

9/4/2019 1:13:00 PM P:\StandDraw\DESIGN STANDARDS\Standards Library\Standard Roadway Drawings - CURRENT\In Progress\110.00 Pipe Culverts and Endwalls IP\DP9E-20190628.dgn

TYPICAL BARS FOR 2:1 SLOPE, STEEL PIPES ROUND INLET OR SIDE TAPERED INLET																								TYPICAL BARS FOR 2:1, STEEL PIPES ROUND INLET ONLY												TYPICAL BARS FOR 2:1, STEEL PIPES SIDE TAPERED INLET ONLY																											
PIPE SKEW	BARS F		BARS FB		BARS FC		BARS WXL		BARS WXS		SERIES BARS WYL (2 REQ'D)				SERIES BARS WYS (1 REQ'D)				2 BARS WZL		2 BARS WZS		SERIES BARS WL (1 REQ'D)				SERIES BARS WS (1 REQ'D)				SERIES BARS WLA (1 REQ'D)				SERIES BARS WSA (1 REQ'D)				SERIES BARS FA (1 REQ'D)				BARS FD		SERIES BARS FA (1 REQ'D)				BARS FD		2 BARS TA												
	T.L.	N.R.	T.L.	N.R.	T.L.	N.R.	T.L.	N.R.	T.L.	N.R.	A	B	C	X	T.L.	A	B	C	X	T.L.	A	B	C	X	T.L.	A	B	C	X	T.L.	A	B	C	X	T.L.	A	B	C	X	T.L.	N.R.	W	T	A	B	C	X	T.L.	N.R.	W	A	B	T.L.										
15°	45°	35"	4	19"	4	25"	7	35"	4	110"	4	110"	110"	0"	1	110"	13"	13"	0"	1	13"	52"	36"	24"	17"	3"	4	106"	24"	17"	4 1/2"	3	711"	24"	17"	4 1/2"	3	511"	69"	43"	10"	4	220"	39"	4	59"	81"	75"	411"	10"	4	248"	39"	5	66"	24 1/2"	19"	81"					
	60°	27"	4	19"	4	25"	7	27"	4	110"	4	16"	16"	0"	1	16"	13"	13"	0"	1	13"	44"	36"	24"	17"	3"	4	106"	24"	17"	4 1/2"	3	711"	24"	17"	4 1/2"	3	511"	68"	42"	10"	4	218"	39"	4	59"	81"	74"	410"	10"	4	244"	39"	5	66"	24 1/2"	19"	81"					
	75°	25"	4	110"	4	25"	7	26"	4	111"	4	14"	14"	0"	1	14"	12"	12"	0"	1	12"	43"	36"	24"	17"	4 1/2"	3	711"	24"	17"	4 1/2"	3	511"	67"	41"	10"	4	214"	39"	4	59"	81"	73"	49"	10"	4	240"	39"	5	66"	24 1/2"	19"	81"										
	90°	21"	4	21"	4	25"	7	22"	4	22"	4	12"	12"	0"	1	12"	12"	12"	0"	1	12"	310"	310"	24"	17"	4 1/2"	3	711"	24"	17"	4 1/2"	3	511"	66"	40"	10"	4	210"	39"	4	59"	81"	72"	48"	10"	4	238"	39"	5	66"	24 1/2"	19"	81"										
18°	45°	45"	4	23"	4	25"	8	46"	4	34"	4	24"	24"	0"	1	24"	19"	19"	0"	1	19"	62"	50"	27"	17"	3"	5	139"	27"	17"	4"	4	110"	27"	17"	3"	5	105"	27"	17"	4"	4	84"	70"	46"	10"	4	230"	39"	4	60"	81"	79"	53"	10"	4	260"	39"	5	69"	29"	20"	91"
