

B.C. MINISTRY OF TRANSPORTATION

Maintenance Specification Chapter 6-500

BRIDGE DECK MAINTENANCE

1. OBJECTIVE

To provide safe, uniform, smooth, stable and durable surfaces on Bridge Decks and to maximize the functional life of the structure.

2. GENERAL PERFORMANCE SPECIFICATIONS

2.1 Routine Maintenance Services

The Contractor must complete temporary repairs to Bridge Deck Systems.

2.2 Quantified Maintenance Services

The Contractor must perform permanent repairs to deteriorated concrete, asphalt and timber Bridge Deck systems, including but not limited to concrete restoration, concrete crack sealing, timber plank replacement or replacement of complete or major portions of timber Decks with or without cross-ties.

3. DETAILED PERFORMANCE SPECIFICATIONS

3.1 Routine Maintenance Services

The Contractor must:

- a) complete temporary repairs to Bridge Deck Systems in accordance with Section B of the Introduction of these Maintenance Specifications and the manufacturer's specifications; and
- b) restore Bridge Deck systems to a safe, durable, even and free-draining condition and that is securely fastened or bonded to the support structure.

3.1.1 Performance Time Frames

The following table establishes the maximum time from the time the deficiency was detected by or reported to the Contractor, within which the Contractor must complete the repair of the following deficiencies:

Deck Deficiency	Summer Highway Classification			
	1&2	3&4	5,6 &7	8
a) Pot-holes in concrete and asphalt Decks - Travelled Lane - remainder of Deck	4 h 2 d	6 h 3 d	24 h 5 d	16 d 30 d
b) loose, broken or rotted timber Deck planks - Travelled Lane - remainder of Deck	4 h 2 d	6 h 3 d	24 h 5 d	16 d 30 d
c) loose sections, broken welds on steel Decks - Travelled Lane - remainder of Deck	4 h 2 d	6 h 3 d	24 h 5 d	16 d 30 d
d) welding, repair, and tightening of steel Deck systems	7 d	15 d	2 m	6 m

Legend

h - hours

d – days

m – months

3.2 Quantified Maintenance Services

The Contractor must:

- a) complete permanent repairs to the Bridge Deck systems in accordance with Section B of the Introduction to these Maintenance Specifications and the manufacturer’s specifications; and

- b) restore the Bridge Deck Systems to the following specifications:
 - i) smooth and safe Wearing Surface;
 - ii) repaired area is not to be restricted to visibly deteriorated area;
 - iii) concrete Deck repairs are to be sound, durable and well bonded to the prepared surface;
 - iv) concrete patch finish is to be tined or broomed;
 - v) concrete Bridge Deck cracks sealed to a minimum depth of 6 mm;
 - vi) patch or crack repair is to match existing Deck profile;
 - vii) timber Deck repair is to be structurally sound, tight-fitting and securely fastened; and
 - viii) timber planks replaced when wear or deterioration exceeds 25% of cross-section.
- c) repair or replace asphalt Wearing Surfaces in accordance with the Maintenance Specification for *Highway Pavement Patching and Crack Sealing*, with credit for such work under the Maintenance Specification for *Highway Pavement Patching and Crack Sealing*. Where the intent of the overlay is to provide a waterproofing layer, a pre-fabricated membrane must be applied first.

3.2.1 Performance Time Frames

The Contractor must:

- a) complete the repair of the deficiencies within 6 months from the time the deficiency was detected by or reported to the Contractor; and

- b) apply linseed oil/mineral spirit in accordance with the following frequencies:
 - i) first re-application – one-year-old concrete surface treatment;
 - ii) second re-application – two-year-old concrete surface treatment;
 - iii) third re-application – four-year-old concrete surface treatment; and
 - iv) fourth re-application – six-year-old concrete surface treatment;
- c) The Contractor must plan to perform all identified Bridge Deck repairs within the Contract Year to the limit of the identified quantities. Where identified work exceeds the available quantities in any Contract Year the Contractor must ensure identified repairs are carried out in order of priority to ensure safety and to protect the infrastructure.

3.3 Materials

The Contractor must:

- a) refer to Section B of the Introduction to these Maintenance Specifications;
- b) use timber Deck materials in accordance with the following:
 - i) cross-ties must be number 1 or better grade, S2S Douglas Fir, cross-ties must be a minimum of 150 mm X 150 mm (6 inch by 6 inch) by the full width the Bridge Deck. Size tolerance is plus or minus 3 mm and maximum Wane allowed must be 10 mm on any surface and cross-ties must be preservative-treated;
 - ii) laminated Decking material must be preservative-treated;
 - iii) re-Decking planks must be of number 1 grade and Wane free, SIS2E, Heart-Side surfaced, 100 mm X 250 mm (4 inch by 10 inch) Douglas Fir, in minimum 4.9 metre (16 foot) lengths laid Heart-Side down;

- iv) all fasteners must be hot-dip Galvanized;
- v) Bridge railing and Bridge post material replaced during timber re-Decking must be in accordance with the Maintenance Specification for *Bridge Railing Maintenance*, with no credit for such work under the Maintenance Specification for *Bridge Railing Maintenance*;
- vi) Ekki Wood, where specified for use by the Province, is normally ordered by actual dimensions and must be in accordance with the following requirements:
 - 1) minimum modulus of rupture in static bending must be 150 MPa;
 - 2) minimum crushing strength will be 70 MPa;
 - 3) timbers must be free of Heartwood, Sapwood, and Wane except members larger than 350 mm by 350 mm which may contain Boxed Heartwood;
 - 4) sound, tight and well-spaced knots not larger than 50 mm are permitted at a maximum of one knot per linear metre of board length;
 - 5) maximum Crook must be 25 mm. Surface checks and Splits must have a maximum length of 150 mm. Slope of Grain will be 1:10 maximum;
 - (6) size tolerance must be plus or minus 3 mm; and
 - (7) Galvanized lag bolts must be used on Ekki Wood Decking;

4. WARRANTY

The Contractor warrants all Bridge Deck maintenance against defects for a period of 365 days from the completion of those Maintenance Services. The Contractor must rectify all defects covered by this warranty and all other ancillary work performed under other Maintenance Specifications, without credit for such work, within 1 month of detection by or notification to the Contractor by the Ministry.

B.C. MINISTRY OF TRANSPORTATION

Maintenance Specification Chapter 6-510

BRIDGE AND STRUCTURE CLEANING

1. OBJECTIVE

To preserve the Bridges and structures; and to remove dirt, Debris, and deleterious materials that are unsafe or have the potential to become unsafe for Highway Users.

2. GENERAL PERFORMANCE SPECIFICATIONS

2.1 Routine Maintenance Services

The Contractor must clean Bridges, structures, and associated components.

2.2 Quantified Maintenance Services

Not applicable to this Maintenance Specification.

3. DETAILED PERFORMANCE SPECIFICATIONS

3.1 Routine Maintenance Services

The Contractor must:

- a) clean all surfaces (horizontal and vertical) on Bridges, structures and associated components;
- b) clean railings and Truss members to a minimum height of 3 metres above the Deck surface;
- c) ensure that cleaning of Underpasses, Overpasses, Flyovers and Overheads is performed without damage to property or cause injury to Highway Users; and

Note: The Contractor must not perform Bridge and structure cleaning when temperatures are 0 degrees celsius or less, or when such temperatures are anticipated within 24 hours.

