



Substructure - Inspection and Rating

## Substructure Inspection and Rating




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## 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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## Introduction

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




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## Introduction

Substructure		Substructure	
Bridge Component	Left	Right	Examination of Condition
Abutments			
(Extended Backfill Pile (Y/N) - 1)			
(Extended Backfill Pile Spacing(mm) - 1000)			
(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 (ft) - 1.10)	3	3	Undermined at east abutment and breastwall piling missing and detached.
Wingspans			
(Total Number of Bearing Piles - #)			
Pile Detail Rating			
Left	0	0	0
Right	0	0	0
Piles	2	2	
Piling/Coating			
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			
(Type) -			
(Depth(mm) - )			
(Width(mm) - )			
(Total Number of Bearing Piles - )			
Pile Detail Rating			
Left			
Right			
(Pile Shaft/Pile)			
(Grouted Height (ft) - )			
Bracing/Struts/Sheathing			
Nose Plate			
Piling/Coating			
(Colour Description - )			
(Colour Code - )			
Piling Rating			
Scour			
Debris (Y/N)	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



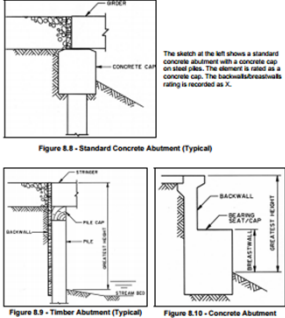
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## Abutments

December 28, 2005  
Chapter 8 - Substructure




The sketch at the left shows a standard concrete abutment with a concrete cap on steel girders. The element is noted as a concrete cap. The backwall/retaining wall 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



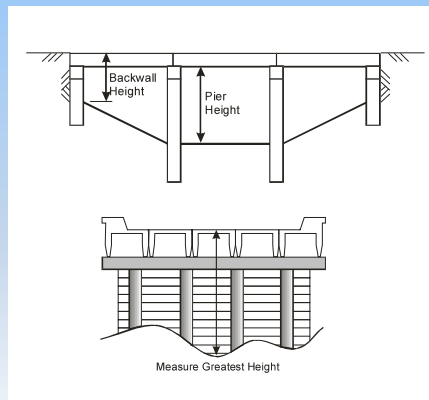
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## Backwall & Pier Height



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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



The photograph shows a concrete wingwall on the left side of a bridge structure, which is clearly separated from the main backwall. The structure is situated in a shallow waterway with some vegetation in the background.




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## Wingwall – Broken Pile



The photograph shows a wingwall structure in a waterway. One of the vertical piles supporting the structure is broken and leaning, indicating structural failure.




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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)

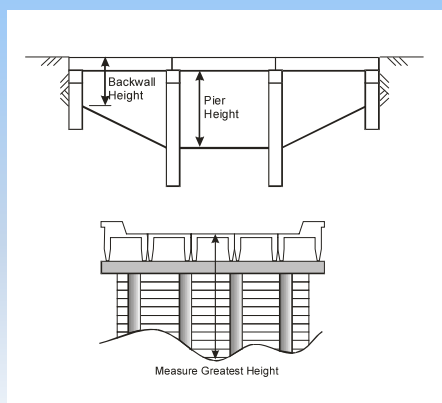


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## Backwall & Pier Height



The diagram consists of two parts. The top part is a cross-section of a bridge showing a backwall on the left and a pier in the center. Arrows indicate the 'Backwall Height' from the ground level to the top of the backwall, and the 'Pier Height' from the lowest point of the pier to the top of the pier cap. The bottom part is a similar cross-section showing a multi-span bridge with a central pier, with an arrow indicating the 'Measure Greatest Height' from the lowest point of the pier to the top of the pier cap.




