Flood Control and Landfill Div. May 9, 1980

Art Chambers, Jr. Planner, MAPD

Paul Johnston, Acting Director

- DP-104 - Oak Cliff Estates
Commercial & Residential C.U.P.

Reference is made to your memo of April 29th requesting review and comments on subject above. I have reviewed subject plans and make the following comments:

The area in question has drainage problems which need to be addressed as indicated by the letters forwarded to Professional Engineering Consultants from this office (copy attached) and from Yash Desai dated March 5, 1980, of which Jack Galbraith was carboned in on.

The drainage presently flows southeasterly with a combination storm sewer and earth channel being proposed to convey this runoff from the site across the southern edge of Maple Gardens and through The Dell Additions.

The light commercial areas will be located at a collection point for the drainage and will abutt an open channel. It had been suggested previously that some of this area might serve as a detention area. This issue has not been resolved. Being adjacent to an open channel will necessitate installing expensive structures to pass Q100-Q5, therefore any access should be kept to a minimum.

When the flow calculations are finalized, if same cannot be contained within the available roadside dedication, it may be necessary to increase same.

The 10 foot planting strip shown along the southerly edge of Parcel 3 may require being adjusted to insure sufficient access for maintenance purposes along the north side of the mentioned channel abutting same.

Any proposed change which has a tendency to substantially increase the runoff should be seriously looked at unless a drainage plan can be supplied for this area which will handle same.

If there are any questions, please advise.

Paul Johnston
Acting Director
Flood Control and Landfill Division

PJ/glm

cc: Phil Dietrich/County
Chris Brennenstuhl/PEC
Oak Cliff Estates Addn. Plat File

WICHITA-SEDGWICK COUNTY

METROPOLITAN AREA PLANNING DEPARTMENT

DATE April 29, 1980

TO Dean Sellers, Acting City Engineer
Paul B. Graves, Traffic Engineer
Robert B. Feldner, Superintendent of Central Inspection
✓ Paul Johnston, Acting Director, Flood Control and Landfill

FROM Arthur D. Chambers, Junior Planner

2 family, multiple family & light commercial

SUBJECT DP-104 - Oak Cliff Estates Commercial & Residential C.U.P. and Z-2228 - "AA"&"LC" to "LC","R-6" & "A". Generally located at the northwest corner of Maple and Maize.

This Community Unit Plan was forwarded for comment on February 27, 1980 and was heard by the Metropolitan Area Planning Commission on March 27, 1980. At that time the Planning Commission deferred the cases so that the applicant could redesign the C.U.P. A copy of the redesigned C.U.P. is attached for your review and comment.

I would appreciate receiving any comments you might have regarding access, drainage, density, etc. by May 7, 1980.

Advised Jack 5-9-80 Comments forthcoming P.J.

Arthur D. Chambers

Arthur D. Chambers
Junior Planner

ADC:el
Attachment

5-9-80

To Art Chambers

The area in question has drainage problems which need to be addressed as indicated by the carbon copy your office received from Jack DeSai dated March 5, 1980 and the attached sheets sent to PEC from this office, dated the same

The drainage presently flows southeasterly with a combination storm sewer and earth channel being proposed to convey this runoff from the site across the southern edge of Maple Gardens & through the Dell.

The light commercial area will be located at a collection point for the drainage and will abutt an open channel. It had been suggested previously that some of this area might serve as a detention area. This issue has not been resolved. Being adjacent to an open channel will necessitate installing expensive [illegible] ... therefore any access should be kept to a minimum.

APR 29 1980

MEMO

PROFESSIONAL ENGINEERING CONSULTANTS
PROFESSIONAL ASSOCIATION
1440 EAST ENGLISH
WICHITA, KANSAS
ZIP CODE / 67211

TO: Steve Lackey
Design Chief Engineer
City Hall - Seventh Floor
455 N. Main
Wichita, KS 67202

ATTN:

PROJECT NO. 30-79283-1120

PROJECT: Oak Cliff Estates

DATE: May 6, 1980

COPIES TO:

Paul Johnston
Phil Dietrich
Louise Olivarez
Dick Linn
Gary Wiley

FROM: Chris Brennenstuhl

REFERENCE: Drainage Plan and calculations

PLEASE ADVISE IMMEDIATELY OF ANY MISCONCEPTIONS OR OMISSIONS YOU BELIEVE TO BE CONTAINED HEREIN.

Transmitted herewith are the Drainage Plan and supportive calculations for Oak Cliff Estates. The Final Plat of Oak Cliff Estates will be filed with MAPD on May 16 for hearing by the MAPC Subdivision Committee on May 29. Please contact either myself or Dick Linn and Gary Wiley should any additional information be needed in your review of this plan.

Comments by May 23 as per Chris B.
5-8-80
SL

Received MAY 7 1980

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Project OAK CLIFF ESTATES

Item DRAINAGE PLAN

DESIGN CONTROLS AND CONSIDERATIONS

DETERMINING LIMITS OF DRAINAGE BASINS

DUE TO THE RESTRICTED CHANNEL SYSTEM WHICH CURRENTLY DRAINS THE SOUTHEAST PORTION OF OAK CLIFF ESTATES (I.E. THE NORTH DITCH OF MAPLE STREET FROM MAIZE ROAD TO COWSKIN CREEK), THE FINAL DRAINAGE PLAN WAS DESIGNED TO LIMIT THE SOUTHEAST DRAINAGE BASIN AS MUCH AS POSSIBLE. STREET GRADES WERE SELECTED SUCH THAT THE TOTAL DRAINAGE AREA TO THE EXISTING 7'x 3'x 40' RCBC IS NOW 70 ACRES AS COMPARED TO 105 ACRES UNDER EXISTING CONDITIONS. OF THIS 70 ACRE TOTAL, 20 ACRES UTILIZES A DIFFERENT STORM SEWER SYSTEM WHICH DISCHARGES INTO COWSKIN CREEK NORTH OF OAK CLIFF ESTATES.

CONCERN WAS ALSO EXPRESSED BY THE FLOOD CONTROL OFFICE THAT THE DRAINAGE SYSTEM AT THE SOUTHWEST CORNER OF THE PLAT IS INADEQUATE FOR PRE-DEVELOPED CONDITIONS. DEVELOPMENT OF THE ADJACENT WESTLINK EIGHTEENTH ADDITION INCLUDED CONSTRUCTION OF A DAM AND POND WHICH, ACCORDING TO STAFF OF THE CITY ENGINEERING DEPARTMENT, RESTRICTS PEAK OUTFLOW TO LESS THAN THAT OF PRE-DEVELOPED CONDITIONS. WHILE THIS WOULD SEEM TO INDICATE THAT NO FURTHER LIMITATIONS OF DISCHARGE IS NECESSARY, STREET GRADES WERE SELECTED TO LIMIT THE TOTAL DRAINAGE AREA AS MUCH AS POSSIBLE BY DRAINING TO THE NORTH STORM SEWER SYSTEM.