3.1.1 Performance Time Frames

The Contractor must:

- a) clean all Bridges, structures and associated components in the spring of each year when reasonable assessment indicates no further Winter Abrasives or chemicals will be applied and within the earliest allowable environmental window, as specified by the appropriate environmental agencies, or by June 30th of each year, whichever comes first;
- b) comply with the following table which establishes the maximum time, from the time dirt, Debris, and deleterious materials that are unsafe or have the potential to become unsafe for Highway Users are detected by or reported to the Contractor, within which the Contractor must complete the cleaning to the following Bridge decks and sidewalks:

Deck and Sidewalk Locations	Time to complete
(i) Fraser River crossings (Oak Street to Port Mann) Lions Gate Bridge Second Narrows Bridge	30 d
(ii) Urban Freeways except as described in (i)	90 d
(iii) Urban Highways except as described in (i) and (ii)	6 m
(iv) all other Highways	1 y

Legend

- d -days
- m – months
- y - years

- c) immediately clean structures when conditions are of an urgent nature such as, but not limited to, storm events, Debris accumulation and/or accidents; and
- d) clean and remove foreign objects from any surfaces where free drainage of the surface is impaired or cause moisture retention on surfaces, within 14 days from the time the deficiency was detected by or reported to the Contractor.

3.2 Quantified Maintenance Services

Not applicable to this Maintenance Specification.

3.3 Materials

Not applicable to this Maintenance Specification.

4. WARRANTY

Not applicable to this Maintenance Specification.

B.C. MINISTRY OF TRANSPORTATION

Maintenance Specification Chapter 6-520

BRIDGE DRAIN AND FLUME MAINTENANCE

1. OBJECTIVE

To provide effective drainage that carries water away as quickly as possible from Bridge Decks, Substructures and Foundations.

2. GENERAL PERFORMANCE SPECIFICATIONS

2.1 Routine Maintenance Services

The Contractor must repair and replace, Bridge Drains and Flumes and related components that have deteriorated to a condition that is unsafe or has the potential to become unsafe for Highway Users; and to prevent further deterioration of the Bridge structure.

2.2 Quantified Maintenance Services

Not applicable to this Maintenance Specification.

3. DETAILED PERFORMANCE SPECIFICATIONS

3.1 Routine Maintenance Services

The Contractor must:

- a) perform Bridge Drain and Flume maintenance in accordance with Section B1 of the Introduction;
- b) remove trapped or Ponding water to prevent damage to Bridge Decks, Bearings and Substructures;
- c) clear catchment areas that have become clogged;
- d) maintain Flumes to carry water from drain pipes down Fill Slopes and away from Bridge Abutment Fills and Wing Walls;
- e) ensure that steel grills are securely anchored; and
- f) clear, repair or replace all grills, Drain pipes, Flumes and funnels that are clogged, rusted, damaged, separated or missing.

3.1.1 Performance Time Frames

The Contractor must:

- a) complete cleaning and unplugging of any clogged steel grill or Drain pipe that causes Ponding on Bridge Decks within a Maximum Response Time of one hour from the time the deficiency was detected by or reported to the Contractor;
- b) complete unplugging of any grills, Drain pipes or Flumes that are plugged, but do not cause Ponding on Bridge Decks, within 14 days from the time the deficiency was detected by or reported to the Contractor;
- c) inspect Drains and Flumes monthly, or more frequently if required, to identify drainage problems in areas that historically have frequently plugged drains; and
- d) complete repair or replacement of damaged or missing grills, Drain pipes or Flumes within 14 days from the time the deficiency was detected by or reported to the Contractor, or commence immediate repairs or replacements when the deficiency is detected by or reported to the Contractor if they are unsafe or have the potential to become unsafe.

3.2 Quantified Maintenance Services

Not applicable to this Maintenance Specification.

3.2.1 Performance Time Frames

Not applicable to this Maintenance Specification.

3.3 Materials

Refer to Section B1 of the Introduction to these Maintenance Specifications.

4. WARRANTY

Not applicable to this Maintenance Specification.

B.C. MINISTRY OF TRANSPORTATION

Maintenance Specification Chapter 6-530

BRIDGE JOINT MAINTENANCE

1. OBJECTIVE

To provide a safe, smooth and stable condition for Highway Users and to maximize the functional life of the Bridge.

2. GENERAL PERFORMANCE SPECIFICATIONS

2.1 Routine Maintenance Services

The Contractor must maintain, repair or re-seal Bridge Joints and Bridge Joint Armours that are unsafe or have the potential to become unsafe.

2.2 Quantified Maintenance Services

The Contractor must replace full or sectional lengths of Bridge Joints, seals and Bridge Joint Armours that are unsafe or have the potential to become unsafe; or that would accelerate the deterioration of elements such as Bearings, Bearing seats or Ballast Walls.

3. DETAILED PERFORMANCE SPECIFICATIONS

3.1 Routine Maintenance Services

The Contractor must:

- a) re-seal and repair components of Bridge Joints and Bridge Joint Armours in accordance with Section B1 of the Introduction to these Maintenance Specifications;
- b) repair or re-seal Bridge Joints that are mis-aligned, cracked, worn, shrivelled, leaking, separated from joint walls or abraded;
- c) repair joint Anchor Bolts that are damaged, rusted, loose or missing;
- d) repair Armour that is bent, gouged, loose, separated or missing from the concrete Deck; and
- e) repair steel Finger Joints and Sliding Plate Joints that are loose, cracked, have broken welds or have missing components.

3.1.1 Performance Time Frames

The Contractor must:

- a) commence maintenance and repairs to Bridge Joints, Bridge Joint Armourments and joint Anchor Bolts that are unsafe or have the potential to become unsafe immediately, from the time the deficiency was detected by or reported to the Contractor; and
- b) complete all maintenance and repairs to Bridge Joints, Bridge Joint Armourments and joint Anchor Bolts which have the potential to reduce the functional life of the structure within the following times:

	Highway Classification				
	1 & 2	3	4	5	6 & 7
a) repair damaged Bridge Joint components	2 m	90 d	6 m	6 m	6 m
b) repair concrete and armour	4 m	6 m	6 m	6 m	6 m

Legend

d - days

m - months

3.2 Quantified Maintenance Services

The Contractor must replace Bridge Joints, seals and Bridge Joint Armourments in accordance with Section B1 of the Introduction to these Maintenance Specifications, or the manufacturer's specifications, or the Bridge Structural Engineer's design, as applicable.

Notes:

1. The Contractor will not be required to perform complete replacement of Finger Joints under this Maintenance Specification.

2. If it is estimated by the Contractor and confirmed by the Province that, at any particular time, on any particular Bridge, the cost to replace Bridge Joints, seals or Bridge Joint Armours exceeds \$35,000, refer to Section G of the Introduction, unless it is mutually agreed to between the Province and the Contractor to continue to perform the work as Quantified Maintenance Services.
3.
 - The area of strip Bridge Joint seals will be determined by using the maximum rated gap according to the manufacturer's specifications, and multiplying that width by the length of seal installed;
 - The area of compression Bridge Joint seals will be determined by using the nominal width of uncompressed seal and multiplying that width by the length of seal installed;
 - The area of poured-in-place Bridge Joint seals will be determined by using the nominal width of Bridge Joint gap as measured at the time of placement and multiplying that width by the length of Bridge Joint filled.

3.2.1 Performance Time Frames

- a) The following table establishes the maximum time from the time the deficiency was detected by or reported to the Contractor, within which the Contractor must complete the replacement of Bridge joint seals:

Bridge Joint Seal Replacement	Summer Highway Classification	
	1 & 2	3,4,5,6,7 & 8
	4 m	6 m

Legend

m - months

- b) The Contractor must plan to perform all identified Bridge Joint replacements within the Contract Year to the limit of the identified quantities. Where identified work exceeds the available quantities in any Contract Year the Contractor must ensure identified repairs are carried out in order of priority to ensure safety and to protect the infrastructure

3.3 Materials

Refer to Section B1 of the Introduction to these Maintenance Specifications, or the manufacturer's specifications, or the Bridge Structural Engineer's design, as applicable.

4. WARRANTY

The Contractor warrants all Bridge Joint replacements against defects for a period of 365 days from the completion of those Maintenance Services. The Contractor must rectify all defects covered by this warranty and all other ancillary work performed under other Maintenance Specifications, without credit for such work, within 1 month of detection by or notification to the Contractor by the Ministry.