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### Timber Pier Bent (Column) with Sway Bracing



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### Timber Pier Bent (Column) with Sheathing



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



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### Galvanized Steel Pier Bent (Column) with Bracing



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## 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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## 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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## 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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## 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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## 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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## Bulging Timber Cap—Rated 3







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## Crushing/Bulging Timber Pier Cap—Rated 2







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## Crushing/Bulging Timber Abutment Cap—Rated 2






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### Crushing/Cracked Timber Pier Cap – Rated 2



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### Crushing/Cracked Timber Abutment Cap – Rated 2



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### Crushing Timber Cap – Rated 2



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### Timber Corbels Major Bridges



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## Level 2 Timber Coring

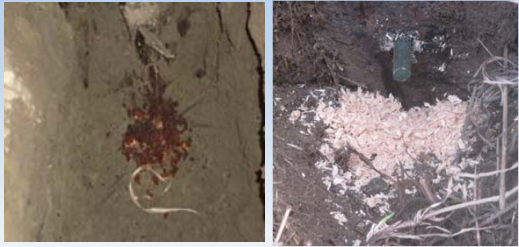


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## Level 2 Core Samples


Core shavings with rot Good texture and color – no rot



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## Fire Damaged Timber Cap with Section Loss



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## Concrete Pier Cap with Spalling



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## 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 :)			
<b>Piles Detail Rating</b>			
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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## 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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## 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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## 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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## 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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## Timber Abutment Piles Bulging – Rated 2






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## Timber Abutment Piles Bulging – Rated 2






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## Timber Abutment Piles Bulging/ Bowing– Rated 2






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### Timber Abutment Piles Wide Split—Rated 3



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### Timber Abutment Piles Horizontal Bending Crack—Rated 3



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### Timber Pier Piles with Rot — Rated 3



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### Timber Piles Repaired with Steel Splice




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## Timber Pile Not Sharing Load – Rated 3



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## 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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## 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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## 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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## 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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## 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

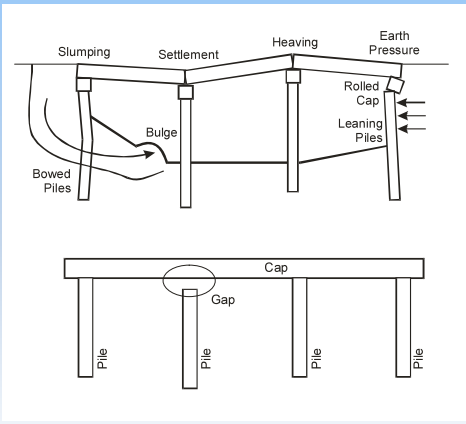



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## Abut/Pier Stability






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## 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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## Stability – Heaved Pier





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## Scour / Erosion

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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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Substructure - Inspection and Rating


## 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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## 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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## 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 sheathing 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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## Bracing / Struts / Sheathing

<b>Piers/Bents</b>				
(Type : <b>PIER-COLUMN</b> )				
(Total Number of Caps/Corbels : <b>8-5</b> )				
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 : <b>TREATED TIMBER</b> )				
(Depth(mm) : <b>356</b> )				
(Width(mm) : <b>356</b> )				
(Total Number of Bearing Piles : <b>10-9</b> )				
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				
			5	4
Greatest 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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## 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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## 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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## Nose Plate





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## 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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## Debris

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




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## 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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## Abutments

Bridge Component		Last	Now	Explanation of Condition
<b>Abutments</b>				
(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				
Scour/Erosion				
3				
3				

Caps cured July 16, 2014. .


A1 cap is crushing. A2 cap is beginning to bulge.

Undetermined at east abutment and breastwall planks missing and detached.


Piles cured July 16, 2014. A1-P1 is bowing and has rot full height. P6 is cracked and bulging at grounding and has rot full height. P9 has rot. P4, P5 beginning rot. A2-P1, P6 have rot. P4, P5 have beginning rot.

Rotted and bulging piles.

Undetermined and eroded at A2.




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## Piers

<b>Piers/Bents</b>				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
<b>(Type : TREATED TIMBER)</b>					
(Depth(mm) : 350)					
(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.	
<b>Substructure General Rating</b>				<b>2</b>	<b>2</b>




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## 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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## Questions??



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