


APPROVED BY:  DATE: 6/22/2023
ERIC J. WENGER, P.E.
CITY ENGINEER

THESE STANDARD DRAWINGS AND ASSOCIATED CALCULATIONS HAVE BEEN PREPARED BY CEC CORPORATION UNDER CONTRACT WITH THE CITY OF OKLAHOMA CITY.

SINGLE CELL BARRELS

CELL HEIGHT	4' SPAN	5' SPAN	6' SPAN	7' SPAN	8' SPAN	9' SPAN	10' SPAN	11' SPAN	12' SPAN
3'	RCB-003 BarrelSgl4',5'&6'Spans	RCB-003 BarrelSgl4',5'&6'Spans	RCB-003 BarrelSgl4',5'&6'Spans	RCB-004 BarrelSgl7'&8'Spans	RCB-004 BarrelSgl7'&8'Spans	RCB-005 BarrelSgl9'&10'Spans	RCB-005 BarrelSgl9'&10'Spans	RCB-006 BarrelSgl11'&12'Spans	
4'	RCB-003 BarrelSgl4',5'&6'Spans	RCB-003 BarrelSgl4',5'&6'Spans	RCB-003 BarrelSgl4',5'&6'Spans	RCB-004 BarrelSgl7'&8'Spans	RCB-004 BarrelSgl7'&8'Spans	RCB-005 BarrelSgl9'&10'Spans	RCB-005 BarrelSgl9'&10'Spans	RCB-006 BarrelSgl11'&12'Spans	
5'		RCB-003 BarrelSgl4',5'&6'Spans	RCB-003 BarrelSgl4',5'&6'Spans	RCB-004 BarrelSgl7'&8'Spans	RCB-004 BarrelSgl7'&8'Spans	RCB-005 BarrelSgl9'&10'Spans	RCB-005 BarrelSgl9'&10'Spans	RCB-006 BarrelSgl11'&12'Spans	RCB-006 BarrelSgl11'&12'Spans
6'			RCB-003 BarrelSgl4',5'&6'Spans	RCB-004 BarrelSgl7'&8'Spans	RCB-004 BarrelSgl7'&8'Spans	RCB-005 BarrelSgl9'&10'Spans	RCB-005 BarrelSgl9'&10'Spans	RCB-006 BarrelSgl11'&12'Spans	RCB-006 BarrelSgl11'&12'Spans
7'				RCB-004 BarrelSgl7'&8'Spans	RCB-004 BarrelSgl7'&8'Spans	RCB-005 BarrelSgl9'&10'Spans	RCB-005 BarrelSgl9'&10'Spans	RCB-006 BarrelSgl11'&12'Spans	RCB-006 BarrelSgl11'&12'Spans
8'					RCB-004 BarrelSgl7'&8'Spans	RCB-005 BarrelSgl9'&10'Spans	RCB-005 BarrelSgl9'&10'Spans	RCB-006 BarrelSgl11'&12'Spans	RCB-006 BarrelSgl11'&12'Spans
9'						RCB-005 BarrelSgl9'&10'Spans	RCB-005 BarrelSgl9'&10'Spans	RCB-006 BarrelSgl11'&12'Spans	RCB-006 BarrelSgl11'&12'Spans
10'							RCB-005 BarrelSgl9'&10'Spans	RCB-006 BarrelSgl11'&12'Spans	RCB-006 BarrelSgl11'&12'Spans
11'								RCB-006 BarrelSgl11'&12'Spans	RCB-006 BarrelSgl11'&12'Spans
12'									RCB-006 BarrelSgl11'&12'Spans

