



Substructure - Inspection and Rating

Substructure Inspection and Rating




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Substructure - Inspection and Rating

Introduction

- That portion of the bridge located below the bearings
 - Abutments
 - Piers
 - Rated separately
- Purpose is to:
 - Receive the loads from the superstructure
 - Transfer forces to the ground
 - Contain the approach fills
 - Withstand other forces on it
 - Ice
 - Debris/drift
 - earth pressure




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Substructure - Inspection and Rating

Introduction

- Components
 - bearing seats, caps
 - piles
 - backwalls
 - wingwalls
 - bracing and struts
- Component materials
 - timber
 - concrete
 - steel




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Substructure - Inspection and Rating

Introduction

Substructure		Substructure	
Bridge Component	Left	Right	Examination of Condition
Abutments			
(Extended Backfill Pile (Y/N) - 1)			
(Extended Backfill Pile Spacing (mm) - 100)			
(Total Number of Caps/Correls - 1)			Caps corrod July 16, 2014. No rot.
Bearing Seats/Caps/Correls Detail Rating			
Left	0	0	0
Right	0	0	0
Bearing Seats/Caps/Correls			
(Type) - TREATED TIMBER			
(Depth (mm) - 200)			
(Width (mm) - 200)			
Backfill/Retaining			
(Grouted Height (m) - 1.10)	3	3	Undermined at east abutment and breastwall piling missing and detached.
Wingspans			
(Total Number of Bearing Piles - 6)			
Pile Detail Rating			
Left	0	0	0
Right	0	0	0
Piles			
Pile Counting	X	X	
Abutment Stability	3	3	Refract and bulging piles.
Scour/Erosion	3	3	Undermined and eroded at AS.
Piles/Bents			
(Type) -			
(Total Number of Caps/Correls -)			
Bearing Seats/Caps/Correls Detail Rating			
Left			
Right			
Bearing Seats/Caps/Correls	X	X	
(Type) -			
(Depth (mm) -)			
(Width (mm) -)			
(Total Number of Bearing Piles -)			
Pile Detail Rating			
Left			
Right			
Pile	X	X	
(Pile Shaft/Pile)			
(Grouted Height (m) -)			
Bracing/Struts/Sheathing	6	6	6 struts 200mm x 100 mm.
Nose Plate	X	X	
Pile Counting	X	X	
(Colour Description -)			
(Colour Code -)			
Pile Rating	X	X	
Scour	X	X	
Debris (Y/N)	No	No	
Substructure General Rating	2	2	




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Abutments

- Purpose
 - Support the ends of the girders or stringers
 - Contain the approach fills
- Two types in standard bridges - classified according to their height



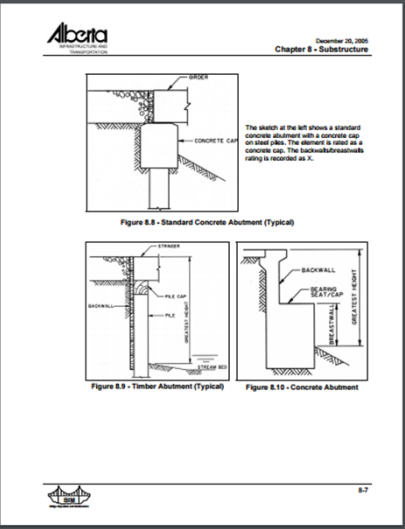
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Abutments

December 28, 2005
Chapter 8 - Substructure




The sketch at the left shows a standard concrete abutment with a concrete cap on steel girders. The diagram is used as a concrete cap. The backwall/streamline rating is recorded as 'X'.

Figure 8.8 - Standard Concrete Abutment (Typical)


Figure 8.9 - Timber Abutment (Typical)

Figure 8.10 - Concrete Abutment

8.7



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Full Height & Spill Through Abutments

December 28, 2005
Chapter 8 - Substructure

Pictures of full height and spill through abutments are shown below.








