**SPECIFICATION**

**Section 07900**

 **Wabo®BusTuff**

Heavy Duty Parking Expansion Control System

for High Load, Speed and Volume Applications

1. GENERAL
	* + 1. WORK INCLUDED
				1. The work shall consist of furnishing and installing expansion control systems in accordance with the details shown on the contract plans, and the requirements of these specifications. Wabo®BusTuff is a proprietary product designed to meet high load, high speed, high daily traffic count vehicle requirements for the Project. In the event of any discrepancy between the contract plans and these specifications, the specification shall govern.
				2. Related Work

Cast-in-place concrete

Sealants and caulking

* + - 1. RELATED DOCUMENTS
				1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
			2. SUBMITTALS
				1. Product Data: Provide the following for each system specified:

Product data sheet describing capabilities of expansion control system.

Information and data as outlined in Section 1.4.C of this specification.

* + - * 1. Shop Drawings: Provide the following for each system specified:

Placement Drawings: Include line diagrams showing plans, elevations, sections, details, splices, blockout requirement, entire route of each system, and attachments to other work.

* + - * 1. Product Test Reports: Material test reports confirming all structural steel materials conform to the specified and designed type, and previous test report(s) executed by an independent qualified testing agency for seismic performance suitability.
				2. Manufacturer certification: Provide certificates validating that the manufacturer of the expansion control system is certified to the most current version of an AISC Bridge Fabrication standard, and ISO 9001 Quality Management System.
			1. PERFORMANCE AND DESIGN CRITERIA
				1. Design of vehicular and bus loading expansion systems shall meet the performance criteria listed on the contract documents, and shall be designed in accordance with requirements of AASHTO LRFD Design Specifications with modifications and exceptions listed below. Fabrication of load bearing elements shall be in accordance with AASHTO LRFD Bridge Construction Specifications.
				2. Unless otherwise indicated, wheel load of 16,000 pounds (bus with dual tire) shall be used.
				3. Prior to fabrication, expansion joint supplier shall submit the following information for review and approval:

Summary of design criteria used in analysis and design.

Engineering calculations and finite element analysis (FEA), stamped by a registered professional engineer under the manufacturer’s direct employ, of load carrying members to validate expansion control system’s ability to transfer all imposed loads to the supporting structure.

Consideration for limit states of collapse, serviceability, and fatigue shall be provided in analysis and design.

* + - * 1. Design Criteria:

Fatigue: 25% lower than design wheel load. Fatigue resistance shall be established using the mean SN curve (50% failure rate) for the materials.

Serviceability: 25% higher than design wheel load.

Collapse: 50% higher than serviceability design wheel load.

Horizontal loads of at least 5 % of vertical load shall be included for serviceability and fatigue limit states unless otherwise indicated. Friction due to vehicular loading shall not be relied upon to provide horizontal load resistance of dynamic loads. A maximum of 33 percent of the friction due to pre-tensioning elements may be considered to resist horizontal loads.

FEA shall use a joint gap of not less than the joint’s maximum service gap position, or 20 percent larger than mid-range joint opening, whichever is larger.

Stress risers including but not limited to recesses and bolt holes shall be accounted for in the fatigue FEA case only.

FEA analysis shall verify stresses are below design limit states. Maximum allowable deflections are 0.035 inches for fatigue and 0.070 inches for serviceability.

Designated expansion control systems shall be designed such that the system will remain in place after a seismic event as described within the contract documents.

Noise prevention components shall be designed for a minimum design life of ten (10) years, and be justified by previous testing, installation, or analysis. Use of rubber sheets, dowels or blocks of any kind shall not be permitted.

* + - 1. QUALITY ASSURANCE
				1. Manufacturer Qualifications: Manufacturer shall have a minimum ten (10) years experience specializing in the design and manufacture of expansion control systems for use in vehicular bridges. Manufacturer shall be certified to an AISC Bridge Fabrication standard, and ISO 9001 Quality Management System. Manufacturer shall have a registered professional engineer under its direct employ with a demonstrated history of designing expansion control systems used in vehicular bridges where high load, high speed, high daily traffic count, and fatigue are considerations for design.

