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EIRSPAN Bridge Management System Principal Inspection Manual

AM-STR-06054
February 2017

AM Asset Management & Maintenance

Standards

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TII Publication Title	*EIRSPAN Bridge Management System Principal Inspection Manual*
TII Publication Number	*AM-STR-06054*

Activity	*Asset Management & Maintenance (AM)*		**Document Set**	*Standards*
Stream	*Structures (STR)*		**Publication Date**	*February 2017*
Document Number	*06054*		**Historical Reference**	-

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1. Description of Principal Inspection Manual

1.1 Introduction

This Principal Inspection Manual is produced by Transport Infrastructure Ireland (TII) to describe fully the procedure for undertaking Principal Inspections and inputting data into the database of the EIRSPAN Bridge Management System.

The Principal Inspection Manual is primarily a reference document for all parties involved in the management of bridges on the national roads including TII, PPP Concessionaires and Local Authority staff. It is envisaged that the reader will have access to the EIRSPAN database.

The purpose of this manual is to describe in detail how the Principal Inspection is carried out in the EIRSPAN system. Furthermore, this manual describes how to input the data into the EIRSPAN database.

1.2 Scope

A Principal Inspection is a systematic visual check of all the accessible parts of a structure.

A Principal Inspection of a National Road structure can only be undertaken by a Team Leader who has met the minimum educational and experience requirements stipulated by the TII Bridge Management Section and attended the TII EIRSPAN Training Workshop. The TII Bridge Management Section retains a list of approved Principal Inspection Team Leaders.

The EIRSPAN system is applicable to all structures with a total length (span) of 2.0m or greater and retaining walls with a retained height greater than 1.5m.

2. Description of the Principal Inspection

2.1 Introduction

A structure deteriorates as a result of internal and external effects including corrosion, overload, vehicle impact and erosion. It is therefore necessary to inspect a structure at regular intervals in order to determine its condition and identify changes in its condition over time.

A Principal Inspection, which is a systematic visual check of all accessible parts of the structure, is necessary for the following reasons:

a) To maintain traffic safety.

b) To evaluate the need for repairs.

c) To monitor changes in the condition of individual structures and the whole stock of structures.

d) To monitor the performance of routine maintenance.

The Principal Inspection Team Leader considers the following during the inspection:

a) A condition rating of the structure and each of its components. The condition is registered by means of a rating from 0 to 5 (0: As new; 5: Dangerous/Failed).

b) Registering the type and extent of any significant damage.

c) Registering the condition of routine maintenance by “Y” or “N” (“N” is used to signify that at the time of inspection there is no need for routine maintenance. “Y” indicates that at the time of inspection there is a need for routine maintenance).

d) Registering the need for Special Inspection (SI).

e) Registering the need for repairs to be carried out before the next Principal Inspection.

f) Determining the year of the next Principal Inspection. The inspection interval is between one and six years, depending on the condition of the structure, the level of traffic on the structure (in the case of a bridge) and the expected rate of future deterioration.

All data mentioned above, illustrated by photos as relevant, will be collected during the Principal Inspection and recorded on an inspection form (See Appendix A).

For each significant defect the proposed year of repair, extent and cost of repair is recorded. Multiple repair works may be registered for each structure component.

A condition rating is given and any necessary repair works stated for each standard component (bridge surface; expansion joints; footway/median; parapets/safety barriers; embankment; wing walls/ spandrel walls/retaining walls; abutments; piers; bearings; slab; girders/beams; riverbed; other elements).

All of the gathered data shall be input into the EIRSPAN database. Data from a Principal Inspection is used in the daily management of the structure. A number of standard reports are available:

a) To prepare overviews of the whole stock of structures based on the condition rating of each structure;

b) Principal Inspection reports (including inventory data; record of events at the structure; condition rating; need for repairs and Special Inspection; the next year for Principal Inspection);

c) Lists of structures for which Special Inspections or new Principal Inspections are required.

A description of the database functions is given in Chapter 5. Chapter 4 outlines the duties of the parties involved in carrying out Principal Inspections and implementing bridge management.

2.2 Undertaking the Principal Inspection

When carrying out Principal Inspections in the field, the Principal Inspection Team Leader should ensure the following:

a) Review existing Inventory and Principal Inspection reports to see if there are special circumstances which apply to the structure, such as previously observed damage or structural elements that need a close inspection.

b) At all structure sites it is normally advantageous to use the same procedure and use the same “inspection route” around the structure. For example, the procedure for inspection of a bridge could be as follows:

   i. Start by taking a photo of the structure identification plate, which has been placed directly on the structure (to assist in photo management later).

   ii. Take a photo of the approaches and bridge surface, parapets and expansion joints.

   iii. Inspect the components on the structure (bridge surface, expansion joints, footways, parapets, etc.) while walking the length of the structure.

   iv. Inspect slopes, abutment and bearings at the far end of the structure.

   v. Take the standard photos of abutment and piers, bearings and expansion joints.

   vi. Inspect piers, bearings, riverbed and the underside of the superstructure while walking under the structure.

   vii. Inspect the other abutment, bearings and slopes.

   viii. Take a photo of the elevation. (For extended structures it may be necessary to take photos of both elevations).

   ix. Assign the condition rating to the “Structure in General”.

This is not the only inspection route (and it is not always possible to follow it) but following the same procedure as far as possible makes it easier to optimise inspection time and ensure all components have been inspected. Reference may be made to Figure 2.1 below for an example of a suitable “inspection route”.

If the Inspector wants to describe the location of a specific observation, compass directions should be used. This co-ordinate system is defined in the inventory field “Direction of Primary Passage” (Inventory Manual).

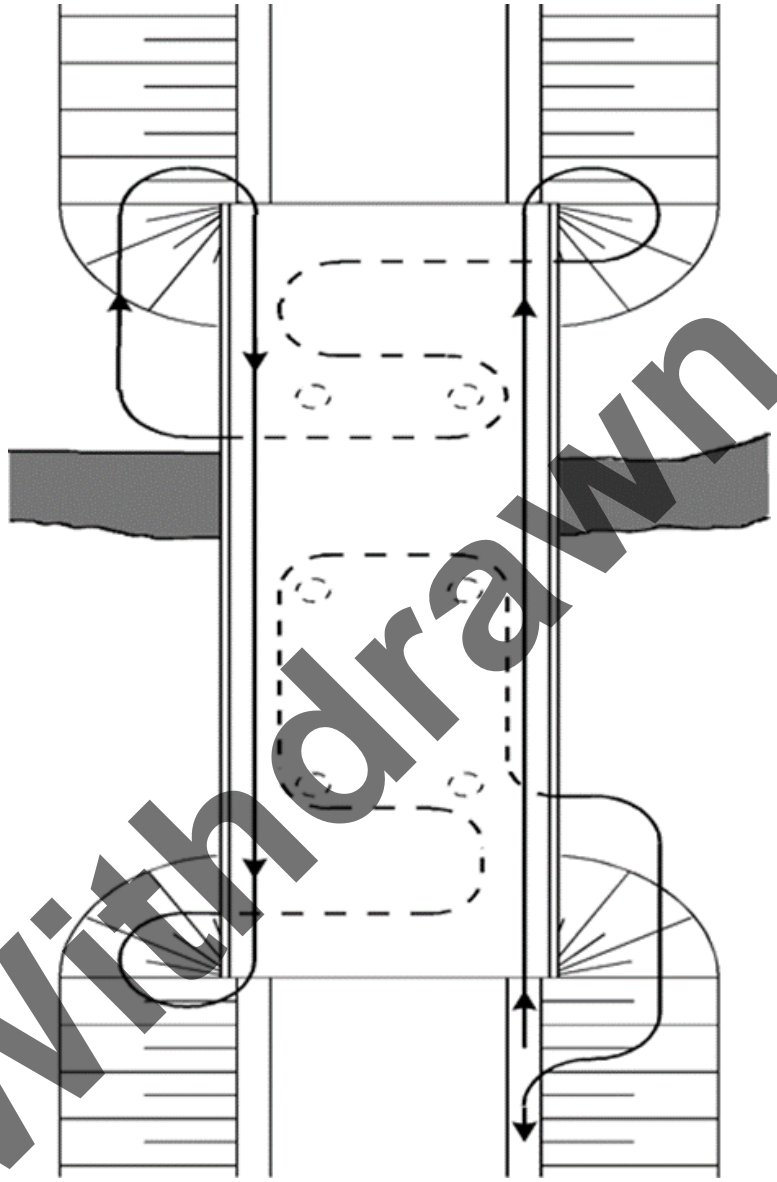


Figure 2.1: Suggested inspection route

2.3 Database Applications

For instructions on how to print a Principal Inspection Report see Chapter 5.

EIRSPAN Bridge Managers have access to a report generator to help them report inventory and inspection data in various forms.

For most types of standard report it is possible to choose reports covering all Maintaining Agents, one specific Maintaining Agent, or one road (in one Maintaining Agent's area). The header of the report will show which selections are made.

Each of the standard reports is described below:

a) Inspection Report

This report contains all inventory data and all data from the latest Principal Inspection on one structure. It contains photo pages for the photos taken during the inspection. The report will also give a chronological overview for the structure, indicating dates and condition ratings for previous Principal Inspections, as well as identifying the significant events such as major repairs or replacement of components, as entered on the database by the bridge managers. An example is shown in Appendix D.

b) Inspections in a Given Year

This report lists the structures (within the geographical selection) which require inspecting in a given year. The report is used for planning batches of Principal Inspections. The proper use of this report ensures that all structures are inspected in due time.

c) Average Conditions

This report provides the average condition rating of components. Selections can be made for all structures on the database, all structures within a particular Maintaining Agent, and finally the aforementioned with a particular Passage selected.

d) Batch of Principal Inspection (PI) Reports

This report allows the user to select a batch of Principal Inspection reports determined by the Maintaining Agent and/or Passages as one report. The user may omit or include the inventory data, inspection data, component data or drawings and sketches by selection of a tick box.

e) High Condition Ratings

This report provides a list of structures and their components where the minimum condition rating can be set as a parameter. Selections can be made for all structures on the database, all structures within a particular Maintaining Agent, and finally the aforementioned with a particular Passage selected.

f) Request for Special Inspections

This report provides a list of structures and their components that require an SI. Selections can be made for all structures on the database, all structures within a particular Maintaining Agent, and finally the aforementioned with a particular Passage selected.

g) Condition Ratings for Structure in General

This report provides a list of structures where the minimum condition rating for component 14, Structure in General, can be set as a parameter. Selections can be made for all structures on the database, all structures within a particular Maintaining Agent, and finally the aforementioned with a particular Passage selected.

3. Principal Inspection Reporting

3.1 Introduction

The reporting instructions describe in detail the information that is to be entered into the data fields in the EIRSPAN database.

The description of data is divided into two sections:

a) Principal Inspection;

b) Standard repairs.

A Principal Inspection Registration Form can be used for collecting data at the structure site. The data appears in almost the same order in the forms as in the screens of the EIRSPAN system. In this chapter the data fields are explained as they appear in the screens.

In order to make text easier to read, all text should be entered in lower case, that is, without the use of the shift or caps lock keys (except, of course, for capital initial letters). Texts must not contain quotation marks (either single ‘ or double “).

3.2 Principal Inspection

This chapter describes in detail the Principal Inspection data in the EIRSPAN database.

a) Structure Number

The structure number (structure identification) is described in the Inventory Manual. It consists of:

i. Regional identification;

ii. Road number;

iii. Structure serial number.

b) Structure name

The structure name is also described in “Inventory”.

c) Inspection date

The day the inspection was performed in the field (not the day the information is entered into the EIRSPAN database). All dates in EIRSPAN must be written in figures as day/month/year.

d) Weather

The weather conditions on the inspection day. The following options exist: Dry, Drizzle, Frost, Rain, Snow, Sunny and Overcast.

e) Temperature

The temperature (in the shade) at the time of the inspection in degrees Celsius (°C).

f) Initials/name

The initials of the Inspector.

g) Year of the next inspection

It is essential for the functioning of the whole management system that the Inspector clearly states when the next Principal Inspection should be undertaken.

The interval between two Principal Inspections may be from one to six years, depending on the condition of the structure and the traffic:

i. If the structure is in poor condition and the traffic is heavy, the next inspection should be carried out in the following year.

ii. If the structure is in good condition the next inspection will be carried out in six years.

iii. If the structure has some damage the next inspection should be performed within a period of one to six years, taking the extent, the likely development of damage and the traffic volume into consideration.

iv. The year of next inspection should be determined assuming that proposed repair works will not be executed (because the Inspector cannot be certain that the proposed works will actually be carried out).

h) Team Leader Name

The name of the Team Leader who has undertaken the Principal Inspection. It is a TII requirement that all Principal Inspections of National Road structures are carried out by a Team Leader who has met the TII minimum education and experience requirements and attended TII's EIRSPAN Training Workshop. The TII Bridge Management Section retains a list of approved Team Leaders.

i) Inspection Organisation

The organisation that has undertaken the Principal Inspection.

j) Inspection Equipment

If special equipment is required for undertaking Principal Inspections it is indicated in this field. The options available are shown in Figure 3.1.