DOUBLE CELL BARRELS

CELL HEIGHT	4' SPAN	5' SPAN	6' SPAN	7' SPAN	8' SPAN	9' SPAN	10' SPAN	11' SPAN	12' SPAN
3'		RCB-007 BarrelDb15'&6'Spans	RCB-007 BarrelDb15'&6'Spans	RCB-008 BarrelDb17'&8'Spans	RCB-008 BarrelDb17'&8'Spans	RCB-009 BarrelDb19'&10'Spans	RCB-009 BarrelDb19'&10'Spans	RCB-010 BarrelDb11'&12'Spans	
4'		RCB-007 BarrelDb15'&6'Spans	RCB-007 BarrelDb15'&6'Spans	RCB-008 BarrelDb17'&8'Spans	RCB-008 BarrelDb17'&8'Spans	RCB-009 BarrelDb19'&10'Spans	RCB-009 BarrelDb19'&10'Spans	RCB-010 BarrelDb11'&12'Spans	
5'		RCB-007 BarrelDb15'&6'Spans	RCB-007 BarrelDb15'&6'Spans	RCB-008 BarrelDb17'&8'Spans	RCB-008 BarrelDb17'&8'Spans	RCB-009 BarrelDb19'&10'Spans	RCB-009 BarrelDb19'&10'Spans	RCB-010 BarrelDb11'&12'Spans	RCB-010 BarrelDb11'&12'Spans
6'			RCB-007 BarrelDb15'&6'Spans	RCB-008 BarrelDb17'&8'Spans	RCB-008 BarrelDb17'&8'Spans	RCB-009 BarrelDb19'&10'Spans	RCB-009 BarrelDb19'&10'Spans	RCB-010 BarrelDb11'&12'Spans	RCB-010 BarrelDb11'&12'Spans
7'				RCB-008 BarrelDb17'&8'Spans	RCB-008 BarrelDb17'&8'Spans	RCB-009 BarrelDb19'&10'Spans	RCB-009 BarrelDb19'&10'Spans	RCB-010 BarrelDb11'&12'Spans	RCB-010 BarrelDb11'&12'Spans
8'					RCB-008 BarrelDb17'&8'Spans	RCB-009 BarrelDb19'&10'Spans	RCB-009 BarrelDb19'&10'Spans	RCB-010 BarrelDb11'&12'Spans	RCB-010 BarrelDb11'&12'Spans
9'						RCB-009 BarrelDb19'&10'Spans	RCB-009 BarrelDb19'&10'Spans	RCB-010 BarrelDb11'&12'Spans	RCB-010 BarrelDb11'&12'Spans
10'							RCB-009 BarrelDb19'&10'Spans	RCB-010 BarrelDb11'&12'Spans	RCB-010 BarrelDb11'&12'Spans
11'								RCB-010 BarrelDb11'&12'Spans	RCB-010 BarrelDb11'&12'Spans
12'									RCB-010 BarrelDb11'&12'Spans

TRIPLE CELL BARRELS

CELL HEIGHT	4' SPAN	5' SPAN	6' SPAN	7' SPAN	8' SPAN	9' SPAN	10' SPAN	11' SPAN	12' SPAN
3'	RCB-011 BarrelTpl4'&5'Spans	RCB-011 BarrelTpl4'&5'Spans	RCB-012 BarrelTpl6',7'&8'Spans	RCB-012 BarrelTpl6',7'&8'Spans	RCB-012 BarrelTpl6',7'&8'Spans	RCB-013 BarrelTpl9'&10'Spans	RCB-013 BarrelTpl9'&10'Spans	RCB-014 BarrelTpl11'&12'Spans	
4'	RCB-011 BarrelTpl4'&5'Spans	RCB-011 BarrelTpl4'&5'Spans	RCB-012 BarrelTpl6',7'&8'Spans	RCB-012 BarrelTpl6',7'&8'Spans	RCB-012 BarrelTpl6',7'&8'Spans	RCB-013 BarrelTpl9'&10'Spans	RCB-013 BarrelTpl9'&10'Spans	RCB-014 BarrelTpl11'&12'Spans	
5'		RCB-011 BarrelTpl4'&5'Spans	RCB-012 BarrelTpl6',7'&8'Spans	RCB-012 BarrelTpl6',7'&8'Spans	RCB-012 BarrelTpl6',7'&8'Spans	RCB-013 BarrelTpl9'&10'Spans	RCB-013 BarrelTpl9'&10'Spans	RCB-014 BarrelTpl11'&12'Spans	RCB-014 BarrelTpl11'&12'Spans
6'			RCB-012 BarrelTpl6',7'&8'Spans	RCB-012 BarrelTpl6',7'&8'Spans	RCB-012 BarrelTpl6',7'&8'Spans	RCB-013 BarrelTpl9'&10'Spans	RCB-013 BarrelTpl9'&10'Spans	RCB-014 BarrelTpl11'&12'Spans	RCB-014 BarrelTpl11'&12'Spans
7'				RCB-012 BarrelTpl6',7'&8'Spans	RCB-012 BarrelTpl6',7'&8'Spans	RCB-013 BarrelTpl9'&10'Spans	RCB-013 BarrelTpl9'&10'Spans	RCB-014 BarrelTpl11'&12'Spans	RCB-014 BarrelTpl11'&12'Spans
8'					RCB-012 BarrelTpl6',7'&8'Spans	RCB-013 BarrelTpl9'&10'Spans	RCB-013 BarrelTpl9'&10'Spans	RCB-014 BarrelTpl11'&12'Spans	RCB-014 BarrelTpl11'&12'Spans
9'						RCB-013 BarrelTpl9'&10'Spans	RCB-013 BarrelTpl9'&10'Spans	RCB-014 BarrelTpl11'&12'Spans	RCB-014 BarrelTpl11'&12'Spans
10'							RCB-013 BarrelTpl9'&10'Spans	RCB-014 BarrelTpl11'&12'Spans	RCB-014 BarrelTpl11'&12'Spans
11'								RCB-014 BarrelTpl11'&12'Spans	RCB-014 BarrelTpl11'&12'Spans
12'									RCB-014 BarrelTpl11'&12'Spans

