the ground surface.

To permit assignment of realistic values for the runoff coefficient it is necessary to have some knowledge of the surface characteristics within the drainage area. Furthermore, since the study must consider future as well as existing conditions, projections of anticipated future land use for the drainage area must be developed.

Land use projections normally are made with respect to the specific application projected for a given area such as Industrial, Commercial, Residential, Open Space, etc.. These standard classifications are well suited to conventional demographic studies but are too restrictive to serve the more limited requirements of a drainage investigation.

To more suitably meet the needs of this study four classes of land use were established.

CLASS I: Open space or undeveloped land not projected for future development. A runoff coefficient "C" of 0.30 was assigned to Class I areas.

CLASS 2: Land which is projected for development but will retain significant portions of the tract in landscaping or grass. Buildings, paving, sidewalks or other hard surfaced areas would not occupy over 65 percent of the total site in this classification. A runoff coefficient "C" of 0.70 was assigned to Class 2 areas.

CLASS 3: Highly developed commercial and service areas in which essentially the entire tract was projected for improvement. A runoff coefficient "C" of 0.90 was assigned to Class 3 areas.

CLASS 4: Concrete paved areas including runways, taxiways, aprons, roadways and major terminal and parking facilities. A runoff coefficient of 0.95 was assigned to Class 4 areas.

Projected land use for the Project Area to the year 2000 is shown on Figure 3.1. The projections were developed in cooperation with the Wichita Airport Authority staff and the Department of Public Works for those areas outside of Mid-Continent Airport. The projected land uses with their assigned runoff coefficients provided the basis for developing and evaluating the proposed storm drainage systems.

For the land located at the southeast corner of the Project Area, designated Area H on Figure 3.1, a somewhat different situation exists. A major portion of this tract is owned by the Cessna Aircraft Company and is the

APPENDIX 2

% IMPERVIOUS CALCULATION



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Project Mid-Continent TARP

Date 8.14.07

Item NORTH SHUTTLE LOT

By DRC

PER FIG. 1, Development Plan:

Total Project Site Area = 17.0 acres

Total Pavement Area = 10.9 acres

$$\% \text{ Impervious} \approx \frac{10.9}{17.0} = 0.64 \text{ or } 64\%$$

APPENDIX 3

**AUGUST 2004 STUDY TITLED "FEASIBILITY OF
ELIMINATING THE DETENTION POINT SOUTH
OF HARRY ST. AND WEST OF MID-CONTINENT
DRIVE"**

**S T U D Y
R E P O R T**

WICHITA AIRPORT AUTHORITY

WICHITA MID-CONTINENT AIRPORT

**FEASIBILITY OF ELIMINATING
THE DETENTION POND SOUTH
OF HARRY ST. AND WEST OF
MID-CONTINENT DRIVE**

Prepare by:
PROFESSIONAL ENGINEERING CONSULTANTS, P.A.

AUGUST 2004

DRAINAGE STUDY
WICHITA MID-CONTINENT AIRPORT DETENTION PONDS
August 2004

This report presents the storm water storage capacity analysis of the detention ponds lying north and south of Harry Street and west of Mid-Continent Drive on Wichita Mid-Continent Airport property. The hydrology for the ponds was taken from the original drainage report written by PEC in August 1976 titled "The Storm Water Runoff and Surface Drainage Report for Wichita Mid-Continent Airport". The purpose for this current study is to find what additional capacity might be required in the north pond if the south pond was filled in, while maintaining the original 5 and 100 year design water surface elevations. The 1976 drainage report showed that the design 5 year and 100 year storm volumes were 44.5 Acre-feet and 69.3 Acre-feet respectively (Fig. 1.3 & 1.4).

ANALYSIS

PEC started out by determining what the original 5 year and 100 year design water surface elevations were for the two ponds as they were originally designed and constructed in 1979. (See figure 1.5) The 5 year water surface elevation was taken from a profile of the Harry Street storm sewer hydraulic grade line contained in the 1976 report and included herein as Fig. 1.1. This figure indicates a hydraulic grade line elevation of 1313.0 at Q1, which is the outfall structure in the south detention pond. The storm sewer was designed for a 5 year storm, and as long as the 5 year storm depth in the pond does not exceed elevation 1313.0 all drainage systems will function as designed for the 5 year storm.

