OKLAHOMA DEPARTMENT OF TRANSPORTATION ROADWAY DESIGN STANDARD DRAWINGS For use with the 2019 ODOT Standard Specifications and effective March 3, 2025

	SHEET NO.	DESCRIPTION	STANDARD	REV. NO.
	R-1	BEST MANAGEMENT PRACTICE REFERENCE MATRIX	BMPR-	0
	R-2	TYPICAL TEMPORARY EROSION / SEDIMENT CONTROL APPLICATIONS	TESCA-	0
	R-3	EROSION CONTROL / TURF REINFORCEMENT MAT INSTALLATION (1 OF 2 SHEETS)	ECTRM1-	0
Ŀ	R-4	EROSION CONTROL / TURF REINFORCEMENT MAT INSTALLATION (2 OF 2 SHEETS)	ECTRM2-	0
RC	R-5	INLET PROTECTION (AGGREGATE AND REINFORCED SILT FENCE APPLICATIONS)	IPD-	0
NT	R-6	REINFORCED SILT FENCE INSTALLATION AND APPLICATIONS	RSF-	0
CO	R-7	TEMPORARY SILT DIKE APPLICATIONS	TSD-	0
N	R-8	TEMPORARY FIBER LOG APPLICATIONS	TFL-	0
SIC	R-9	TEMPORARY ROCK FILTER DAM APPLICATIONS	TRFD-	0
RO	R-10	TEMPORARY SEDIMENT BASIN	TSB-	0
E	R-11	STABILIZED CONSTRUCTION EXIT	SCE-	0
	R-12	TEMPORARY SLOPE DRAIN	SD-	0
	R-13	CONCRETE WASHOUT APPLICATIONS	CWA-	0
	R-14	SOLID SLAB SODDING	SSS-2-	1
	R-15	ASPHALT SURFACING CONSTRUCTION DETAILS	ASCD-6-	1
	R-16	CONCRETE SURFACING CONSTRUCTION DETAILS	CSCD-6-	2
	R-17	JOINTS AND SEALERS – LONGITUDINAL, EXPANSION / ISOLATION & CONTRACTION	LECS-5-	2
	R-18	LOAD TRANSFER UNITS FOR CONCRETE PAVEMENT JOINTS	LTU-5-	1
IS	R-19	CONTINUOUSLY REINFORCED CONCRETE PAVEMENT DETAILS	CRCP1-4-	1
EN,	R-20	CONTINUOUSLY REINFORCED CONCRETE PAVEMENT TERMINAL JOINTS	CRCP2-4-	1
IM	R-21	PAVEMENT RECONSTRUCTION DETAILS	PR-4-	1
VE	R-22	PORTLAND CEMENT CONCRETE PAVEMENT REPAIR	PCPR-4-	2
PA	R-23	PAVEMENT EDGE DRAIN	PED-4-	1
	R-24	PAVEMENT SAFETY EDGE	PSE-2-	1
	R-25	WHEELCHAIR RAMPS	WCR-4-	2
	R-26	TACTILE WARNING DEVICES	TWD-2-	2
	R-27	Reserved		
	R-28	PRECAST STANDARD MEDIAN DRAIN	PSMD-2-	2
	R-29	CAST-IN-PLACE STANDARD MEDIAN DRAINS (18" TO 36" PIPES)	SMD-4-	2
	R-30	CULVERT END TREATMENT SINGLE PIPE INSTALLATION 1 TO 4 SAFETY SLOPE	CET4S-4-	2
	R-31	CULVERT END TREATMENT SINGLE PIPE INSTALLATION 1 TO 6 SAFETY SLOPE	CET6S-4-	2
	R-32	CULVERT END TREATMENT DOUBLE PIPE INSTALLATION 1 TO 4 SAFETY SLOPE	CET4D-4-	2
	R-33	CULVERT END TREATMENT DOUBLE PIPE INSTALLATION 1 TO 6 SAFETY SLOPE	CET6D-4-	2
RES	R-34	PREFABRICATED CULVERT END SECTIONS	PCES-5-	1
UF	R-35	SLOPED CONCRETE END SECTIONS	SCES-4-	1
JCT	R-36	CAST-IN-PLACE CONCRETE DROP INLETS FOR R. C. BOXES (3' x 2' TO 6' x 6')	CDIB-2-	2
RL	R-37	CAST-IN-PLACE CONCRETE DROP INLETS FOR 30 DEG. SKEW R. C. BOXES (3' x 2' TO 6' x 6')	CDIB30-2-	2
ST	R-38	CAST-IN-PLACE CONCRETE DROP INLET FOR 18" TO 72" R. C. PIPES	CDIP-2-	2
GE	R-39	CAST-IN-PLACE CONCRETE DROP INLET FOR 30 DEG. SKEW 18" TO 72" R. C. PIPES	CDIP30-2-	2
ΝΨ	R-40	CAST-IN-PLACE GRATED PIPE DROP INLET (18" TO 42" PIPE)	GPI-5-	2
Aľ	R-41	STORM SEWER CONSTRUCTION DETAILS	SSCD-4-	1
DR	R-42	PRECAST CURB INLET (DESIGNS 1,2, AND 3)	PCI-1-	1
	R-43	Reserved		
	R-44	Reserved		
	R-45	CAST-IN-PLACE CURB INLETS	CI-2-	2
	R-46	STORM SEWER INLET FRAMES (CURB INLETS)	SSIF-5-	1
	R-47	CAST IRON GRATES (CURB INLETS)	CIG-4-	1
	R-48	MANHOLE FRAME AND COVER	MFC-5-	1

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	SHEET NO.	DESCRIPTION	STANDARD	REV. NO.
	R-49	CAST-IN-PLACE MANHOLES AND JUNCTION BOXES	MJB-4-	2
S	R-50	PRECAST ROUND MANHOLE	PRM-1-	2
CULVERT DRAINAGE NSTALLATION STRUCTURES	R-51	PRECAST SQUARE MANHOLE	PSM-1-	2
NA(TU	R-52	PRECAST MANHOLE DETAILS	PMD-1-	1
AD UC	R-53	Reserved		
DR	R-54	Reserved		
S]	R-55	Reserved		
	R-56	Reserved		
	R-57	CONCRETE CULVERT INSTALLATION (1 OF 2 SHEETS)	CCI-1-	0
7	R-58	CONCRETE CULVERT INSTALLATION (2 OF 2 SHEETS)	CCI-2-	0
CULVERT NSTALLATION	R-59	METAL CULVERT INSTALLATION (1 OF 3 SHEETS)	MCI-1-	0
	R-60	METAL CULVERT INSTALLATION (2 OF 3 SHEETS)	MCI-2-	0
	R-61	METAL CULVERT INSTALLATION (3 OF 3 SHEETS)	MCI-3-	0
	R-62	THERMOPLASTIC CULVERT INSTALLATION	TCI-1-	0
	R-63	PIPE BEDDING AND BACKFILL	PBB-1-	3
Ц	R-64	STANDARD BOX INSTALLATION	SBI-5-	2
	R-65	PIPE UNDERDRAIN INSTALLATION	PUD-4-	1
	R-66	CONCRETE LONGITUDINAL BARRIER (MASH F-SHAPE)	CLB-2-	2
	R-67	MAILBOX INSTALLATION	MI-4-	2
	R-68	RURAL DRIVEWAY INSTALLATION	RDI-4-	1
NN	R-69	PAVED DITCHES AND FLUMES	DC-4-	1
EO TIC	R-70	PAVEMENT DROP-OFF TREATMENTS	PDT-2-	3
.AN UC	R-71	RIGHT-OF-WAY FENCE STYLE WWF (WOVEN WIRE FENCE)	RWF1-3-	1
ELL	R-72	RIGHT-OF-WAY FENCE STYLE SWF (STRAND WIRE FENCE)	RWF2-3-	1
SCE	R-73	RIGHT-OF-WAY FENCE STYLE CLF (CHAIN LINK FENCE)	RWF3-3-	2
MI	R-74	SUPERELEVATION	SUEL1-4-	1
	R-75	SUPERELEVATION TABLES LOW SPEED URBAN STREETS	SUEL2-4-	1
	R-76	SUPERELEVATION TABLES (e max = 6%)	SUEL3-4-	1
	R-77	SUPERELEVATION TABLES (e max = 8%)	SUEL4-4-	1

CURRENT STANDARDS ARE AVAILABLE FOR DOWNLOAD OR PRINT FROM: https://oklahoma.gov/odot/business-center/pre-construction-design/roadway-design.html

FOR DISCONTINUED STANDARDS, QUESTIONS OR COMMENTS, CONTACT THE ROADWAY STANDARDS ENGINEER AT (405) 215-6408 OR BY EMAIL AT RDWYSTDS@ODOT.ORG

			BEST MANAGEME	INT PRACTICE REFE	ERENCE MATRIX
BEST MANAGEMENT PRACTICE (BMP)	STANDARD DRAWING NUMBER	PLAN SYMBOL	MATERIAL REFERENCES	CONSTRUCTION REFERENCES	USAGE GUIDELINES
REINFORCED SILT FENCE (AS PERIMETER CONTROL)	RSF	******	221.02C 712.06	221.04C	REINFORCED SILT FENCE, INSTALLED AS A TEMPORARY PERIMETER CONTROL AT THE BOTTOM OF BARREN SLOPES, AROUND DISTURBED CONSTRUCTION AREAS AND TEMPORARY SOIL STOCKPILES SHOULD RETAIN THE SOIL ON DISTURBED LAND UNTIL CONSTRUCTION ACTIVITIES ARE SUFFICIENT COMPLETED TO ALLOW REVEGETATION AND PERMANENT SOIL STABILIZATION.
TEMPORARY SLOPE DRAIN	SD	TSD	221.02A	221.04A	A TEMPORARY SLOPE DRAIN IS CONSTRUCTED WITH A FLEXIBLE PIPE OR CONDUIT EXTENDING FRO THE TOP OF A CUT OR FILL SLOPE INTO A BED OF RIP RAP DOWN SLOPE. THE PURPOSE OF THE TEM SLOPE DRAIN IS TO CONVEY STORMWATER RUNOFF DOWN THE FACE OF THE SLOPE WITHOUT CAU EROSION ON THE SLOPE. THE TEMPORARY EARTHEN BERM IS USED TO REDUCE SLOPE LENGTH AND RUNOFF TO THE TEMPORARY SLOPE DRAIN PIPE. MAXIMUM DRAINAGE AREA IS 0.50 ACRE.
TEMPORARY FIBER LOG	TFL		221.02H	221.04H	TEMPORARY FIBER LOGS ARE APPROPRIATE FOR VELOCITY REDUCTION AND CONTROL OF SEDIME TRANSPORT, MOST NOTABLY ON SLOPES. TEMPORARY FIBER LOGS ARE NOT TO BE USED IN ACTIVE STREAMS.
TEMPORARY SEDIMENT BASIN	TSB	TYPE #	221.02E	221.04E	TEMPORARY SEDIMENT BASINS ARE USED TO REDUCE TURBIDITY OF CONSTRUCTION STORMWATE RUNOFF DURING GRADING.
STABILIZED CONSTRUCTION EXIT	SCE	SCE	713.03		STABILIZED CONSTRUCTION EXITS ARE INSTALLED AT POINTS OF VEHICULAR INGRESS AND EGRES THE STABILIZED CONSTRUCTION ENTRANCES REDUCE THE AMOUNT OF SEDIMENT TRANSPORTED ONTO PAVED PUBLIC TRAVEL WAYS BY CONSTRUCTION EQUIPMENT AND OTHER MOTOR VEHICLES
DITCH CHECK STRUCTURES	STANDARD DRAWING NUMBER	PLAN SYMBOL	MATERIAL REFERENCES	CONSTRUCTION REFERENCES	INSTALL DITCH CHECKS TO CONTROL RUNOFF VELOCITY, TRAP SEDIMENTS AND REDUCE I DRAINAGE AREA, DITCH GRADIENT AND SOIL TYPE AID IN SELECTING THE PROPER DITCH
TEMPORARY ROCK FILTER DAM (AS DITCH CHECK)	TRFD	- RFD •	221.02G 712.02, 713.03, 732.09	221.04G	TEMPORARY ROCK FILTER DAM DITCH CHECKS ARE CONSTRUCTED ACROSS THE DITCH OR SWALE LOWER THE VELOCITY OF CONCENTRATED WATER FLOWS AND CAPTURE SEDIMENT.
TEMPORARY ROCK FILTER DAM (WITH SEDIMENT TRAP)	TRFD	TYPE =	221.02G 712.02, 713.03, 732.09	221.04G	A TEMPORARY ROCK FILTER DAM DITCH CHECK WITH SEDIMENT TRAP IS USUALLY USED AT THE EN OF A SERIES OF ROCK FILTER DAM DITCH CHECKS. THE PRIMARY PURPOSE IS TO INTERCEPT SEDIM AND, SECONDLY, REDUCE VELOCITY. PROTECT THE CHANNEL DOWNSTREAM OF THE LOWEST CHEC DAM FROM EROSION, SINCE WATER WILL FLOW OVER AND AROUND THE DAM.
TEMPORARY SILT DIKE (AS DITCH CHECK)	TSD	$\triangle \land \triangle$	221.02F 735.07	221.04F	THE PRIMARY PURPOSE OF A TEMPORARY SILT DIKE DITCH CHECK IS TO CONTROL THE SEDIMENT V ITS SECONDARY PURPOSE IS TO SLOW THE VELOCITY OF THE WATER, THEREBY CONTROLLING THE EROSION OF THE SOILS IN THE DITCH.
REINFORCED SILT FENCE (AS DITCH CHECK)	RSF	4000 H	221.02C AASHTO M288	221.04C	REINFORCED SILT FENCE DITCH CHECKS ARE PRIMARILY USED IN ROADSIDE DITCHES AND AREAS C SHEET FLOW.
INLET PROTECTION STRUCTURES	STANDARD DRAWING NUMBER	PLAN SYMBOL	MATERIAL REFERENCES	CONSTRUCTION REFERENCES	CONFIGURATIONS MAY BE ADJUSTED WITH APPROVAL OF THE ENGINEER FOR TRAVELWAY SAFETY, WATER FLOW, SOIL OR INSTALLATION CHALLENGES.
FIBER LOG (AS INLET PROTECTION)	TFL	IP1	221.02H	221.04H	FIBER LOG INLET PROTECTION PROVIDES SEDIMENT TRAPPING BY PONDING STORMWATER TO A DE EQUAL TO OR LESS THAN THE FIBER LOG DIAMETER. ENSURE POTENTIAL PONDING WILL NOT HAVE ADVERSE IMPACTS.
AGGREGATE INLET PROTECTION	IPD	— IP2 —	221.02D	221.04D	THE ELEVATION OF THE TOP OF THE REQUIRED STONE BERM SHALL BE A MINIMUM OF 1.5 FEET ABO' THE ELEVATION OF THE INLET WORKING POINT AND A MINIMUM OF 6 INCHES BELOW THE ELEVATIO OF THE OUTSIDE EDGE OF THE INSIDE SHOULDER.
REINFORCED SILT FENCE (AS INLET PROTECTION)	IPD	IP3	221.02C	221.04C	REINFORCED SILT FENCE INLET PROTECTION PROVIDES SEDIMENT TRAPPING BY PONDING STORMW TEMPORARILY BEFORE IT ENTERS THE INLET. ENSURE POTENTIAL PONDING WILL NOT HAVE ADVERS IMPACTS.



- ALL CONSTRUCTION AND MATERIAL REQUIREMENTS SHALL BE IN ACCORDANCE WITH THE 1. 2019 ODOT STANDARD SPECIFICATIONS.
- "J-HOOK" CONFIGURATION SILT FENCE APPLICATIONS ARE TO BE USED IN CONJUNCTION WITH PERIMETER SILT FENCE WHEN STORMWATER RUNOFF IS IN TWO DIRECTIONS (DOWN 2. A FILL SLOPE AND DOWN GRADIENT ALONG THE RIGHT-OF-WAY).
- FOR SHEET FLOW OR NON-CONCENTRATED FLOW, DIVERSION BERMS, AS PART OF SLOPE З. DRAINS, CAN BE USED TO SAFELY CONVEY STORMWATER AWAY FROM OR AROUND A DENUDED AREA. THE DIVERSION BERMS CAN BE MADE OF SAND BAGS OR LOCAL SOIL. SEE ROADWAY STANDARD SD.
- ERODIBLE MATERIAL STOCKPILES, WHICH ARE STILL PRESENT AFTER 14 DAYS, SHALL BE 4. STABILIZED WITH MULCHING AND/OR SEEDING.
- EROSION CONTROL / TURF REINFORCEMENT MATS OR HYDRAULIC MULCH MAY BE USED 5. FOR EROSION PROTECTION AND VEGETATION ESTABLISHMENT ON 1V:2H OR STEEPER SOIL SLOPES WITH SLOPE LENGTH MORE THAN 15 FEET OR IN SENSITIVE AREAS WHEN DIRECTED BY THE ENGINEER, EROSION CONTROL / TURF REINFORCEMENT MATS MAY ALSO BE UTILIZED IN CHANNELS WHEN DIRECTED BY THE ENGINEER. SEE ROADWAY STANDARDS ECTRM1 AND ECTRM2.
- 6. TEMPORARY SLOPE DRAINS MAY BE CONSTRUCTED USING PIPE OR EXCAVATED DITCH. SEE ROADWAY STANDARD SD.
- SHEET FLOW IS DEFINED AS THE FLOW OF WATER OVER A PLANE SURFACE AS A MORE OR 7. LESS UNIFORMLY THICK FILM OR SHEET OF WATER.
- SHALLOW CONCENTRATED FLOW IS FLOW AT THE END OF SHEET FLOW. IT ACCUMULATES IN SMALL RILLS OR GULLIES AND SWALES. ITS DEPTH CAN RANGE FROM 1.5 TO 6 INCHES. 8. IT IS NOT CONCENTRATED ENOUGH TO BE DEFINED AS CHANNEL.
- IF ANY BEST MANAGEMENT PRACTICE CREATES PONDING OF WATER, ENSURE THE PONDING 9. DOESN'T CAUSE ANY ADVERSE IMPACTS.

SEE ROADWAY STANDARDS IPD, TFL AND TSD

FOR INLET PROTECTION

AS ALTERNATIVES TO EARTHEN BERMS AND SILT DIKES, SAND BAGS CAN BE USED AS DIVERSION BERMS TO PREVENT SEDIMENT FROM BEING WASHED ONTO HARD SURFACES

EN FLOW

500'MAX BETI 500'MAX BETI 500'E DRAINS

DIVERSION BERM AND SLOPE DRAINS SEE NOTES #3 AND #6 AND ROADWAY STANDARD SD

FOR TEMPORAY FIBER LOG SEE ROADWAY STANDARD TFL

TEMPORARY SLOPE DRAIN

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FOR DITCH CHECKS SEE ROADWAY STANDARDS

SHOULDER

"J-HOOK" CONFIGURATION SILT FENCE, SEE NOTE #2 AND

FLOW

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ROADWAY STANDARD RSF

FLOW

REINFORCED SILT FENCE

ROW

AT CROSS DRAINS SEE

RSF, TRFD AND TSD

FLOW

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SLOPE TRACKING PARALLEL TO SLOPE

STABILIZED CONSTRUCTION EXIT

SEE ROADWAY STANDARD SCE





INSTALLATION STEPS

INSTALL AND MAINTAIN THE MAT IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.

- A PREPARE SLOPE BY REMOVING LARGE ROCKS, VEGETATION, FIXING SURFACE RILLS AND COMPACTING SOIL SO THAT SURFACE IS RELATIVELY SMOOTH.
- B. IF INSTALLING EROSION CONTROL MAT, FERTILIZER AND SEED SHALL BE APPLIED BEFORE INSTALLING MAT ON TOP. IF INSTALLING TURF REINFORCEMENT MAT, SEED AND TOPSOIL MAY BE APPLIED ON TOP OF MAT.
- C. DIG INITIAL ANCHOR TRENCH. SET ASIDE NATIVE SOIL REMOVED FROM TRENCH. INITIAL ANCHOR TRENCHES ARE NOT NEEDED IF SITE ALLOWS FOR THE TRENCH INSTALLATION OF MORE THAN 3 FEET BEYOND THE TOP OF THE SLOPE.
- D. PLACE MAT PARALLEL WITH DIRECTION OF FLOW, AND SECURE MAT IN INITIAL ANCHOR TRENCH, STAPLING MAT AS SHOWN.
- E. REPLACE NATIVE SOIL PREVIOUSLY REMOVED FROM TRENCH.
- F. ROLL MAT PARALLEL TO THE SLOPE IN A CONTROLLED MANNER, TAKING CARE TO REMOVE EXCESS SLACK, AND TAKING CARE NOT TO STRETCH MAT. WOOD EXCELSIOR FIBER MATS MAY BE ABUTTED INSTEAD OF OVERLAPPED ON SIDE-BY-SIDE SEAMS ON SLOPES BECAUSE THE FIBERS EXPAND TOGETHER. ALL OTHER FIBER-TYPE MATS SHALL BE OVERLAPPED ON SIDE-BY-SIDE SEAMS.
- G. STAPLE MAT AS SHOWN OR PER MANUFACTURER'S STAPLE PATTERN GUIDE, SO THERE ARE NO GAPS BETWEEN THE MAT AND THE SOIL, AND MAT MAINTAINS DIRECT CONTACT WITH SOIL. STAPLE WHILE UNROLLING MAT DOWNSTREAM, TO MINIMIZE WALKING ON MAT. ENSURE MAT COVERS ENTIRE SITE, LEAVING NO BARE AREAS.

GENERAL NOTES

- 1. ALL CONSTRUCTION AND MATERIAL REQUIREMENTS SHALL BE IN ACCORDANCE WITH THE 2019 ODOT STANDARD SPECIFICATIONS.
- 2. EROSION CONTROL MATS SHALL BE CONSTRUCTED OF COCONUT FIBER, ASPEN EXCELSIOR, OR SYNTHETIC MATERIAL WITH BIODEGRADABLE OR PHOTODEGRADABLE NETTING. THEIR TEMPORARY FUNCTIONAL LONGEVITY RANGES FROM 3 MONTHS TO 36 MONTHS.
- 3. TURF REINFORCEMENT MATS ARE PERMANENT DEVICES MADE OF UV-STABILIZED, SYNTHETIC FIBERS, FILAMENTS, NETS, WIRE MESH AND/OR OTHER ELEMENTS PROCESSED INTO A THREE-DIMENSIONAL MATRIX WHICH MAY BE SUPPLEMENTED WITH DEGRADABLE COMPONENTS. THEY ARE USUALLY INSTALLED FIRST FOLLOWED BY A LAYER OF TOPSOIL AND SEEDING. THEY ARE INSTALLED TO STABILIZE AN OTHERWISE ERODIBLE AREA.
- 4. MAT SHALL BE MEASURED FOR PAYMENT OF VISIBLE SURFACE COVERED. OVERLAPS, OVERWIDTHS, AND TRENCHING WILL NOT BE MEASURED FOR PAYMENT. COST OF MAT (ALL TYPES OF EROSION CONTROL AND TURF REINFORCEMENT) SHALL INCLUDE ALL LABOR AND MATERIALS INCLUDING STAPLING AND FILLING OF TRENCHED ENDS.
- 5. INSTALLATION IS NOT SUITABLE ON ROCKY SITES.
- 6. STAPLES SHALL BE MADE OF 11 GAUGE STEEL WIRE. TYPICALLY SHAPED AS A "U", DIMENSIONS ARE 1 INCH BY 6 INCHES FOR THE EROSION CONTROL MATS AND 1 INCH BY 12 INCHES FOR THE TURF REINFORCEMENT MATS. FOR BEST RESULTS INSERT STAPLES SO THE HEADS ARE PARALLEL TO THE FLOW OF WATER. OTHER TYPES OF STAPLES MAY BE USED AS RECOMMENDED BY THE MANUFACTURER AND APPROVED BY THE ENGINEER.
- 7. INSTALLATION AS SHOWN ON THIS STANDARD AND ON ROADWAY STANDARD ECTRM2 IS TYPICAL IN NATURE AND DOES NOT REPRESENT A SPECIFIC MANUFACTURER. CHECK WITH THE MANUFACTURER'S INSTALLATION GUIDELINES BEFORE PLACING MATS.

BASIS OF PAYMENT						
ITEM NO. ITEM UNIT						
228	EROSION CONTROL MAT		SY			
227	(SP) TURF REINFORCEMENT MAT		SY			
● SPECIFY TYPE: 1, 2, 3 OR 4 ■ SPECIFY TYPE: 1, 2, 3 OR 4						
	APPROVED BY ROADWAY ENGINEER:	3	DATE:	6/24/22		
/	ROADWAY DESIGN DIV	ISION STAN	DARD)		
(EROSION CONTROL / TURF REINF	ORCEME	ENT N	ЛАТ		
AT AN	INSTALLATION DETAILS (1 C	F 2 SHEE	TS)			
	OKLAHOMA					
	Transportation	2019 SPECIFICATIONS				
		ECTRM	11	0		



ATS		
TYPE 2	TYPE 3	TYPE 4
OUBLE NET	DOUBLE NET	DOUBLE NET
3H:1V	3H:1V	2H:1V
6-12 MOS.	12-24 MOS.	24-36 MOS.
75 LBS/ FT	100 LBS/ FT	125 LBS/ FT
.75 LBS/SF	2.00 LBS/SF	2.25 LBS/SF
0.20 AT 2H:1V	0.25 AT 1.5H:1V	0.25 AT 1H:1V

EROSION (1/2 IN. SOIL LOSS) DURING A 30-MINUTE FLOW EVENT IN LARGE-SCALE PERFORMANCE TESTING, ASTM D6460.

INFORCEMENT MATS						
TYPE 1	TYPE 2	TYPE 3	TYPE 4 (HIGH PERFORMANCE)			
80% AT 500 HRS.	80% AT 1000 HRS.	80% AT 1,000 HRS.	80% AT 3,000 HRS.			
150 LBS/FT	200 LBS/FT	650 LBS/FT	3000 LBS/FT			
6 LBS/SF	10 LBS/SF	12 LBS/SF	14 LBS/SF			
1H:1V	1H:1V	0.5H:1V	0.5H:1V			

GENERAL NOTES

- THE LOCATION OF ALL DETAIL DRAWINGS SHOWN ON THIS SHEET ARE SHOWN ON THE 2019 ROADWAY STANDARD EROSION CONTROL / TURF REINFORCEMENT MAT INSTALLATION DETAILS (1 OF 2 SHEETS).
- EROSION CONTROL MATS ARE TYPICALLY USED WHERE MULCHING IS 2. NOT SUFFICIENT TO CONTROL EROSION AND SOIL STABILITY DURING VEGETATION ESTABLISHMENT. EROSION CONTROL MATS ARE USUALLY TEMPORARY IN NATURE AND ARE MADE UP OF DEGRADABLE FIBERS AND MESH.
- TURF REINFORCEMENT MATS ARE FOR PERMANENT STABILIZATION OF 3. ERODIBLE AREAS, EVEN AFTER VEGETATION IS ESTABLISHED. IN DITCHES WHERE THE SHEAR STRESSES ARE NEAR OR ABOVE 2 PSF, IT MAY BE MORE EFFICIENT TO USE TURF REINFORCEMENT MAT.
- IF THERE ARE SIGNS OF RILLING UNDER THE MAT, INSTALL MORE 4. STAPLES. IF RILLING BECOMES SEVERE ENOUGH TO PREVENT ESTABLISHMENT OF VEGETATION, REMOVE THE SECTION OF MAT WHERE THE DAMAGE HAS OCCURRED. FILL THE ERODED AREA WITH TOPSOIL. COMPACT, RESEED AND REPLACE THE SECTION OF MAT. TRENCHING AND OVERLAPPING ENDS PER MANUFACTURER'S RECOMMENDATIONS. ADDITIONAL STAKING IS RECOMMENDED NEAR WHERE RILLING WAS FILLED.
- 5. TRENCHING DIMENSIONS FOR ALL TYPES OF MATS SHALL BE 6 INCHES WIDE AND 6 INCHES TALL. STAPLE PATTERNS SHALL BE THE SAME FOR ALL MAT TYPES.
- ALL INSTALLATION INFORMATION IS TYPICAL IN NATURE AND DOES 6 NOT REPRESENT ANY SPECIFIC MAT. CONSULT WITH MANUFACTURER FOR SPECIFIC INSTALLATION PROCEDURES.





SYMBOLOGY SYMBOL TO BE USED TO DENOTE DEVICE ON PLANS
AGGREGATE IP2
REINFORCED SILT FENCE IP3

ANY TYPE OF INLET

GENERAL NOTES

- 1. ALL CONSTRUCTION AND MATERIAL REQUIREMENTS SHALL BE IN ACCORDANCE WITH THE 2019 ODOT STANDARD SPECIFICATIONS.
- 2. CONFIGURATIONS MAY BE ADJUSTED WITH APPROVAL OF THE ENGINEER FOR TRAVELWAY SAFETY, WATER FLOW, SOIL OR INSTALLATION CHALLENGES.

REINFORCED SILT FENCE MAY BE REQUIRED UPSLOPE OF THE INLET EXCAVATION AS DIRECTED BY THE ENGINEER.

- 4. IF REINFORCED SILT FENCE IS INSTALLED AROUND THE INLET EXCAVATION IT SHOULD BE PLACED IN A CONFIGURATION THAT WILL ALLOW INLET CONSTRUCTION.
- 5. DEWATERING HOLES IN THE DEWATERING DEVICE SHALL BE 1 TO 1 1/2 INCHES IN DIAMETER AND SPACED 2 TO 3 INCHES APART TO ALLOW FOR DEWATERING IN NO MORE THAN 48 HOURS. IF THIS DOESN'T FUNCTION PROPERLY, ANOTHER DEVICE CAN BE ADDED AT THE DIRECTION OF THE ENGINEER.
- 6. FASTEN DEWATERING DEVICE TO THE 2 INCHES BY 4 INCHES SIDE BRACE.
- 7. STAPLE FILTER FABRIC TO DEWATERING DEVICE AND CUT ACROSS SLITS IN THE FILTER FABRIC AT THE HOLE LOCATIONS TO ALLOW WATER TO FLOW THROUGH. PROVIDE FILTER FABRIC IN ACCORDANCE WITH AASHTO M 288 SPECIFICATION.
- 8. PRICE BID FOR THE REINFORCED SILT FENCE INLET PROTECTION WILL INCLUDE FILTER FABRIC, POSTS, WIRE MESH, WOOD BRACING, DEWATERING DEVICE AND ALL INCIDENTALS REQUIRED TO COMPLETE ITS INSTALLATION. THIS INLET PROTECTION DEVICE SHALL BE PAID FOR AS TEMPORARY INLET SEDIMENT FILTER, WITH UNITS OF EACH.

ROCK GRADATION FOR THE AGGREGATE INLET PROTECTION (TEMPORARY SEDIMENT FILTER) SHALL BE AS FOLLOWS: PERCENT PASSING SIEVE SIZE

100	4 INCH
90-100	3.5 INC
25-60	2.5 INC
D-15	1.5 INCI
D-5	3/4 INC

- 10. COST FOR ALL MATERIALS, LABOR AND MAINTENANCE OF THE AGGREGATE INLET PROTECTION SHALL BE PAID FOR AS TEMPORARY INLET SEDIMENT FILTER, WITH UNITS OF EACH.
- 11. INLET PROTECTION DEVICES SHALL BE LEFT IN PLACE UNTIL THE DRAINAGE AREA IS PERMANENTLY STABILIZED WITH ESTABLISHED VEGETATION OR PAVEMENT.

