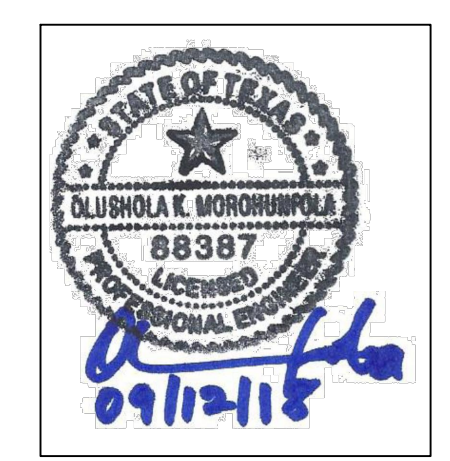


FLCW RATE SUMMARY

EVENT	INTENSITY In/Hr	Q Allowable (CFS)	A to fl Rate use CFS
100-Yr	9.8	4.50	4.40
25-Yr	8.3	3.61	3.54
10-Yr	7.1	3.26	3.18
5-Yr	6.1	2.80	2.75

C5 = 2.80 CFS	W.S. ELEV. = 490.815
C10 = 3.26 CFS	W.S. ELEV. = 490.865
C25 = 3.61 CFS	W.S. ELEV. = 490.905
C100 = 4.50 CFS	W.S. ELEV. = 490.995



**DETENTION BASIN CALCULATIONS.**

TOTAL DETENTION REQUIRED BASED ON 2-YR, 25-YR AND 100 YEAR PEAK RUNOFF RATE  
 DETENTION CALCULATED USING MODIFIED RATIONAL METHOD.  
 Drainage Areas "A" = 0.645 Ac., "B" = 0.1417 Ac., "C" = 0.0259 Ac. & "D" = 0.4088. With C = 0.5 Contribute Flow within Project area Per Current Design Condition (with a Total Area = 1.2324 Ac)  
 Offsite Drainage Area "O-1" = 0.13385 Ac & "O-2" = 0.13385 Ac with a Total Area of 0.2677 Ac. Flows Thru The Site with C = 0.5 Per Current Design Condition  
 Total Drainage generated within site From Drainage Areas A, B, C & D (1.2423 Ac) = 6.09 CFS (for Existing Condition)  
 Offsite Drainage through site From Drainage Area "O-1 & O-2" of 0.2677 Ac = 1.31 CFS (Existing Condition)  
 The weighted combined Runoff Coefficient for Proposed Condition for the project site: C = 0.543 (Existing Site Condition: C = 0.5 typical)  
 Runoff Coefficient C of 0.9 is allowed to be used only for new Paved Area of 0.1343 Ac, and C of 0.5 everywhere else

**DETENTION POND DESIGN CONCEPT:**

Drainage Areas A (1.0707 Ac) of the subject site (With weighted C= 0.543 for fully Developed Condition) will be Detained.  
 Drainage Areas of 0.1716 Ac from B (0.1417 Ac) & C (0.0259 Ac) within Site with a runoff of 0.81 CFS will not be Detained.  
 Offsite Drainage Area O-1 & O-2 (0.2677 Ac) through the Site w/ C of 0.5 Generating a Runoff of 1.31 CFS is not required to be Detained.  
 Equivalent Area generating the same Runoff of 1.31 CFS as Offsite Runoff w/ a Weighted Runoff Coefficient (W) of 0.543 is = 0.2482 Ac  
 THEREFORE, RUNOFF FROM A TOTAL DRAINAGE AREA OF 1.3189 Ac. (1.0707 Ac + 0.2482 Ac) WILL BE ROUTED THRU THE POND  
 DETENTION BASIN HAS BEEN DESIGNED SUCH THAT THE OUTFLOW FROM THE BASIN PLUS THE RUNOFF FROM UNDETAINED AREAS (0.81 CFS) PLUS OFF SITE RUNOFF THRU THE SITE (1.31 CFS) WILL EQUAL THE PREDEVELOPED CONDITION TOTAL FLOW (6.09 CFS) MINUS RUNOFF FROM UNDETAINED AREAS (0.76) PLUS OFFSITE RUNOFF THRU THE SITE (1.31 CFS)  
 MAX RUNOFF OUT OF DETENTION POND: 6.09 CFS - 2.90 CFS + 1.31 CFS = 4.50 CFS

Maximum Peak Discharge (Pre-Development/Existing Condition- For Entire Site)  
Tc = 10 min