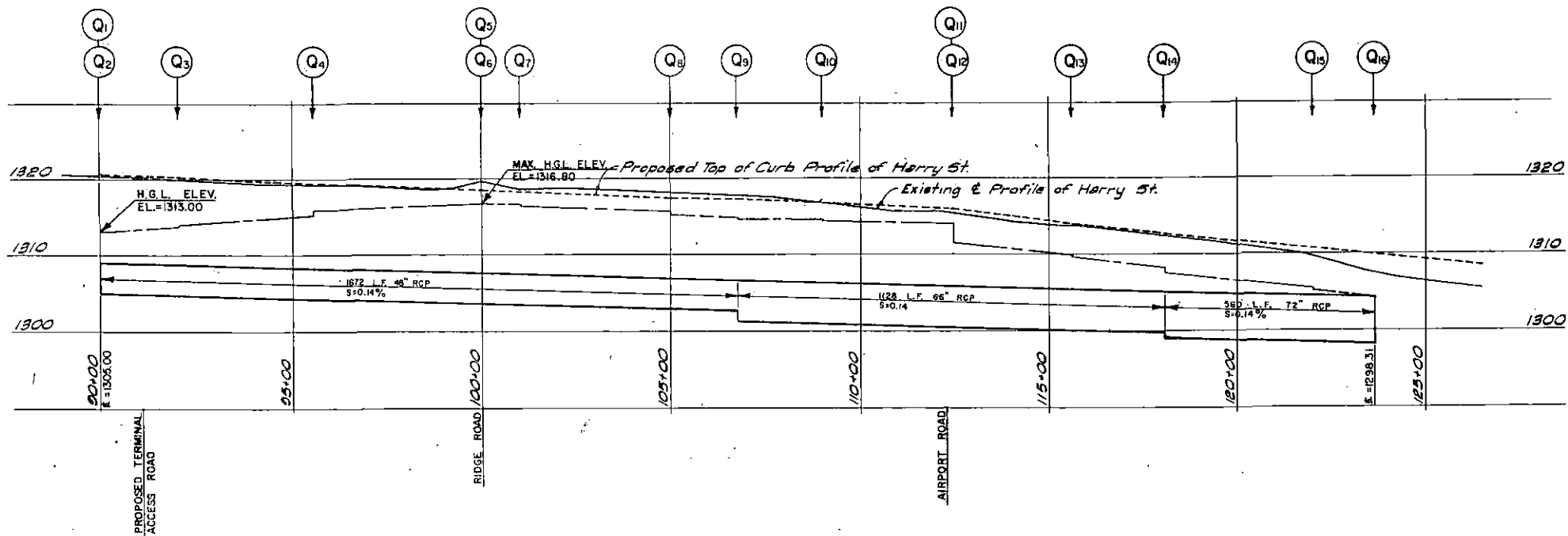
In order to verify the 5 year storage volume and elevation from the 1976 report, PEC performed a volumetric analysis of the ponds based on the contour grading plan in the original construction drawings (Fig 1.5). This analysis found that at elevation 1313.0 approximately 43 ac-ft of storm runoff would be detained in the ponds, and the original report finding was validated within reasonable engineering judgment.

Further volumetric analysis of the ponds for the 100 year storm runoff volume of 69.3 ac-ft found that the water surface elevation in the ponds would reach an approximate elevation of 1315.0

The focus of the current study is to determine if the north pond, which has been excavated out from its original design in order to provide fill for another project, has sufficient storage available to partially or completely fill in the south pond. PEC analyzed the north pond in its current condition (Fig 1.6) and found that the 5 year storm could store 46 acre feet at elevation 1313.0, which is slightly larger than the original design. The 100 year storage volume was found to be 74.4 acre feet at elevation 1315.0, which is also slightly larger than the original design.

SUMMARY

It is our conclusion that if the south pond was desired to be filled in for development, the north pond would provide storage for the 5 and 100 year storms at water surface elevations slightly lower than originally designed without additional excavation. This study did not size any of the structures that would need to be extended through the south pond and across Harry Street. Additionally, the outfall structure in the south pond would have to be demolished and a similar structure be constructed in the north pond.