1		BAS	IS OF PAYMEN	Т		i a
	ITEM NO.		ITEM		UNI	Т
	221(H)	(PL)TEMPO	RARY INLET SEDIMI	ENT FILTER	ΕA	
	1		\cap .			
	APPROVED E ROADWAY E	BY ENGINEER:	REALS	5	DATE:	6/24/22
/		ROA	DWAY DESIGN DIV	ISION STAND	DARD)
(INLET PROT	ECTION		
		(AGGF	REGATE AND RE	EINFORCE	D SI	LT
			FENCE APPLIC	CATIONS)		
	Transp	ortation		2019 SPEC		ATIONS
				IPD		0



		GENERAL NOTES	
	1.	ALL CONSTRUCTION AND MATERIAL REQUIREMENTS SHALL BE IN ACCORDANCE WITH THE 2019 ODOT STANDARD SPECIFICATIONS.	
GTH	2.	AFTER THE REINFORCED SILT FENCE IS INSTALLED IN THE DITCH, IF THE TOP OF THE FILTER FABRIC (WEIR) AT POINT (B) IS HIGHER THAN THE BOTTOM OF THE FENCE AT POINT (A) (EDGES OF FENCE) THEN NO WEIR IS REQUIRED.	
	3.	REINFORCED SILT FENCE SHOULD BE PLACED WELL INSIDE RIGHT-OF-WAY AND ALONG EDGE OF CLEARING LIMITS. THIS WILL ALLOW ROOM FOR ADDITIONAL BEST MANAGEMENT PRACTICES SUCH AS VEGETATED BUFFERS.	
	4.	THE CONTRACTOR MAY ELECT TO USE EITHER INSTALLATION: METHOD I OR METHOD II.	
	5.	METHOD II INSTALLATION SHALL BE ACCOMPLISHED USING AN IMPLEMENT THAT IS MANUFACTURED FOR THE APPLICATION AND PROVIDES A CONFIGURATION MEETING THE REQUIREMENTS OF THE DETAIL.	
	6.	REINFORCED SILT FENCE SHALL BE A FILTER FABRIC SUPPORTED BETWEEN POSTS WITH A WIRE MESH BACKING. ATTACH THE FILTER FABRIC TO THE WIRE MESH USING 16 GA. GALVANIZED STEEL C-RING STAPLES OR OTHER SIMILAR ACCEPTABLE MEANS. PROVIDE FILTER FABRIC IN ACCORDANCE WITH AASHTO M 288 SPECIFICATION.	
	7.	WOOD POSTS SHALL BE OF SOUND QUALITY WOOD WITH A NOMINAL CROSS SECTIONAL AREA OF 1.5 X 1.5 INCHES. STEEL POSTS SHALL BE STANDARD T AND U SECTIONS WEIGHING NOT LESS THAN 1.33 POUNDS PER LINEAR FOOT OR OTHER STEEL POSTS HAVING EQUIVALENT STRENGTH AND BENDING RESISTANCE.	
	8.	FILTER FABRIC SHALL BE FURNISHED WITH A SUITABLE WRAPPING FOR PROTECTION AGAINST MOISTURE AND EXTENDED ULTRAVIOLET EXPOSURE PRIOR TO PLACEMENT. ROLLS SHALL BE STORED IN A MANNER WHICH PROTECTS THEM FROM THE ELEMENTS. IF STORED OUTDOORS, THEY SHALL BE ELEVATED AND PROTECTED WITH A WATERPROOF COVER.	
N	9.	WIRE MESH BACKING SHALL BE MADE OF 12.5 GAUGE STEEL. THE VERTICAL AND HORIZONTAL SPACING OF THE WIRE SHALL BE 6 INCHES. ATTACH WIRE MESH TO POSTS BY MEANS OF 11 GA. ALUMINUM FENCE WIRE TIES AT 6.5 INCHES LONG, OR APPROVED SIMILAR.	
<u>CED</u> G	10.	TIEBACK DESIGNS SHOULD BE INSTALLED SUCH THAT THE BOTTOM OF THE END OF THE SILT FENCE (WHERE THE J-HOOK IS INSTALLED ON THE SLOPE), OR POINT A, SHOULD BE AT A HIGHER ELEVATION THAN THE TOP OF THE SILT FENCE AT THE TOE OF THE FILL SLOPE, OR POINT B. SEE SECTION C-C FOR VISUAL.	
	11.	TIEBACK DESIGNS SHOULD ONLY BE USED WHEN THERE IS RUNOFF FLOW BOTH DOWN THE FILL SLOPE AND LONGITUDINALLY IN THE DIRECTION OF THE ROAD. MEASURE SILT FENCE IN PLACE, INCLUDING THE STRAIGHT SECTION AND THE 'J-HOOK' SECTION.	
RE MESH	12.	PRICE BID FOR REINFORCED SILT FENCE SHALL INCLUDE COST OF ALL MATERIALS AND LABOR NECESSARY FOR CONSTRUCTION, MAINTENANCE AND REMOVAL, REGARDLESS OF APPLICATION.	
CING, LTER <u>FLOW</u> JND	13.	TEMPORARY (STANDARD) SILT FENCE MAY BE USED IN LIEU OF REINFORCED SILT FENCE IF APPROVED BY THE ENGINEER. TEMPORARY SILT FENCE IS TYPICALLY USED WHERE SHEET FLOW OCCURS. REINFORCED SILT FENCE IS USUALLY USED WHERE CONCENTRATION FLOW OCCURS.	
		BASIS OF PAYMENT	
		ITEM NO. ITEM UNIT	
		221(D) TEINFORCED SILT FENCE LF 221(C) REINFORCED SILT FENCE LF	
	/		_ ,
	/	ROADWAY ENGINEER: <u>VY Y U</u> DATE: <u>D</u> ATE: <u>D</u> ATE	5
	(REINFORCED SILT FENCE	
ATION		INSTALLATION AND APPLICATIONS	
		Transportation 2019 SPECIFICATIONS	
			-



- ALL CONSTRUCTION AND MATERIAL REQUIREMENTS SHALL BE IN ACCORDANCE WITH THE 2019 ODOT STANDARD SPECIFICATIONS.
- THIS WORK SHALL CONSIST OF FURNISHING, INSTALLING, AND MAINTAINING THE TEMPORARY SILT DIKE. THE DIKES SHALL BE USED AS A CONTINUOUS LINE BARRIER AT THE TOE OF SLOPE OR ACROSS THE ROADWAY DITCH TO CONTAIN SEDIMENT AND MINIMIZE EROSION, OR AS DIRECTED BY THE ENGINEER. THESE DIKES SHALL BE INSTALLED AND LOCATED AS SOON AS CONSTRUCTION WILL ALLOW OR AS DIRECTED
- TEMPORARY SILT DIKE SHALL BE TRIANGULAR SHAPED HAVING A HEIGHT OF AT LEAST 8 TO 10 INCHES IN THE CENTER WITH EQUAL SIDES AND A 16 TO 20 INCH BASE. THE TRIANGULAR SHAPED INNER MATERIAL SHALL BE URETHANE FOAM MEETING THE REQUIREMENTS FOR ASTM D3574. THE OUTER COVER SHALL BE A WOVEN GEOTEXTILE FABRIC PLACED AROUND THE INNER MATERIAL AND ALLOWED TO EXTEND BEYOND BOTH SIDES OF THE TRIANGLE 24 INCHES TO 36 INCHES. THIS FABRIC SHOULD BE MILDEW RESISTANT, ROT-PROOF RESISTANT TO HEAT AND ULTRAVIOLET RADIATION, AND MEETING REQUIREMENTS FOR SEDIMENT CONTROL IN AASHTO M 288. THE DIKES SHALL BE ATTACHED TO THE GROUND WITH WIRE STAPLES. THE STAPLES SHALL BE NO. 11 GAUGE WIRE AND BE AT LEAST 6 TO 8 INCHES LONG. STAPLES SHALL BE PLACED AS SHOWN ON THESE DETAILS.
- SILT DIKES ARE FURNISHED IN 7 FOOT INCREMENTS. TOP OVERLAPS SHALL BE INSTALLED IN THE DIRECTION OF FLOW.
- SILT DIKE DITCH CHECKS SHOULD BE SPACED SO THAT THE ELEVATION OF THE TOE OF THE UPSTREAM DEVICE IS EQUAL TO THE ELEVATION OF THE CREST OF THE DOWNSTREAM DEVICE. THIS ALLOWS THE WATER BETWEEN EACH DITCH CHECK TO POOL, GREATLY REDUCING THE
- ACCEPTED TEMPORARY SILT DIKE, MEASURED AS PROVIDED ABOVE, WILL BE PAID FOR AT THE CONTRACT UNIT PRICE BID FOR TEMPORARY SILT DIKE. PRICE BID WILL INCLUDE THE COST OF FURNISHING THE DIKES, INSTALLING, MAINTAINING AND REMOVAL WHEN DIRECTED

	BASIS OF PAYMENT					
		ITEM NO.	ITEM		UNIT	
		221(E)	TEMPORARY SILT DIKE		LF	
				~		,
		APPROV ROADW	ED BY AY ENGINEER:	8	DATE	6/24/22
TF	(ROADWAY DESIGN DI	ISION S	TANDARI	C
			TEMPORARY SILT DI	KE APP	LICATI	ONS
			AHOMA	2019	SPECIFIC	ATIONS
			sportation	Т	SD	0
						R-7







- ALL CONSTRUCTION AND MATERIAL REQUIREMENTS SHALL BE IN ACCORDANCE WITH THE 2019 ODOT STANDARD SPECIFICATIONS.
- 2. MATERIALS SPECIFICATIONS FOR FILTER FABRIC, STONE FILL FOR GABIONS (ROCK) AND WIRE MESH, SHALL BE IN ACCORDANCE WITH THE STANDARD SPECIFICATION SECTIONS 712.02, 713.03 AND 732.09, RESPECTIVELY. STONE FILL CONVERSION FACTOR SHALL BE 150 - 160 LBS, PER CU, FT.
- SPECIFIC DIMENSIONS OF ROCK FILTER DAMS AND/OR SEDIMENT 3. TRAPS SHALL BE SHOWN ON THE PLANS.
- ROCK FILTER DAM WITH SEDIMENT TRAP TO BE USED AT THE END, 4 OR DOWNSLOPE OF SERIES OF ROCK FILTER DAMS AND IN AN EASILY ACCESSIBLE AREA TO REMOVE SEDIMENT. COST OF MATERIALS AND CONSTRUCTION OF SEDIMENT TRAP SHALL BE INCLUDED IN COST OF ROCK FILTER DAM.
- ROCK FILTER DAM DITCH CHECKS SHOULD BE SPACED SO THAT THE 5. ELEVATION OF THE TOE OF THE UPSTREAM DAM IS EQUAL TO THE ELEVATION OF THE CREST OF THE DOWNSTREAM DAM. THIS ALLOWS THE WATER BETWEEN EACH CHECK DAM TO POOL, GREATLY REDUCING THE FLOW VELOCITY
- ROCK FILTER DAM TYPES 2 AND 3 SHALL BE SECURED WITH WIRE MESH. 6. THE ROCK SHALL BE PLACED ON THE MESH TO THE HEIGHT AND SLOPES SPECIFIED. THE MESH SHALL BE FOLDED AT THE UPSTREAM SIDE OVER THE ROCK AND TIGHTLY SECURED TO ITSELF ON THE DOWNSTREAM SIDE USING WIRE TIES OR HOG RINGS. IN CHANNEL USE, THE MESH SHALL BE SECURED OR STAKED TO THE CHANNEL BED PRIOR TO ROCK PLACEMENT.
- ROCK FILTER DAMS SHALL BE EMBEDDED A MINIMUM OF 4 INCHES 7. INTO THE EXISTING GROUND. FILTER FABRIC SHALL BE INSTALLED ON TOP OF EXISTING GROUND, BEFORE INSTALLING THE ROCK FILTER DAMS
- TOES OF SEDIMENT TRAP EXCAVATION ARE TO FIT THE DITCH BOTTOM
- 9 MAXIMUM DRAINAGE AREA OF DISTURBED SOIL SHALL BE 5 ACRES AND LONGITUDINAL SLOPE SHALL NOT BE GREATER THAN 10%.
- COST OF ROCK FILTER DAM (ALL TYPES) TO INCLUDE ALL MATERIAL 10. AND LABOR REQUIRED FOR CONSTRUCTION AND MAINTENANCE. ROCK FILTER DAM TYPES 1, 2 OR 3 SHALL INCLUDE COST OF FILTER FABRIC. MAINTENANCE SHALL INCLUDE THE REMOVAL OF SEDIMENT WHEN HALF OF THE HEIGHT OF THE DAM HAS BEEN FILLED OR AS DIRECTED BY THE ENGINEER.

BASIS OF PAYMENT				
ITEM NO.	ITEM	UNIT		
221(F)	TEMPORARY ROCK FILTER DAM (TYPE 1)	CY		
221(F)	TEMPORARY ROCK FILTER DAM (TYPE 2)	CY		
221(F)	TEMPORARY ROCK FILTER DAM (TYPE 3)	CY		
221(F)	TEMPORARY ROCK FILTER DAM (TYPE 4)	CY		



TRFD





Transportation

2019 SPECIFICATIONS

TSB



- 1. LOCATION OF STABILIZED CONSTRUCTION EXIT TO BE AS SHOWN ON THE PLANS OR AS APPROVED BY THE ENGINEER.
- 2. THE APPROACH TRANSITIONS SHOULD BE NO STEEPER THAN 1:6 OR AS DIRECTED BY THE ENGINEER.
- 3. RUNOFF FROM THE CONSTRUCTION EXIT SHALL BE DIRECTED TO AN APPROPRIATE SEDIMENT CONTROL DEVICE AS APPROVED BY THE ENGINEER.
- 4. THE TREATED TIMBER PLANKS SHALL BE #2 GRADE MINIMUM, AND SHOULD BE FREE FROM LARGE OR LOOSE KNOTS.
- 5. THE TREATED TIMBER PLANKS SHALL BE ATTACHED TO THE RAILROAD TIES WITH 1/2 IN. X 6 IN. LAG BOLTS. OTHER FASTENERS MAY BE USED AS APPROVED BY THE ENGINEER.
- 6. MATERIALS FOR THE ROCK BASE SHALL BE IN ACCORDANCE WITH CURRENT STANDARD SPECIFICATIONS, SEC. 713.03 "GABIONS, REVETMENT MATTRESSES, AND ROCK FILTER DAMS."
- 7. ALL MATERIALS, LABOR AND MAINTENANCE TO COMPLETE THE STABILIZED CONSTRUCTION EXIT SHALL BE INCLUDED IN THE COST OF WORK, INCLUDED IN THE BID AND NOT PAID FOR SEPARATELY.
- 8. MAINTENANCE INCLUDING SEDIMENT REMOVAL AND ROUTINE INSPECTION OF THE DEVICE, SHALL BE INCLUDED IN THE COST OF WORK AND PERFORMED AT THE DISCRETION OF THE ENGINEER.
- 9. AN ALTERNATE DESIGN MAY BE USED, DUE TO PROJECT SPACE CONSTRAINTS, IF APPROVED BY ENGINEER. ALL MATERIALS, LABOR, INSTALLATION AND MAINTENANCE NEEDED FOR THE ALTERNATE DEVICE SHALL BE PAID FOR "STABILIZED CONSTRUCTION EXIT."

BASIS OF PAYMENT								
ITEM NO.	ITEM	UNIT						
242	STABILIZED CONSTRUCTION EXIT	ΕA						



- SLOPE DRAIN SHOULD EXTEND A MINIMUM OF 4 FEET PAST THE TOE OF SLOPE AND OUTLET SHOULD HAVE LESS THAN 1% SLOPE.
- SHALL BE RIPRAP STONE OR MATERIAL MADE OF CRUSHED NON-EROSIVE ROCK THAT IS FREE OF ALL FINES, CLAYS AND SILTS AND OF SUFFICIENT SIZE TO PREVENT DOWNSTREAM
- THE SOIL AROUND AND UNDER THE INLET PIPE AND ENTRANCE SECTION SHALL BE HAND TAMPED IN 4 INCH LIFTS TO THE TOP OF
- LONGITUDINAL DIRECTION OF THE HIGHWAY, MAY BE MADE OF SOIL, SAND BAGS, OR SILT DIKE. SIDE SLOPES OF THE DIVERSION BERM
- PRICE BID FOR TEMPORARY SLOPE DRAIN SHALL INCLUDE COST OF ALL MATERIALS AND LABOR NECESSARY FOR CONSTRUCTION,
- CALENDAR DAYS, THEY SHALL BE STABILIZED TO PREVENT

BASIS OF PAYMENT								
ITEM NO.	ITEM	UNIT						
221(A)	TEMPORARY SLOPE DRAIN	LF						

DATE: 6/24/22

TEMPORARY SLOPE DRAIN

2019 SPECIFICATIONS

SD



- 1. ALL CONSTRUCTION AND MATERIAL REQUIREMENTS SHALL BE IN ACCORDANCE WITH SECTION 220.04.H(2) OF THE 2019 ODOT STANDARD SPECIFICATIONS.
- 2. TEMPORARY CONCRETE WASHOUT DEVICES SHOULD BE CONSTRUCTED ABOVE GRADE OR BELOW GRADE AT THE OPTION OF THE CONTRACTOR. WASHOUT DEVICE SHOULD BE CONSTRUCTED AND MAINTAINED IN SUFFICIENT QUANTITY AND SIZE TO CONTAIN ALL LIQUID AND CONCRETE WASTE GENERATED BY WASHOUT OPERATIONS.
- 3. PROVIDE A WASHOUT AREA A MINIMUM OF 50 FEET AWAY FROM INLETS, SWALES, DRAINAGE WAYS AND CHANNELS, IF THE SITE CONFIGURATION PROVIDES SUFFICIENT SPACE TO DO SO. IN NO CASE SHALL THE CONCRETE WASHOUT DEVICE BE INSTALLED CLOSER THAN 20 FEET FROM INLETS, SWALES, DRAINAGE WAYS AND CHANNELS.
- 4. PLASTIC LINER SHALL CONFORM TO ASTM D-4397, BE A MINIMUM OF 10 MIL (0.10 INCHES) THICK, AND FREE OF ALL TEARS AND HOLES AND BE IMPERMEABLE.
- 5. SIGNS SHALL BE PLACED AT THE CONSTRUCTION ENTRANCE, AT THE LOCATION OF THE CONCRETE WASHOUT DEVICE, AND ELSEWHERE AS NECESSARY TO CLEARLY INDICATE THE LOCATION OF THE FACILITY TO OPERATORS OF CONCRETE TRUCKS AND PUMP RIGS.
- 6. USE EXCAVATED MATERIAL FOR PERIMETER BERM CONSTRUCTION.
- 7. THE CONCRETE WASHOUT DEVICE SHALL BE INSTALLED PRIOR TO CONCRETE PLACEMENT ON SITE, AND SHOULD REMAIN IN PLACE UNTIL ALL CONCRETE FOR THE PROJECT IS PLACED.
- 8. CONCRETE MATERIALS, ACCUMULATED IN PIT, SHALL BE REMOVED, ALONG WITH THE PLASTIC LINER, ONCE THE PIT HAS REACHED 50% CAPACITY, USING SUITABLE WATER TIGHT CONTAINERS AND DISPOSED OF IN ACCORDANCE WITH LOCAL, STATE AND FEDERAL REGULATIONS OR IN A MANNER APPROVED BY THE RESIDENT ENGINEER.
- 9. ALL MATERIALS, LABOR AND SIGNS NEEDED TO CONSTRUCT AND MAINTAIN THE CONCRETE WASHOUT DEVICE SHALL BE INCLUDED IN OTHER ITEMS OF WORK.
- 10. ALTERNATE DESIGNS OF THE CONCRETE WASHOUT DEVICE MAY BE USED IF APPROVED BY THE ENGINEER.







TYPICAL PLACEMENT OF SOLID SLAB SODDING OR APPROVED STABILIZING MAT ON FILL SLOPES, APPROACHES TO OVERPASSES AND BRIDGES

TYPICAL PLACEMENT OF SOLID SLAB SODDING AT STRUCTURE HEADWALLS



TYPICAL PLACEMENT OF SOLID SLAB SODDING IN DITCHES



SOLID SLAB SODDING (MARCH 1 THRU AUGUST 31) THE PLACEMENT OF SOLID SLAB SOD SHALL BE RESTRICTED TO THE PERIOD FROM MARCH 1 THRU AUGUST 31, UNLESS OTHERWISE APPROVED BY THE ENGINEER.

GENERAL NOTES

- ALL CONSTRUCTION AND MATERIAL REQUIREMENTS SHALL BE IN ACCORDANCE WITH THE 2019 ODOT STANDARD SPECIFICATIONS. 1.
- SOLID SLAB SOD SHALL BE PLACED IN HORIZONTAL ROWS WITH THE LONGEST SIDE OF EACH SLAB RUNNING PARALLEL TO THE ROADWAY, AND THE SLABS IN ALTERNATE ROWS STAGGERED HALF THE LENGTH OF EACH INDIVIDUAL SLAB. ENSURE THE ROWS RUN PARALLEL TO 2. THE ROADWAY.
- SLABS SHALL BE CUT AND HARVESTED WITH A COMMERCIAL SOD CUTTER TO THE DIMENSIONS SHOWN, THEN LOADED, TRANSPORTED AND HANDLED ON PALLETS. З.
- AFTER PLACEMENT OF SOLID SLAB SOD, EARTH AT THE OUTER EDGES OF THE PLACEMENT SHALL BE BACKFILLED AND LOOSELY COMPACTED TO AT LEAST 1 INCH ABOVE THE TOP OF THE SOLID SLAB SODDING. 4.
- WATER THE SOD IMMEDIATELY AFTER INSTALLATION, TO AN 5. APPROPRIATE DEPTH SO AS TO ENCOURAGE HEALTHY GROWTH. SOD SHALL BE ESTABLISHED BEFORE BEING MOWED.
- ON SLOPES STEEPER THAN ONE UNIT VERTICAL TO 4 UNITS HORIZONTAL (1:4), STAKE THE SOD WITH STAKES SPACED AS THE SOIL NATURE AND SLOPE STEEPNESS DICTATE, 24 INCHES APART ALONG THE LENGTH OF THE SOD STRIP. MAXIMUM SLOPE OF USING STAKED SOD IS 1:3; STEEPER SLOPES WILL REQUIRE AN APPROVED STABILIZING MAT. AFTER INSTALLING, STAKED SURVING DURING AN APPROVED STABILIZING MAT. AFTER INSTALLING, 6. STAKES SHOULD HOLD THE SOD FIRMLY IN PLACE AND PRESENT NO DANGER TO PEDESTRIANS OR MOWING CREWS. STAKES CAN BE MADE OF SOUND WOOD APPROXIMATELY 1 INCH SQUARE OR 1 INCH IN DIAMETER AND AT LEAST 6 INCHES LONG, OR METAL STAPLES IN PLACE OF WOODEN STAKES STAKES.

	BASIS OF PAYMENT									
	ITEM NO.	-		UNIT						
	230(A)	SOLID SLAB SODDI	NG		SY					
			\neg							
	APPROV ROADWA	ED BY	GUS	3	DATE:	6/24/22				
/		ROADWAY	DESIGN DIV	ISION STAN	IDARE)				
(
		SOL	ID SLAB S	SODDING						
S		AHOMA								
	Trans	sportation	2019 SPE	ATIONS						
	•			SSS-2		1				











r										
JOINT REHABILITATION TREATMENT TABLE										
SILICONE SEALANT										
JOINT WIDTH	DEPTH OF CUT	SEALANT RECESS DEPTH	SEALANT THICKNESS	BACKER ROD DIAMETER						
1	2	3	4	5						
3/8"	1 1/4"	3/8"	3/16"	1/2"						
1/2"	1 3/4"	3/8"	1/4"	5/8"						
3/4"	1 3/4"	3/8"	3/8"	7/8"						
7/8"	1 3/4"	1/2"	7/16"	1"						
1"	2"	1/2"	1/2"	1 1/8"						
OVER 1"	OVER 2"	1/2"	1/2"	1 1/4"						



DOWEL BAR TABLE										
▲ SPACING & SIZE DATA										
(T) SLAB DEPTH	DOWEL DIA.	TOTAL DOWEL LENGTH	C/C DOWEL SPACING							
6" - 8"	1"	18"	12"							
8 1/2" - 10"	11/4"	18"	12"							
10 1/2" & UP	1½"	18"	12"							

DOWEL DIAMETER WILL BE DETERMINED BY THE SLAB DEPTH (T) OR THE NOMINAL DEPTH WHEN SLAB DEPTH VARIES. WHEN NOMINAL DEPTH VALUE IS TO BE USED, THE CALCULATED NOMINAL DEPTH WILL BE SHOWN ON THE PLANS.

GENERAL NOTES

- 1. ALL CONSTRUCTION AND MATERIAL REQUIREMENTS SHALL BE IN ACCORDANCE WITH THE 2019 ODOT STANDARD SPECIFICATIONS.
- 2. ANY DEVICE USED FOR SUPPORTING DOWELS SHALL HAVE SUFFICIENT RIGIDITY AND BE HELD IN PLACE DURING CONCRETE PLACEMENT SO THAT DOWELS WILL BE IN SPECIFIED POSITION IN THE FINISHED PAVEMENT. ANY DEVICE NOT PRODUCING THE SPECIFIED RESULTS SHALL BE REJECTED.
- 3. PRODUCER AND CONTRACTOR SHALL AVOID PATENT INFRINGEMENT OF THE BASKET AND SHALL SAVE THE STATE HARMLESS IN THE USE OF ANY BASKET.
- 4. THE CONTRACTOR MAY SELECT THE TYPE OF BASKET TO BE USED. AFTER THE SELECTION IS MADE, THE SAME TYPE BASKET SHALL BE USED THROUGHOUT THE PROJECT, UNLESS APPROVED OTHERWISE BY THE ENGINEER.
- COLD-DRAWN STEEL WIRE, USED FOR DOWEL BASKETS, SHALL BE ACCEPTED BY VISUAL FIELD INSPECTION, AS PROVIDING SUFFICIENT DOWEL BAR SUPPORT DURING PAVING PROCESS.
- ▲ 6. DOWEL BARS SHALL BE GRADE 60 PLAIN BARS, IN ACCORDANCE WITH SECTION 723.01 OF THE SPECIFICATIONS. DOWEL BARS SHALL BE CENTERED ON THE BASKET REGARDLESS OF THE WIDTH OF THE BASKET OR THE LENGTH OF THE DOWEL BAR.
- 7. THE HEIGHT OF THE LOAD TRANSFER UNIT (MEASURED TO THE CENTER OF THE DOWEL BAR FROM THE PAVEMENT SURFACE) SHALL BE 1/2 THE THICKNESS OF THE PAVEMENT, PLUS OR MINUS 1/2 THE DIAMETER OF DOWEL BAR OF THE UNIT.
- 8. DOWEL BARS SHALL HAVE A SHOP APPLIED EPOXY COATING OVER THEIR ENTIRE LENGTH (ENDS EXCEPTED). ADDITIONALLY, DOWELS SHALL BE COMPLETELY COATED WITH A FORM RELEASE AGENT (OR APPROVED EQUIVALENT BOND BREAKER) APPLIED IN THE FIELD, IMMEDIATELY PRIOR TO PAVING. THE FORM RELEASE AGENT SHALL NOT BE ALLOWED TO EVAPORATE FROM THE BARS PRIOR TO PAVING.
- 9. FOR EXPANSION JOINTS, THE DOWEL BARS SHALL HAVE EXPANSION CAPS WITH A MINIMUM 1" AND A MAXIMUM 2" AIR SPACE IN THE END OF THE EXPANSION CAPS (EXPANSION JOINT ASSEMBLIES).
- 10. THE CONTRACTOR SHALL DEMONSTRATE TO THE ENGINEER A STAKING PATTERN THAT SHALL SECURE ALL DOWEL BASKETS SUCH THAT THE FINAL DOWEL POSITION IS WITHIN SPECIFICATION LIMITS.
- 11. FOR EXPANSION JOINTS, IN ADDITION TO THE SUPPORTS INDICATED, THE CONTRACTOR SHALL PROVIDE SUITABLE INSTALLING DEVICES AND SUCH ADDITIONAL STAKES AS MAY BE REQUIRED TO HOLD THE JOINT FILLER VERTICAL AND SECURELY IN LINE AND POSITION. THE CONTRACTOR WILL ALSO BE REQUIRED TO SATISFACTORILY FORM THE UPPER PORTION OF THE JOINT FOR RECEIVING THE SEAL. SEE ROADWAY STANDARD LECS-5.







1" DIA. DOWELS FOR 6" TO 8" PAVEMENTS 11/4" DIA. DOWELS FOR 81/2" TO 10" PAVEMENTS 1%" DIA. DOWELS FOR 10%" PAVEMENTS OR THICKER.

DETAIL OF DOWEL BAR WITH CAP

GENERAL NOTES

1. ALL CONSTRUCTION AND MATERIALS REQUIREMENTS SHALL BE IN ACCORDANCE WITH THE 2019 ODOT STANDARD SPECIFICATIONS.

2. THE BOND BREAKER SHALL BE A NON WOVEN GEOTEXTILE MEETING THE REQUIREMENTS OF AASHTO M 288 CLASS 1, AND SHALL HAVE A MINIMUM WEIGHT OF 15 OUNCES PER SQ. YD.

3. LONGITUDINAL STEEL REINFORCEMENT MAY BE PLACED WITHIN 1" ABOVE T/2 TO 1/2" BELOW T/2. DIMENSION FOR PLACEMENT IS MEASURED AT THE CENTERLINE OF THE REINFORCING BAR.

4. TYPE 1 TERMINAL JOINT ONLY TO BE USED BETWEEN CRCP CONTRACTS AND/OR WHERE THE PAVING OPERATION IS DELAYED SEVEN OR MORE DAYS. THE CONTRACTOR SHALL PROTECT THE EXPOSED END OF PAVEMENT AND SLEEPER SLAB FROM PERMANENT DAMAGE DURING ALL WORK STOPPAGES IN A MANNER APPROVED BY THE ENGINEER.

5. TYPE 2 TERMINAL JOINT TO BE USED WHEN CRCP PAVEMENT TERMINATES AT LOCATIONS OTHER THAN AT BRIDGES. TRANSITION SLAB MAY BE TEMPORARY OR PERMANENT.

6. THE 15 FOOT TRANSITION SECTION OF REINFORCED PAVEMENT ADJACENT TO THE TYPE 2 TERMINAL JOINT SHALL BE PAID FOR AS CONTINUOUSLY REINFORCED CONCRETE PAVEMENT.

7. THE TRANSITION SLAB SHALL BE REINFORCED WITH THE SAME SIZE BARS AND SPACED THE SAME AS THE CONTINUOUSLY REINFORCED CONCRETE PAVEMENT. SEE PLANS FOR VALUE OF PAVEMENT THICKNESS "T'

* 8. THE LONGITUDINAL REINFORCING STEEL SHALL HAVE 3" TO 4" OF CONCRETE COVER BETWEEN THE END OF THE REINFORCING STEEL AND THE JOINT OPENING FACE.