Figure 8.1 - Full Height Abutment Figure 8.2 - Spill-through Abutment




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Abutments

- Full Height Type
 - Solid retaining walls
 - Extend the full height of the bridge
 - Has wingwalls
 - No headslopes
 - Susceptible to lateral displacement from earth pressure
 - Vulnerable to undermining if not protected




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Abutments

Full Height Type





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Full Height Abutment







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Full Height Abutment






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Abutments

- Spill Through Type
 - Intersect the headslopes at the cap height
 - No retaining wall (backwalls) below caps
 - Short wings
 - Vulnerable to undermining if headslopes not protected with scour protection
 - Susceptible to slumping if headslopes too steep or scour at toe





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Spill Through Abutment






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Abutments

- Indicate Extended Backwall Piles “Yes” or “No”
- Record Extended Backwall Pile maximum spacing in mm
- Provide Backwall/Breastwall rating—refer to 8.6
- Measure and record greatest height – lowest point to top of deck
- Rate struts on single span bridge in Pier section of form





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Extended Backwall Pile





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Backwalls/Breastwalls

Backwalls/Breastwalls	3	3	Undetermined at east abutment and breastwall planks missing and detached.
Greatest Height (m)	3.10		

- Applies to abutments only
- That part of the abutment sheeting between the wingwalls
- Function is to retain the approach fill
- On standard bridges, backwalls are:
 - horizontal timber planks nailed to the piles
 - vertical driven tongue and groove timber planks nailed to whalers attached to piles
 - Includes extended backwall piles
- Measure and record greatest height – lowest point to top of deck




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Backwalls/Breastwalls

- On Standard bridges Breastwalls refer to planks attached to streamside of abutment piles
- Look for:
 - Defects common to timber and steel
 - Sheathing not installed low enough
 - sheathing to be set 300 mm below ground level or scour protection
 - Loss of fill material below the backwall or breastwall
 - Loose, missing, or bowing planks




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Backwalls/Breastwalls Ratings

- Rate according to condition and ability to perform as designed (retaining wall)
- Sheeting bowing out from earth pressure rate 5 providing it is functioning (retaining fill).
- Loss of material under sheathing - rate 4 or less
 - Excessive gaps between the planks allowing infiltration rate 4 or less
- Decay, broken or missing planks - rate 4 or less





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Backwalls/Breastwalls Loss of Fill Rated 4





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Repair with Breastwall





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Vertical Driven Backwall Sheathing



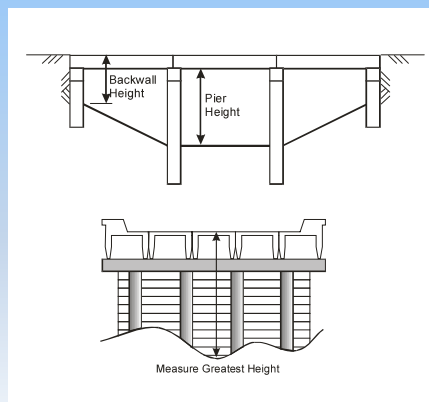
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Backwall & Pier Height



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Wingwalls

- Applies to abutments only
- Primary function is to retain fill
- Consist of horizontal or vertical driven sheathing attached to piles
- Wing piles are included in inspection and rating
- Stability and Scour/Erosion are rated separately
- Look for:
 - Material defects
 - Sheeting not installed low enough - sheeting to be set below the ground level or scour protection installed at the bottom
 - Loss of fill material below the wingwall
 - Excessive gaps between the planks allowing infiltration
 - Sheeting or piles bowing out from earth pressure
 - Missing or broken planks or piles
 - Missing or damaged tin tops on timber wing piles
 - installed to prevent water from entering cut end and rotting interior of pile
 - Proper attachment to backwall - loose or missing wing cleat
 - Broken or loose anchor tie to pile