PROJECTED STORM SEWER PROFILE
 FOR HARRY STREET
 ALTERNATE 3A
 (5 Year Statistical Storm)

Fig 1.1

DRAINAGE STUDY
 WICHITA MID-CONTINENT
 AIRPORT
 PROJECTED HYDRAULIC
 GRADE LINE

PROFESSIONAL ENGINEERING CONSULTANTS, P.A.
 ENGINEERS
 WICHITA, KANSAS
 FIG. 5.8

Fig 1.1

Computation of energy losses due to assumed hydraulic properties.

HYDRAULIC PROPERTIES

POINT	PIPE/BOX SIZE (IN/FEET)	AREA (SQ.FT.)	N	LENGTH (FT)	FLOW (CFS)	VELOCITY (FT/SEC)
Q15	72	28.27	.013	160	306.4	10.84
Q14	72	28.27	.013	400	302.3	10.69
Q13	66	23.76	.013	240	249.0	10.48
Q11-Q12	66	23.76	.013	320	236.9	9.97
Q10	66	23.76	.013	340	109.8	4.62
Q9	66	23.76	.013	228	101.6	4.28
Q8	48	12.57	.013	172	73.6	5.86
Q7	48	12.57	.013	400	55.0	4.38
Q5-Q6	48	12.57	.013	100	38.9	3.10

HYDRAULIC LOSSES

POINT	HYD-SL (FT/FT)	H(F) (FT)	H(B) (FT)	H(T) (FT)	H(M) (FT)	H(D) (FT)	H(J) (FT)	H(TOT) (FT)	HYD-GL (ELEV)
Q15	.0052	.837	0.	.005	0.	.210	.097	1.15	1304.31
Q14	.0051	2.038	0.	.007	0.	0.	.771	2.82	1308.27
Q13	.0055	1.320	0.	.016	0.	0.	.350	1.69	1309.96
Q11-Q12	.0050	1.593	0.	.121	0.	0.	2.444	4.16	1314.12
Q10	.0011	.363	0.	.005	0.	0.	.101	.47	1314.59
Q9	.0009	.209	0.	.050	0.	0.	.015	.27	1314.86
Q8	.0026	.452	0.	.024	0.	0.	.481	.96	1315.82
Q7	.0015	.586	0.	.015	0.	0.	.303	.90	1316.72
Q5-Q6	.0007	.073	0.	0.	0.	0.	0.	.07	1316.80

HYDRAULIC PROPERTIES

POINT	PIPE/BOX SIZE (IN/FEET)	AREA (SQ.FT.)	N	LENGTH (FT)	FLOW (CFS)	VELOCITY (FT/SEC)
Q3	48	12.57	.013	200	90.5	7.20
Q4	48	12.57	.013	350	85.5	6.80
Q5-Q6	48	12.57	.013	450	62.4	4.97

HYDRAULIC LOSSES

POINT	HYD-SL (FT/FT)	H(F) (FT)	H(B) (FT)	H(T) (FT)	H(M) (FT)	H(D) (FT)	H(J) (FT)	H(TOT) (FT)	HYD-GL (ELEV)
Q3	.0040	.794	0.	.009	0.	0.	.192	.99	1313.00
Q4	.0035	1.240	0.	.034	0.	0.	.687	1.96	1315.96
Q5-Q6	.0019	.849	0.	0.	0.	0.	0.	.85	1316.80