9. SLEEPER SLAB SHALL EXTEND 2'-0" BEYOND THE OUTSIDE LATERAL EDGES OF THE CRCP PAVED LANES.

10. COST OF LOAD TRANSFER DEVICE RETROFIT TO BE INCLUDED IN OTHER ITEMS OF WORK.

BASIS OF PAYMENT							
ITEM NO.	ITEM	UNIT					
414 ()	TERMINAL JOINT	EA					
414 (J)							
	HEDULE OF TYPE 1, TYPE 2 AND/OR TYPE 3						

	GENERA	L SEQUENCE OF PAVEMENT REPA	IR
(1)			
(1)		AL OF FULL DEDTH DATCHES, SAWING IS TO BE	
(Z)	DEPTH. LIFT	OUT DAMAGED PAVEMENT WHENEVER PRACTI	CAL.
(3)	TO PATCHIN MILE.	IF TRAFFIC MAY BE RESTRICTED TO ONE LANEL IGOPERATION FOR A MAXIMUM DISTANCE OF O	NE
	STEP 2	2 DOWEL BAR RETROFIT INSTALLATION	
(1)	INSTALL DO CONSIST OF APART, AND	WEL BARS AS SHOWN. BAR PLACEMENT SHALL ⁵ 3 BARS PER WHEEL PATH, PLACED 12" TO 15" ¹ 18" FROM EDGE OF DRIVING LANE.	
(2)	DOWEL BAR LONGITUDIN	S SHALL NOT BE PLACED ON TOP OF A IAL CRACK.	
(3)	PAYMENT FOR DOWEL	OR 'DOWEL BAR RETROFIT' SHALL ONLY BE MAD S PLACED BY THE PROCESS OF CUTTING A SLO	DE T.
(4)	IF SLOTS AF SAW CUTS S	E SAWED BUT NOT RETROFITTED WITH A BAR, SHALL BE CLEANED AND SEALED WITH AN EPOX	THE Y RESIN.
	STEP 3 D	AMOND GRINDING CONCRETE PAVEMENT	
(1)	AFTER SLAE	STABILIZATION AND/OR DOWEL BAR RETROFI ON, & APPROPRIATE CURE TIME HAS BEEN D. GRINDING OPERATIONS MAY BEGIN.	т
		STEP 4 CONCRETE JOINT SEALING	
(1)	CUT SHALL	BEGIN AT THE LOW EDGE OF THE NES AND MOVE TOWARD THE INITIAL JOINT.	
(2)	INSTALLATI SHALL BE FF EDGE OF TH	ON OF BOND BREAKER AND SILICONE JOINT SEA ROM THE END OF THE INITIAL JOINT TO THE LOW E DRIVING LANES.	ALANT /
		GENERAL NOTES	
1.	ALL CONSTR ACCORDAN	RUCTION AND MATERIAL REQUIREMENTS SHALL CE WITH THE 2019 ODOT STANDARD SPECIFICA	. BE IN TIONS.
2.	COST OF SA	WING AND REMOVAL OF PAVEMENT FOR FULL D	EPTH
	INCIDENTAL IN THE PRICI UNLESS OTH	SOST OF DOWEL BARS, THE BARS AND ANY/ALL S REQUIRED FOR INSTALLATION SHALL BE INCL E BID FOR FULL DEPTH PCC PATCH (PLACEMENT FERWISE SHOWN ON THE PLANS.	.UDED ſ),
3.	HIGH EARLY	STRENGTH (HES) CONCRETE, WHEN USED FOR	FULL PAVEMEN
4.	BID ITEM FO WILL INCLUE SILICONE SE	R CONCRETE JOINT SEALING (JOINT REHABILIT/ DE SAWING, CLEANING OF JOINT, BACKER ROD, ALANT AND ANY/ALL INCIDENTALS REQUIRED	ATION) TO
5.	FOR SKEWE	D TRANSVERSE JOINTS, DOWEL BARS SHALL AL	WAYSBE
	TEACEDTA		
	1		
	ITEMNO	BASIS OF PAYMENT	1
	$202(\Lambda)$		
	414 (F)	FULL DEPTHP C C PATCH (PLACEMENT)	SY
	414 (G)	P. C. CONCRETE FOR PAVEMENT	CY
	415	CONCRETE JOINT SEALING	I F
	416		FA
	425		
	420		51
	425	DIAMOND GRINDING CONCRETE PAVEMENT	SY
	4000	OVED BY	
/	ROAD	WAY ENGINEER:	DATE: 6/30
		ROADWAY DESIGN DIVISION STAN	DARD
		PORTLAND CEMENT CONC	RETE
	OK		
7	Tra	2019 SPE	

Transportation

PCPR-4

- ACCORDANCE WITH THE 2019 ODOT STANDARD SPECIFICATIONS.
- CONCURRENT WITH THE INSTALLATION OF PAVEMENT EDGE DRAIN.
- 4. OUTLET ELBOWS (90°) SHALL BE USED WHEN PIPE EDGE DRAIN SLOPE EXCEEDS TWO (2) PERCENT.
- 5. CONNECTION OF THE OUTLET LATERAL PIPE TO THE OUTLET FITTING SHALL BE DONE IN A MANNER APPROVED BY THE ENGINEER. COST OF ALL CAPS, FITTINGS, LATERAL PIPE, BONDING MATERIALS, RODENT SCREENS, TRENCHING AND BACKFILLING NEEDED TO INSTALL OUTLET ATERAL PIPE SHALL BE INCLUDED IN THE PRICE BID FOR EDGE DRAIN
- 6. EDGE DRAINS AND OUTLET LATERALS SHALL BE LOCATED ON LOW SIDE OF SUPER ELEVATED SECTIONS AT CURVES. OUTLET LATERALS ARE TO BE PLACED AT 300' INTERVALS ON GRADE OR AS APPROVED
- 7. PRICE BID FOR OUTLET LATERAL HEADWALL INCLUDES SURFACE PREPARATION, CLASS A CONCRETE, LABOR AND ANY INCIDENTALS
- OF SECTION 701.06 OF THE SPECIFICATIONS, AGGREGATE NO. 57. COST OF AGGREGATE COVER MATERIAL TO BE INCLUDED IN
- 10. DETAILS ON THIS SHEET ARE BASED ON 6" DIA. EDGE DRAIN CONDUIT. THE CONTRACTOR SHALL MAKE ALL NECESSARY ADJUSTMENTS TO ACCOMMODATE OTHER SIZE EDGE DRAINS.

BASIS OF PAYMENT							
ITEM NO.	ITEM	UNIT					
613 (J)	EDGE DRAIN CONDUIT - PERFORATED	LF 🗍					
613(K)	EDGE DRAIN OUTLET LATERAL - NONPERFORATED	LF					
613 (Q)	OUTLET LATERAL HEADWALL	EA					

WE 6/30/22 ROADWAY DESIGN DIVISION STANDARD PAVEMENT EDGE DRAIN OKLAHOMA 2.5 2019 SPECIFICATIONS Transportation

PED-4

SAFETTEDGE WIDTH										
v	X (2% S	SLOPE)	Х							
I	2%	-2%	(-4% SLOPE)							
IN	IN	IN	IN							
0.50	0.86	0.88	0.89							
0.75	1.28	1.31	1.33							
1.00	1.71	1.75	1.77							
1.50	2.57	2.63	2.66							
2.00	3.42	3.50	3.54							
2.50	4.28	4.38	4.43							
3.00	5.14	5.26	5.31							
3.50	5.99	6.13	6.20							
4.00	6.85	7.01	7.08							
4.50	7.70	7.88	7.97							
5.00	8.56	8.76	8.85							

 $X = \frac{Y \times SIN(B)}{SIN(A)}$

CALCULATE X USING 30° FOR ANGLE A.

■ SEE TYPICAL SECTION FOR DIMENSIONS AND SLOPES.

SAFETY EDGE DETAILS (A-C) • VARIES BETWEEN 2" AND 5" WITH A MAXIMUM 5" HEIGHT ● 30°±5° (ANGLE IS MEASURED FROM SLOPED EDGE OF SHOULDER)

TYPICAL SECTION VIEW OF AN ASPHALT PAVEMENT SAFETY EDGE NOTE: SAFETY EDGE SHALL BE INSTALLED ON SHOULDERS OF WIDTH 4'-0" OR LESS.

GENERAL NOTES

- 1. ALL CONSTRUCTION AND MATERIAL REQUIREMENTS SHALL BE IN ACCORDANCE WITH THE 2019 ODOT STANDARD SPECIFICATIONS.
- 2. SAFETY EDGE SHALL BE CONSTRUCTED IN UNION WITH THE ASPHALT CONCRETE PAVEMENT.
- 3. THE SAFETY EDGE, AS SHOWN, CAN BE APPLIED TO NEW CONSTRUCTION AND TO OVERLAYS OF AT LEAST 2".
- 4. INSTALLATION OF SAFETY EDGE IS NOT REQUIRED IN CURB AND GUTTER AREAS.
- 5. ALL SAFETY EDGES MUST MEET THE APPROVAL OF THE ENGINEER. THE ENGINEER MAY REQUIRE PROOF THAT THE SYSTEM HAS BEEN USED ON PREVIOUS PROJECTS WITH ACCEPTABLE RESULTS OR MAY REQUIRE THAT A TEST SECTION BE CONSTRUCTED PRIOR TO THE BEGINNING OF WORK TO DEMONSTRATE THAT THE EDGE SHAPE AND COMPACTION IS TO THE SATISFACTION OF THE ENGINEER.
- 6. PRIOR TO PAVING SAFETY EDGE, GRADE AN AREA 10" WIDE BEGINNING AT EDGE OF PAVED SHOULDER TO PROVIDE A LEVEL SURFACE FREE OF VEGETATION. 1) - 12

	1 100	A 21	
	APPROVED BY ROADWAY ENGINEER:	DATE	. 6/30/22
(ROADWAY DESIGN D	VISION STANDAR	D
	PAVEMENT SA	AFETY EDGE	
		2019 SPECIFIC	ATIONS
		PSE-2	1

- 1. ALL CONSTRUCTION AND MATERIAL REQUIREMENTS SHALL BE IN ACCORDANCE WITH THE 2019 ODOT STANDARD SPECIFICATIONS.
- 2. ALL FEATURES OF TACTILE WARNING DEVICE DESIGN AND FINAL INSTALLATION SHALL COMPLY WITH THE PUBLIC RIGHT-OF-WAY ACCESSIBILITY GUIDELINES (PROWAG). WHERE SPATIAL LIMITATIONS OR EXISTING FEATURES WITHIN THE LIMITS OF THE PROJECT PREVENT FULL COMPLANCE WITH THE PROWAG. THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER UPON DISCOVERY OF SUCH FEATURE(S). THE CONTRACTOR SHALL NOT PROCEED WITH ANY ASPECT OF THE WORK WHICH IS NOT IN FULL COMPLIANCE WITH THE PROWAG WITHOUT PRIOR WRITTEN APPROVAL FROM THE ENGINEER. ANY WORK WHICH IS NOT PERFORMED WITHIN THE GUIDELINES OF THE PROWAG, FOR WHICH THE CONTRACTOR DOES NOT HAVE WRITTEN APPROVAL, SHALL BE CORRECTED AT THE CONTRACTOR'S EXPENSE.
- 3. TACTILE WARNING SURFACE SHALL EXTEND FROM EDGE TO EDGE OF WALKWAY ENTERING THE CROSSWALK, AT STREET LEVEL.
- 4. CURB IS NOT SHOWN IN THE SECTION X-X DETAIL ON THIS SHEET.
- 5. THICKNESS 'T' OF PAVEMENT ABUTTING SIDEWALK/RAMP VARIES.
- SIDEWALK, RAMP AND FLARE THICKNESS SHALL BE 4" MINIMUM THICKNESS AFTER INSTALLATION OF TACTILE WARNING TREATMENT.
- 7. TRUNCATED DOME SURFACE SHALL CONTRAST VISUALLY WITH THE ADJOINING WALKING SURFACES EITHER LIGHT-ON-DARK, OR DARK-ON-LIGHT. THE MATERIAL USED TO PROVIDE CONTRAST SHALL BE AN INTEGRAL PART OF THE TRUNCATED SURFACE.
- 8. LEVELING SAND FOR DOMED BRICK SYSTEMS SHALL MEET THE REQUIREMENTS OF SECTION 703.06B(2) OF THE SPECIFICATIONS.
- 9. SURFACE BONDED TACTILE SYSTEMS MAY ONLY BE PLACED ON NEWLY POURED CONCRETE AFTER AN APPROPRIATE PERIOD OF CURING, IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATIONS AND AS DIRECTED BY THE ENGINEER.
- 10. ROWS OF TACTILE DOME TREATMENT SHOULD BE ORIENTED PARALLEL WITH CENTERLINE OF SIDEWALK/RAMP OR TOWARD THE CENTERLINE OF MARKED CROSSWALK.
- 11. EXPANSION JOINTS DEEMED NECESSARY, BUT NOT SHOWN ON THE PLANS, MAY BE ADDED AND PLACED DURING CONSTRUCTION, AS DIRECTED BY THE ENGINEER.
- 12. TACTILE SYSTEMS, DOME PATTERNS OR FEATURES DIFFERING FROM THOSE SHOWN ON THIS DETAIL, BUT MEETING CURRENT PROWAG SPECIFICATIONS, SHALL BE SUBMITTED TO AND APPROVED BY THE ENGINEER BEFORE INSTALLATION.
- 13. THE SAME TACTILE DOME PATTERN AND COLOR SHALL BE USED THROUGHOUT ANY NEW OR RETROFIT PROJECT. DOME PATTERN AND LOCATION OF EXISTING RAMPS TO BE RETROFIT WITH TACTILE DEVICES SHALL BE DESIGNATED ON THE PLANS OR AS DIRECTED BY THE ENGINEER.
- 14. RETROFIT INSTALLATIONS WILL NOT REQUIRE REPLACING EXISTING DEPRESSED CURBING. A NOMINAL 6 TO 8 INCH SETBACK FROM FACE OF CURB SHALL BE ENFORCED FOR NEAR EDGE OF TACTILE DOMES.
- 15. TYPES A & B TACTILE SYSTEMS SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 10,000 PSI. TYPES C & D SYSTEMS SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 2000 PSI. COMPRESSIVE TESTS MEET ASTM D695.
- 16. TACTILE WARNING SURFACES MAY NOT BE STAMPED IN WET CONCRETE.

11										
BASIS OF PAYMENT										
ITEM NO.	ITEM NO. ITEM UNIT									
610(1)	TACTILE WARNING DEVICE - NEW		SF							
610(1)	TACTILE WARNING DEVICE - RETROFIT		SF							
NOTE: TYPE A OR B TACTILE WARNING DEVICE SHALL BE SPECIFIED ON THE PLANS FOR NEW CONSTRUCTION & TYPE C OR D SHALL BE SPECIFIED ON THE PLANS FOR RETROFIT CONSTRUCTION.										
APPROVED BY ROADWAY ENGINEER:										
	Transportation	 		2						
		I	ND-2	2						
				R-26						

	SCHEDULE OF DIMENSIONS AND REINFORCING STEEL																										
PIPE STANDARD TYPE OF T DIAMETER DEPTH INLET (A BA	RS (IN	² /FT)					A	HBARS	G (IN ² /F	T) ()											
	GRATE	ATE KNOCK OUT	OCK OUT X	х	х	х	х	х	х	х	х	х	Х	х	ХҮ		DEPTH		DEPTH								
			DIAMETER			≤5'	≤10'	≤15'	4'	5'	6'	7'	8'	9'	10'	11'	12'	13'	14'	15'							
18" & 24"	3'-2"	TYPE 1 OR 2	TYPE 1 OR 2	2'-6"	2'-8"	2'-6"	0.17	0.21	0.26	0.12	0.12	0.12	0.13	0.14	0.15	0.17	0.18	0.20	0.21	0.23	0.24						
30"	4'-3"	TYPE 2B	TYPE 1B OR 2B	3'-8"	3'-8"	3'-8"	0.20	0.27	0.34	0.19	0.22	0.25	0.28	0.31	0.35	0.38	0.41	0.45	0.48	0.52	0.55						

REINFORCING STEEL VALUES LISTED IN "SCHEDULE OF DIMENSIONS AND REINFORCING STEEL" ARE MINIMUM VALUES. STRUCTURES THAT PROVIDE VALUES LARGER THAN THOSE SHOWN WILL BE CONSIDERED ACCEPTABLE.

① SECTIONS WITHOUT A THIN WALL KNOCK OUT AND A MINIMUM THICKNESS OF 6" MAY USE AN AREA OF REINFORCING STEEL EQUAL TO 0.13 IN²/FT

DESIGN DATA

MATERIAL: CLASS A CONCRETE f'c = 4 KSI REINFORCING STEEL fy = 60 KSI

LOADING: HL-93

DESIGN:

AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 7TH EDITION ASTM C890 ASTM C913

GENERAL NOTES

- 1. ALL CONSTRUCTION AND MATERIAL REQUIREMENTS SHALL BE IN ACCORDANCE WITH THE 2019 ODOT STANDARD SPECIFICATIONS.
- 2. STANDARD DEPTH IS AS SHOWN. COST OF ALL MATERIALS FOR ADDITIONAL DEPTH SHALL BE INCLUDED IN THE PRICE BID FOR THE INLET. INLET ADDITIONAL DEPTH DATA SHALL BE NOTED ON THE PLANS.
- 3. THERE SHALL BE A MINIMUM VERTICAL DISTANCE OF 6" BETWEEN OPENINGS AND THE TOP EDGE.
- 4. PROVIDE LIFTING DEVICES IN CONFORMANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.
- 5. PROVIDE GRADE 60 REINFORCING STEEL CONFORMING TO ASTM A615 OR EQUIVALENT AREA OF WELDED WIRE REINFORCING CONFORMING TO ASTM A1064.
- 6. PROVIDE A MINIMUM CLEAR COVER OF 11/2" TO REINFORCING STEEL
- 7. WALLS OR SLABS WITH A THICKNESS OF 8" OR GREATER REQUIRE A SECONDARY LAYER OF REINFORCING STEEL. PROVIDE AN AREA OF STEEL EQUAL TO 0.11 IN²/FT **ΕΔCH WΔY**
- 8. DESIGN TONGUE AND GROOVE JOINTS FOR FULL CLOSURE ON BOTH SHOULDERS. MINIMUM SPIGOT DEPTH IS 3/4".
- 9. SEAL TONGUE AND GROOVE JOINTS WITH PREFORMED OR BULK MASTIC IN CONFORMANCE WITH THE MANUFACTURER'S RECOMMENDATIONS. TONGUE AND GROOVE JOINTS MAY BE GROUTED NO MORE THAN 1" BETWEEN EACH SECTIONS OR 1/2 THE JOINT DEPTH, WHICHEVER IS GREATER. JOINT SEALING SHALL BE INCLUDED IN COST OF STRUCTURE.
- 10. DO NOT GROUT RUBBER GASKET JOINTS WITHOUT THE MANUFACTURER'S RECOMMENDATIONS.
- 11. THE FOUNDATION SHALL BE STABILIZED OR REMOVED AND REPLACED WITH FIRM AND STABLE FOUNDATION MATERIAL. A MINIMUM 3" THICK LEVELING COURSE SHALL BE PROVIDED BELOW THE BASE AREA OF THE INLET AND EXTEND 6" BEYOND THE BASE AREA. THE LEVELING COURSE SHALL BE CONSTRUCTED WITH AGGREGATE BASE TYPE A. COSTS ASSOCIATED WITH THE FOUNDATION AND LEVELING COURSES SHALL BE INCLUDED IN THE PRICE **BID OF THE STRUCTURE**
- 12. THIN WALL KNOCKOUTS MAY BE CAST AT THE MANUFACTURER'S DISCRETION.
- 13. REFER TO PROJECT PLAN SHEETS FOR NUMBER, LOCATION, AND SIZE OF PIPE.
- 14. FLEXURAL REINFORCING STEEL SHALL NOT EXCEED SPACING OF 6" CENTER TO CENTER.

LEVELING COURSE SHALL BE 3" MIN.

	BASIS OF PAYMENT	
ITEM NO.	ITEM	UNIT
611(G)	PRECAST INLET (SMD - TYPE 1)	EA.
611(G)	PRECAST INLET (SMD - TYPE 2)	EA.
611(G)	PRECAST INLET (SMD - TYPE 2B)	EA.

ENGTH	6	APRON REINF.	APRON CLASS C
X	Y	STEEL	CONCRETE
FT IN.	FT IN.	LB.	C.Y.
3 - 7¾	3 - 57/8	57	0.83
3 - 7¾	4 - 1	59	0.87
4 - 8	4 - 8	66	0.99
E APRON			

	SMD INLET BAR LIST											
1	BAR	SIZE	NO.	SHAPE	LENGTH	SPACE						
- 1		TY	PE 1 - 18	" OR 24" I	RCP OR CGSF	2						
1	Α	#4	5	BENT	11'-10"	6" C/C						
1	В	#4 15 BENT 2'-113⁄4" 9"										
-1	C #5 7 STR. 3'-178" 6" C/C											
1	D #5 6 STR. 3'-3¾" 6" C/C											
- 1		TYI	PE 2 - 18	" OR 24"	RCP OR CGSI	P						
	Α	#4	6	BENT	11'-10"	6" C/C						
1	В	#4	16	BENT	3'-6¼"	9" C/C						
1	С	#5	7	STR.	3'-1%"	6" C/C						
1	D	#5	6	STR.	3'-3¾"	6" C/C						
-1		TYPE	2A - 18",	24" OR 3	0" RCP OR C	GSP						
зł	Α	#4	7 -	BENT	12'-11½"	6" C/C						
1	В	#4	18	BENT	4'-1"	9" C/C						
-1	С	#5	7	STR.	3'-3¾"	6" C/C						
1	D	#5	7	STR.	3'-7"	6" C/C						
1		TYPE 2	3 - 18",2·	4",30" OR	36" RCP OR (CGSP						
- 1	Α	#4	8	BENT	16'-2"	6" C/C						
1	В	#4	20	BENT	4'-7"	9" C/C						
1	С	#5	7	STR.	4'-4"	6" C/C						
1	D	#5	8	STR.	4'-4"	6" C/C						
		GR	ATES - (OVERALL	DIMENSION	S						
		TYP		TE: 3'-	1/2" x 2'-11%"							
		TYP	= 2 GRA	TE 3'-	1 ¹ / ₄ " x 2'-11 ³ / ₄ "							
		TYPE	= 1 1 2 1	GRATE	3'-1¼" x 3'	-6%"						
		TYP	= 18 28	GRATE	1'-1%" × 1	-1%"						
			01/1	FOR T	- 1 1/2 A -	1/2						
		vv =	8/4"	FURIN	PE 2							
		VV =	9"	FURIN	PE 2A & 2B							
			PIPEG	RATEM	ATERIAL							
		21/2"	I.D. ST	D. WEIGH	IT STEEL PIP	E						

TYPE 1B GRATE	
DIMENSIONS	NO.
³ %" DIA. x 4'-1½"	14
3½" x ¼" x 4'-1½"	2
4" x ¼" x 4'-1"	22
	TYPE 1B GRATE DIMENSIONS %" DIA. x 4'-1½" 3½" x ¼" x 4'-1½" 4" x ¼" x 4'-1½"

END PLATE CROSS BARS C AT 4" CTRS. BEARING PLATES AT	3'-6½" GRATE TYPE 1A 4'-1½" GRATE TYPE 1B
PLATES AT 2 [%] " CTRS.	
GRATE T SLOTTED T BOLTS	O BE TO FIT S.

ES	ADD'L SMD DEPTH PER VERT. FT.						
	-	1 PIPE	2 PIPES			DEINE	
DESIGNATED PIPE SIZE	OF GRATE	CLASS A CONC.	CLASS A CONC.	STEEL	CLASS A CONC.	STEEL	
	ONATE	CY	CY	LB.	CY	LB	
18" RCP	1 OR 2	0.75	0.67	115	0.23	27	
24" RCP	1 OR 2	0.85	0.76	129	0.23	27	
30" RCP	1A OR 2A	1.06	0.96	160	0.25	29	
36" RCP	1B OR 2B	1.52	1.38	211	0.31	35	

BASIS OF PAYMENT							
ITEM. NO.	ITEM	UNIT					
611 (G)	INLET (SMD-TYPE 1)	EA					
611 (G)	INLET (SMD-TYPE 2)	EA					
611 (G)	INLET (SMD-TYPE 2A)	EA					
611 (G) INLET (SMD-TYPE 2B)							

ALL CONSTRUCTION AND MATERIAL REQUIREMENTS SHALL BE IN ACCORDANCE WITH THE 2019 ODOT STANDARD SPECIFICATIONS.

QUANTITIES SHOWN IN TABLE B ARE FOR ONE END ONLY. CLASS A CONCRETE SHALL CONFORM TO THE MINIMUM REQUIREMENTS OF SECTION 509 OF THE ODOT SPECIFICATIONS

TYPES A4 THROUGH E4 END TREATMENTS, AS SHOWN IN TABLE B, MAY BE USED WITH ANY AASHTO DESIGNATED METAL, ALUMINUM AND CONCRETE PIPE SIZES, AS SHOWN IN TABLE A. END TREATMENT QUANTITIES ARE BASED ON METAL PIPE DIMENSIONS, NO PIPE WALL THICKNESS AND SMALLEST LISTED CULVERT ROUND OR ARCH WITHIN SAME TYPE.

COAT THE FIELD OR SHOP CUT EDGES OF THE METAL PIPE CULVERT WITH TWO COATS OF COLD GALVANIZATION. COAT THE FIELD OR SHOP CUT EDGES OF THE CONCRETE PIPE CULVERT WITH CONCRETE OR AN APPROVED CORROSION INHIBITOR. IF THE PIPE CULVERT IS CUT AFTER THE CONSTRUCTION OF THE CULVERT END TREATMENT, THE CONTRACTOR SHALL ALLOW SUFFICIENT TIME FOR THE PROPER CURING OF THE CONCRETE. INCLUDE THE COST OF CUTTING AND COATING IN THE PRICE BID FOR THE METAL AND/OR CONCRETE PIPE CULVERT.

IN THE PRICE BID FOR THE CONCRETE. INCLUDE THE COST OF CONTINUE AND COATING IN THE PRICE BID FOR THE METAL AND/OR CONCRETE PIPE CULVERT. ALL SIZES OF CULVERT PIPE WILL BE CUT ON 1 TO 4 SLOPE. PIPE FOR SAFETY GRATES SHALL BE 3" x 7.58 LBS./FT. STANDARD WEIGHT STEEL PIPE, SCHEDULE 40. IT SHALL BE FURNISHED GALVANIZED, PLAIN END AND SHALL MEET THE MINIMUM REQUIREMENTS OF ASTM A53 (HYDROSTATIC TESTS MAY BE WAIVED) OR ASTM F1083. COST OF GRATES TO BE INCLUDED IN PRICE BID FOR THE CULVERT END TREATMENT.

ANY GALVANIZED AREA(S) OF METAL PIPE DISTRESSED DURING THE POST FABRICATION AND/OR HANDLING PROCESS SHALL BE COATED WITH AN APPROVED ZINC-RICH PAINT.

REINT. REINFORCING STEEL AND PIPE GRATE GUIDES SHALL BE NO. 4 DEFORMED BARS. COST OF STEEL SHALL BE INCLUDED IN PRICE BID FOR THE CULVERT END TREATMENT. CRITERIA FOR USE OF PIPE SAFETY GRATE MEMBERS:

 (A) ALL SIDE DRAIN AND MULTIPLE PIPE INSTALLATIONS WITHIN THE CLEAR ZONE.
 (B) ALL CROSS DRAIN INSTALLATIONS WITH A CULVERT SPAN OF 30" OR LARGER WITHIN THE CLEAR ZONE.

 ALL INSTALLATIONS OUTSIDE THE CLEAR ZONE WHERE HAZARD POTENTIAL IS HIGH BASED ON TRAFFIC DIRECTION, SPEED, VOLUME, AND SIZE OF CULVERT.
 NOTE: ANALYZE HYDRAULIC PERFORMANCE AT VARYING DEGREES OF CLOGGING AND APPLY RISK ASSESSMENT BEFORE USING GRATES.

ANCHOR END OF PIPE GRATE MEMBERS SHALL BE HELD IN PLACE WITH A 1/2" x 5 1/2" GALVANIZED BOLT, NUT AND WASHER. THREADS, 1 3/4" (NOM.) SHALL REMAIN EXPOSED FOR INSTALLING GRATE, WASHER AND NUT. ALL BOLTS, NUTS AND WASHERS SHALL CONFOM TO ASTM A307 WITH COST TO BE INCLUDED IN THE PRICE BID FOR THE CULVERT END TREATMENT.

CULVERT END TREATMENT. FOR TOTAL QUANTITY OF EXTRA DEPTH TOE WALL, MULTIPLY WIDTH B (TABLE B) TIMES 0.0185 FOR EACH FOOT OF DEPTH OF TOE WALL REQUIRED. PAYMENT TO BE INCLUDED IN PRICE BID FOR THE CULVERT END TREATMENT.

PRECAST CULVERT END TREATMENTS OR OTHER ALTERNATIVE DESIGNS MAY BE USED IF APPROPRIATE DRAWINGS ARE SUBMITTED TO AND APPROVED BY THE ENGINEER.

		BASIS OF PAY	MENT		
	ITEM NO.	ITEM		UNIT	
	613 (M)	CULVERT END	D TREATMENT	EA	
	 SPECIFY (EXAMPL 	Y TYPE OF END TREAT	MENT END TREATMENT)	
	CET ORI BE SPEC (SEE TYP)	ENTATION AND SAFE FIED ON THE SUMMAI CAL ABBREVIATIONS	TY GRATE REQUIF RY OF DRAINAGE	REMENTS SHALL STRUCTURES.	
			1) 1	10	
	AP		KE DU	DATE	6/30/22
o		CL SIN	JLVERT END T	REATMENT	
-		KLAHOMA	1104 SAFET	T SLOPE	
	Tr	ransportation		2019 SPECIFIC	ATIONS
		•		CET4S-4	2
					R-30

ALL CONSTRUCTION AND MATERIAL REQUIREMENTS SHALL BE IN ACCORDANCE WITH THE 2019 ODOT STANDARD SPECIFICATIONS

QUANTITIES SHOWN IN TABLE B ARE FOR ONE END ONLY. CLASS A CONCRETE SHALL CONFORM TO THE MINIMUM REQUIREMENTS OF SECTION 509 OF THE ODOT SPECIFICATIONS.

TYPES A6 THROUGH E6 END TREATMENTS, AS SHOWN IN TABLE B, MAY BE USED WITH ANY AASHTO DESIGNATED METAL, ALUMINUM AND CONCRETE PIPE SIZES, AS SHOWN IN TABLE A. END TREATMENT QUANTITIES ARE BASED ON METAL PIPE DIMENSIONS, NO PIPE WALL THICKNESS AND SMALLEST LISTED CULVERT ROUND OR ARCH WITHIN SAME TYPF

COAT THE FIELD OR SHOP CUT EDGES OF THE METAL PIPE CULVERT WITH TWO COATS OF COLD GALVANIZATION. COAT THE FIELD OR SHOP CUT EDGES OF THE CONCRETE PIPE CULVERT WITH CONCRETE OR AN APPROVED CORROSION INHIBITOR. IF THE PIPE CULVERT IS CUT AFTER THE CONSTRUCTION OF THE CULVERT END TREATMENT, THE CONTRACTOR SHALL ALLOW SUFFICIENT TIME FOR THE PROPER CURING OF THE CONCRETE. INCLUDE THE COST OF CUTTING AND COATING IN THE PRICE BID FOR THE METAL AND/OR CONCRETE PIPE CULVERT. ALL SIZES OF CULVERT PIPE WILL BE CUT ON 1 TO 6 SLOPE. PIPE FOR SAFETY GRATES SHALL BE 3" x 7.58 LBS./FT. STANDARD WEIGHT STEEL PIPE,

SCHEDULE 40. IT SHALL BE FURNISHED GALVANIZED, PLAIN END AND SHALL MEET THE MINIMUM REQUIREMENTS OF ASTM A53 (HYDROSTATIC TESTS MAY BE WAIVED) OR ASTM F1083. COST OF GRATES TO BE INCLUDED IN PRICE BID FOR THE CULVERT END TREATMENT

ANY GALVANIZED AREA(S) OF METAL PIPE DISTRESSED DURING THE POST FABRICATION AND/OR HANDLING PROCESS SHALL BE COATED WITH AN APPROVED ZINC-RICH PAINT

REINFORCING STEEL AND PIPE GRATE GUIDES SHALL BE NO. 4 DEFORMED BARS. COST OF STEEL SHALL BE INCLUDED IN PRICE BID FOR THE CULVERT END TREATMENT. CRITERIA FOR USE OF PIPE SAFETY GRATE MEMBERS:

- ALL SIDE DRAIN AND MULTIPLE PIPE INSTALLATIONS WITHIN THE CLEAR ZONE. (A)
- (B) ALL CROSS DRAIN INSTALLATIONS WITH A CULVERT SPAN OF 30" OR LARGER WITHIN THE CLEAR ZONE

ALL INSTALLATIONS OUTSIDE THE CLEAR ZONE WHERE HAZARD POTENTIAL (C) IS HIGH BASED ON TRAFFIC DIRECTION, SPEED, VOLUME, AND SIZE OF CULVERT. NOTE: ANALYZE HYDRAULIC PERFORMANCE AT VARYING DEGREES OF CLOGGING AND APPLY RISK ASSESSMENT BEFORE USING GRATES.

