1.0 Purpose:

The purpose of this document is to ensure the structural integrity of bridges, tunnels and culverts that VTA is responsible for including the shared right of way Union Pacific Railroad (UPRR) freight tracks by the consistent application of sound inspection and infrastructure management practices. This Bridge Management Program (BMP) is critical to the prevention of bridge or bridge component failures and for the protection of vital infrastructure investments. The information within this document comply with the requirements of 49 CFR Part 237, Bridge Safety Standards (BSS), concerning bridges and other structures safety management practices.

Additional written procedures regarding bridges and tunnels are included in the AREMA Bridge Inspection Handbook and that document is part of this BMP by reference.

2.0 Scope:

2.1 Bridge Management System (BMS) - Light Rail:

All Light Rail Bridges and Structures are to be inspected biennially to assess their condition, determine if there are structural concerns, assess maintenance issues and allow for the schedule of repairs. The applicable list of Light Rail Bridge and Structures, equipment, ratings, reporting, procedures for inspections, and other applicable details are provided in Appendices A, B and C. The Bridge and Structure Management System database should be maintained and updated in conjunction with the inspection process.

The BMS database for light rail bridges and structures shall also be updated to reflect the information.

The inspections shall follow the recommended practices and guidelines as published in the current issues of the AREMA, AASHTO, Caltrans, FHWA, NHI manuals; and the APTA Guidelines and Inspection Procedure (APTA RT-FS-S-001-02 Rev 1, APTA RT-FS-S-003-02), Appendix B, as applicable for each element. The inspections shall be documented using inspection forms, photographs and other documents as applicable to ensure regulatory compliance. Each issue shall be identified as either Maintenance or Structural in nature, rated as to the severity (in accordance with Visual Condition Assessment (VCA), Appendix C), shall include proposed remedy and provide for notes as applicable. The overall condition of the structural element shall be rated as per Appendix C.

2.2 Bridge Management System - UPRR Freight Bridges and Structures along Vasona Joint Corridor:

All structures within the Vasona joint corridor are to be inspected annually to assess their condition, determine if there are structural concerns, assess maintenance issues and allow for the schedule of repairs. The applicable list of these Bridge and Structures, program reporting and rating requirements, procedures for inspections and other details are provided in Appendices D and F.

The inspections shall follow the requirements, practices, and guidelines as published in the current issues of the 49 CFR Part 213 and 237 Bridge Safety Standards, Final Rule as applicable for each element. The inspections shall be documented using inspection forms, photographs and other documents as applicable to ensure regulatory compliance. Each issue shall be identified as either Maintenance or Structural in nature, rated as to the severity (in accordance with Visual Condition Assessment (VCA), Appendix E), shall include proposed remedy and provide for notes as applicable. The overall condition of the structural element shall be rated as per Appendix E. Inspection procedures in Appendix B can be used as additional reference guide to conduct inspection of UPRR bridges and Structures as long as they are not in conflict with the requirements of 49 CFR Parts 213 and 237.

3.0 Responsibilities (All VTA Light Rail and UP Bridges and Structures):

3.1 Operations Manager – Maintenance Engineering or designee – Bridge and Structure Project Manager for the Bridge Management Program. Maintenance Engineering is responsible for managing the Bridges and Structures Program, scheduling the required inspections for UP and VTA structures, coordinating the support for the inspections, managing the inspection program, updating the BMS database as applicable, direct follow-up actions to identified issues and maintenance of inspection records.

3.2 The Superintendent of Way Power & Signal provides vehicles and staff to facilitate the inspection

3.3 Contractor and its personnel hired for evaluating and inspecting all VTA Light Rail Bridges and Structures, shall conduct the inspections, enter the information and findings into VTA's BMS database for light rail bridges, and provide final report of the findings to VTA as per contract agreement with VTA.

3.4 The Contractor and its personnel hired for evaluating and inspecting all VTA owned UP Bridges and Structures, shall conduct field inspections and provide final report of the findings to VTA within the specified time period as per contract agreement with VTA.

3.5 Bridge and Structures Program Manager (BSPM) is responsible for:

- 3.5.1 Ensuring implementation and compliance with this procedure,
- 3.5.2 Overseeing all aspects of the BMP,
- 3.5.3 Integrity of all assigned bridges, tunnels and culverts,
- 3.5.4 Consulting with a Railroad Bridge Engineer when required,
- 3.5.5 Determination of Inspector qualifications,
- 3.5.6 Correction of substandard conditions,

3.5.7 Tracking of critical deficiencies to resolution,
3.5.8 Remedial action for Emergency Conditions,
3.5.9 Prioritization of maintenance & capital program requirements,
3.5.10 Audit procedures,
3.5.11 Establish procedures to ensure that bridges are not loaded beyond their capacities,
3.5.12 Designation of qualified Railroad Bridge Engineers, Railroad Bridge Inspectors and Railroad Bridge Supervisors per 49CFR 237.57.

3.6 The Railroad Bridge Engineer (RBE) is an engineer determined by the BSPM to be competent in the field of railroad bridge engineering including design, loading, inspection, load rating, and repair. The RBE shall be a registered professional engineer in the State of California. The responsibilities for this individual include:

3.6.1 Establishing inspection procedures and frequency,
3.6.2 Consulting with the Bridge and Structures Program Manager concerning:
3.6.2.1 Correction of substandard conditions,
3.6.2.2 Interpretation of inspection reports,
3.6.2.3 Remedial action for Emergency Conditions,
3.6.2.4 Designing repairs and modifications,
3.6.2.5 Determining bridge load ratings,
3.6.2.6 Approving exceptional weight loads,
3.6.2.7 Reviewing all inspection reports,
3.6.2.8 Auditing compliance with applicable procedures and inspection frequency.

3.7 The Railroad Bridge Supervisor (RBS) is an individual, determined by the BSPM to be technically competent and experienced in railroad bridge maintenance, repair and/or construction and who has held assignments in a responsible capacity. RBS shall be registered as a Civil or Structural Engineer in the State of California with experience in bridge and structural inspections. The responsibilities of this individual include:

3.7.1 Supervising repair/maintenance of bridges, tunnels and culverts under the direction of the BSPM or RBE,
3.7.2 Inspection of material used for such repairs,
3.7.3 Knowledge of standard practices and procedures for bridge work,
3.7.4 And has the authority to restrict train movements over bridges.

3.8 The Railroad Bridge Inspector (RBI) is an individual, determined by the BSPM to be technically competent and experienced in railroad bridge inspection, who held assignments in responsible capacity supplemented by training in bridge inspection particularly concerning bridge mechanics and the importance of various defects. RBI shall be registered as a Civil or Structural Engineer in the State of California with experience in bridge and structural inspections. The responsibilities of this individual include:

3.8.1 Inspection of bridges, tunnels and culverts under the direction of the BSPM,
3.8.2 Taking of accurate field measurements,
3.8.3 Field recording of defects and substandard conditions,
3.8.4 Performing soundings or probing of underwater conditions,
3.8.5 Writing of inspection reports,
3.8.6 Immediate notification to the BSPM of unsafe conditions and taking appropriate actions to protect railroad operations,
3.8.7 And has the authority to restrict train movements over bridges.