My understanding that existing pond area [illegible] designed for this addition [illegible] directions into channel [illegible] N of [illegible]

STORM SEWER DESIGN

THE THREE STORM SEWER SYSTEMS WERE DESIGNED TO CARRY THE APPROPRIATE DESIGN FREQUENCY DISCHARGE WITH THE OUTLET CHANNEL IN 100-YEAR STORM FLOW CONDITION. FOR THE NORTH AND THE SOUTHEAST STORM SEWER SYSTEMS, THE 100-YEAR HIGH WATER ELEVATIONS USED WERE THOSE PUBLISHED BY FEMA. FOR THE SOUTHWEST AREA THE 100-YEAR HIGH WATER WAS COMPUTED ON THE BASIS OF THE DESIGN PLANS FOR CONSTRUCTION OF THE WESTLINK EIGHTEENTH ADDITION

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POND AND DAM.

VALUES USED IN COMPUTING DESIGN FLOW RATES ARE AS FOLLOWS:

LAND USE	DESIGN FREQUENCY	COEF. OF RUNOFF
SINGLE FAMILY RESIDENT'L	2 YR	0.5
MULTI-FAMILY RESIDENT'L	2 YR	0.7
LIGHT COMMERCIAL	5 YR	0.8

ROUTING OF 100 YEAR STORM

TO ROUTE THE 100 YEAR STORM, THE 100 YEAR FLOW RATE WAS COMPUTED USING THE RAINFALL INTENSITY FOR THE TIME OF CONCENTRATION AT THE FIRST INLET UPSTREAM OF THE OUTLET OF THE STORM SEWER SYSTEM AND THE TOTAL DRAINAGE AREA AT THAT POINT. THIS FLOW RATE WAS COMPARED TO THE CAPACITY OF THE OUTLET PIPE USING MANNING'S EQUATION WITH HYDRAULIC SLOPE CALCULATED AS THE TOP OF CURB ELEVATION AT THE FIRST INLET MINUS THE SOFFIT ELEVATION AT THE OUTLET DIVIDED BY THE LENGTH OF PIPE. ANY EXCESS WOULD THEN BE CONVEYED THROUGH AN OVERLAND SWALE WITHIN THE DRAINAGE EASEMENT.

FOR THE SOUTHEAST DRAINAGE AREA, THE 100 YEAR ROUTING WAS COMPUTED AT EACH NODE TO DETERMINE THE EXCESS FLOW BEYOND THE STORM SEWER CAPACITY. THE MAXIMUM CAPACITY OF THE 60" RCP FROM JUST WEST OF THE MAIZE AND MAPLE INTERSECTION TO COWSKIN CREEK WAS FOUND BY UTILIZING THE MAXIMUM HYDRAULIC SLOPE. IT WAS THEN FOUND THAT EITHER THE STORM SEWER COULD BE USED TO DECREASE THE FLOW IN THE DITCH OR THE TOTAL EXCESS FLOW COULD PASS THROUGH THE EXISTING CROSS ROAD CULVERT UNDER MAIZE ROAD WITHOUT OVERTOPPING OF THE ROADWAY.

THE POSSIBILITY OF CONFLICT WITH THE EXISTING 27" VCP SANITARY SEWER NORTH OF MAPLE STREET WOULD APPEAR TO BE NOT INSURMOUNTABLE AS THE SANITARY SEWER IS LOCATED APPROXIMATELY 30 FEET NORTH OF THE

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Project OAK CLIFF ESTATES

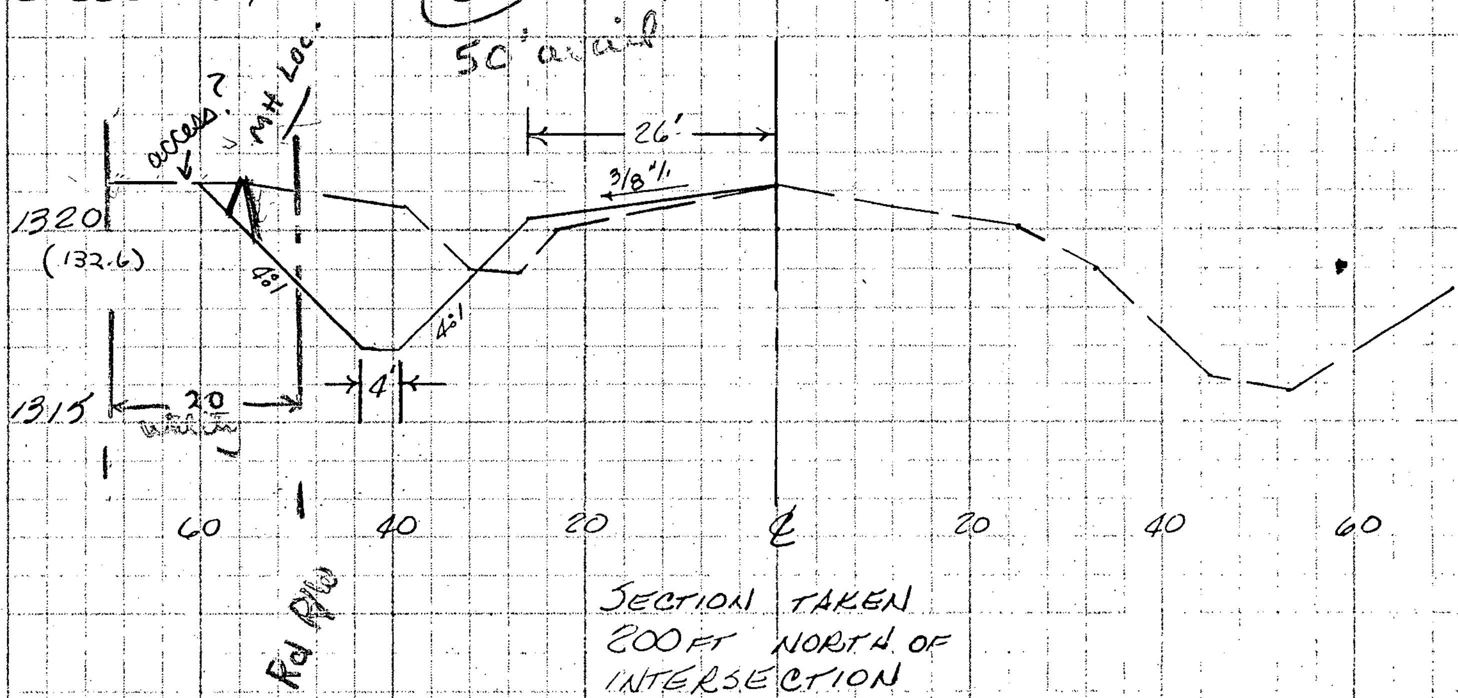
Item DRAINAGE PLAN

CENTERLINE OF MAPLE AND IS APPROXIMATELY 17 FEET BELOW NATURAL GROUND SURFACE.

