FOR PIPE OPENINGS

	PIPE SIZES							
	12"	15"	18"	24"	30"	36"	42"	48"
CUBIC YARDS CONCRETE TO DEDUCT	0.03	0.04	0.06	0.11	0.16	0.23	0.31	0.40
ADDITIONAL STEEL REQUIRED FOR PIPE OPENING								
WIDTH OF WALL REQUIRED FOR PIPE			3'-0"	3'-6"	4'-0"	4'-6"	5'-0"	
LENGTH OF #6 BAR REQUIRED			4'-0"	4'-6"	5'-0"	5'-6"	6'-0"	
WEIGHT OF BAR LBS.			6.0	6.8	7.5	8.3	9.0	

NOTE:
CONCRETE QUANTITIES IN TABLE INCLUDE INVERT. THE QUANTITY OF STEEL FOR 3" OF "D" IS NOT $\frac{1}{4}$ OF THAT FOR 1 FOOT OF "D", NEITHER IS THE QUANTITY FOR 6" OF "D" EQUAL TO $\frac{1}{2}$ THAT FOR 1 FOOT OF "D". SO USE QUANTITY IN 1 FOOT COLUMN FOR FULL FEET AND IN 3" COLUMN FOR FRACTIONAL FEET.

QUANTITIES

SIZE (W)		TO AND INCLUDING 20' DEPTH				20' TO AND INCLUDING 30' DEPTH		
		D= 3'-3"	D= 4'-3"	ADD OR SUBTRACT FOR EACH		ADD OR SUBTRACT FOR EACH		ADDITIONAL STEEL IN BOTTOM DIFFERENCE IN #4 AND #6 BARS
				1 FT.	3 IN.	1 FT.	3 IN.	
3'-0" X 3'-0"	C	1.62	1.93	0.31	0.08	0.31	0.08	
	S	157.90	176.80	18.60	2.00	20.64	5.16	30.14
3'-0" X 3'-6"	C	1.77	2.11	0.33	0.08	0.33	0.08	
	S	173.80	194.60	20.60	2.30	23.12	5.78	34.85
3'-0" X 4'-0"	C	1.93	2.28	0.35	0.09	0.35	0.09	
	S	187.10	208.60	21.30	2.30	24.27	6.07	39.56
3'-0" X 4'-6"	C	2.16	2.53	0.38	0.09	0.38	0.09	
	S	211.20	234.70	23.30	2.70	26.75	6.69	44.26
3'-0" X 5'-0"	C	2.32	2.71	0.40	0.10	0.40	0.10	
	S	219.60	243.80	24.00	2.70	27.90	6.97	48.97
3'-6" X 3'-6"	C	1.94	2.29	0.35	0.09	0.35	0.09	
	S	192.40	215.10	22.70	2.70	25.60	6.40	40.27
3'-6" X 4'-0"	C	2.10	2.48	0.38	0.09	0.38	0.09	
	S	204.30	227.70	23.40	2.70	26.75	6.69	45.69
3'-6" X 4'-6"	C	2.35	2.75	0.40	0.10	0.40	0.10	
	S	230.00	255.50	25.30	3.00	29.23	7.31	51.11
3'-6" X 5'-0"	C	2.53	2.95	0.42	0.10	0.42	0.10	
	S	240.90	267.10	26.00	3.00	30.38	7.60	56.53
4'-0" X 4'-0"	C	2.28	2.68	0.40	0.10	0.40	0.10	
	S	216.70	240.80	24.10	2.70	27.90	6.97	51.83
4'-0" X 4'-6"	C	2.55	2.97	0.42	0.10	0.42	0.10	
	S	246.40	272.60	26.00	3.00	30.38	7.60	57.96
4'-0" X 5'-0"	C	2.74	3.18	0.44	0.11	0.44	0.11	
	S	255.60	282.50	26.70	3.00	31.53	7.88	64.10
4'-6" X 4'-6"	C	2.75	3.19	0.44	0.11	0.44	0.11	
	S	276.80	304.90	28.00	3.30	32.86	8.22	64.81
4'-6" X 5'-0"	C	2.94	3.41	0.46	0.12	0.46	0.12	
	S	289.40	318.20	28.70	3.30	34.01	8.50	71.66
5'-0" X 5'-0"	C	3.15	3.64	0.48	0.12	0.48	0.12	
	S	299.80	329.30	29.40	3.30	35.16	8.79	79.23