ANCHOR END OF PIPE GRATE MEMBERS SHALL BE HELD IN PLACE WITH A 1/2" x 5 1/2" GALVANIZED BOLT, NUT AND WASHER. THREADS, 1 3/4" (NOM.) SHALL REMAIN EXPOSED FOR INSTALLING GRATE, WASHER AND NUT. ALL BOLTS, NUTS AND WASHERS SHALL CONFORM TO ASTM A307 WITH COST TO BE INCLUDED IN THE PRICE BID FOR THE CULVERT END TREATMENT.

FOR TOTAL QUANTITY OF EXTRA DEPTH TOE WALL, MULTIPLY WIDTH B (TABLE B) TIMES 0.0185 FOR EACH FOOT OF DEPTH OF TOE WALL REQUIRED. PAYMENT TO BE INCLUDED IN PRICE BID FOR THE CULVERT END TREATMENT.

PRECAST CULVERT END TREATMENTS OR OTHER ALTERNATIVE DESIGNS MAY BE USED IF APPROPRIATE DRAWINGS ARE SUBMITTED TO AND APPROVED BY THE ENGINEER.

		BASIS OF PA	YMENT		
	ITEM NO.	ITEM		UNIT	
	613 (M)	CULVERT END T	REATMENT	EA	
	 SPECIFY TYP (EXAMPLE: CET ORIENT/ BE SPECIFIEI (SEE TYPICA) 	PE OF END TREATMENT TYPE B6 CULVERT END ATION AND SAFETY GI D ON THE SUMMARY O AL ABBREVIATIONS.)	T TREATMENT) RATE REQUIREMEN' F DRAINAGE STRUC	TS SHALL TURES.	
	APP ROA	ROVED BY ADWAY ENGINEER: ROAD	HED DE	DAT SION STANDAI	e: <i>6/30/22</i> RD
		CL SII KLAHOMA ansportation	JLVERT END TI NGLE PIPE INST 1 TO 6 SAFET	REATMENT ALLATION Y SLOPE 2019 SPECIFI	CATIONS
			[CET6S-4	2
_			· · · · ·		D 21

	DIMENSIONS OF END SECTIONS FOR ROUND METAL PIPE														
PIPE DIA.	GA. A B H L W APPROX. SLOPE														
12"	16	6"	6"	6"	21"	24"	1:2 1/2	1PC.							
15"	16	7"	8"	6"	26"	30"	1:2 1/2	1 PC.							
18"	16	8"	10"	6"	31"	36"	1:2 1/2	1 PC.							
21"	16	9"	12"	6"	36"	42"	1:2 1/2	1 PC.							
24"	16	10"	13"	6"	41"	48"	1:21/2	1 PC.							
30"	14	12"	16"	8"	51"	60"	1:2 1/2	1 PC.							
36"	14	14"	19"	9"	60"	72"	1:2 1/2	2 PC.							
42"	12	16"	22"	11"	69"	84"	1:2 1/2	2 PC.							
48"	12	18"	27"	12"	78"	90"	1:2 ¹ /4	2 PC.							
54"	12	18"	30"	12"	84"	102"	1 2	2 PC.							
60"	12	18"	33"	12"	87"	114"	1:1 3/4	3 PC.							
66"	12	18"	36"	12"	87"	120"	1:1 1/2	3 PC.							
72"	12	18"	39"	12"	87"	126"	1:1 1/3	3 PC.							
78"	12	18"	42"	12"	87"	132"	1:1 1/4	3 PC.							
84"	12	18"	45"	12"	87"	138"	1:1 ¹ /6	3 PC.							

SKIRT PLATE

TOEPLATE

HOLES ON 12"C/C

ARCH METAL PIPE END SECTION

END VIEW

PIPE - ARCH SIZES.

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TYPICAL METAL END SECTION CONNECTIONS

FOR ALUMINUM END SECTIONS THE 28" x 20" SHALL BE 14 GAGE AND THE 42" x 29" SHALL BE 12 GAGE.

	DIMENSIONS OF PRECAST END SECTIONS FOR ROUND PIPE													
DIAMETER	R3	R4	R5	Т	к	J	С	D	E	SLOPE				
18"	3"	3"	6"	21/2"	9"	2.25'	3.83'	6.08'	3.00'	1:3				
24"	3"	3"	7"	3"	9 ¹ /2"	3.63'	2.50'	6.12'	4.00'	1:3				
30"	3"	3"	8"	31/2"	12"	4.50'	1.65'	6.16'	5.00'	1:3				
36"	3"	3"	10 ¹ /2"	4"	15"	5.25'	2.90'	8.15'	6.00'	1:3				
42"	3"	3"	10 ¹ /2"	4 ¹ /2"	21"	5.25'	2.92'	8.17'	6.50'	1:3				
48"	6"	6"	14"	5"	24"	6.00'	2.17'	8.17'	7.00'	1:3				
54"	6"	6"	-	5 ¹ /2"	27"	5.42'	2.92'	8.33'	7.50'	1:2 1/2				
60"	6"	6"	-	6"	30"	5.00'	3.25'	8.25'	8.00'	1:2				
66"	6"	6"	-	6 ¹ /2"	24"	6.50'	1.75'	8.25'	8.50'	1:2				
72"	6"	6"		7"	24"	6.50'	1.75'	8.25'	9.00'	1:2				

-	_															
APPROX.		DIMENSIONS OF PRECAST END SECTIONS FOR ELLIPTICAL PIPE														
DIAMETER	RISE	SPAN	R1	R2	R3	R4	R5	Т	к	J	С	D	Е	SLOPE		
18"	14"	23"	6"	20"	3"	3"	6"	23/4"	8"	2.25'	3.75'	6.00'	3.00'	1:3		
24"	19"	30"	8 ¹ /4"	26 ¹ /4"	3"	3"	7"	31/4"	8 ¹ /2"	3.25'	2.75'	6.00'	4.00'	1:3		
30"	24"	38"	10 ¹ /4"	32 ³ /4"	3"	3"	9"	33/4"	9 ¹ /2"	4.50'	1.50'	6.00'	5.00'	1:3		
36"	29"	45"	12 ¹ /4"	39 ¹ /4"	3"	3"	12"	41/2"	11 V4"	5.00'	3.00'	8.00'	6.00'	1:3		
42"	34"	53"	14 ¹ /2 "	46"	6"	6"	13"	5"	15 3/4 "	5.00'	3.00'	8.00'	6.50'	1:3		
48"	38"	60"	16 1/2"	51 ¹ /2"	6"	6"	14"	5 ¹ /2"	21"	5.00'	3.00'	8.00'	7.00'	1:3		
54"	43"	68"	18 3/4 "	58 ¹ /2"	6"	6"	16"	6"	25 1/2 "	5.00'	3.00'	8.00'	7.50'	1:3		
60"	48"	76"	20 3/4 "	65"	6"	6"	3611/16"	6 ¹ /2"	30"	5.00'	3.25'	8.25'	8.00'	1:2		
66"	53"	83"	22 ³ /4 "	71 ¹ /2"	6"	6"	36 ¹ /8"	7 ¹ /2"	24"	6.50'	1.75'	8.25'	8.50'	1:2		
72"	58"	91 "	243/4	78"	6"	6"	38"	71/2"	24"	6 50'	175'	8 25'	9 00'	1.2		

APPROX.				DIMEN	SIO	NS OF F	PRECAS	ST END	SE	CTIONS	FOR	ARC	H PIP	E			
DIAMETER	SPAN	RISE	Α	В	R	R1	R2	R3	R4	R5	Т	к	J	С	D	Е	SLOPE
18"	22"	13"	- ¹ /4"	5 3/4"	2"	27 1/2 "	13 3/4 "	5 ¼″	3"	13"	21/2"	7"	2.25'	3.75'	6.08'	3.00'	1:3
24"	28"	18"	3 7/16"	9 ² 1/ ₃₂ "	3"	40 11/16"	14 %16"	4 ¹⁹ / ₃₂ "	3"	16 ¹³ /16 "	3"	9 ¹ /2"	3.58'	2.50'	6.08'	4.00'	1:3
30"	36"	22"	3 3/4 "	12 ³ /32"	3"	51"	18 ³ /4 "	6 ¹ / ₃₂ "	3"	18 ¹ /2 "	31/2"	12"	4.50'	1.58'	6.08'	5.00'	1:3
36"	43"	26"	4 ¹ /8 "	15 1/2"	6"	62"	22 ¹ /2"	6 ³ /8"	3"	24 ⁵ /16"	4"	15"	5.25'	2.90'	8.15'	6.00 [,]	1:3
42"	51"	31"	5 ¹ /16"	18"	6"	73"	26 ¹ /4"	7 ⁹ ∕ ₁₆ "	3"	27 ¹ /2"	4½"	21"	5.25'	2.92'	8.17'	6.50'	1:3
48"	58"	36"	6"	201/2"	6"	84"	30"	8 ³ /4"	3"	28 ¹ / 2"	5"	24"	6.00'	2.17'	8.17'	7.00'	1:3
54"	65"	40"	6 ⁵ /8"	22 ¹¹ / ₁₆ "	6"	92 ¹ /2"	33 ³ /8 "	9 ¹ 3/ ₁₆ "	6"	33 ¹ / 8"	5½"	27"	5.42'	2.92'	8.34'	7.50'	1:2.4
60"	73"	45"	7 ¹ /2"	25%32"	6"	105"	37 1/2"	117/32"	6"	33 11/ 16"	6"	30"	5.00'	3.25'	8.25'	8.00 [,]	1:2
72"	88"	54"	9"	317/16	6"	126"	45"	12 9/ ₁₆ "	6"	38 ¹⁵ / 16"	7"	24"	6.50'	1.75'	8.25'	9.00'	1:2

PIPE LENGTH COMPUTED TO HERE. SEE GENERAL NOTES.

FILL SLOPE

STD. COUPLING BAND FOR TYPE 3 ONLY.

METAL END SECTION SIDE VIEW

SLOPE = Y to X

SKIRT PLATE

TOE PLATE

ROUND CONCRETE PIPE END SECTION END VIEW

SPAN

ELLIPTICAL CONCRETE PIPE END SECTION END VIEW

ARCH CONCRETE PIPE END SECTION END VIEW

PLAN VIEW

GENERAL NOTES

- ALL CONSTRUCTION AND MATERIAL REQUIREMENTS SHALL BE IN ACCORDANCE WITH THE 2019 ODOT STANDARD SPECIFICATIONS. 1
- CULVERT END SECTIONS SHALL BE OF THE SAME MATERIAL AND SHAPE (ROUND, ARCH, OR ELLIPTICAL) AS THE PIPE ON WHICH THEY ARE INSTALLED. 2.
- 3. DIMENSIONS SHOWN FOR END SECTIONS ARE SUBJECT TO MANUFACTURER TOLERANCES.
- TOE PLATE WILL BE REQUIRED ON ALL METAL END SECTIONS UNLESS SOLID ROCK IS ENCOUNTERED. HOLES IN TOE PLATE TO BE PUNCHED TO MATCH HOLES IN SKIRT PLATE, 3/8" BOLTS TO BE FURNISHED. LENGTH OF TOE PLATES FOR ROUND PIPE END SECTIONS SHALL BE W=10" FOR 12" TO 30" DIAMETER PIPE, W=20" FOR 36" TO 84" DIAMETER PIPE. LENGTH OF TOE PLATES FOR ARCH PIPE END SECTIONS SHALL BE W=10" FOR A RISE OF 13" TO 29" AND W=20" FOR A RISE OF 33" 4. 13" TO 29" AND W=20" FOR A RISE OF 33" TO 57".
- CONNECTOR SECTION, SKIRT PLATE, AND TOE PLATE ON METAL END SECTIONS SHALL BE THE SAME GAGE AND MATERIAL AS THE SKIRT AND SHALL BE INCLUDED IN PRICE BID FOR END SECTION. 5.
- IF TYPE 3 METAL END SECTION IS USED AS OPTIONAL PIPE, THE LENGTH OF PIPE TO BE REDUCED BY 12" FOR EACH END SECTION. IF CONCRETE PIPE OPTION IS USED, THE LENGTH OF PIPE TO BE REDUCED BY THE C DIMENSION FOR EACH END SECTION. 6.

	BASIS OF PAYMENT												
ITEM NO.	ITEM	UNIT											
613(L)	▼ PREFAB. CULVERT END SECTION, ROUND	EA											
613(L)	▼ PREFAB. CULVERT END SECTION, ARCH	EA											
613(L)	613 (L) ▼ PREFAB. CULVERT END SECTION, ELLIPTICAL EA												
▼ END	SECTIONDIMENSION(S) SHALL BE SPECIFIED.												

1	$\left(\right)$	APPROVED BY ROADWAY ENGINEER: ROADWAY DESIGN DIV	DATE ISION STANDARI	- <i>6/30/22</i>
		PREFABRICATED CULV OKLAHOMA Transportation	/ERT END SEC	
-		·	PCES-5	1
				R-34

			.e.,							. [DIME	NSIONS) BAR L	IST		5.6				v					
DESIGN	BAF	RREL ISIONS	STANDARD	DH1	BARS	(BENT)	DH2	BARS	(BENT)	DH3	BARS	(BENT)	DL1 : (E	#4 BARS BENT)	DL2 (E	#4 BARS BENT)	DV1	#4 BARS	DV2	#4 BARS	DC i	#4 BARS	EH1 :	#4 BARS	EH2	#4 BARS
NO.	SPAN S	HEIGHT H	DEPTH	SIZE	NO.	LENGTH	SIZE	NO.	LENGTH	SIZE	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH	NO.		NO.	LENGTH	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH
1	3'	2'	3'-6"	#4	12	5'-10"	#4	8	4'-10"	#4	16	6'-0"	16	3'-4"	6	4'-0"	16	3'-4"	6	<u>U</u> .	2	4'-2"	5	5'-1"	4	4'-2"
2	3'	3'	4'-6"	#4	14	5'-10"	#4	8	5'-10"	#4	20	7'-0"	18	3'-4"	6	4'-0"	18	4'-4"	6		2	4'-2"	5	6'-1"	5	4'-2"
3	4'	2'	3'-6"	#4	12	6'-10"	#4	8	4'-10"	#4	16	6'-0"	17	3'-4"	7	4'-0"	17	3'-4"	7	682	2	5'-2"	6	5'-1"	4	5'-2"
4	4'	3'	4'-6"	#5	14	6'-10"	#5	8	5'-10"	#5	20	7'-0"	19	3'-4"	7	4'-0"	19	4'-4"	7	EYE	2	5'-2"	6	6'-1"	5	5'-2"
5	4'	4'	5'-6"	#5	16	6'-10"	#5	8	6'-10"	#5	24	8'-0"	21	3'-4"	7	4'-0"	21	5'-4"	7		2	5'-2"	6	7'-1"	6	5'-2"
6	5'	2'	3'-6"	#5	12	7'-10"	#5	8	4'-10"	#5	16	6'-0"	18	3'-4"	8	4'-0"	18	3'-4"	8		2	6'-2"	7	5'-1"	4	6'-2"
7	5'	3'	4'-6"	#5	14	7'-10"	#5	8	5'-10"	#5	20	7'-0"	20	3'-4"	8	4'-0"	20	4'-4"	8] Éछ₹	2	6'-2"	7	6'-1"	5	6'-2"
8	5'	- 4'	5'-6"	#5	16	7'-10"	#5	8	6'-10"	#5	24	8'-0"	22	3'-4"	8	4'-0"	22	5'-4"	8	≥∵્<	2	6'-2"	7	7'-1"	6	6'-2"
9	5'	5'	6'-6"	#5	18	7'-10"	#5	8	7'-10"	#5	28	9'-0"	24	3'-4"	8	4'-0"	24	6'-4"	8		2	6'-2"	7	8'-1"	7	6'-2"
10	6'	3'	4'-6"	#5	14	8'-10"	#5	8	5'-10"	#5	20	7'-0"	21	3'-4"	9	4'-0"	21	4'-4"	9		2	7'-2"	8	6'-1"	5	7'-2"
11	6'	4'	5'-6"	#5	16	8'-10"	#5	8	6'-10"	#5	24	8'-0"	23	3'-4"	9	4'-0"	23	5'-4"	9	<pre>L</pre>	2	7'-2"	8	7'-1"	6	7'-2"
12	6'	5'	6'-6"	#5	18	8'-10"	#5	8	7'-10"	#5	28	9'-0"	25	3'-4"	9	4'-0"	25	6'-4"	9		2	7'-2"	8	8'-1"	7	7'-2"
13	6'	6'	7'-6"	#5	20	8'-10"	#5	8	8'-10"	#5	32	10'-0"	27	3'-4"	9	4'-0"	27	7'-4"	9		2	7'-2"	8	9'-1"	8	7'-2"

▲ REINFORCING FOR ADDITIONAL DEPTH

- FOR INLET DEPTHS GREATER THAN STANDARD DEPTH:
- 2 ADDITIONAL DH1 BARS WILL BE REQUIRED FOR EVERY 6" OF ADDITIONAL DEPTH.
- 2 ADDITIONAL DH2 BARS WILL BE REQUIRED FOR EVERY 6" OF ADDITIONAL DEPTH.
- DV1 BARS WILL HAVE TO BE EXTENDED BY LENGTH EQUAL TO ADDITIONAL DEPTH OF INLET.
- DV2 BARS WILL HAVE TO BE ADDED, WITH A LENGTH EQUAL TO ADD'L. DEPTH PLUS 1'-8".

-	QUANT	FITIES (FOR	INFORMA	ATION PURPOSES	ONLY)	
	CLASS AA	CONCRETE	REINF	ORCING STEEL	PIPE G	RATES
DESIGN NO.	STANDARD DEPTH INLET	PER ADDITIONAL FT OF DEPTH	STANDARD DEPTH INLET	ADDITIONAL FOR EXTRA DEPTH INLETS	LENGTH OF PIPE	NUMBER OF GRATES
1	1.6 CY	0.37 CY	258 LBS	7 LBS+44 LBS/FT	3'-03⁄4"	2
2	2.2 CY	0.42 CY	328 LBS	7 LBS+48 LBS/FT	4'-01⁄2"	2
3	1.9 CY	0.42 CY	281 LBS	8 LBS+48 LBS/FT	3'-03⁄4"	3
4	2.6 CY	0.48 CY	460 LBS	8 LBS+71 LBS/FT	4'-01⁄2"	3
5	3.4 CY	0.53 CY	568 LBS	8 LBS+76 LBS/FT	5'-03⁄8"	3
6	2.1 CY	0.48 CY	389 LBS	9 LBS+71 LBS/FT	3'-03⁄4"	4
7	2.9 CY	0.53 CY	491 LBS	9 LBS+76 LBS/FT	4'-01⁄2"	4
8	3.7 CY	0.59 CY	603 LBS	9 LBS+82 LBS/FT	5'-03⁄8"	4
9	4.7 CY	0.64 CY	727 LBS	9 LBS+87 LBS/FT	6'-01⁄4"	4
10	3.2 CY	0.59 CY	522 LBS	10 LBS+82 LBS/FT	4'-01⁄2"	5
11	4.1 CY	0.64 CY	639 LBS	10 LBS+87 LBS/FT	5'-03⁄8"	5
12	5.1 CY	0.70 CY	766 LBS	10 LBS+93 LBS/FT	6'-01⁄4"	5
13	6.3 CY	0.75 CY	905 LBS	10 LBS+98 LBS/FT	7'-01⁄4"	5

GENERAL NOTES

- 1. ALL CONSTRUCTION AND MATERIAL REQUIREMENTS SHALL BE IN ACCORDANCE WITH THE 2019 ODOT STANDARD SPECIFICATIONS.
- 2. MAXIMUM DEPTH OF DROP INLETS SHALL BE THE HEIGHT OF THE RCB CULVERT PLUS 15'-0".
- 3. ALL REINFORCING STEEL SHALL HAVE A 2" MINIMUM CLEAR COVER UNLESS OTHERWISE SHOWN.
- 4. INLET TOP OPENING SHALL HAVE 3" x 7.58 LBS/FT STD. WEIGHT STEEL, GAL VANIZED, SCHEDULE 40, PIPE SAFETY GRATES INSTALLED PERPENDICULAR TO THE DIRECTION OF TRAFFIC AT 12" MAX. CENTERS. COST OF PIPE SAFETY GRATES AND ALL HARDWARE NEEDED FOR INSTALLATION SHALL BE INCLUDED IN THE PRICE BID FOR THE INLET.
- PIPE GRATE ENDS SHALL BE HELD DOWN WITH ½" x 5½" GALVANIZED BOLT, WASHER & NUT MEETING THE REQUIREMENTS OF ASTM F3125. BOLT THREADS, 1³4", SHALL REMAIN EXPOSED FOR INSTALLING GRATE.
- 6. FOR 'T', 'U' AND 'W' DIMENSIONS, SEE BRIDGE STANDARD DRAWINGS.

	BASIS OF PAYMENT	
ITEM NO.	ITEM	UNIT
611(G)	INLET CDI RCB DES.	EA
611(H)	ADD'L. DEPTH IN INLET CDI RCB DES. 💻	VF

• INLET DESIGN NUMBER SHALL BE SPECIFIED.

	20							2							22				5				E	SAR LI	SI							S		6		4		
DESIG	N DH1	BARS (BENT)	DH2 BAF	rs (Bent)	DH3 BA	ARS (BENT	T) DH4	BARS	S (BENT)	, DL1 #	#4 BARS BENT)	5 DL2	#4 BARS BENT)	DV1 #	4 BARS	DV2	#4 BARS	S DC	#4 BARS	EH1 ; (E	#4 BARS BENT)	EH2	#4 BARS	5	41 BA	ARS		A2 BARS	B1 BAR (BENT	RS F)	B2 E (BE	BARS ENT)		E1 #4 BARS	E3 #4 BAR	S E4	#4 BARS
NO.	SIZE	NO.	ENGTH		LENGTH	I SIZE N	D. LENGT	THSIZE	NO.	LENGTH	H NO.	LENGT	H NO.	LENGTH	I NO.		NO.		^H NO.	LENGTH	I NO.	LENGTH	I NO.	LENGTH	I SIZE	NO.	LENGTH	SIZE NC	D. LENGTH	SIZE NO. LI	ENGTH	SIZE NO	. LENGTH	NO.	LENGTH	NO. LENGT	TH NO.	. LENGTH
1	#4	12	6'-6"	#4 4	4'-10"	#4 6	5 5'-11'	#4	6	5'-11"	16	3'-4"	6	4'-0"	16	3'-4"	6	<u></u> .	2	4'-2"	5	5'-1"	4	4'-2"	#5	14	3'-8"	#5 6	2'-6" AVG. (1'-7" TO 3'-5) #4 18	2'-5"	#4 18	3'-1"	18	4'-7 1/2" AVG. (3'-8" TO 5'-7")	2 4'-5'	2	6'-10"
2	#4	14	6'-6"	#4 4	5'-10"	#4 8	3 6'-11'	" #4	8	6'-11"	18	3'-4"	6	4'-0"	18	4'-4"	6	ASE	2	4'-2"	5	6'-1"	5	4'-2"	#5	14	3'-10"	#5 6	2'-8" AVG. (1'-9" TO 3'-7) #4 18	2'-5"	#4 18	4'-1"	18	4'-7 1/2" AVG. (3'-8" TO 5'-7")	3 4'-6'	' 3	6'-10"
3	#5	12	7'-5"	#5 4	4'-10"	#5 6	5 5'-11'	#5	6	5'-11"	17	3'-4"	7	4'-0"	17	3'-4"	7	SKS	2	5'-2"	6	5'-1"	4	5'-2"	#5	14	4'-10"	#5 6	3'-8" AVG. (2'-9" TO 4'-7) #4 19	2'-7"	#4 19	3'-3"	20	4'-8" AVG. (3'-5" TO 5'-11")	2 4'-2'	2	7'-2"
4	#5	14	7'-5"	#5 4	5'-10"	#5 8	3 6'-11'	" #5	8	6'-11"	19	3'-4"	7	4'-0"	19	4'-4"	7	ERE	2	5'-2"	6	6'-1"	5	5'-2"	#5	14	4'-10"	#5 6	3'-8" AVG. (2'-9" TO 4'-7) #4 19	2'-7"	#4 19	4'-3"	20	4'-8" AVG. (3'-5" TO 5'-11")	3 4'-2'	" 3	7'-2"
5	#5	16	7'-5"	#5 4	6'-10"	#5 1	0 7'-11'	" #5	10	7'-11"	21	3'-4"	7	4'-0"	21	5'-4"	7		2	5'-2"	6	7'-1"	6	5'-2"	#5	14	5'-0"	#5 6	3'-9" AVG. (2'-11" TO 4'-9	') #5 19	3'-1"	#5 19	5'-5"	20	4'-8" AVG. (3'-5" TO 5'-11")	4 4'-3'	' 4	7'-2"
6	#5	12	8'-7"	#5 4	4'-10"	#5 6	5 5'-11'	" #5	6	5'-11"	18	3'-4"	8	4'-0"	18	3'-4"	8	<u>A</u> mg	2	6'-2"	7	5'-1"	4	6'-2"	#6	12	5'-8"	#6 10	3'-8" AVG. (1'-11" TO 5'-5) #4 18	2'-7"	#4 18	3'-3"	22	4'-7 1/2" AVG. (3'-1" TO 6'-2")	2 3'-10	" 2	7'-5"
7	#5	14	8'-7 '	#5 4	5'-10"	#5 8	8 6'-11'	" #5	8	6'-11"	20	3'-4"	8	4'-0"	20	4'-4"	8	FRA	2	6'-2"	7	6'-1"	5	6'-2"	#6	12	5'-8"	#6 10	3'-8" AVG. (1'-11" TO 5'-5) #5 18	3'-1"	#5 18	4'-5"	22	4'-7 1/2" AVG. (3'-1" TO 6'-2")	3 3'-10	" 3	7'-5"
8	#5	16	8'-7"	#5 4	6'-10"	#5 1	0 7'-11'	" #5	10	7'-11"	22	3'-4"	8	4'-0"	22	5'-4"	8	≥∵S	2	6'-2"	7	7'-1"	6	6'-2"	#6	12	5'-10"	#6 10	3'-10" AVG. (2'-1" TO 5'-7) #5 18	3'-1"	#5 18	5'-5"	22	4'-7 1/2" AVG. (3'-1" TO 6'-2")	4 3'-11	" 4	7'-5"
9	#5	18	8'-7"	#5 4	7'-10"	#5 1	2 8'-11'	" #5	12	8'-11"	24	3'-4"	8	4'-0"	24	6'-4"	8	₽Ĕ	2	6'-2"	7	8'-1"	7	6'-2"	#6	12	6'-0 "	#6 10	4'-0" AVG. (2'-3" TO 5'-9) #5 18	3'-1"	#5 18	6'-5"	22	4'-7 1/2" AVG. (3'-1" TO 6'-2")	5 3'-11	5	7'-5"
10	#5	14	9'-9"	#5 4	5'-10"	#5 8	3 6'-11'	#5	8	6'-11"	22	3'-4"	10	4'-0"	22	4'-4"	10	빌림	2	7'-2"	8	6'-1"	5	7'-2"	#6	16	7'-0"	#6 10	5'-0" AVG. (3'-3" TO 6'-9) #4 23	2'-7"	#4 23	4'-3"	24	5'-8" AVG. (3'-10" TO 7'-6")	3 4'-8'	" 3	8'-8"
11	#5	16	9'-9"	#5 4	6'-10"	#5 1	0 7'-11'	" #5	10	7'-11"	24	3'-4"	10	4'-0"	24	5'-4"	10	≤⊥⊲	2	7'-2"	8	7'-1"	6	7'-2"	#6	16	7'-0"	#6 10	5'-0" AVG. (3'-3" TO 6'-9) #4 23	2'-7"	#4 23	5'-3"	24	5'-8" AVG. (3'-10" TO 7'-6")	4 4'-8'	' 4	8'-8"
12	#5	18	9'-9"	#5 4	7'-10"	#5 1	2 8'-11'	#5	12	8'-11"	26	3'-4"	10	4'-0"	26	6'-4"	10	<u>Б</u> щр	2	7'-2"	8	8'-1"	7	7'-2"	#6	16	7'-2"	#6 10	5'-2" AVG. (3'-5" TO 6'-11) #4 23	2'-7"	#4 23	6'-3"	24	5'-8" AVG. (3'-10" TO 7'-6")	5 4'-9'	5	8'-8"
13	#5	20	9'-9"	#5 4	8'-10"	#5 1	4 9'-11'	#5	14	9'-11"	28	3'-4"	10	4'-0"	28	7'-4"	10		2	7'-2"	8	9'-1"	8	7'-2"	#6	16	7'-2"	#6 10	5'-2" AVG. (3'-5" TO 6'-11) #4 23	2'-8"	#4 23	7'-4"	24	5'-9" AVG. (3'-11" TO 7'-7")	6 4'-9'	6	8'-8"

			DIMENSI	ON T/	ABLE		
DESIGN	S =		STANDARD		INLET	DIMENSIONS	
NO.	SPAN	HEIGHT	DEPTH	А	В	С	D
1	3'	2'	3'-6"	4'-0"	5'-39⁄16"	2'-87⁄ ₁₆ "	3'-59⁄ ₁₆ "
2	3'	3'	4'-6"	4'-0"	5'-39⁄16"	2'-87⁄ ₁₆ "	3'-59⁄ ₁₆ "
3	4'	2'	3'-6"	4'-0"	5'-71⁄16"	2'-4 ¹⁵ /16"	4'-77⁄ ₁₆ "
4	4'	3'	4'-6"	4'-0"	5'-71⁄16"	2'-4 ¹⁵ /16"	4'-77⁄ ₁₆ "
5	4'	4'	5'-6"	4'-0"	5'-71⁄16"	2'-4 ¹⁵ /16"	4'-77⁄ ₁₆ "
6	5'	2'	3'-6"	4'-0"	5'-101⁄2"	2'-11⁄2"	5'-95⁄16"
7	5'	3'	4'-6"	4'-0"	5'-101⁄2"	2'-11⁄2"	5'-95⁄16"
8	5'	4'	5'-6"	4'-0"	5'-101⁄2"	2'-11⁄2"	5'-95⁄16"
9	5'	5'	6'-6"	4'-0"	5'-101⁄2"	2'-11⁄2"	5'-95⁄16"
10	6'	3'	4'-6"	5'-0"	7'-2"	2'-10"	6'-111⁄8"
11	6'	4'	5'-6"	5'-0"	7'-2"	2'-10"	6'-111⁄8"
12	6'	5'	6'-6"	5'-0"	7'-2"	2'-10"	6'-111⁄8"
13	6'	6'	7'-6"	5'-0"	7'-2"	2'-10"	6'-111/8"

	QUANT	FITIES (FOR	INFORM/	ATION PURPOSES	ONLY)	
1	CLASS AA	CONCRETE	REIN	FORCING STEEL	PIPE G	RATES
DESIGN	STANDARD	PER	STANDARD	ADDITIONAL	LENGTH	NUMBEF
NO.	DEPTH	ADDITIONAL	DEPTH	FOR EXTRA	OF	OF
	INLEI	FIOFDEPIH	INLE I	DEPTHINLETS	PIPE	GRATES
1	2.8 CY	0.39 CY	440 LBS	7 LBS+46 LBS/FT	3'-03⁄4"	3
2	3.7 CY	0.45 CY	530 LBS	7 LBS+50 LBS/FT	4'-01⁄2"	3
3	3.5 CY	0.46 CY	570 LBS	8 LBS+68 LBS/FT	3'-03⁄4"	4
4	4.4 CY	0.51 CY	680 LBS	8 LBS+73 LBS/FT	4'-01⁄2"	4
5	5.6 CY	0.57 CY	880 LBS	8 LBS+79 LBS/FT	5'-03⁄8"	4
6	4.0 CY	0.52 CY	670 LBS	9 LBS+74 LBS/FT	3'-03⁄4"	5
7	4.9 CY	0.58 CY	840 LBS	9 LBS+79 LBS/FT	4'-01⁄2"	5
8	6.1 CY	0.63 CY	980 LBS	9 LBS+85 LBS/FT	5'-03⁄8"	5
9	7.4 CY	0.69 CY	1130 LBS	9 LBS+90 LBS/FT	6'-01⁄2"	5
10	6.5 CY	0.64 CY	960 LBS	12 LBS+87 LBS/FT	4'-01⁄2"	6
11	7.7 CY	0.7 CY	1090 LBS	12 LBS+92 LBS/FT	5'-03⁄8"	6
12	9.2 CY	0.75 CY	1250 LBS	12 LBS+98 LBS/FT	6'-01⁄2"	6
13	10.7 CY	0.81 CY	1410 LBS	12 LBS+103 LBS/FT	7'-01⁄4"	6

- RCB CULVERT PLUS 15'-0".
- 3. ALL REINFORCING STEEL SHALL HAVE A 2" MINIMUM CLEAR COVER UNLESS OTHERWISE SHOWN.
- BID FOR THE INLET.