DITCH CROSS-SECTIONS

THE OUTLET DITCH FOR THE WESTLINK EIGHTEENTH ADDITION POND HAS BEEN SHOWN AS BEING LOCATED IN THE SOUTHWEST CORNER OF OAK CLIFF ESTATES. THE DITCH WILL HAVE THE SAME TYPICAL SECTION AS SHOWN ON THE DESIGN PLANS FOR THE DAM AND POND (BOTTOM WIDTH IS 10 FEET AND SIDE SLOPES ARE 6 TO 1).

USING TYPICAL SECTIONS OF THE MAIZE ROAD AND MAPLE STREET DITCHES (AS PROVIDED BY SCDPW FIELD DATA), IT WAS FOUND THAT THOSE DITCHES COULD BE IMPROVED TO A SECTION AS SHOWN BELOW WITHOUT EXCEEDING THE 60-FT RIGHT-OF-WAY WIDTH.



SECTION TAKEN 200 FT NORTH OF INTERSECTION

(using as typical

100YR HIGH WATER ELEVATION AT OUTLET OF ST SWR SYSTEM ?

DISCHARGE FROM POND which?

SPILLWAY CREST ELEVATION 1330.5 } AS PER
DWR DESIGN WATER SURFACE 1333.0 } DESIGN PLANS

H = 2.5 FT

LENGTH OF LEVEL SECTION IS 10 FT; USE 20 FT (MINIMUM ON DWR TABLE)

$q^{CFS/L.F.} = 10.70\ ^{CFS/L.F.}$

LENGTH OF CREST = 80.0 L.F.

$Q_{DWR} = q^{CFS/L.F.} \times L$
$= (10.70)(80.0)$
$= 856$ CFS

which?

DA = 145 Ac = 0.23 SQMI (AS PER DESIGN PLANS)

$P_{DWR} = 100YR, 6HR + 0.27\,[PMP - 100YR, 6HR]$
$= 5.9 + 0.27(27.5 - 5.9)$
$= 11.7$ IN

ASSUMING CN = 90 (AS PER DWR PRACTICE)

$R_{DWR} = 10.5$ IN

$q_u = \frac{Q(CFS)}{DA(SQMI)R(IN)} = \frac{856}{(0.23)(10.5)} = 360\ ^{CFS/SQMI/IN}$

$P_{100} = 5.9$ IN

$R_{100} = 4.8$ IN (USING CN = 90)

$Q_{100} = (360\ ^{CFS/SQMI/IN})(0.23)(4.8) = 387$ CFS

prev by Chris @ 460

EXISTING STRUCTURE AT MAPLE STREET

4'x4'x28' RCBC

FL = 1325.0
℄ Rd = 1330.0 1330.5

USING HIGH WATER ELEVTN = 1331.7 (?)

HW = 6.0 FT
D = 4.0 FT

$HW/D = 1.67$

$Q/NB = 40$ CFS/L.F.

$Q_{RCBC} = 160$ CFS

$Q_{OVER} = (3.0)(H)^{3/2} L$

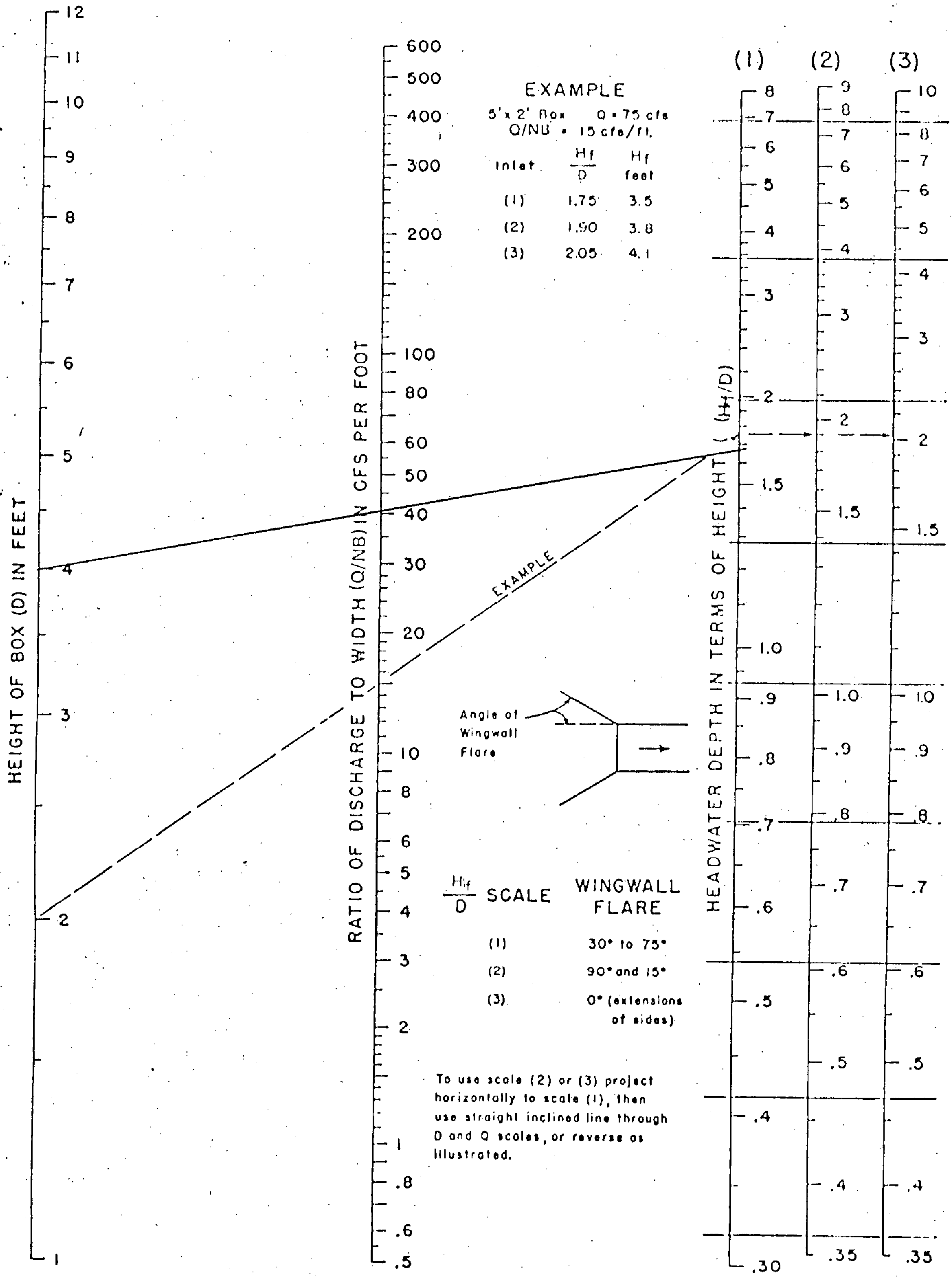
H = 1.7 FT
$L_{AVE} = 35.0$ FT

$Q_{OVER} = (3.0)(1.7)^{3/2}(35.0)$
= 233 CFS

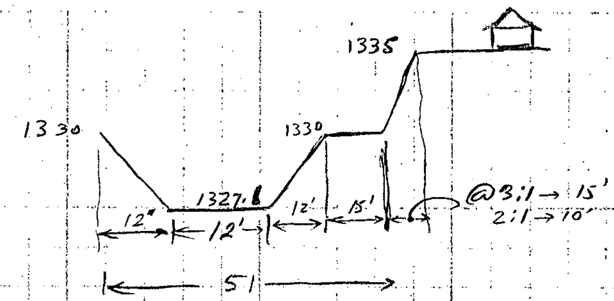
$Q_{TOTAL} = 160 + 233$
= 393 CFS > Q_{100}

This means Maple will have 20" ~~deep~~ water, thus practically ~~impossible~~ to pass. Implies that detention is very important.

for 100 year frequency and considering 100 year storm the water should be 1 ft. below the top of Maple A[ve.] If water tends to flow over Maple for 100 year freq., detention should be provided so no street overtoppi[ng] occurs.