4.0 Procedure:

4.1 Bridge Management System (BMS) - Light Rail:

4.1.1 Project Manager or designee in Maintenance Engineering prepares contract specifications, establishes and manages the contract for the inspection of light rail bridges and structures. Bridge inspections shall be done by qualified personnel per the contract agreement, shall meet industry standards, and all local, State and Federal regulatory compliance. Bridge Inspectors, Engineers and Supervisors shall be Civil and/or Structural Engineers registered in the State of California.

4.1.2 Inspector(s) shall become familiar with the existing BMS and previous conditions of structures.

4.1.3 Operations Manager – Maintenance Engineering or designee - LR Maintenance Administration prepares a schedule for inspection.

4.1.3.1 Coordinate inspections with OCC, Way Power & Signals and other departments as applicable.

4.1.3.2 Assure inspectors are supported by Way, Power and Signal (WPS) staff and, where applicable, confined-space-entry trained.

4.1.3.3 Include inspection in rail allocation meetings.

4.1.3.4 Schedule with WPS for flagmen and other assistance as required.

4.1.4 Inspect the structures in accordance with recommended practices and guidelines as published in the current issues of the AREMA and AASHTO manuals, APTA guidelines, Inspection Procedure, Appendix B, as applicable for each element; and consistent with NHI, FHWA and Caltrans.

4.1.4.1 Where possible, structures should be observed during the passage of light rail trains, such that the effects of vibration and deflection may be noted.

4.1.4.2 When the inspector finds a defect that, in his or her opinion, is of such a nature as to make traffic at a regular speed unsafe (imminent hazard), the inspector shall immediately report the condition to OCC and the Operations Manager - Light Rail Maintenance Administration. The inspector shall indicate a safe speed limit and describe the conditions that prompted the actions. An immediate written report shall be submitted to the Operations Manager - Light Rail Maintenance Administration to initiate a detailed investigation to include recommended repair.

4.1.4.3 The inspections shall be documented using inspection forms, the database, and photographs and other documents as applicable. Each issue shall be clearly described, photographed, and identified as either Maintenance or Structural in nature, and rated as to the severity in accordance with the VCA scale (Appendix C). A proposed remedy shall be provided and notes should be added where applicable. Cracks in concrete and masonry should be noted and photographed. The size and length of cracks shall be recorded with reference points established for future inspection and measurements.

4.1.5 All personnel engaged in the inspection and reporting of bridge and structure conditions shall comply with all OSHA requirements and safety requirements related to work and access on VTA right of way.

4.1.6 Inspector shall enter inspection information into the BMS database.

4.1.7 Inspector shall submit a report of the inspection results to VTA. The report shall, at a minimum, include:

4.1.7.1 All defects found that are imminent hazards or structural in nature, the description of the issue, the ratings and proposed remedy.

4.1.7.2 All defects that could contribute to future failure or structure deterioration, the description of the issue, the ratings and proposed remedy.

4.1.7.3 Defects shall be categorized as maintenance or structural.

4.1.7.4 Summary of issues found during inspection.

4.1.8 Information shall be presented to Management with the recommendations for action and repairs.

4.1.9 The Operations Manager – Maintenance Engineering or designee - Light Rail Maintenance Administration shall work with appropriate departments to establish an action plan.

4.1.10 Where remedial corrections are made, the BMS shall be updated by Maintenance Engineering to reflect actions taken.

4.2 Bridge Management - UPRR Freight Bridges and Structures along Vasona Joint Corridor:

4.2.1 Project Manager in Maintenance Engineering prepares contract specifications, establishes and manages the contract for the inspection of UPRR bridges and structures. Bridge inspections shall be done by qualified personnel per the contract agreement, shall meet industry standards, and all local, State and Federal regulatory compliance. Bridge Inspectors, Engineers and Supervisors shall be Civil and/or Structural Engineers registered in the State of California.

4.2.2 Safety Considerations

4.2.2.1 Safety is the number one priority when working on, under, or around a railroad bridge, culvert or tunnel. All personnel engaged in the inspection and reporting of bridge and structure conditions shall comply with all OSHA requirements.

4.2.2.2 Anytime inspections or other work are being performed at a railroad structure, personnel must comply with all applicable requirements, including but not limited to FRA 49CFR Part 214, Subpart B Bridge Worker Safety standards and Subpart C Roadway Worker Protection, On-Track Safety Rules and Engineering Instructions.

4.2.2.3 Any railroad personnel who discovers a deficient condition on a structure that affects the immediate safety of train operations shall report the condition to the Operations Control Center (OCC) as promptly as possible.

4.2.3 Proper communication between VTA and UPRR, shall comply with SOP 6.14 VTA Shared Corridor Communications.

4.2.4 Structure Inventory

4.2.4.1 The structures inventory list is maintained in Maintenance Engineering and overseen by the Bridge and Structure Program Manager. The inventory list includes the following items pertaining to bridges, structures and culverts, as applicable:

4.2.4.1.1 Structure Identifier – Subdivision, Milepost location and Track Identifier,

4.2.4.1.2 Location (City and State),

4.2.4.1.3 Geographic Coordinates,

4.2.4.1.4 Crossing (drainage, highway, etc.)

4.2.4.1.5 Number of tracks and sections,

4.2.4.1.6 Number of spans and span lengths,

4.2.4.1.7 Overall length,

4.2.4.1.8 Height,

4.2.4.1.9 Configuration and type(s) of construction (substructure, superstructure, deck, lining),

4.2.4.1.10 Handrails,

4.2.4.1.11 Date of last inspection,

4.2.4.1.12 Date of next scheduled inspection,

4.2.4.1.13 Comments,

4.2.4.1.14 Dates of construction and major renovations or strengthening, if known,

4.2.4.1.15 Out of service.

4.2.5 Appendix D contains a list of the UP Bridge and Structures.

4.2.6 Structure Nomenclature and Identification Protocol

4.2.6.1 Structure nomenclature provides a consistent method for identifying various types of structures and their various components. Appendix F contains examples of structure component identifications and a list of structure abbreviations. The structure identification protocol provides a consistent method to identify the location of structure components.

4.2.6.2 Milepost locations used for structure identification, as well as geographic coordinates, will be on the centerline of track at the face of the bridge backwall or tunnel portal face at the low milepost end of the structure. For bridges and tunnels, numbering or lettering will begin at the low milepost end and increase to the high milepost end. For culverts, the milepost and geographic coordinates will be at the intersection of the centerline of track and the centerline of culvert. If multiple lines of culvert exist, the first culvert centerline is used.

If a bridge or tunnel consists of multiple superstructure or lining types, a Section letter, beginning with "A", identifies each type.