Figure 3.1: Inspection Equipment.

0	Nothing
1	Underbridge Unit (on the Structure)
2	Lift (Scissor, telescopic – under the Structure)
3	Boat
4	Confined spaces apparatus
5	Irish Rail Permit
6	Traffic Management
9	Other

k) Traffic Data

The traffic data must reflect the most recent count for the actual stretch of road. Traffic flow data can be obtained from the TII website at https://www.nratrafficdata.ie

The traffic data should consist of:

i. AADT (Annual Average Daily Traffic);

ii. The percentage of heavy vehicles;

iii. The percentage of light vehicles.

There is no longer a requirement to factor the % HGV by 0.75, which was the case in the past. The actual HGV figures noted on the TII website shall be used.

l) Remark

In this field the Inspector may add a descriptive comment to the Principal Inspection performed.

m) Components

The evaluation of the structure condition is divided into the fourteen components as illustrated in Figure 3.2.

Figure 3.2: Standard components of a structure.

1	Bridge Surface
2	Expansion Joints
3	Footway/Median
4	Parapet/Safety Barrier
5	Embankments/Revetments
6	Wingwalls/Spandrel Walls/Retaining Walls
7	Abutments
8	Piers
9	Bearings
10	Deck/Slab
11	Beams/Girders/Transverse Beams
12	Riverbed
13	Other Elements
14	Structure in General

The condition of the structure is evaluated for each of the above mentioned standard components 1 to 13, and component 14 “Structure in General”.

The following provides a description of what has to be evaluated for each of the components:

a) Bridge Surface

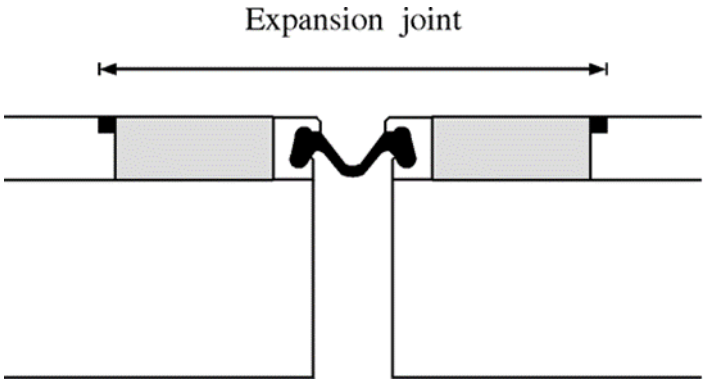
This component comprises surfaces (mostly asphalt or concrete) on the bridge and on the approaches (up to 10.0m from each end of the superstructure). The component includes bituminous joints but does not include expansion joints.

The component includes the whole surface of the bridge, normally the area between the kerbs. A grass verge or an area without wearing course between the carriageway and the kerb is considered as “damage” to the bridge surface for all structure types because it allows water to penetrate into the slab. In addition, this component includes drainage and waterproofing membrane.

b) Expansion Joints

This component comprises all expansion joint construction components including nosings (e.g. epoxy), rails, neoprene inserts and bituminous joints adjacent to the joint construction (as shown in Figure 3.3). This includes road, footway and edge beam joints as appropriate.

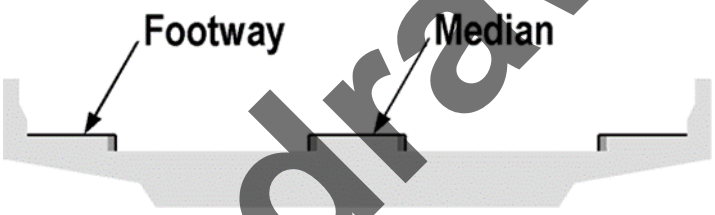
Figure 3.3: Expansion joint



c) Footway/Median

This component includes surfaces and kerbs on footways and medians, as shown in Figure 3.4. A soft verge or median present over structures should be called up in "Damage" for all structure types as their presence allows water to percolate down to the deck slab/masonry arch.

Figure 3.4: Footway/median



d) Parapet/Safety Barrier

This component includes the parapets, safety barriers and railings at bridge edges and in medians. All safety barrier on bridge approaches and that protecting piers and abutments, as well as any safety barrier on the bridge is included under this component.

Local damage to the slab (or edge beam) in the anchorage zone of railing posts, caused by for example, vehicle impact, is considered as damage to the parapet or safety barrier. If there is no safety barrier on the approaches to a parapet, or a clearly inadequate safety barrier, engineering judgement should be used to decide whether to install/replace the safety barrier giving consideration to the structure location, road geometry, traffic flows etc.

e) Embankment/Revetments

This component comprises slopes, including slope protection (revetments), adjacent to the abutments and wing walls.

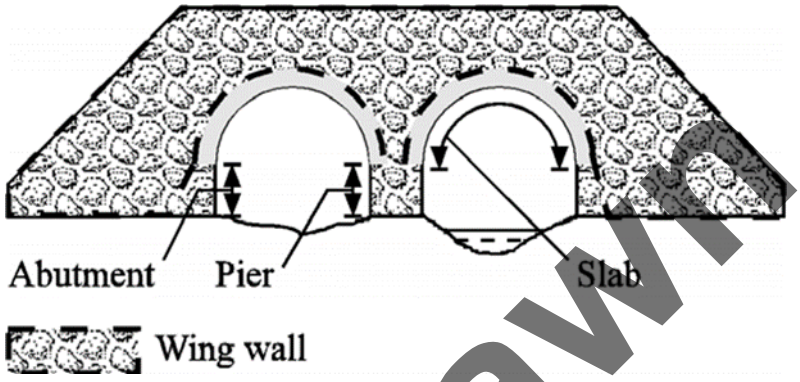
f) Wingwalls/Spandrel Walls/Retaining Walls

This component includes wingwalls and retaining walls that form part of the bridge. In instances where masonry retaining walls are very long and adjacent to a masonry retaining wall that retains a road the Inspector must decide the extent of retaining wall that can be considered part of the bridge.

In the absence of a defining feature which illustrates the end of the bridge structure retaining wall the Inspector shall identify the end of the retaining wall by considering whether the bridge would be affected if this retaining wall were to suffer significant deterioration. The length of retaining wall in such circumstances seldom exceeds 10m in length.

On concrete and masonry arch bridges of the closed type, the whole vertical wall beneath the parapet is considered and evaluated as Spandrel Wall/Retaining Wall (Figure 3.5).

Figure 3.5: Components of arch bridges



g) Abutments

This component comprises the whole abutment structure including ballast wall, curtain wall, bearing shelf, bearing plinth/pedestal and visible parts of footings.

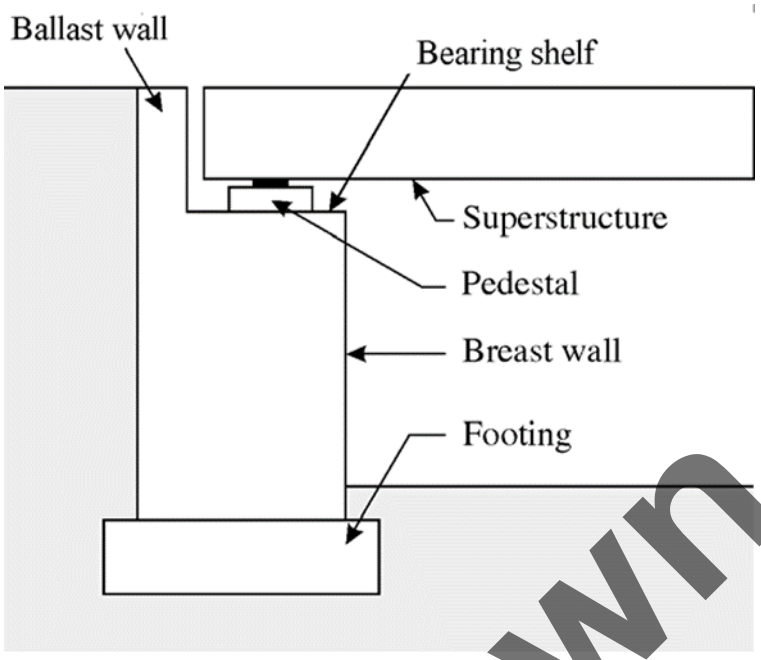
Figure 3.6 illustrates the different elements of a typical abutment cross-section.

Very local damage to the bearing plinth is regarded as damage to the component “Bearings”.

Erosion or scour under abutments is regarded as damage to “Embankment / Revetments” and/or “Riverbed”. Only settlement or other damage to the abutment itself is evaluated under the component, “Abutments”.

On arch bridges (see Figure 3.5 above) the vertical parts of the end supports (up to the arch springing level) are regarded as “Abutments”.

Figure 3.6: Typical cross section of abutment



h) Piers

This component comprises the whole pier structure including bearing plinths and visible parts of footings. Very local damage to bearing plinths (pedestals) is regarded as damage to the component "Bearings".

Erosion or scour under piers is regarded as damage to the "Riverbed". Only settlement or other damage to the pier itself is evaluated under the component "Piers".

On arch bridges, the vertical part of the intermediate supports (up to arch springing level, see Figure 3.5) are regarded as "Piers".

i) Bearings

This component comprises the bearings on abutments and piers and in half-joints in cantilevered superstructures: it includes grouting under base plates.

Very local damage to bearing plinths is regarded as damage to the component "Bearings".

j) Deck Slab

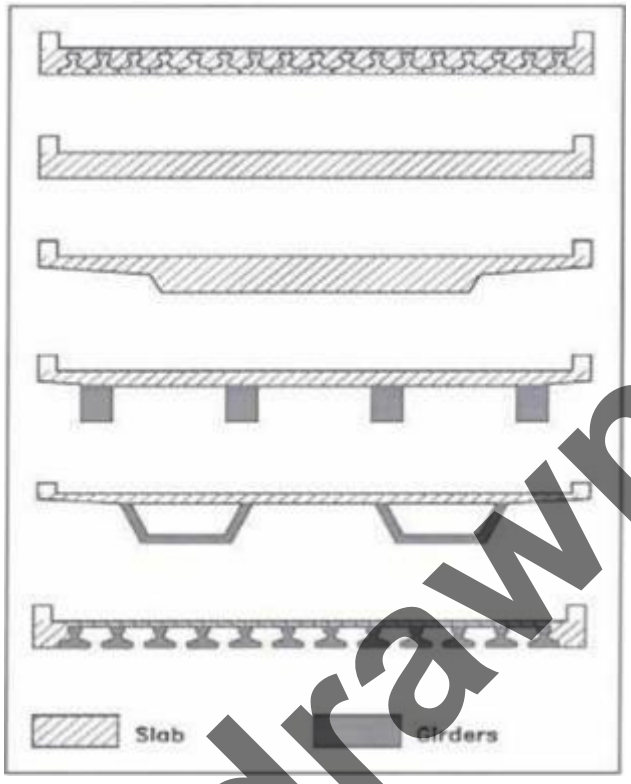
The Deck Slab may be described as the part of the superstructure that is not beams/girders (see Figure 3.7). The slab includes, where relevant, cantilevered footways.

Closely-spaced inverted T-beams are considered as a "Slab" whereas beams spaced so that a deck slab is visible through the gaps between the beams are considered as "beam and slab" with only the top deck slab being recorded under "Deck/Slab".

On arch bridges of the closed type, the arch barrel is regarded as "Slab" for the purpose of Principal Inspection (Figure 3.5).

Top slabs in box girders are part of the component “Deck”.

Figure 3.7: Distinction between “deck slab” and “beams/girders”



k) Beams/Girders/Transverse Beams

In addition to the main longitudinal beams (see Figure 3.7) this component comprises cross beams and diaphragms, bracing beams and other similar elements.

Bottom slabs in box girders are part of the component “Beams/girders”. On slab bridges this component is “not applicable”.

l) Riverbed

This component includes the riverbed immediately upstream and downstream of a bridge as well as the area under the structure. The area around piers and abutments is particularly important, being susceptible to scour damage.

The Inspector should inform the TII Bridge Manager of any environmental pollution in watercourses.

m) Other Elements

This component comprises any significant components present but not included in the above mentioned standard components. (i.e. stairs on a pedestrian bridge, lighting posts, stays of cable-stay bridges, etc.).

For structures comprising pipes, the condition of the pipes shall be recorded in “Other Elements”.

n) Structure in General

Under this component, the overall condition of the structure is stated considering the structure as a whole. Reference should be made to “Condition rating” in Chapter 3.

The condition rating of the structure is determined taking into account which components are damaged, the type and extent of damage, the expected deterioration rate, and the influence the damage has on traffic flow.

This means that the condition rating of the component “Structure in General” is not necessarily the rating of the worst damaged component (because this may be a less important component). Neither is it necessarily the average of the component ratings (because one structurally important component may have a rating considerably different from the average).

Example 1:

All of the components have a condition rating of 2, except the beams/girders, which have a rating of 4. This will normally lead to a rating of 4 for “Structure in General”, because the beams/girders are essential structural members.

Example 2:

All of the components have a condition rating of 1, except for “Bridge Surface” which has a rating of 3 because the asphalt is missing along the edge beam. In this case the rating of the “Structure in General” will be 1, because the bridge fulfils its function even with this missing asphalt.