B.C. MINISTRY OF TRANSPORTATION

Maintenance Specification Chapter 6-540

BRIDGE BEARING MAINTENANCE

1. OBJECTIVE

To ensure that Superstructure loads are properly transmitted and distributed to the Substructure and that the Superstructure is free to undergo necessary movements without developing damaging stresses that may limit the functional life of the Bridge.

2. GENERAL PERFORMANCE SPECIFICATIONS

2.1 Routine Maintenance Services

The Contractor must clean, lubricate, re-align, re-Grout and repair Bridge Bearings.

2.2 Quantified Maintenance Services

The Contractor must replace entire Bridge Bearings and associated components that are unsafe or have the potential to be unsafe or have deteriorated to the condition where maintenance and repair will not restore the original design function of the particular Bridge Bearing, as determined by the Bridge Structural Engineer.

3. DETAILED PERFORMANCE SPECIFICATIONS

3.1 Routine Maintenance Services

The Contractor must:

- a) clean, lubricate, re-align, re-Grout and repair Bridge Bearings in accordance with the manufacturer's specifications or original design specifications;
- b) maintain and clean all Bridge Bearings and associated components that are rusty, mis-aligned, or are covered with Winter Abrasives, dirt or Debris;
- c) repair all pads that are damaged, crushed, cracked, split, bulging or torn;
- d) repair Anchor Bolts and Pins that are damaged or missing; and

- e) repair concrete pads and Bearing areas that are cracked or spalled.

3.1.1 Performance Time Frames

The Contractor must:

- a) immediately start repairs on Bridge Bearings that are unsafe or have the potential to become unsafe, as determined by a Bridge Structural Engineer;
- b) complete re-aligning and repairing Bearings, repairing or replacing Anchor Bolts and re-Grouting concrete pads and Bearing areas within 6 months from the time the deficiency was detected by or reported to the Contractor; and
- c) lubricate Bearings once annually or in accordance with the manufacturer's recommendation.

3.2 Quantified Maintenance Services

The Contractor must:

- a) replace deteriorated Bearings and associated components with a replacement Bearing as originally designed or as designed by the Bridge Structural Engineer;
- b) use an installation and jacking procedure, prepared by a Professional Engineer retained by the Contractor, and approved in writing by the Province;

Note: The Contractor will not be required to replace Bridge Bearings where the costs, including all associated components, Bridge jacking, engineering and traffic control, exceed \$35,000 for any particular Bridge Bearing, as calculated by the Bridge Structural Engineer unless mutually agreed by the Contractor and the Province. If the cost is \$35,000 or less, the Contractor and the Province will negotiate a price for the work to the limit of the Quantified Provisional Sum identified for such work within the Contract Year and the Contractor must complete such work in accordance with this Maintenance Specification.

3.2.1 Performance Time Frames

The Contractor and the Province will negotiate the time frames for each Bridge Bearing replacement.

3.3 Materials

Refer to Section B of the Introduction to these Maintenance Specifications.

4. WARRANTY

The Contractor warrants all Bridge Bearing replacements against defects for a period of 365 days from the completion of those Maintenance Services. The Contractor must rectify all defects covered by this warranty and all other ancillary work performed under other Maintenance Specifications, without credit for such work, within 1 month of detection by or notification to the Contractor by the Ministry.

B.C. MINISTRY OF TRANSPORTATION

Maintenance Specification Chapter 6-560

BAILEY AND ACROW BRIDGE MAINTENANCE

1. OBJECTIVE

To ensure the safety of Highway Users and to maintain the structural integrity and a sufficient load-carrying capacity for the intended use.

2. GENERAL PERFORMANCE SPECIFICATIONS

2.1 Routine Maintenance Services

The Contractor must maintain and store Emergency Bailey and Acrow bridging inventory.

2.2 Quantified Maintenance Services

Not applicable to this Maintenance Specification.

3. DETAILED PERFORMANCE SPECIFICATIONS

3.1 Routine Maintenance Services

The Contractor must:

- a) maintain Bailey and Acrow Bridges in accordance with Section B1 of the Introduction to these Maintenance Specifications;
- b) maintain, repair or replace all damaged or deteriorated Bailey and Acrow components;
- c) check and tighten Sway Braces, Transom Clamps, and Pins in accordance with the manufacturer's specifications; and
- d) perform welding repairs only with the prior written approval of the Province.

3.1.1 Performance Time Frames

The Contractor must:

- a) immediately notify the Province of any incidents of damage and report any indications of potential risk of structural failure in order that a Bridge Structural Engineer may conduct an assessment;
- b) if the Bridge Structural Engineer determines that there is a risk of structural failure under loading, immediately, as directed in writing by the Province, take the following actions:
 - i) restrict allowable loading of the Bridge;
 - ii) close the Bridge to all vehicular traffic; or
 - iii) close the Bridge to all use;
- c) within 48 hours, from the time the deficiency was detected by or reported to the Contractor, repair or replace any deficient components;
- d) notwithstanding 3.1.1 c), where any component is damaged or deteriorated, but still allows the Bridge to remain structurally sound without a reduction in the load-carrying capacity and to remain safe for Highway Users, as determined by a Bridge Structural Engineer, the components must be repaired or replaced by the Contractor within two months from the time the deficiency was detected by or reported to the Contractor;
- e) repair, replace and/or tighten Sway Braces, Transom Clamps, End Posts, Panel Pins or bolts within one day, from the time the deficiency was detected by or reported to the Contractor;
- f) replace or tighten any damaged, missing or loose bolts or Pins within two hours from the time the deficiency was detected by or reported to the Contractor; and
- g) tighten Sway Braces, Transom Clamps, and bolts annually.

3.2 Quantified Maintenance Services

Not applicable to this Maintenance Specification.

3.2.1 Performance Time Frames

Not applicable to this Maintenance Specification.

3.3 Materials

The Contractor must:

- a) provide Panels of the same steel section and steel grade as the Panels on the existing Bailey or Acrow Bridge. If an existing Bailey Bridge contains Panels of differing steel section and/or steel grade, then replacement Panels must be at least equal to the strength of the damaged Panel as indicated on the attached list of “Bailey Panel Types”;
- b) ensure Bailey BB1 “I” section Panels and American BB1 channel section Panels are not used as a replacement component in any assembled structure;
- c) refer to the Appendix to this Maintenance Specification for a list of acceptable Bailey Panel types; and
- d) refer to section B of the Introduction of these Maintenance Specifications for all other materials.

4. WARRANTY

Not applicable to this Maintenance Specification.

BAILEY/ACROW PANEL TYPES

- (i) - Bailey (BB1) with "I" – section verticals and diagonals.
 - Production pre-war to approximately 1979? by two manufacturers.
 - Earliest panels have smaller 6" x 6" mid-panel Gusset plates vs. more common 9" x 9" plates. Post 1970 panels have reinforcements at sway brace slots to improve fatigue resistance. Some panels TSBB1 circa 1970 had built-in Transom Clamps.
 - Strength: - steel grade 50C yield 51.5 ksi
 - allowable single-storey shear 33.6 kips

- (ii) - Bailey (BB1) Wartime AMERICAN Panels
 - These panels have channel-section verticals and diagonals. Steel members may have "U.S. Steel" rolling stamps or "Carnegie U.S.A."
 - The chord channels are 4" x 1 3/4", which are different than all other Bailey Panels which have 4" x 2" chord channels.
 - Strength data is unavailable. They are assumed to be as strong as the "I" section panels.

- (iii) - Bailey MJBB1 Super Panel
 - circa 1966
 - chords 4" x 2" channel
 - diagonals/verticals 3" x 1 1/2" channel
 - strength: - steel grade 50C yield 51.5 ksi
 - allowable single-storey shear 45 kips

Note: The "super" does not designate high strength steel; it merely designates that it is not a "I" section panel.

