Meridian Outlet Mall	Area (acres)	Area Accum	C	Tc (min)	i_5 (in/hr)	i_{10} (in/hr)	i_{100} (in/hr)	Q_5 (cfs)	Q_{10} (cfs)	Q_{100} (cfs)	Pipe Slope	Pipe Size	Inlets
A	7.00		0.95	15	5.21	6.08	8.98	34.7	40.4	59.7	0.16%	42"	
B	0.40		0.70	15	5.21	6.08	8.98	1.5	1.7	2.5			
C	0.39		0.90	15	5.21	6.08	8.98	1.8	2.1	3.2			
		0.79	0.80	17	4.97	5.79	8.55	3.1	3.7	5.4	0.24%	15"	1@L=3' on ea. side
		7.79	0.93	20	4.66	5.44	8.03	33.8	39.4	58.2	0.16%	42"	
D	0.37		0.90	15	5.21	6.08	8.98	1.7	2.0	3.0			
		8.16	0.93	22	4.49	5.24	7.74	34.1	39.8	58.7	0.16%	42"	
E	0.54		0.70	15	5.21	6.08	8.98	2.0	2.3	3.4			
F	8.76		0.70	22	4.49	5.24	7.74	27.5	32.1	47.5			
G	7.06		0.60	28	4.09	4.77	7.04	17.3	20.2	29.8	0.12%	36"	
H	1.18		0.70	15	5.21	6.08	8.98	4.3	5.0	7.4			
		8.24	0.61	28	4.09	4.77	7.04	20.6	24.0	35.4	0.12%	36"	2@L=10'
I	8.54		0.60	28	4.09	4.77	7.04	21.0	24.4	36.1			
		16.78	0.60	30	3.92	4.56	6.79	39.5	45.9	68.4	0.20%	42"	2@L=10'
J	12.81		0.60	28	4.09	4.77	7.04	31.4	36.7	54.1			2@L=5' 2@L=10'
		29.59	0.60	32	3.73	4.33	6.45	66.2	76.8	114.5	0.26%	48"	
K	12.60		0.60	28	4.09	4.77	7.04	30.9	36.1	53.2	0.28%	36"	2@L=5' 2@L=10'
		42.19	0.60	34	3.55	4.13	6.16	89.9	104.5	155.9	0.16%	60"	
L	9.19		0.70	22	4.49	5.24	7.74	28.9	33.7	49.8			
M	3.90		0.70	19	4.76	5.55	8.19	13.0	15.2	22.4			
N	7.16		0.70	24	4.34	5.07	7.48	21.8	25.4	37.5			
O	4.79		0.80	15	5.21	6.08	8.98	20.0	23.3	34.4			
		84.66	0.68	35	3.55	4.13	6.16	204.4	237.8	354.6			