	5 - YEAR	10 - YEAR	25 - YEAR	100 - YEAR
C =	0.5	0.5	0.5	0.5
I =	6.1	7.1	8.3	9.8
A =	1.2423	1.2423	1.2423	1.2423
Q =	3.79	4.41	5.16	6.09

Maximum Peak Discharge (Post-Development Condition - Portion Subject Site Detained)  
Tc = 10 min

	5 - YEAR	10 - YEAR	25 - YEAR	100 - YEAR
C =	0.543	0.543	0.543	0.543
I =	6.1	7.1	8.3	9.8
A =	0.6973	0.6973	0.6973	0.6973
Q =	2.31	2.69	3.14	3.71

**PROPOSED CONDITION USEAGE (COMMERCIAL)**

ENTIRE SITE AREA		Offsite Area		Det. Site Area		Area Thru Site Not Det. in 1	
Tc min	C	Tc min	C	Tc min	C	Tc min	C
10	0.543	10	0.543	10	0.543	10	0.543
15	1.2423	15	0.2462	15	0.6973	15	0.545
20	0.6745689	20	0.133687	20	0.3786339	20	0.295935
25	9.8	25	9.8	25	9.8	25	9.8
100	6.61	100	1.31	100	3.71	100	2.90

**PROPOSED CONDITIONS (BASED ON Tc = 10 MINUTES)**

**5-YEAR STORM**

DURATION (MIN.)	OUTFLOW Duration (min)	INTENSITY (IN./HR.)	C	A (ACRES)	Q (CFS)	Qm (CFS)	Inflow II (CF)	Om (CF)	Cutoff V (CF)
10	20	6.10	0.543	0.9435	3.13	2.80	1875.1	1680.00	195.09
15	25	5.50	0.543	0.9435	2.82	2.80	2536.0	2100.00	436.99
20	30	4.90	0.543	0.9435	2.51	2.80	3012.4	2520.00	492.44
30	40	4.10	0.543	0.9435	2.10	2.80	3769.9	3360.00	429.90
40	50	3.40	0.543	0.9435	1.74	2.80	4180.5	4200.00	-19.46

**10-YEAR STORM**

DURATION (MIN.)	OUTFLOW Duration (min)	INTENSITY (IN./HR.)	C	A (ACRES)	Q (CFS)	Qm (CFS)	Inflow II (CF)	Om (CF)	Cutoff V (CF)
10	20	7.10	0.543	0.9435	3.84	3.26	2182.5	1956.00	226.49
15	25	6.50	0.543	0.9435	3.33	3.26	2917.1	2445.00	472.07
20	30	5.90	0.543	0.9435	3.02	3.26	3627.2	2934.00	693.23
30	40	4.80	0.543	0.9435	2.46	3.26	4426.4	3912.00	514.45
40	50	4.40	0.543	0.9435	2.05	3.26	4918.3	4890.00	28.28
50	60	3.50	0.543	0.9435	1.70	3.26	5378.4	5861.00	-448.63

**25-YEAR STORM**

DURATION (MIN.)	OUTFLOW Duration (min)	INTENSITY (IN./HR.)	C	A (ACRES)	Q (CFS)	Qm (CFS)	Inflow II (CF)	Om (CF)	Cutoff V (CF)
10	20	8.30	0.543	0.9435	4.25	3.61	2551.4	2166.00	385.38
15	25	7.50	0.543	0.9435	3.84	3.61	3458.2	2707.50	750.68
20	30	6.80	0.543	0.9435	3.38	3.61	4057.6	3243.00	814.58
30	40	5.50	0.543	0.9435	2.82	3.61	5072.1	4332.00	739.97
40	50	4.80	0.543	0.9435	2.38	3.61	5656.0	5415.00	241.02

**100-YEAR STORM**

DURATION (MIN.)	OUTFLOW Duration (min)	INTENSITY (IN./HR.)	C	A (ACRES)	Q (CFS)	Qm (CFS)	Inflow II (CF)	Om (CF)	Cutoff V (CF)
10	20	9.80	0.543	0.9435	5.02	4.50	3012.4	2700.00	312.44
15	25	9.00	0.543	0.9435	4.61	4.50	4149.8	3375.00	774.80
20	30	8.30	0.543	0.9435	4.25	4.50	5102.7	4050.00	1052.71
30	40	6.90	0.543	0.9435	3.54	4.50	6363.0	5400.00	963.02
40	50	6.00	0.543	0.9435	2.97	4.50	7131.5	6750.00	381.50
50	60	5.00	0.543	0.9435	2.56	4.50	7684.8	8002.00	-415.19