- (iv) - Bailey MJBB1001 Superlife Panels
 - circa 1970
 - same as MJBB1 but with improved fatigue details.
 - strength: - steel grade 50C yield 51.5 ksi
 - allowable single-storey shear 45 kips

- (v) - Bailey TSBB475 - Shear panels
 - 1970 to 1976?
 - Bailey TSBB1 - Low strength
 - circa 1979
 - Tubular verticals and diagonals; otherwise same as BB1
 - Strength: - steel grade 50C yield 51.5 ksi
 - allowable single-storey shear 54 kips

- (vi) - Bailey TSBB1 High strength
 - after 1980 or 1982?
 - identical to low-strength model - only way to distinguish is if panels/chords were marked or if a paper trail exists
 - Strength: - steel grade 55C yield 65 ksi
 - allowable single-storey shear 54 kips

- (vii) - Compact Bailey
 - These panels come in standard and high shear strength models. Transoms are located adjacent to verticals. No Rakers are used. Chord reinforcing comes in light and heavy sizes and need not be placed on all Truss lines.
 - Strength: - steel grade 55C yield 65 ksi
 - allowable single-storey shear 50 kips standard

- (viii) - Acrow Series 100 or 300
 - These panels are unique. Transoms are located 2 per bay inside the diamonds. Rakers are used. Panel height is traditional 5 feet.
 - Strength: - steel grade 55C yield 65 ksi
 - allowable single-storey shear 56 kips

- (ix) - Acrow Series 700
 - similar to series 100 except panel height is 7.5 feet
 - Chord reinforcing comes in light and heavy sizes and need not be placed on all truss lines. As of December 1994, no series 700 exists in Ministry stock.

- (x) - Universal Bridging
 - Similar to Compact Bailey except panel height is 8 feet. No Ministry stock as of December 1994.

Note: BB.....Bailey Bridging
TS.....“Thomas Storey Ltd.”
MJ.....“Mabey & Johnson Ltd.”

B.C. MINISTRY OF TRANSPORTATION

Maintenance Specification Chapter 6-570

MINOR PAINTING OF BRIDGE STRUCTURES

1. OBJECTIVE

To prevent corrosion in steel components and rot in timber components of Bridge structures, and to present a neat and tidy appearance.

2. GENERAL PERFORMANCE SPECIFICATIONS

2.1 Routine Maintenance Services

Not applicable to this Maintenance Specification.

2.2 Quantified Maintenance Services

The Contractor must maintain previously coated surfaces or apply new coated surfaces to Bridge structures and associated components.

3. DETAILED PERFORMANCE SPECIFICATIONS

3.1 Routine Maintenance Services

Not applicable to this Maintenance Specification.

3.1.1 Performance Time Frames

Not applicable to this Maintenance Specification.

3.2 Quantified Maintenance Services

The Contractor must:

- a) perform minor painting of Bridge structures and associated components in accordance with Section B1 of the Introduction to these Maintenance Specifications or the manufacturer's specifications;
- b) prepare and coat all surfaces of Bridge structures and steel rail systems to a minimum level of SSPC SP6, where the coating system is deteriorated, broken or damaged and the steel is corroding and rust is apparent; and

- c) prepare and coat surfaces of timber rail systems, where the coating system is deteriorated, broken or damaged.

3.2.1 Performance Time Frames

The Contractor must plan to perform all identified minor painting of Bridge structures within the Contract Year to the limit of the identified quantities. Where identified work exceeds the available quantities in any Contract Year the Contractor must ensure identified repairs are carried out in order of priority to ensure safety and to protect the infrastructure.

3.3 Materials

The Contractor must supply and use the same type and quality of material as on the existing structure or an alternate material as proposed by the Contractor and approved in writing by the Province.

4. WARRANTY

The Contractor warrants all minor painting of Bridge structures against defects for a period of 365 days from the completion of those Maintenance Services. The Contractor must rectify all defects covered by this warranty and all other ancillary work performed under other Maintenance Specifications, without credit for such work, within 1 month of detection by or notification to the Contractor by the Ministry.

B.C. MINISTRY OF TRANSPORTATION

Maintenance Specification Chapter 6-600

CONCRETE STRUCTURE MAINTENANCE

1. OBJECTIVE

To restore and maintain the integrity and durability of concrete structures; to ensure the safety of Highway Users; and to maximize the functional life of the structures.

2. GENERAL PERFORMANCE SPECIFICATIONS

2.1 Routine Maintenance Services

Not applicable to this Maintenance Specification.

2.2 Quantified Maintenance Services

The Contractor must maintain and repair concrete structures and associated components.

3. DETAILED PERFORMANCE SPECIFICATIONS

3.1 Routine Maintenance Services

Not applicable to this Maintenance Specification.

3.2 Quantified Maintenance Services

The Contractor must:

- a) maintain and repair concrete structures in accordance with Section B1 of the Introduction to these Maintenance Specifications or in accordance with the manufacturer's specifications;
- b) perform all concrete repairs in a manner that ensures a sound, durable, and well-bonded patch to the prepared surface;
- c) **c)** remove all deteriorated concrete at the repair site;
- d) finish concrete surfaces to match the adjacent finished concrete surface profiles;

- e) not allow tolerances or deviations of concrete to exceed the following limits:
 - i) Deck surface ± 3mm
 - ii) patches on other surfaces ± 5 mm
 - iii) cross-sectional dimensions ± 25 mm
 - iv) cover to Reinforcing Steel minimum 50 mm
 - v) separation from other reinforcing minimum 25 mm

Note: The above deviations are allowable only if they do not prevent the required fit of structural members;

- f) seal non-structural cracks;
- g) repair structural cracks by pressure injection of an epoxy material in accordance with the manufacturer's specifications;
- h) remove excess epoxy to match existing surface profile; and
- i) perform crack sealing of concrete wearing surfaces in accordance with the Maintenance Specification for *Bridge Deck Maintenance*, with credit for such work under the Maintenance Specification for *Bridge Deck Maintenance*.

Note: If it is estimated by the Contractor and confirmed by the Province that at any particular time, at any particular Bridge, the cost of maintaining or repairing concrete structures or associated components exceeds \$35,000, refer to Section G of the Introduction to these Maintenance Specifications; unless it is mutually agreed to between the Province and the Contractor to continue to perform the work as Quantified Maintenance Services.

3.2.1 Performance Time Frames

The Contractor must:

- a) notify the Province immediately, from the time the deterioration or damage to the concrete structure was detected by or reported to the Contractor;

- b) respond immediately if the Bridge Structural Engineer determines that there is risk of structural failure under loading, by doing one of the following, as approved in writing by the Province:
 - (i) restrict allowable loading on the structure;
 - (ii) close the structure to all vehicular traffic;
 - (iii) close the structure to all use;
 - (iv) start repairs immediately as instructed by the Bridge Structural Engineer;
 - (v) complete repairs within three months, or within a time frame that is appropriate to the nature and urgency of the repair as determined by the Bridge Structural Engineer;
- c)
 - c) **complete all other** concrete repairs within 6 months, from the time the deficiency was detected by or reported to the Contractor;
 - d) perform epoxy injection within 6 months, from the time the deficiency was detected by or reported to the Contractor; and
 - e) plan to perform all identified concrete structure repairs within the Contract Year to the limit of the identified quantities. Where identified work exceeds the available quantities in any Contract Year the Contractor must ensure identified repairs are carried out in order of priority to ensure safety and to protect the infrastructure.