Numbering for substructure units, such as abutments, bents and piers, and superstructure spans is consecutive from low milepost to high milepost for each Section, beginning at "1". Numbering longitudinally spaced components of a superstructure, such as floor beams, bracing panels, etc.

4.2.7 Structure Records

4.2.7.1 VTA shall maintain records for all new designs, ratings, repairs, modifications and inspections and available existing records for its structures per retention requirements specified herein. Records include drawings, specifications, calculations, reports, photographs, etc. If VTA acquires other rail lines in the future, it shall attempt to obtain any existing structure records from the previous owner.

4.2.7.2 Records will be kept for the life of the structure or until the structure is replaced. If a structure is part of a sale of property, the records will be transferred to the new owner, as appropriate.

4.2.7.3 All existing and new records for each structure are stored in the Maintenance Engineering Office, which is located at 101 W. Younger Street, San Jose, CA 95110. Records shall be available for inspection and reproduction by the Federal Railroad Administration (FRA).

4.2.8 Capacity of Bridges and Structures

4.2.8.1 To prevent the operation of equipment that could damage a bridge by exceeding safe stress levels in bridge components or by extending beyond the horizontal or vertical clearance limits of the bridge. Protection of bridges and bridge components from overstress is essential to the continued integrity and serviceability of the bridge. It is also essential that equipment or loads that exceed the clearance limits of a bridge not be operated owing to the potential for severe damage to the bridge.

4.2.9 Bridge Load Capacity

4.2.9.1 The designated RBE is responsible for the determination of bridge load capacities. Bridge load capacities will utilize a comparison of bridge ratings and equipment standards. Bridge and equipment ratings will utilize the Cooper load system shown in AREMA *Manual for Railway Engineering* (Manual), Chapter 15 – Steel Structures. See page 41291.

4.2.9.2 Generally, bridge ratings will be determined using the recommended practices shown in the AREMA Manual, Chapters 15 – Steel Structures, Chapter 8 –

Concrete Structures, and Chapter 7 – Timber Structures. Individual bridge ratings will be determined using one or more of the following:

4.2.9.2.1 Original design drawings,

4.2.9.2.2 Modification drawings,

4.2.9.2.3 Field measurements,

4.2.9.2.4 Inspection records,

4.2.9.2.5 And other available information.

4.2.9.3 Bridge Load Capacities, along with the methodology, basis used for the determination, date of determination and the name of the RBE making the determination are recorded and maintained in the Maintenance Engineering Office.

4.2.9.4 Bridge load capacity shall be expressed in terms of numerical values related to a standard system of bridge loads, but shall in any case be stated in terms of weight and length of individual or combined cars and locomotives.

4.2.9.5 Bridge load capacity shall be expressed in terms of both normal and maximum load conditions. Normal bridge ratings generally define the loads that can be operated on a bridge for an indefinite period without damaging the bridge.

4.2.9.6 Bridge ratings will be re-evaluated based on structural modifications made to the bridge or conditions found during inspections. An RBE will determine a new load capacity if warranted.

4.2.9.7 An RBE shall create Equipment Ratings for standard weight cars, as defined by the RBE, as well as for other common equipment.

4.2.9.8 An RBE shall determine Line Load Limits, based on the bridge ratings and equipment ratings. Line loads limits shall be issued by VTA as part of the track bulletin instructions provided to UPRR.

4.2.10 Dimensional Capacity

4.2.10.1 Measurements of bridges and tunnels with possible dimensional restrictions shall be done at intervals of no more than five years. Recorded measurements are maintained in the Maintenance Engineering Office.

4.2.10.2 Instructions regarding dimensions shall be expressed in terms of feet and inches of cross section and equipment length, in conformance with common railroad industry practice for reporting dimensions of exceptional equipment in interchange in which

height above top-of-rail is shown for each cross section measurement, followed by the width of the car or the shipment at that height.

4.2.11 Protection from overweight or over dimensional loads

4.2.11.1 The BSPM is responsible for issuance of instructions to operating and mechanical personnel regarding bridge capacities. UPRR would be responsible for following those instructions and staying within the prescribed bridge capacities. The BSPM will consult with an RBE regarding all excess weight loads. Approved movement instructions may contain conditions such as speed restrictions, restriction of traffic from adjacent tracks, or weight limitations on adjacent cars in the same train.

4.2.12 Structure Inspections

4.2.12.1 The evaluation of a bridge and/or structure requires the application of engineering principles by a person deemed competent by the BSPM.

4.2.12.2 Bridge and structure inspections shall be conducted under the direct supervision of the designated RBI, who shall be responsible for the accuracy of the results and the conformity of the inspection to the bridge management program.

4.2.12.2.1 In the event an inspection shall require more than one person for safety and/or efficiency, others are able to assist the designated inspector. The Bridge and Structures designated Inspector shall remain responsible for the results of the inspection.

4.2.12.3 Bridge and Structure Inspections shall occur at least once every calendar year, with no more than 540 days between successive inspections.

4.2.12.4 Prior to any inspection or work being done, the weekly Track Allocation meeting must be attended to obtain the necessary access permits. Track Allocation meetings are scheduled once a week. All employees working on the right-of-way will also be required to attend a four-hour safety training session. Contact the Track Allocation office for further information at least 3 weeks in advance to obtain the necessary access permit prior to any work being performed.

4.2.12.5 Inspections shall be coordinated with OCC, Way, Power & Signals and other departments as applicable.

4.2.12.6 Whenever work is being performed on the right-of-way, arrangements shall be made to have VTA personnel on-site to perform flagging and to maintain radio contact with OCC.

4.2.12.7 Inspection Reports should show at a minimum any conditions on the bridge and/or structure that might lead to a reduction in capacity, initiation of repair work, or a more detailed inspection to further characterize the condition.

4.2.12.8 Type of the inspections shall be at the discretion of the BSPM and RBE, based on the levels of detail for inspections performed at different periods, depending on the configuration and condition of the bridge. The AREMA BIH, Chapters 8(Concrete & Masonry), 9 (Steel Bridges) and 12 (Culvert Inspections), contains additional information pertinent to the specialized type of bridges and/or structures inspections.

4.2.12.8.1 Initial Inspections shall be performed and inventoried before the bridge and structure is opened to rail traffic or there is a change or update in section responsibility.

4.2.12.8.2 Routine inspections provide documentation of the existing physical and functional conditions of the structure. All changes to the inventory that have occurred since the previous inspections are also to be documented and updated. Routine Inspections shall occur at least once every calendar year, with no more than 540 days between successive inspections. Load capacity analyses are re-evaluated only if changes in structural conditions or pertinent site conditions have occurred since the previous analyses.

4.2.12.8.3 In-depth inspections shall be done as-needed, generally performed for Major or Complex bridges and structures. Additionally this inspection type is recommended when the routine inspection does not provide a condition evaluation to ascertain the safe live load capacity at the discretion of the BSPM and RBE.