	60°	33"	4	23"	4	25"	7	34"	4	24"	4	18"	18"	0"	1	18"	12"	12"	0"	1	12"	50"	40"	27"	17"	4"	4	110"	27"	17"	6"	3	83"	27"	17"	4"	4	84"	27"	17"	6"	3	63"	611"	45"	10"	4	228"	39"	4	60"	81"	78"	52"	10"	4	258"	39"	5	69"	29"	20"	91"
	75°	31"	4	25"	4	25"	7	31"	4	25"	4	16"	16"	0"	1	16"	13"	13"	0"	1	13"	49"	41"	27"	17"	4"	4	110"	27"	17"	6"	3	83"	27"	17"	4"	4	84"	27"	17"	6"	3	63"	610"	44"	10"	4	224"	39"	4	60"	81"	77"	51"	10"	4	254"	39"	4	69"	29"	20"	91"
	90°	29"	4	29"	4	25"	6	29"	4	29"	4	15"	15"	0"	1	15"	15"	15"	0"	1	15"	45"	45"	27"	17"	6"	3	83"	27"	17"	6"	3	83"	27"	17"	6"	3	63"	69"	43"	10"	4	220"	39"	4	60"	81"	76"	50"	10"	4	250"	39"	4	69"	29"	20"	91"					
24°	45°	45"	4	23"	4	25"	9	46"	6	24"	6	30"	30"	0"	1	30"	24"	24"	0"	1	24"	62"	40"	32"	22"	3"	5	168"	32"	22"	6"	3	100"	32"	22"	3"	5	134"	32"	22"	6"	3	80"	76"	46"	10"	4	240"	39"	4	66"	81"	86"	56"	10"	4	280"	39"	5	76"	36"	26"	111"
	60°	34"	4	23"	4	25"	7	33"	6	23"	6	23"	23"	0"	1	23"	110"	110"	0"	1	110"	50"	40"	32"	22"	4"	4	134"	32"	22"	6"	3	100"	32"	22"	4"	4	108"	32"	22"	6"	3	80"	76"	46"	10"	4	240"	39"	4	66"	81"	86"	56"	10"	4	280"	39"	5	76"	36"	26"	111"
	75°	32"	4	25"	4	25"	7	32"	6	25"	6	26"	26"	0"	1	26"	20"	20"	0"	1	20"	410"	41"	32"	22"	4"	4	134"	32"	22"	6"	3	100"	32"	22"	4"	4	108"	32"	22"	6"	3	80"	76"	46"	10"	4	240"	39"	4	66"	81"	86"	56"	10"	4	280"	39"	5	76"	36"	26"	111"
	90°	29"	4	29"	4	25"	6	210"	4	210"	4	24"	24"	0"	1	24"	24"	24"	0"	1	24"	45"	45"	32"	22"	6"	3	100"	32"	22"	6"	3	100"	32"	22"	6"	3	80"	76"	46"	10"	4	240"	39"	4	66"	81"	86"	56"	10"	4	280"	39"	5	76"	36"	26"	111"					
30°	45°	71"	4	38"	4	25"	13	65"	6	33"	6	30"	30"	0"	1	30"	20"	20"	0"	1	20"	710"	48"	22"	38"	3"	7	251"	22"	38"	6"	4	144"	22"	38"	3"	7	205"	22"	38"	6"	4	118"	710"	54"	10"	4	264"	39"	6	70"	105"	91"	67"	10"	4	314"	39"	6	83"	43"	30"	131"
	60°	55"	4	38"	4	25"	13	48"	6	33"	6	26"	26"	0"	1	26"	20"	20"	0"	1	20"	59"	45"	22"	38"	4"	6	216"	22"	38"	6"	4	144"	22"	38"	4"	6	176"	22"	38"	6"	4	118"	711"	55"	10"	4	268"	39"	6	70"	105"	92"	68"	10"	4	318"	39"	6	83"	43"	30"	131"