As a general rule the following applies:

The condition rating for “Structure in General” cannot be worse than that of the worst of the other components, and the condition rating of “Structure in General” cannot be better than that of the worst of the “important” components; Deck Slab, Beams/Girders/Transverse Beams, Abutments, Piers, Bearings. Only under very special circumstances may deviations from this rule occur.

The component “Structure in General” must exist on all structures, which means that it must receive a condition rating.

If it is not possible to give a rating because one of the important components referred to is rated “?” then “Structure in General” must also be rated as “?”. It must never be left with “-”, because this indicates that the component does not exist. If special access is required to complete the Principal Inspection then the special access should be used to complete the inspection. The Inspector should not enter a condition rating of “?” due to the need for special access.

If any structure is found to have a “Structure in General” rating greater than 3 then the Bridge Manager shall be informed by telephone and one copy of the Inventory and Principal Inspection Reports shall be submitted to the Bridge Manager within 48 hours. If the safety of bridge users is jeopardised then the Local Authority and Gardaí shall also be informed.

o) Condition Rating

The evaluation of the condition rating for each component must be carried out taking into consideration the degree of distress or deterioration of the component and its ability to fulfil its function, or in other words, its ability to sustain the applied strain or load.

The condition rating should not be influenced by lack of routine maintenance (see "Maintenance Rating" in Chapter 3). However, if the lack of proper routine maintenance has led to damage to the structure, this may influence the condition rating.

The condition rating is a figure from 0 to 5, according to the following guidelines:

Figure 3.8: Condition rating

0	No or insignificant damage
1	Minor damage but no need for repair
2	Some damage, repair needed when convenient. Component is still functioning as originally designed. Observe the condition development.
3	Significant damage, repair needed very soon. i.e. within next financial year.
4	Damage is critical and it is necessary to execute repair works at once, or to carry out a detailed inspection to determine whether any rehabilitation works are required.
5	Ultimate damage. The component has failed or is in danger of total failure, possibly affecting the safety of the road user. It is necessary to implement emergency temporary repair work immediately or rehabilitation work without delay after the introduction of load limitation measures.
?	Unknown
-	Does not exist

As an aid to evaluating the condition rating, Appendix B lists guidelines for each of the components:

i. Routine maintenance works.

ii. Typical types of damage.

iii. A description of how serious this damage must be to give a condition rating of 3.

If any of the structurally important components (Abutment, Pier, Bearings, Deck Slab, Beams) receive the condition rating “?”, the component “Structure in General” must also be read as “?”.

3.3 Assessment of Cracks

It is beyond the scope of this document to describe in detail how to evaluate damaged structures. It is assumed that the Inspector is capable of assessing the degree of distress/deterioration and to determine which parts of the structure need close investigation. The guidance below is prudent. Technical Report No 22 “Non-structural cracks in concrete” produced by the UK Concrete Society is also a useful guide.

a) Common reinforced concrete structures will not fail without early warning such as coarse cracks and visible deflections, while connections in steel structures exposed to repeated loads may fail in fatigue without any warning other than very fine cracks. Therefore, potentially vulnerable details of steel structures should be pinpointed in advance of the Principal Inspection in order to give these details a closer inspection.

b) Bearings often need a close inspection. The stresses at the bearings are high, therefore there is a danger of crushing, in particular if the bearings are misplaced or badly designed.

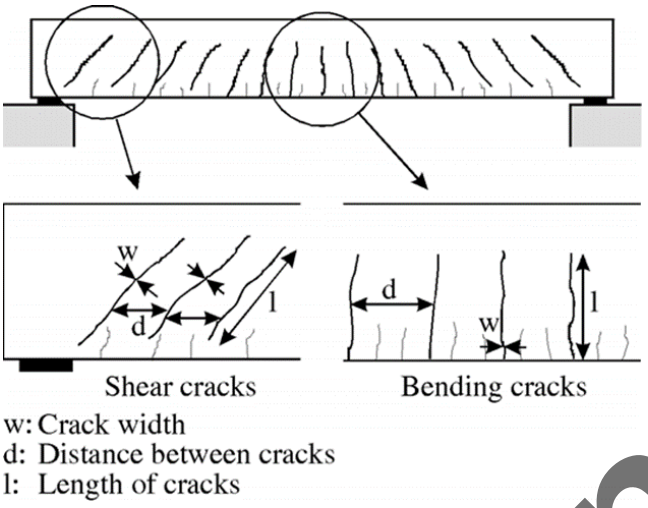
Reinforced concrete girders may present a crack pattern as shown in Figure 3.9. This is not necessarily dangerous. The following rough guidelines may be used:

a) If all the crack widths are less than 0.3mm it may be assumed that the stresses are not too high and no further action is to be taken. The condition mark will be 2 or 3. Make a note of the cracks in the field “Damage/Remark” so the next Inspector will know that the cracks are not new.

b) If the crack width is between 0.3 and 0.6mm the stresses may be high but they are not assumed to be dangerous. The Inspector must record in the Principal Inspection report the crack width, crack length and crack distance in shear and bending zones in the field “Damage/Remark”. Crack widths are measured using a “crack width gauge”. Note that some cracks have broken edges that make the crack look wider than it is. Vernier scales and Demec studs or similar must also be used to provide baseline recordings in the report to one tenth of a millimetre; changes in crack width over time can therefore be measured to one tenth of a millimetre and compared to the baseline reading in the report. The crack shall be marked and labelled with crayon and photographed for the report. The condition rating will normally be 3.

c) If the crack width is larger than 0.6mm it indicates that the stresses are high and that there may be a problem regarding the carrying capacity. The dimensions of the girder, the crack width, crack length and crack distance in shear and bending zones should be noted in the field “Damage/Remark” and a Special Inspection should be requested. The width of bending cracks will be measured at the main reinforcement even if the crack width may be larger at a greater distance from the edge of the beam. The condition rating will be 4 or more.

Figure 3.9: Normal crack pattern in simple span beam.



"S-shaped" cracks (shear cracks) e.g. near the centre of the span or, on continuous girders near the supports, indicate very high stresses in bending as well as shear. In this case, the Inspector must always ask for a Special Inspection (see Figure 3.10).

Figure 3. 10: "S-shaped" crack in beam

If the crack pattern is different from the typical form shown in Figure 3.9 and the Inspector is not sure whether the cracks are significant, an SI must be requested.

Diaphragms may also have serious bending and/or shear cracks indicating overload, requiring Special Inspections.

Cracks or spalling at the joint between main girders and diaphragms may indicate anchorage problems due to insufficient or wrongly placed reinforcement.

Even relatively fine "map-pattern" cracks on the underside of thin deck panels may indicate insufficient load carrying capacity. Often the cracks appear in the asphalt surface too. (A systematic crack pattern in an asphalt surface often indicates problems in the deck).

Eccentricity between piles and columns may induce bending moments in columns (and piles). Normally structures are not designed to withstand this.

Inclined coarse cracks over the entire cross section of columns or piles may indicate a compression failure (in particular if there is a displacement between the two parts on either side of the crack).

It is essential for the function of steel trusses and lattices that the members (in particular members in compression) are not deformed as compression forces in conjunction with deformation produce unintended bending moments and a risk of stability failure.

Connections in steel structures may collect dust and water. Therefore the risk of corrosion is high, and for this reason, routine maintenance is very important. It may be necessary to clean such areas during the inspection in order check for signs of corrosion.

If welding in high-stress areas of steel structures is not executed correctly, fatigue cracks may occur at the edge of the welded areas. A close inspection is necessary to locate such cracks.

If the Inspector encounters signs of inadequate load carrying capacity (some of the above mentioned or others), a Special Inspection should be considered.

Damage in masonry arch structures in the form of settlement, cracking, bulging, rotating or other movement or defects also require careful consideration by the Inspector. Cracks in masonry arch structures also often require monitoring; crack widths may be too large to be measured with a crack width gauge. It is very important to determine whether the crack is active or historic. If the crack requires monitoring then Vernier scales should be used to record the baseline measurement to one tenth of a millimetre. If appropriate a crack width gauge can be installed, with initial baseline readings recorded in the report by the Inspector.

3.4 Monitoring

Monitoring is not a repair work and should not be entered as such (i.e. by using repair type “Z – Other” and entering a description of “Monitor”).

If an Inspector decides, for instance, that a concrete structure contains a significant crack that requires monitoring, they shall install a crack gauge or Demec discs and record a Demec gauge reading in the Principal Inspection Report. A short interval to the next Principal Inspection shall be chosen to facilitate monitoring. Supplementary information in the form of sketches showing the extent and size of cracks (with scale) shall be included in the report. These shall be imported as “photos” into the database under the appropriate component. Refer to Chapter 5 on how to import photos into the database.

3.5 Maintenance Rating

Routine maintenance works are carried out regularly by the party responsible for routine maintenance which may be TII, the PPP Concessionaire, the Local Authority or the Motorway Maintenance and Renewals Contractor (MMaRC). Any lack of proper execution of these works shall not affect the condition rating: however if a lack of properly executed routine maintenance leads to a structural defect for any component then the Inspector shall obviously take account of the defect when giving a condition rating. If routine maintenance is required for a component then “Y” shall be entered against that component. If routine maintenance is not required then “N” shall be entered. A maintenance rating of “Y” or “N” shall be entered for all components. If “Y” is entered for any component 1 to 13 then “Y” shall be entered for component 14 Structure in General, otherwise “N” shall be entered for component 14.

If “Y” is entered for any component then details of Routine Maintenance work required shall be provided in the “Damage” field for that component (i.e. removal of vegetation, removal of graffiti, masonry repointing).

3.6 Special Inspection

If the Inspector is uncertain regarding the evaluation of a defect, the consequences or the extent of damage, or if he is not certain which repair strategy to recommend he may request a Special Inspection (SI).

In addition, if the Principal Inspection reveals that a load capacity assessment is required an SI should be requested. Further, if the repairs required are so large that the repair strategy affects the whole life cost of the bridge then an SI shall be requested (i.e. extensive spalling and reinforcement corrosion on a bridge soffit may require an SI to determine the optimum repair strategy). This is done by inserting "Y" in the SI field. Otherwise the field is left blank.

Results of Special Inspections are used in deciding the optimum repair strategy for a structure and for deciding which structures to repair if funds are not sufficient for carrying out all requested works.

For this reason an SI should be carried out prior to rehabilitation or replacement works, unless the extent is insignificant and/or the optimum repair strategy obvious.

Access to the soffit of some short span structures may be made very difficult because of high water levels. Inspectors should return to such structures to undertake their inspection at a time when water levels are expected to be lower. If water levels do not recede and diving equipment is required to complete the inspection, then an SI shall be requested on the basis that an underwater inspection is necessary. Small diameter piped structures may be inaccessible and require a CCTV inspection. This is not classified as an SI and shall be arranged and undertaken by the Inspector as part of the Principal Inspection. Similarly, confined space inspections shall be arranged and undertaken as part of the Principal Inspection and not highlighted as an SI. This includes long culverts, abutment galleries and other confined spaces.

Access to the whole of the substructure element of some bridges may be made difficult because of high water levels. Inspectors should return to such structures to undertake their inspection at a time when water levels are expected to be lower. If water levels are not expected to be lower than engineering judgement should be used to decide whether an underwater inspection is necessary.

If a request has been made for an SI for a particular component, the Inspector must not also enter an SI request in component 14.

Examples of types of damage which often require an SI (reference should also be made to the "Assessment of Cracks" section in Chapter 3) are:

a) Slab (top side):
   i. Major cracking or spalling of concrete.

b) Superstructure:
   i. Cracks in concrete caused by corrosion of reinforcement.
   ii. Cracks in critical areas of concrete members.
   iii. Failure of primary members.
   iv. Uncontrolled movement of bearings.
   v. Cracks or severe corrosion in steel members.
   vi. Masonry arches with distortion, major settlement or major cracking.

c) Substructure:

i. Cracks in concrete caused by corrosion of reinforcement.

ii. Movement or settlement of piers or abutments.

iii. Severe cracking or spalling in concrete members.

iv. Failure of pier or abutment members.

If an SI is requested the Inspector shall describe in detail in the remarks column the reason for calling the SI and brief details of what he expects the SI to achieve. The Inspector shall use engineering judgement to recommend the most appropriate repair method notwithstanding that a SI has been requested. The Inspector shall enter the repair details, cost and year of repair against the defect for which an SI has been requested.

Tranches of SIs may be ordered by the Bridge Manager from time to time, for example Post-Tensioning Special Inspections (PTSIs).

3.7 Special Access

Inspectors shall organise their own access if a scissor lift, mobile tower, boat, underbridge unit or confined space apparatus is required. In extreme cases where access to bridges is not possible, for example because both ends of the bridge have been subjected to fly-tipping, the TII Bridge Manager will assist in arranging to clear a path to the bridge.

3.8 Damage/Remark

This field is used for a description of damage or other remarks on condition, routine maintenance, repairs, SIs and other relevant items. In particular, if an SI is requested, a specific and detailed description of the problem is required (reference should also be made to the “Assessment of Cracks” Chapter 3).