TO AND INCLUDING 20-FOOT DEPTH

NOTE:
TO COMPUTE THE QUANTITIES FOR DEPTHS ("D") NOT SHOWN, REFER TO TABLE FOR THE SIZE OF MANHOLE REQUIRED. SUBTRACT THE "D" VALUE FROM THE TABLE AND THE "D" VALUE FROM THE PLANS. MULTIPLY THE VALUES SHOWN IN THE 1-FOOT COLUMN FROM THE TABLE WITH THE FULL ONE FOOT INCREMENTS FROM THE DIFFERENCE BETWEEN THE "D" FROM THE PLANS AND THE "D" FROM THE TABLE. MULTIPLY THE VALUES SHOWN IN THE 3" COLUMN FROM THE TABLE WITH THE REMAINING FRACTIONAL FOOT VALUES PER 3" INCREMENTS. FOLLOW THIS SAME PROCESS FOR THE STEEL CALCULATIONS. SEE THE EXPAMPLE BELOW:

FOR EXAMPLE: QUANTITIES FOR 3'-0" X 4'-0" MANHOLE WITH 6'-9" "D" HAVING ONE 18", ONE 24" AND ONE 36" PIPE OPENINGS ARE DETERMINED AS FOLLOWS:
"D" REQUIRED = 6'-9"
"D" GIVEN IN TABLE = 4'-3"
"D" ADDITIONAL = 2'-6"

2.76	CONCRETE	STEEL
FROM TABLE FOR 4'-3" "D"	2.28	208.6
ADD (2 X QUANTITIES FOR 1-FOOT)	0.70	42.6
ADD (6" = 2 X 3") (2 X QUANTITIES FOR 3")	0.18	255.8
SUBTOTAL	3.16	255.8
ADJUST QUANTITIES FOR THE PIPE OPENINGS (DEDUCT CONCRETE AND ADD STEEL FOR TWO 3' AND ONE 4' WALL)	-0.40	+19.5
TOTAL	2.76	275.3
USE	2.80	280.0

MORE THAN 20-FOOT TO AND INCLUDING 30-FOOT DEPTH

FIRST, COMPUTE QUANTITIES FOR 20-FOOT DEPTH FROM THE TABLE "TO AND INCLUDING 20-FOOT DEPTHS".

FOR EXAMPLE: QUANTITIES FOR 3'-0" X 4'-0" MANHOLE WITH 20'-0", "D" HAVING ONE 18", ONE 24" AND ONE 36" PIPE OPENINGS ARE DETERMINED AS FOLLOWS:

"D" REQUIRED = 20'-0"
"D" GIVEN IN TABLE = 4'-3"
"D" ADDITIONAL = 15'-9"

	CONCRETE	STEEL
FROM TABLE FOR 4'-3" "D"	2.28	208.6
ADD (15 X QUANTITIES FOR 1-FOOT)	5.25	319.9
ADD (9" = 3 X 3") (3 X QUANTITIES FOR 3")	0.27	6.9
SUBTOTAL	7.80	535.0
ADJUST QUANTITIES FOR THE PIPE OPENINGS (DEDUCT CONCRETE AND ADD STEEL FOR TWO 3' AND ONE 4' WALL)	-0.40	+19.5
TOTAL	7.40	554.5

SECOND, COMPUTE QUANTITIES FOR THE DEPTHS BEYOND 20 FEET TO A MAXIMUM OF 30 FEET, USING THE TABLE "20-FOOT TO AND INCLUDING 30-FOOT DEPTH", AND ADD TO THE QUANTITIES FOR 20-FOOT DEPTH. ALSO, ADD THE DIFFERENCE IN STEEL IN THE BOTTOM DUE TO THE INCREASE IN SIZE OF BARS FROM #4 TO #6 BARS ON 7-INCH CENTERS.

FOR EXAMPLE:
"D" REQUIRED = 30'-0"
"D" COMPUTED = 20'-0"
"D" ADDITIONAL = 10'-0"

	CONCRETE	STEEL
ADD CONCRETE (10 X QUANTITIES FOR 1-FOOT)	3.50	
ADD STEEL (10 X QUANTITIES FOR 1-FOOT)	242.70	
ADD STEEL (ADDITIONAL STEEL IN BOTTOM)		39.56
TOTAL (30-FOOT DEPTH)	10.90	836.76
USE	10.9	840.0

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STATE OF MISSOURI
KATHRYN PHILLIPS HARVEY
NUMBER PE-23751
PROFESSIONAL ENGINEER
THIS SHEET HAS BEEN SIGNED, SEALED AND DATED ELECTRONICALLY.

CONCRETE MANHOLES

DATE EFFECTIVE: 02-01-2009
DATE PREPARED: 8/26/2009

604.30G

IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.