CONTRACT SPECIFICATIONS – DISK BEARINGS

1.0 DESIGN

1.1 Scope of Work

1.1.1 This work shall consist of furnishing Multi-Rotational, High Load Disk Bearings and installing Disk Bearing Assemblies at the locations shown on the plans in accordance with these specifications and the AASHTO Standard Specifications for Highway Bridges; 17th Edition. Bearing assemblies shall include bearings device, distribution plates, distribution pads, and connection hardware.

1.1.2 Disk bearings shall consist of a polyether urethane structural element (disk) confined by upper and lower steel bearing plates. The bearing shall be equipped with a shear restriction mechanism to prevent lateral movement of the disk. Bearings shall adequately provide for the thermal expansion and contraction, rotation, camber changes, and creep and shrinkage of structural members, where applicable.

1.1.3 Disk bearings shall be supplied as fixed bearings; guided expansion bearings; and non-guided expansion bearings as designated by the contract documents.

1.1.4 Due to concerns over large cyclical live load deformations and rotations, pot bearings are not recommended for support of railroad bridges. In addition, pot bearings should not be used when the minimum vertical load is less than 20% of the bearing vertical design load.

1.2 Qualified Suppliers
The following suppliers have displayed the capability of supplying disk bearings with characteristics that conform to the general requirements of these contract specifications.

(1) R. J. Watson, Inc.
11035 Walden Ave
Alden, NY 14004
Phone: 716-901-7020
Fax: 716-901-7015

The contractor should note that he/she is not limited to sourcing the disk bearings from the above supplier as long as the alternate supplier meets the qualification requirements of Section 1.3.

1.3 Qualification Requirements
Disk bearings and the bearing supplier shall be subject to the qualification requirements for acceptance listed below.
1.3.1 Disk bearings shall be designed and constructed in accordance with AASHTO Standard Specifications for Highway Bridges; Div. I, Section 14 and Div. II, Section 18.

1.3.2 The supplier shall show previous history in the design and fabrication of disk bearings. Documentation showing a minimum of five years experience and ten bridge installations shall be provided to the engineer.

1.3.3 Sliding bearings shall be stiff in shear, i.e. negligible shear displacements shall occur within the vertical load support element.

1.3.4 The vertical load support element (elastomeric disc) shall be designed for rotational fatigue at the design vertical load. Rotational loading shall be static dead load rotation plus cyclic live load rotation. Bearings that rely upon lateral confinement of the elastomer to sustain the vertical load shall simultaneously include ½ the design horizontal load. Rotational fatigue test results shall be provided to the engineer.

1.4 Shop Drawings
The contractor shall submit drawings to the engineer for approval, and shall have received said approval prior to the construction of the beam seats and fabrication of disk bearings. These drawings shall include, but not be limited to, the following information.

(1) Plan and elevation of each disk bearing size
(2) Complete details and sections showing all materials (with ASTM or other designations) incorporated in the disk bearings.
(3) Vertical and horizontal load capacities.
(4) Bearing seat and all bearing connection details.

The shop drawings shall be stamped by a professional engineer employed by the bearing supplier with at least 5 years of documented history of disk bearing design experience.

2.0 CONSTRUCTION

2.1 All materials shall be new and unused, with no reclaimed material incorporated in the finished bearing.

2.2 The physical properties of the polyether urethane elements shall conform to AASHTO Standard Specifications for Highway Bridge; Div. II, Table 18.4.7.1-1.

2.3 All steel except stainless steel components of the bearing shall conform to the requirements of the type of steel designated on the contract plans.
2.4 Stainless steel shall conform to the requirements of ASTM A240 – Type 304. Higher grades of stainless are permissible. Stainless steel in contact with PTFE shall be polished to a No. 8 bright mirror finish. The minimum thickness of stainless steel sheet shall be 12 gage.