4.2.12.8.4 Special (Interim) Inspections shall be scheduled by VTA to examine bridges or portions of bridges with known or suspected deficiencies. Special inspections shall focus on specific areas of a bridge where problems were previously reported or to investigate areas where problems are suspected. Special inspections are conducted until corrective actions remove critical deficiencies or until the risk is diminished.

4.2.12.8.5 Scour Inspections shall be designated by an RBE. Designations are noted in the bridge inventory by "SS". Scour Inspections shall be part of the General Inspection. Additional inspections including

soundings or probing shall be conducted if flood events or flow conditions create scour hazards or concerns.

4.2.12.8.6 Underwater Inspections shall be designated by an RBE. Designations are noted in the bridge inventory by "UW" along with the required frequency of inspection, as needed. Underwater Inspections consist of soundings, probing, diving or other procedures as specified by an RBE.

4.2.12.8.7 Emergency Inspections shall be performed whenever the bridge or structure is involved in an event which might have compromised the integrity of the bridge or structure, including flood, fire, earthquake, derailment, or other vehicular or vessel impact.

4.2.13 Review of Inspection Reports:

The BSPM or the RBE shall review all reports submitted by an inspector within 14 days of submission, unless noted for expedited review, in which case a review by an RBE shall occur within 5 days of submission. Upon completion of the review, the reviewer will add the signature of the reviewer with the date of review to the inspection record. Deficiencies noted during any type of inspection shall be noted.

4.2.14 Emergency Inspections:

An inspection performed due to an incident, such as derailment, fire, flood, earthquake, or collision impact that may have resulted in a change of condition of the structure. The procedures used and the intensity of this inspection will be determined by an RBE in direct relation to the severity of the incident. The AREMA BIH, Chapters 13 and 14, contains additional information pertinent to emergency inspections. During an emergency disaster, VTA's BSPM shall contact the designated RBE, RBI and/or RBS to perform inspections. BSPM shall coordinate Track Access thru OCC, WPS personnel support, and other resources as needed to expedite inspection process. Proper communications between VTA and UPRR, shall comply with SOP 6.14 VTA Shared Corridor Communications. Following are the required responses to various emergency conditions, unless otherwise directed by the RBE:

4.2.14.1 Accidents/Collision Impacts – Once learning of any vehicular or vessel impact to a bridge or its supports, the train dispatcher shall cease train operations over the bridge until an RBI has inspected and evaluated the bridge. Rail operations may resume, either normally or with restrictions, only after an RBI, in consultation with the BSPM or RBE, has determined that it is safe to do so.

4.2.14.2 Derailments – Following any derailment involving a bridge, the train dispatcher shall cease train operations over the bridge until an RBI has inspected and evaluated the bridge. Rail operations may resume, either normally or with restrictions, only after an RBI, in consultation with the BSPM or RBE, has determined that it is safe to do so.

4.2.14.3 Flash Floods/Floods – After receipt of a warning of flooding which might damage bridges or their approaches, the train dispatcher shall notify train crews operating on all track/bridges subject to damage from the flood. The speed of all trains shall be limited to that which will permit safe operation consistent with the potential water levels and visibility conditions.

4.2.14.4 Fires – In the event of a fire on or beneath a bridge, the train dispatcher shall cease train operations over the bridge until an RBI has inspected and evaluated the bridge. Unless it can be determined that the fire was of such a minor nature that no primary load carrying structural components or systems were affected, the RBI will consult with an RBE and the appropriate sections on the evaluation of fire damage in the AREMA MRE will be utilized.

4.2.14.5 Earthquakes – In the event of an emergency, OCC Rail Control Supervisor communicates with UP following protocols established as per SOP 6.14 VTA Shared Corridor Communications and SOP 9.15 Earthquake Procedures.

4.2.14.5.1 In case of a significant Earthquake, RBE shall conduct an inspection of VTA owned Bridges and Structures and VTA will follow the recommendation for appropriate corrective measures.

4.2.14.5.2 The Structural Engineer shall prepare an Emergency Inspection Summary report documenting locations and observation that shall be certified and provided to the VTA at the earliest opportunity.

4.2.14.5.3 Light Rail Operators shall adhere to SOP 9.15, Earthquake Procedures, for guidelines in response to a "significant" earthquake.

4.2.15 Repairs and Modifications of Structures

4.2.15.1 An RBE will design and issue all structural repairs of modifications. Structural Repairs will have either project specific plans or specifications. If necessary, plans will include instructions pertaining to movement of rail traffic or other live loads during the repair/modification process. Repairs that do not affect structural integrity or capacity may not require the involvement of an RBE or an RBS.

4.2.15.2 An RBE will supervise all Structural Repairs and Structural Modifications. The RBS will ensure that all work is accomplished in accordance with the plans and specifications.

4.2.15.3 An RBE will issue any common standards pertaining to processes or methods that materially modify the capacity of the structure.

4.2.15.4 All repairs and modifications made to a structure thru inspections or Capital projects shall follow VTA's Configuration Management Procedure (ET-CO-PR-0001) and shall be compliant with 49 FRA Part 213 and 237 requirements.

4.2.16 Program Audit

4.2.16.1 The BSPM shall audit the effectiveness of this program to ensure the validity of procedures and compliance with applicable regulations. The audit consists of an annual review of bridge inventory data, bridge inspection reports and movement restrictions on loads with exceptional weight or dimensions. The BSPM and the RBE will review the provisions of this BMP biennially to ensure the validity and effectiveness of the written program. The BSPM will keep an audit report on file summarizing the findings of the audit.

4.2.16.2 Structure inspection audit procedures

4.2.16.2.1 An RBE shall audit the effectiveness of the inspection program to ensure the timeliness of inspections, validity of bridge inspection reports, and compliance with inspection procedures & frequency. At least annually, a RBE will accompany each RBI during structure inspections to observe the procedures used and validity of the findings.

4.2.16.2.2 The RBE will submit an audit report to the BSPM for each audit.

4.2.17 Inspection Records

4.2.17.1 A hard copy of initial report of each inspection shall be provided to VTA within 21 calendar days of the completion of the field portion of the inspection.

4.2.17.1.1 The report shall include the identification of the bridge inspected, date(s) of the inspection, date the report was created, date of completion of the inspection, identification of the inspector, type of inspection performed, and indication on the report as to whether any item noted thereon requires expedited or critical review by the Railroad Bridge Engineer and any restrictions placed at the time of the inspection.

4.2.17.2 The complete final report of each inspection shall be provided to VTA within 60 days of completion of the field portion of the inspection.

4.2.17.2.1 The final report shall include the identification of the bridge inspected, date(s) of the inspection, date the report was created, date of completion of the inspection, identification of the inspector, type of inspection performed, and indication on the report as to whether any item noted thereon requires expedited or critical review by the Railroad Bridge Engineer, any restrictions placed at the time of the inspection, and the condition of all components inspected.

4.2.17.3 Inspection reports shall be reviewed by the responsible Railroad Bridge Supervisor and Railroad Bridge Engineers.