Fig 1.2

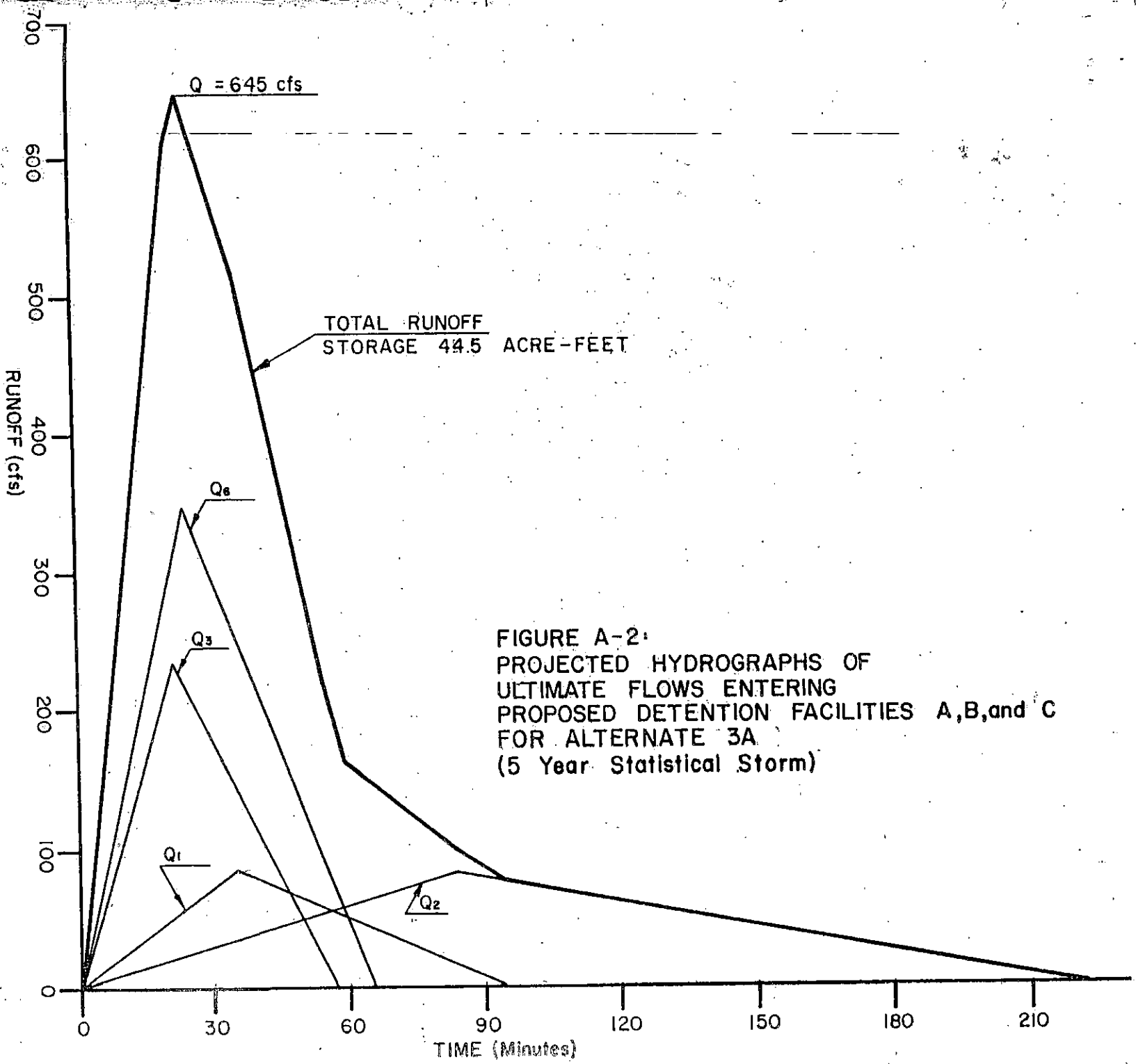


FIGURE A-2
 PROJECTED HYDROGRAPHS OF
 ULTIMATE FLOWS ENTERING
 PROPOSED DETENTION FACILITIES A, B, and C
 FOR ALTERNATE 3A
 (5 Year Statistical Storm)