DESIGN DATA

CLASS AA CONCRETE $f_c = 4$ K.S.I.
 REINFORCING STEEL $f_y = 60$ K.S.I.
 LOADING -
 HL-93 LOADING OR OKLAHOMA DEPARTMENT OF TRANSPORTATION OVERLOAD TRUCK
 H-20 TRUCK
 HS-20 TRUCK
 TYPE 3-3 (SPECIAL HAULING VEHICLE)
 EV3 (TANDEM REAR AXLE EMERGENCY VEHICLE)
 SHV NRL (SPECIAL HAULING VEHICLE NOTIONAL RATING LOAD)
 ALL LOAD VEHICLES LISTED, EXCEPT HL-93 AND OKLAHOMA DEPARTMENT OF TRANSPORTATION OVERLOAD TRUCK, WERE ANALYZED USING LOAD FACTOR DESIGN (LFD).
 DESIGN -
 AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 9TH EDITION
 AASHTO MANUAL FOR BRIDGE EVALUATION, 3RD EDITION, 2018, WITH 2019 INTERIM REVISIONS

STANDARD SPECIFICATIONS

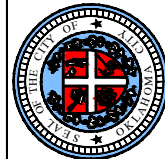
THE CONSTRUCTION METHODS AND MATERIALS SHALL COMPLY WITH THE REQUIREMENTS OF THE CURRENT CITY OF OKLAHOMA CITY STANDARD SPECIFICATIONS, EXCEPT AS MODIFIED BY THE PLANS AND SPECIAL PROVISIONS.

GUIDELINES FOR USING R.C.B. CULVERT STANDARDS ①

- DETERMINE REQUIRED WATERWAY OPENING BY HYDRAULIC ANALYSIS.
- ALL BARRELS ARE DESIGNED FOR 2' TO 10' FILL.
- END SECTIONS ARE DESIGNED FOR BARRELS AT 0° AND 30° SKEW. IF REQUIRED, THE R.C.B. CULVERT CAN HAVE INLET AND OUTLET END SECTIONS WITH DIFFERING SKEWS.
- STANDARDS REQUIRED ARE LISTED IN REFERENCE GUIDE SCHEDULES. ALL STANDARDS IN THE BOX AT THE INTERSECTION OF THE APPLICABLE ROW AND COLUMN WILL BE REQUIRED. STANDARDS ARE DESIGNATED BY SHEET NUMBER FOLLOWED BY A SHORT DESCRIPTION OF SHEET. ②
 USE THE REFERENCE GUIDE SCHEDULES AS FOLLOWS:
 - BARREL ON STD. RCB-001 RefGuide-1
 KNOWING NUMBER OF BARREL CELLS, CELL SPAN AND CELL HEIGHT, CHOOSE SINGLE, DOUBLE OR TRIPLE CELL SCHEDULE, SPAN COLUMN AND CELL HEIGHT ROW TO GET STANDARDS REQUIRED.
 - END SECTION ON STD. RCB-002 RefGuide-2
 KNOWING SKEW ANGLE OF END SECTION, NUMBER OF BARREL CELLS, CELL SPAN AND CELL HEIGHT, CHOOSE CELL COLUMN AND CELL HEIGHT ROW TO GET STANDARDS REQUIRED.
 USE STD. RCB-015 PipeRailing FOR HANDRAIL REQUIRED ON TOP OF HEADWALL AND WINGS.
 - CURTAIN WALL ON STD. RCB-002 RefGuide-2
 KNOWING SKEW ANGLE OF END SECTION, NUMBER OF BARREL CELLS, CELL SPAN AND CELL HEIGHT, CHOOSE CELL COLUMN AND WALL DEPTH ROW TO GET STANDARDS REQUIRED.
- SEE QUANTITY CALCULATION ON STD. RCB-002 RefGuide-2 FOR GUIDELINES FOR DETERMINING BARREL LENGTH, R.C.B. CULVERT LENGTH, AND CONCRETE AND REINFORCING STEEL QUANTITIES.