HEADWATER DEPTH FOR BOX CULVERTS WITH INLET CONTROL



Southwest Drainage Area

Tc = 49.7 min
C = 0.5
DA = 30.4 ac

INT_{100}: 4.58 in/hr

Q_{100}: (0.5)(30.4)(4.58) = 69.6 cfs

Pipe size at outlet 48"

Slope required to carry Q_{100} = 0.22%

Actual Slope (34.02 [28.22]) (30.3 [26.5]) / 50 = 7.3% [1.72 / 50] 3.44%

∴ Pipe will carry Q_{100}

48" pipe
6" thick wall

4.5' cover
+ 1.3
5.8

Street El. 34.02
− 5.8
∴ Pipe El 28.22

North Drainage Area

System from west (Nodes 1100 to 1010)

Tc = 32.3 min
C = 0.5
DA = 34.2 − (6.8) = 27.4 ac

INT_{100}: 6.41 in/hr
Q_{100} = (0.5)(27.4)(6.41) = 87.8 cfs

System from south (Nodes 1015 to 1010)

Tc = 51.1 min
C = 0.5
DA = 23.6 − (7.1) = 16.5 ac

INT_{100} = 4.5 in/hr
Q_{100} = (0.5)(16.5)(4.5) = 37.1 cfs

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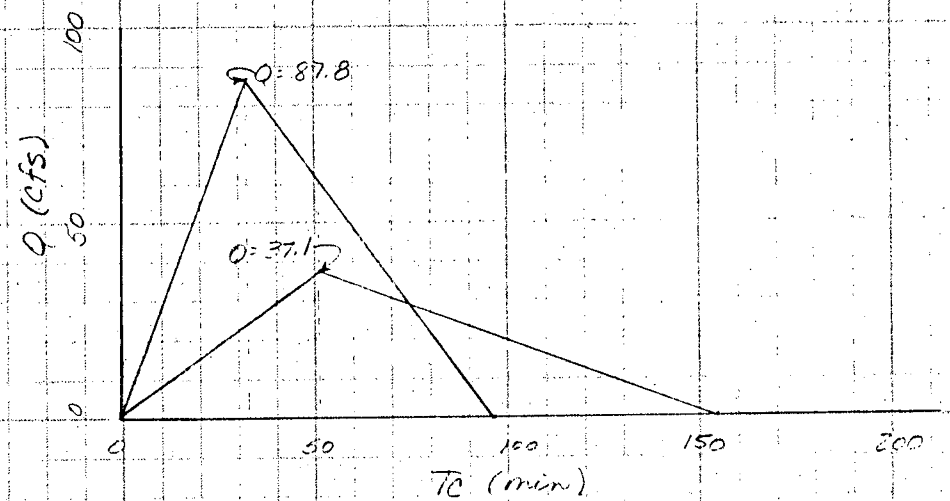
Project ______

Item ______



37+62 = 99 cfs

88+25 = 113 cfs ←

Q_{100} = 113 cfs

Pipe size at outlet - 60" — 12.0 is not the design water surface el. in creek?

Hyd. slope required to carry Q_{100} = 0.20%

? → Act slope = (23.50 - (12.00)) / 330 = 3.48% (16.3 - 12)/330 = 4.3/330 = 1.3%

1323.50
2.2
5
1316.3

∴ Pipe will carry Q_{100}

When the creek is in flood

actual slope available is negative; hence systems will not work.

℄ pipe ≈ 1316.3; hence 6.7 feet back water on pipe.

∴ Flap gate structure absolutely necessary and of course storm water sewer system is ~~no good~~ ineffective during high flows in river. An equalizing pond like that for Westlink 17th will improve storm

MAIZE ROAD C.R.C.

7'x3' x 40' RCBC $\quad$ FL = 1316.4 (AS PER SCDPW
℄ Rd = 1321.4 $\quad$ FIELD DATA)

NODE 200

LENGTH TO CRC $\quad$ 550.0 FT
DITCH SLOPE $\quad$ 0.20%

DITCH FL @ NODE 200 = 1316.4 + (5.50)(0.20)
= 1317.5

NODE 100 (OUTLET AT COWSKIN CREEK)

LOW FLOW WATER SURFACE = 1308.2±
FL 60" RCP = 1309.0
SOFFIT 60" RCP = 1314.0

MAXIMUM CAPACITY 60" RCP NODE 200 TO NODE 100

MAXIMUM ~~HYDRAULIC~~ Energy SLOPE

$$\frac{1317.0 - 1314.0}{1350} = 0.22\%$$

This is not the available slope

Considering losses, etc. hydraulic slope ≈ $\frac{1315.0 - 1314}{1350} = \frac{1}{1350} = .0741\%$

MAXIMUM FLOW RATE

A = 19.635 $\qquad$ $Q_{MAX} = \frac{1.486}{n} A R^{2/3} \sqrt{S}$

$\frac{\pi D^2}{4}$

$$= \frac{1.486}{0.013} \frac{\pi (5.0)^2}{4} \left(\frac{5.0}{4}\right)^{2/3} \sqrt{0.0022}$$

.015 $\qquad$ 0.000741

assuming losses = 122.8 CFS

v = 3.13 $\quad$ Q = 61.443 cfs

AVAILABLE CAPACITY

$Q_{AVAIL} = Q_{MAX} - Q_{DESIGN\ STORM}$
= 122.8 - 62.2
= 60.6 CFS

∴ Available capacity is zero.

MAIZE ROAD C.R.C.