The following manufacturer is known to have a pre-qualified expansion control system design by completing and conforming to all requirements described herein:

Watson Bowman Acme Corp.

95 Pineview Drive

Amherst, NY 14228

Tel: (800) 677-4922

Fax: (716) 691-9239

Web: [www.wbacorp.com](http://www.wbacorp.com)

* + - * 1. Installer Qualifications: The specified expansion control system shall be installed by an employer of skilled workers that have completed the manufacturer’s formal "factory trained applicator" training program. Factory field technical service shall be required by any installer who has not successfully completed a minimum of two (2) installations of the specified materials.
				2. Source Limitations: Obtain expansion control systems through one (1) source from a single manufacturer.
				3. Warranty: The expansion control system shall be warranted for a period of three (3) years when installed by the manufacturer’s factory trained applicator. Installation shall be in strict accordance with manufacturer’s technical specifications, details, installation instructions and general procedures in effect for normal intended usage and suitable applications under specified design movements and loading conditions.
			1. PRODUCT DELIVERY, STORAGE, AND HANDLING
				1. Deliver products in manufacturer's original, intact, labeled containers, and store under cover in a dry location until installed. Store off the ground, protect from weather and construction activities.

PART 2 – PRODUCTS

2.1 GENERAL

A. Provide Wabo®BusTuff utilizing QuietRide™ Technology that includes all materials as described in this Section; specifically, structural steel components designed and fabricated to meet requirements for the Project, non-elastomer sound attenuating materials between the expansion control system and the substructure, a specialty manufactured non-metallic, non-elastomer spring material to ensure the system is in full contact with the substructure as vehicles travel across the expansion control system, and an elastomeric concrete header. Components of the system shall not be substituted.

2.2 MATERIALS

1. Steel plates and shapes: Supply materials in conformance to ASTM A 588, or as directed by the manufacturer. Non-load bearing steel materials shall be as recommended by the manufacturer. Use of aluminum for any component is prohibited.
2. Headed concrete anchor studs shall conform to ASTM A 108 grades 1010 through 1020.
3. Structural steel hardware: Bolts, studs, and nuts shall conform to or meet mechanical properties of ASTM A 325 or ASTM A 449. All hardware shall be protected from corrosion by means of hot dip galvanizing in conformance to ASTM A 153.
4. Cover plate sound attenuating material –Cover plates shall contain a dovetail cut on the bottom surface to accept a high density urethane material that is hot poured into the dovetail joints. Application of pre-formed urethane pads to cover plates through use of adhesive(s) is prohibited. Use of rubber sheet, dowels, blocks, or cross section of any kind is prohibited.
5. Spring material: Manufacturer shall specify material properties, geometry, and compression deflection criteria required for precompression springs in order to ensure the sound attenuating pads are in complete and constant contact throughout a wheel load cycle. Material shall be designed to minimize compression set for a design life of at least one million vehicles. Use of steel or elastomer materials is prohibited.
6. Elastomeric Concrete Header: (Wabo®Crete Parking Series)

Material shall be an ambient cure, 100% solids, two component polyurethane with pregraded aggregate mix exhibiting the physical properties listed in the tables below. When properly mixed and poured, the elastomeric concrete cures rapidly, flows and fills any voids, spalls or irregularities forming a monolithic unit.