4.2.17.4 Paper records will be kept as the official bridge records. If an electronic system of records is used in the future, the system will meet the BSS requirements, as required by the FRA, at that time. An electronic version of the paper inspection report may be created to facilitate longer retention of records, and will be stored in the Maintenance Engineering Office.

5.0 Definitions and Acronyms

AREMA:

The American Railway Engineering and Maintenance of Way Association. Where used herein, AREMA MRE refers to the Manual for Railway Engineering. AREMA BIH refers to the Bridge Inspection Handbook. AREMA publishes both documents.

BRIDGE CAPACITY RATING:

A value pertaining to the ability of a bridge to carry imposed loads.

BRIDGE MODIFICATION:

A change to the configuration of a railroad bridge that affects the load capacity of the bridge.

BRIDGE RECORD:

Any document pertaining to the design, rating, inspection, repair or modification of a Railroad Bridge. This includes drawings, calculations, capacity ratings, etc.

CULVERT:

Any structure that provides for drainage through the subgrade supporting the track(s) but does not meet the definition of a Railroad Bridge.

EQUIPMENT RATING:

A value pertaining to the loading imposed on a bridge by on track equipment.

LINE LOAD LIMIT:

The weight and equipment configuration limit pertaining to a particular line segment of the railroad.

OVERHEAD BRIDGE:

Any structure passing over the track(s) constructed for the purpose of carrying railroads, highways, pedestrians, pipelines, conveyors, or other miscellaneous purposes and is supported by structural elements on one or both sides of the track(s). This category also includes signal structures when configured such that all or a portion of the structure extends over the clearance envelope above the track.

RAILROAD BRIDGE:

Any structure with a deck regardless of length, or any other below track structure with an individual span length of 10 feet or more, supporting one or more railroad tracks.

SIGNIFICANT EARTHQUAKE:

A "significant" earthquake should be understood to mean any movement of the earth's surface that is felt by employees and/or reported by the local news media as an event large enough to damage structures (SOP 9.15).

SPAN LENGTH:

The distance between center of bearings of the primary load-carrying members (girders, trusses, etc.), or the distance between spring lines of arches.

STRUCTURAL MODIFICATION:

A change to the configuration of a structure, which affects the capacity of the structure to carry imposed loads.

STRUCTURAL REPAIR:

Remediation of damage or deterioration, which has affected the structural integrity of the structure.

TUNNEL:

Any longitudinal opening through soil or rock constructed by mining, boring or cut and cover methods and through which track(s) passes.

UNDERPASS:

Any railroad Bridge over a roadway or railroad.

AASHTO: American Association of Highway Transportation Officials

APTA: American Public Transportation Association

BMS: Bridge Maintenance System - Database of VTA's Light Rail Bridges and Structures

Caltrans: California Department of Transportation

FHWA: Federal Highway Administration

NHI: National Highway Institute

OCC: Operations Control Center

OSHA: Occupational Safety and Health Administration

RSSRB: Rail Safety Systems Review Board

UPRR: Union Pacific Railroad

VCA: Visual Condition Assessment

WPS: Way, Power and Signal Department

6.0 Records:

6.1 Bridge Management System (BMS)-Light Rail:

6.1.1 All records pertaining to inspection of the Light Rail Bridges and Structures shall be maintained in the BMS database.

6.1.2 The BMS database shall be maintained in the Maintenance Engineering Share Drive.

6.2 Bridge Management - UPRR Freight Bridges and Structures along Vasona shared Right-of-Way:

6.2.1 One hardcopy set of all records pertaining to inspection of the UPRR Bridges and Structures shall be maintained at VTA's Maintenance Engineering Office by the BSPM. See additional requirements for inspection records in section 4.2.16 for UPRR Bridges and Structures.

7.0 Appendices:

7.1 Bridge Management System (BMS) - Light Rail:

A – List of Bridges and Structures

B – Inspection Procedure

C – Visual Condition Assessment Rating Schedule

7.2 Bridge Management - UPRR Freight Bridges and Structures along Vasona shared Right-of-Way:

D – List of Bridges and Structures

E – Visual Condition Assessment Rating (UPRR)

F – Sample Structure Inventory

G – Structure Identification Abbreviation

H – Bridge Capacity Rating

I – Executive Bridge Inspection Summary Report

8.0 Training Requirements:

All inspectors shall be RWP trained and, where applicable, trained for confined space entry prior to the start of inspection.

9.0 Summary of Changes:

9.1 Initial Release of Procedure, 06/04/08

9.2 Revised Bridge Management Program responsibilities and procedures

9.3 Addition of UPRR Bridge and Structure Bridge Management Program

10.0 Approval Information:

Manjit S. Khalsa — Date Signed: 5/3/17
Sr. Systems Engineer, Maintenance Engineering

George Sandoval — Date Signed: 5/3/17
Operations Manager, Light Rail Maintenance

Rufus Francis — 5/3/17
Director, System Safety and Security

David Hill — Date Signed: 5/3/17
Deputy Director, Rail Operations

Inez P. Evans — Date Signed: 5/3/17
Chief Operating Officer

5/3/2017
Date Ratified by the R.S.S.R.B.

Prepared by:	Reviewed by:	Approved by:
Erica Casillas/Manjit Khalsa	L.R.M.R.P.D. Committee, 10-Day Review Group, and R.S.S.R.B.	L.R.M.R.P.D. Committee

Appendix A – List of VTA Light Rail Bridge and Structures

Structure #		Structure Name/Type	TES Pole No.
01	37-477	Miyuki Tunnel/Tunnel	9.46A
02	37X-013	Cottle Station/Station	9.04A
03	37X-015E	Snell Station East/Station	7.95A
04	37X-015W	Snell Station West/Station	7.95A
05	37X-015	Snell Station/Station	7.95A
06	37X-012	Blossom Hill Station/Station	7.60A
07	37X-005	Blossom Hill Station Per/Bridge	7.60A
08	37X-001L	Canoas Creek Bridge/Bridge	7.56A
09	37X-001R	Canoas Creek Bridge/Bridge	7.56A
10	37X-440L	Cahalan Avenue/Bridge	7.41A
11	37X-440R	Cahalan Avenue/Bridge	7.41A
12	37C-338	Santa Teresa Blvd./Bridge	6.93A
13	37C-337	Chynoweth Avenue/Bridge	6.56A
14	37X-016	Branham Station/Station	6.14A
15	37X-008	Capitol Station/Station	5.72A
16	37C-816	Capitol Expressway/Bridge	5.72A
17	37C-809	Hillsdale Avenue/Bridge	5.50A
18	37X-002	Canoas Creek Bridge/Bridge	5.39A
19	37C-810	Carol Drive L/Bridge	5.06A
20	37C-811L	Masonic Drive/Bridge	4.96A
21	37C-811R	Masonic Drive UP/Bridge	4.96A
22	37X-009	Curtner Station/Station	4.87A
23	37X-006	Curtner Station/Bridge	4.87A
24	37C-817L	Curtner Avenue Left/Bridge	4.83A
25	37C-817R	Curtner Avenue Right/Bridge	4.83A
26	37C-812	Almaden Road /Bridge	4.29A
27	37X-003	Alma RR SEP /Bridge	4.12A
28	37C-818L	Alma Avenue/Bridge	3.98A
29	37C-818R	Alma Avenue/Bridge	3.98A
30	37X-010	Alma (Tamien) Station/Station	3.89A
31	37X-007	Alma Station/Bridge	3.87A