DRAINAGE STUDY
 WICHITA MID-CONTINENT
 AIRPORT

PROJECTED HYDROGRAPHS

PROFESSIONAL ENGINEERING CONSULTANTS, P.A.
 ENGINEERS
 WICHITA, KANSAS

Fig 1.3

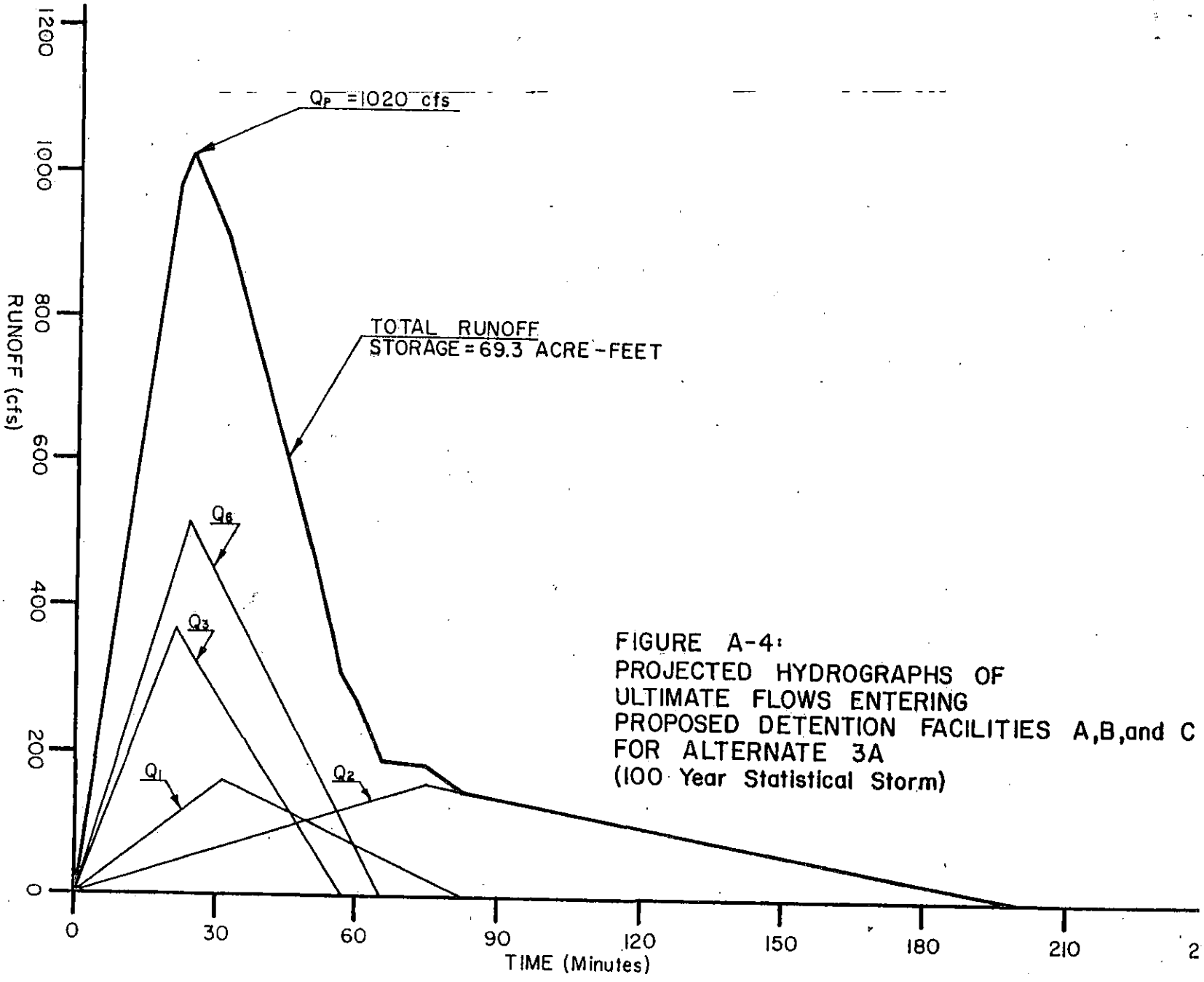
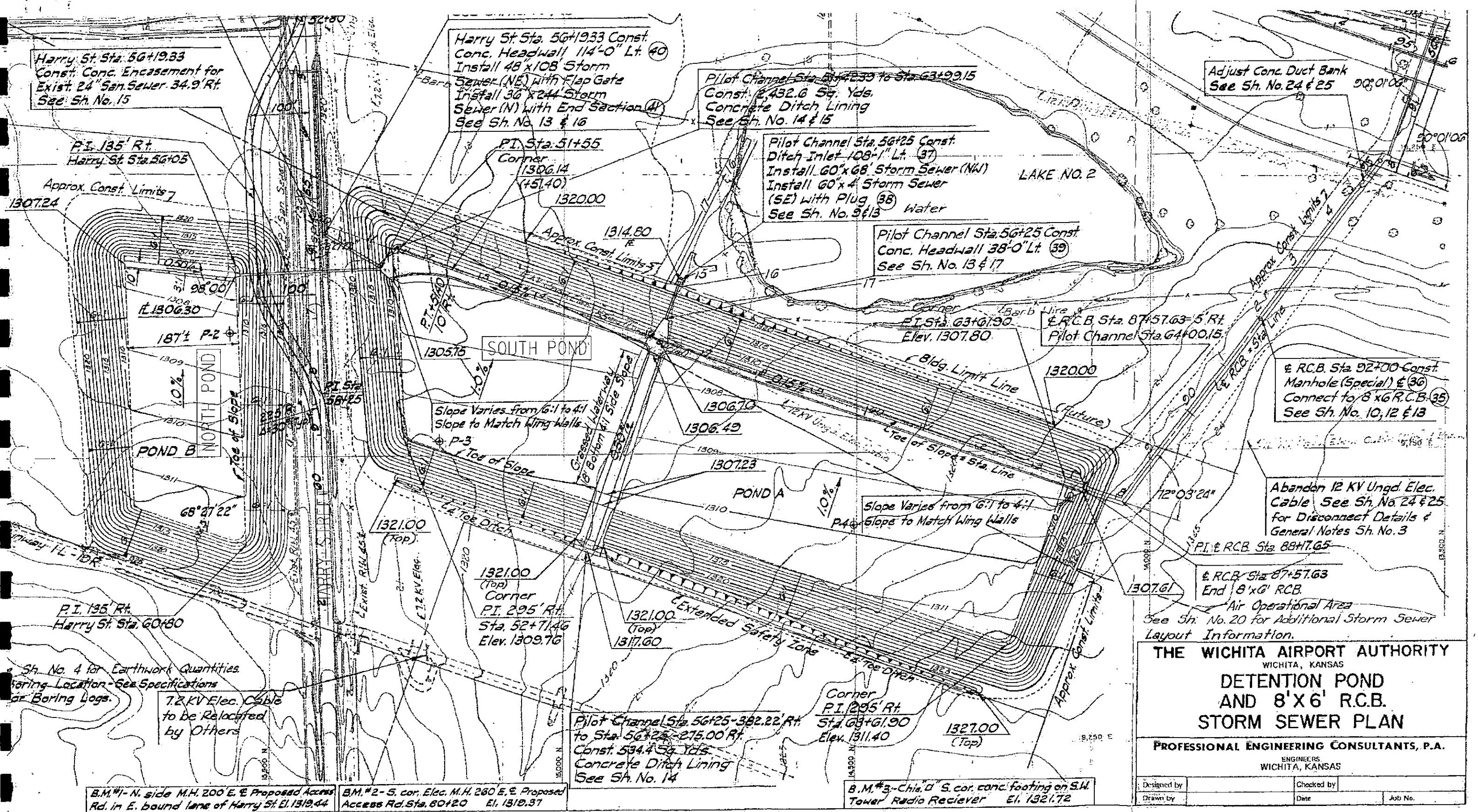