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Wingwall Ratings

- Requires repairs for aesthetics but is still functional - rate 5 or more
- Requires repairs to be functional - rate 4 or less
 - Loss of fill material – rate 4 or less (also rate under Scour)
 - Sheathing or piles bowing out from earth pressure rate 5 or less depending on functionality
 - Missing or broken planks rate 5 or less depending on functionality
 - Broken or rotted piles rate 4 or less
 - Missing or damaged tin tops on wing piles rate 4


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Wingwall – Separation from Backwall



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Wingwall – Broken Pile



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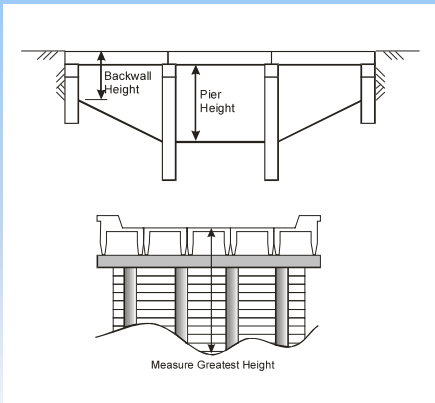
Piers

- Intermediate supports between the abutments on multi-span bridges
- Record pier type
 - On Standard bridges piers are usually “Pile Bents”
 - Pile bent is a single row of piles
 - Pile Bent is recorded as “Pier Column”
- Measure and record greatest height – lowest point to top of pier cap
- Material Type:
 - Timber
 - Steel
 - Concrete (major bridges)

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Substructure - Inspection and Rating


Backwall & Pier Height




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Substructure - Inspection and Rating

Timber Pier Bent (Column) with Sway Bracing




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Timber Pier Bent (Column) with Sheathing




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Substructure - Inspection and Rating

Teepee Pier Bent (Column) with Sheathing, Capitols, Steel Caps




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Substructure - Inspection and Rating

Galvanized Steel Pier Bent (Column) with Bracing



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Substructure - Inspection and Rating

Bearing Seats/Caps/Corbels


8.5. **ABUTMENT AND PIER BEARING SEATS / CAPS / CORBELS**

Bridge Component	Last	Now	Explanation of Condition	
Abutments or Piers/Bent				
(Total Number of Caps or Corbels)				
Bearing Seats/Caps/Corbels Detail Rating				
N (count)	1 (count)	2 (count)		3 (count)
Last				
Now				
Bearing Seats/Caps/Corbels				
(Type:)				
(Depth (mm) :)				
(Width (mm) :)				

- Applies to abutments and piers
- Corbels used on major bridges only
- Purpose
 - Receive the loads from the superstructure
 - Transfer loads to the piles
- High stress concentrations in bearing areas
 - Under girders or timber stringers
 - Above piles



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Substructure - Inspection and Rating

Abutment or Pier Caps

- Types
 - Timber - found on timber pile bents
 - Concrete - found on concrete or steel
 - Steel - found on steel or timber pile bents
- Confirm and/or record:
 - ✓ Total number of individual caps at each abutment and pier (west: east or south: north) (e.g. 3:3)
 - ✓ Record Detailed rating boxes for caps
 - record number of caps not visible in "N" box
 - record "0" if timber caps are rated 4 or more or if caps are not timber
 - ✓ Provide cap rating - refer to Section 8.5
 - ✓ Record Type and size of caps – if different sizes provide comment
 - Use nominal dimensions-(250, 305, 356mm)



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Substructure - Inspection and Rating

Abutment or Pier Caps

- Look for:
 - Concrete caps with wide cracks, delamination, spalls, corrosion of rebar, other deterioration
 - Material defects
 - Especially decay in timber
 - Check shape of timber caps (bulging/crushing)
 - Good contact between girders and caps , and between caps and piles
 - Fire damage-reduced section and strength
 - Evidence of defective connections
 - Corrosion of dowels or drift pins
 - Broken, cracked or poor welds
 - Capitals
 - proper size for pile
 - Location and installation of steel cap stiffeners
 - over pile locations
 - on both sides of web
 - Rotation or displacement
 - Usually indicates substructure movement