page 2 of 3

Meridian Outlet Mall	Area	Area Accum.	C	T_c	i_5	i_{10}	i_{100}	Q_5	Q_{10}	Q_{100}	Pipe Slope	Pipe Size	Inlets
P	0.70		0.70	15	5.21	6.08	8.98	2.6	3.0	4.4			
Q	0.60		0.90	15	5.21	6.08	8.98	2.8	3.3	4.8			
		1.30	0.79	17	4.97	5.79	8.55	5.1	5.9	8.8	0.33%	18"	1@L=5' on each side
R	0.29		0.90	15	5.21	6.08	8.98	1.4	1.6	2.3			
		1.59	0.81	17	4.97	5.79	8.55	6.4	7.5	11.0	0.33%	18"	
S	0.63		0.70	15	5.21	6.08	8.98	2.3	2.7	4.0			
T	0.59		0.90	15	5.21	6.08	8.98	2.8	3.2	4.8			
U	0.64		0.70	15	5.21	6.08	8.98	2.3	2.7	4.0			
V	0.52		0.90	15	5.21	6.08	8.98	2.4	2.8	4.2			
		2.38	0.80	17	4.97	5.79	8.55	[illegible]	11.0	16.3	0.20%	24"	2@L=5'
W	2.10		0.90	15	5.21	6.08	8.98	[illegible]	11.5	17.0			
X	0.62		0.90	15	5.21	6.08	8.98	2.9	3.4	5.0			
		2.82	0.90	17	4.97	5.79	8.55	12.6	14.7	21.7	0.26%	27"	2@L=5'
		5.10	0.85	18	4.86	5.67	8.37	21.1	24.6	36.3	0.34%	30"	2@L=5'
Y	3.22		0.95	15	5.21	6.08	8.98	15.9	18.6	27.5			
Z	0.60		0.90	15	5.21	6.08	8.98	2.8	3.3	4.8			
		3.82	0.94	16	5.09	5.93	8.76	18.3	21.3	31.5	0.55%	27"	
AA	0.60		0.90	15	5.21	6.08	8.98	2.8	3.3	4.8			
		4.42	0.94	16	5.09	5.93	8.76	21.1	24.6	36.4	0.14%	36"	2@L=5' on ea. side
BB	5.41		0.60	25	4.27	4.99	7.36	13.9	16.2	23.9			
CC	3.41		0.70	15	5.21	6.09	8.98	12.1	14.1	20.8			

page 3 of 3

Meridian Outlet Mall	Area	Area Accum.	C	T_c	i_5	i_{10}	i_{100}	Q_5	Q_{10}	Q_{100}	Pipe Slope	Pipe Size	Inlets
		8.72	0.64	25	4.27	4.99	7.36	23.8	27.8	41.1	0.19%	36"	1@L=10' 1@L=5'
DD	3.01		0.60	15	5.21	6.08	8.98	9.4	11.0	16.2			1@L=10' 1@L=5'
		11.73	0.63	28	4.09	4.77	7.04	30.2	35.2	52.0	0.28%	36"	
EE	1.73		0.28	15	5.21	6.08	8.93	2.5	2.9	4.3			
N. Box Culvert	298.69	312.15	0.50	63	2.20	2.55	3.81	343.4	398.0	594.6	0.12%	3-10'x4'	
FF	0.21		0.90	15	5.21	6.08	8.98	1.0	1.1	1.7			
GG	7.23		0.95	15	5.21	6.08	8.98	35.8	41.8	61.7			
HH	0.23		0.90	15	5.21	6.08	8.98	1.1	1.3	1.9			
		7.46	0.95	16	5.09	5.93	8.76	36.1	42.0	62.0	0.36%	36"	2@L=10' on ea. side
II	0.20		0.90	15	5.21	6.08	8.98	0.9	1.1	1.6			
		7.66	0.95	16	5.09	5.93	8.76	37.0	43.2	63.7	0.16%	42"	
JJ	1.82		0.70	15	5.21	6.08	8.98	6.6	7.7	11.4			
S. Box Culvert	312.15	321.[illegible]	0.52	66	2.12	2.46	3.67	354.8	411.7	614.2	0.12%	3-10'x4'	
KK	0.23		0.90	15	5.21	6.08	8.98	1.1	1.3	1.9	X-Section?	freeboard?	
LL	0.40		0.90	15	5.21	6.08	8.98	1.9	2.2	3.2			
		0.63	0.90	17	4.97	5.79	8.55	2.8	3.3	4.8			
MM (Should not [illegible] drain to ditch)	2.29		0.70	15	5.21	6.08	8.98	8.4	9.7	14.4			

@ S=0.12% For 5yr flow, Ditch & B=20', D=4', Side Slope = 3:1 Width = 5[illegible]' Q = 376.3 cfs

A 60" RCP @ 0.16% will allow 100 cfs out of the detention facility. At that Q it would take

Meridian Outlet Mall
FBN 1/14/85

Detention Basin

Per KHB memo of 5/30/84, Calculations are as follows
The proposed lake has a planned surface area of 5.5 acres.*
A 100 year 6 hour storm event is stated as 5.95" of rainfall.
The C.U.P. contains 2585' x 1240' = 73.6 acres.
$5.95''/12'' \times 73.6 = 36.5$ Acre-ft of water if all the storm water were to be contained with no runoff.
The lake would contain approximately 34 Acre-feet along with storage in parking lot, apartment site, and internal street.
However, the system is not "closed". Depending on the soil conditions and ground cover, water does perculate. Up to 40% in a development such as proposed.

