SUMMARY OF POT BEARING DESIGN & CONSTRUCTION: AGENCY COMPARISON BY COMPONENT

COMPONENT	PENNDOT	FDOT	NCDOT
Design Specifications	AASHTO Standard Specifications for Highway Bridges (Fifteenth Edition, 1992) / AASHTO LRFD Bridge Design Specifications (Second Edition, 1998)	AASHTO LRFD Bridge Design Specifications & SCEF SBI 1008-1991	AASHTO Standard Specifications for Highway Bridges
Construction Specifications	Specification entitled "Publication 408", Section 1111	Standard Specification 461, entitled "Multirotational Bearings"	Standard Specification entitled "Pot Bearings"
Structural Steel	AASHTO M270/ASTM A709, Grade 50 (Grades 36 and 50W are also listed in Pub. 408)	ASTM A709, Grade 50W	AASHTO M270 Grade 50W
Steel Corrosion Protection	Shop painting is required in accordance with Publication 408, Section 1060.	Metallization of steel for pot bearings in accordance with their standard specification	Metallization of steel for pot bearings in accordance with their special provision for "Thermal Sprayed Coatings (Metallization)"
Pot	The pot wall thickness and pot base thickness are designed according to equations in AASHTO LRFD (Second Edition). The preferred method of attaching the pot to the masonry plate is to machine a recess into the masonry plate and place the pot in the recess. However, welding is an acceptable connection alternative.	The pot base thickness is sized by the manufacturer. A sample drawing provided shows a 3/16" recessed connection detail, similar to the one in PENNDOT's BD-613M standard.	The pot is designed by the manufacturer. The specification entitled "Pot Bearings" discusses welding the pot to the masonry plate, but does not limit the attachment method. The standard pot bearing details provided show a welded connection between the pot and masonry plate.
Elastomeric Disc	Virgin plain neoprene or natural rubber with hardness of 50 durometer (+/-10) per AASHTO M251. The disc surfaces are lubricated with silicone grease. Allowable design pressure = 3,500 psi (max) & 700 psi (min).	Manufacturer is responsible for design of the neoprene disc per the applicable design specification. The FDOT specification does not discuss the material requirements. The contract drawings provided indicate the use of a PTFE sheet on top and bottom of the neoprene pad.	Neoprene with a hardness of 50 durometer capable of a minimum rotation of 0.02 radians. The NCDOT specification requires a 1/64" thick unfilled PTFE disc on either side of the neoprene disc inside the bearing. Other Engineer-approved material is permitted. Allowable design pressure = 3,500 psi (max).
Sealing Rings	PENNDOT requires 3 flat brass sealing rings meeting ASTM B36 (half hard) specification. Ends are cut at a 45° angle with a maximum gap of 0.05". The openings are staggered in the brass rings 120° apart. Sealing rings are recessed in elastomeric discs so that the top sealing ring is flush with upper surface of elastomeric disc.	Manufacturer is responsible for design of the sealing rings.	Manufacturer is responsible for sizing and detailing the rings. A single, brass sealing ring with round cross section is shown on the NCDOT standard details sheet. Material specification is not mentioned on the standard details sheet. Rings are placed on top of the elastomeric disc in pot.
Piston	The piston face width is calculated using equations in AASHTO LRFD (Second edition). The piston diameter is always 0.02" less than the inside pot diameter for standard derived bearings.	Designers select the piston height by comparing several manufacturer's catalogs so that the total bearing height is known during the design stage. However, the piston face width and clearance are determined by the manufacturer. If the piston height is modified by the manufacturer, the contractor is required to adjust the bearing elevations accordingly.	The manufacturer is responsible for sizing and detailing the piston based on design loads provided on the contract drawings by the designer.
Sole Plates	The thickness of the sole plate is designed for flexure based on an allowable bending stress of 0.55*Fy. The sole plate plan dimensions and bevel thicknesses are provided by the designer on the contract drawings.	The SCEF SBI-1008 (1991) specification lists the allowable bending stress at 0.75*Fy for sole plates. The example contract drawings provided show a beveled sole plate to beam connection using threaded rods with double heavy hex nuts. The sole plate plan dimensions and bevel thicknesses are provided by the designer on the contract drawings.	Sole plate dimensions are determined by the manufacturer based on the design loads provided on the contract drawings.