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Substructure - Inspection and Rating

Timber Caps – Abutments or Piers

- Decay in timber
 - check moist areas - contact between girders, piles, sheeting planks
 - check cut ends, dowel, drift, and bolt holes
 - most often occurs in the cap interior while the treated surface remains sound
 - look for discoloration at bottom of caps where moisture leaches out decay by-products
 - look for crushing or bulging especially in high stress areas at piles or under girders
 - sound caps with hammer to detect hollow areas
 - Recommend Level 2 coring if any decay present or suspected based on visual clues



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Substructure - Inspection and Rating

Rating Abutment/Pier Caps

- Refer to Section 8.5.3 in Manual
- Rate according to condition and functionality
- Record number of caps rated N, 1, 2 & 3 in Detail Rating Field. Record "0" if caps rated >3
- Any deficiencies reducing ability to transmit loads rate 4 or less
- Spalling and rebar exposed - rate 4 or less
- Girder bearing less than 100mm rate 4 or less
- Girder bearing less than 75 mm rate 3 or less
- Timber caps with:
 - Vertical or horizontal splits extending through full dimension rate 4 or less
 - Early signs of rot rate 4 or less
 - Signs of bulging rate 3 or less
 - Signs of crushing rate 2 or less





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Substructure - Inspection and Rating

Bulging Timber Cap—Rated 3







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Substructure - Inspection and Rating

Crushing/Bulging Timber Pier Cap—Rated 2







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Substructure - Inspection and Rating

Crushing/Bulging Timber Abutment Cap—Rated 2






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Substructure - Inspection and Rating


Crushing/Cracked Timber Pier Cap – Rated 2



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Substructure - Inspection and Rating


Crushing/Cracked Timber Abutment Cap – Rated 2



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Substructure - Inspection and Rating


Crushing Timber Cap – Rated 2



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Substructure - Inspection and Rating


Timber Corbels Major Bridges



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Substructure - Inspection and Rating

Level 2 Timber Coring

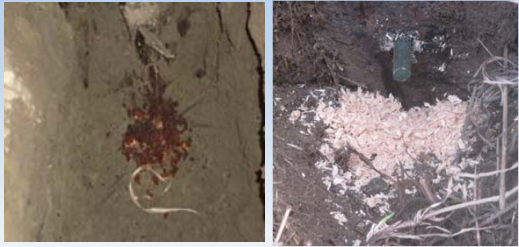


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Substructure - Inspection and Rating

Level 2 Core Samples


Core shavings with rot Good texture and color – no rot



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Substructure - Inspection and Rating


Fire Damaged Timber Cap with Section Loss



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Substructure - Inspection and Rating

Concrete Pier Cap with Spalling



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Substructure - Inspection and Rating

Abutment and Pier Piles


8.8. ABUTMENT BEARING PILES AND PIER SHAFT / PILES

Bridge Component	Last	Now	Explanation of Condition
(Total Number of Bearing Piles :)			
Piles Detail Rating			
N (count)	1 (count)	2 (count)	3 (count)
Last			
Now			
Abutment Piles or Pier Shaft/Piles			
Greatest Height (m)			

- Applies to piles at abutments and piers
- Piles receive the loads from the caps and transmit them to the ground
- Piles also accommodate lateral loads
 - ice and drift
 - earth pressure
- Record Detail Ratings as “0” if timber piles rated 4 or more - or if not timber piles




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Substructure - Inspection and Rating

Abutment and Pier Piles

- Pile types
 - Timber
 - Steel H-pile
 - Steel pipe pile filled with concrete
 - Concrete
- Record the maximum pier height
 - Measure from lowest point to top of pier cap




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Substructure - Inspection and Rating