	75°	47"	4	311"	4	25"	11	47"	6	36"	6	26"	26"	0"	1	26"	20"	20"	0"	1	20"	57"	43"	22"	38"	4"	6	216"	22"	38"	6"	4	144"	22"	38"	4"	6	176"	22"	38"	6"	4	118"	76"	52"	10"	4	254"	39"	6	610"	105"	89"	65"	10"	4	304"	39"	6	83"	43"	30"	131"
	90°	45"	4	45"	4	25"	11	40"	6	40"	6	23"	23"	0"	1	23"	23"	23"	0"	1	23"	50"	50"	22"	38"	4 1/2"	5	1711"	22"	38"	4 1/2"	5	1711"	22"	38"	4 1/2"	5	147"	22"	38"	4 1/2"	5	147"	77"	51"	10"	4	254"	39"	6	610"	105"	810"	64"	10"	4	304"	39"	6	83"	43"	30"	131"
36°	45°	71"	4	38"	4	25"	13	65"	6	33"	6	30"	30"	0"	1	30"	20"	20"	0"	1	20"	710"	48"	28"	42"	3"	7	287"	28"	42"	6"	4	164"	22"	42"	3"	7	2311"	28"	42"	6"	4	138"	84"	510"	10"	4	284"	39"	6	76"	120"	910"	74"	10"	4	344"	39"	7	90"	50"	36"	151"
	60°	55"	4	38"	4	25"	12	48"	6	33"	6	30"	30"	0"	1	30"	20"	20"	0"	1	20"	511"	48"	28"	42"	4"	6	246"	28"	42"	6"	4	164"	28"	42"	4"	6	206"	28"	42"	6"	4	138"	85"	511"	10"	4	288"	39"	6	76"	120"	911"	75"	10"	4	348"	39"	7	90"	50"	36"	151"
	75°	47"	4	311"	4	25"	11	47"	6	36"	6	33"	33"	0"	1	33"	23"	23"	0"	1	23"	60"	411"	28"	42"	4"	6	246"	28"	42"	6"	4	164"	28"	42"	4"	6	206"	28"	42"	6"	4	138"	82"	58"	10"	4	278"	39"	6	74"	120"	98"	72"	10"	4	338"	39"	7	90"	50"	36"	151"
	90°	45"	4	45"	4	25"	11	40"	6	40"	6	30"	30"	0"	1	30"	30"	30"	0"	1	30"	55"	55"	28"	42"	4 1/2"	5	205"	28"	42"	4 1/2"	5	205"	28"	42"	4 1/2"	5	171"	28"	42"	4 1/2"	5	171"	81"	57"	10"	4	274"	39"	6	74"	120"	97"	71"	10"	4	334"	39"	7	90"	50"	36"	151"
42°	45°	81"	4	49"	4	25"	15	85"	6	43"	6	50"	50"	0"	1	50"	30"	30"	0"	1	30"	100"	60"	28"	48"	3"	9	330"	28"	48"	6"	5	218"	28"	48"	3"	9	330"	28"	48"	6"	5	184"	810"	64"	10"	4	304"	39"	7	80"	137"	107"	81"	10"	4	374"	39"	8	99"	59"	40"	171"
	60°	68"	4	48"	4	25"	14	61"	6	43"	6	43"	43"	0"	1	43"	30"	30"	0"	1	30"	76"	58"	28"	48"	4"	7	304"	28"	48"	6"	5	218"	28"	48"	4"	7	258"	28"	48"	6"	5	184"	811"	65"	10"	4	308"	39"	6	80"	137"	108"	82"	10"	4	378"	39"	8	99"	59"	40"	171"
	75°	66"	4	411"	4	25"	14	60"	6	47"	6	43"	43"	0"	1	43"	30"	30"	0"	1	30"	74"	60"	28"	48"	4"	7	304"	28"	48"	6"	5	218"	28"	48"	4"	7	258"	28"	48"	6"	5	184"	88"	62"	10"	4	298"	39"	6	711"	137"	105"	711"	10"	4	368"	39"	8	99"	59"	40"	