	BASIS OF PAYMENT												
ITEM NO. ITEM UNIT													
611(G)	INLET CDI 30SK RCB DES.	EA											
611(H) ADD'L. DEPTH IN INLET CDI 30SK RCB DES.													

DESIGN NUMBER SHALL BE SPECIFIED.

▲ REINFORCING FOR ADDITIONAL DEPTH FOR INLET DEPTHS GREATER THAN STANDARD DEPTH:

- 2 ADDITIONAL DHI BARS WILL BE REQUIRED FOR EVERY 6" ADDITIONAL DEPTH.

- 2 ADDITIONAL DH2 BARS WILL BE REQUIRED FOR EVERY 6" ADDITIONAL DEPTH. - DV1 BARS WILL HAVE TO BE EXTENDED BY LENGTH EQUAL TO ADDITIONAL DEPTH OF INLET.

- DV2 BARS WILL HAVE TO BE ADDED, WITH A LENGTH EQUAL TO ADD'L. DEPTH PLUS 1'-8".

9" H=RCB BARREL HEIGHT 6" DH3 AT 6"	CEM E BR BE T D E ⁴ BAF SL SL SL SL SL SL	ENT IDG IED 4 BA (S IN AB) AB) WA	OF E ST TO I RS I BA	A1, E TANE E1 BJ SHA RRE	B1, B2 DARD ARS I LL BE L.	S.N.
DVIAT 12" TOT	Ŋ.	(NUM DF B	BER	5	
the sin and the	DES	N1	N2	N3	N4	
50 05	1	7	3	11	7	
DH4 BARS	2	7	3	11	7	
10 10 mg	3	7	3	12	7	
VILLE B	4	7	3	12	7	
Do A CESAL	5	7	3	12	7	
CONDE IN RS AT. ST	6	6	5	12	6	
"ECTET Na B2 WAS"	7	6	5	12	6	
ON ST BIAT ST	8	6	5	12	6	
ROBANDA 6" (ROP	9	6	5	12	6	
AARD OTTOLAR	10	8	5	15	8	
a or ABI	11	8	5	15	8	
SECTION C-C THRU INLET AND CULVERT	12	8	5	15	8	
	<u>13</u>	Ø	5	15	8	

GENERAL NOTES

1. ALL CONSTRUCTION AND MATERIAL REQUIREMENTS SHALL BE IN ACCORDANCE WITH THE 2019 ODOT STANDARD SPECIFICATIONS. 2. MAXIMUM DEPTH OF DROP INLETS SHALL BE THE HEIGHT OF THE

4. INLET TOP OPENING SHALL HAVE 3" x 7.58 LBS/FT STD. WEIGHT STEEL, GALVANIZED, SCHEDULE 40, PIPE SAFETY GRATES INSTALLED PERPENDICULAR TO THE DIRECTION OF TRAFFIC AT 12" MAX. CENTERS. COST OF PIPE SAFETY GRATES AND ALL HARDWARE NEEDED FOR INSTALLATION SHALL BE INCLUDED IN THE PRICE

5. PIPE GRATE ENDS SHALL BE HELD DOWN WITH ½" x 5½" GALVANIZED BOLT, WASHER & NUT MEETING THE REQUIREMENTS OF ASTM F3125. BOLT THREADS, 13/4", SHALL REMAIN EXPOSED FOR INSTALLING GRATE. ■ 6. FOR 'T', 'U' AND 'W' DIMENSIONS, SEE BRIDGE STANDARD DRAWINGS.

GALVANIZED 兆 5兆 BOLT NUT & WASHER THRU %" x 1" SLOT H = RCB 6" 6" BARREL HEIGHT in.

TYPICAL GRATE DETAIL

						DIN	ΛEΝ	VSIC	DNS	S RE	EIN	FOF	RCI	NG	ST	EEL	&	QUA	ANTITI	ES			
	DIN	IENSI	ONS						RI	EINFC	RC	ING S	TEE	EL		A			CLASS A	CONCRETE	REINFOR	CING STEEL	PIPE GRATES
ESIGN	D DIAM. F PIPE	AREA JF PIPE	T= IICKNESS IF WALL	ANDARD DEPTH	#4 STR	CH BARS AIGHT	#4 BI	H1 BARS ENT	#4 B	H2 BARS ENT	#4 STR	H3 BARS AIGHT	#4 STR	V1 BARS AIGHT	#4 B	V2 BARS ENT	#4 Bl	V3 BARS ENT	TOTAL TO TOP OF PIPE INCLUDING	PER FOOT OF ADDITIONAL	TOTAL TO TOP OF PIPE INCLUDING	PER FOOT OF ADDITIONAL	NO. OF PIPE
¤₹	0	0	돈이	ST	NO.	LGTH.	NO.	LGTH.	NO.	LGTH.	NO.	LGTH.	NO.	LGTH.	NO.	LGTH.	NO.	LGTH.	CURB	HEIGHT	CURB	HEIGHT	GRATES
	IN	SQ.FT	IN	FT-IN	EA	EA IN EA IN EA				IN	EA	IN	EA	IN	EA	IN	ΕA	IN	CY	CY/VF	LBS	LBS/VF	EA
1 1 0	18"	1.77	21/2"	1'-11½"	4	29"	5	134"	7	30"	7	26"	2	12"	6	42"	2	48"	0.58	0.21	77	24	2
2	24"	3.14	3"	2'-6"	4	35"	6	158"	8	36"	8	32"	3	13"	6	48"	2	54"	0.86	0.26	104	29	2
3	30"	4.91	3½"	3'-½"	4	41"	7	182"	9	42"	9	38"	4	14"	7	54"	2	60"	1.20	0.30	138	35	3
4	36"	7.07	4"	3'-7"	4	47"	8	206"	10	48"	10	44"	4	16"	8	60"	2	66"	1.58	0.35	176	42	3
5	42"	9.62	4½"	4'-1½"	4	53"	9	230"	11	54"	11	50"	5	18"	10	66"	2	72"	2.11	0.40	223	49	4
6	48"	12.57	5"	4'-8"	4	59"	15	254"	12	60"	12	56"	5	19"	10	72"	2	78"	2.60	0.45	333	52	4
7	54"	15.90	5½"	5'-21/2"	4	65"	16	278"	13	66"	13	62"	6	21"	10	78"	2	84"	3.18	0.49	385	60	5
8	60"	19.63	6"	5'-9"	4	71"	17	302"	14	72"	14	68"	6	22"	11	84"	2	90"	3.79	0.54	448	66	5
9	66"	13.76	6½"	6'-3½"	4	77"	18	326"	15	78"	15	74"	7	24"	12	90"	2	96"	4.47	0.59	517	74	6
10	72"	28.27	7"	6'-10"	4	83"	19	350"	16	84"	16	80"	7	25"	14	96"	2	102"	5.21	0.64	594	83	6

TYPICAL GRATE DETAIL

GENERAL NOTES

- ALL CONSTRUCTION AND MATERIAL REQUIREMENTS SHALL BE IN ACCORDANCE WITH THE 2019 ODOT STANDARD SPECIFICATIONS.
 HORIZONTAL REINFORCING BARS SHALL BE PLACED AT 6" CENTERS
- 2. HORIZONTAL REINFORCING BARS SHALL BE PLACED AT 6" CENTERS EXCEPT AS SHOWN FOR 48" TO 72" R.C. PIPE. VERTICAL BARS ARE TIE BARS SPACED AS SHOWN.
- 3. MAXIMUM DEPTHS OF DROP INLET FOR 48" TO 72" RCP SHALL BE AS FOLLOWS: 48" RCP - 18'-0"

48" RCP - 18'-0"
54" RCP - 16'-0"
66" RCP - 12'-0"
72" RCP - 10'-0".

- 4. TOTAL QUANTITIES AS SHOWN IN TABLE ARE COMPUTED TO TOP OF PIPE AND INCLUDE CURB. FOR DROP INLETS OF GREATER DEPTH, MULTIPLY THE FIGURE IN PER FOOT COLUMN BY THE HEIGHT FROM TOP OF PIPE TO TOP OF DROP INLET AND ADD THE RESULT TO THE QUANTITY IN THE RECEDING COLUMN.
- 5. INLET TOP OPENING SHALL HAVE 3" x 7.58 LBS/FT STD. WEIGHT STEEL PIPE, GALVANIZED, SCHEDULE 40, PIPE SAFETY GRATES INSTALLED PERPENDICULAR TO THE DIRECTION OF TRAFFIC AT 12" (MAXIMUM) CENTERS WITH THE COST OF PIPE SAFETY GRATES & ALL HARDWARE NEEDED FOR THE INSTALLATION TO BE INCLUDED IN THE PRICE BID FOR THE INLET.
- 6. PIPE GRATE ENDS SHALL BE HELD DOWN WITH 1/2" x 5 1/2" GALVANIZED BOLT, WASHER & NUT MEETING THE REQUIREMENTS OF ASTM F3125. BOLT THREADS, 1 3/4", SHALL REMAIN EXPOSED FOR INSTALLING GRATE.
- 7. BAR BENDING DIAGRAMS AND DIMENSIONS FOR DESIGNS 1 THROUGH 10, AS SHOWN THIS SHEET, ARE FOR STANDARD DEPTH DROP INLETS.
- 8. ARCH PIPES MAY BE USED INSTEAD OF ROUND PIPES AT THE DISCRETION OF THE ENGINEER.

BASIS OF PAYMENT			
ITEM NO.	ITEM	UNIT	
611 (G)	INLET CDI RCP DES.	EA	
611 (H) ADD'L. DEPTH IN INLET CDI RCP DES.			

DESIGN NUMBER SHALL BE SPECIFIED.

V2 = V3 =

V2 & V3 BARS

H1 =2N+2W+38"

■ BAR BENDING DIAGRAMS

TYPICAL GRATE DETAIL

GENERAL NOTES

- 1. ALL CONSTRUCTION AND MATERIAL REQUIREMENTS SHALL BE IN ACCORDANCE WITH THE 2019 ODOT STANDARD SPECIFICATIONS.
- 2. TOTAL QUANTITIES AS SHOWN IN TABLE ARE COMPUTED TO TOP OF THE PIPE PLUS 3" AND INCLUDES CURB. FOR DROP INLETS OF GREATER DEPTH, MULTIPLY THE FIGURE IN THE PER FOOT ROW BY THE DIFFERENCE IN HEIGHT FROM TOP OF PIPE PLUS 3" TO TOP OF DROP INLET AND ADD THE RESULT TO THE STANDARD DROP INLET QUANTITY.
- 3. MAXIMUM DEPTH OF DROP INLETS FOR 42" TO 72" RCP SHALL BE AS FOLLOWS:

42" RCP - 22'-0"	
48" RCP - 18'-0"	
54" RCP - 16'-0"	
60" RCP - 14'-0"	
66" RCP - 12'-0"	
72" RCP - 11'-0"	

- 4. INLET TOP OPENING SHALL HAVE 3" x 7.58 LBS/FT STD. WEIGHT STEEL PIPE, GALVANIZED. SCHEDULE 40. PIPE SAFETY GRATES INSTALLED PERPENDICULAR TO THE DIRECTION OF TRAFFIC AT 12" (MAXIMUM) CENTERS WITH THE COST OF PIPE SAFETY GRATES & ALL HARDWARE NEEDED FOR INSTALLATION TO BE INCLUDED IN THE PRICE BID FOR THE INLET.
- PIPE GRATE ENDS SHALL BE HELD DOWN WITH 1/2" x 5 1/2" GALVANIZED BOLT, WASHER & NUT MEETING THE REQUIREMENTS OF ASTM F 3125. BOLT THREADS, 1 3/4", SHALL REMAIN EXPOSED FOR INSTALLING GRATE.
- 6. BAR BENDING DIAGRAMS AND DIMENSIONS, AS SHOWN THIS SHEET, ARE FOR STANDARD DEPTH DROP INLETS.

BASIS OF PAYMENT			
ITEM NO.	ITEM	UNIT	
611(G)	INLET CDI 30SK RCP DES.	EA	
611(H)	ADD'L. DEPTH IN INLET CDI 30SK RCP 👤	VF	
		T	

DESIGN NUMBER SHALL BE SPECIFIED.

- CLASS C CONCRETE QUANTITIES				
1	DESIGN 2			
PER FOOT OF FLUME	CURTAIN WALL	PER FOOT OF FLUME		
.048 C.Y.	0.074 C.Y.	0.037 C.Y.		

1. ALL CONSTRUCTION AND MATERIAL REQUIREMENTS SHALL BE IN ACCORDANCE WITH THE 2019 ODOT STANDARD SPECIFICATIONS.

2. INLET STRUCTURES MAY BE SUPPLIED AS PRECAST UNITS IF PROPOSED PRECAST DESIGN IS SUBMITTED TO THE ENGINEER AND APPROVED FOR USE. SEE ROADWAY STANDARD CI-2.

BASIS OF PAYMENT			
ITEM NO.	ITEM	UNIT	
509(D)	CLASS C CONCRETE	CY	

- 1 ALL CONSTRUCTION AND MATERIAL REQUIREMENTS SHALL BE IN ACCORDANCE WITH THE 2019 ODOT STANDARD SPECIFICATIONS.
- 2. FOR DETAILS OF FRAMES, GRATES AND HOODS SEE ROADWAY STANDARDS SSIF-5, CIG-4 AND CI-2. COST OF FRAMES, GRATES AND HOODS SHALL BE INCLUDED IN THE COST OF THE STRUCTURE.
- 3. THERE SHALL BE A MINIMUM VERTICAL DISTANCE OF 6" BETWEEN AN OPENING AND ANY EDGE.
- 4. PROVIDE LIFTING DEVICES IN CONFORMANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.
- 5. PROVIDE GRADE 60 REINFORCING STEEL CONFORMING TO ASTM A615 OR EQUIVALENT AREA OF WELDED WIRE REINFORCING CONFORMING TO ASTM A1064.
- 6. PROVIDE A MINIMUM CLEAR COVER OF 11/2" TO REINFORCING STEEL.
- 7. WALLS OR SLABS WITH A THICKNESS OF 8" OR GREATER REQUIRE A SECONDARY LAYER OF REINFORCING STEEL. PROVIDE AN AREA OF REINFORCING STEEL EQUAL TO $0.11\,{\rm IN}^2/{\rm FT}$ EACH WAY IN THE SECONDARY Ι ΔYFR
- 8. BLOCKOUTS IN WALLS MAY BE FORMED FOR GRATE SUPPORT BEAMS. THE SUPPORT BEAM SHALL BE OF SIZE S4x7.7 OR AS DESCRIBED ON ROADWAY STANDARD SSIF-5.
- MAXIMUM OPENING DIAMETER SHALL BE 4" LARGER THAN OUTSIDE DIAMETER OF PIPE.
- 10. DO NOT GROUT RUBBER GASKET JOINTS WITHOUT THE MANUFACTURER'S RECOMMENDATIONS
- 11 THE FOUNDATION SHALL BE STABILIZED OR REMOVED AND REPLACED WITH FIRM AND STABLE FOUNDATION MATERIAL. A MINIMUM 3" THICK LEVELING COURSE SHALL BE PROVIDED BELOW THE BASE AREA OF THE INLET AND EXTEND 6' BEYOND THE BASE AREA. THE LEVELING COURSE SHALL BE CONSTRUCTED WITH AGGREGATE BASE TYPE A. COSTS ASSOCIATED WITH THE FOUNDATION AND LEVELING COURSE SHALL BE INCLUDED IN THE PRICE **BID OF THE STRUCTURE**
- 12. WALLS AND SLABS WILL HAVE A MINIMUM THICKNESS OF 6". A TOLERANCE OF ±3%" WILL BE ALLOWED FOR FABRICATION.
- 13. FLEXURAL REINFORCING STEEL SHALL NOT EXCEED SPACING OF 6" CENTER TO CENTER

	BASIS OF PAYMENT		
ITEM NO.	ITEM	UNIT	
611(G)	PRECAST INLET CI DES. 1 (STD)	EA.	
611(G)	PRECAST INLET CI DES. 1 (A)	EA.	
611(G)	PRECAST INLET CI DES. 1 (B)	EA.	
611(G)	PRECAST INLET CI DES. 1 (C)	EA.	
611(G)	PRECAST INLET CI DES. 1 (D)	EA.	
611(G)	PRECAST INLET CI DES. 1 (2A)	EA.	
611(G)	PRECAST INLET CI DES. 1 (A-B)	EA.	
611(G)	PRECAST INLET CI DES. 1 (A-C)	EA.	
611(G)	PRECAST INLET CI DES. 1 (2B)	EA.	
611(G)	PRECAST INLET CI DES. 1 (B-C)	EA.	
611(G)	PRECAST INLET CI DES. 1 (2C)	EA.	
611(G)	PRECAST INLET CI DES. 2 (STD)	EA.	
611(G)	PRECAST INLET CI DES. 2 (B)	EA.	
611(G)	PRECAST INLET CI DES. 2 (C)	EA.	
611(G)	PRECAST INLET CI DES. 2 (D)	EA.	
611(G)	PRECAST INLET CI DES. 2 (2B)	EA.	
611(G)	PRECAST INLET CI DES. 2 (2C)	EA.	
611(G)	PRECAST INLET CI DES. 2 (B-D)	EA.	
611(G)	PRECAST INLET CI DES. 2 (2D)	EA.	
611(G)	PRECAST INLET CI DES. 3 (STD)	EA.	
611(G)	PRECAST INLET CI DES. 3 (B)	EA.	
611(G)	PRECAST INLET CI DES. 3 (D)	EA.	
611(G)	PRECAST INLET CI DES. 3 (2B)	EA.	
611(G)	PRECAST INLET CI DES. 3 (B-D)	EA.	
611(G)	PRECAST INLET CI DES. 3 (2D)	EA.	
611(G)	ADD'L DEPTH IN PRECAST INLET CI DES. 1	VF	
611(G)	ADD'L DEPTH IN PRECAST INLET CI DES. 2	VF	
611(G)	ADD'L DEPTH IN PRECAST INLET CI DES. 3	VF	
-	APPROVED BY	12	6/20/2
	ROADWAY ENGINEER:	DAT	E 0/ 50/22
	ROADWAY DESIGN DIV	ISION STANDA	RD
	DDECAST CU		
	FRECAST CO		
	OKLAHOMA (DESIGNS 1, 2	2 AND 3)	
	Transportation	2019 SPECIFI	CATIONS
		PCI-1	- 11

DESIGN	TYPE	DIMENSIONS		
NO.	OF CURB	а	b	
	4" MOUNTABLE	4½"	9½"	
1	6" MOUNTABLE	6½"	11½"	
'	6" BARRIER	6½"	11½"	
	8" BARRIER	8½"	13½"	
	4" MOUNTABLE	4½"	9½"	
2	6" MOUNTABLE	6½"	11½"	
2	6" BARRIER	6½"	11½"	
	8" BARRIER	8½"	13½"	
	4" MOUNTABLE	4½"	9½"	
3	6" MOUNTABLE	6½"	11½"	
	6" BARRIER	6½"	11½"	
	8" BARRIER	8½"	13½"	

BASIS OF PAYMENT			
ITEM NO.	ITEM	UNIT	
611(G)	INLET (CI DES. ▲)	ΕA	
611(H)	ADDITIONAL DEPTH IN INLET (CI DES.♥)	VF	
611()	REPLACEMENT OF INLET FRAME AND GRATE▲	EA	
611(J)	REPLACEMENT OF INLET FRAME	EA	
611(K)	REPLACEMENT OF INLET GRATE	EA	
611(M)	REPLACEMENT OF CAST IRON HOOD	EA	

- 1. ALL CONSTRUCTION AND MATERIAL REQUIREMENTS SHALL BE IN ACCORDANCE WITH THE 2019 ODOT STANDARD SPECIFICATIONS.
- 2. INLET DESIGN NO. 1 REQUIRES ONE TYPE 'A' FRAME.
- INLET DESIGN NO. TREADIRES ONE TYPE A TRAME.
 INLET DESIGN NO. 2 REQUIRES TWO TYPE 'B' FRAMES AND 2 EA.-3/4" x 5" BOLTS WITH NUTS AND ONE S 4 x 7.7 x 3'-4" LONG SUPPORT BEAM. IF BUILT ON CURVED CURB, THE INLET REQUIRES 1 EA. 3/4" x 5" BOLT WITH NUT AND 1 EA. 3/4" x 6 1/2" BOLT WITH NUT AND ONE M 5 x 18.9 x 3'-4" LONG SUPPORT BEAM.
- 4. INLET DESIGN NO. 3 REQUIRES THE SAME APPURTENANCES AS DESIGN NO. 2 WITH TWO OR MORE TYPE 'C' FRAMES LOCATED BETWEEN THE TWO TYPE 'B' FRAMES AND ONE ADDITIONAL SUPPORT BEAM AND A PAIR OF BOLTS WITH NUTS FOR EACH ADDED TYPE 'C' FRAME, PLUS ONE ADDITIONAL PAIR OF BOLTS AND SUPPORT BEAM.
- 5. ALL LETTERING TO BE RECESSED 1/16" AND SHALL NOT EXCEED 1" IN HEIGHT. INFORMATION REQUIRED SHALL BE STATED IN THE SPECIFICATIONS. LOCATION OF LETTERING TO BE AS SHOWN WITH ADDITIONAL IDENTIFICATION LETTERING AT OTHER LOCATIONS ACCEPTABLE.
- 6. FRAMES SHALL BE CAST STEEL, DUCTILE IRON, OR GRAY IRON CONFORMING TO SECTION 725 OF THE SPECIFICATIONS.
- INLET FRAMES AND GRATES INSTALLED DURING ORIGINAL CONSTRUCTION SHALL BE INCLUDED IN THE CONTRACT UNIT PRICE OF THE ORIGINAL INLET.

NOTE: MACHINING (SYMBOL A) MAY BE ACCOMPLISHED BY MILLING OR BY LEVEL GRINDING.

BASIS OF PAYMENT			
ITEM NO.	ITEM	UNIT	
611()	REPLACEMENT OF INLET FRAME AND GRATE (EA	
611(J)	REPLACEMENT OF INLET FRAME (EA	

■ TYPE OF FRAME AND TYPE OF GRATE SHALL BE SPECIFIED.

TYPE A, B, OR C FRAMES AS SHOWN HERE WITH GRATES FROM STANDARD CIG-4 (TYPE VG-F OR RVG-F) COMPRISE THE PAY ITEM. SEE NOTE THIS SHEET FOR PAY UNIT.

	[]]	11	
	APPROVED BY ROADWAY ENGINEER:	DATE	6/30/22
1	ROADW/Y DESIGN DIV	ISION STANDAR	D
(STORM SEWER IN	ILET FRAMES	
	OKI AHOMA (CURB INL	ETS)	
	Transportation	2019 SPECIFIC	ATIONS
		SSIE-5	1

SECTION B - B (FRAME INSTALLATION)

GENERAL NOTES

1. ALL CONSTRUCTION AND MATERIAL REQUIREMENTS SHALL BE IN ACCORDANCE WITH THE 2019 ODOT STANDARD SPECIFICATIONS.

2. FRAME TYPE GRATES SHALL NOT TO BE USED IN TRENCH INSTALLATIONS. 3. GRATES SHALL BE INSTALLED IN THE FRAME WITH FLOW ARROW POINTING

DOWNSTREAM OR TOWARD THE LOW POINT IN A SUMP.

4. ALL LETTERING IS TO BE RECESSED 1/16". ALL INFORMATION REQUIRED SHALL BE SUFFICIENT FOR IDENTIFICATION, AS SHOWN.

5. GRATES SHALL BE CAST STEEL, DUCTILE IRON, OR GRAY IRON CONFORMING TO SECTION 725 OF THE SPECIFICATIONS.

6. ALL GRATES INSTALLED IN A TRENCH FRAME (STD. SSIF-5) SHALL HAVE A BOLTED HOLD-DOWN FEATURE. IF INSTALLED IN AN ANGLE IRON FRAME OR RESTING ON A CONCRETE SHOULDER, A POSITIVE HOLD-DOWN FEATURE, APPROVED BY THE

7. INLET FRAMES, GRATES AND COVER GRATES INSTALLED DURING ORIGINAL CONSTRUCTION SHALL BE INCLUDED IN THE CONTRACT UNIT PRICE OF THE

NOTE: MACHINING (SYMBOL N MAY BE ACCOMPLISHED BY MILLING OR BY

	BASIS OF PAYN	/ENT			
ITEM NO.	ITEM		UNIT		
▼ 611() RE	EPLACEMENT OF INLET FR	AME AND GRATE	EA		
611 (K) RE	EPLACEMENT OF INLET GF	RATE (TYPE 🔳)	EA		
▼ ANY FRAM A PROPER SSIF-5 (TYP	ie type grate on this d Frame, as shown on r Pes a, b and c) will co	RAWING INSTALL OADWAY STANDA MPRISE THE PAY I	ED IN ARD TEM.		
CAS	T INLET GRATE NON	ENCLATURE			
TYPE VG-F	VANE GRATE - FRAM	/E TYPE	7		
TYPE VG-T	VANE GRATE - TREN	ICH TYPE	1		
TYPE RVG-	-F RIBBED VANE GRAT	E - FRAME TYPE			
TYPE RVG-	-T RIBBED VANE GRAT	E - TRENCH TYPE]		
5	E.	120	11		
Ŕ	APPROVED BY ROADWAY ENGINEER:				
	OKLAHOMA	CAST IRON (CURB INI	GRATES LETS) 2019 SPECIFIC	CATIONS	
			CIG-4	1	
				R-47	

R-48

- . ALL CONSTRUCTION AND MATERIAL REQUIREMENTS SHALL BE IN ACCORDANCE WITH THE 2019 ODOT STANDARD SPECIFICATIONS.
- 2. ALL MANHOLES SHALL HAVE 4 FOOT DIAMETERS UNLESS A LARGER DIAMETER IS REQUIRED.
- 3. CAST-IN-PLACE CONCRETE WALLS WITH THE SAME DIMENSIONS SHOWN ON THIS STANDARD, MAY BE USED IN LIEU OF THE BRICK MASONRY. CAST-IN-PLACE WALLS EXCEEDING 5 FEET IN DEPTH (GUTTERLINE TO FLOWLINE), WILL REQUIRE NO. 4 REINFORCING BARS SPACED AT 30 INCH CENTERS VERTICALLY AND 12 INCH CENTERS HORIZONTALLY.
- 4. WHERE A MORTAR COAT IS REQUIRED IT SHALL BE 1/2" THICK AND SHALL BE APPLIED WHILE BRICK MASONRY IS CLEAN AND DAMP.
- 5. MANHOLES UP TO 6 FEET IN HEIGHT SHALL BE PAID FOR AS 'MANHOLE' (EA.). ANY ADDITIONAL HEIGHT OF MANHOLE SHALL BE PAID FOR AS 'ADDITIONAL DEPTH IN MANHOLE' (VF).
- 6. JUNCTION BOXES SHALL HAVE INSIDE DIMENSIONS AND HEIGHT AS SHOWN ON THE PLANS, AND CONSTRUCTION SHALL BE MEASURED BY CF OF WALL MATERIAL AND TO BE PAID FOR AS 'JUNCTION BOXES' (CF). DEDUCTIONS IN VOLUME WILL BE MADE FOR ALL PIPE OPENINGS I8 INCHES IN DIAMETER AND LARGER (SEE TABLE).
- 7. REINFORCING STEEL AND STRUCTURAL STEEL WILL BE INCLUDED AS PART OF THE COST OF THE STRUCTURE COMPLETE, AND WILL NOT BE MEASURED AS A PAY ITEM.
- 3. MANHOLE FRAMES, COVERS AND COVER GRATES INSTALLED DURING ORIGINAL CONSTRUCTION SHALL BE INCLUDED IN CONTRACT UNIT PRICE OF ORIGINAL MANHOLE AND JUNCTION BOX. FOR DETAILS OF FRAME AND COVER, SEE THE CURRENT VERSION OF ROADWAY STANDARD MFC-5.

OPTIONAL PRECAST MANHOLES

9. PRECAST STORM SEWER MANHOLE STRUCTURES CAN BE SUBSTITUTED FOR BRICK MASONRY OR CAST-IN-PLACE MANHOLE STRUCTURES. SEE ROADWAY STANDARDS PRM-1, PSM-1, AND PMD-1 FOR THEIR DESIGN, DETAILS AND BASIS OF PAYMENT.

1. ALL CONSTRUCTION AND MATERIAL REQUIREMENTS SHALL BE IN ACCORDANCE WITH THE 2019 ODOT STANDARD SPECIFICATIONS.

- FOR DETAILS OF FRAME AND COVER, SEE THE CURRENT VERSION OF ROADWAY STANDARD MFC-5. PRICE BID OF MANHOLE SHALL INCLUDE PAYMENT FOR THESE ITEMS AND ALL OTHER ITEMS AND LABOR NECESSARY TO COMPLETE THE INSTALLATION. PRICE BID OF ADDITIONAL DEPTH SHALL INCLUDE PAYMENT FOR ALL MATERIAL AND LABOR. PERTAINING ONLY TO THE ADDITIONAL DEPTH, NECESSARY TO COMPLETE ITS INSTALLATION.
- 3. SQUARE MANHOLES MAY BE SUBSTITUTED PER THE MANUFACTURER'S RECOMMENDATION. SEE THE CURRENT VERSION OF ROADWAY STANDARD PSM-1 FOR MATERIAL AND INSTALLATION DETAILS
- 4. PIPE OPENINGS SHALL NOT BE LOCATED IN A CONE SECTION.
- 5. THERE SHALL BE A MINIMUM DISTANCE OF 6" BETWEEN AN OPENING AND ANY JOINT.
- 6. PROVIDE LIFTING DEVICES IN CONFORMANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.
- PROVIDE GRADE 60 REINFORCING STEEL CONFORMING TO ASTM A615 OR EQUIVALENT AREA OF WELDED WIRE REINFORCING CONFORMING TO ASTM A1064. PROVIDE CIRCUMFERENTIAL REINFORCING STEEL IN VERTICAL WALLS OF BASE, RISER, AND CONE IN ACCORDANCE WITH ASTM C478
- 8. PROVIDE A MINIMUM CLEAR COVER OF 11/2" TO REINFORCING STEEL.
- 9. WALLS OR SLABS WITH A THICKNESS OF 8" OR GREATER REQUIRE A SECONDARY LAYER OF REINFORCING STEEL. PROVIDE AN AREA OF REINFORCING STEEL EQUAL TO 0.11 SQ. IN.²/ FT EACH WAY IN THE SECONDARY LAYER
- 10. DESIGN TONGUE AND GROOVE JOINTS FOR FULL CLOSURE ON RISER SHOULDERS, CONICAL TOPS, AND FLAT SLABS. MINIMUM SPIGOT DEPTH IS 3/4"
- 11. MAXIMUM OPENING SHALL BE 4" LARGER THAN OUTSIDE PIPE DIAMETER. REFER TO THE MOST CURRENT VERSION OF ROADWAY DESIGN STANDARD PMD-1 FOR PIPE CONNECTION MATERIAL.
- 12. SEAL TONGUE AND GROOVE JOINTS WITH PREFORMED OR BULK MASTIC IN CONFORMANCE WITH THE MANUFACTURER'S RECOMMENDATIONS, TONGUE AND GROOVE JOINTS MAY BE GROUTED NO MORE THAN 1" BETWEEN EACH SECTIONS OR 1/2 THE JOINT DEPTH, WHICHEVER IS GREATER. JOINT SEALING SHALL BE INCLUDED IN THE COST OF THE MANHOLE.
- 13. DO NOT GROUT RUBBER GASKET JOINTS WITHOUT THE MANUFACTURER'S RECOMMENDATIONS.
- 14. THE FOUNDATION SHALL BE STABILIZED OR REMOVED AND REPLACED WITH FIRM AND STABLE FOUNDATION MATERIAL. A MINIMUM 3" THICK LEVELING COURSE SHALL BE PROVIDED BELOW THE BASE AREA OF THE MANHOLE AND EXTEND 6" BEYOND THE BASE AREA. THE LEVELING COURSE SHALL BE CONSTRUCTED WITH AGGREGATE BASE TYPE A. COSTS ASSOCIATED WITH THE FOUNDATION AND LEVELING COURSES SHALL BE INCLUDED IN THE PRICE BID OF THE MANHOLE
- 15. OPENINGS IN FLAT SLAB TOPS SHALL BE ADDITIONALLY REINFORCED WITH A MINIMUM OF 0.20 SQ. IN. OF REINFORCING STEEL AT 90 DEGREES.
- 16. REFER TO PROJECT PLAN SHEETS FOR NUMBER, LOCATION, AND SIZE OF PIPE
- 17. FLEXURAL REINFORCING STEEL SHALL NOT EXCEED SPACING OF 9" CENTER TO CENTER
- 18. PRECAST CONCRETE GRADE RING WALL THICKNESS SHALL BE $\frac{1}{2}$ OF INTERNAL DIAMETER OR 4", WHICHEVER IS GREATER.
- 19. THE ENGINEER MAY SPECIFY THE USE OF STEPS OR LADDERS AND SHALL CONFORM TO ASTM C478.
- 20. THE ORIENTATION OF THE SPIGOT IS SHOWN FOR INFORMATIONAL PURPOSES ONLY AND IS AT THE DISCRETION OF THE MANUFACTURER.