7'×3'×40' RCBC FL = 1316.4' (AS PER SCDPW
℄ Rd = 1321.4' FIELD DATA)

intersection Maple & Maize 1320

NODE 200

LENGTH TO CRC 550.0 FT
DITCH SLOPE 0.20%

DITCH FL @ NODE 200 = 1316.4 + (5.50)(0.20)
= 1317.5 + 1320 = 2.5'

NODE 100 (OUTLET AT COWSKIN CREEK)

LOW FLOW WATER SURFACE = 1308.2±
FL 60" RCP = 1309.0 121.6
SOFFIT 60" RCP = 1314.0

MAXIMUM CAPACITY 60" RCP NODE 200 TO NODE 100

MAXIMUM HYDRAULIC SLOPE

$$\frac{1317.0 - 1314.0}{1350} = 0.22\%$$

MAXIMUM FLOW RATE 60" Pipe

$$Q_{MAX} = \frac{1.486}{n} A R^{2/3} \sqrt{S}$$

$$= \frac{1.486}{0.013} \frac{\pi (5.0)^2}{4} \left(\frac{5.0}{4}\right)^{2/3} \sqrt{0.0022}$$

A = 19.6
P = 15.7
R = 1.25

$$= 122.8 \text{ CFS}$$

$$\frac{1.49}{.013}(19.6)\,1.25^{2/3}\,.0022^{1/2}$$

122.3

AVAILABLE CAPACITY

$$Q_{AVAIL} = Q_{MAX} - Q_{DESIGN\ STORM}$$
$$= 122.8 - 62.2$$
$$= 60.6 \text{ CFS}$$

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ZIP CODE / 67211

Date MAY 6, 1980

Project OAK CLIFF ESTATES

Item DRAINAGE PLAN

100 YEAR ROUTING OF SOUTHEAST STORM SEWER SYSTEM

NODE NUMBER	C	AREA (Ac)	TIME OF CONCENTRTN (MIN)	100-YR INTENSITY (IN/HR)	100-YR FLOW RATE (CFS)	ST. SWR FLOW RATE (CFS)	EXCESS (CFS)
535	0.50	3.86	52.1	4.40	8.5	3.6	4.9
530	0.50	0.79	52.4	4.38	1.7	0.7	1.0
526	0.50	1.57	32.4	6.41	5.0	2.1	2.9
525	0.50	1.33	55.1	4.21	2.8	1.2	1.6
522	0.50	1.43	32.8	6.35	4.5	1.9	2.6
521	0.50	4.94	48.7	4.64	11.5	4.9	6.6
520	0.50	1.77	57.0	4.10	3.6	1.6	2.0
515	0.50	1.40	57.2	4.09	2.9	1.2	1.7
510	0.50	1.60	58.0	4.04	3.2	1.4	1.8
508	0.50	0.41	15.4	8.88	1.8	0.8	1.0
507	0.50	1.89	32.9	6.33	6.0	2.5	3.5
506	0.60	0.51	33.2	6.28	1.9	0.8	1.1
504	0.50	1.99	29.8	6.87	6.8	2.9	3.9
505	0.50	2.13	58.2	4.03	4.3	1.8	2.5
500					Σ 64.5	Σ 27.4	Σ = 37.2

V = 3.45

Q_{cap} = 51.75 cfs.

Hence 0.16

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Date MAY 6, 1980

Project OAK CLIFF ESTATES

Item DRAINAGE PLAN

NODE NUMBER	C	AREA (Ac)	TIME OF CONCENTRTN (MIN)	100-YR INTENSITY (IN/HR)	100-YR FLOWRATE (CFS)	ST. SWR. FLOWRATE (CFS)	EXCESS (CFS)
415	0.80	1.17	15.0	8.97	8.4	4.9	3.5
410	0.80	3.00	15.0	8.97	21.5	12.5	9.0
405	0.80	2.75	15.8	8.79	19.3	11.3	8.0
400							Σ = 20.6
310	0.80	2.20	15.0	8.97	15.8	9.2	6.6
305	0.80	1.60	16.6	8.63	11.0	6.4	4.6
300							Σ = 11.2
230	0.70	3.40	25.2	7.33	17.4	7.9	9.5
225	0.70	2.32	26.0	7.24	11.8	4.7	7.1
220	0.70	2.75	26.8	7.16	13.8	6.1	7.7
215	0.70	3.04	28.0	7.03	15.0	6.5	8.5
210	0.80	2.20	31.6	6.54	11.5	6.3	5.2
205	0.80	0.92	33.2	6.28	4.6	2.5	2.1
200							Σ = 40.1

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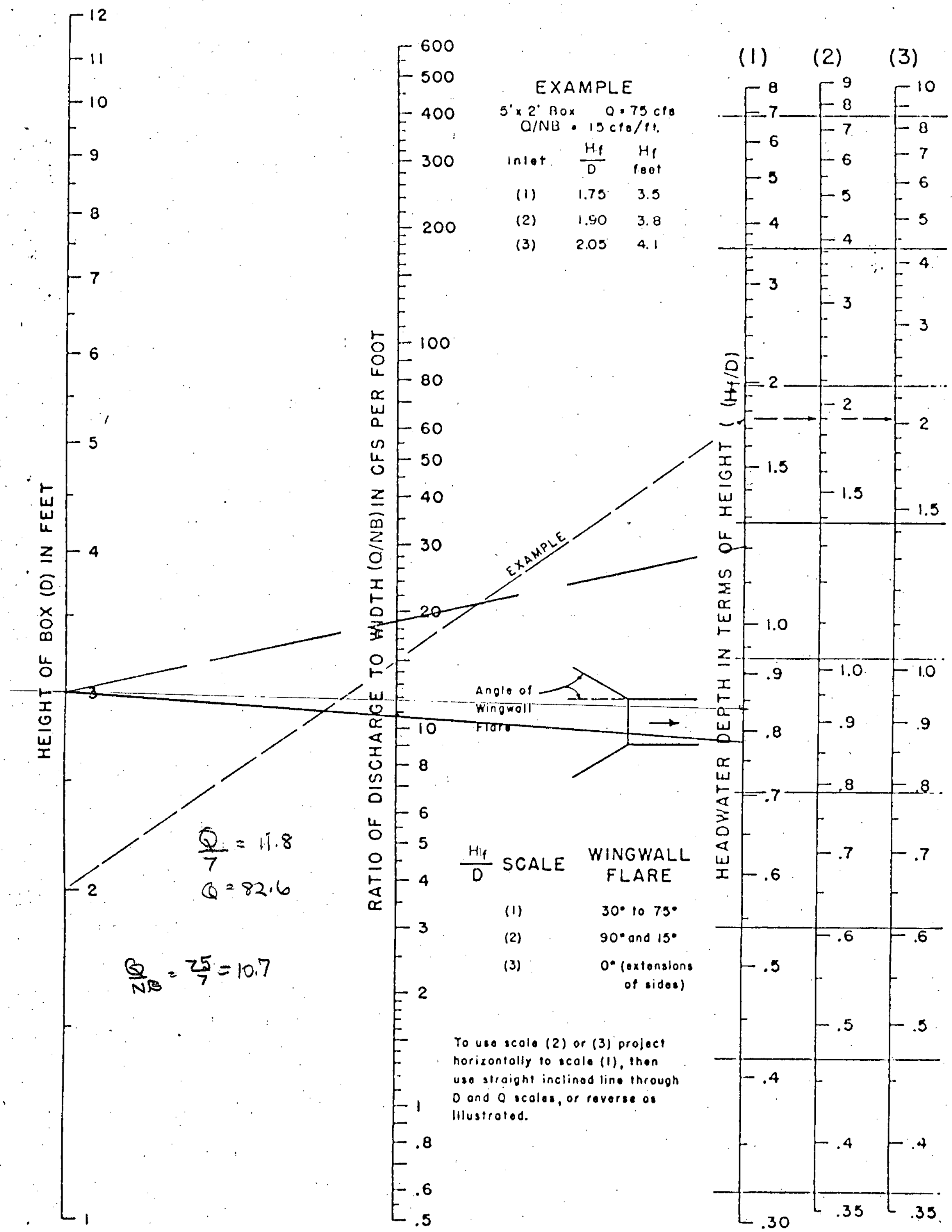
Date MAY 6, 1980