3.3 Materials

The Contractor must:

- a) supply and use materials of the same type and quality as the existing material or refer to Section B of the Introduction to these Maintenance Specifications;
- b) meet the following concrete mixes and patching material specifications:

	minimum compressive strength at 28 days	maximum nominal size aggregate mm	maximum Water/Cement ratio by weight	air content %	Slump maximum mm
1. Deck and Parapet	35 MPa	20	0.42	6 (+/-1)	50
2. Abutments, Piers and Footings	30 MPa	28	0.45	5 (+/-1)	75

- c) achieve minimum 28 day compressive strength of 35 MPa for Cementitious, non-shrink, non-metallic Grout which may be polymer-modified.

4. WARRANTY

The Contractor warrants all concrete structure repairs against defects for a period of 365 days from the completion of those Maintenance Services. The Contractor must rectify all defects covered by this warranty and all other ancillary work performed under other Maintenance Specifications, without credit for such work, within 1 month of detection by or notification to the Contractor by the Ministry.

B.C. MINISTRY OF TRANSPORTATION

Maintenance Specification Chapter 6-605

STEEL AND ALUMINUM STRUCTURE MAINTENANCE

1. OBJECTIVE

To restore and maintain the integrity and durability of steel and aluminum structures; to ensure the safety of Highway Users; and to maximize the functional life of the structures.

2. GENERAL PERFORMANCE SPECIFICATIONS

2.1 Routine Maintenance Services

The Contractor must maintain and repair steel and aluminum structures and associated components that are unsafe or have the potential to become unsafe.

2.2 Quantified Maintenance Services

Not applicable to this Maintenance Specification.

3. DETAILED PERFORMANCE SPECIFICATIONS

3.1 Routine Maintenance Services

The Contractor must:

- a) maintain and repair steel and aluminum structures;
- b) repair and/or replace lost, missing, deteriorated, or corroded rivets, bolts and associated components, including but not limited to, catwalks, ladders, working platforms and fall arrest systems;
- c) replace deteriorated steel or aluminum members; and

Note: If it is estimated by the Contractor and confirmed by the Province that, at any particular time, and at any particular structure, the cost to maintain or repair a steel and aluminum structure exceeds \$35,000, refer to Section G of the Introduction.

3.1.1 Performance Time Frames

The Contractor must:

- a) notify the Province immediately, from the time the deterioration or damage to the steel and aluminum structure was detected by or reported to the Contractor;
- b) respond immediately if the Bridge Structural Engineer determines that there is risk of structural failure under loading, by doing one of the following, as approved in writing by the Province:
 - (i) restrict allowable loading on the structure;
 - (ii) close the structure to all vehicular traffic;
 - (iii) close the structure to all use;
 - (iv) start repairs immediately as instructed by the Bridge Structural Engineer;
 - (v) complete repairs within three months, or within a time frame that is appropriate to the nature and urgency of the repair as determined by the Bridge Structural Engineer; and
- c) complete all other steel and aluminum structure maintenance within four months, from the time the deficiency was detected by or reported to the Contractor.

3.2 Quantified Maintenance Services

Not applicable to this Maintenance Specification.

3.2.1 Performance Time Frames

Not applicable to this Maintenance Specification.

3.3 Materials

The Contractor must supply and use materials of the same type and quality as the existing material or refer to Section B of the Introduction to these Maintenance Specifications.

4. WARRANTY

Not applicable to this Maintenance Specification.

B.C. MINISTRY OF TRANSPORTATION

Maintenance Specification Chapter 6-620

TIMBER TRUSS BRIDGE MAINTENANCE

1. OBJECTIVE

To preserve the durability and load carrying capacity of the structures.

2. GENERAL PERFORMANCE SPECIFICATIONS

2.1 Routine Maintenance Services

The Contractor must:

- a) maintain and repair timber Truss Bridges and associated components;
- b) repair timber Truss Portals; and
- c) tighten, repair or replace fastening hardware.

2.2 Quantified Maintenance Services

The Contractor must replace timber Truss End Posts, Truss Rods, Truss Portals, all Braces, Floor Beams and corbels.

3. DETAILED PERFORMANCE SPECIFICATIONS

3.1 Routine Maintenance Services

The Contractor must:

- a) maintain and repair deteriorated timber Truss Bridge components in accordance with the specifications referred to in Section B1 of the Introduction to these Maintenance Specifications or in accordance with the original design specifications;
- b) tighten Flashing; and tighten and replace all fasteners;
- c) treat all freshly sawn or drilled timber members with preservatives;
- d) repair or replace deteriorated cast components;
- e) replace Flashing that is torn, missing or otherwise required to be installed for protection of the structure;

- f) Camber top and bottom Laminated Chords by tightening all Truss Rods evenly and systematically until all Counter Braces are bearing at both ends; the procedure for doing so must be approved in writing by the Province;
- g) refrain from excessive tightening of Truss Rods in an attempt to lift more Camber into the Truss; in the event that the Chord Cambers are not smooth or even in profile after all Counter Braces are bearing both ends, the Province may require the Contractor to Shim and/or cut Counter Brace lengths;
- h) tighten all Lateral Rods evenly to maintain a straight and uniform Chord line; and
- i) refrain from patching, welding or splicing, unless a procedure is prepared by a Professional Engineer retained by the Contractor and approved in writing by the Province.

3.1.1 Performance Time Frames

The Contractor must:

- a) initiate Traffic Control in accordance with the Maintenance Specification for *Highway Traffic Control*, immediately from the time a deficiency is detected by or reported to the Contractor that may affect the structure and/or the safety of Highway Users;
- b) notify the Province immediately so that the Bridge Structural Engineer can be assigned to assess the deficiency and risk of structural failure;
- c) respond immediately if the Bridge Structural Engineer determines that there is risk of structural failure under loading, by doing one of the following, as approved in writing by the Province:
 - i) restrict allowable loading on the Bridge;
 - ii) close the Bridge to all vehicular traffic; or

- iii) close the Bridge to all use;
 - iv) immediately commence maintenance repairs after receiving instructions from the Bridge Structural Engineer, except where the damage will require complete re-construction of the structure as determined by the Province;
- d) complete the repair of the following deficiencies within the maximum time, from the time the deficiency was detected by or reported to the Contractor:

Component and Damage	Action and Maximum Response Time
i) torn, loose or missing Flashing	repair or replace within 6 m
ii) Flashing not previously installed	install within 12 m
iii) non-structural damage or deterioration to Portals, Braces and lateral Braces	repair within 6 m
iv) damaged or loose Truss Rods; damaged, loose, or missing fasteners	repair within 2 m
vi) adjusting the Camber	as required

Legend
m - months

3.2 Quantified Maintenance Services

The Contractor must replace deteriorated timber Truss components in accordance with the specifications referred to in Section B1 of the Introduction to these Maintenance Specifications or in accordance with the original design specifications.

Notes:

1. The Contractor will not be responsible for replacing structural members associated with complete Bridge replacement or complete replacement of either top or bottom Chords unless mutually agreed between the Contractor and the Province.
2. If it is estimated by the Contractor and confirmed by the Province that, at any particular time, and at any particular Bridge, the cost to replace timber Truss components exceeds \$35,000, refer to Section G of the Introduction, unless it is mutually agreed to between the Province and the Contractor to continue to perform the work as Quantified Maintenance Services. .

3.2.1 Performance Time Frames

The Contractor must:

- a) replace Truss Rods or Lateral Rods, or deteriorated End Posts, Main Braces, Counter Braces, Floor Beams and/ or corbels within 2 months from the time the deficiency was detected by or reported to the Contractor; and
- b) plan to perform all identified timber Truss component replacements within the Contract Year to the limit of the identified quantities. Where identified work exceeds the available quantities in any Contract Year, the Contractor must ensure identified repairs are carried out in order of priority to ensure safety and to protect the infrastructure

3.3 Materials

Supply and use materials of the same type and quality as the existing material or refer to Section B1 of the Introduction to these Maintenance Specifications.

4. WARRANTY

Not applicable to this Maintenance Specification.