BASIS OF PAYMENT					
ITEM NO.	ITEM	UNIT			
611(A)	(SP) PRECAST CONC RND 4' DIA MANHOLE	EACH			
611(A)	(SP) PRECAST CONC RND 5' DIA MANHOLE	EACH			
611(A)	(SP) PRECAST CONC RND 6' DIA MANHOLE	EACH			
611(B)	(SP) ADD'L DEPTH PRECAST RND 4' MANHOLE	VF			
611(B)	(SP) ADD'L DEPTH PRECAST RND 5' MANHOLE	VF			
611(B)	(SP) ADD'L DEPTH PRECAST RND 6' MANHOLE	VF			

PRECAST ROUND MANHOLE

2019 SPECIFICATIONS

PRM-1

- 1. ALL CONSTRUCTION AND MATERIAL REQUIREMENTS SHALL BE IN ACCORDANCE WITH THE 2019 ODOT STANDARD SPECIFICATIONS.
- FOR DETAILS OF FRAME AND COVER, SEE CURRENT VERSION OF ROADWAY STANDARD MFC-5. PRICE BID OF MANHOLE SHALL INCLUDE PAYMENT FOR THESE ITEMS AND ALL OTHER ITEMS AND LABOR, NECESSARY TO COMPLETE THE INSTALLATION. PRICE BID OF ADDITIONAL DEPTH SHALL INCLUDE PAYMENT FOR ALL MATERIAL AND LABOR PERTAINING ONLY TO THE ADDITIONAL DEPTH, NECESSARY TO COMPLETE ITS INSTALLATION.
- 3. PRECAST ROUND MANHOLES MAY BE SUBSTITUTED PER THE MANU-FACTURER'S RECOMMENDATION. SEE ROADWAY STANDARD PRM-1 FOR DESIGN AND INSTALLATION DETAILS.
- 4. THERE SHALL BE A MINIMUM DISTANCE OF 6" BETWEEN AN OPENING AND ANY JOINT
- 5. PROVIDE LIFTING DEVICES IN CONFORMANCE WITH THE MANUFACTURER'S RECOMMENDATIONS
- PROVIDE GRADE 60 REINFORCING STEEL CONFORMING TO ASTM A615 OR EQUIVALENT AREA OF WELDED WIRE REINFORCING CONFORMING 6. TO ASTM A1064
- 7. PROVIDE A MINIMUM CLEAR COVER OF 11/2" TO REINFORCING STEEL.
- 8. WALLS OR SLABS WITH A THICKNESS OF 8" OR GREATER REQUIRE A SECONDARY LAYER OF REINFORCING STEEL. PROVIDE AN AREA OF REINFORCING STEEL EQUAL TO 0.11 SQ. IN. / FT EACH WAY IN THE SECONDARY LAYER
- 9. DESIGN TONGUE AND GROOVE JOINTS FOR FULL CLOSURE ON RISER SHOULDERS, CONICAL TOPS, AND FLAT SLABS. MINIMUM SPIGOT DEPTH
- 10. MAXIMUM OPENING SHALL BE 4" LARGER THAN OUTSIDE PIPE DIAMETER. REFER TO ROADWAY DESIGN STANDARD PMD-1 FOR PIPE CONNECTION MATERIAL
- 11. SEAL TONGUE AND GROOVE JOINTS WITH PREFORMED OR BULK MASTIC IN CONFORMANCE WITH THE MANUFACTURER'S RECOMMENDATIONS. TONGUE AND GROOVE JOINTS MAY BE GROUTED NO MORE THAN 1" BETWEEN EACH SECTIONS OR 1/2 THE JOINT DEPTH, WHICHEVER IS GREATER. JOINT SEALING SHALL BE INCLUDED IN THE COST OF THE MANHOLE.
- 12. DO NOT GROUT RUBBER GASKET JOINTS WITHOUT THE MANUFACTURER'S RECOMMENDATIONS.
- THE FOUNDATION SHALL BE STABILIZED OR REMOVED AND REPLACED 13 WITH FIRM AND STABLE FOUNDATION MATERIAL. A MINIMUM 3" THICK LEVELING COURSE SHALL BE PROVIDED BELOW THE BASE AREA OF THE MANHOLE AND EXTEND 6" BEYOND THE BASE AREA. THE LEVELING COURSE SHALL BE CONSTRUCTED WITH AGGREGATE BASE TYPE A. COSTS ASSOCIATED WITH THE FOUNDATION AND LEVELING COURSES SHALL BE INCLUDED IN THE PRICE BID OF THE MANHOLE.
- 14. OPENINGS IN FLAT SLAB TOPS SHALL BE ADDITIONALLY REINFORCED WITH A MINIMUM OF 0.20 SQ. IN. OF STEEL AT 90 DEGREES.
- 15. REFER TO PROJECT PLAN SHEETS FOR NUMBER, LOCATION, AND SIZE OF
- 16. FLEXURAL REINFORCING STEEL SHALL NOT EXCEED SPACING OF 9" CENTER TO CENTER
- 17. SEE CURRENT VERSION OF ROADWAY STANDARD PRM-1 FOR DIMENSIONS AND REINFORCING REQUIREMENTS FOR PRECAST CONCRETE ROUND MANHOLES, WITH AND WITHOUT ROUND REDUCED RISER SECTIONS.
- 18. THE ENGINEER MAY SPECIFY THE USE OF STEPS OR LADDERS AND SHALL CONFORM TO ASTM C478.
- 19. THE ORIENTATION OF THE SPIGOT IS SHOWN FOR INFORMATIONAL PURPOSES ONLY AND IS AT THE DISCRETION OF THE MANUFACTURER.

BASIS OF PAYMENT					
ITEM NO.	ITEM	UNIT			
611(A)	(SP) PRECAST CONC SQ 4' WIDE MANHOLE	EACH			
611(A)	(SP) PRECAST CONC SQ 5' WIDE MANHOLE	EACH			
611(A)	(SP) PRECAST CONC SQ 6' WIDE MANHOLE	EACH			
611(B)	(SP) ADD'L DEPTH PRECAST SQ 4' MANHOLE	VF			
611(B)	(SP) ADD'L DEPTH PRECAST SQ 5' MANHOLE	VF			
611(B)	(SP) ADD'L DEPTH PRECAST SQ 6' MANHOLE	VF			

APPROVED BY ROADWAY ENGINEER ROADWAY DESIGN DIVIS	DATE: 6/30/2
PRECAST SQUAF	RE MANHOLE

1) ... 10

PSM-1

2019 SPECIFICATIONS

MANHOLE STRUCTURE SIZING DETAIL

CONNECTION DETAIL

MANUFACTURER MAY PROVIDE BOOTS MEETING ASTM D2321 AND ASTM C923 FOR HDPE OR PP PIPE.

	MANHOLE STRUCTURE SIZE SCHEDULE						
	MANHOLE INSIDE DIAMETER	90° DEFLECTION	135° DEFLECTION	180° DEFLECTION			
1	48"	18"	27"	30"			
	60"	27"	36"	42"			
	72"	33"	48"	48"			

NOTE: DIAMETER SHOWN IN MANHOLE STRUCTURE SIZE SCHEDULE IS THE INTERNAL PIPE DIAMETER. TABLE VALUES ARE DETERMINED BY ASSUMING ADJOINING PIPES ARE EQUAL IN DIAMETER AND ARE THE MAXIMUM SIZE ALLOWED FOR ADJOINING PIPES OF EQUAL DIAMETER. PIPES MAY HAVE DIFFERENT DIAMETERS THAN SHOWN IN THE TABLE AS LONG AS THEY PROVIDE A MINIMUM STRUCTURAL LEG OF 6 INCHES.

FOR STRUCTURES WITH DIFFERENT DEFLECTION ANGLES, PIPE DIAMETERS, OR COMBINATIONS REFER TO THE NATIONAL PRECAST CONCRETE ASSOCIATION MANHOLE SIZING RECOMMENDATIONS AT: https://precast.org/wp-content/uploads/2014/08/Precast-concrete-manhole-sizing-recommendations.pdf

NOTE: HDPE PIPE SHOWN, RCP SIMILAR. ALTERNATIVELY, THE

ROUND CONCRETE PIPE							
WALL	CLEAR SPACE BETWEEN	SINGLE PIPE STANDARD TRENCHING		DOUBLE PIPE STANDARD TRENCHING		TRIPLE PIPE STANDARD TRENCHING	
L THIC	PIPES	W WIDTH ▲	STANDARD BEDDING MATERIAL ■	W WIDTH ▲	STANDARD BEDDING MATERIAL ■	W WIDTH ▲	STANDARD BEDDING MATERIAL ■
FT.	IN.	FT.	CY/LF	FT.	CY/LF	FT.	CY/LF
0.208	12.00	4.92	0.17	7.83	0.24	10.75	0.32
0.250	15.00	5.50	0.21	9.25	0.33	13.00	0.45
0.292	18.50	6.08	0.27	10.71	0.43	15.34	0.60
0.333	22.00	6.67	0.32	12.17	0.55	17.66	0.78
0.375	25.50	7.25	0.38	13.63	0.67	20.00	0.97
0.417	29.00	7.83	0.43	15.09	0.81	22.34	1.19
0.458	32.50	8.42	0.50	16.54	0.96	24.66	1.42
0.500	36.00	9.00	0.56	18.00	1.12	27.00	1.68
0.542	36.00	9.58	0.64	19.17	1.27	28.75	1.91
0.583	36.00	10.17	0.71	20.33	1.43	30.50	2.14
0.625	36.00	10.75	0.80	21.50	1.60	32.25	2.39
0.667	36.00	11.33	0.88	22.67	1.77	34.00	2.65
0.708	36.00	11.92	0.98	23.83	1.95	35.75	2.93
0.750	36.00	12.67	1.10	25.17	2.17	37.50	3.21

ARCH CONCRETE PIPE

WALL	CLEAR SPACE BETWEEN	SINGLE PIPE STANDARD TRENCHING		DOUBLE PIPE STANDARD TRENCHING		TRIPLE PIPE STANDARD TRENCHING	
	PIPES	WIDTH	STANDARD BEDDING MATERIAL ■	WIDTH	STANDARD BEDDING MATERIAL ■	WIDTH	STANDARD BEDDING MATERIAL ■
FT.	IN.	FT.	CY/LF	FT.	CY/LF	FT.	CY/LF
0.208	12.00	5.25	0.19	8.50	0.27	11.75	0.37
0.250	12.00	5.83	0.21	9.67	0.31	13.50	0.43
0.292	12.00	6.58	0.29	11.17	0.42	15.75	0.58
0.333	12.00	7.25	0.35	12.50	0.51	17.75	0.71
0.375	17.25	8.00	0.43	14.44	0.65	20.88	0.93
0.417	19.61	8.67	0.52	15.97	0.79	23.27	1.15
0.458	21.97	9.33	0.62	17.50	0.95	25.66	1.39
0.500	24.67	10.08	0.75	19.22	1.16	28.36	1.71
0.583	29.72	11.50	1.00	22.48	1.58	33.45	2.34
0.667	34.44	13.11 1.28		25.81	2.03	38.52	3.02
0.708	36.00	14.67	1.71	28.67	2.64	42.67	3.92
0.750	36.00	15.56	1.88	30.22	2.89	44.89	4.28

HORIZONTAL ELLIPTICAL CONCRETE PIPE

WALL	CLEAR SPACE BETWEEN	SINGLE PIPE STANDARD		DOUBLE PIPE STANDARD		TRIPLE PIPE STANDARD	
THIO	PIPES	WIDTH	STANDARD BEDDING MATERIAL ■	WIDTH	STANDARD BEDDING MATERIAL ■	WIDTH	STANDARD BEDDING MATERIAL ■
FT.	IN.	FT.	CY/LF	FT.	CY/LF	FT.	CY/LF
0.229	12.00	5.38	0.18	8.75	0.28	12.13	0.38
0.271	12.00	6.04	0.23	10.08	0.37	14.13	0.50
0.312	12.00	6.79	0.30	11.58	0.48	16.37	0.66
0.375	12.00	7.50	0.37	13.00	0.61	18.50	0.85
0.417	17.94	8.25	0.45	15.00	0.78	21.74	1.11
0.458	20.31	8.92	0.52	16.52	0.92	24.13	1.33
0.500	23.00	9.67	0.60	18.25	1.10	26.83	1.61
0.542	25.69	10.42	0.71	19.98	1.33	29.53	1.96
0.583	28.06	11.08	0.81	21.50	1.55	31.92	2.29
0.625	30.75	11.83	0.94	23.23	1.82	34.63	2.71
0.667	33.11	12.67	1.08	24.93	2.10	37.19	3.12
0.708	35.81	13.67	1.25	26.90	2.44	40.13	3.63
0.750	36.00	14.56	1.40	28.47	2.69	42.39	3.99
0.792	36.00	15.56	1.60	30.22	3.04	44.89	4.49

W, OR WIDTH OF TRENCHING IS BASED ON TRENCH INSTALLATION, WITH SPRINGLINE WIDTH OF THE GREATER OF OD/6 OR 18 INCHES.

VALUES SHOWN IN TABLES ARE BASED ON HEIGHT TO SPRINGLINE.

ORIGINAL GROUND LINE ORIGINAL GROUND LINE URLEATED TO SEE ANGLE OF REPOSE FOR SLOPING OF SIDES OF EXCAVATIONS IN TRENCHES WITH DEPTH GREATER THAN 5 FEET AND LESS THAN 20 FEET, AS A METHOD TO PROTECT PERSONNEL WORKING IN EXCAVATIONS FROM CAVE-INS. ◆
OPTIONAL TRENCHES WITH DEPTH GREATER THAN 5.0 FEET EXCAVATION AND BEDDING MATERIAL WILL BE MEASURED AND PAID FOR AS IF TRENCHED WALLS WERE VERTICAL. (SPECIAL TRENCHING = STD. WIDTH TRENCH + 12 INCHES
▼ NATURAL SOLID MINERAL MATTER THAN CAN BE EXCAVATED WITH VERTICAL SIDES AND REMAIN INTACT WHILE EXPOSED.

♦ SOIL CLASSIFICATION - SOIL AND ROCK DEPOSITS SHALL BE CLASSIFIED IN ACCORDANCE WITH APPENDIX A UNDER SUBPART P 'EXCAVATIONS' OF 29 CFR 1926.

4.

	OUVER	OOVEN
	FEET	INCHES
	10	12
	10	12
	10	12
	10	12
	10	12
	10	12
	10	12
	10	12
	10	12
	10	12
	10	12
	10	12
ORIGINAL GR		
11		
APPROXIMATE ANGLE OF REPOSE FO OF SIDES OF EXCAVATIONS IN TRENC		

REINF. CONC. HORIZONTAL ELLIPTICAL PIPE

SPAN

23

30

38

45

53

60

68

76

83

91

98

106

CLASS HE-III

INCHES

RISE

14

19

24

29

34

38

43

48

53

58

63

68

EQUIV

DIA.

INCHE:

18

24

30

36

42

48

54

60

66

72

78

84

10

10

10

12

REINFORCED CONCRETE ARCH PIPE						
EQUIV.	CLAS	S A-III	MINIMUM	MAXIMUM COVER		
DIA.	SPAN	RISE				
INCHES	INC	HES	INCHES	FEET		
18	22	13	12	10		
24	28	18	12	10		
30	36	22	12	10		
36	43	26	12	10		
42	51	31	12	10		
48	58	36	12	10		
54	65	40	12	10		
60	73	45	12	10		
66			12	10		
72	88	54	12	10		

77

84

90

96

115

122

CONCRETE ROUND PIPE CULVERT											
		FILL HEIGHT AND PIPE CLASS TABLE									
PIPE DIAMETER			EMBAN	KMENT			TRE	NCH			
	MINIMUM	CLASS II	CLASS III	CLASS IV	CLASS V	CLASS II	CLASS III	CLASS IV	CLASS V		
INCHES	INCHES			MAXIMUM F	ILL HEIGHT ,	ABOVE TOP	OF PIPE IN F	EET			
12	12	10	14	20	30	18	50	•	•		
18	12	10	14	20	30	20	50	•	•		
24	12	10	14	20	30	12	20	40	•		
30	12	10	14	20	30	12	20	50	•		
36	12	10	14	20	30	10	14	30	50		
42	12	10	14	20	30	10	16	30	50		
48	12	10	14	20	30	10	16	30	50		
54	12	10	14	20	30	10	16	30	50		
60	12	12	16	20	30	10	14	25	50		
66	12	12	16	20	30	10	14	25	50		
72	12	12	16	20	35	10	14	25	50		
78	12	12	16	20	35	10	16	25	50		
84	12	12	16	20	35	10	16	25	50		
90	12	12	16	20	35	12	16	25	50		
96	12	12	16	20	35	12	16	25	50		
108	12	12	16	20	35	12	16	25	50		

SPECIAL DESIGN PIPE. DESIGN METHOD TO CONFORM TO CURRENT AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS.

CONCRETE PIPE FABRICATION SF	PIPE DESCRIPTIONS		
SHAPE OF CONCRETE PIPE	AASHTO	ASTM	
CONCRETE ROUND PIPE	M 170	C 76	
CONCRETE ARCH PIPE	M 206	C 506	SIZE IS DENOTED AS SPAN × RISE, BOTH IN INCHES
CONCRETE HORIZONTAL ELLIPTICAL PIPE	M 207	C 507	SPAN, THE LONGEST DIMENSION, IS ORIENTED
			HORIZONTALLY WHILE THE RISE IS ORIENTED
			VERTICALLY. DENOTED AS RISE X SPAN, BOTH IN
			INCHES

GENERAL NOTES

1. ALL CONSTRUCTION AND MATERIALS REQUIREMENTS SHALL BE IN ACCORDANCE WITH THE 2019 ODOT STANDARD SPECIFICATIONS

2. TRENCH EXCAVATION AND BEDDING MATERIAL WILL NOT BE REQUIRED FOR PIPE INSTALLATIONS OF SIDE DRAINS UNLESS OTHERWISE NOTED ON THE PLANS.

3. NORMAL BACKFILLING OPERATIONS SHALL FOLLOW BEDDING PIPE INSTALLATION AS CLOSELY AS PRACTICAL. IN NO CASE SHALL A PIPE INSTALLATION SUBJECT TO SUDDEN FLOW DEVELOPMENT BE LEFT WITHOUT SUFFICIENT BACKFILL TO RESTRAIN THE CONDUIT AND PREVENT JOINT SEPARATION AND/OR PIPING SCOUR. PHYSICALLY RESTRAINING THE CONDUIT MAY BE USED TO AUGMENT OR REPLACE THIS IMMEDIATE BACKEILL REQUIREMENT

ANY EXCESS EXCAVATION NOT USED FOR BACKFILL WILL BECOME THE PROPERTY OF, AND DISPOSED OF BY THE CONTRACTOR IN A MANNER APPROVED BY THE ENGINEER.

5. STANDARD BEDDING QUANTITIES FOR ROUND PIPE ARE BASED ON AASHTO SPECIFICATION M-170 DESIGNATED CLASS III (WALL B) REINFORCED CONCRETE PIPE.

6 3 INCHES OF BEDDING MATERIAL BELOW PIPE CONDUIT IS REQUIRED FOR A PROPER FOUNDATION. IF THE FOUNDATION IS ROCKY, THEN 6 INCHES OF BEDDING MATERIAL IS REQUIRED

7. MULTIPLE PIPE CULVERTS SHALL BE INSTALLED WITH A MINIMUM CLEARANCE BETWEEN PIPES OF 1/2 D OR 12 INCHES, WHICHEVER IS GREATER, BUT NOT TO EXCEED 36 INCHES

8. CLASS I AND II REINFORCED CONCRETE PIPE SHALL ONLY BE USED FOR SEWERS IN TRENCHES OUTSIDE ROADBED AND STREET LIMITS.

9. FOR COMPUTING TRENCH EXCAVATION AND STANDARD BEDDING QUANTITIES, THE LENGTH OF THE CULVERT SHALL INCLUDE THE END SECTION AND END TREATMENT LENGTHS. COST OF TRENCH EXCAVATION AND BEDDING SHALL BE PAID FOR SEPARATELY FOR CROSS DRAINS ONLY, FOR SIDE DRAINS, THE COST OF BOTH ITEMS SHALL BE INCLUDED IN COST OF CULVERT.

10. WHEN EITHER GROUND WATER OR SURFACE RUN-OFF IS ENCOUNTERED, THE CONTRACTOR SHALL FURNISH, INSTALL, MAINTAIN. AND OPERATE ALL NECESSARY PUMPS, MATERIALS AND EQUIPMENT TO KEEP EXCAVATION REASONABLY FREE FROM WATER UNTIL THE LAYING AND JOINTING OF THE PIPE, POURING OF CONCRETE AND PLACING OF BEDDING MATERIAL HAS BEEN COMPLETED, INSPECTED AND APPROVED AND ALL DANGER OF FLOTATION AND OTHER DAMAGE IS REMOVED.

11. TYPICAL CLASS OF REINFORCED CONCRETE ARCH PIPE SHALL BE CLASS A-III. AND TYPICAL REINFORCED CONCRETE HORIZONTAL ELLIPTICAL PIPE SHALL BE CLASS HE-III, STANDARD BEDDING MATERIAL QUANTITIES ARE BASED ON THESE PIPE CLASSES.

12. PROPER INSTALLATION PRACTICE MUST BE ADHERED TO AS SHOWN ON ROADWAY STANDARD PBB-1

13. IN THE EVENT LOADS IN EXCESS OF HL-93 ARE TO BE OPERATED OVER OR ADJACENT TO THE PIPE INSTALLATION DURING CONSTRUCTION, THE CONTRACTOR SHALL PROVIDE AND MAINTAIN A MINIMUM OF 3 FEET OF COVER OVER THE PIPE AT WHEEL OR TRUCK PATHS.

14. HAUNCH AREA, AND BEDDING LAYER UNDER PIPE SHALL BE CLASS B OR CLASS C BEDDING, BACKFILL FROM SPRINGLINE TO TOP OF GROUND SHALL BE NATIVE SOIL, SEE ROADWAY STANDARD PBB-1.

15. CLASS V CONCRETE PIPE SHALL BE USED IN PIPE JACKING OPERATIONS, TYPICALLY WITHOUT THE CASING. COST OF ALL MATERIALS AND LABOR ASSOCIATED WITH JACKING OPERATIONS WITHOUT CASING SHALL BE PAID FOR AS 613(W) JACKED CONDUIT, IN UNITS OF LINEAR FEET. TYPICALLY, THE POTABLE WATER AND SANITARY SEWER PIPES ARE CASED. CASING SHALL BE PAID FOR AS 613(U) BORE AND JACK STEEL CASING, WATER AND SANITARY SEWER PIPES ARE PAID FOR SEPARATELY WITH UNITS OF LINEAR FEET.

	BASIS OF PAYMENT									
ITEM NO.	ITEM	UNIT								
613 (A)	R.C. PIPE CLASS	LF								
613 (A)	R.C. PIPE ARCH CLASS A-111	LF								
613 (A)	R.C. PIPE ELL. CLASS HE-111	LF								
613(R)	STANDARD BEDDING MATERIAL, CLASS A	CY								
613(S)	STANDARD BEDDING MATERIAL, CLASS B	CY								
613 (T)	STANDARD BEDDING MATERIAL, CLASS C	CY								
613(U)	BORE AND JACK 🛦 STEEL CASING	LF								
613 (V)	TRENCHEXCAVATION	CY								
613 (W)	JACKED CONDUIT	LF								

- 1. ALL CONSTRUCTION AND MATERIAL REQUIREMENTS SHALL BE IN ACCORDANCE WITH SECTIONS 613 AND 726.02 OF THE 2019 ODOT STANDARD SPECIFICATIONS.
- 2. TRENCH EXCAVATION AND STANDARD BEDDING WILL NOT BE REQUIRED FOR PIPE INSTALLATIONS ON SIDE DRAINS, UNLESS OTHERWISE SPECIFIED IN THE PLANS.
- 3. METAL PIPE FILL HEIGHT DESIGNS ARE BASED ON HS-20 LIVE LOADING AND 120 LBS/CF SOIL WEIGHT.
- 4. TRENCHING REQUIREMENTS FOR DEPTHS OVER 5 FEET SHALL BE IN ACCORDANCE WITH AND DEFINED BY, O.S.H.A. REGULATIONS, TITLE 29 CFR, STANDARDS 1926.650, 1926.651 AND 1926.652. SEE DETAIL IN LOWER LEFT.
- 5. IN THE EVENT LOADS IN EXCESS OF HL-93 ARE TO BE OPERATED OVER OR ADJACENT TO THE PIPE INSTALLATION DURING THE CONSTRUCTION PHASE, THE CONTRACTOR SHALL PROVIDE AND MAINTAIN A MINIMUM OF 3 FEET OF COVER OVER THE PIPE AT WHEEL OR TRACK PATHS. SEE TABLE ON ROADWAY STANDARD MCI-3.
- 6. PROPER INSTALLATION PRACTICE MUST BE ADHERED TO AS SHOWN ON ROADWAY STANDARD PBB-1 AND THIS STANDARD. IN NO CASE SHALL A PIPE INSTALLATION, SUBJECT TO SUDDEN FLOW DEVELOPMENT, BE LEFT WITHOUT SUFFICIENT BACKFILL TO RESTRAIN THE CONDUIT AND PREVENT JOINT SEPARATION AND/OR PIPING SCOUR. PHYSICALLY RESTRAINING THE CONDUIT MAY BE USED TO AUGMENT OR REPLACE THIS IMMEDIATE BACKFILL REQUIREMENT.
- 7. ANY EXCESS EXCAVATION NOT USED FOR BACKFILL WILL BECOME THE PROPERTY, AND DISPOSED OF BY THE CONTRACTOR IN A MANNER APPROVED BY THE ENGINEER.
- 8. CORRUGATED GALVANIZED STEEL PIPE (CGSP) IS ZINC COATED (GALVANIZED). MILL PRECOATED CGSP HAS A COATING OF POLYMER OVER THE GALVANIZED LAYER. THE ALUMINIZED TYPE 2 CORRUGATED STEEL PIPE (CSP) HAS A PURE ALUMINUM COATING OVER THE CORRUGATED STEEL BASE PIPE AND DOES NOT HAVE A ZINC COATING. ALUMINIZED TYPE 2 CSP IS NOT AN ALUMINUM ALLOY PIPE.
- 9. JOINTS IN METAL PIPES SHALL CONFORM TO SECTION 26.4.2.4 OF AASHTO LRFD BRIDGE CONSTRUCTION SPECIFICATIONS. IF A WATERTIGHT JOINT IS SPECIFIED IN THE PLANS, A 12 INCHES WIDE BY 3/4 INCH THICK NEOPRENE SLEEVE GASKET MEETING ASTM D1056 REQUIREMENT SHALL BE USED. ALTERNATIVES MAY BE USED AT THE DISCRETION OF THE ENGINEER.
- 10. BEDDING MATERIAL SHALL BE CLASS 'B' BEDDING MATERIAL, IF PIPE IS INSTALLED UNDER PAVEMENT. OTHERWISE, CLASS C OR D BEDDING IS USED. REFER TO ROADWAY STANDARD PBB-1 FOR MORE DETAILS.
- 11. FOR INSTALLATION AND PAYMENT DETAILS OF TYPICAL END SECTIONS, SEE ROADWAY STANDARDS CET4D-4, CET6D-4, CET4S-4, CET6S-4 AND PCES-5. OTHER END SECTIONS MAY BE USED AT THE DISCRETION OF THE ENGINEER.
- 12. METAL PIPE SHALL HAVE A MINIMUM COVER OF 1 FOOT. SEE ROADWAY STANDARD MCI-2.
- 13. FOUNDATION SHALL BE MADE OF STABLE IN-SITU SOIL. IF THE FOUNDATION AREA IS UNSTABLE, THE CONTRACTOR SHALL EXCAVATE TO A DEPTH REQUIRED BY THE ENGINEER AND REPLACE WITH SUITABLE MATERIAL AS SPECIFIED BY THE ENGINEER.