Guide Plate	The thickness of the guide plate is designed for flexure based on an allowable bending stress of 0.55*Fy. The plate is connected to the piston by recessing the piston into the guide plate.	The guide plate (termed "top plate") thickness is provided by the designer on the contract drawings. The plate is bolted to the sole plate by the use of threaded rods. The plate is connected to the piston through the use of a center guide key.	The guide plate (termed "top steel plate") is designed by the pot bearing manufacturer. The plate is attached to the piston through the use of a center guide key.
Guide Bar	External guide bars are typically welded to the sole plate, bolted to the sole plate or machined in the sole plate.	A single guide key is placed along the centerline of the bearing. The thickness is designed by the designer but the key height and keyway opening are determined by the manufacturer.	A single, central guide key is used. Horizontal design loads are provided by the designer and the pot bearing manufacturer is responsible for the design of the guide key.
PTFE	PTFE is required to be unfilled, dimpled and lubricated. Made from virgin TFE resin per ASTM D4894. Dimples must have a minimum edge distance of 1/2" and conform to 1998 AASHTO LRFD Section 14.7.2. Allowable design pressure = 3,500 psi (max).	Unfilled PTFE sheets are shown on the sample drawings provided. The FDOT specification entitled "Multi-rotational Bearings" allows the use of unfilled virgin PTFE or glass-fiber filled PTFE. The resin is to conform to ASTM D1457.	Acceptable PTFE types are unfilled, virgin PTFE sheets or glass-fiber filled PTFE sheets, resulting from skiving billets formed under hydraulic pressure and heat. Resin is to conform to ASTM D4894 or D4895. Allowable design pressure = 3,500 psi (max).
Stainless Steel	Stainless steel sheets are 13 gage and conform to ASTM A240, Grade 30, Type 304 with an ANSI 0.02 mil surface finish or less. Stainless steel is attached to the guide bars or sole plate with a 1/16" continuous fillet weld around the perimeter of the sheet. The design coefficient of friction when mated with PTFE is 0.04.	Stainless steel sheets are to conform to ASTM A240, Type 316. Specification lists a minimum thickness of 1/16".	NCDOT specification calls for ASTM A240/A167, Type 304 with a minimum #8 mirror surface finish. Thickness provided is 16 gage for max. plan dimension <= 12", 11 gage for max. plan dimension > 12".
Masonry Plate	Designed using an allowable bending stress of 0.55*Fy. Two methods to attach pot to masonry plate: setting the pot in a machined recess in the masonry plate and sealing around the perimeter of the pot base with an approved caulking compound, or by welding.	Sized by the designer per the SCEF SBI-1008 (1991) specification, which lists procedures to be used for the masonry plate design. Allowable bending stress is 0.75*Fy. Pot is attached to the masonry plate with a 3/16" deep machined recess on sample drawings provided.	Sized by the designer and detailed on the contract drawings. Pot is attached to the masonry plate using a welded connection.
Anchor Bolts	Anchor bolts conform to ASTM F1554, Grade 55. Hex nut and washer to be drawn up finger tight to masonry plate then back off 1/4 turn. The anchor bolt threads are peened after installation. The swedged bolts are embedded in the concrete substructure.	Anchor bolts are installed using 6" diameter preformed blockouts. Galvanized, swedged anchor bolts conforming to ASTM A307 are used. Designer provides anchor bolt diameter, length and configuration.	Preformed holes are used for anchor bolt installation. The holes are created by using a 4" diameter x 1'-3" long standard pipe with a closed end. A grout tube is also placed outside of the masonry plate plan area and is attached to the side of the pipe near the bottom to facilitate placing of the non-shrink, non-metallic grout. Designer provides anchor bolt diameter, length, and configuration.
Bedding Material	A 1/8" thick bedding material meeting the requirements of ASTM D378 is shown in the PENNDOT standards.	A 1/8" thick neoprene pad is shown on the sample drawings provided.	A 3/16" thick preformed neoprene pad is shown on the standard details provided.