Project OAK CLIFF ESTATES

Item DRAINAGE PLAN

NODE NUMBER	C	AREA (AC)	TIME OF CONCENTRTN (MIN)	100-YR INTENSITY (IN/HR)	100-YR FLOW RATE (CFS)	ST. SWR. FLOW RATE (CFS)	EXCESS (CFS)
1200	0.50	1.09	23.5	7.53	4.1	1.9	2.2
1190	0.50	1.35	24.1	7.46	5.0	2.3	2.7
1180	0.50	0.89	24.8	7.38	3.3	0.9	2.4
1164	0.50	2.48	26.3	7.21	8.9	4.0	4.9
1162	0.50	0.99	26.6	7.18	3.6	1.4	2.2
1070	0.50	2.22	40.9	5.33	5.9	2.5	3.4
1065	0.50	2.06	41.3	5.29	5.4	2.3	3.1
1058	0.50	0.36	22.1	7.71	1.4	0.6	0.8
1057	0.50	0.81	27.9	7.04	2.9	1.2	1.7
1056	0.50	1.67	32.4	6.41	5.4	2.3	3.1
					45.9		Σ = 26.5

Chart 7



HEADWATER DEPTH FOR BOX CULVERTS WITH INLET CONTROL

FEDERAL HIGHWAY ADMINISTRATION
MAY 1973

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Project OAK CLIFF ESTATES

Item DRAINAGE PLAN

TOTAL EXCESS FLOW TO DITCH (above retention in St R/W

Rational
$Q = ciA$
$0.5(5.9)(70) = 206$ cfs

$Q_{EXC} = 37.2 + 20.6 + 11.2 + 40.1 + 26.5$
$= 135.6$ CFS

$Q_{DITCH} = Q_{EXC} - Q_{AVAIL}$
$= 135.6 - 60.6$
$= 75.0$ CFS

CAPACITY AT MAIZE ROAD CRC

$Q/_{NB} = \frac{75.0}{7} = 10.7$ CFS/LF

HEIGHT OF BOX (D) = 3.0 FT — 2.5 avail (intersection Maple & Maize)

$\frac{HW}{H}$ $\frac{2.5}{3} = 0.833$
$Q/7 = 11.8$
$Q = 82.6$

$H_f/D = 0.78$

$H_f = (0.78)(3.0)$
$= 2.34$

HW ELEV = 1316.4 (FL Box) + 2.3
= 1318.7 < 1320.0 ℄Rd ELEV @ MAPLE & MAIZE

WITH HW ELEV = 1320.0, $H_f = 1320.0 - 1316.4$
$= 3.6$

$H_f/D = \frac{3.6}{3.0} = 1.2$

$Q/_{NB} = 19.0$ CFS/LF

$Q_{MAX\ CAP} = (19.0)(7.0)$
$= 133.0$ CFS (98% Q_{EXC})

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Project Oak Cliff

Item CRC Size, 100 Yr Discharge

60" Qmax 15 cfs

SW Corner

DA = 31.1 acre
COR = 0.5
TOC = 42.9 min
INT = 5.13 in/hr

Q_{100} = (0.5)(31.1)(5.13 in/hr) = 79.8 cfs

(All Q_{100} will pass thru 48" outlet pipe)

Q_{100} from back of lots

DA = 0.51 acre
COR = 0.5
INT = 5.13 in/hr
Q_{100} = 1.31 cfs

CRC on more westerly street a Maple

h = 32.20 - 31.0 = 1.2'
Q = 1.31 cfs

1 - 17"x13" CMAC
→ 21x15" (min)

SE Area - (drains to Maple at manhole location 500)

DA = 25.2 acre
COR = 0.5
TOC = 53.7 min
INT = 4.30 in/hr

Q_{100} = (0.5)(25.2)(4.30) = 54.2 cfs
Q_2 = (0.5)(25.2)(1.81) = 22.8 cfs
Q overland = 31.4 cfs
Q thru CRC = 31.4/2 = 15.7 cfs

Q_{100} from back of lots

DA = 2.27
COR = 0.5
INT = 4.30

Q_{100} = 4.9 cfs

$Q_{TOT(CRC)}$ = 20.6 cfs
h = 28.00 - 24.8 = 3.2 (with 0.5% ditch slope)

→ 1 - 28x20" CMAC

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Project Oak Cliff
Item

Q_{100} thru CRC at Maize and most southerly street from Oak Cliff

Q = 8.67 cfs (see 100 YR - Flood Routing calc.)

h = 24.00 - 19.8 = 4.2 ft (with 0.5% ditch slope)

→ 1- 21" x 15" CMAC

Q_{100} thru CRC at Maize and middle street from Oak Cliff

DA = 1.26 Acre
COR = 0.5
TOC = 41.3 min (from sled. 1040)
INT = 5.29 in/hr

Q_{100} = 3.3 cfs

h = 21.50 - 19.0 = 1.5'

→ 1- 21" x 15" CMAC

Q_{100} thru CRC at Maize and most northerly street

DA = 1.25 acre
COR = 0.5
TOC = 42.9 min
INT = 5.19 in/hr

Q = (0.5)(1.25)(5.19) = 3.2 cfs

h = 22.2 - 21.0 = 1.2 (head is approximate, but min. size CRC is more than adequate)

→ 1- 21" x 15" CMAC

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Date 5-1-8[illegible]

Project Oak Cliff

Item # of inlets

	NODE #	Type	Approach Slope	Approach Q	Number of Inlets	Q bypass	
SW Corner							
	675	Mini-Sump	NA	3.4	1	0	
	670	Mini-Sump	—	1.9	1	0	
	666	Mini-Sump	—	1.0	1	0	
	665	Mini-Sump	—	0.9	1	0	
	664	Mini-Sump	—	2.2	1	0	
	663	Mini-Sump	—	2.3	1	0	
	660	By pass	0.70	1.5	1	0	
	661	By pass	0.70	1.8	1	0.1	
	656	MiniSump	—	1.3	1	0	
	655	By-pass	0.32	1.3	1	0	
	651	Mini-Sump	—	2.0	1	0	
	650	Mini-Sump	—	3.0	1	0	
	640	Mini-Sump	—	3.5	1	0	
	635	Mini-Sump	—	2.0	1	0	
	626	Mini-Sump	—	1.4	1	0	
	625	Mini-Sump	—	2.7	1	0	
	621	Mini-Sump	—	1.2	1	0	
	620	Mini-Sump	—	3.8	1	0	
	616	Mini-Sump	—	1.1	1	0	
	615	Mini-Sump	—	3.7	1	0	
	610	Mini-Sump	—	1.6	1	0	
	605	Mini-Sump	—	0.1	1	0	
North Area	1165	Mini-Sump	—	2.7	1	0	
	1159	Mini-Sump	—	2.3	1	0	
	1157	By-pass	0.65	0.4	1	0	
	1155	By-pass	0.10	0.7	1	0	
	1147	By-pass	0.32	2.1	1	0.1	
	1145	By-pass	0.32	1.7	1	0	
	1137	By-pass	0.32	2.0	1	0.1	
	1135	By-pass	0.32	1.6	1	0	
	1127	By-pass	0.75	2.1	1	0.3	
	1125	By-pass	0.75	1.8	1	0.2	(to 1110)
	1115	By-pass	0.75	2.5	1	0.5	(to 1105)
	1200	Mini-Sump	—	1.9	1	0	
	1190	Mini-Sump	—	2.3	1	0	
	1180	By-pass	0.32	1.2	1	0	
	1170	By-pass	0.32	0.4	1	0	