BASIS OF PAYMENT								
ITEM NO.	ITEM	UNIT						
613 (B)	CORR. GALV. STEEL PIPE	LF						
613 (B)	CORR. GALV. STEEL PIPE ARCH	LF						
613 (C)	▲ MILL PRECOATED CGSP	LF						
613 (C)	🗾 TYPE II ALUMINIZED CORR. STEEL PIPE, ARCH	LF						
613 (C)	TYPE II ALUMINIZED CORR. STEEL PIPE, ROUND	LF						
613 (D)	CORR. ALUMINUM PIPE	LF						
613 (D)	CORR. ALUMINUM PIPE ARCH	LF						
613 (S)	STANDARD BEDDING MATERIAL, CLASS B	CY						
613 (T)	STANDARD BEDDING MATERIAL, CLASS C	CY						
613 (V)	TRENCH EXCAVATION	CY						

SPECIFY SPAN AND RISE OF ARCH PIPE

SPECIFY DIAMETER OF ROUND PIPE

▲ SPECIFY SIZE AND SHAPE OF PIPE

	APPROVED BY ROADWAY ENGINEER:		12/20/2024
/	ROADWAY DESIGN DIV	ISION STANDARI	D
	METAL CULVERT IN (1 OF 3 SHE CKLAHOMA	NSTALLATIOI EETS)	Ν
	Transportation	2019 SPECIFIC	CATIONS
		MCI-1	0

	PIPE C	HARA	CTERIS	TICS	MIN. COVER	MAXIMUM FILL HEIGHT ABOVE TOP OF PIPE						
PIPE DIAM.	COF	RUGA	TED STE	EL	(INCHES)	(FEET)						
INCHES	2 2/3"	3"	5"	6"x2"	TOP OF PIPE TO TOP OF SUBGRADE		E	QUIV. S		RD GAG	SE	
	1/2"	1"	1"	PLATE		16	14	12	10	8	7	!
12"					12"	218'	272'					
15"					12"	174'	218'					
18"	•				12"	145'	181'	254'				
21"	•				12"	124'	155'	218'				<u> </u>
24"					12"	108	108	190				
36"					12	72'	90'	102	163'			
50	•				12"	83'	104'	146'	188'	231'		
42"	•	•			12"	62'	77'	108'	140'	171'		
	-	•			12"	71'	89'	125'	161'	198'		
48"		-			12"	54'	67'	95'	122'	150'		
	-	•			12"	62'	78'	109'	141'	173'		
					12"	55'	69'	97'	125'	153'		
54"	\bullet				12"		60'	84'	109'	133'		
		\bullet			12"	55'	69'	97'	125'	153'		
					12"	49'	61'	86'	111'	136'		
60"			L	ļ	12"			76'	98'	120'		
		•			12"	49'	62'	87'	112'	138'		
			•		12"	44'	55'	78'	100'	123'		
				\bullet	12"			46'	68'	90'	96'	1
66"	•	-			12"	45	50	701	89'	109'		
		•			12"	45'	56	79'	102'	125'		_
					12"	40	50	10'	91	78	821	
72"					12"			42	81'	99'	02	
12	•				12"	41'	51'	72'	94'	115'		-
		-			12"	36'	46'	64'	83'	102'	73'	7
					12"			38'	57'	69'		
78"	•				12"					88'		
					12"	38'	47'	67'	86'	106'		
					12"	33'	42'	59'	77'	94'		
					12"			35'	53'	63'	66'	7
84"	\bullet				12"					76'		
			<u> </u>		12"	35'	44'	62'	80'	98'		
					12"	31'	39'	55'	71'	87'		
					12"			33'	49'	59'	61'	6
90"		_			12"	0.01	4.11	50				
					12"	32'	41'	58'	/5' 661	92'		-
					I2" 12"	29	- 30	21'	45'	55'	57'	6
96"					12"			51	40	00	57	- C
		•			12"		38'	54'	70'	86'		-
		-			12"		34'	48'	62'	76'		\vdash
					12"			29'	43'	53'	54'	5
102"					12"							
		•			24"		36'	51'	66'	81'		
					24"		32'	45'	58'	72'		
108"					24 "							
					24"			48'	62'	76'		
	!				24"			43'	55'	68'		
					24"		<u> </u>	25'	38'	49'	50'	5
114"		_			24 "							<u> </u>
		•			24"			45'	59'	72'		
100"					24"			40'	52'	64'		-
120"					24"			43'	56'	68'		-
					24"			38'	50.	01.		I

		FULL	CIRCL		ALLOY	PIPE (JULVEF	۲F			
PIPE	PIPE CH4	ARACTER	RISTICS	MIN. COVER	MAXIMUM FILL HEIGHT ABOVE TOP OF PIPE (FEET)						
DIAM. IN INCHES	CORR. AL		ALLOY		EQUIV. STANDARD GAGE						
	2 2/3" x 1/2"	3" × 1"	6" × 1"	SUBGRADE	16	14	12	10	8		
12"	•			12"	141'	176'	247'	318'			
15"	•			12"	112'	141'	197'	254'			
18"	Ŏ			12"	93'	117'	164'	212'			
21"	-			12"	80'	100'	140'	181'			
24"	•			12"	69'	87'	123'	158'			
30"	•			12"		77'	109'	140'			
				12"			98'	126'			
36"		-		12"		69'	88'	114'			
	-			12"			81'	105'			
				12"			69'	89'			
42"			-	12"		63'	60'	78'			
	•			12"			53'	69'			
48"				12"		57'		61'	51'		
				12"					82'		
54"				12"					45'		
				12"					73'		
				12"					66'		
60"			•	12"					41'		
	•			12"					66'		
				12"					58'		
66"	•		-	12"					37'		
00				12"					51'		
				12"					52'		
72"				12"					54'		
12				15"					43'		
78"				15					50'		
70				15					40'		
0.4=			•	10"					40		
04				10					4/ ¹		
90"				10					12		
50				10					2/1		
06"				10					34		
90				10					40		
10.2"				10					32		
102		-		21"					201		
10.0				21"					29		
IUG		-		21"					35'		
11.4"				21"					20		
114"				24"					34		
100				24"					26		
120"				24"		-			32'		
		1		24"		1		1	25'		

ALL NOTES, PAY ITEMS AND DRAWINGS RELEVANT TO METAL CULVERTS AND THEIR INSTALLATIONS ARE SHOWN ON ROADWAY STANDARD MCI-1.

TABLE OF STANDARD BEDDING MATERIAL QUANTITIES SHOWN ON ROADWAY STANDARD MCI-3.

SIE	EL & ALUMI FILLS	TO 10 F	T. MAX	PE ARC	H -		
2 2/3" × 1/2" CORRUGATION PATTERN							
APPROX.	OLZE	CORRUGATED STEEL					
EQUIV. ROUND PIPE	SPAN x RISE	MIN. GAGE	MIN. COVER (INCHES)	MIN. GAGE	MIN. COVER (INCHES)		
15"	17" x 13"	16	12"	16	12"		
18"	21" x 15"	16	12"	16	12"		
21"	24" x 18"	16	12"	16	12"		
24"	28" x 20"	16	12"	14	12"		
30"	35" x 24"	14 🝚	12"	14	12"		
36"	42" x 29"	14	12"	12	15"		
42"	49" x 33"	14	12"	12	15"		
48"	57" x 38"	12	12"	10	15"		
54"	64" x 43"	12	12"	10	18"		
60"	71" x 47"	10	12"	8	18"		
66"	77" x 52"	8	12"	8	18"		
72"	83" x 57"	8	12"	8	18"		
	3" x 1" & 5" x	1" CORRUG	ATION PAT	TERN			
36"	40" x 31"	14	12"				
42"	46" x 36"	14	12"				
48"	53" x 41"	14	12"				
54"	60" x 46"	14	12"	14	15"		
60"	66" x 51"	14	12"	14	18"		
66"	73" x 55"	14	12"	14	18"		
72"	81" x 59"	14	12"	12	21"		
78"	87" x 63"	14	12"	12	21"		
84"	95" x 67"	12	12"	12	24"		
90"	103" x 71"	12	18"	10	24"		
96"	112" x 75"	12	18"	10	27"		
102"	117 " x 79"	12	18"				
108"	128" x 83"	10	24"				
114"	137" x 87"	10	24"				
120"	142" x 91"	10	24"				

♥ WHEN INSTALLED UNDER PAVEMENT INCLUDING ALL P.C. OR A.C. SURFACING UNDER MAINLINE TRAFFIC AND MAJOR STREET RETURNS. A MINIMUM PIPE GAGE OF 16 MAY BE USED FOR INSTALLATIONS REQUIRING 30 INCH EQUIVALENT ROUND CONDUITS (MAX.) AND LIMITED TO LOW VOLUME COUNTY OR OFF-SYSTEM ROADS, MINOR STREET RETURNS, DRIVEWAYS OR TEMPORARY DETOURS, AS APPROVED BY THE ENGINEER.

EQUIVALENT METAL THICKNESS AND GAGE							
GAGE	METAL THICKNESS (INCHES)						
NUMBER	STEEL	ALUMINUM ALLOY					
16	0.064	0.060					
14	0.079	0.075					
12	0.109	0.105					
10	0.138	0.135					
8	0.168	0.164					
7	0.188						
5							

THE THICKNESS OF THE SHEET INCLUDES BOTH THE BASE STEEL AND THE ZINC COATING (GALVANIZE).

♦ THE THICKNESS SHOWN REFERS TO THE BASE ALUMINUM CLAD SHEET.

		STAI	NDAR	D BED	DING	MATE	RIAL	QUAN	ITITIE	ES (RO	UND F	PIPE)
			H	BEDDING	SING STAI TREN	LE PIPE NDARD NCHING	DOUB STAN TREN	LE PIPE IDARD ICHING	TRIPI STAI TREN	LE PIPE NDARD NCHING	SPACING	SPACING
		PIPE DIAMETER	BEDDING MAT'L	THICKNESS UNDER PIPE	W WIDTH	STANDARD BEDDING MATERIAL	W WIDTH	STANDARD BEDDING MATERIAL	W WIDTH	STANDARD BEDDING MATERIAL	BETWEEN PIPES	OF PIPE, EACH SIDE
		INCHES	FT.	INCHES	FT.	CY/LF	FT.	CY/LF	FT.	CY/LF	INCHES	FT.
		12	2.17	2.00	5.00	0.37	7.00	0.53	9.00	0.69	12	2.00
<u> </u>		15	2.42	2.00	5.25	0.42	7.50	0.63	9.75	0.83	12	2.00
1 1		18	2.67	2.00	5.50	0.48	8.00	0.72	10.50	0.97	12	2.00
E '~		21	2.92	2.00	5.75	0.53	8.50	0.83	11.25	1.13	12	2.00
AT A		24	3.17	2.00	6.00	0.59	9.00	0.94	12.00	1.29	12	2.00
≿ 8		30	3.67	2.00	6.50	0.70	10.25	1.21	14.00	1.72	15	2.00
		36	4.17	2.00	7.00	0.82	11.50	1.51	16.00	2.21	18	2.00
I Z I		42	4.67	2.00	7.50	0.94	12.75	1.85	18.00	2.75	21	2.00
	믭	48	5.17	2.00	8.00	1.07	14.00	2.21	20.00	3.36	24	2.00
1 T T T T T T	Ē	54	5.67	2.00	8.50	1.19	15.25	2.61	22.00	4.03	27	2.00
<u>, </u>	ΙŻ	60	6.17	2.00	9.00	1.33	16.50	3.04	24.00	4.75	30	2.00
Ё ろ	١ð	66	6.67	2.00	9.50	1.47	17.75	3.50	26.00	5.54	33	2.00
I S N	1	72	7.17	2.00	10.00	1.61	19.00	4.00	28.00	6.38	36	2.00
		78	7.67	2.00	10.50	1.75	20.00	4.45	29.50	7.15	36	2.00
A A		84	8.17	2.00	11.00	1.90	21.00	4.93	31.00	7.95	36	2.00
H M M M M		90	8.67	2.00	11.50	2.06	22.00	5.43	32.50	8.80	36	2.00
R R		96	9.17	2.00	12.00	2.21	23.00	5.95	34.00	9.68	36	2.00
l o Ž		102	9.73	2.00	12.50	2.40	24.00	6.55	35.50	10.69	36	2.00
K		108	10.29	2.00	13.00	2.60	25.00	7.17	37.00	11.75	36	2.00
Ŏ		114	10.85	2.00	13.50	2.80	26.00	7.83	38.50	12.85	36	2.00
		120	11.42	2.00	14.00	3.01	27.00	8.51	40.00	14.00	36	2.00

DIAMETER OR	AXLE FORCE						
PIPE SPAN INCHES	18-50 KIPS	50-75 KIPS	75-110 KIPS	110-150 KIPS			
12" - 42"	24"	30"	36"	36"			
48 " - 72 "	36"	36"	42"	48"			
78" - 120"	36"	42"	48"	48"			
126" - 144"	42"	48"	54"	54"			

THE CONTRACTOR SHALL PROVIDE MINIMUM COVER PLUS ANY ADDITIONAL COVER (AS SPECIFIED BY THE ENGINEER) REQUIRED TO AVOID DAMAGE TO THE PIPE. IN UNPAVED SITUATIONS, THE SURFACE MUST BE MAINTAINED TO A LEVEL AND NON-RUTTED CONDITION.

		STANDARD BEDDING MATERIAL QUANTITIES (ARCH PIPE)													
						H	BEDDING	SING STAI TREN	LE PIPE NDARD ICHING	DOUB STAN TREN	LE PIPE IDARD CHING	TRIPL STAN TREN	LE PIPE NDARD CHING		SPACING
		SPAN	HEIGHT	EQUIV. ROUND		BEDDING MAT'L	THICKNESS UNDER PIPE	W WIDTH, USING SPAN	STANDARD BEDDING MATERIAL	W WIDTH, USING SPAN	STANDARD BEDDING MATERIAL	W WIDTH, USING SPAN	STANDARD BEDDING MATERIAL	SPACING BETWEEN PIPES	PIPE AND TRENCH WALL
	Í	INCHES	INCHES	INCHES	1	FT.	INCHES	FT.	CY/LF	FT.	CY/LF	FT.	CY/LF	INCHES	FT.
		17	13	15		2.25	2.00	5.42	0.41	7.83	0.61	10.25	0.81	12.00	2.00
	Ì	21	15	18	z	2.42	2.00	5.75	0.45	8.50	0.70	11.25	0.94	12.00	2.00
		24	18	21] []	2.67	2.00	6.00	0.50	9.00	0.80	12.00	1.10	12.00	2.00
	_ [28	20	24	AD	2.83	2.00	6.33	0.55	9.67	0.90	13.00	1.25	12.00	2.00
		35	24	30	۲ ۲	3.17	2.00	6.92	0.63	10.83	1.09	14.75	1.55	12.00	2.00
믭		42	29	36	N N	3.58	2.00	7.50	0.73	12.00	1.33	16.50	1.93	12.00	2.00
, 0	ļ	49	33	42	Ō	3.92	2.00	8.08	0.82	13.53	1.61	18.97	2.40	16.33	2.00
		57	38	48	12	4.33	2.00	8.75	0.94	15.08	1.96	21.42	2.97	19.00	2.00
Lo∣		64	43	54	×	4.75	2.00	9.33	1.05	16.44	2.30	23.56	3.55	21.33	2.00
	ļ	71	47	60	5/3	5.08	2.00	9.92	1.14	17.81	2.63	25.69	4.11	23.67	2.00
14		77	52	66	N	5.50	2.00	10.42	1.24	18.97	2.98	27.53	4.73	25.67	2.00
		83	57	72		5.92	2.00	10.92	1.35	20.14	3.37	29.36	5.39	27.67	2.00
5 ≥ 	Щ										·,				
	루	40	31	36		3.75	2.00	7.33	0.76	11.67	1.36	16.00	1.96	12.00	2.00
Ì≦	<u>Ω</u>	46	36	42		4.17	2.00	7.83	0.85	12.94	1.64	18.06	2.43	15.33	2.00
ī⊒∣	٩	53	41	48	S	4.58	2.00	8.42	0.96	14.31	1.96	20.19	2.96	17.67	2.00
I≧۱		60	46	54	Ĩ	5.00	2.00	9.00	1.08	15.67	2.31	22.33	3.55	20.00	2.00
AL		66	51	60	l d	5.42	2.00	9.50	1.18	16.83	2.65	24.17	4.12	22.00	2.00
		73	55	66	Ř	5.75	2.00	10.08	1.27	18.19	2.99	26.31	4.72	24.33	2.00
	ļ	81	59	72	Ö	6.08	2.00	10.75	1.37	19.75	3.40	28.75	5.43	27.00	2.00
39		87	63	78	- -	6.42	2.00	11.25	1.44	20.92	3.74	30.58	6.04	29.00	2.00
R		95	67	84	×	6.75	2.00	11.92	1.55	22.47	4.19	33.03	6.83	31.67	2.00
8		103	71	90	مآ	7.08	2.00	12.58	1.66	24.03	4.67	35.47	7.67	34.33	2.00
		112	75	96	∞	7.42	2.00	13.33	1.80	25.67	5.19	38.00	8.58	36.00	2.00
		117	79	102	×	7.75	2.00	13.75	1.85	26.50	5.50	39.25	9.16	36.00	2.00
	ļ	128	83	108	ω.	8.08	2.00	14.67	2.03	28.33	6.13	42.00	10.22	36.00	2.00
	ļ	137	87	114		8.42	2.00	15.42	2.18	29.83	6.67	44.25	11.17	36.00	2.00
		142	91	120		8.75	2.00	15.83	2.22	30.67	7.03	45.50	11.84	36.00	2.00

■ FOR PIPES UNDER PAVEMENT, THE H DIMENSION AND THE STANDARD BEDDING MATERIAL QUANTITY SHALL BE INCREASED TO GO TO THE PAVEMENT. SEE ROADWAY STANDARD PBB-1.

▲ SEE MULTIPLE PIPE INSTALLATION, ROADWAY STANDARD MCI-1.

MINIMUM COVER FOR CONSTRUCTION LOADS (INCHES)

ALL NOTES, PAY ITEMS AND DRAWINGS RELEVANT TO METAL CULVERTS AND THEIR INSTALLATIONS ARE SHOWN ON ROADWAY STANDARD MCI-1.

	CC	CORRUGATED POLYPROPYLENE AND HIGH DENSITY POLYETHYLENE PIPES									
				STANDAR	D BEDI	DING MATE	ERIAL C	QUANTITIE	S		
		H	SING	SINGLE PIPE		DOUBLE PIPE		LE PIPE	CLEAR	SPACE	
	DIAM. (D)	BED. MAT.	W WIDTH	STANDARD BEDDING MATERIAL	W WIDTH	STANDARD BEDDING MATERIAL	W WIDTH	STANDARD BEDDING MATERIAL	BETWEEN PIPES	PIPE AND TRENCH WALL	
	IN.	FT.	FT.	CY/LF	FT.	CY/LF	FT.	CY/LF	FEET	FEET	
	12	2.33	2.50	0.19	5.00	0.37	7.00	0.52	1.00	1.00	
	15	2.58	2.88	0.23	5.50	0.44	7.75	0.61	1.00	1.00	
	18	2.83	3.25	0.28	6.00	0.50	8.50	0.70	1.00	1.00	
PIPE	24	3.33	4.00	0.38	7.00	0.63	10.00	0.89	1.00	1.00	
Ð	30	3.83	4.75	0.49	8.25	0.81	12.00	1.16	1.25	1.00	
S	36	4.33	5.50	0.62	9.50	1.00	14.00	1.46	1.50	1.00	
œ.	42	4.83	6.25	0.76	10.75	1.21	16.00	1.80	1.75	1.00	
	48	5.33	7.00	0.92	12.00	1.44	18.00	2.16	2.00	1.00	
	60	6.33	8.50	1.27	15.00	2.06	22.50	3.10	2.50	1.25	

CFR 1926

■ HEIGHT OF STD BEDDING MATERIAL INCLUDES THE BEDDING UNDER PIPE, THE NOMINAL DIAMETER OF THE PIPE, AND 12 INCHES ABOVE TOP OF PIPE.

■ FOR PIPES UNDER PAVEMENT, THE H DIMENSION AND THE STANDARD BEDDING MATERIAL QUANTITY SHALL BE INCREASED TO GO TO THE PAVEMENT. SEE ROADWAY STANDARD PBB-1.

▲ SEE MULTIPLE INSTALLATIONS TABLE.

ALLOWABLE PIPE SIZES								
CORRUGATED HIGH DENSITY POLYETHYLENE PIPE, TYPE S (HDPE)	CORRUGATED POLYPROPYLENE PIPE, TYPE S (PP)							
AASHTO M 294	AASHTO M 330							
ASTM F2306	ASTMF2881							
DIAMETER (INCHES)	DIAMETER (INCHES)							
12	12							
15	15							
18	18							
24	24							
30	30							
36	36							
42	42							
48	48							

SEE "DUAL WALL" TYPE S CONFIGURATION DETAIL

MIN. HT. C HDPE FEET	DF COVER PP FEET	MAX. HT. (HDPE	OF COVER PP
HDPE FEET	PP FEET	HDPE	PP
FEET	FEET	FEET	
1		ILLI	FEET
	2	29	32
1	2	26	30
1	2	26	25
1	2	24	25
1	2	24	25
1	2	24	24
1	2	23	23
1	2	23	21
1	2	23	21
	1 1 1 1 1 1 1 1 1	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	1 2 29 1 2 26 1 2 26 1 2 24 1 2 24 1 2 24 1 2 23 1 2 23 1 2 23

MINIMUM COVER DEPTH IS TAKEN FROM AASHT O LIKED BRIDGE DESIGN SPEC. 12.6.6.3, AND THE MAXIMUM COVER DEPTH IS TAKEN FROM PLASTIC PIPE INSTITUTE'S HANDBOOK, CHAPTER 7.

INSTALLATION WIDTH = (D X 1.5) +12" (FOR SINGLE PIPE)

TRENCH INSTALLATION

INSIDE PIPE DIAMETER	"X" SPACING
12" TO < 24"	12"
24" TO 60"	1/2 D

MULTIPLE PIPE INSTALLATION

BASIS OF PAYMENT											
ITEM NO.	ITEM	UNIT									
613 (E)	CORRUGATED POLYETHYLENE PIPE	LF									
613 (EE)	CORRUGATED POLYPROPYLENE PIPE	LF									
613 (S)	STANDARD BEDDING MATERIAL, CLASS B	CY									
613 (T)	STANDARD BEDDING MATERIAL, CLASS C	CY									
613 (V)	TRENCHEXCAVATION	CY									

PIPE BEDDING CLASS/DESIGN TABLE													
	■ 1	JNDER	PAVIN	G	OUTSIDE PAVING								
TYPE OF PIPE	CROSS DRAIN (NHS OR ADT > 6000 VPD)	CROSS DRAIN (OTHER)	STORM SEWER (NHS OR ADT > 6000 VPD)	STORM SEWER (OTHER)	CROSS DRAIN	SIDE DRAIN	STORM SEWER						
REINFORCED CONCRETE PIPE	В	С	В	С	С	D	С						
CORRUGATED GALV. STEEL PIPE (CGSP)	NA	В	NA	В	С	D	С						
MILL (POLYMER) PRECOATED CGSP	NA	В	NA	В	С	D	С						
CORRUGATED GALV. STRUCT. PLATE	NA	В	NA	В	С	D	С						
ALUMINIZED (ALUMINUM COATED) TYPE II CSP	NA	В	NA	В	С	D	С						
CORRUGATED HIGH DENSITY POLYETHYLENE / PVC	NA	Α	NA	Α	В	В	В						
POLYVINYL CHLORIDE (SC 40/80 PVC)	NA	NA	NA	NA	NA	NA	NA						
CORRUGATED POLYPROPYLENE PIPE (PP)	В	В	В	В	С	D	С						

■ WHEN THERE IS ANY POSSIBILITY OF THE PAVEMENT BEING WIDENED DURING THE LIFE OF THE DRAINAGE STRUCTURE, THE BEDDING SHALL MEET THE 'UNDER PAVING SECTION' CRITERIA FOR THE FULL EXTENT OF ANY ANTICIPATED EXPANSION TO THE FACILITY.

▲ BACKFILL WITH A MINIMUM OF TWO (2) FEET OF APPROVED BACKFILL MATERIAL.

GENERAL NOTES

1. ALL CONSTRUCTION AND MATERIAL REQUIREMENTS SHALL BE IN ACCORDANCE WITH THE 2019 ODOT STANDARD SPECIFICATIONS.

2. THE THICKNESS OF BEDDING MATERIAL BELOW PIPE CONDUIT VARIES ACCORDING TO THE TYPE OF PIPE BEING INSTALLED. SEE ROADWAY STANDARDS CCI-1, TCI-1 AND MCI-1.

3. NATIVE SOIL FOR BACKFILL, TO BE COMPACTED IN ACCORDANCE WITH SECTION 202.04 OF THE STANDARD SPECIFICATIONS.

4. A BETTER CLASS OF BEDDING MAY BY SUBSTITUTED FOR THE NEXT LOWER CLASS. EXAMPLE: CLASS A STANDARD BEDDING CAN BE USED IN LIEU OF CLASS B STANDARD BEDDING.

5. FOR TRENCH WIDTH (W), BEDDING HEIGHT (H), PIPE DATA, MULTIPLE PIPE SPACING & BEDDING DATA, SEE ROADWAY STANDARDS CCI-1, TCI-1, MCI-1, AND MCI-3.

6. DESIGN TABLE WILL DISPLAY 'NA' WHEN THE TYPE OF PIPE IS NOT ALLOWED.

7. STANDARD BEDDING CLASS D MATERIAL(S) (ALTERNATE 1) WILL BE CONSIDERED AS INCIDENTAL AND NOT BE PAID FOR SEPARATELY. COST FOR BORROW OR FILL MATERIAL, NEEDED FOR ALTERNATE 2, WILL BE INCLUDED IN THE PRICE OF THE PIPE.

8. PIPE MATERIAL(S)/PRODUCT(S) NOT SHOWN IN THE DESIGN TABLE WILL BE EVALUATED AND APPROVED ON A CASE BY CASE BASIS.

9. ALL TEMPORARY PIPES SHALL HAVE CLASS D BEDDING UNLESS OTHERWISE SHOWN IN THE PLANS.

★11.

10. BEDDING MATERIAL CLASSES B, C, AND D, SHALL BE PLACED IN 6" LAYERS. CLASSES C AND D BEDDING SHALL BE COMPACTED TO 95% MAXIMUM DENSITY AND CLASS B SHALL BE COMPACTED TO 98% STANDARD DENSITY, ALL COMPACTION OF BEDDING MATERIAL SHALL BE DONE USING HAND-OPERATED EQUIPMENT ONLY.

WHEN PIPE INSTALLATION IS UNDER PAVING, IN LIEU OF BACKFILLING WITH NATIVE SOIL, PLACE BEDDING MATERIAL ALL THE WAY TO THE PAVEMENT FOR ALL PIPES EXCEPT REINFORCED CONCRETE PIPE. THE STANDARD BEDDING HEIGHT FOR REINFORCED CONCRETE PIPE SHALL GO TO THE SPRINGLINE OF PIPE, NO MATTER IF PIPE IS UNDER PAVEMENT OR NOT, SEE ROADWAY STANDARD CCI-1 FOR DETAILS.

12. THE USE OF AN ALTERNATE PIPE AND ITS CORRESPONDING BEDDING MATERIAL WILL BE ACCEPTABLE PROVIDED THE CRITERIA IN THE DESIGN TABLE IS MET.

13. CORRUGATED POLYPROPYLENE PIPE SHALL BE INSTALLED IN ACCORDANCE WITH ASTM D2321.

	BASIS OF PAYMENT	
ITEM NO.	ITEM	UNIT
613 (R)	STANDARD BEDDING MATERIAL, CLASS A	CY
613 (S)	STANDARD BEDDING MATERIAL, CLASS B	CY
613 (T)	STANDARD BEDDING MATERIAL, CLASS C	CY

INSTALLATION TECHNIQUE: (12" DIAMETER OR SMALLER)

PERFORATED PIPE UNDERDRAIN, WHEN INSTALLED IN A TRENCH, SHALL BE BEDDED ON 4" OF COARSE COVER AGGREGATE. THE INSTALLED PIPE SHALL THEN BE CAREFULLY BACKFILLED WITH THE REMAINING COARSE COVER AGGREGATE TO 6" ABOVE THE TOP OF THE PIPE. FILTER SAND SHALL BE INSTALLED TO APPROXIMATELY 6" BELOW THE ORIGINAL NATURAL GROUND AS APPROVED BY THE ENGINEER. THE COARSE COVER AGGREGATE AND FILTER SAND SHALL BE PAID FOR AS PIPE UNDERDRAIN COVER MATERIAL AND SHALL CONFORM TO SEC. 703.06 OF THE SPECIFICATIONS.

NON-PERFORATED PIPE UNDERDRAIN, WHEN INSTALLED IN A TRENCH, SHALL BE BEDDED IN A 4" LAYER CONSISTING OF COARSE AGGREGATE COVER MATERIAL OR A 50-50 MIX OF COARSE AGGREGATE COVER MATERIAL AND FILTER SAND. THIS LAYER OF COVER MATERIAL SHALL CONFORM TO SEC. 703.06, AND SHALL BE PAID FOR AS PIPE UNDERDRAIN COVER MATERIAL. THE REMAINING BACKFILL MAY BE NATIVE SOIL REMOVED IN THE TRENCHING OPERATION, FILTER SAND OR BACKFILLED ACCORDING TO THE ENGINEER. COST TO BE INCLUDED IN OTHER ITEMS OF WORK. SEE GENERAL NOTE NUMBERS 5 & 6.

GENERAL NOTES

- 1. ALL CONSTRUCTION AND MATERIAL REQUIREMENTS SHALL BE IN ACCORDANCE WITH THE 2019 ODOT STANDARD SPECIFICATIONS.
- 2. THE EXTENT, LOCATION AND DEPTH OF DRAINS MAY BE ADJUSTED BY THE ENGINEER TO SUIT CONDITIONS FOUND DURING CONSTRUCTION.
- 3. COST OF ALL FITTINGS TO BE INCLUDED IN THE PRICE BID PER LINEAR FOOT OF PIPE UNDERDRAIN.
- 4. FOR PIPE UNDERDRAIN OF UP TO 12" IN DIAMETER,
 W = 24" WITHOUT SHEETING AND SHORING.
 W = 36" WHEN SHEETING AND SHORING IS USED.
 SEE ROADWAY STANDARD SPI-5 FOR SHEETING & SHORING NOTES.
- 5. FOR PIPE UNDERDRAIN LARGER THAN 12" IN DIAMETER, SEE ROADWAY STANDARD SPI-5 FOR ADDITIONAL TRENCH EXCAVATION DETAILS.
- 6. NON-PERFORATED UNDERDRAIN PIPES, LARGER THAN 12", SHALL BE TREATED AS PIPE CONDUITS: I.E., PAY ITEMS SHALL CONSIST OF TRENCH EXCAVATION AND BEDDING MATERIAL. SEE STANDARD SPB-2.
- 7. MATERIALS SHOWN HERE ARE TYPICAL ONLY AND ARE NOT THE ONLY CHOICE FOR SUBSURFACE DRAINAGE PURPOSES.
- 8. OUTLET OPENING SHALL HAVE INSTALLED A REMOVABLE RODENT SCREEN HAVING A WIRE MESH DESIGN & 0.23" to 0.50" (NOM.) SQUARE OPENINGS. SCREEN MATERIAL MAY BE STAINLESS STEEL OR GALVANIZED WITH WIRE THICKNESS OF BETWEEN 0.023" & 0.038", AFTER SHAPING AND FABRICATION. RODENT SCREEN DESIGN SHALL BE APPROVED BY THE ENGINEER.
- 9. THE FINAL SECTION OF THE OUTLET LATERAL CONDUIT SHALL BE NON-PERFORATED, SCHEDULE 40 OR TYPE S HIGH DENSITY POLYETHYLENE AND A MINIMUM 20'-0" IN LENGTH, INCLUDING COUPLINGS.
- 10. FOR DETAILS OF OUTLET LATERAL HEADWALL, SEE ROADWAY STANDARD PED-4.

	BASIS OF PAYMENT	
ITEM NO.	ITEM	UNIT
613(H)	PERFORATED PIPE UNDERDRAIN ROUND	LF
613(丨)	NON-PERFORATED PIPE UNDERDRAIN RND.	LF
613 (Q)	OUTLET LATERAL HEADWALL	ΕA
613(T)	STANDARD BEDDING MATERIAL, CLASS C	CY
613(U)	PIPE UNDERDRAIN COVER MATERIAL	CY
613 (V)	TRENCH EXCAVATION	CY

■ DIMENSION TO BE SPECIFIED IN INCHES

- 1. ALL CONSTRUCTION AND MATERIAL REQUIREMENTS SHALL BE IN ACCORDANCE WITH THE 2019 ODOT STANDARD SPECIFICATIONS.
- MAILBOX INSTALLATION, SINGLE OR MULTIPLE TYPE, SHALL BE OF A DESIGN AND MATERIAL THAT HAS BEEN CRASH-TESTED AND APPROVED. OTHER DESIGNS OR MAILBOX TYPES SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL.
- 3. IF MAILBOX IS INSTALLED IN AN AREA WITH GUARDRAIL, MAILBOX AND/OR POST ASSEMBLY SHOULD BE BEHIND OR FLUSH WITH FACE OF RAIL.
- 4. PRODUCER AND CONTRACTOR SHALL AVOID PATENT INFRINGEMENT OF THE MAILBOX SUPPORT ASSEMBLY AND SHALL SAVE THE STATE HARMLESS IN THE USE OF ANY MAILBOX SUPPORT ASSEMBLY.
- ALTERNATE WOODEN POST SUPPORT INSTALLATIONS MAY BE USED IN LIEU OF METAL PIPE SUPPORT UNITS IF WOODEN COMPONENTS CONFORM TO CURRENT SPECIFICATIONS.
- 6. PRICE OF EACH MAILBOX INSTALLATION, SINGLE OR MULTIPLE, INCLUDES PAYMENT FOR INSTALLATION OF THE POST SYSTEM, SUPPORT POST, ALL ATTACHMENT HARDWARE AND MOUNTING OF THE MAILBOX. PAYMENT FOR THE MAILBOX WILL BE PAID FOR BY THE EACH AND SEPARATELY FROM THE SUPPORT SYSTEM.
- 7. IF A MAILBOX IS INSTALLED BEHIND THE CURB, THEN A MINIMUM OF 4 FEET CLEAR CONTINUOUS SPACE MUST BE ALLOWED BETWEEN THE MAILBOX AND THE EXTREME OUTSIDE EDGE OF THE DESIGNATED PEDESTRIAN ACCESS ROUTE PER PROWAG (PUBLIC RIGHTS OF WAY ACCESSIBILITY GUIDELINES).