If the Inspector wants to make reference to a particular element, compass directions as defined in the inventory field “Direction of chainage of primary route” must be used.

The text entered into these fields is printed as text on all photo pages for this component.

If the Inspector wishes to refer to a specific photo, the photo identification must be included in the text. For example, “Photo 1: Impact damage to main beam E1”.

3.9 Type of Damage

If there is damage to a component, the damage type must be indicated in this field using the codes in Figure 3.11.

If code “90-Other” is used, the type of damage should be described in the field “Damage/Remark”.

If a component has more than one type of damage at the same time, code “90-Other” must be used. The damage will be described in the “Damage/Remark” field.

10	Cracking of concrete
11	Corrosion of reinforcement
12	Spalling
13	Carbonation
14	Corrosion of structural steel
15	Cracking of steel
16	Loose connections
17	Structural damage
18	Permanent deformation
19	Wear and abrasion
20	Material deterioration
21	Abnormal vibration
22	Water seepage
23	Tilt/settlement
24	Erosion/scour
25	Ponding of water
26	Debris and vegetation
27	Blockage of drain
28	No pipe/inadequate pipe length
29	Vehicle impact
30	Potholes
31	Rutting
32	Cracking
33	Abnormal noise
34	Rupture
35	Material loss/disintegration
36	Silting of culvert
37	Inadequate size of component
38	Corrosion
39	Missing
40	Grass verge over structure
41	Damaged paving slab
42	No safety barrier
43	Inadequate parapet height
44	Damaged/missing mesh
45	Loss of masonry pointing
46	No parapet/barrier connection
47	Bulging
90	Other
91	Not applicable
92	Unknown
93	Not registered

3.10 Number of Photos

In this field of the database the number of photos taken of each component is generated by the database as photographs are uploaded. This allows the EIRSPAN report program to print the appropriate number of photo pages. The text entered in the field “Damage/Remark” is printed as text below all photos for each component.

All photos shall be number-referenced if more than one photograph is required for any component. All photos shall be date-stamped. The file size of each photograph shall be at least 250KB and shall not exceed 2MB.

The Principal Inspection must always include the following photos, which are noted under the relevant elements:

a) Bridge approach (showing surface, parapets, footways and medians, seen from one end of the bridge). If there is a signpost with the name of the bridge, this should be included in the photo. Upload the approach photo under component 1, “Bridge surface”.

b) Bridge elevation (showing the whole structure (if possible) from one side). If the elevations are different, i.e. extensions to original structure, then two elevation photographs shall be taken. The elevation photo is entered under component 14, “Structure in General”.

c) Abutment (showing the general arrangement of the abutment, including the underside of the superstructure). If the abutments are of different types, photographs of both should be taken.

d) Pier (showing a pier and the underside of the superstructure). If the bridge has different types of piers, photos of all types should be taken.

e) Bearings: If the structure has different types of bearings, photos should be taken of all types, if accessible.

f) Expansion Joints on the structure should be photographed separately as they may not be easily recognisable on the “approach” photo.

As an aid in identifying the photos from a specific structure it may be useful to start with a photo of the structure identification plate which has been placed on the structure as part of the inventory activity. This photo shall not be included in the report.

When photographing some defects it may be appropriate to include items such as a pencil or ruler which help the viewer to gain an appreciation of scale from the photograph. A wax crayon can help highlight cracks or locate monitoring studs.

3.11 Sketches/Drawings

Drawings and sketches are typically not needed except where stated below. However, they can be provided to explain a particular problem or defect by scanning as a photo in GIF, JPG, JPEG, BMP or PNG format.

A sketch showing the plan of all footbridges shall be included in the Principal Inspection Report as a photo under Component 14. The sketch shall be annotated to show:

a) The minimum vertical clearance above each verge and hard shoulder.

b) Any locations where the setback from the kerb (or edge of wearing course) to a pier is less than 4.5m.

Sketches showing particular defects shall be uploaded under the relevant component.

3.12 Repair Work

In these fields the Inspector confirms which repairs are required for the component. A condition marking of 2 or more indicates that there is a need for repair, therefore if the condition rating is 2 or more, repair work must always be noted. The database will give a reminder to the user if a Condition Rating of 2 or more has been entered without repair work being called up.

Appendix C contains a list of standard repairs relating to each component, the unit of measurement (m, m2, m3, etc.) and a unit price for the execution of the work. It is possible to assign multiple repairs to each component.

For each repair work the extent and the year of repair will be stated. The register of standard repairs contains unit prices, and EIRSPAN calculates the total cost from these unit prices and the extent of repair. The extent of repair is measured on site. The year of repair is determined giving consideration to the health and safety risk to the public and the expected development of damage. Condition Rating 3 means repair is required within the next financial year whilst Condition Rating 2 means repair required when convenient.

If there is no immediate risk to road users it is in many cases economic to postpone the repair. The repair should be made before a risk to road users arises, before the damage develops into a type that is more expensive to repair, and before other structure components are affected.

If the proposed repair work is not in the list of standard repairs, the standard repair code “Z-Other” should be used, and the Inspector must describe the proposed work in the “Damage/Remark” field. In this case the Inspector must estimate the cost of the repair and enter it into the field “Cost” (in € including VAT).

If the Inspector believes the standard repair cost as calculated by the EIRSPAN programme is inaccurate, the Inspector is obliged to manually overwrite the calculated cost with the estimated cost in the “Cost” date entry field of the “Components – Details” tab in EIRSPAN.

It is important that accurate repair costs are entered as the costings may be used by bridge managers for budget purposes. Even if the Inspector requests a Special Inspection he must use engineering judgement to determine the type and extent of repairs and enter a best estimate of the cost of the Works.

It should be noted that routine maintenance works are not stated here, nor are the costs of routine maintenance works entered.

3.13 Standard Repair Works

The concept of standard repairs may be used for budgeting of repair works.

The register of standard repairs (Appendix C) contains a list of standard repair works for each of the structure components. Only TII may modify the list (Chapter 4, Bridge Management Structure).

The data in each standard repair is described below:

a) Letter

   i. The “reference” of the repair work within the specific structure component, indicated with letters, A, B, C, etc.

   ii. The letter “Z” indicates the work type “other” within each of the components. This repair work is used when no appropriate standard repair exists in the list.

b) Name

   i. The name of the standard repair. The name may consist of up to 55 characters.

c) Unit

   i. The unit of measurement of the repair work. The unit may consist of up to 6 characters. Special characters such as ² should not be used; square metres and cubic metres are to be written as m^2 and m^3 respectively (because the special signs will not be printed correctly on all printers).

d) Unit Price

   The price (in €) of repair of one of the units described above. The unit price should be calculated on the assumption that the extent is of “average” size. Given the unit price will vary depending on many factors including repair size, location of defect, traffic management needs, etc., the Inspector must not rely on the standard repair cost calculated by the EIRSPAN programme. As stated in Chapter 3 the Inspector is obliged to overwrite this standard cost if he believes the cost is inaccurate.

   The unit price must include all costs arising from the repair - that is, it includes the design of the repair work, the cost of the contract, supervision and the internal administration of the work.

   The prices should include VAT.

   It is possible to change prices of specific works, or it is possible to change all prices by a specified percentage.

e) Description

   The description describes the type of work included in each repair work.

4. Bridge Management Structure

4.1 Introduction

There is a diverse network of organisations involved in managing bridges on Motorways, National Primary and National Secondary roads in Ireland:

Transport Infrastructure Ireland:

a) Senior Project Manager (Structures) – leads TII Structures Section.

b) Project Manager (Bridge Management) – responsible for TII bridge management.

c) 3 Regional Bridge Managers – (Leinster, Munster and Connaught/Ulster), help to implement bridge management in the regions.

d) Database administrator – maintains the EIRSPAN database.

Public Private Partnership Concessionaires:

a) Implement bridge management on PPP structures.

Local Administrations (County and City Councils):

a) Area Engineers and Maintenance Crews – assist in regional bridge management.

4.2 Principal Inspection

A Principal Inspection must be carried out before a new bridge is brought into service or after an existing bridge has been rebuilt, strengthened or repaired.

Principal Inspections are carried out in the year of planned inspection in accordance with reports produced by the EIRSPAN database.

Principal Inspections must be undertaken by engineers who are listed on the “Principal Inspection Team Leader” list, which is held by TII’s Bridge Management section. The Team Leader must satisfy minimum educational and experience requirements and attend a TII bridge inspection workshop before he/she is permitted to act in the role of Principal Inspection Team Leader.

The PI Team Leader must visit the bridge and undertake the inspection; it is not sufficient for the Team Leader to delegate the inspection role to other staff or act only as a report checker. Principal Inspection Team Leaders are responsible for:

a) The execution of the Principal Inspections, and

b) Registering and entering of information in the database.

5. Users Guide to the Database

5.1 Introduction

The EIRSPAN database for Motorway and National Road bridges is a web-based system maintained by TII. Usernames and passwords are provided by TII to Regional Bridge Managers, PPP Companies and third parties including consultants who undertake inspection work on behalf of TII. User rights and access to particular parts of the database for each type of user will be defined by TII.

Consultants who undertake Principal Inspections and input data into the database will be given "Third Party" access rights. The TII Bridge Management section will "assign" structures to the Third Party, who can then undertake data input as described below.

One report will be recorded in the chronology for each Principal Inspection carried out on a structure.

5.2 Principal Inspection for the Third Party Users

Figure 5.1: Main screen for third party users

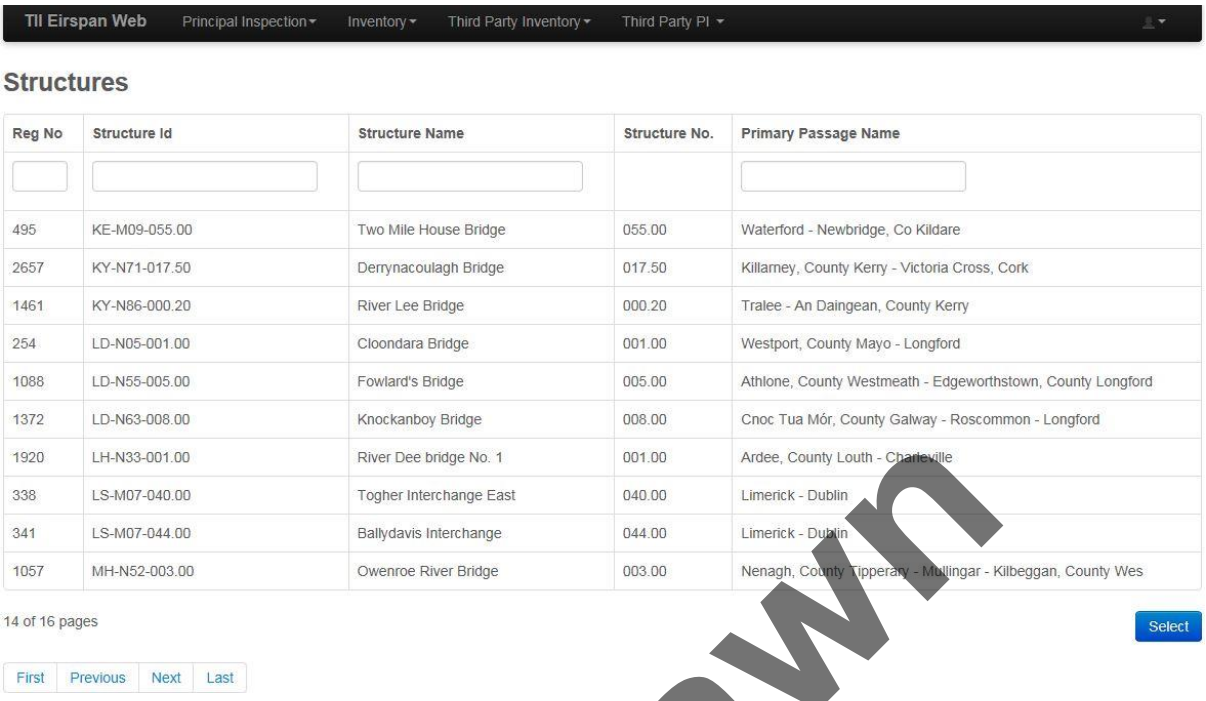
The "Principal Inspection" heading for reading or printing existing reports can be selected from the system menu screen of EIRSPAN. Figure 5.1 shows the screen for a Third Party user. Data input for new inspections for structures which have been assigned to a Third Party is carried out under the Third Party PI heading.

a) Initial Principal Inspection

When a first inspection is required the Bridge Manager will create the structure on the database and assign it to a Third Party for Inventory collection and Principal Inspection; there is no facility for a Third Party to create a new structure. Within the Third Party PI heading there is an Assigned Principal Inspection button.