FIGURE A-4:
 PROJECTED HYDROGRAPHS OF
 ULTIMATE FLOWS ENTERING
 PROPOSED DETENTION FACILITIES A,B,and C
 FOR ALTERNATE 3A
 (100 Year Statistical Storm)

Fig 14

DRAINAGE STUDY
 WICHITA MID-CONTINENT
 AIRPORT
 PROJECTED HYDROGRAPHS
 PROFESSIONAL ENGINEERING CONSULTANTS, P.A.
 ENGINEERS
 WICHITA, KANSAS

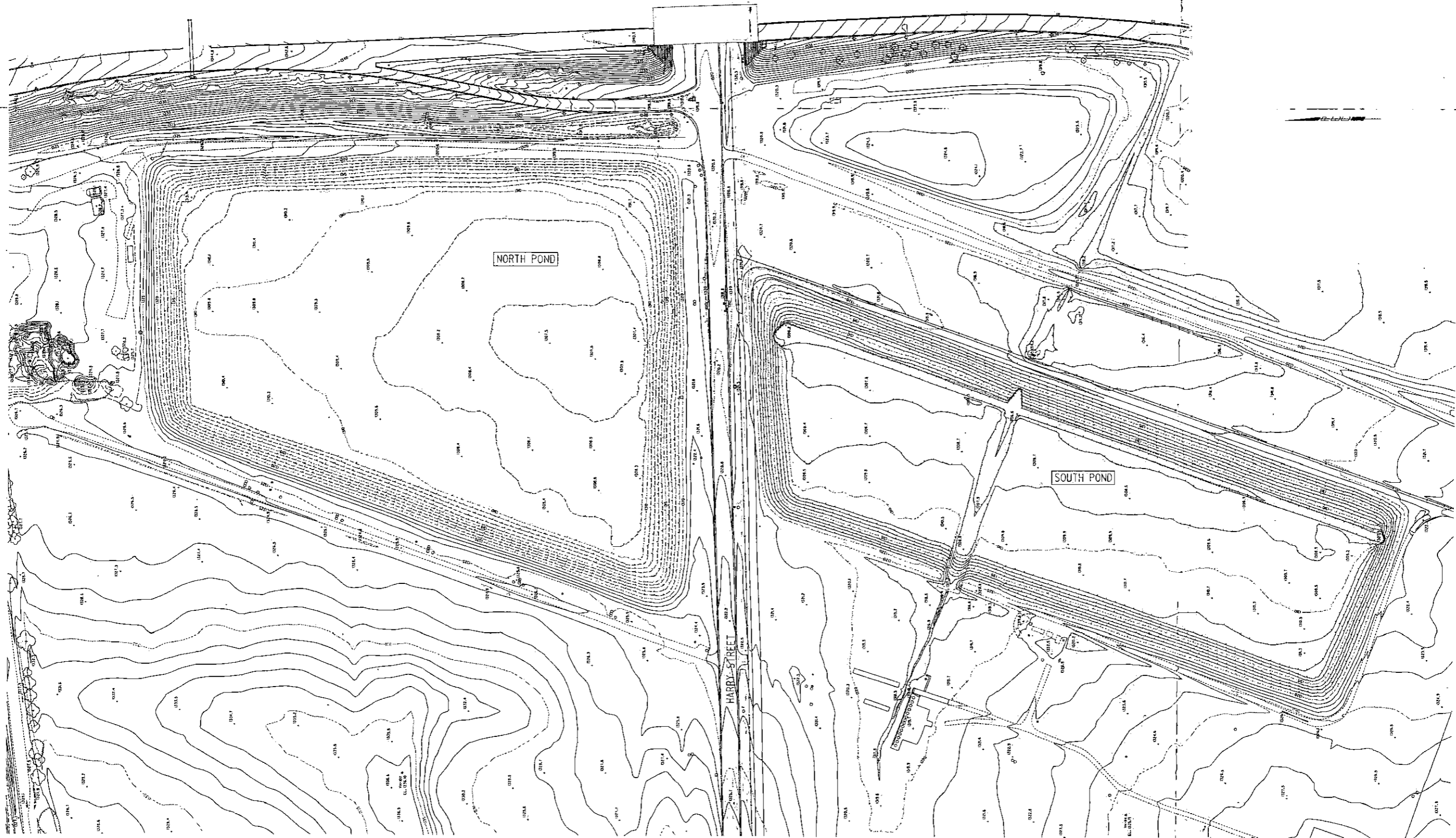


THE WICHITA AIRPORT AUTHORITY
 WICHITA, KANSAS
**DETENTION POND
 AND 8' X 6' R.C.B.
 STORM SEWER PLAN**

PROFESSIONAL ENGINEERING CONSULTANTS, P.A.
 ENGINEERS
 WICHITA, KANSAS

Designed by	Checked by
Drawn by	Date
	Job No.

ORIGINAL DESIGN



2004 CONTOURS

Fig 46