Structure #		Structure Name/Type	TES Pole No.
32	37-437L	Alma Station/Bridge	3.87A
33	37-437R	Alma Station/Bridge	3.87A
34	37C-813	Willow Street Viaduct/Bridge	3.70A
35	37X-011	Virginia Station/Station	3.33A
36	37-425	Route 87 Connector Lip/Bridge	3.00A
37	37C-900	Bassett Street OH/Bridge	1.09A
38	37C-901	SPRR/LRT Grade SEP/Bridge	1.09A
39	37-406	Guadalupe River/San Carlos/Bridge	2.49A
40	37C-378	Guadalupe River/Tasman/Bridge	5.34B
41	37C-213	Lafayette Street/Tasman Dr. LRT/SPRR/Bridge	5.71B
42	37C-252	San Tomas Aquino Creek/Tasman Drive/Bridge	6.14B
43	37C-253	Calabasas Creek Bridge/Box Culvert	6.91B
44		Box Culvert under W. Java Drive/Box Culvert	9.25B
45		Bridge over Route 237, E. Java Drive and Fair Oaks Avenue/Bridge	8.52B
46		Box Culvert under Mathilda Avenue/Box Culvert	10.06B
47		Large Box Culvert at Moffett Park Drive and Mathilda Avenue/Box Culvert	10.79B
48		Moffett Depressed Track Section /Retaining Wall	11.55E
49		Not applicable (~~Route 237 Underpass/Bridge~~)	
50		Evelyn Station Pedestrian Underpass/Bridge - *Structure demolished in 2015.*	13.35B
51	37-0603	Hamilton Avenue Underpass/Bridge	6.45D
52		Hamilton Station Access Structure, Elevator and Plaza/Station	6.41D
53		Hamilton Station Pedestrian Overcrossing/Bridge	6.41D
54	37C-0821	Hamilton Avenue Overcrossing/Bridge	6.41D
55	37-0258	Meridian Avenue Underpass/Bridge	4.90D
56	37C-0051	Kingman Avenue Underpass/Bridge	4.90D
57		Park Avenue Underpass /Bridge	
58		San Jose Diridon Station and Promenade/Station	3.36D
59		Diridon Tunnel (EB and WB)/Tunnel	3.23D
60		Diridon Pedestrian Tunnel Extension/Tunnel	3.23D
61		Diridon Tunnel West Channel/Tunnel	3.04DW
62		Diridon Tunnel East Channel/Tunnel	3.06DE
63		Los Gatos Creek Bridge/Bridge	2.97D

Structure #		Structure Name/Type	TES Pole No.
64		Retaining Walls #1 and #2, Hamilton Avenue	6.41D
65A		Retaining Walls #4 & #5, at north abutment of Hamilton OC	
65B		Retaining Walls #3 and #4, along Southwest Expwy	
66		Retaining Wall #5, between San Carlos Street Overhead and Park Avenue Underpass	
67		Retaining Wall No. 1 - SB 87 off-ramp at Park Avenue	2.60D
68		Retaining Wall No. 2 - San Carlos - WOZ Way and Delmas	2.60D
69		Sound Wall #1, between Winchester and Campbell Stations	
70		Sound Wall #2, between Campbell Station and Hamilton Avenue	
71A		Sound Walls #1, #2, and #3, north of Hamilton Station	
71B		Sound Walls #3 and #4, between Hamilton and Fruitdale Stations	4.93D
72		Sound Wall #5, between Fruitdale and Meridian Underpass	4.90D
73	37C-0410L	Bridge Over Coyote Creek/Bridge	5.63C
74		Baypointe LRT Station Structure/Station	9.24B
75		Great Mall/Main Aerial Station/Station	6.92C
76		Great Mall Pedestrian Overcrossing/Bridge	6.92C
77		Montague Aerial Station/Station	7.61C
78		LRT Aerial Guideway - Great Mall Parkway/Capitol Avenue/Bridge	
79		Penitentia Creek Bridge/Bridge	10.27C
80		Sound Wall at Salmar Avenue	6.69D
81		Tasman Drive /Bridge	
82		Tasman Drive /Bridge	

Appendix B – Inspection Procedures

The inspection of each structure shall follow Local, State and Federal codes and industry standards. The following publications shall be used as references for inspection of all VTA Bridges and Structures:

Code of Federal Regulations:

- 23 CFR 650, Subpart C, National Highway Bridge Inspection Standards.
- 23 CFR 650, Subpart E, National Tunnel Inspection Standards.
- 29 CFR, OSHA Standards.
- 29 CFR, OSHA Standards, Subpart T.
- 49 CFR Part 213 Track Safety Standards
- 49 CFR Part 237 Bridge Safety Standards
- 49 CFR Part 659, Rail Fixed Guideway Systems; State Safety Oversight

American Association of State Highway and Transportation Officials

- "AASHTO Manual for Maintenance Inspection of Bridges," prepared by the Highway Subcommittee on Bridges and Structures, 1970.
- AASHTO Manual for Bridge Evaluation

American National Standards Institute and American Welding Society:

- ANSI/AWS D1.1.
- ANSI/AWS D1.5.

American Railway Engineering and Maintenance Association:

- AREMA Fatigue Standards.
- AREMA Manual for Railway Engineering, Chapter 9, Part 1, Section 1.2.
- AREMA Manual for Railway Engineering, Chapter 9, Part 1, Section 1.5.

Federal Highway Administration:

- "Inspection of Fracture Critical Bridge Members"
- "Manual for Moveable Bridge Inspection"
- "Manual on Uniform Traffic Control Devices"
- "Bridge Inspector's Reference Manual"

- "Underwater Bridge Inspection Manual"
- "Highway and Rail Transit Tunnel Inspection Manual"
- "Tunnel Operations, Maintenance, Inspection, and Evaluation (TOMIE) Manual"
- "Specifications for the National Tunnel Inventory"

Transit Cooperative Research Program

- "TCRP Synthesis 23, Transportation Research Board (TRB) "Inspection Policy and Procedures for

Rail Transit Tunnels and Underground Structures.

The following items are to be inspected in detail:

1. Track (Directly Connected to Structures)
    a. The surface of the track on the structure; approaches and bridge ends.
    b. The alignment of track and its location with reference to the structure.
    c. Where track is out of line or surface. The report shall show the location and probable cause.
    d. Condition of direct fixation fasteners and track slab.
    e. Rail condition
2. Substructure
    a. Evidence of settlement at footings, columns, abutments and retaining walls.
    b. Condition of retained fill material.
    c. Evidence of spalling, cracks or corrosion.
3. Pre-stressed and Reinforced Concrete
    a. Evidence of spalling, cracks or corrosion.
    b. Observable condition of reinforcing.
    c. Observable condition of bearings.
    d. Condition of handrails.
    e. Condition of curbs.
    f. Condition of drainage channels.