B.C. MINISTRY OF TRANSPORTATION

Maintenance Specification Chapter 6-640

BRIDGE PILING MAINTENANCE

1. OBJECTIVE

To ensure structural strength, to prevent Scour and to maintain the impact resistance of Bridge Pilings.

2. GENERAL PERFORMANCE SPECIFICATIONS

2.1 Routine Maintenance Services

The Contractor must maintain and repair Pilings, Trash Racks and associated components that are unsafe or have the potential to become unsafe for Highway Users.

2.2 Quantified Maintenance Services

The Contractor must replace deteriorated Bridge Pilings and associated components where maintenance and repair will not restore the original design function of the particular Piling, as determined by the Bridge Structural Engineer.

3. DETAILED PERFORMANCE SPECIFICATIONS

3.1 Routine Maintenance Services

The Contractor must:

- a) maintain or repair damaged Bridge Pilings and associated components as required in accordance to the specifications referred to in Section B1 of the Introduction to these Maintenance Specifications;
- b) splice Piles only if the base of the Pile is sound;
- c) tighten loose cables and fasteners;
- d) replace broken or missing cables and fasteners;
- e) repair or replace damaged or missing Flashing and Armour; and install Flashing and Armour where previously none was in place;

- f) repair damaged Trash Racks; and
- g) remove accumulated Debris as soon as access permits and dispose of Debris in a manner acceptable to regulatory agencies.

3.1.1 Performance Time Frames

The Contractor must:

- a) initiate Traffic Control in accordance with the Maintenance Specification for *Highway Traffic Control*, immediately from the time a deficiency is detected by or reported to the Contractor that may affect the structure and/or the safety of Highway Users;
- b) notify the Province immediately so that the Bridge Structural Engineer can be assigned to assess the deficiency and risk of structural failure;
- c) respond immediately if the Bridge Structural Engineer determines that there is risk of structural failure under loading, by doing one of the following, as approved in writing by the Province:
 - i) restrict allowable loading on the Bridge;
 - ii) close the Bridge to all vehicular traffic; or
 - iii) close the Bridge to all use;
 - iv) commence repairs within 2 days after receiving instructions from the Bridge Structural Engineer, except where the damage will require complete re-construction as determined by the Province, unless mutually agreed by the Contractor and the Province; and
- d) complete maintenance and repair to Pilings and associated components within 6 months from the time the deficiency was detected by or reported to the Contractor.

3.2 Quantified Maintenance Services

The Contractor must:

- a) replace Pilings and associated components in accordance with Section B1 of the Introduction to these Maintenance Specifications;
- b) use Pile types and installation procedures, prepared by a Professional Engineer retained by the Contractor, and approved in writing by the Province; and
- c) replace Trash Racks that cannot be repaired.

Notes:

- 1. The Contractor is not responsible for replacing concrete Bridge Piles under this Maintenance Specification.
- 2. The Contractor will not be required to replace Piles where the costs, including all associated components, Bridge jacking, engineering and traffic control, exceed \$35,000, at any particular time, for a Piling located at a particular structure, as calculated by the Bridge Structural Engineer unless mutually agreed by the Contractor and the Province. If the cost is \$35,000 or less, the Contractor and the Province will negotiate a price for the work to the limit of the Quantified Provisional Sum identified for such work within the Contract Year.

3.2.1 Performance Time Frames

The Contractor must:

- a) commence emergency replacement of Bridge Piles and associated components within 2 days, from the time directed to do so by the Province, where the safety of Highway Users and structural integrity is compromised, except where the damage requires complete re-construction of the Pile Bent or Bridge structure, as determined by the Province; and
- b) complete non-emergency replacement of Piles and associated components within 6 months, from the time the deficiency was detected by or reported to the Contractor;

3.3 Materials

Refer to Section B1 of the Introduction to these Maintenance Specifications.

4. WARRANTY

The Contractor warrants all Pile replacements against defects for a period of 365 days from the completion of those Maintenance Services. The Contractor must rectify all defects covered by this warranty and all other ancillary work performed under other Maintenance Specifications, without credit for such work, within 1 month of detection by or notification to the Contractor by the Ministry.

B.C. MINISTRY OF TRANSPORTATION

Maintenance Specification Chapter 6-650

TIMBER AND LOG STRUCTURE MAINTENANCE

1. OBJECTIVE

To preserve the durability and load carrying capacity of timber and log structures.

2. GENERAL PERFORMANCE SPECIFICATIONS

2.1 Routine Maintenance Services

The Contractor must maintain and repair all timber and log structures and their associated components that are unsafe or have the potential to become unsafe.

2.2 Quantified Maintenance Services

The Contractor must replace timber and log Stringers, Brow Logs, Needle Beams and timber Caps where maintenance and repair will not restore the original design function of the particular structure, as determined by the Bridge Structural Engineer.

3. DETAILED PERFORMANCE SPECIFICATIONS

3.1 Routine Maintenance Services

The Contractor must:

- a) maintain and repair timber and log structures and associated components in accordance with Section B1 of the Introduction of these Maintenance Specifications;
- b) ensure that the durability and load carrying capacity of the structure is maintained while repairing the structure; and
- c) bolt Brow Logs (not cable-wrap them) to the log Stringers or Needle Beams.

3.1.1 Performance Time Frames

The Contractor must:

- a) initiate Traffic Control in accordance with the Maintenance Specification for *Highway Traffic Control*, immediately from the time a deficiency is detected by or reported to the Contractor that may affect the structure and/or the safety of Highway Users;
- b) notify the Province immediately so that the Bridge Structural Engineer can be assigned to assess the deficiency and risk of structural failure;
- c) respond immediately if the Bridge Structural Engineer determines that there is risk of structural failure under loading, by doing one of the following, as approved in writing by the Province:
 - i) restrict allowable loading on the Bridge;
 - ii) close the Bridge to all vehicular traffic; or
 - iii) close the Bridge to all use;
 - iv) commence repairs within 2 days after receiving instructions from the Bridge Structural Engineer, except where the damage will require complete re-construction as determined by the Province, unless mutually agreed by the Contractor and the Province; and
- d) complete maintenance and repairs to timber or log structures in accordance with the times, from the time the deficiency was detected by or reported to the Contractor, established in the following table:

Activity	Highway Classification	
	1, 2 & 3	4, 5, 6 & 7
repair timber or log Stringers, Brow Logs, Needle Beams and Caps	3 m	6 m
repair Braces and other structural components	3 m	6 m
install temporary support	3 m	6 m
tighten loose timber joints, bolts, fastenings, cables and other structural components	1 m	4 m

Legend
m – months

3.2 Quantified Maintenance Services

The Contractor:

- a) must replace timber and log Stringers, Brow Logs, Needle Beams and timber Caps in accordance Section B1 of the Introduction to these Maintenance Specifications; and
- b) must construct temporary support, in a manner approved in writing by the Province, when replacing timber Stringers, Caps and Braces.

Notes:

- c) 1. The Contractor will not be responsible for replacing Laminated Stringers.
- 2. The Contractor will not be responsible for replacing timber or log stringers associated with complete Bridge replacement, unless mutually agreed between the Contractor and the Province.

3.2.1 Performance Time Frames

- a) The following table establishes the maximum time, from the time the deficiency was detected by or reported to the Contractor, within which the Contractor must complete the repair of the following deficiencies:

Maximum Response Times		
	Highway Classification	
Quantified Maintenance Activity	1, 2 & 3	4, 5, 6 & 7
replace timber or log Stringers, Brow Logs, Needle Beams and Caps	3 months	6 months

- b) The Contractor must plan to perform all identified timber and log structure component replacement within the Contract Year to the limit of the identified quantities. Where identified work exceeds the available quantities in any Contract Year, the Contractor must ensure identified repairs are carried out in order of priority to ensure safety and to protect the infrastructure.