*NOTE: Present Drainage Plan shows a surface area of 4.8 acres

Per FBN drainage calc's, it will take approximately 35 min. for the peak runoff to arrive at the detention basin.

$A = 84.7$ acres — Ignore Temporary Storage
$T_c = 35$ min. — Composite Runoff Coef. of Area, $C = 0.68$
$I_{100} = 6.16$ in/hr

$Q_{Peak} = 0.68 \times 6.16 \times 84.7 = 354.8$ cfs

Total Rainfall 6.16 in/hr $\times \frac{35 \text{ min}}{60 \text{ min}} = 3.59$ inches ?

Ignore Infiltration & other losses

$Q_T = 84.7 \text{ acres} \times 3.59''/12'' = 25.4$ Acre-feet runoff volume to detention pond

MERIDIAN OUTLET MALL
(Drainage)

Meridian Outlet Mall
FBN 1/16/85

Box Culverts - 1

West Side of Meridian

Design Data — $T.W. = 4' = h_o$

$Q_{100} = 600$ cfs — Conc. Box Culvert w/ 45° Flared Wing Wall, entrance crown edge rounded, & $n = 0.012$

$L = 110$ feet
$S_o = 0.0012$ foot per foot

Allowable HW = 5' — Max. box rise = 3'

A. Inlet Control

For $Q = 600$ cfs, Rise = 3, & $HW/Rise = \frac{5}{3} = 1.67$
Figure 3 indicates $Q/Span = 27$. ∴ $Span = \frac{600}{27} = 22.2'$
Assuming 3 8'x3' culverts. $Span = 24'$ & $Q/Span = \frac{600}{24} = 25$
From Fig. 3, $HW/Rise = 1.60 \Rightarrow HW = 4.8' < 5'$ OK

B. Outlet Control

TW = 4' — From Table 5, $k_e = 0.2$ — $A = 24' \times 3' = 72\square'$
For Rise = 3', Span = 24', Q = 600 cfs, $k_e = 0.2$, Fig. 4 ⇒ $H = 1.5'$
TW = 4' > Rise = 3' ∴ Culverts are Outlet Controlled
$HW = H + h_o - LS_o = 1.5 + 4 - 110(0.0012) = 5.37'$

Try 3 9'x3', $A = 27' \times 3' = 81\square'$. Fig 4 ⇒ $H = 1.1$
$HW = 1.1 + 4 - 0.132 = 4.97 < 5'$

Meridian & I-235

The area served by the detention basin and the areas draining to the Big Slough will not contribute to the peak flow in the Big Slough since they will all have flap gates.