- REQUIRES THE FOLLOWING STANDARDS:
 RCB-001 RefGuide-1
 RCB-002 RefGuide-2
- TERMS USED IN SHEET DESCRIPTION:
 Sgl REFERS TO SINGLE CELL
 Db1 REFERS TO DOUBLE CELL
 Tpl REFERS TO TRIPLE CELL
 Spans REFERS TO CELL SPANS
 Ht REFERS TO CELL HEIGHT

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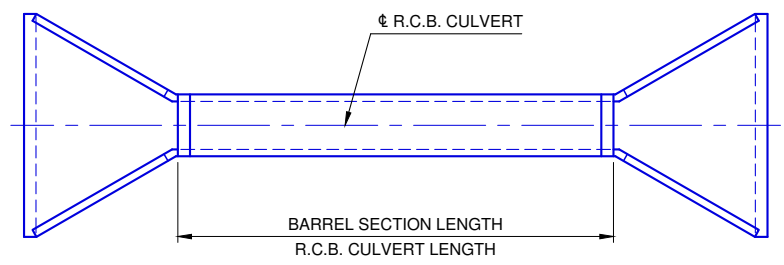


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CITY ENGINEER

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0 DEGREE SKEW END SECTIONS			
CELL HEIGHT	SINGLE CELL R.C.B.	DOUBLE CELL R.C.B.	TRIPLE CELL R.C.B.
3'	RCB-016 EndSecSgl3'H0Skew-1 RCB-017 EndSecSgl3'H0Skew-2 RCB-015 PipeRailing	RCB-040 EndSecDb3'H0Skew-1 RCB-041 EndSecDb3'H0Skew-2 RCB-015 PipeRailing	RCB-064 EndSecTpl3'H0Skew-1 RCB-065 EndSecTpl3'H0Skew-2 RCB-015 PipeRailing
4'	RCB-018 EndSecSgl4'H0Skew-1 RCB-019 EndSecSgl4'H0Skew-2 RCB-015 PipeRailing	RCB-042 EndSecDb4'H0Skew-1 RCB-043 EndSecDb4'H0Skew-2 RCB-015 PipeRailing	RCB-066 EndSecTpl4'H0Skew-1 RCB-067 EndSecTpl4'H0Skew-2 RCB-015 PipeRailing
5'	RCB-020 EndSecSgl5'H0Skew-1 RCB-021 EndSecSgl5'H0Skew-2 RCB-015 PipeRailing	RCB-044 EndSecDb5'H0Skew-1 RCB-045 EndSecDb5'H0Skew-2 RCB-015 PipeRailing	RCB-068 EndSecTpl5'H0Skew-1 RCB-069 EndSecTpl5'H0Skew-2 RCB-015 PipeRailing
6'	RCB-022 EndSecSgl6'H0Skew-1 RCB-023 EndSecSgl6'H0Skew-2 RCB-015 PipeRailing	RCB-046 EndSecDb6'H0Skew-1 RCB-047 EndSecDb6'H0Skew-2 RCB-015 PipeRailing	RCB-070 EndSecTpl6'H0Skew-1 RCB-071 EndSecTpl6'H0Skew-2 RCB-015 PipeRailing
7'	RCB-024 EndSecSgl7'H0Skew-1 RCB-025 EndSecSgl7'H0Skew-2 RCB-015 PipeRailing	RCB-048 EndSecDb7'H0Skew-1 RCB-049 EndSecDb7'H0Skew-2 RCB-015 PipeRailing	RCB-072 EndSecTpl7'H0Skew-1 RCB-073 EndSecTpl7'H0Skew-2 RCB-015 PipeRailing
8'	RCB-026 EndSecSgl8'H0Skew-1 RCB-027 EndSecSgl8'H0Skew-2 RCB-015 PipeRailing	RCB-050 EndSecDb8'H0Skew-1 RCB-051 EndSecDb8'H0Skew-2 RCB-015 PipeRailing	RCB-074 EndSecTpl8'H0Skew-1 RCB-075 EndSecTpl8'H0Skew-2 RCB-015 PipeRailing