3.3 Materials

The Contractor must:

- a) refer to section B1 of the Introduction to these Maintenance Specifications; and
- b) replace timber material with preservative-treated Douglas Fir timber of the following standard sizes, unless otherwise approved by the Province in writing;
 - i) timber Stringers, 150 mm x 400 mm (6 inch x 16 inch) select structural grade or as specified or directed by the Province;
 - ii) timber Caps, Sills 305 mm x 305 mm minimum (12 inch x 12 inch) Number 1 grade;
 - iii) timber Box Beam Caps 305 mm x 355 mm (12 inch x 14 inch) Number 1 grade; and
- c) logs for structural repair must be cut from live Cedar or Douglas Fir species, and must be cut in mid-winter and allowed to cure for a minimum of 30 days prior to peeling and placing, unless otherwise approved in writing by the Province.

4. WARRANTY

The Contractor warrants all timber and log structure component replacements against defects for a period of 365 days from the completion of those Maintenance Services. The Contractor must rectify all defects covered by this warranty and all other ancillary work performed under other Maintenance Specifications, without credit for such work, within 1 month of detection by or notification to the Contractor by the Ministry.

B.C. MINISTRY OF TRANSPORTATION

Maintenance Specification Chapter 6-660

RETAINING STRUCTURE MAINTENANCE

1. OBJECTIVE

To ensure the continued safe and stable condition of all Retaining Structures and associated components.

2. GENERAL PERFORMANCE SPECIFICATIONS

2.1 Routine Maintenance Services

The Contractor must clean out Debris behind the Retaining Structures and maintain and repair Retaining Structures and associated components that are unsafe or have the potential to become unsafe for Highway Users.

2.2 Quantified Maintenance Services

The Contractor must replace Retaining Structure components where maintenance and repair will not restore the original function of the structure.

3. DETAILED PERFORMANCE SPECIFICATIONS

3.1 Routine Maintenance Services

The Contractor must:

- a) repair Retaining Structure components in accordance with Section B1 of the Introduction to these Maintenance Specifications;
- b) repair or reinforce any portion of a Retaining Structure showing signs of deterioration, deflection or settlement;
- c) repair Retaining Structures showing signs of continued movements, as recommended by a Geotechnical Engineer in consultation with a Bridge Structural Engineer, and as approved in writing by the Province;

- d) repair timber and log Retaining Structure components in accordance with the Maintenance Specification for *Bridge Piling Maintenance* (subject to section 3.2.1 b), with no credit for this work under the Maintenance Specification for *Bridge Piling Maintenance*;
- e) clean out accumulations of Debris behind Retaining Structures when the Debris prevents the Retaining Structure from functioning as designed; and dispose of Debris in a manner acceptable to regulatory agencies; and
- f) perform traffic control in accordance with the Maintenance Specification for *Highway Traffic Control*, whenever a structure and/or the safety of Highway Users is threatened.

3.1.1 Performance Time Frames

The Contractor must:

- a) initiate Traffic Control in accordance with the Maintenance Specification for *Highway Traffic Control*, immediately from the time a deficiency is detected by or reported to the Contractor;
- b) commence maintenance repairs within 24 hours from receiving written approval by the Province to proceed;
- c) maintain and repair Retaining Structure deficiencies within the time, from the time the deficiency was detected by or reported to the Contractor, established in the table below:

	1 & 2	3	4	5, 6 & 7
Maximum Response Time	1 m	2 m	4 m	6 m

- d) clean out accumulations of Debris behind Retaining Structures annually, or as required to ensure the structure functions as designed.

Legend

m – months

3.2 Quantified Maintenance Services

The Contractor must:

- a) replace components of Retaining Structures in accordance with Section B1 of the Introduction to these Maintenance Specifications;
- b) replace concrete Retaining Structure components in accordance with the Maintenance Specification for *Concrete Structure Maintenance* (subject to section 3.2.1 b), with credit for this work under the Maintenance Specification for *Concrete Structure Maintenance*; and
- c) replace timber and log Retaining Structure components in accordance with the Maintenance Specification for *Bridge Piling Maintenance* (subject to section 3.2.1 b), with credit for this work under the Maintenance Specification for *Bridge Piling Maintenance*.

Note: The Contractor will not be responsible for replacing entire Retaining Structures, unless mutually agreed to by the Contractor and the Province.

3.2.1 Performance Time Frames

The Contractor must:

- a) complete the replacement of Retaining Structure components within six months, from the time the deficiency was detected by or reported to the Contractor;
- b) comply with the Performance Time Frames in this Maintenance Specification and not the respective Performance Time Frames outlined in the *Concrete Structure Maintenance* and the *Bridge Piling Maintenance*; and
- c) plan to perform all identified Retaining Structure component replacement within the Contract Year to the limit of the identified quantities. Where identified work exceeds the available quantities in any Contract Year, the Contractor must ensure identified repairs are carried out in order of priority to ensure safety and to protect the infrastructure

3.3 Materials

The Contractor must:

- a) refer to Section B1 of the Introduction to these Maintenance Specifications; and
- b) supply timber material that is incised and preservative-treated Douglas Fir, Number 2, minimum size (150 mm x 200 mm) or the same size, as existing.

4. WARRANTY

The Contractor warrants all Retaining Structure maintenance against defects for a period of 365 days from the completion of those Maintenance Services. The Contractor must rectify all defects covered by this warranty and all other ancillary work performed under other Maintenance Specifications, without credit for such work, within 1 month of detection by or notification to the Contractor by the Ministry.

B.C. MINISTRY OF TRANSPORTATION

Maintenance Specification Chapter 6-680

MULTIPLATE STRUCTURE MAINTENANCE

1. OBJECTIVE

To allow unimpeded flow through Multiplate structures and to maximize the functional life of these structure.

2. GENERAL PERFORMANCE SPECIFICATIONS

2.1 Routine Maintenance Services

The Contractor must maintain, repair and/or replace components of Multiplate structures and bank and watercourse protection that are unsafe or have the potential to become unsafe for Highway Users or adversely effect the functional life of the structure.

2.2 Quantified Maintenance Services

- a) Not applicable to this Maintenance Specification.

3. DETAILED PERFORMANCE SPECIFICATIONS

3.1 Routine Maintenance Services

The Contractor must:

- a) maintain repair and/or replace Multiplate structure components in accordance with Section B1 of the Introduction to these Maintenance Specifications;
- b) protect the floor area using steel plates or concrete, as instructed by the Bridge Structural Engineer or as approved in writing by the Province;
- c) replace Scoured and/or eroded foundation material at the inlet, outlet, shore, bank and watercourse with concrete or angular rock in accordance with the Maintenance Specification for *Shore, Bank and Watercourse Maintenance* (subject to section 3.1.1 f), with credit for such work under the Maintenance Specification for *Shore, Bank and Watercourse Maintenance*;

- d) maintain and repair concrete in accordance with the Maintenance Specification for *Concrete Structure Maintenance* (subject to section 3.1.1 f), with credit for such work under the Maintenance Specification for *Concrete Structure Maintenance*; and
- e) maintain and repair asphalt surfaces in accordance with the Maintenance Specification for *Highway Pavement Patching and Crack Sealing* (subject to section 3.1.1 f), with credit for such work under the Maintenance Specification for *Highway Pavement Patching and Crack Sealing*.

Note: If it is estimated by the Contractor and confirmed by the Province that, at any particular time, at any particular structure, the cost of maintaining, repairing or replacing components of a Multiplate structure exceeds \$35,000, refer to Section G of the Introduction to these Maintenance Specifications.