4. Culverts
    a. Condition of channels.
    b. Indications of settlements.
    c. Evidence of open joints.
    d. Condition of headwalls and wingwalls.
    e. Evidence of water leaking into the embankment.
5. Retaining walls and barriers
    a. Indication of cracking or spalling.
    b. Evidence of movement or settlement.
    c. Condition of backfill material.
    d. Condition of glare screens.
6. Tunnels
    a. Condition of Underside of Roof
    b. Condition of Concrete Track Supports
    c. Condition of Walls
    d. Condition of Safety Walks
    e. Condition of Railings
    f. Condition of Utility Supports

Inspection Equipment

Tools for Cleaning - Tools for cleaning include:

- Wisk broom - used for removing loose dirt and debris
- Wire brush - used for removing loose paint and corrosion from steel elements
- Scrapers (2-inch or 50-mm) - used for removing corrosion or growth from element surfaces
- Flat-head screwdriver - used for general cleaning and probing
- Shovel - used for removing dirt and debris from bearing areas

Tools for Inspection - Tools for inspection include:

- Pocket knife - used for general duty
- Ice pick - used for surface examination of timber elements
- Hand brace and bits - used for boring suspect areas of timber elements
- Increment borer - used for internal examination of timber elements
- Chipping hammer with leather holder (16 ounce geologist's pick) used for loosening dirt and rust scale, sounding concrete, and checking for sheared or loose fasteners
- Plumb bob - used to measure vertical alignment of a superstructure or substructure element
- Tool belt with tool pouch - used for convenient holding and access of small tools
- Chain drag - used to identify areas of delamination on concrete decks
- Range pole / probe - used for probing for scour holes
- String line

Tools for Visual Aid - Tools for visual aid include:

- Binoculars - used to preview areas prior to inspection activity and for examination at distances
- Flashlight - used for illuminating dark areas
- Lighted magnifying glass (e.g., 5 power and 10 power) - used for close examination of cracks and areas prone to cracking
- Inspection mirrors - used for inspection of inaccessible areas (e.g., underside of deck joints)
- Dye penetrant - used for identifying cracks and their lengths

Tools for Measuring (shall be Calibrated) - Tools for measuring include:

- Pocket tape (6 foot rule) - used to measure defects and element and joint dimensions
- Fold-out wood carpenter tape
- 25 foot and 100 foot tape - used for measuring component dimensions
- Calipers - used for measuring the thickness of an element beyond an exposed edge
- Optical crack gauge - used for precise measurements of crack widths
- Paint film gauge - used for checking paint thickness

- Tiltmeter and protractor - used for determining tilting substructures and for measuring the angle of bearing tilt
- Thermometer - used for measuring ambient air temperature and superstructure temperature
- 4 foot carpenter's level - used for measuring deck cross-slopes and approach pavement settlement
- D-Meter (ultrasonic thickness gauge) - used for accurate measurements of steel thickness
- Electronic Distance Meter (EDM) - used for accurate measurements of span lengths and clearances when access is a problem
- Line level and string line
- Tool carrier
- Gloves

Tools for Documentation - Tools for documentation include:

- Inspection forms, clipboard, and pencil - used for record keeping for most bridges
- Field books - used for additional record keeping for complex structures
- Straight edge - used for drawing concise sketches
- Digital camera - used to provide visual documentation of the bridge site and conditions
- Chalk, keel, paint sticks, or markers - used for element and defect identification for improved organization and photo documentation
- Center punch - used for applying reference marks to steel elements for movement documentation (e.g., bearing tilt and joint openings)
- "P-K" nails - Parker Kalon masonry survey nails used for establishing a reference point necessary for movement documentation of substructures and large cracks
- Pliers

Tools for Access - Some common tools for access include:

- Ladders - used for substructures and various areas of the superstructure
- Boat - used for soundings and inspection; safety for over water work
- Rope - used to aid in climbing
- Waders - used for shallow streams

Safety and Miscellaneous Equipment - Miscellaneous equipment should include:

- "C"-clamps - used to provide a "third hand" when taking difficult measurements
- Penetrating oil - aids removal of fasteners, lock nuts, and pin caps when necessary
- Insect repellent - reduces attack by mosquitoes, ticks, and chiggers
- Wasp and hornet killer - used to eliminate nests to permit inspection
- First-aid kit - used for small cuts, snake bites, and bee stings
- Hard hat – used to protect head from falling objects and bumps
- Reflective vest – used to be more visible in right of way
- Dust masks or respirators - used to protect against inhalation in dusty condition or work around pigeon droppings
- Coveralls - used to protect clothing and skin against sharp edges while inspecting
- Life jacket - used for safety over water
- Cell phone - used to inform when arriving and leaving LRT right of way and calling in emergencies
- Toilet paper

Equipment for Special Access Requirements

- Scissor Lifts
- Cherry Picker Lifts
- Overside Inspection Vehicles

Appendix C – Condition Rating Guide (VTA Light Rail Bridges and Structures)

VCA	CONDITION	DESCRIPTION
0	FAILED	Out of service
1	"IMMINENT" FAILURE	Major deterioration or section loss present in critical structural components or obvious vertical or horizontal movement affecting structure stability. Bridge is closed to traffic but corrective action may put structure back in light service.
2	CRITICAL	Advanced deterioration of primary structural elements. Fatigue cracks in steel or shear cracks in concrete may be present or scour may have removed substructure support. Unless closely monitored it may be necessary to close the bridge until corrective action is taken.
3	SERIOUS	Loss of section, deterioration, spalling or scour have seriously affected primary structural components. Local failures are possible. Fatigue cracks in steel or shear cracks in concrete may be present.
4	POOR	Advanced section loss, deterioration, spalling or scour.
5	FAIR	All primary structural elements are sound but may have minor section loss, cracking, spalling or scour.
6	SATISFACTORY	Structural elements show some minor deterioration.
7	GOOD	Some minor problems.
8	VERY GOOD	No problems noted.
9	EXCELLENT	
NA	NOT APPLICABLE	

Appendix D - List of Bridges and Structures (UPRR Freight Tracks)

SEQUENCE	STRUCTURE TYPE	NAME/LOCATION	Milepost (MP)
UP 1	Bridge	HWY 280	MP 0.92
UP 2	Bridge	Meridian Avenue	MP 1.08
UP 3	Steel Bridge	HWY SR17	MP 2.95
UP 4	Culvert	Hacienda Culvert (approx. 500 feet south of Hacienda Avenue, near Kaiser)	MP 5.00

Appendix E – Condition Rating Guide (UPRR Freight Bridges and Structures)