Abutment and Pier Piles

- Look for:
 - Material defects
 - Cracks, decay of timber piles (especially in wet/dry zone)
 - Cracks, corrosion/loss of section of steel piles
 - Collision damage from ice, drift or vehicles (Lead pile especially)
 - Abrasion from ice or drift
 - Bowing due to excessive earth pressure or vertical loads
 - Misalignment (out of plumb – not sharing loads) due to lateral forces
 - Uneven spacing due to poor construction
 - Signs of heaving or settlement. Note in vertical misalignment




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Substructure - Inspection and Rating

Abutment and Pier Piles

- Confirm and/or record:
 - ✓ Total number of bearing piles at each abutment and pier (west: east or south: north)
 - ✓ Example 8:7 (numbers may be different)
 - ✓ Record Detailed Rating boxes for piles
 - record total number of abut/pier piles not visible (“N”)
 - record “0” if timber piles caps are rated 4 or more or if piles are not timber
 - ✓ Provide rating for abut and pier piles - refer to Section 8.8




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Substructure - Inspection and Rating

Abutment and Pier Piles

- Rate according to condition and functionality
- Do not consider
 - Stability - rate under abutment or pier stability
 - Bracing - rate under bracing
 - Struts - rate under struts
- Piles that are not sharing the loads from the superstructure - rate 4 or less
- Wide splits or cracks (>15mm) rate 4 or less
- If repaired (banded, clamps, struts) rate 5.
- Horizontal bending cracks rate 3 or less
- Crushing from horizontal load of struts rate 3 or less
- Piles showing duress (bowing) under loads - rate 2 or less
- Piles with bulging outer fibers - rate 2
- Record number of timber piles rated N, 1, 2 or 3 in pier and abutment Detail Ratings (0 if piles rated >3 or if not timber piles)




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Substructure - Inspection and Rating

Timber Abutment Piles Bulging – Rated 2






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Bridge Inspection and Maintenance


Substructure - Inspection and Rating

Timber Abutment Piles Bulging – Rated 2






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Substructure - Inspection and Rating

Timber Abutment Piles Bulging/ Bowing– Rated 2






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Substructure - Inspection and Rating


Timber Abutment Piles Wide Split—Rated 3



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Substructure - Inspection and Rating

Timber Abutment Piles Horizontal Bending Crack—Rated 3



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Substructure - Inspection and Rating

Timber Pier Piles with Rot — Rated 3



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Substructure - Inspection and Rating


Timber Piles Repaired with Steel Splice




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Substructure - Inspection and Rating

Timber Pile Not Sharing Load – Rated 3





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Substructure - Inspection and Rating


Paint / Coating

Nose Plate	4	4	Stream has degraded below bottom of nose plates.
Paint/Coating	X	X	No paint on nose plate.
(Colour Description :)			
(Colour Code :)			

- Applies to abutments and pier elements
- Steel
 - Paint
 - Galvanizing
- Concrete
 - Cosmetic coatings
 - Pigmented Sealers
 - Waterproofing coatings
- Does not refer to the creosote on timber components
- Refers to nose plate coating only on timber piers




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Substructure - Inspection and Rating

Paint / Coating

- No coating on treated timber substructures therefore rate X.
 - unless there is a nose plate then rate plate coating
- Check areas exposed to moisture and or salt
 - under leaking joints
 - water line
 - ground line
- Check areas that are difficult to coat
 - edges and corners
 - bolts and connections
 - areas with poor access




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Substructure - Inspection and Rating

Paint / Coating

- Rate according to condition and ability to protect the underlying element
- Top coat deteriorating but prime coat intact - rate 5
- Pitting or loss of section of underlying element - rate 4 or less
- Coatings for aesthetics only (cosmetic coatings on concrete) - rate 3 or more
- If no coating on steel elements and there is corrosion, rate 4 or less.