	BASIS OF PAYMENT	
ITEM NO.	ITEM	UNIT
629(A)	MAILBOX INSTALLATION - SINGLE	EA
629(B)	MAILBOX INSTALLATION - MULTIPLE	EA
629(C)	REMOVAL OF MAILBOX INSTALLATION	EA
629(D)	REMOVE AND RESET MAILBOX	EA

■ MAILBOXDESIGN TYPE(S) AND LOCATION(S) SHALL BE SPECIFIED IN THE PLANS.

7

THESE GUIDELINES APPLY TO CONSTRUCTION ZONE WORK AREAS WHERE CONTINUOUS PAVEMENT EDGES OR DROP-OFFS EXIST PARALLEL AND ADJACENT TO A LANE USED FOR TRAFFIC

THE FOLLOWING TYPES OF TREATMENT MAY BE USED:

• WARNING DEVICES (SUCH AS SIGNS OR CHANNELIZING DEVICES), AND • POSITIVE BARRIERS (SUCH AS PORTABLE LONGITUDINAL BARRIERS).

DISTANCE "X" IS TO BE THE MAXIMUM PRACTICAL UNDER JOB CONDITIONS. TWO FEET MINIMUM FOR CONDITIONS WITH TRAVELING SPEEDS GREATER THAN AND EQUAL TO 45 MPH. DISTANCE "Y" IS THE LATERAL CLEARANCE FROM EDGE OF TRAVEL LANE TO EDGE OF DROP-OFF. DISTANCE "Z" DOES NOT HAVE A MINIMUM VALUE.

EACH CONSTRUCTION ZONE DROP-OFF CONDITION SHOULD BE ANALYZED INDIVIDUALLY, TAKING INTO ACCOUNT OTHER VARIABLES, SUCH AS: TRAFFIC MIX, POSTED SPEED IN THE CONSTRUCTION ZONE, HORIZONTAL CURVATURE, AND THE PRACTICALITY OF THE TREATMENT

THE CONDITIONS FOR INDICATING THE USE OF POSITIVE OR PROTECTIVE

POSITIVE OR PROTECTIVE BARRIERS AS DEFINED BY FHWA ARE DEVICES THAT CONTAIN AND/OR REDIRECT VEHICLES AND MEET THE CRASH-WORTHINESS EVALUATION CRITERIA CONTAINED IN NCHRP REPORT 350. SEE TITLE 23 OF CFR (CODE OF FEDERAL REGULATIONS), SUBPART K. PART 630 "TEMPORARY TRAFFIC CONTROL DEVICES."

SEVERAL TYPES OF POSITIVE BARRIERS ARE AVAILABLE TO ENHANCE WORKER AND MOTORIST SAFETY. THEY INCLUDE, BUT NOT LIMITED TO, PORTABLE CONCRETE LONGITUDINAL BARRIERS, BALLAST-FILLED BARRIERS, AND MOVEABLE BARRIERS AS WELL AS SHADOW VEHICLES WITH TRUCK-MOUNTED ATTENTUATORS.

APPROVED BY ROADWAY ENGINEER: DWS Kl DATE: 12/20/2024 ROADWAY DESIGN DIVISION STANDARD **PAVEMENT DROP-OFF TREATMENTS** OKLAHOMA 2019 SPECIFICATIONS Transportation 3

PDT-2

RUNOFF	LENGTH ADJU	STMENTS
NUMBER OF LANES ROTATED	ADJUSTMENT FACTOR	LENGTH INCREASE RELATIVE TO 1 LANE = n1b _W
1.0	1.00	1.00
1.5	0.83	1.25
2.0	0.75	1.50
2.5	0.70	1.75
3.0	0.67	2.00
3.5	0.64	2.25

TION							SUPER	ELEV	ΑΤΙΟ	N TABLE (L	.ow s	SPEED	URBAN S	TREE	TS)							TION
AVA A	$V_d =$	15 mph		V _d =	20 mph		V _d =	25 mph		V _d =	30 mph		V _d =	35 mph		V _d =	40 mph		$V_{d} =$	45 mph		NA N
ec.		Lr (FT.)		Lr (FT.)		Lr (FT.)		Lr (FT.)		Lr	FT.)		Lr	(FT.)		Lr (FT.)	0 0 0
13 dr	RADIUS (FT.)	$n_{i=1}$	<i>Пt</i> =2	RADIUS (FT.)	$\eta_{1=1}$	<i>П1=2</i>	RADIUS (FT.)	<i>П</i> ₁₌₁	Πt=2	RADIUS (FT.)	$n_{i=1}$	<i>∏t</i> =2	RADIUS (FT.)	<i>П</i> ₁₌₁	<i>⊓t</i> =2	RADIUS (FT.)	<i>П</i> ₁₌₁	П1=2	RADIUS (FT.)	<i>П</i> ₁₌₁	<i>Пt=2</i>	JPEF
N N			, -		L´.	, -								<u> </u>	/ -		_ · ·	/ -		, ·	/ -	N.
-2.0 % (NC)	50	31	46	107	32	49	198	34	51	333	36	55	510	39	58	762	41	62	1,039	44	67	-2.0 % (NC)
2.0 % (RC)	44	31	46	92	32	49	167	34	51	273	36	55	408	39	58	593	41	62	794	44	67	2.0 % (RC)
2.2 %	44	34	51	91	36	54	165	38	57	270	40	60	404	43	64	586	46	68	785	49	73	2.2 %
2.4 %	44	37	55	91	39	58	164	41	62	268	44	65	400	46	70	580	50	74	776	53	80	2.4 %
2.6 %	43	40	60	90	42	63	163	45	67	265	47	71	396	50	75	573	54	81	767	58	87	2.6 %
2.8 %	43	43	65	89	45	68	161	48	72	263	51	76	393	54	81	567	58	87	758	62	93	2.8 %
3.0 %	43	46	69	89	49	73	160	51	77	261	55	82	389	58	87	561	62	93	750	67	100	3.0 %
3.2 %	43	49	74	88	52	78	159	55	82	259	58	87	385	62	93	556	66	99	742	71	107	3.2 %
3.4 %	42	52	78	88	55	83	158	58	87	256	62	93	382	66	99	550	70	106	734	76	113	3.4 %
3.6 %	42	55	83	87	58	88	157	62	93	254	65	98	378	70	105	544	74	112	726	80	120	3.6 %
3.8 %	42	58	88	87	62	92	155	65	98	252	69	104	375	74	110	539	79	118	718	84	127	3.8 %
4.0 %	42	62	92	86	65	97	154	69	103	250	73	109	371	77	116	533	83	124	711	89	133	4.0 %
4.2 %	41	65	97	85	68	102	153	72	108	248	76	115	368	81	122	528	87	130	703	93	140	4.2 %
4.4 %	41	68	102	85	71	107	152	75	113	246	80	120	365	85	128	523	91	137	696	98	147	4.4 %
4.6 %	41	71	106	84	75	112	151	79	118	244	84	125	361	89	134	518	95	143	689	102	153	4.6 %
4.8 %	41	74	111	84	78	117	150	82	123	242	87	131	358	93	139	513	99	149	682	107	160	4.8 %
5.0 %	41	77	115	83	81	122	149	86	129	240	91	136	355	97	145	508	103	155	675	111	167	5.0 %
5.2 %	40	80	120	83	84	126	148	89	134	238	95	142	352	101	151	503	108	161	668	116	173	5.2 %
5.4 %	40	83	125	82	88	131	147	93	139	236	98	147	349	105	157	498	112	168	662	120	180	5.4 %
5.6 %	40	86	129	82	91	136	146	96	144	234	102	153	346	108	163	494	116	174	655	124	187	5.6 %
5.8 %	40	89	134	81	94	141	145	99	149	233	105	158	343	112	168	489	120	180	649	129	193	5.8 %
6.0 %	39	92	138	81	97	146	144	103	154	231	109	164	340	116	174	485	124	186	643	133	200	6.0 %

NOTES - LOW-SPEED URBAN STREETS TABLE

- 1. THE VALUES LISTED ON THIS TABLE WERE CALCULATED USING DISTRIBUTION METHOD 2.
- 2. SUPERELEVATION MAY BE OPTIONAL ON LOW-SPEED URBAN STREETS.
- 3. THE SUPERELEVATION RUNOFF LENGTH (*Lr*) WAS BASED ON THE NUMBER OF LANES ROTATED. SINGLE LANE ROTATED IS TYPICAL OF 2 LANE HIGHWAYS, AND TWO LANES ROTATED IS TYPICAL OF 4 LANE HIGHWAYS.
- 4. FOR THE TANGENT RUNOUT LENGTH (*Lt*), USE THE FORMULA: 2.0%(0)/K, WHERE K IS Control (*Lt*)/(*FT*).
 5. VALUES OF RADIUS AND SUPERELEVATION RUNOFF LENGTHS SHALL NOT BE INTERPOLATED OR ROUNDED UP.

<u> </u>																						
NOIL								S	UPERI	ELEVATION	N TAE	BLE (en	_{nax.} =6 %)									NOIT
AV A	V _d =15	mph	-	V _d =2	0 mph		V _d =2	5 mph		V _d =	30 mph		$V_{cl} = 3$	5 mph	-	V _d =4	0 mph		$V_{cl} = 4$	5 mph		N N
		Lr (FT.)		Lr	FT.)		Lr	FT.)		Lr	FT.)		Lr	(FT.)	-	Lr	(FT.)		Lr	FT.)	00 GE
PER	RADIUS (FT.)	n. 1		RADIUS (FT.)	0.1	<i>n</i> . 0	RADIUS (FT.)	n. 1		RADIUS (FT.)	n. 1		RADIUS (FT.)	n. 1	<i>n</i> . 0	RADIUS (FT.)	n. 1	<i>n</i> . 0	RADIUS (FT.)	n. 1	n . 0	PER
SL		<i>η</i> =1	111=2		///=1	1/1=2		///=	<i>m=2</i>		///=	111=2		///=	1/1=2		///=	1/1=2		///=1	1/1=2	sr
-2.0 % (NC)	868	31	46	1,580	32	49	2,290	34	51	3,130	36	55	4,100	39	58	5,230	41	62	6,480	44	67	-2.0 % (NC)
2.0 % (RC)	614	31	46	1,120	32	49	1,630	34	51	2,240	36	55	2,950	39	58	3,770	41	62	4,680	44	67	2.0 % (RC)
2.2 %	543	34	51	991	36	54	1,450	38	57	2,000	40	60	2,630	43	64	3,370	46	68	4,190	49	73	2.2 %
2.4 %	482	37	55	884	39	58	1,300	41	62	1,790	44	65	2,360	46	70	3,030	50	74	3,770	53	80	2.4 %
2.6 %	430	40	60	791	42	63	1,170	45	67	1,610	47	71	2,130	50	75	2,740	54	81	3,420	58	87	2.6 %
2.8 %	384	43	65	709	45	68	1,050	48	72	1,460	51	76	1,930	54	81	2,490	58	87	3,110	62	93	2.8 %
3.0 %	341	46	69	635	49	73	944	51	77	1,320	55	82	1,760	58	87	2,270	62	93	2,840	67	100	3.0 %
3.2 %	300	49	74	566	52	78	850	55	82	1,200	58	87	1,600	62	93	2,080	66	99	2,600	71	107	3.2 %
3.4 %	256	52	78	498	55	83	761	58	87	1,080	62	93	1,460	66	99	1,900	70	106	2,390	76	113	3.4 %
3.6 %	209	55	83	422	58	88	673	62	93	972	65	98	1,320	70	105	1,740	74	112	2,190	80	120	3.6 %
3.8 %	176	58	88	358	62	92	583	65	98	864	69	104	1,190	74	110	1,590	79	118	2,010	84	127	3.8 %
4.0 %	151	62	92	309	65	97	511	69	103	766	73	109	1,070	77	116	1,440	83	124	1,840	89	133	4.0 %
4.2 %	131	65	97	270	68	102	452	72	108	684	76	115	960	81	122	1,310	87	130	1,680	93	140	4.2 %
4.4 %	116	68	102	238	71	107	402	75	113	615	80	120	868	85	128	1,190	91	137	1,540	98	147	4.4 %
4.6 %	102	71	106	212	75	112	360	79	118	555	84	125	788	89	134	1,090	95	143	1,410	102	153	4.6 %
4.8 %	91	74	111	189	78	117	324	82	123	502	87	131	718	93	139	995	99	149	1,300	107	160	4.8 %
5.0 %	82	77	115	169	81	122	292	86	129	456	91	136	654	97	145	911	103	155	1,190	111	167	5.0 %
5.2 %	73	80	120	152	84	126	264	89	134	413	95	142	595	101	151	833	108	161	1,090	116	173	5.2 %
5.4 %	65	83	125	136	88	131	237	93	139	373	98	147	540	105	157	759	112	168	995	120	180	5.4 %
5.6 %	58	86	129	121	91	136	212	96	144	335	102	153	487	108	163	687	116	174	903	124	187	5.6 %
5.8 %	51	89	134	106	94	141	186	99	149	296	105	158	431	112	168	611	120	180	806	129	193	5.8 %
6.0 %	39	92	138	81	97	146	144	103	154	231	109	164	340	116	174	485	124	186	643	133	200	6.0 %

<u></u>																						
NOT NOT								S	UPER	ELEVATION	N TAB	LE (em	_{aax.} =6 %)									
A V	V _d =50) mph		V _d =5	5 mph		V _d =6	0 mph		V _d =6	5 mph		V _d =7	0 mph		V _d =7	5 mph		V _d =80) mph		NA
0 BE		Lr (FT.)		Lr	FT.)		Lr	FT.)		Lr (FT.)		Lr	FT.)		Lr	(FT.)		Lr	(FT.)	ene Bere
l H	RADIUS (FT.)			RADIUS (FT.)			RADIUS (FT.)			RADIUS (FT.)			RADIUS (FT.)		<u> </u>	RADIUS (FT.)			RADIUS(FT)			E
Ins		<i>n₁</i> =1	<i>n</i> ₁₌₂		<i>n</i> ₁ =1	<i>n</i> ₁₌₂		<i>n₁</i> =1	<i>n</i> ₁₌₂		<i>n₁</i> =1	<i>n₁</i> =2		<i>n</i> ₁₌₁	<i>n</i> ₁₌₂		<i>n</i> ₁ =1	<i>n</i> ₁₌₂		<i>n</i> ₁₌₁	<i>n</i> ₁₌₂	SUB
-2.0 % (NC)	7,870	48	72	9,410	51	77	11,100	53	80	12,600	56	84	14,100	60	90	15,700	63	95	17,400	69	103	-2.0 % (NC)
2.0 % (RC)	5,700	48	72	6,820	51	77	8,060	53	80	9,130	56	84	10,300	60	90	11,500	63	95	12,900	69	103	2.0 % (RC)
2.2 %	5,100	53	79	6,110	56	84	7,230	59	88	8,200	61	92	9,240	66	99	10,400	69	104	11,600	75	113	2.2 %
2.4 %	4,600	58	86	5,520	61	92	6,540	64	96	7,430	67	100	8,380	72	108	9,420	76	114	10,600	82	123	2.4 %
2.6 %	4,170	62	94	5,020	66	100	5,950	69	104	6,770	73	109	7,660	78	117	8,620	82	123	9,670	89	134	2.6 %
2.8 %	3,800	67	101	4,580	71	107	5,440	75	112	6,200	78	117	7,030	84	126	7,930	88	133	8,910	96	144	2.8 %
3.0 %	3,480	72	108	4,200	77	115	4,990	80	120	5,710	84	126	6,490	90	135	7,330	95	142	8,260	103	154	3.0 %
3.2 %	3,200	77	115	3,860	82	123	4,600	85	128	5,280	89	134	6,010	96	144	6,810	101	152	7,680	110	165	3.2 %
3.4 %	2,940	82	122	3,560	87	130	4,250	91	136	4,890	95	142	5,580	102	153	6,340	107	161	7,180	117	175	3.4 %
3.6 %	2,710	86	130	3,290	92	138	3,940	96	144	4,540	100	151	5,210	108	162	5,930	114	171	6,720	123	185	3.6 %
3.8 %	2,490	91	137	3,040	97	146	3,650	101	152	4,230	106	159	4,860	114	171	5,560	120	180	6,320	130	195	3.8 %
4.0 %	2,300	96	144	2,810	102	153	3,390	107	160	3,950	112	167	4,550	120	180	5,220	126	189	5,950	137	206	4.0 %
4.2 %	2,110	101	151	2,590	107	161	3,140	112	168	3,680	117	176	4,270	126	189	4,910	133	199	5,620	144	216	4.2 %
4.4 %	1,940	106	158	2,400	112	169	2,920	117	176	3,440	123	184	4,010	132	198	4,630	139	208	5,320	151	226	4.4 %
4.6 %	1,780	110	166	2,210	117	176	2,710	123	184	3,220	128	193	3,770	138	207	4,380	145	218	5,040	158	237	4.6 %
4.8 %	1,640	115	173	2,050	123	184	2,510	128	192	3,000	134	201	3,550	144	216	4,140	152	227	4,790	165	247	4.8 %
5.0 %	1,510	120	180	1,890	128	191	2,330	133	200	2,800	140	209	3,330	150	225	3,910	158	237	4,550	171	257	5.0 %
5.2 %	1,390	125	187	1,750	133	199	2,160	139	208	2,610	145	218	3,120	156	234	3,690	164	246	4,320	178	267	5.2 %
5.4 %	1,280	130	194	1,610	138	207	1,990	144	216	2,420	151	226	2,910	162	243	3,460	171	256	4,090	185	278	5.4 %
5.6 %	1,160	134	202	1,470	143	214	1,830	149	224	2,230	156	234	2,700	168	252	3,230	177	265	3,840	192	288	5.6 %
5.8 %	1,040	139	209	1,320	148	222	1,650	155	232	2,020	162	243	2,460	174	261	2,970	183	275	3,560	199	298	5.8 %
6.0 %	833	144	216	1,060	153	230	1,330	160	240	1,660	167	251	2,040	180	270	2,500	189	284	3,050	206	309	6.0 %

NOTES:

- 1. THE VALUES LISTED IN THE SUPERELEVATION TABLES WERE CALCULATED USING DISTRIBUTION METHOD 5.
- THE SUPERELEVATION RUNOFF LENGTH (L_f) WAS BASED ON THE NUMBER OF LANES ROTATED. SINGLE LANE ROTATED IS TYPICAL OF 2 LANE HIGHWAYS, AND TWO LANES ROTATED IS TYPICAL OF 4 LANE HIGHWAYS.
- FOR THE TANGENT RUNOUT LENGTH (∠t), USE THE FORMULA: 20%(0)//K , WHERE K IS (20%(0))//(t/(FT)).
 VALUES OF RADIUS AND SUPERELEVATION RUNOFF LENGTHS SHALL NOT BE INTERPOLATED OR ROUNDED UP.

NO	T							S	UPER	ELEVATIO	ΝΤΑΕ	BLE (<i>e</i> ,	лах. =8 %)									TION
VAT	Va =	15 mph		Va =	20 mph		V/4 =	25 mph		V _d =	30 mph		Va =	35 mph		K-=	40 mph		V _A =	45 mph		VAT
ed		Lr	(FT.)	<u> </u>	40	(FT.)		Lr	(FT.)			(FT.)		Lr	(FT.)		10	(FT)		Lr	FT.)	ed Ele
SUPER	RADIUS (FT.)	<i>n</i> ₁₌₁	n ₁₌₂	RADIUS (FT.)	<i>n</i> ₁₌₁	n ₁₌₂	RADIUS (FT.)	<i>n</i> ₁₌₁	n ₁₌₂	RADIUS (FT.)	<i>n</i> ₁₌₁	<i>n₁₌₂</i>	RADIUS (FT.)	<i>n</i> ₁₌₁	<i>n</i> _{<i>l</i>=2}	RADIUS (FT.)	<i>n</i> ₁₌₁	n ₁₌₂	RADIUS (FT.)	<i>n</i> ₁₌₁	<i>n</i> ₁₌₂	SUPER
-2.0 % (NC)	932	31	46	1.640	32	49	2.370	34	51	3.240	36	55	4.260	39	58	5.410	41	62	6,710	44	67	-2.0 % (NC)
2.0 % (RC)	676	31	46	1,190	32	49	1,720	34	51	2,370	36	55	3,120	39	58	3,970	41	62	4,930	44	67	2.0 % (RC)
2.2 %	605	34	51	1,070	36	54	1,550	38	57	2,130	40	60	2,800	43	64	3,570	46	68	4,440	49	73	2.2 %
2.4 %	546	37	55	959	39	58	1,400	41	62	1,930	44	65	2,540	46	70	3,240	50	74	4,030	53	80	2.4 %
2.6 %	496	40	60	872	42	63	1,280	45	67	1,760	47	71	2,320	50	75	2,960	54	81	3,690	58	87	2.6 %
2.8 %	453	43	65	796	45	68	1,170	48	72	1,610	51	76	2,130	54	81	2,720	58	87	3,390	62	93	2.8 %
3.0 %	415	46	69	730	49	73	1,070	51	77	1,480	55	82	1,960	58	87	2,510	62	93	3,130	67	100	3.0 %
3.2 %	382	49	74	672	52	78	985	55	82	1,370	58	87	1,820	62	93	2,330	66	99	2,900	71	107	3.2 %
3.4 %	352	52	78	620	55	83	911	58	87	1,270	62	93	1,690	66	99	2,170	70	106	2,700	76	113	3.4 %
3.6 %	324	55	83	572	58	88	845	62	93	1,180	65	98	1,570	70	105	2,020	74	112	2,520	80	120	3.6 %
3.8 %	300	58	88	530	62	92	784	65	98	1,100	69	104	1,470	74	110	1,890	79	118	2,360	84	127	3.8 %
4.0 %	277	62	92	490	65	97	729	69	103	1,030	73	109	1,370	77	116	1,770	83	124	2,220	89	133	4.0 %
4.2 %	255	65	97	453	68	102	678	72	108	955	76	115	1,280	81	122	1,660	87	130	2,080	93	140	4.2 %
4.4 %	235	68	102	418	71	107	630	75	113	893	80	120	1,200	85	128	1,560	91	137	1,960	98	147	4.4 %
4.6 %	215	71	106	384	75	112	585	79	118	834	84	125	1,130	89	134	1,470	95	143	1,850	102	153	4.6 %
4.8 %	193	74	111	349	78	117	542	82	123	779	87	131	1,060	93	139	1,390	99	149	1,750	107	160	4.8 %
5.0 %	172	77	115	314	81	122	499	86	129	727	91	136	991	97	145	1,310	103	155	1,650	111	167	5.0 %
5.2 %	154	80	120	284	84	126	457	89	134	676	95	142	929	101	151	1,230	108	161	1,560	116	173	5.2 %
5.4 %	139	83	125	258	88	131	420	93	139	627	98	147	870	105	157	1,160	112	168	1,480	120	180	5.4 %
5.6 %	126	86	129	236	91	136	387	96	144	582	102	153	813	108	163	1,090	116	174	1,390	124	187	5.6 %
5.8 %	115	89	134	216	94	141	358	99	149	542	105	158	761	112	168	1,030	120	180	1,320	129	193	5.8 %
6.0 %	105	92	138	199	97	146	332	103	154	506	109	164	713	116	174	965	124	186	1,250	133	200	6.0 %
6.2 %	97	95	143	184	101	151	308	106	159	472	113	169	669	120	180	909	128	192	1,180	138	207	6.2 %
6.4 %	89	98	148	170	104	156	287	110	165	442	116	175	628	124	186	857	132	199	1,110	142	213	6.4 %
6.6 %	82	102	152	157	107	161	267	113	170	413	120	180	590	128	192	808	137	205	1,050	147	220	6.6 %
6.8 %	76	105	157	146	110	165	248	117	175	386	124	185	553	132	197	761	141	211	990	151	227	6.8 %
7.0 %	70	108	162	135	114	170	231	120	180	360	127	191	518	135	203	716	145	217	933	156	233	7.0 %
7.2 %	64	111	166	125	117	175	214	123	185	336	131	196	485	139	209	672	149	223	878	160	240	7.2 %
7.4 %	59	114	171	115	120	180	198	127	190	312	135	202	451	143	215	628	153	230	822	164	247	7.4 %
7.6 %	54	117	175	105	123	185	182	130	195	287	138	207	417	147	221	583	157	236	765	169	253	7.6 %
7.8 %	48	120	180	94	126	190	164	134	201	261	142	213	380	151	226	533	161	242	701	173	260	7.8 %
8.0 %	38	123	185	76	130	195	134	137	206	214	145	218	314	155	232	444	166	248	587	178	267	8.0 %

LION	I							S	UPER	ELEVATIO	N TAB	LE (en	nax. =8 %)									TION
SUPERELEVA.	$V_d = 50 \text{ mph}$			$V_d = 55 \text{ mph}$			$V_d = 60 \text{ mph}$			$V_d = 65 \text{ mph}$			$V_d = 70 \text{ mph}$			$V_d = 75 \mathrm{mph}$			$V_d = 80 \text{ mph}$			A V
	-	<i>L_r</i> (FT.)			Lr (FT.)			<i>L_L</i> (FT.)			<i>L_L</i> (FT.)			<i>L_r</i> (FT.)			<i>L_r</i> (FT.)			L _r (FT.)		e G
	RADIUS (FT.)	<i>n</i> ₁₌₁ <i>n</i> ₁₌₂	<i>n</i> _{t=2}	RADIUS (FT.)	<i>D</i> ₁ =1	<i>n</i> ₁₌₂	RADIUS (FT.)	<i>n</i> _{t=1}	<i>n</i> ₇₌₂	RADIUS (FT.)	<i>n</i> ₇ =1	<i>n</i> /=2	RADIUS (FT.)	<i>n</i> ₁₌₁	<i>n</i> ₇₌₂	RADIUS (FT.)	<i>n</i> /=1	<i>n</i> ₇₌₂	RADIUS (FT.)	<i>n</i> ₁₌₁	<i>n</i> ₁₌₂	SUPEF
-2.0 % (NC)	8,150	48	72	9,720	51	77	11,500	53	80	12,900	56	84	14,500	60	90	16,100	63	95	17,800	69	103	-2.0 % (NC)
2.0 % (RC)	5,990	48	72	7,150	51	77	8,440	53	80	9,510	56	84	10,700	60	90	12,000	63	95	13,300	69	103	2.0 % (RC)
2.2 %	5,400	53	79	6,450	56	84	7,620	59	86	8,600	61	92	9,660	66	99	10,800	69	104	12,000	75	113	2.2 %
2.4 %	4,910	58	86	5,870	61	92	6,930	64	96	7,830	67	100	8,810	72	108	9,850	76	114	11,000	82	123	2.4 %
2.6 %	4,490	62	94	5,370	66	100	6,350	69	104	7,180	73	109	8,090	78	117	9,050	82	123	10,100	89	134	2.6 %
2.8 %	4,130	67	101	4,950	71	107	5,850	75	112	6,630	78	117	7,470	84	126	8,370	88	133	9,340	96	144	2.8 %
3.0 %	3,820	72	108	4,580	77	115	5,420	80	120	6,140	84	126	6,930	90	135	7,780	95	142	8,700	103	154	3.0 %
3.2 %	3,550	77	115	4,250	82	123	5,040	85	128	5,720	89	134	6,460	96	144	7,260	101	152	8,130	110	165	3.2 %
3.4 %	3,300	82	122	3,970	87	130	4,700	91	136	5,350	95	142	6,050	102	153	6,800	107	161	7,620	117	175	3.4 %
3.6 %	3,090	86	130	3,710	92	138	4,400	96	144	5,010	100	151	5,680	108	162	6,400	114	171	7,180	123	185	3.6 %
3.8 %	2,890	91	137	3,480	97	146	4,140	101	152	4,710	106	159	5,350	114	171	6,030	120	180	6,780	130	195	3.8 %
4.0 %	2,720	96	144	3,270	102	153	3,890	107	160	4,450	112	167	5,050	120	180	5,710	126	189	6,420	137	206	4.0 %
4.2 %	2,560	101	151	3,080	107	161	3,670	112	168	4,200	117	176	4,780	126	189	5,410	133	199	6,090	144	216	4.2 %
4.4 %	2,410	106	158	2,910	112	169	3,470	117	176	3,980	123	184	4,540	132	198	5,140	139	208	5,800	151	226	4.4 %
4.6 %	2,280	110	166	2,750	117	176	3,290	123	184	3,770	128	193	4,310	138	207	4,890	145	218	5,530	158	237	4.6 %
4.8 %	2,160	115	173	2,610	123	184	3,120	128	192	3,590	134	201	4,100	144	216	4,670	152	227	5,280	165	247	4.8 %
5.0 %	2,040	120	180	2,470	128	191	2,960	133	200	3,410	140	209	3,910	150	225	4,460	158	237	5,050	171	257	5.0 %
5.2 %	1,930	125	187	2,350	133	199	2,820	139	208	3,250	145	218	3,740	156	234	4,260	164	246	4,840	178	267	5.2 %
5.4 %	1,830	130	194	2,230	138	207	2,680	144	216	3,110	151	226	3,570	162	243	4,090	171	256	4,640	185	278	5.4 %
5.6 %	1,740	134	202	2,120	143	214	2,550	149	224	2,970	156	234	3,420	168	252	3,920	177	265	4,460	192	288	5.6 %
5.8 %	1,650	139	209	2,010	148	222	2,430	155	232	2,840	162	243	3,280	174	261	3,760	183	275	4,290	199	298	5.8 %
6.0 %	1,560	144	216	1,920	153	230	2,320	160	240	2,710	167	251	3,150	180	270	3,620	189	284	4,140	206	309	6.0 %
6.2 %	1,480	149	223	1,820	158	237	2,210	165	248	2,600	173	260	3,020	186	279	3,480	196	294	3,990	213	319	6.2 %
6.4 %	1,400	154	230	1,730	163	245	2,110	171	256	2,490	179	268	2,910	192	288	3,360	202	303	3,850	219	329	6.4 %
6.6 %	1,330	158	238	1,650	169	253	2,010	176	264	2,380	184	276	2,790	198	297	3,240	208	313	3,720	226	339	6.6 %
6.8 %	1,260	163	245	1,560	174	260	1,910	181	272	2,280	190	285	2,690	204	306	3,120	215	322	3,600	233	350	6.8 %
7.0 %	1,190	168	252	1,480	179	268	1,820	187	280	2,180	195	293	2,580	210	315	3,010	221	332	3,480	240	360	7.0 %
7.2 %	1,120	173	259	1,400	184	276	1,720	192	288	2,070	201	301	2,470	216	324	2,900	227	341	3,370	247	370	7.2 %
7.4 %	1,060	178	266	1,320	189	283	1,630	197	296	1,970	207	310	2,350	222	333	2,780	234	351	3,250	254	381	7.4 %
7.6 %	980	182	274	1,230	194	291	1,530	203	304	1,850	212	318	2,230	228	342	2,650	240	360	3,120	261	391	7.6 %
7.8 %	901	187	281	1,140	199	299	1,410	208	312	1,720	218	327	2,090	234	351	2,500	246	369	2,970	267	401	7.8 %
8.0 %	758	192	288	960	204	306	1,200	213	320	1,480	223	335	1,810	240	360	2,210	253	379	2,670	274	411	8.0 %

- 1. THE VALUES LISTED IN THE SUPERELEVATION TABLES WERE CALCULATED USING DISTRIBUTION METHOD 5.
- THE SUPERELEVATION RUNOFF LENGTH (Zr) WAS BASED ON THE NUMBER OF LANES ROTATED. SINGLE LANE ROTATED IS TYPICAL OF 2 LANE HIGHWAYS, AND TWO LANES ROTATED IS TYPICAL OF 4 LANE HIGHWAYS.
- FOR THE TANGENT RUNOUT LENGTH (*Lt*), USE THE FORMULA: <u>2.0%(00)</u>, WHERE K IS <u>6.0(00)</u>
 VALUES OF RADIUS AND SUPERELEVATION RUNOFF LENGTHS SHALL NOT BE INTERPOLATED OR ROUNDED UP.