2.5 Polytetrafluoroethylene (PTFE) sheet shall be manufactured from pure virgin (not reprocessed) PTFE resin. PTFE sheet shall meet the applicable material requirements of *AASHTO Standard Specifications for Highway Bridges; Div. II, Section 18.4.3*. Alternative low coefficient of friction materials shall be considered for use on both the guide bars and horizontal sliding surface. Materials used on the horizontal sliding surfaces shall be more durable than PTFE with a coefficient of friction similar to PTFE.

2.6 Elastomeric rotational element shall be molded as a single piece, separate layers are not allowed.

2.7 Fabrication Details

2.7.1 The contractor shall provide the engineer with written notification thirty (30) days prior to the start of bearing fabrication. This notification shall include all of the information required by Sections 1.3 and 1.4. The bearing fabricator shall be certified by the American Institute of Steel Construction (AISC) for Simple Steel Bridges Category.

2.7.2 All steel surfaces exposed to the atmosphere, except stainless steel surfaces and metal surfaces to be welded, shall be shop coated in accordance with the contract plans. Prior to coating, the exposed steel surfaces shall be cleaned in accordance with the recommendations of the coating’s manufacturer.

2.7.3 Stainless steel sheet shall be attached to its steel substrate with a continuous seal weld.

2.7.4 All welding shall conform to, and all welders shall be qualified in accordance with, the requirements of the American Welding Society (AWS).

2.7.5 Except as noted, all bearing fabrication tolerances shall be in accordance with *AASHTO Standard Specifications for Highway Bridges; Div. II, Table 18.5.1.5-1*.

2.7.6 Every bearing shall have an individual bearing serial number indelibly marked with ink.

2.7.7 After assembly including sole plates and masonry plates as applicable, bearing components shall be held together with steel strapping or other means to prevent disassembly until the time of installation.
2.8 Production Bearing Sampling and Testing

2.8.1 Production bearing sampling and testing shall be performed in accordance with *AASHTO Standard Specifications for Highway Bridges; Div. II, Section 18.7.*

2.8.2 The Long-Term Deterioration Test per *AASHTO Standard Specifications for Highway Bridges; Div. II, Section 18.7.* may be satisfied by testing of samples or previous bearings unless otherwise specified in the contract plans.

2.8.3 Each bearing shall be visually examined both during and after testing. Any resultant defects, such as bond failure, physical destruction or cold flow of PTFE to the point of debonding, shall be cause for rejection. Defects such as extruded or deformed elastomer or cracked steel shall also be cause for rejection. Minor deformations in the elastomer are allowed.

3.0 INSTALLATION

3.1 Bearings delivered to the bridge site shall be stored under cover on a platform above the ground surface. Bearings shall be protected at all times from damage. When placed, bearings shall be dry, clean, and free from dirt, oil, grease, or other foreign substances.

3.2 Bearing devices shall not be disassembled unless otherwise permitted by the engineer or manufacturer.

3.3 Bearings shall be installed in accordance with the alignment plan and installation scheme as shown in the contract plans. Upon final installation of the bearings, the engineer shall inspect the bearing components to assure that they are level and parallel to within ± 0.005 radians. Any deviations in excess of the allowed tolerances shall be corrected.

3.4 Bearings assemblies shall be handled by their bottom surfaces only. Do not lift bearings by their tops, sides and/or shipping bands.

3.5 Caution shall be taken to ensure that the steel temperature directly adjacent to the polyether urethane rotational element does not exceed 225°F. The polyether urethane disk must not be exposed to direct flame or sparks.

4.0 CERTIFICATE OF COMPLIANCE

4.1 In addition to records of test results, the contractor’s disk bearing supplier shall submit Certificates of Compliance for the disk bearings indicating the materials, fabrication, testing, and installation are as specified herein.
5.0  PAYMENT

5.1  If a portion or all of the bearings are either fabricated or tested at a site more than 300 airline miles from all NY State airports, additional shop inspection expenses will be sustained by the Owner. Payment to the Contractor for furnishing the bearings will be reduced $5,000 for any fabrication or testing site located more than 300 airline miles from all NY State airports, or in the case where the fabrication or testing site is located more than 3000 airline miles from all NY State airports, payment will be reduced $15,000.