3.1.1 Performance Time Frames

The Contractor must:

- a) initiate Traffic Control in accordance with the Maintenance Specification for *Highway Traffic Control*, immediately from the time a deficiency is detected by or reported to the Contractor that may affect the structure and/or the safety of Highway Users;
- b) notify the Province immediately so that the Bridge Structural Engineer can be assigned to assess the deficiency and risk of structural failure;
- c) respond immediately if the Bridge Structural Engineer determines that there is risk of structural failure under loading, by doing one of the following, as approved in writing by the Province:
 - i) restrict allowable loading on the Multiplate structure;
 - ii) close the Multiplate structure to all vehicular traffic; or
 - iii) close the Multiplate structure to all use;
- c) **d)** tighten or replace loose, damaged or missing bolts within 10 days, from the time the deficiency was detected by or reported to the Contractor, or as soon as conditions allow;

- f) e) repair Multiplate structures and protect the Multiplate structure from Scour and erosion to the inlet, outlet and foundation, within 6 months from the time the deficiency was detected by or reported to the Contractor; and
- f) comply with the Performance Time Frames in this Maintenance Specification and not the respective Performance Time Frames outlined in the *Maintenance Specification for Concrete Structure Maintenance; Highway Pavement Patching and Crack Sealing; and Shore, Bank and Watercourse Maintenance*.

3.2 Quantified Maintenance Services

Not applicable to this Maintenance Specification.

3.2.1 Performance Time Frames

Not applicable to this Maintenance Specification.

3.3 Materials

Refer to section B1 of the Introduction to these Maintenance Specifications.

4. WARRANTY

Not applicable to this Maintenance Specification.

B.C. MINISTRY OF TRANSPORTATION

Maintenance Specification Chapter 6-690

BRIDGE RAILING MAINTENANCE

1. OBJECTIVE

To provide a structurally sound and safe barrier between pedestrians, vehicles and hazards and to maximize the functional life of the Bridge railing.

2. GENERAL PERFORMANCE SPECIFICATIONS

2.1 Routine Maintenance Services

The Contractor must maintain, repair and replace, as required, Bridge rail systems and Parapets that are unsafe or have the potential to become unsafe for Highway Users.

2.2 Quantified Maintenance Services

Not applicable to this Maintenance Specification.

3. DETAILED PERFORMANCE SPECIFICATIONS

3.1 Routine Maintenance Services

The Contractor must:

- a) maintain, repair and replace Bridge rail systems and Parapets to original design;
- b) perform concrete repairs in accordance with the Maintenance Specification for *Concrete Structure Maintenance* (subject to section 3.1.1 e), with credit for such work under the Maintenance Specification for *Concrete Structure Maintenance*;
- c) perform minor painting of Bridge rail systems in accordance with the Maintenance Specification for *Minor Painting of Bridge Structures* (subject to section 3.1.1 e), with credit for such painting under the *Minor Painting of Bridge Structures*;
- d) install a temporary barrier or railing where required, to ensure the safety of Highway Users; and

- e) perform traffic control, as required, in accordance with the Maintenance Specification for *Highway Traffic Control*.

Note: If it is estimated by the Contractor and confirmed by the Province that at any particular time, at any particular Bridge, the cost of maintaining, repairing or replacing deficient Bridge railings exceeds \$35,000, refer to Section G of the Introduction to these Maintenance Specifications.

3.1.1 Performance Time Frames

The Contractor must:

- a) immediately notify the Province of any deficiency of any Bridge railing which is unsafe or has the potential to become unsafe for Highway Users;
- b) immediately provide traffic control under situations described in 3.1.1 a);
- c) complete installation of temporary railing, as required, within 24 hours, from the time the deficiency was detected by or reported to the Contractor;
- d) complete maintenance, repairs and/or replacement within 2 months, from the time the deficiency was detected by or reported to the Contractor; and
- e) comply with the Performance Time Frames in this Maintenance Specification and not the respective Performance Time Frames outlined in the *Concrete Structure Maintenance and Minor Painting of Bridge Structures*.

3.2 Quantified Maintenance Services

Not applicable to this Maintenance Specification.

3.2.1 Performance Time Frames

Not applicable to this Maintenance Specification.

3.3 Materials

- a) Refer to Section B of the Introduction to these Maintenance Specifications; and
- b) in accordance with the following:
 - i) timber must be Number 1 Douglas Fir species and must meet the following minimum specifications:
 1. timber End Posts must be rough cut and 250 mm x 250 mm (10 inch x 10 inch), intermediate posts must be S2E 150 mm x 150 mm (6 inch x 6 inch);
 2. timber railing must be S4S 75 mm x 200 mm (3 inch x 8 inch x 16 feet) or as approved in writing by the Province, fastened with 200 mm Galvanized nails;
 3. timber Wheelguards must be untreated, rough cut to and 200 mm x 200 mm x 4.9 metres (8 inch x 8 inch x 16 feet) or as otherwise approved by the Province, and maximum Wane allowed on any surface must be 10 mm; and
 - ii) all fasteners must be hot-dip Galvanized.

4. WARRANTY

Not applicable to this Maintenance Specification.

B.C. MINISTRY OF TRANSPORTATION

Maintenance Specification Chapter 6-740

DEBRIS TORRENT STRUCTURE MAINTENANCE

1. OBJECTIVE

To ensure the safety of Highway Users and to ensure the continued structural and functional integrity of Debris Torrent Structures.

2. GENERAL PERFORMANCE SPECIFICATIONS

2.1 Routine Maintenance Services

All services for this Maintenance Specification are Routine.

2.2 Quantified Maintenance Services

Not applicable to this Maintenance Specification.

3. DETAILED PERFORMANCE SPECIFICATIONS

3.1 Routine Maintenance Services

The Contractor must:

- a) maintain, repair and/or replace components of Debris Torrent Structures in accordance with Section B1 of the Introduction to these Maintenance Specifications;
- b) remove Debris from the Flume, basin area, and from around the Debris Torrent Structure;
- c) remove any blockage or sediment from relief wells to ensure free drainage into the discharge manifold;
- d) remove and replace all dissipater panels that are damaged or worn, as determined by the Province;
- e) maintain all piezometers associated with Debris Torrent Structures as directed by the Province;

- f) maintain all paved Highway surfaces including access Highways and parking areas in accordance with the Maintenance Specification for *Highway Pavement Patching and Crack Sealing* (subject to 3.1.1e), with credit for such work under the Maintenance Specification for *Highway Pavement Patching and Crack Sealing*;
- g) maintain grillage beams and all concrete structures in accordance with the Maintenance Specification for *Concrete Structure Maintenance* (subject to 3.1.1e), with credit for such work under the Maintenance Specification for *Concrete Structure Maintenance*; and
- h) seal concrete cracks in accordance with the Maintenance Specification for *Bridge Deck Maintenance* (subject to 3.1.1e), with credit for such work under the Maintenance Specification for *Bridge Deck Maintenance*.

Note: If it is estimated by the Contractor and confirmed by the Province that at any particular time and at any particular structure, the cost to maintain, repair or replace components of a structure exceeds \$35,000, refer to Section G of the Introduction to these Maintenance Specifications.

3.1.1 Performance Time Frames

The Contractor must:

- a) clear Flume and basin areas of Debris within one month of any Debris Event or as specified by the Province;
- b) clear Flume and basin areas of Debris at least once annually;
- c) repair or replace damaged grillage beams, concrete surfaces, dissipater panels, asphalt pavements, piezometers and relief wells within two months from the time the deficiency was detected by or reported to the Contractor;
- d) clean relief wells at least once annually; and
- e) comply with the Performance Time Frames in this Maintenance Specification and not the respective Performance Time Frames outlined in the *Pavement Patching and Crack Sealing, Concrete Structure Maintenance and Bridge Deck Maintenance*.

3.2 Quantified Maintenance Services

Not applicable to this Maintenance Specification.

3.2.1 Performance Time Frames

Not applicable to this Maintenance Specification.

3.3 Materials

Refer to section B1 of the Introduction to these Maintenance Specifications.

4. WARRANTY

Not applicable to this Maintenance Specification.