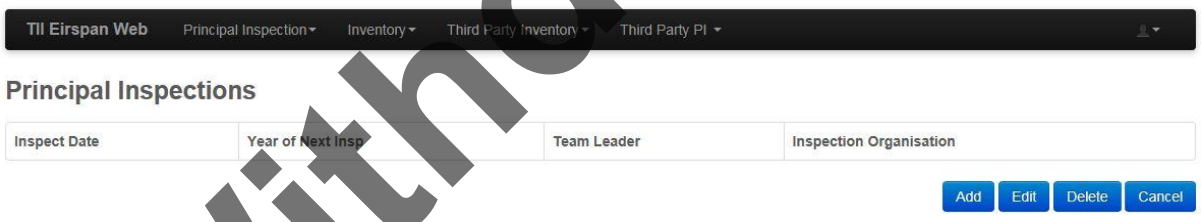
After selecting this the Third Party will need to select a structure from the Assigned Structure list (Figure 5.2). After selecting a structure the Third Party can start to input the Principal Inspection data.

Figure 5.2: Assigned structure list (third party user)



On selecting the structure this opens a Principal Inspection Lookup screen which will be blank as this is the initial Principal Inspection for this structure (see Figure 5.3).

Figure 5.3: Principal inspection lookup (third party user)



Selecting the “Add” button allows for data to be input for the Principal Inspection under the following Tab headings (see Figure 5.4):

a) Inspection
b) Components: Overview
c) Components: Details
d) Photos

5.3 Inspection

All fields in the Inspection tab as shown in Figure 5.4 must be completed. Traffic AADT figures with percentage light and heavy vehicles can be obtained from the TII website at https://www.nratrafficdata.ie.

There is no need to factor the % HGV figures by 0.75 as was the case in the past.

If no fields are present to allow relevant Principal Inspection data to be input for a structure then the "Remarks" field should be used.

When all information has been input under this tab select the "Save" button.

5.4 Components: Overview

The "Components: Overview" tab gives an overview of all key data for each individual component (Figure 5.5) including Condition Ratings (CR), Maintenance Ratings (MR), the need for a Special Inspection (SI), number of photos and number of repairs. This tab is automatically updated as data is input into the Component Details and Photos tabs.

5.5 Components Details

The Components Details tab allows for various Principal Inspection details to be input for all components which are relevant to the structure (see Figure 5.6). To input details for a component, the component must first be selected in the Components Overview tab. The details in the following sections are entered.

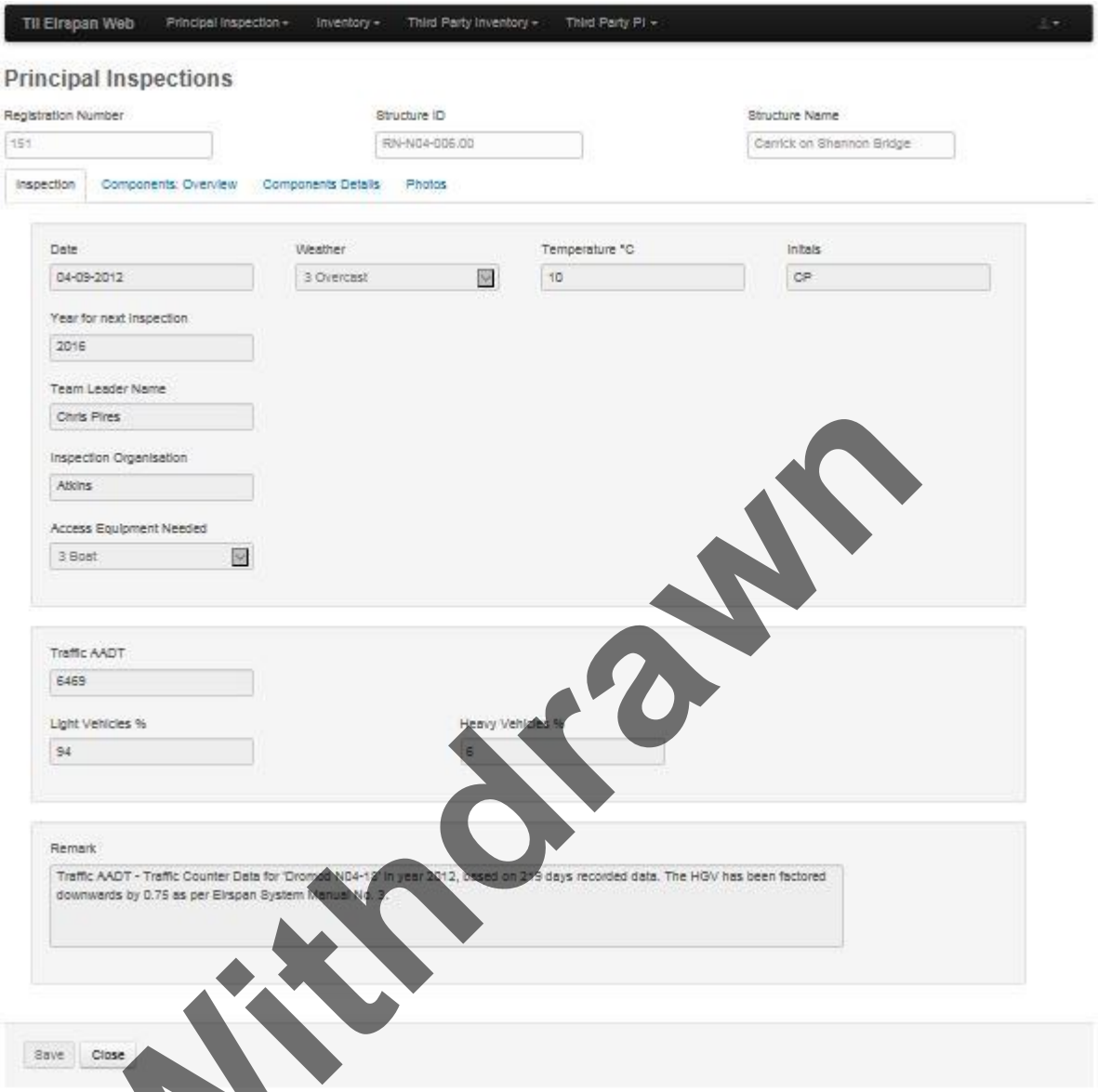
5.6 Condition Rating

A condition rating of 0, 1, 2, 3, 4 or 5 is assigned to a component depending on its Condition (refer to Chapter 3). If the component does not exist on the structure the user must enter "-", in which case the component is not printed in the Principal Inspection report.

5.7 Maintenance Required

A Yes or No Response is required; enter "Y" if there is a need for routine maintenance to be carried out on the component, or "N" if no routine maintenance is necessary. If "Y" is entered for any component 1 to 13 then a description of the required maintenance must be given in the "Damage" field, and "Y" must be entered for component 14. If "N" is entered for all components 1 to 13 then "N" is also entered for component 14.

Figure 5.4: Inspection tab (Third Party User)



5.8 Special Inspection

Enter “Y” if a Special Inspection is required for a component. There is no need to enter “N” for components which do not need a SI, and there is no need to enter “Y” for component 14 if an SI has been requested for another component 1 to 13.

5.9 Damage

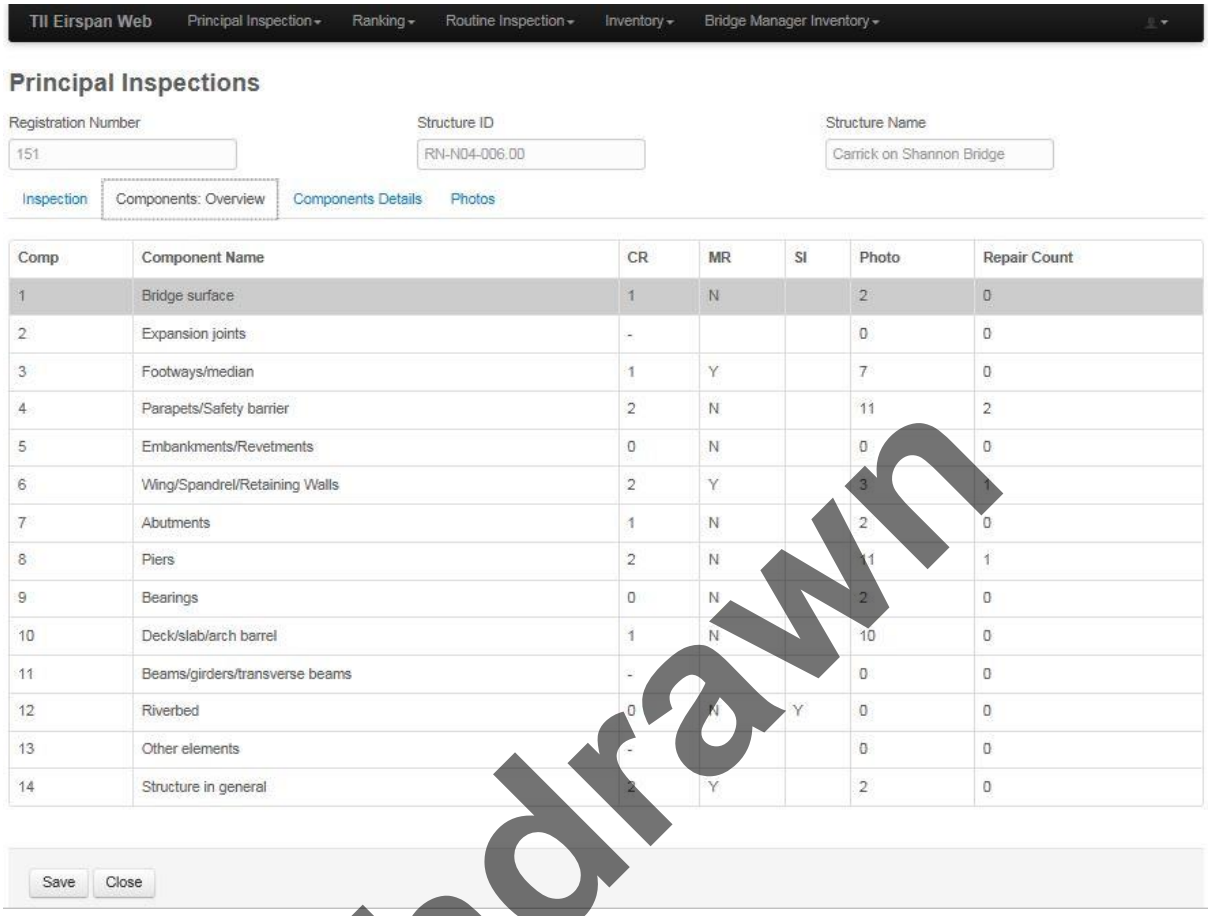
Precise details of damage to a component are entered here. Unlimited text may be entered. If an SI is called up for a component then the reason for calling the SI shall be stated here along with a description of what the SI should entail, and the required deliverables for the SI.

5.10 Damage Type

The Inspector must choose the damage type from a predefined list. If a CR of 2 or greater is entered then a Damage Type must be stated.

Figure 5.5: Components overview tab (bridge manager user – similar for third party user)

repair works



Comp	Component Name	CR	MR	SI	Photo	Repair Count
1	Bridge surface	1	N		2	0
2	Expansion joints	-			0	0
3	Footways/median	1	Y		7	0
4	Parapets/Safety barrier	2	N		11	2
5	Embankments/Revetments	0	N		0	0
6	Wing/Spandrel/Retaining Walls	2	Y		3	1
7	Abutments	1	N		2	0
8	Piers	2	N		11	1
9	Bearings	0	N		2	0
10	Deck/slab/arch barrel	1	N		10	0
11	Beams/girders/transverse beams	-			0	0
12	Riverbed	0	N	Y	0	0
13	Other elements	-			0	0
14	Structure in general	2	Y		2	0

The system allows for multiple Repair Works to be input for a particular component. If a Condition Rating of 2 or more is given then a Repair Work must be called up.

To input a Repair Work click on “Add” in the bottom right hand corner (see Figure 5.6). Standard repair works may be selected from a pull-down menu within the “Repair type” field.