Base Color: Gray

1. Elastomeric cured binder and aggregate shall meet the following physical properties:

**PHYSICAL PROPERTIES ASTM METHOD**  **REQUIREMENTS** **TEST RESULTS**

Compressive Strength D695 Mod 2200 2723 psi

Resilience at 5% deflection D695 90 (min.) 96.7%

Adhesion to concrete: C190

 Dry Bond 400 451.3 psi

 Wet Bond 250 353.9 psi

Impact Resistance Steel ball drop (.375” th. Disc / dry steel plate)

 At **-**20 deg F(-29C) no cracks at 5 ft 7.0 ft-lbs

 At 32 deg F (0C) no cracks at 5 ft 10.0 ft-lbs

 At 158 deg F (70C) no cracks at 5 ft 10.0 ft-lbs

 Bonding Agent

Provide manufacturer’s two component, 100 percent solids bonding agent and apply to the sides and base of the preformed blockouts prior to placement of Wabo®Crete Parking Series elastomeric concrete header. Store, mix and apply in accordance with manufacturer’s system data sheet.

Liquid components shall be identified by the following information:

Part A - Resin; Color: Clear

Part B - Activator; Color: Tan

 Accessories

 Provide necessary and related system components including MasterSeal 940 broadcast aggregate which is utilized to enhance non-slip, UV resistance and aesthetic appeal of the final installation. (Refer to installation procedures)

1. Corrosion Protection: All exterior facing structural steel surfaces shall be protected against corrosion by PPG Amercoat 137 epoxy primer. Riding surface of structural steel cover plates shall be further protected from corrosion and provide skid resistance by application of PPG Amercoat 138G non-skid epoxy top coat. Color shall be gray.
2. (Optional) Neoprene Trough and Drainage System: Areas shown on contract plans that require diversion of water shall incorporate a trough and downspout system. Neoprene trough material shall exhibit the following physical properties:

|  |  |
| --- | --- |
| PROPERTY | REQUIREMENTS |
| Fabric Type | 4 ounce polyester cloth |
| Temperature Range | - 30º F + 200º F |
| Hardness Shore A | 70 +/-5 |
| Tensile, PSI | 1000 |
| Elongation, % | 250 |
| Tear, Die C, PPI | 150 |

2.3 Fabrication

A. Expansion control system assemblies shall be fabricated in minimum three (3) foot long sections, and to suit staged construction. The entire system shall be preassembled prior to shipment to ensure proper fit prior to installation. All welds shall conform to AWS D 1.1, and welders shall be qualified in all procedures incorporated into the work.

3.0 EXECUTION

* + - 1. EXAMINATION
				1. Contractor shall examine adjacent road and bridge surfaces, and blockouts where expansion control systems will be installed to verify adjacent construction is within acceptable tolerance affecting performance of work. Proceed with installation only after unsatisfactory conditions have been corrected, and substructure geometry is agreed upon by Architect, General Contractor, and manufacturer.
			2. PREPARATION
				1. Comply with manufacturer's written instructions for storing and handling expansion control systems and materials unless more stringent requirements are indicated.
				2. Prepare substrates according to approved shop plans.
				3. Repair concrete slabs and blockouts using manufacturer's recommended repair grout of compressive strength adequate for anticipated structural loadings.
				4. Contractor shall measure joint opening, obtain adjacent deck temperature, and compare this information to the joint setting temperature table located on the approved shop plans. Contractor shall notify Architect and manufacturer of any discrepancy between actual and theoretical joint opening prior to proceeding.
			3. PROTECTION
				1. Contractor shall exercise care at all times to protect each expansion control system from damage. Contractor shall protect concrete blockouts and supporting systems from damage and construction traffic prior to installation of the expansion control systems.
				2. Remove and properly store cover plates and install temporary protection over joints where necessary if heavy construction traffic wheel loads exceed design criteria established for the expansion control system. Reinstall cover plates prior to Substantial Completion of the Work if required.
			4. INSTALLATION
				1. Each expansion control system shall be installed in strict accordance with the manufacturer’s approved shop plans and installation instructions.
				2. Care shall be taken during installation to ensure riding surface elevations are as shown on the approved shop plans, and there is no elevation differentiation between adjacent cover plates.
				3. (Optional) Water Barrier Drainage System: Provide neoprene trough where called for on contract documents or manufacturer’s shop plans. Provide drainage fittings at a maximum of 50 feet or where indicated.

End of Section