VCA	CONDITION	DESCRIPTION	SAFE TRAIN OPERATION (Y OR N)
0	FAILED	Out of service	
1	"IMMINENT" FAILURE	Major deterioration or section loss present in critical structural components or obvious vertical or horizontal movement affecting structure stability. Bridge is closed to traffic but corrective action may put structure back in light service.	
2	CRITICAL	Advanced deterioration of primary structural elements. Fatigue cracks in steel or shear cracks in concrete may be present or scour may have removed substructure support. Unless closely monitored it may be necessary to close the bridge until corrective action is taken.	
3	SERIOUS	Loss of section, deterioration, spalling or scour have seriously affected primary structural components. Local failures are possible. Fatigue cracks in steel or shear cracks in concrete may be present.	
4	POOR	Advanced section loss, deterioration, spalling or scour.	
5	FAIR	All primary structural elements are sound but may have minor section loss, cracking, spalling or scour.	
6	SATISFACTORY	Structural elements show some minor deterioration.	
7	GOOD	Some minor problems.	
8	VERY GOOD	No problems noted.	
9	EXCELLENT		

NA	NOT APPLICABLE		

Appendix F - Sample Structures Inventory

Bridge ID			Location				Details														
MP	Track	Description	City/Town	Lat	Long	Crossing	Tracks	No. Sections	Overall Length (ft)	Spans	Span Length (ft)	Deck	Superstr	Substr	Max Height	Hand Rail	Last Inspection	Next Inspection	Track In service (Y/N)	Date of construction/ major renovations	Comments

Appendix G – Structure Identification Abbreviation

Abbr.	Description
Decks	
00	Open Deck
BD	Ballast Deck
T4*	Timber- 4" thick
C8*	Concrete - 8" thick
•Note -	Thickness number depends on specific location
Culverts	
CBC	Concrete Box Culvert
CMP	Corrugated Metal Pipe
SSP	Smooth Steel Pipe
RCPO	Reinforced Concrete Pipe-Oval
Superstructure	
TST	Timber Stringers
	Steel Stringers
	Steel Rolled Beams
DPG	Steel Deck Plate Girder
	Steel Through Plate Girder
	Steel Through Truss- Riveted Connections
TIP	Steel Through Truss - Pin Connections
DTR	Steel Deck Truss- Riveted Connections
DTP	Steel Deck Truss- Pin Connections
PTI	Steel Pony Truss
Pre-stressed Concrete Box Girder	
Pre-stressed Concrete Slab Girder	
RCSG	Reinforced Concrete Slab Girder
Substructure	
TPB	Timber Pile Bent SST
TFB	Timber Frame Bent RBM
SPB	Steel Pile Bent
SFB	Steel Frame Bent TPG
TPP	Timber Pile Pier TIR
SPP	Steel Pile Pier
CPB	Concrete Pile Bent
CPP	Concrete Pile Pier
CA	Mass Concrete Abutment
CP	Mass Concrete Pier PCBG
MA	Masonry Abutment PCSG
MP	Masonry Pier
CSF	Concrete Spread Footer

Appendix H – Railroad Bridge Capacity Rating (Sample)

Bridge Rating Sheet

Division:	Colorado		
Bridge Number:	8.85	Date:	10/3/2011
Section:	A	By:	RSB
Span Type:	OO-TPG	Method	AREMAMRE
Year:	1940	Basis	Design Dwgs
Span Length:	80ft.		
Flbm spacing:	10ft.		
Girder Spacing:	17ft.6in.		
Design Live Load:	E-50 w/ steam impact	TT Speed:	50 mph

E- Values
Normal

	Girder	Floorbeam	Stringer	Bearing
Moment	48		70	
Shear	53		91	
Reaction		62		85

Maximum

Moment (60)	70		102
Moment (10)	80		112
Shear (60)	90		154
Shear(10)	112		166
Reaction (60)		90	103
Reaction (10)		104	

Appendix I – Executive Bridge Inspection Summary Report (Sample)

Executive (Summary) Report

4/13/2017

Structure ID	Structure No	Structure Name/Location	Structure Type	Corridor	TES Pole No.	Last Inspection Date	Required Action Date	Future Inspection Date	Current Overall VCA	Notes/Comments
01	37-477	Miyuki Tunnel	Tunnel	Guadalupe	9.46A	6/9/2016		6/9/2018	5	Not accessible, need right-of-way, locked gate. Closest point of access is Via Del Oro Street.
02	37X-013	Cottle Station	Station	Guadalupe	9.04A	6/9/2016		6/9/2018	6	
03	37X-015E	Snell Station East	Station	Guadalupe	7.95A	6/9/2016		6/9/2018	7	Staircase with elevator and escalator, on East side of station.
04	37X-015W	Snell Station West	Station	Guadalupe	7.95A	6/9/2016		6/9/2018	7	Staircase, on West side of station.
05	37X-015	Snell Station	Station	Guadalupe	7.95A	6/9/2016		6/9/2018	5	Station with staircase, elevator, and escalator at center.
06	37X-012	Blossom Hill Station	Station	Guadalupe	7.60A	6/9/2016		6/9/2018	6	
07	37X-005	Blossom Hill Station Per UC (LRT)	Bridge	Guadalupe	7.60A	6/9/2016		6/9/2018	7	
08	37X-001L	Canoas Creek Bridge (LRT)	Bridge	Guadalupe	7.56A	6/9/2016		6/9/2018	6	Creek crosses north of Blossom Hill Station near Chesbro Ave.; closest point of access at NW corner of park-and-ride lot.
09	37X-001R	Canoas Creek Bridge (LRT)	Bridge	Guadalupe	7.56A	6/9/2016		6/9/2018	7	Creek crosses north of Blossom Hill Station near Chesbro Ave.; closest point of access at NW corner of park-and-ride lot.
10	37X-440L	Cahalan Avenue UC (LRT)	Bridge	Guadalupe	7.41A	6/16/2016		6/16/2018	7	Not Accessible, need right-of-way, locked gate at Cahalan.
11	37X-440R	Cahalan Avenue UC (LRT)	Bridge	Guadalupe	7.41A	6/16/2016		6/16/2018	7	Not Accessible, need right-of-way, locked gate at Cahalan.
12	37C-338	Santa Teresa Blvd. UP (LRT)	Bridge	Guadalupe	6.93A	6/16/2016		6/16/2018	7	LRT cross under Hwy 85, then up to run along center of Hwy 85; Not accessible, need right-of-way.
13	37C-337	Chynoweth Avenue UP (LRT)	Bridge	Guadalupe	6.56A	6/16/2016		6/16/2018	7	LRT cross under Hwy 87S, then up to run along center of Hwy 87; Not accessible, need right-of-way.

Page 1 of 5

Legend

0 - Failed Condition
1 - "Imminent" Failure Condition
2 - Critical Condition
3 - Serious Condition
4 - Poor Condition
5 - Fair Condition
6 - Satisfactory Condition
7 - Good Condition
8 - Very Good Condition
9 - Excellent Condition
NA - Not Applicable