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Substructure - Inspection and Rating

Abut/Pier Stability


Substructure			
Bridge Component	Last	Now	Explanation of Condition
Abutments			
Abutment Stability			
Pier Stability			

- Applies to abutments and piers but rated separately
- Can cause failure of the structure or problems with superstructure
- Small movement can be tolerated
- Excessive movements are those which affect load carrying capacity, level of service or cause distress to bridge elements



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Substructure - Inspection and Rating


Abut/Pier Stability

- Types
 - Rotational or dipping
 - excessive earth pressure
 - Scour/erosion
 - Superstructure movement
 - Vertical
 - heaving due to frost
 - settlement due to inadequate bearing capacity
 - Horizontal
 - movement of soil mass or slope failure



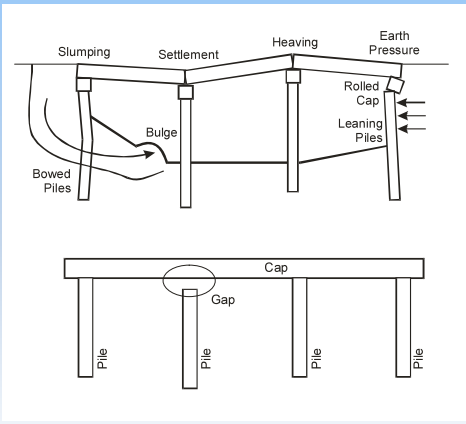
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Substructure - Inspection and Rating


Abut/Pier Stability





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Substructure - Inspection and Rating


Abut/Pier Stability

- Span alignment problems detected in superstructure inspection may indicate substructure instability
- Rotational Movement - look for:
 - mis-alignment of caps with backwalls or piles (rotating or rolling)
 - damage to connections at bearing areas
 - damage to anchoring system
 - signs of embankment movement



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Abut/Pier Stability

- Lateral Movement - look for:
 - uneven bearing areas
 - horizontal misalignment between spans
 - separation between backwall and wingwalls
 - signs of embankment movement
 - out of plumb piles
 - bowed struts
 - broken backwall scab/anchor pile connections




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Abut/Pier Stability

- Vertical Movement - look for:
 - unevenness in superstructure
 - gaps between piles and caps
 - misalignment of structural elements
- Can have serious scour without affecting stability
- Movement that requires monitoring - rate 4 or less
- Movement causing damage to any bridge element - rate 4 or less





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Abut/Pier Stability Bowed Struts







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Substructure - Inspection and Rating

Stability – Heaved Pier





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Substructure - Inspection and Rating


Scour / Erosion

Substructure			
Bridge Component	Last	Now	Explanation of Condition
Abutments			
Scour/Erosion			
Piers/Bents			
Scour			

- Abutments and piers rated separately
- Refers to removal of material by flowing water stream or approach drainage
- Most bridge failures associated with scour / erosion during floods
- Only scour which affects or has the potential to affect the abutments or piers



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Scour / Erosion

Definition – refer to 16.2

- Scour – Removal of streambed material due to increased velocities caused by obstruction or constrictions
- Erosion – general removal of material on stream banks, drainage ditches etc. by flowing water
- Factors
 - stream geometry
 - type of material in stream banks and bed
 - obstructions
 - ice, drift, piers, abutments, river training works
 - alignment of piers and abutments
 - degree or constriction at bridge
 - severity of flood




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Scour / Erosion

- Look for:
 - A variation from the natural stream banks or bed
 - General stream degradation and associated slumping of banks
 - Loss of material
 - toe of headslopes
 - in front of abutment backwalls
 - around piers
 - scour if any debris is present




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Scour / Erosion

- Determine the extent of the scour / erosion and probable cause
- Approach road drainage that is also causing abutment erosion rated in Abut Scour/Erosion
- Scour or erosion causing loss of fill material from below or behind backwall rate 4 or less
- If stability of structure threatened rate 3 or less
- If vertical bank at the abutment rate 3 or less
- If loss of fill is safety concern resulting in a hazard, rate 2 or less