9'	RCB-028 EndSecSgl9'H0Skew-1 RCB-029 EndSecSgl9'H0Skew-2 RCB-015 PipeRailing	RCB-052 EndSecDb9'H0Skew-1 RCB-053 EndSecDb9'H0Skew-2 RCB-015 PipeRailing	RCB-076 EndSecTpl9'H0Skew-1 RCB-077 EndSecTpl9'H0Skew-2 RCB-015 PipeRailing
10'	RCB-030 EndSecSgl10'H0Skew-1 RCB-031 EndSecSgl10'H0Skew-2 RCB-015 PipeRailing	RCB-054 EndSecDb10'H0Skew-1 RCB-055 EndSecDb10'H0Skew-2 RCB-015 PipeRailing	RCB-078 EndSecTpl10'H0Skew-1 RCB-079 EndSecTpl10'H0Skew-2 RCB-015 PipeRailing
11'	RCB-032 EndSecSgl11'H0Skew-1 RCB-033 EndSecSgl11'H0Skew-2 RCB-015 PipeRailing	RCB-056 EndSecDb11'H0Skew-1 RCB-057 EndSecDb11'H0Skew-2 RCB-015 PipeRailing	RCB-080 EndSecTpl11'H0Skew-1 RCB-081 EndSecTpl11'H0Skew-2 RCB-015 PipeRailing
12'	RCB-034 EndSecSgl12'H0Skew-1 RCB-035 EndSecSgl12'H0Skew-2 RCB-015 PipeRailing	RCB-058 EndSecDb12'H0Skew-1 RCB-059 EndSecDb12'H0Skew-2 RCB-015 PipeRailing	RCB-082 EndSecTpl12'H0Skew-1 RCB-083 EndSecTpl12'H0Skew-2 RCB-015 PipeRailing

0 DEGREE SKEW CURTAIN WALLS			
WALL DEPTH	SINGLE CELL R.C.B.	DOUBLE CELL R.C.B.	TRIPLE CELL R.C.B.
3'	RCB-036 3'CurtainWallSglCell0Skew	RCB-060 3'CurtainWallDbCell0Skew	RCB-084 3'CurtainWallTplCell0Skew
4'	RCB-037 4'CurtainWallSglCell0Skew	RCB-061 4'CurtainWallDbCell0Skew	RCB-085 4'CurtainWallTplCell0Skew
5'	RCB-038 5'CurtainWallSglCell0Skew	RCB-062 5'CurtainWallDbCell0Skew	RCB-086 5'CurtainWallTplCell0Skew
6'	RCB-039 6'CurtainWallSglCell0Skew	RCB-063 6'CurtainWallDbCell0Skew	RCB-087 6'CurtainWallTplCell0Skew



0° SKEW QUANTITY CALCULATION

BARREL SECTION LENGTH IS FROM OUTSIDE HEADWALL TO OUTSIDE HEADWALL
 CONCRETE AND REINFORCING STEEL QUANTITIES FROM BARREL DETAIL SHEETS
 MULTIPLIED BY THE BARREL SECTION LENGTH TO CALCULATE BARREL QUANTITIES
 CONCRETE AND REINFORCING STEEL QUANTITIES ARE GIVEN ON THE END SECTION
 DETAIL SHEET FOR ONE END SECTION
 CONCRETE AND REINFORCING STEEL QUANTITIES ARE GIVEN ON THE CURTAIN
 WALL DETAIL SHEET FOR ONE CURTAIN WALL
 FOR TOTAL QUANTITIES FOR ONE R.C.B. CULVERT, COMBINE BARREL QUANTITIES
 WITH ONE OR TWO END SECTION QUANTITIES AND CURTAIN WALL QUANTITIES

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Drawing Number
RCB-002