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Project [illegible]

Item

NODE #	Type	Approach Slope	Approach Q	Number of Inlets	Q bypass
1164	Mini-Sump	—	4.0	1	0
1162	By-pass	0.33	1.5	1	0
1160	Mini-Sump	—	4.1	1	0
1150	Mini-Sump	—	1.5	1	0
1144	Mini-Sump	—	2.7	1	0
1142	By-pass	0.40	2.2	1	0.2
1140	By-pass	0.32	1.5	1	0
1130	By-pass	0.32	1.7	1	0
1120	By-pass	0.32	2.0	1	0.1
1110	Mini-Sump	—	3.1	1	0
1105	By-pass	0.32	1.8	1	0.1
1100	Mini-Sump	—	1.9	1	0
1070	Mini-Sump	—	2.5	1	0
1065	Mini-Sump	—	2.5	1	0
1058	Maxi-Sump	—	0.6	1	0
1057	Maxi-Sump	—	1.2	1	0
1056	Maxi-Sump	—	2.3	1	0
1055	By-pass	1.19	0.8	1	0
1051	Mini-Sump	—	1.4	1	0
1050	Mini-Sump	—	1.8	1	0
1045	By-pass	0.35	0.5	1	0
1040	By-pass	1.00	2.0	1	0.3
1035	By-pass	1.00	2.1	1	0.4
1033	Mini-Sump	—	1.8	1	0
1032	Mini-Sump	—	2.1	1	0
1031	By-pass	0.65	0.6	1	0
1030	Mini-Sump	—	3.0	1	0
1026	By-pass	0.50	1.0	1	0
1025	By-pass	2.20	3.3	2	0
1020	Mini-Sump	—	4.2	1	0
1015	Mini-Sump	—	1.2	1	0
1010	Mini-Sump	—	2.4	1	0

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Item

SE Corner

Node #	Type	App. Slope	App. Q	Number of Inlets	Q bypass
535	Bypass	0.32	3.6	1	0.7
530	Bypass	0.32	1.2	1	0
526	Mini	—	2.8	1	0
525	Bypass	0.32	1.9	1	0.1
522	Bypass	0.34	1.9	1	0.1
521	Bypass	0.34	4.9	1	1.5
520	Mini	—	4.0	1	0
515	Bypass	0.34	2.0	1	0.1
510	Mini	—	2.6	1	0
507	By-pass	0.32	2.5	1	0.2
506	Bypass	0.32	1.1	1	0
505	Mini	—	3.0	1	0
504	Mini	—	2.9	1	0

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Project Oak Cliff

Item Cost Estimate

NORTH DRAINAGE AREA

	Number	Unit price	Price	Total Cost
Inlets	48	1080.00	51840	
Manholes (Type A)	2	1440.00	2880	
Outfall	1	4000.00	4000	

Pipes

Size	Length	#/LF	Price	Total Cost
15"	2200	24.00	52800	
18"	1280	30.00	38400	
24"	1850	36.00	66600	
30"	830	43.00	35690	
36"	280	52.00	14560	
42"	460	59.00	27140	
48"	100	66.00	6600	
60"	330	82.00	27060	
				327570
				+ 20%
				$ 393,000

SOUTHEAST DRAINAGE AREA

	Number	Unit price	Price	Total Cost
Inlets	13	1080.00	14040	
Manholes (Type A)	4	1440.00	5760	
Outfall	1	4000.00	4000	

Pipes

Size	Length	#/LF	Price	Total Cost
15"	264	24.00	6336	
18"	800	30.00	24000	
24"	1015	36.00	36540	
30"	218	43.00	9374	
54"	250	73.00	18250	
42"	430	59.00	25370	
48"	504	66.00	33264	287634
60"	1350	82.00	110700	+ 20%
			287634	$ [illegible]

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Project Oak Cliff

Item Cost Estimate

SOUTHWEST DRAINAGE AREA

	Number	Unit price	Price
Inlets	22	1080.00	23760
Manholes	1	1440.00	1440
Outfall	1	4000.00	4000

Pipes

Size	Length	#/LF	Price
15"	400	24.00	9600
18"	50	30.00	1500
24"	500	36.00	18000
30"	800	43.00	34400
36"	50	52.00	2600
42"	900	59.00	53100
48"	220	66.00	14520