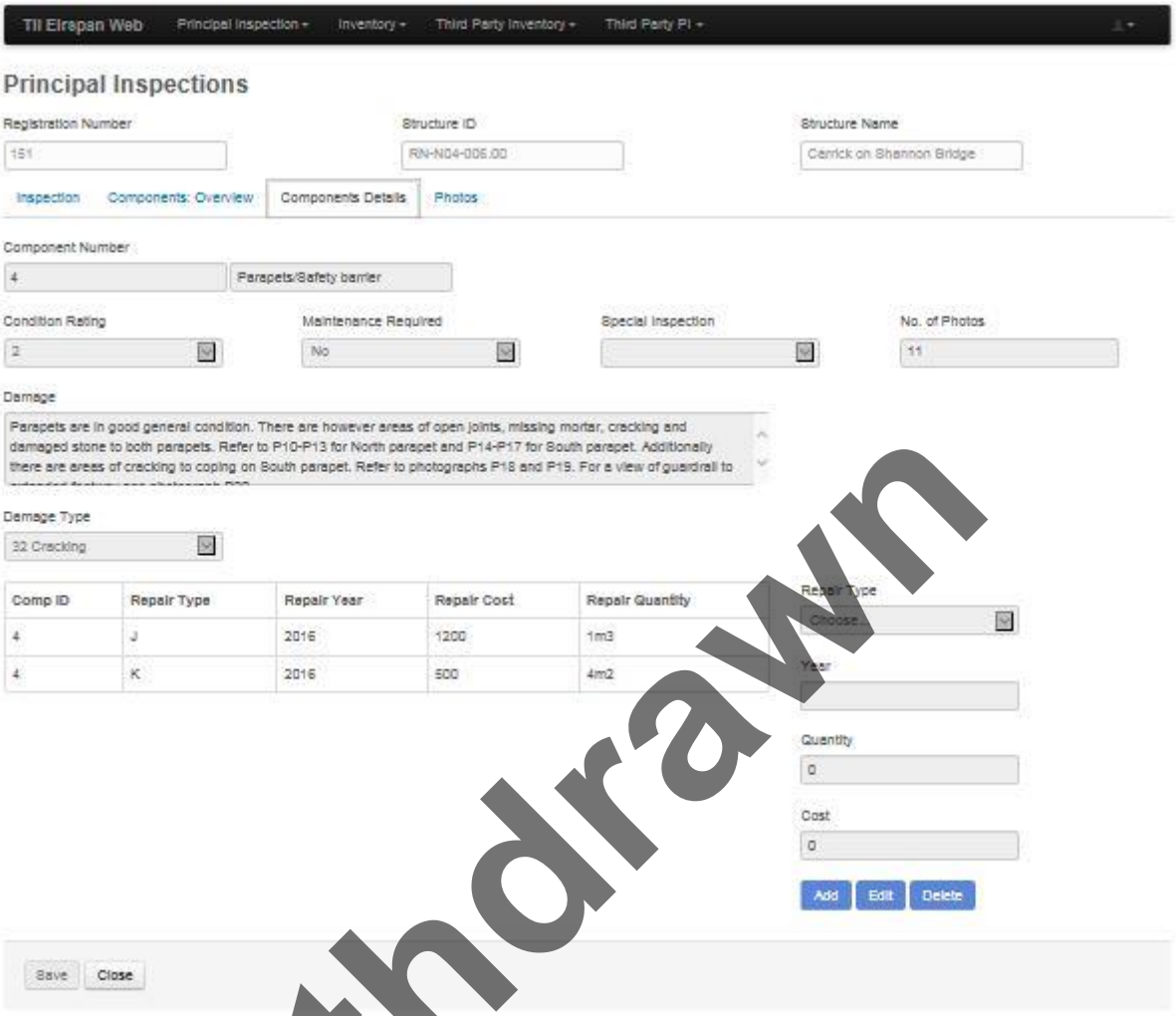
The standard repair works have standard unit rates (Chapter 3). The module uses the unit rates to calculate the cost of the repair work when the quantity is specified. The Inspector must manually overwrite the cost in the “Cost” box if he believes the standard repair cost calculated using unit rates is inaccurate. If a non-standard work type is suggested, the letter “Z – Other repair work” must be entered for the type and the price must be defined manually.

The year for undertaking these works must be specified in the “Year” field.

The “Save” button must be selected when all details of a Repair Work have been entered.

After data has been entered for a repair work it is possible to either edit or delete this repair work by selecting the appropriate button (Edit or Delete). Another Repair may also be added by selecting the “Add” button.

Figure 5.6: Component details tab (third party user)



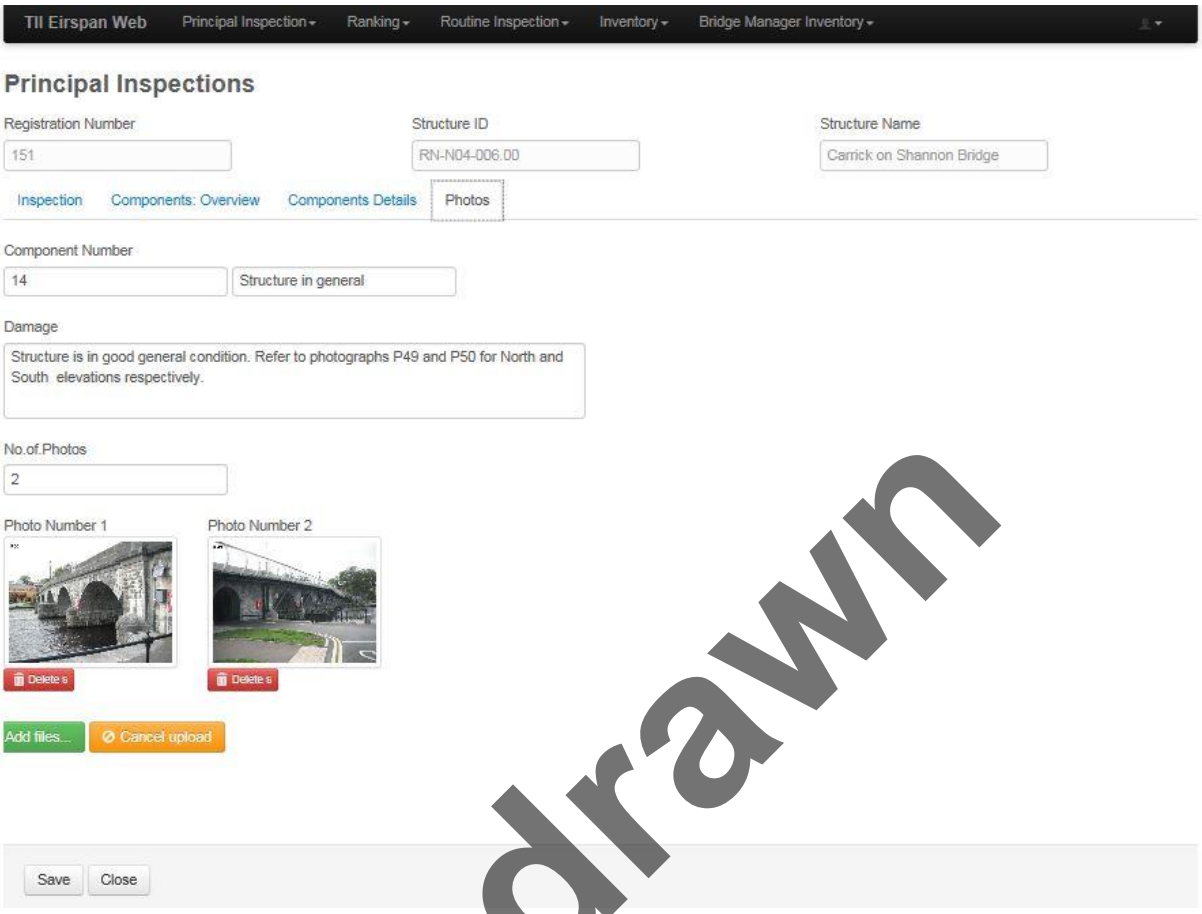
5.11 Photos

The “Photos” tab is used to add digital photos to each individual component, taking care to ensure photos have been entered for the correct component. Figure 5.7 shows the screen for the Photo tab. The program will accept pictures in GIF, JPG, JPEG, BMP or PNG format.

The process of importing digital photos is carried out for one structure at a time and by inserting one single photo at a time. Click on the “Add files” button in bottom left corner, see Fig 5.7. Browse to the file on the hard drive and select it to add it to the Principal Inspection. Now click on “Start”. The photo is stored in the Database.

Click on “Save” to save the Record. Thumbnail photos are displayed as shown in Figure 5.7 and can be deleted if incorrectly uploaded.

Figure 5.7: Photo tab (bridge manager user – similar for third party user)



5.12 Editing a Principal Inspection

Locate the required inspection as shown in Figure 5.3. Highlight the Principal Inspection and click on Edit. This will bring you into the detail of the Inspection where you can edit and save your changes.

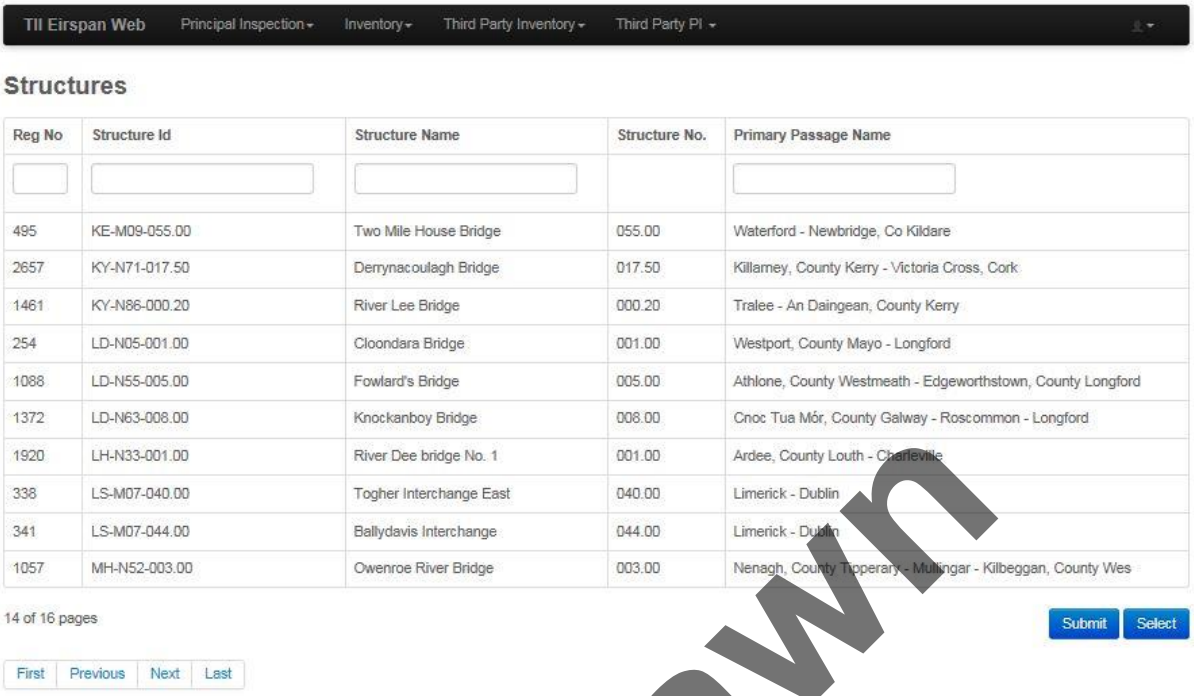
5.13 Deleting a Principal Inspection

Locate the required inspection as shown in Figure 5.3. Highlight the Principal Inspection and click on Delete. A warning notice will be given before you confirm deletion of all components and photos, etc.

5.14 Submitting a Principal Inspection

Third Party users can submit their Principal Inspections by highlighting each structure individually and pressing the “submit” button within the “Assigned Structure” section of the “Third Party Inventory” heading as shown in Figure 5.8.

Figure 5: 8 Submitting a Principal Inspection (third party user)



5.15 Principal Inspection for Bridge Manager Users

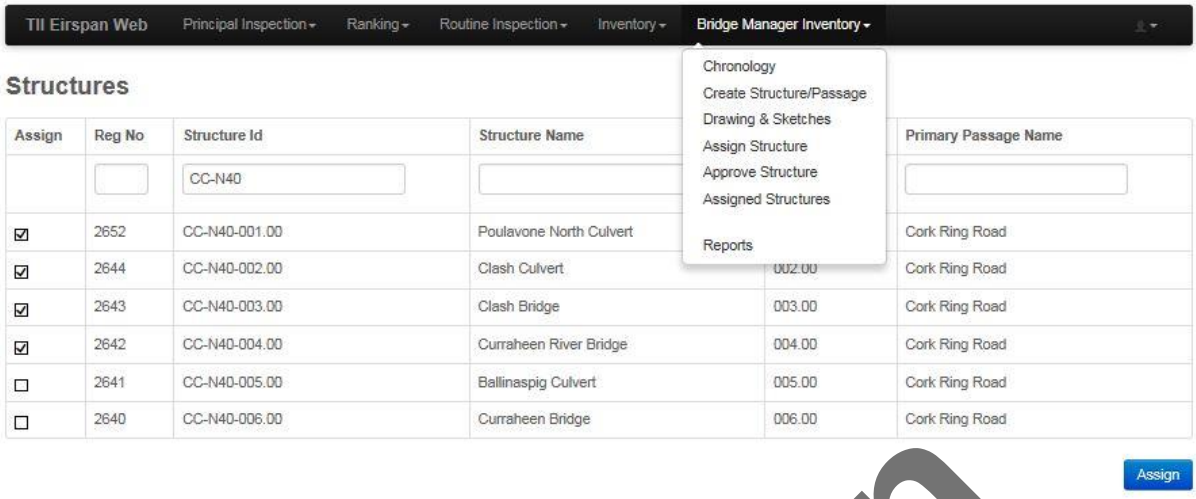
The user rights of Bridge Managers enable them to input Principal Inspection data in the same manner as third parties as described in Chapter 5. Bridge Manager users also have the facility to allocate particular structures to third parties to enable the third parties to input Principal Inspection data into the database, and to approve or reject reports that have been submitted by third parties. These functions are undertaken using the "Assign structure" and "Approve Structure" sub-headings contained within the Bridge Manager Inventory heading, see Figure 5.9.