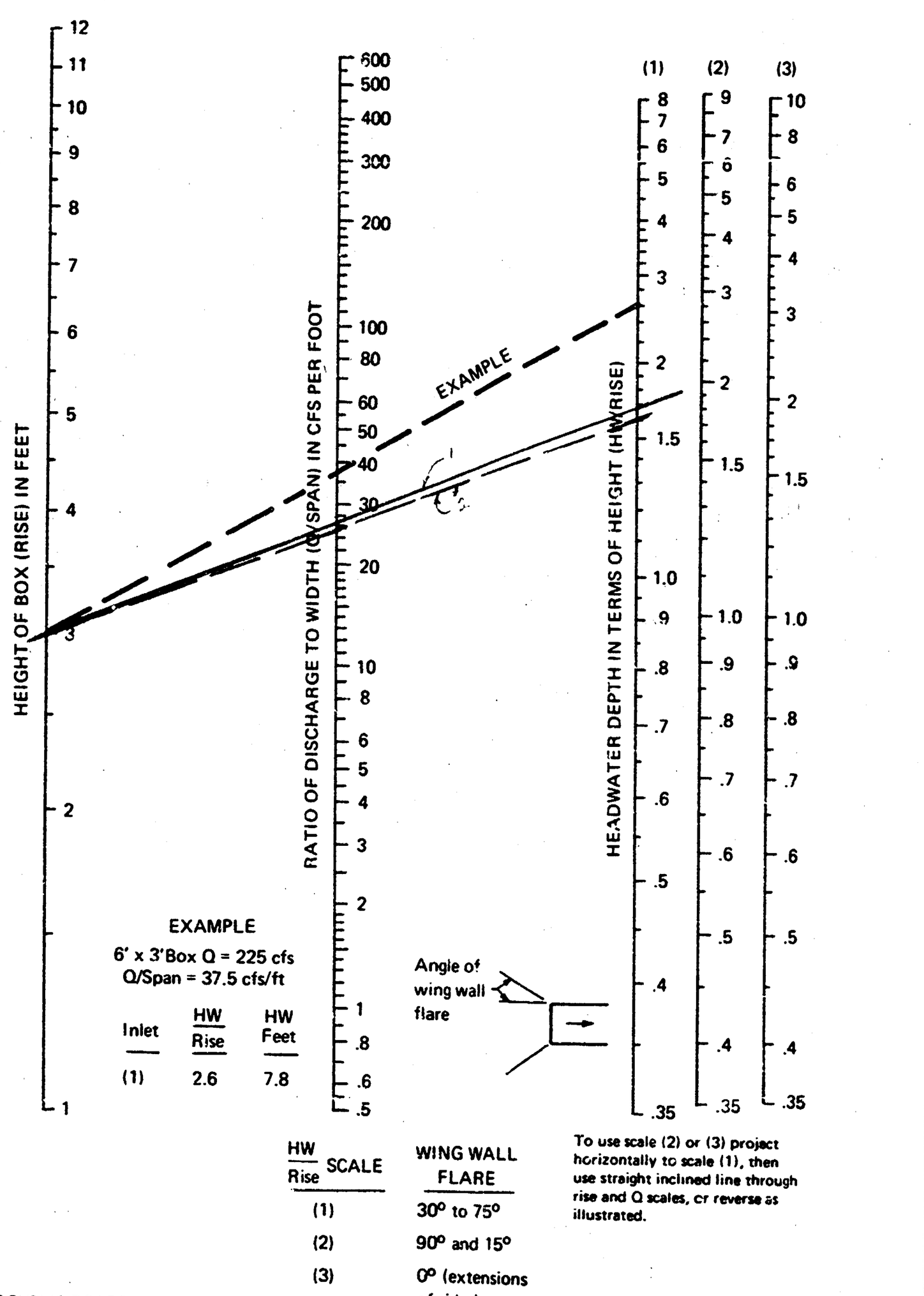
Meridian [illegible]
FBN [illegible]

Box Culverts - 2

~~Meridian & I235~~ (Cont.)

Additional flow will be added by Areas [illegible], [illegible], [illegible], HH, GG, II, JJ, KK, LL & MM or a total area of [illegible] w/ a composite C=0.76. For $T_c = 70$ min, $i_{100} = 3.51$, Q_{100} = [illegible]
However, all of the runoff of the site presently [illegible] to the peak flow at this box culvert. For T_c = [illegible], [illegible] acres, $C = 0.24$, $i_{100} = 3.51$ in/hr, $Q_{100} = 62.0$ cfs
This means that, with flap gates controlling the flow [illegible] Big Slough from the proposed pipe systems that [illegible] the Big Slough, the peak flow would not increase and [illegible] no additional box culvert would be needed at the I-235 - Meridian exit.