CHANNEL DISCHARGE  $Co = 2/3 * C1 * 1.48 * 2.48 * 0.5 * 1.5 = 4.40$  CFS  
 PROVIDE 1-12" DEEP x 18" WIDE CURB OPENING TO PROVIDE A TOTAL DISCHARGE OF 4.4 CFS  
 DETENTION POND AREA = 3,500 SF  
 AVERAGE DETAINED WATER DEPTH = 4 IN.  
 DETENTION POND STORAGE = 1,166.67 CF  
 REQUIRED STORAGE VOLUME = 1,052.71 CF

MINIMUM REQUIRED STORAGE VOLUME  
1,052.7 CF  
TIME TO PEAK (Tpeak) = 20 MINUTES

DETENTION STORAGE DESIGN  
 $VOLUME (IN) = Qm(N) * Tpeak$   
 $VOLUME (IN) = (DR. AREA) * (RUNOFF COEFF. C) * (I) (IN/HR @ Tpeak) (Tpeak) * 60 sec/min$   
 $= (0.9435) * (0.543) * (8.3) * (20) * (60)$   
 $= 5,102.71 CF$   
 SET VOLUME (STORAGE) = 1,106.7 CF  
 $VOLUME (OUT) = VCL (IN) - VOL (STORAGE)$   
 $= 5,102.71 - 1,106.7$   
 $VOLUME (OUT) = 3,996.0 CF$   
 $VOLUME (OUT) = 0.5 * (Tpeak + To) * Qout * 60 sec/min.$   
 $3,996.0 = (0.5 * (20 + 10)) * Qout * 60$   
 $Qout = 4.37 CFS$   
 (Less than 4.5 CFS, okay)

**REQUIRED MINIMUM POND STORAGE**

V5 =	482.44	6F	=	0.0113	ac-ft	at	Q5 = 2.80	cfs
V10 =	893.23	6F	=	0.0169	ac-ft	at	Q10 = 3.26	cfs
V25 =	808.58	6F	=	0.0186	ac-ft	at	Q25 = 5.30	cfs
V100 =	1,052.71	6F	=	0.0242	ac-ft	at	Q100 = 4.50	cfs

Equivalent Offsite Area for same Runoff using the weighted Runoff Coefficient = (1.31)(0.543) = 0.246 Ac  
 Max. Q100 allowed out of Det Pond = Max. Existing Condition Q - Q from Undetained area = 6.09 - 2.90 + (1.31) = 4.50 CFS  
 Max. Q25 allowed out of Det Pond = Max. Existing Condition Q - Q from Undetained area = 5.16 - 2.48 + (1.11) = 3.81 CFS  
 Max. Q10 allowed out of Det Pond = Max. Existing Condition Q - Q from Undetained area = 4.41 - 2.10 + (0.83) = 3.26 CFS  
 Max. Q5 allowed out of Det Pond = Max. Existing Condition Q - Q from Undetained area = 3.79 - 1.81 + (0.82) = 2.80 CFS  
 Max. Q100 allowed out of Detention Pond includes offsite runoff (1.31 CFS) not required to be detained

AS-BUILT RECORD DRAWING  
CASE #SP2016-033

OWNER/APPLICANT NAME:  
LIZARDO OMEMO  
816 COURTLAND DRIVE  
MESQUITE, TX 75150  
(214) 475-5144

OKM ENGINEERING, INC.  
Mechanical, Environmental & Civil Engineering Consultants  
(TBP E FIRM REG. #F-7241)  
112 S. Madison Avenue  
Dallas, Texas 75028  
Phone: (214) 941-9412  
Fax: (214) 941-9445

REVISIONS

Date	Description

Project Name & Address:  
PROPOSED OFFICE (REAL ESTATE)  
1201 N. GOLIAD STREET  
LIZARDO OMEMO ADDITION  
LOT 1, BLOCK A  
ROCKWALL, TX 75087

Sheet Title:  
DETENTION POND CALC. SHEET

Date: AUGUST 30, 2017

Scale: 1" = 20'

Sheet No.: 17-150

CKM Project No.: 17-150

Owner's Project No.: N/A

C-3.1