TII Regional Bridge Managers are set up as Bridge Managers and have access to data for all Maintaining Agents within their region including PPP Companies. PPP Companies are set up as Bridge Managers to manage data within their projects. TII Bridge Managers will monitor the PPP data to ensure the PPP structures are managed in accordance with the principles of the EIRSPAN Bridge Management System.

5.16 Assigning Structures

Bridge Managers can allocate structures to a third party by selecting the "Assign Structure" sub-heading under the "Bridge Manager Inventory" heading, see Figure 5.9. The Bridge Manager uses the Registration Number, Structure ID or Structure Name fields to search for structures, clicks the "Assign" checkbox adjacent to the relevant structures and selects the "Assign" button. The TII Database Manager will then associate the consultant or other third party with the Maintaining Agent which contains the assigned structures thereby enabling the third party to view the structure details and enter a new PI for each structure.

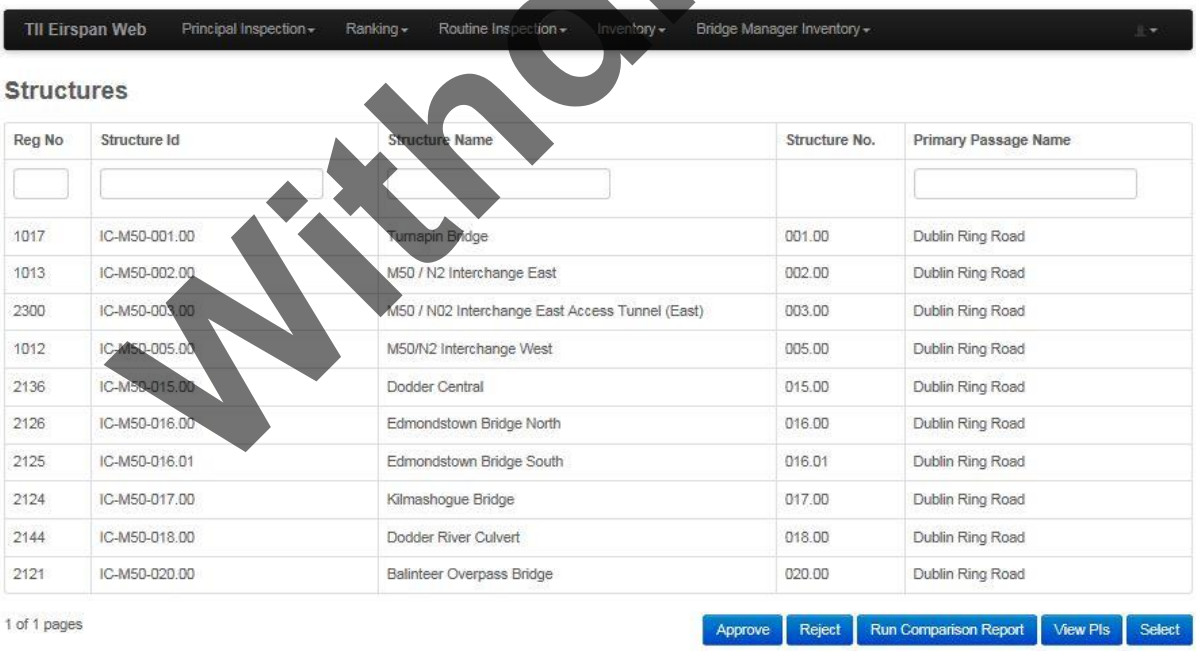
Figure 5.9: Assign structure (bridge manager user)



5.17 Approving Principal Inspection Reports

The Bridge Manager can view, approve or reject Principal Inspection reports which have been submitted by a Third Party by highlighting the structure and selecting the “View PIs”, “Approve” or “Reject” buttons within the “Approve Structure” sub-heading under the “Bridge Manager Inventory” heading, see Figure 5.10.

Figure 5.10: View, approve or reject PIs (Bridge Manager user)



5.18 Standard Repair Works

Editing of standard repair works shall only be performed by TII, since it is of the utmost importance that data for the whole country refers to the same catalogue of repairs.

5.19 Reports

The Principal Inspection module can be used to produce a series of standard reports for use by Bridge Managers. They are ordered from the “Reports” sub-heading under the Principal Inspection heading and the user makes the selection, following the instructions given on the screen. The following standard reports can be printed:

a) Inspection Report
b) Average Condition
c) Batch of PI Reports
d) High Condition Ratings
e) Inspections in a Given Year
f) Requests for Special Inspection
g) Condition Ratings for Structure in General.

5.20 Inspection Report

The search fields of “Structure Name”, “Structure ID” or “Registration No” can be used to locate a particular structure under the Principal Inspection heading and Reports sub-heading, see Figure 5.11.

A combined Inventory and Principal Inspection Report can be printed for an individual structure on selecting “Inspection Report” within the Reports sub-heading. Click on the bridge name then click on the Principal Inspection report one wishes to view then click the “Run Reports” button. It is possible to print the full inventory and principal inspection report or selected pages from the report. It is possible to select photos for particular components of a structure by inserting the component number in the field provided.

5.21 Average Condition

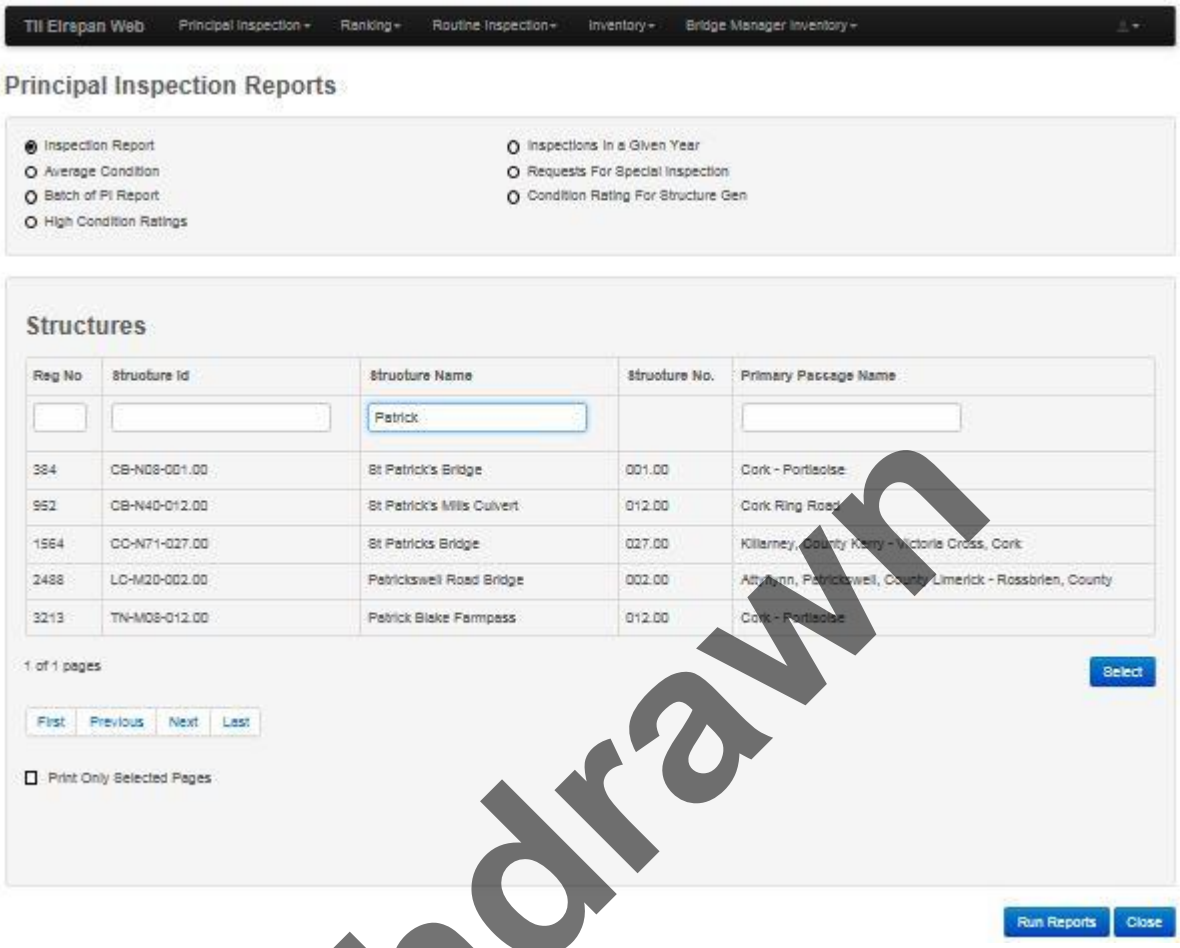
Average condition of component reports can be printed out within the EIRSPAN system. These reports can be printed out for all structures on the database or alternatively for individual Maintaining Agents or Passages.

5.22 Batch of Principal Inspection Reports

Batches of Principal Inspection reports can be printed from the EIRSPAN System. Such reports can be printed for all structures on the database, an individual Maintaining Agent and all Passages or a combination of individual Maintaining Agent and particular Passage.

The user must select the information required from the Inventory Data, Inspection Data and Component Data tick boxes. When Inventory Data is ticked the option is available to also print Drawings and Sketches.

Figure 5.11: Inspection report (bridge manager user) – searching for "St Patrick's Bridge"



5.23 High Condition Ratings Reports

The EIRSPAN System allows for reports to be printed for structures which have Condition Ratings above or equal to a selected Condition Rating (see Figure 5.11). Such reports can be printed for all structures on the database, an individual Maintaining Agent and all Passages or a combination of individual Maintaining Agent and particular Passage. By ticking "Other" the report will include the name of the Maintaining Agent and Road Name.

5.24 Inspections in a Given Year

The EIRSPAN System allows for reports to be printed which will identify the number of Principal Inspections required in a selected year. Such reports can be printed for all structures on the database, an individual Maintaining Agent and all Passages or a combination of individual Maintaining Agent and particular Passage. By ticking "Other" the report will include the name of the Maintaining Agent and Road Name.

5.25 Requests for Special Inspections

The EIRSPAN System allows for reports to be printed for structures that have Special Inspections called up against components. Such reports can be printed for all structures on the database, an individual Maintaining Agent and all Passages or a combination of individual Maintaining Agent and particular Passage.

The report will identify the structure and component against which a Special Inspection has been called up and will also indicate what Condition Rating has been assigned to the component and the date of the last Principal Inspection. By ticking “Other” the report will also include the name of the Maintaining Agent and Road Name.

5.26 Condition Ratings for Structure in General

The EIRSPAN System allows for reports to be printed for Condition Ratings that have been assigned to the Structure in General component. Reports will be printed for structures which have a Structure in General Condition Rating above or equal to a selected Condition Rating. Such reports can be printed for all structures on the database, an individual Maintaining Agent and all Passages or a combination of individual Maintaining Agent and particular Passage. The report will identify the structure, structure name, AADT, % heavy vehicles, date of the last Principal Inspection and Condition Rating. The report can also include the name of the Maintaining Agent and Road Name.

Appendix A:

Condition Ratings for Structure in General

Eirspan - Principal Inspection Form

Maintaining Agent: __ _____ Structure Identification: __ __ ' __ __ __ ' __ __ __ ' __ __

Structure Name: _____

Inspection Consultant: _____ Team Leader: _____

Weather: Temperature: °C Year for Next Principal Inspection:

Traffic AADT: _____ Light Vehicles (%) _____ Heavy Vehicles (%): _____

Component Number and Name		Condition Rating	Routine Maint. Reqd. Y/N	Spec. Insp. Reqd. Y/N	Photo No.	Description of Damage	Damage Type (cause)	Type of Repair	Quantity of Repair	Year of Repair
1	Bridge Surface									
2	Expansion Joints									
3	Footways/Median									
4	Parapet/ Safety Barrier									
5	Embankments/ Revetments									

Component Number and Name		Condition Rating	Routine Maint. Reqd. Y/N	Spec. Insp. Reqd. Y/N	Photo No.	Description of Damage	Damage Type (cause)	Type of Repair	Quantity of Repair	Year of Repair
6	Wingwalls/ Spandrel Walls/ Retaining Walls									
7	Abutments									
8	Piers									
9	Bearings									
10	Deck									
11	Beams/Girders/ Transverse Beams									

Component Number and Name		Condition Rating	Routine Maint. Reqd. Y/N	Spec. Insp. Reqd. Y/N	Photo No.	Description of Damage	Damage Type (cause)	Type of Repair	Quantity of Repair	Year of Repair
12	Riverbed									
13	Other Elements									
14	Structure in General									
	Remarks									

Appendix B:

Guidelines for the Condition Ratings of Components

Guidelines for the Condition Rating of Structure Components

All bridge components shall be inspected and given a condition rating.

Guidelines for allocating a condition rating of at least 3, which is defined as “Significant damage, repair needed very soon” are given in this section.

In general the need for routine maintenance shall not affect the condition rating. The following pages highlight those works which are considered as routine maintenance works.

It should be noted that in some cases a lack of routine maintenance could lead to a structural defect e.g. if unchecked vegetation growing from spandrel walls of masonry arches has caused damage to the stonework then the Inspector will record the structural defect and allocate an appropriate condition rating and enter a repair work.