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Bracing / Struts / Sheathing

Substructure			
Bridge Component	Last	Now	Explanation of Condition
Bracing/Struts/Sheathing			

- Applies to piers only
 - Bracing or sheathing on piers
 - Struts which extend between abutment or pier piles
- Bracing and sheeting
 - For load distribution between piles
 - To give the pier rigidity
 - Bracing are single planks or steel members connecting the piles
 - Sheathing is a solid wall of planks on both sides of the pier
 - usually combined with a nose plate




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Bracing / Struts / Sheathing

- Struts
 - Normally timber
 - To prevent the earth pressure from pushing the abutment piles out
 - if no struts, check that other pile anchor systems in place for backwall type abutment




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Substructure - Inspection and Rating

Bracing / Struts / Sheathing

- Look for:
 - Material defects
 - Adequate connections
 - struts include retainer planks (horizontal planks on piles supporting struts)
 - Whether struts interfere with passage of drift or ice
 - Struts bear on piles and not caps
 - Missing or bowing struts




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Substructure - Inspection and Rating

Bracing / Struts / Sheathing

- Rate according to condition and functionality
- All elements a single rating - use the "Explanation of Condition" to identify details
- If struts are bowed, missing, or bear on caps instead of piles
 - significant abutment movement has not occurred rate 4
 - Significant movement, rate 3 or less.
- If sheeting on pier does not extend to waterline or above high water level rate 4
- Loose/missing sheathing rate 4 or less
- Cracked/broken bracing rate 4 or less




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Substructure - Inspection and Rating

Bracing / Struts / Sheathing

Piers/Bents				
(Type : PIER-COLUMN)				
(Total Number of Caps/Corbels : 8-5)				
Caps cored Aug. 25/15				
Pier 2 has 1 100x200 T.T. on top of caps				
Pier 1 has 2 - 100x305 T.T. on top of caps				
Beginning rot in all 100x305 T.T. top planks at both piers.				
Bearing Seats/Caps/Corbels Detail Ratings				
N (count)	1 (count)	2 (count)	3 (count)	
Last	0	0	0	0
Now	0	0	0	0
Bearing Seats/Caps/Corbels				
(Type : TREATED TIMBER)				
(Depth(mm) : 356)				
(Width(mm) : 356)				
(Total Number of Bearing Piles : 10-9)				
Piles cored Aug. 25/15				
piles P6 and P7-P9, P6, P8 and P9 all with beginning rot at base of pile.				
Wide checking to Pier 2, Pile 9 - Ok.				
Piers Detail Ratings				
N (count)	1 (count)	2 (count)	3 (count)	
Last	0	0	0	0
Now	0	0	0	0
Pier Shaft/Piles				
N (count)	1 (count)	2 (count)	3 (count)	
Last	0	0	0	0
Now	0	0	0	0
Pier Shaft/Piles				
Created Height (m)	5.30			
Bracing/Struts/Sheathing	4	4		Pier 2 - 1 cracked bracing plank. Struts in Sp. 1 and 2 (150 x 200 TT Rated 7



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Substructure - Inspection and Rating


Nose Plate

Nose Plate	4	4	Stream has degraded below bottom of nose plates.
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- Applies to piers only
- Located on the upstream side
- Protects pier from impact or abrasion from ice or drift
- Made from steel and bolted or welded to pier
- Found on H-pile and sheeted timber piers




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Substructure - Inspection and Rating

Nose Plate

- Look for:
 - Material defects
 - Adequate connections to pier shaft/piles
 - Impact damage
- Rate according to condition and functionality
- Do not rate damage to pier - rate under piles or bracing/sheeting
- Missing nose plate on timber pier prone to damage from ice or drift rate 3 or less
- Timber pier with no plate and damaged rate X and recommend installation in comments and recommendations




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Substructure - Inspection and Rating

Nose Plate





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Substructure - Inspection and Rating