162920
+20%

Total $195,500

SPILLWAY DESIGN TABLES
Soil Conservation Service
Work Unit Staffs

L Feet	Graded Entrance Length Feet	Graded Entrance Rise Feet	Graded Entrance Slope %	Transition Length Feet	Level Crest Length Feet	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5
						Values of "q", cfs per one Foot of Spillway Width in cfs. Values of Hp + 1' Freeboard in Feet									
20					20	2.30	4.62	7.78	10.70	14.3	18.4	22.8	27.7		
30					30	2.12	4.40	7.20	10.20	13.8	17.8	22.3	26.9		
40					40	2.00	4.18	6.90	9.90	13.3	17.4	21.7	26.3		
50					50	1.88	3.98	6.60	9.60	12.9	16.8	21.2	25.7		
60					60	1.80	3.80	6.30	9.30	12.6	16.4	20.7	25.2	29.9	
70					70	1.73	3.67	6.18	9.02	12.3	15.2	20.3	24.7	29.4	
80					80	1.66	3.54	6.00	8.82	12.0	15.7	19.8	24.3	28.9	
90					90	1.60	3.42	5.86	8.62	11.7	15.4	19.5	23.9	28.6	
100					100	1.55	3.29	5.71	8.50	11.5	15.1	19.2	23.6	28.2	
120					120	1.50	3.10	5.40	8.04	11.1	14.6	18.6	22.8	27.4	
140					140	1.45	2.94	5.18	7.80	10.7	14.2	18.0	22.2	26.7	
160					160	1.40	2.82	4.98	7.60	10.3	13.6	17.5	21.6	26.1	
180					180	1.33	2.70	4.80	7.30	10.1	13.3	17.0	21.1	25.5	30.0
200					200	1.26	2.58	4.59	7.11	9.82	12.8	16.6	20.6	24.9	29.4
220					220	1.20	2.49	4.42	6.94	9.61	12.6	16.3	20.3	24.6	29.2
240					240	1.15	2.40	4.30	6.78	9.42	12.4	15.9	19.9	24.2	28.7
260					260	1.10	2.32	4.20	6.58	9.23	12.2	15.6	19.6	23.8	28.3
280					280	1.05	2.24	4.10	6.40	9.04	11.8	15.3	19.3	23.5	27.9
300					300	1.00	2.17	3.98	6.29	8.90	11.6	15.1	18.9	23.2	29.5
320					320	0.96	2.10	3.88	6.18	8.74	11.5	14.8	18.7	22.8	27.3
340					340	0.92	2.05	3.78	6.02	8.58	11.3	14.6	18.4	22.5	26.8
360					360	.88	2.00	3.68	5.88	8.42	11.1	14.4	18.2	22.3	26.6
380					380	.84	1.95	3.58	5.74	8.26	11.0	14.2	18.0	22.0	26.3
400					400	.80	1.90	3.48	5.60	8.10	10.8	14.0	17.7	21.7	26.0
75	25	0.25	1.0		50	1.62	3.60	6.10	9.10	12.30	16.2	20.5	25.1	29.8	
100	50	0.50	1.0		50	1.56	3.50	5.76	8.60	12.06	15.8	20.0	24.5	29.2	
125	75	0.75	1.0		50	1.50	3.42	5.70	8.50	11.73	15.4	19.6	23.9	28.7	
150	100	1.00	"		50	1.44	3.30	5.62	8.40	11.40	15.1	19.2	23.6	28.2	
175	125	1.25	"		50	1.44	3.29	5.55	8.30	11.30	14.9	18.9	23.5	27.8	
200	150	1.50	"		50	1.44	3.28	5.44	8.20	11.20	14.7	18.7	23.0	27.5	
225	175	1.75	"		50	1.44	3.27	5.40	8.15	11.10	14.5	18.5	22.8	27.2	
250	200	2.00	"		50	1.44	3.26	5.36	8.10	11.00	14.4	18.3	22.6	27.0	
275	225	2.25	"		50	1.44	3.25	5.33	8.05	10.90	14.3	18.1	22.4	26.8	
300	250	2.50	"		50	1.44	3.24	5.30	8.00	10.80	14.2	18.0	22.2	26.6	
350	300	3.00	"		50	1.44	3.22	5.28	7.95	10.70	14.1	17.9	22.0	26.4	
400	350	3.50	"		50	1.44	3.20	5.26	7.90	10.60	14.0	17.7	21.7	26.1	

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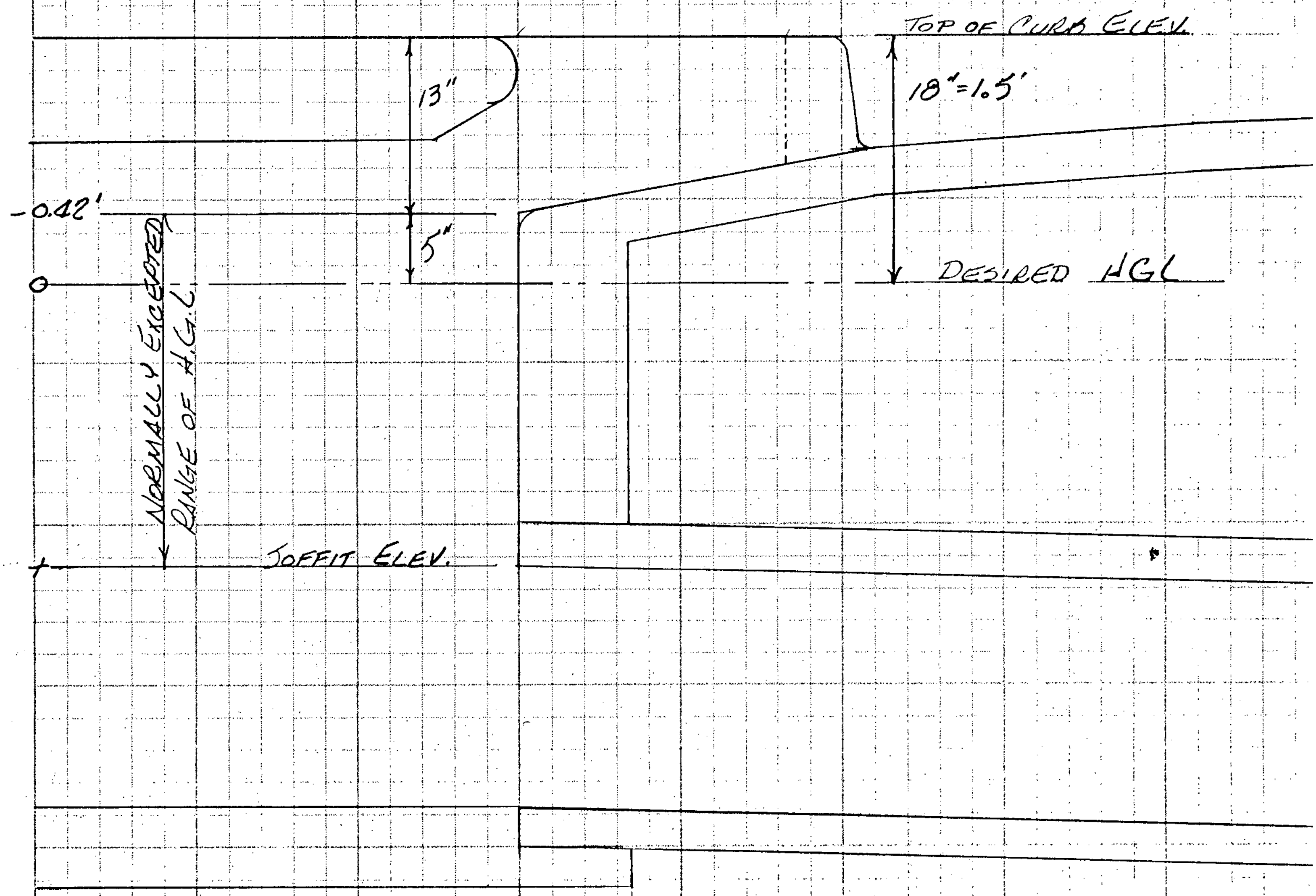
Project OAK CLIFF ESTATES

Item DRAINAGE PLAN

DESIRED HYDRAULIC GRADE LINE ELEVATION



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Date JUNE 12, 1980 Page 1 of 1

Project OAK CLIFF ESTATES

Item DRAINAGE PLAN

SOUTHWEST CHANNEL

CHANNEL SLOPE

AT OUTLET OF 24" CMP	140.20 CD 1327.60 MSL
AT 4x4 RCBC	1325.03 MSL
LENGTH OF CHANNEL	425 FT

$$SLOPE = \frac{1327.60 - 1325.03}{4.25} = 0.60\%$$

CHANNEL SECTION