FIGURE 3: Headwater Depth for Concrete Box Culverts With Inlet Control



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4 design data 26

TABLE 5: Entrance Loss Coefficients

Coefficient k_e to apply to velocity head $V^2/2g$ for determination of head loss at entrance to a structure, such as a culvert or conduit, operating full or partly full with *control at the outlet.*

Entrance head loss $H_e = k_e V^2/2g$

Type of Structure and Design of Entrance Box, Reinforced Concrete	Coefficient k_e	Type of Structure and Design of Entrance Box, Reinforced Concrete	Coefficient k_e
Headwall parallel to embankment (no wing walls)		Wing walls at 10° to 25° to barrel	
Square-edged on 3 edges	0.5	Square-edged at crown	0.5
Rounded on 3 edges to radius of 1/12 barrel dimension	0.2	Wing walls parallel (extension of sides)	
Wing walls at 30° to 75° to barrel		Square-edged at crown	0.7
Square-edged at crown	0.4		
Crown edge rounded to radius of 1/12 barrel dimension	0.2		

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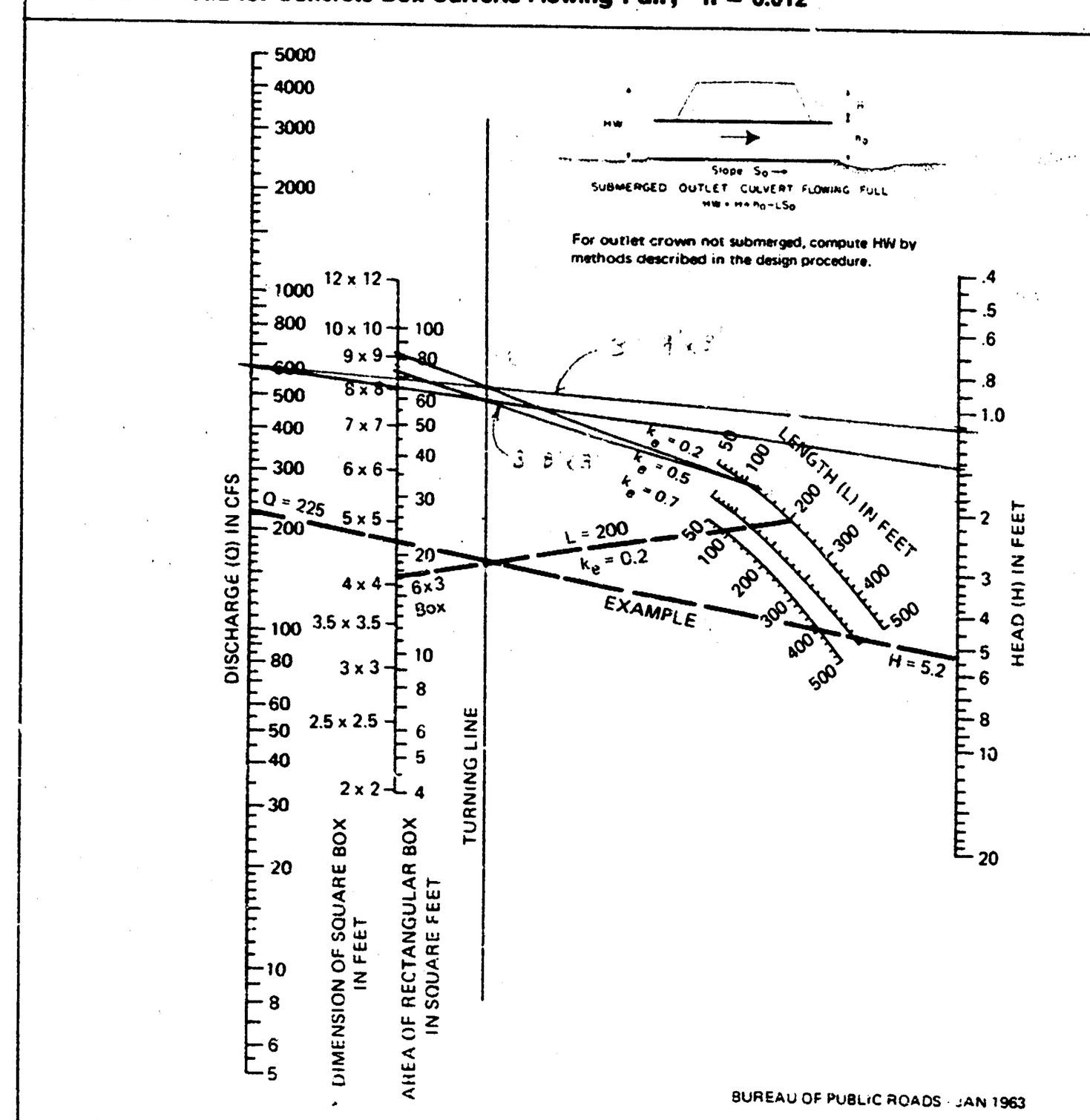
FIGURE 4: Head for Concrete Box Culverts Flowing Full, n = 0.012