Debris

Debris (Y/N)	Yes	Old piles.
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- Applies to substructure as a whole –abuts and piers
- Material deposited in the bridge opening
 - trees and vegetation
 - logs
 - boulders
 - beaver dams
 - Refuse (tires, washing machines, etc)
 - old piling under bridge




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Substructure - Inspection and Rating

Debris

- Problems caused by debris
 - reduction in flow carrying capacity of bridge
 - scour
 - impedes fish passage
 - upstream siltation




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Substructure - Inspection and Rating

Debris

- Look at the entire bridge opening for any debris accumulation
- If debris is located away from the bridge, record under the “Channel” section
 - If has an effect on the bridge or has the potential to
- Indicate whether any significant debris is present by **Yes** or **No**
 - If Yes, explain
- No rating is required but the presence of debris may affect the Substructure General Rating
- Old piling is considered debris, note in Explanation




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Substructure - Inspection and Rating

Abutments

Bridge Component		Last	Now	Explanation of Condition
Abutments				
(Extended Backwall Piles (Y/N) - Y) (Extended Backwall Piles Spacing(mm) - 1500) (Total Number of Caps/Corbels - 1:1)				
Bearing Seats/Caps/Corbels Detail Ratings				
	N (count)	1 (count)	2 (count)	3 (count)
Last	0	0	0	0
Now	0	0	1	1
Bearing Seats/Caps/Corbels				
(Type - TREATED TIMBER)				
(Depth(mm) - 300)				
(Width(mm) - 305)				
Backwalls/Breastwalls				
Greatest Height (m)				
3.10				
Wingwalls				
5				
5				
(Total Number of Bearing Piles - 6:6) Piles Detail Ratings				
	N (count)	1 (count)	2 (count)	3 (count)
Last	0	0	2	3
Now	0	0	2	3
Piles				
2				
2				
X				
X				
Abutment Stability				
3				
3				
Rotted and bulging piles.				
Scour/Erosion				
3				
3				
Undetermined and eroded at A2.				




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Substructure - Inspection and Rating

Piers

Piers/Bents				Caps changed in 1988.	
(Type : PIER-COLUMN)					
(Total Number of Caps/Corbels : 3:3)					
Bearing Seats/Caps/Corbels Detail Ratings					
	N (count)	1 (count)	2 (count)	3 (count)	
Last	0	0	0	0	0
Now	0	0	0	0	0
Bearing Seats/Caps/Corbels				6	6
(Type : TREATED TIMBER)					
(Depth(mm) : 300)					
(Width(mm) : 350)					
(Total Number of Bearing Piles : 5:5)				Wide cracks and outer fibers are bulging at west pier P5 and east pier - P2, P5. Remaining piles have wide cracks and suspect rot.	
Piles Detail Ratings					
	N (count)	1 (count)	2 (count)	3 (count)	
Last	0	0	2	8	
Now	0	0	3	7	
Pier Shafts/Piles				2	2
Greatest Height (m)				4.50	
Bracing/Struts/Sheathing				5	4
				Missing 1 bottom plank at P2 but allows for pile inspection.	
Nose Plate				4	4
				Stream has degraded below bottom of nose plates.	
Paint/Coating (Colour Description :)				X	X
(Colour Code :)				No paint on nose plate.	
Pier Stability				4	4
				Rot in pier piles.	
Scour				5	5
				Minor scour behind both piers.	
Debris (Y/N)				Yes	
				Old piles.	
Substructure General Rating				2	2



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Substructure - Inspection and Rating


General Rating

- Governed by; refer to 1.10.3 and 8.15
 - Structural load carrying members
 - Caps/Seats ratings
 - Pile ratings
 - Backwall rating of 2 or less
 - Abutment and/or pier stability ratings

- The structural element ratings for both the abutments and piers must be taken into account when determining Substructure General Rating



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Substructure - Inspection and Rating

Questions??



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