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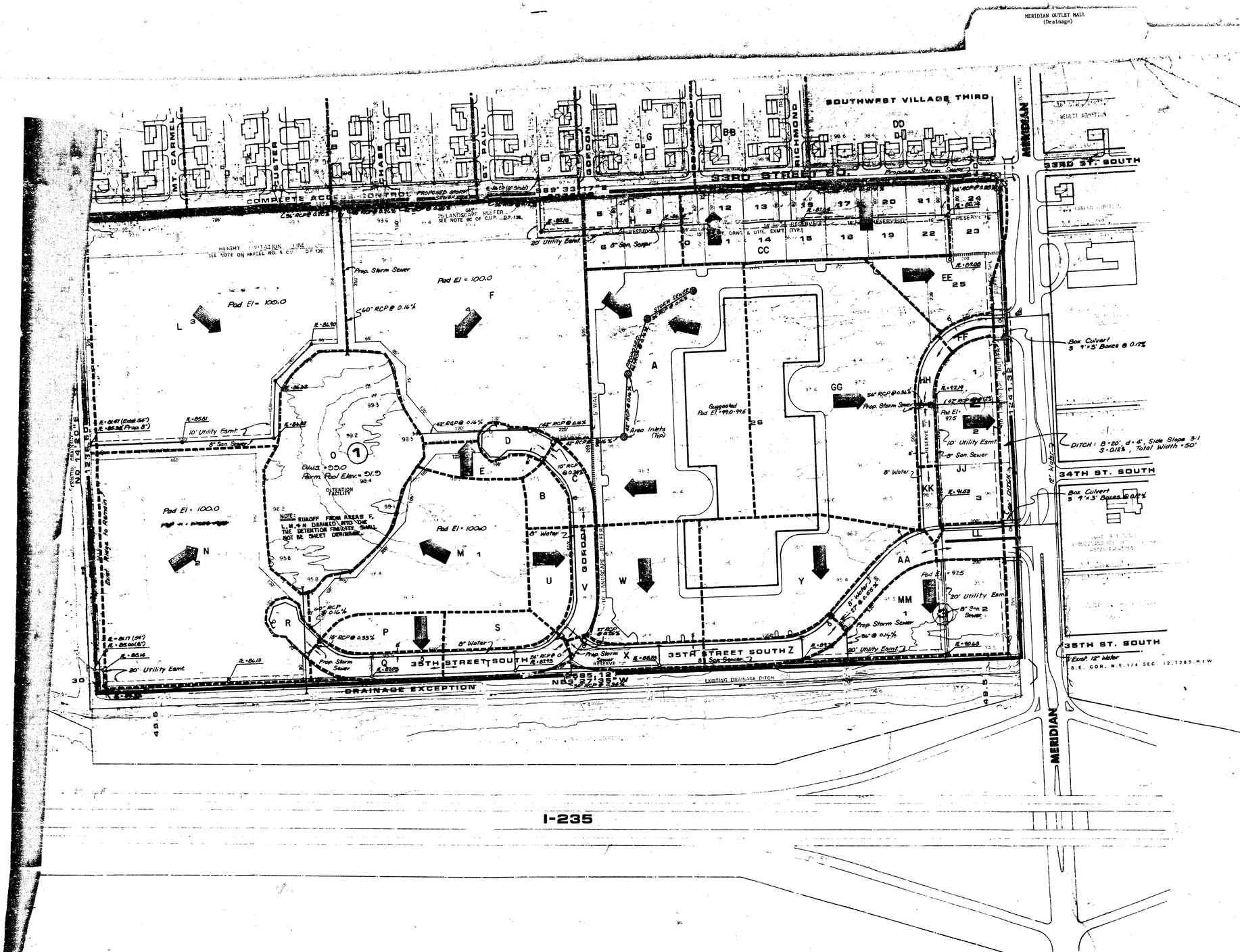


NOTES:

TOPOGRAPHY PREPARED FROM AERIAL PHOTO DEC. 1983

ALL UNDEVELOPED AREAS ARE TO BE PLANTED WITH GROUND COVER TO MINIMIZE BLOWING OF DUST AND DIRT FROM SITE.

THE MAINTENANCE OF NON PUBLIC OPEN-SPACE (INTERNAL & YET PARKING AREAS, DRAINAGE IMPROVEMENTS, WALLS, BUFFER STRIPS AND ENTRY SHALL BE PROVIDED BY A MANAGEMENT COMPANY OR THE COMMON OWNER

SEE C.U.P. D.P. 138 NOTE NO. 9. FOR EXCEPTIONS OR DETAILS OF LANDSCAPE BUFFERS.

LOTS 1-24 BLOCK 1 ARE ZONED P-6

LOTS 25 & 26 BLOCK 1 AND LOTS 1, 2 & 3 OF BLOCK 2 AND LOTS 1 & 2 BLOCK 3 ARE ZONED L.C.

SOUTH HALF OF 33RD ST. SO. TO BE CONSTRUCTED WITH TEMPORARY HAMMERHEAD TURNAROUNDS ARE TO BE CONSTRUCTED AT ST. TO AND SUSTER STREETS.

DRAINAGE PLAN TO BE SUBMITTED SEPARATELY BY THE ASSIGNED ENGINEERING CONSULTANTS

DESIGN OF MERIDIAN AS PER SHEET 1 DATED 10/16/84 BY KENNEDY & ASSOCIATES CONSULTING ENGINEERS

COMPLETE ACCESS CONTROL ALONG LOTS 3 & 4 OF BLOCK 3 IS TO ALLOW FOR ONE 20' EMERGENCY ACCESS EASEMENT

RESERVE "A" IS FOR LAKE, DRAINAGE, UTILITIES, LANDSCAPING AND RECREATION FACILITIES.
RESERVES "B", "C" & "J" ARE FOR DRAINAGE, UTILITIES AND LANDSCAPING
RESERVES "D" THRU "I" ARE FOR PRIVATE STREETS, DRAINAGE AND UTILITIES

DRAINAGE CONCEPT AND UTILITY PLAN

MERIDIAN OUTLET MALL

OWNER: BUILDERS COMMERCIAL, INC., 1005 PARKLANE, WICHITA, KANSAS

SHEET 1 OF 2

OCT. 22, 1984

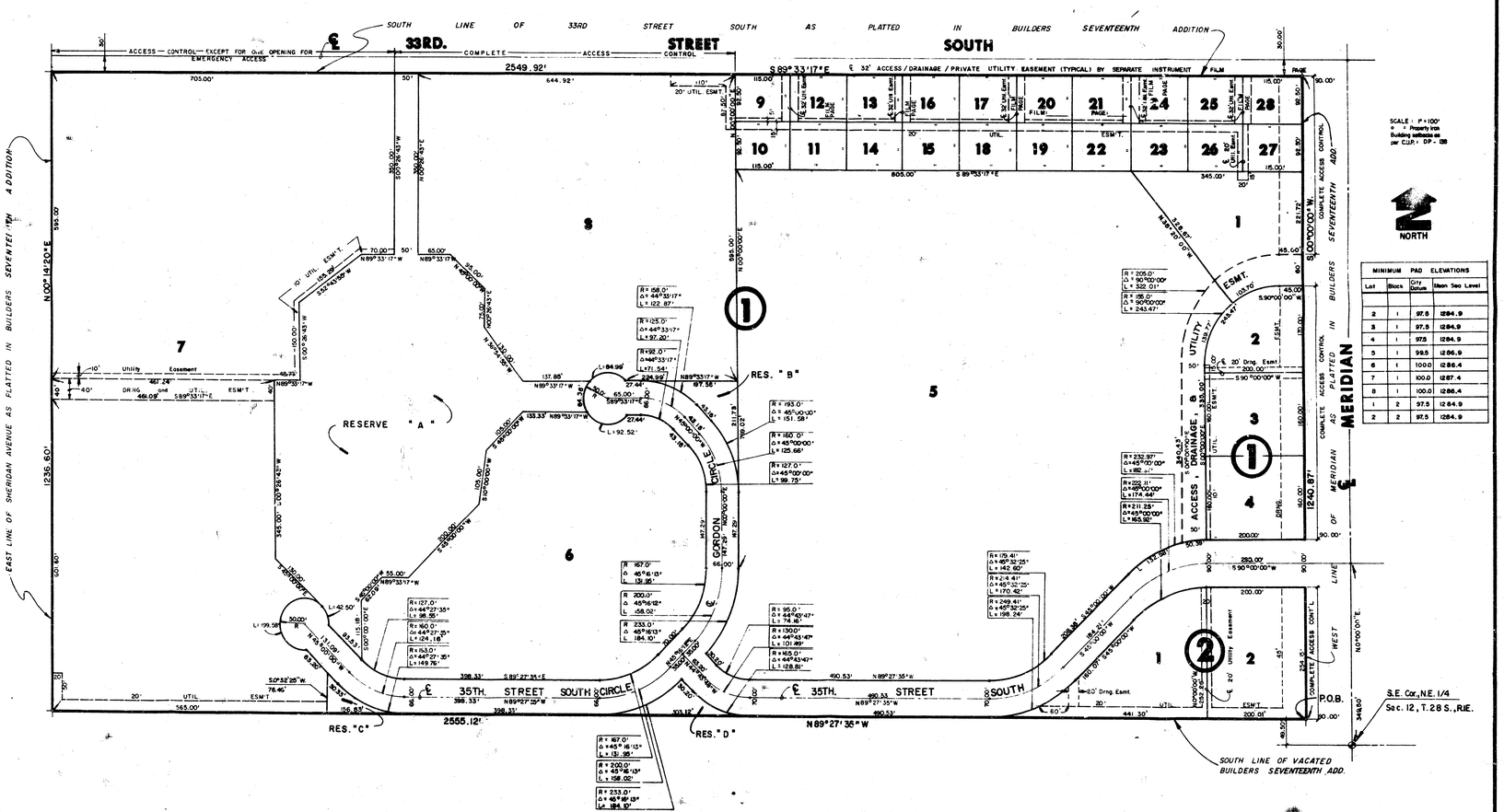
BILL G. YUNG DESIGN
8225 E. 35TH ST. NORTH, WICHITA KS. 67226 316 683 5581

MERIDIAN OUTLET MALL
(Drainage)

FINAL PLAT OF

MERIDIAN OUTLET MALL

AN ADDITION TO WICHITA, SEDGWICK COUNTY, KANSAS



MINIMUM PAD ELEVATIONS			
Lot	Block	City Datum	Mean Sea Level
2	1	97.5	1284.9
3	1	97.5	1284.9
4	1	97.5	1284.9
5	1	99.5	1286.9
6	1	100.0	1286.4
7	1	100.0	1287.4
8	1	100.0	1286.4
1	2	97.5	1284.9
2	2	97.5	1284.9