B.1. Component No.1: Bridge Surface

Damage to be repaired by routine maintenance

a) Sealing of Pavement cracks
b) Maintenance of kerb stones
c) Patching of potholes
d) Sweeping and cleaning
e) Cleaning of drainage system
f) Vegetation Clearance

Damage Type	Definition of condition rating of at least 3, if
Rutting	The extent affects the road safety (reduced steering qualities).
Skid resistance	The extent affects the road safety (increased braking distance).
Ravelling	The extent affects the road safety.
Spalling of concrete	The extent affects the road safety.
Corrosion of reinforcement	The extent affects the road safety.

B.2. Component No.2: Expansion Joint

Damage to be repaired by routine maintenance:

a) Cleaning of expansion joint
b) Maintenance of expansion joint

Damage Type	Definition of condition rating of at least 3, if
Loose steel parts	The damage affects the road safety.
Cracked rubber seal	The water leakage affects other components and the defect affects road safety.
Failure in anchorage	The damage affects the road safety or will affect the safety soon.
Insufficient movement clearance	It affects the joint itself or other components.
Loose steel parts	The damage affects the road safety.

B.3. Component No.3: Footway and Median

Damage to be repaired by routine maintenance:

a) Sealing of pavement cracks
b) Sweeping and cleaning
c) Installation of rubbing strip
d) Maintenance of surface

Damage Type	Definition of condition rating of at least 3, if

B.4. Component No.4: Parapet / Safety Barrier

Damage to be repaired by routine maintenance:

a) Removal of vegetation
b) Maintenance of bedding mortar
c) Repair of parapet (depending on type of parapet and extent of damage)
d) Tightening of bolts

Damage Type	Definition of condition rating of at least 3, if
Fracture in elements (posts, rails or part of footway)	Any failure or considerable reduction in strength comparable to the original strength.
Corrosion	Corrosion resulting in considerable reduction in strength.

B.5. Component No.5: Embankment/Revetments

Damage to be repaired by routine maintenance:

a) Removal of vegetation
b) Establishment of drainage channel
c) Maintenance of gabions
d) Maintenance of revetments
e) Erosion due to rain or flooding (depending on extent)

Damage Type	Definition of condition rating of at least 3, if
Erosion	If the damage affects the road safety or the safety of the structure, or part of the structure.
Failure of revetment	If the damage affects the road safety or the safety of the structure, or part of the structure.

B.6. Component No.6: Wing Walls/Spandrel Walls/Retaining Walls

Damage to be repaired by routine maintenance:

a) Minor spalling and cracking.
b) Removal of vegetation.
c) Establishment of base protection.
d) High pressure hosing of surfaces.
e) Maintenance of polysulphide sealant joints.
f) Masonry repair and repointing of a minor nature.

Damage Type	Definition of condition rating of at least 3, if
Failure	Any.
Excessive or abnormal movement	The stability of the structure or part of the structure is affected.
Failure in masonry	The stability or load bearing capacity of the structure is affected.
Corrosion of reinforcement	The load bearing capacity is affected or the durability of the structure is considerably affected.
Damaged concrete	The load bearing capacity is affected or the durability of the structure is considerably affected.

B.7. Component No.7: Abutment

Damage to be repaired by routine maintenance:

a) Minor spalling and cracking.
b) Removal of vegetation.
c) Establishment of base protection.
d) Maintenance of drainage channels.
e) High pressure hosing of surfaces.
f) Masonry repair and repointing of a minor nature.

Damage Type	Definition of condition rating of at least 3, if
Failure	Any.
Excessive or abnormal movement	The stability of the structure or part of the structure is affected.
Failure in masonry	The stability or bearing capacity of the structure is affected.
Corrosion of reinforcement	The load bearing capacity is affected or the durability of the structure is considerably affected.
Damaged concrete	The load bearing capacity is affected or the durability of the structure is considerably affected.

B.8. Component No.8: Piers

Damage to be repaired by routine maintenance:

a) Minor spalling and cracking.
b) Removal of vegetation.
c) Establishment of base protection.
d) Maintenance of drainage channels.
e) High pressure hosing of surfaces.
f) Masonry repair and repointing of a minor nature.

Damage Type	Definition of condition rating of at least 3, if
Failure	Any.
Excessive or abnormal movement	The stability of the structure or part of the structure is affected.
Failure in masonry	The stability or bearing capacity of the structure is affected.
Corrosion of reinforcement	The load bearing capacity is affected or the durability of the structure is considerably.

B.9. Component No.9: Bearings

Damage to be repaired by routine maintenance:

a) Cleaning of bearings.
b) Maintenance of bedding mortar.
c) Patch painting of steel.

Damage Type	Definition of condition rating of at least 3, if
Failure	Any failure.
Excessive movements	The stability or the load bearing capacity is affected.
Missing fixing or deteriorated concrete plinths	The stability or the load bearing capacity is affected.

B.10. Component No.10: Slab

Damage to be repaired by routine maintenance:

a) Cleaning of drip tubes.
b) High pressure hosing of surface.
c) Minor spalling.
d) Masonry repair and repointing of a minor nature.

Damage Type	Definition of condition rating of at least 3, if
Fracture	Any sign of fracture.
Excessive deformation	The load bearing capacity is affected.
Structural cracks	The crack width exceeds 0.3mm.
Corrosion in reinforcement	The load bearing capacity is affected (reduction in cross section of reinforcement or spalling in large areas).
Damaged Concrete	The load bearing capacity is affected or the durability of the structure is considerably affected.
Leaching or Leakage	The water may affect any pre-stressing arrangement or the re-bars in a considerable extent.

B.11. Component No.11: Beams/Girders/Transverse Beams

a) Damage to be repaired by routine maintenance:

b) High pressure hosing of surface.

Damage Type	Definition of condition rating of at least 3, if
Fracture in concrete	Any failure.
Structural cracks	The crack width exceeds 0.3mm.
Excessive deflection	The load bearing capacity is affected.
Severe impact damage	The load bearing capacity is affected.
Corrosion in reinforcement	The load bearing capacity is affected or the durability of the structure is considerably affected.
Leaching/leakage	The water may affect any pre-stressing arrangement or the re-bars in a considerable extent.
Fracture or vibration in steel	Any signs or sounds of failure.
Corrosion in structural steel components	The load bearing capacity is affected or the durability of the structure is considerably affected.

B.12. Component No.12: Riverbed

Damage to be repaired by routine maintenance:

a) Clearance of watercourse

b) Minor scour repairs

Damage Type	Definition of condition rating of at least 3, if
Significant scour damage	The stability of the structure or part of the structure is affected.

B.13. Component No.13: Other Elements

No remarks

B.14. Component No.14: Bridge in General

Damage to be repaired by routine maintenance:

a) Maintenance of structure ID.

Appendix C:

Report of Standard Repairs - Example

C.1. Standard Repair Works

All bridge components shall be inspected and given a condition rating.

Component Work and Description		Unit	Unit Price
Component 1: Bridge Surface			
A	Replacement of asphalt pavement (dense type)	m^2	180
B	Replacement of asphalt pavement (open type)	m^2	130
C	Replacement of surfacing course	m^2	65
D	Surface dressing	m^2	50
E	Patching of potholes	m^2	60
F	Sealing of cracks in pavement	m	13
G	Installation of asphaltic plug joint	m	250
H	Installation of drain gully with inlet and 10m tube	No.	1330
I	Reconstruction of drain asphalt in waterway	m	130
J	Construction of slope along edge beam	m	130
K	Replacement of waterproofing, incl. Pavement	m^2	350
L	Road markings	m	10
Z	Other repair work		
Component: 2 Expansion joints			
A	Replacement of joint, steel plate	m	2350
B	Asphalt plug joint material (50 x 10 cm)	m	250
C	Replacement of joint, finger type	m	2150
D	Replacement of joint, neoprene block type	m	2050
E	Repair of joint	m	120
F	Replacement of joint, buried type	m	200
G	Replacement of joint, elastomeric in metal runners	m	2000
Z	Other repair work		
Component: 3 Footways/Median			
A	Laying of asphalt surfacing course on footway	m^2	50
B	Install or replace existing footway or rubbing strip	m^2	200
C	Replacement of kerb stones	m	100
D	Injection of cracks	m	250
Z	Other repair work		
Component: 4 Parapets/Safety Barrier			
A	Replacement of parapet, excl. repair of edge beam	m	370
B	Replacement of parapet, incl. Repair of edge beam	m	1350
C	Replacement, light parapet	m	130
D	Repair of parapet/guardrail	m	100
E	Cleaning and painting of parapet/guardrail	m	130
F	Spot paint repair, parapet/guardrail	m	45
G	Cleaning and painting, light parapet	m	25
H	Galvanising of parapet/guardrail	m	235
I	Installation of road guardrail	m	100
J	Masonry repair	m^3	1200
K	Masonry Repointing	m^2	125

Component Work and Description		Unit	Unit Price
Z	Other repair work		
Component: 5 Embankments/Revetments			
A	Slope protection	m^2	65
B	Re-establishment of slope (fill)	m^3	210
C	Removal of vegetation	m^2	45
D	Re-establishment of vegetation	m^2	90
E	Re-establishment of ditch tube	m	120
F	Sheet piling, wood	m	450
G	Sheet piling, steel	m	560
Z	Other repair work		
Component: 6 Wing Walls/Spandrel Walls/Retaining Walls			
A	Concrete repair (without reinforcement)	m^2	395
B	Concrete repair (with reinforcement)	m^2	765
C	Masonry repair	m^3	1200
D	Masonry Repointing	m^2	125
E	Injection of cracks	m	250
Z	Other repair work		
Component: 7 Abutments			
A	Concrete repair (without reinforcement)	m^2	395
B	Concrete repair (with reinforcement)	m^2	765
C	Masonry repair	m^3	1200
D	Masonry Repointing	m^2	125
E	Injection of cracks	m	250
Z	Other repair work		
Component: 8 Piers			
A	Concrete repair (without reinforcement)	m^2	395
B	Concrete repair (with reinforcement)	m^2	765
C	Masonry repair	m^3	1200
D	Masonry Repointing	m^2	125
E	Injection of cracks	m	250
Z	Other repair work		
Component: 9 Bearings			
A	Repair	no.	675
B	Replacement	no.	10000
Z	Other repair work		
Component: 10 Deck/Slab			
A	Concrete repair (without reinforcement)	m^2	535

	Component Work and Description	Unit	Unit Price
B	Concrete repair (with reinforcement)	m^2	1035
C	Masonry repair	m^3	1500
D	Masonry Repointing	m^2	185
E	Injection of cracks	m	300
Z	Other repair work		
Component: 11 Beams/girders/transverse beams			
A	Concrete repair	m^2	535
B	Steelwork protection	m^2	70
C	Injection of cracks	m	250
Z	Other repair work		
Component: 12 Riverbed			
A	Regrading/dredging of river bed	m^2	10
B	Scour protection	m	50
Z	Other repair work		
Component: 13 Other elements			
Z	Other repair work		
Component: 14 Structure in general			
Z	Other repair work		

NOTES:-

All prices shall be Euro (€)

Concrete repair with reinforcement refers to a repair that involves adding or replacing reinforcement.

Concrete repair without reinforcement refers to a repair that does not involve the adding or replacement of reinforcement.

Appendix D:

Principal Inspection Report - Example

CARHOON BRIDGE

STRUCTURE ID: GC-M18-006.00 INVENTORY AND PRINCIPAL INSPECTION REPORT

CARHOON BRIDGE

STRUCTURE ID: GC-M18-006.00

INVENTORY AND PRINCIPAL INSPECTION REPORT

Document No: 12.153.10/PI/GC-M18-006.00

Made: J Singh

Checked: J McClean

Approved: M Jones

Issue	Description	Made	Checked	Approved	Date
1	Inventory and Principal Inspection Report	J Singh	J McClean	M Jones	September 2012

DO NOT SCALE USE FIGURED DIMENSIONS ONLY

	Structure Title	CARHOON BRIDGE STRUCTURE ST 83			
	Structure Ref. No.	GC-M18-006.00			
	Date JUNE '12	Scale 1:50,000	CAD File 12153	Project No. 12.153	
	Drawn GM	Checked JK	Approved RMJ	Drawing No. -	Rev. -

NRA		EIRSPAN	Printed	Page
DF		Inspection report	04/10/2012	1
GC-M18-006.00	Carhoon Bridge			

Maintaining Agent: 11 GC - Galway
Road.....: Gort Crusheen
Side of road.....: 0

Region.....: 1 Connacht\Ulster
Struct. reg. no..: 3898

Year of construction.....: 2010
Year of reconstruction.....:

Primary passage Overbridge/Underbridge.: 0
Dir. of chainage on primary road.....: S
Access equipment needed.....: 0 Nothing

Data collected : Date.....: 2012.07.24
Inspector Initials....: SD+AO
Checker Initials.....: JS

Geographical position :
Latitude Y: 197074.000 Longitude X: 142649.000 m

Geometry :	Number of spans.....	2
	Min span length.....(m)	19.55
	Max span length.....(m)	21
	Overall length.....(m)	40.55
	Width out-to-out.....(m)	9.05
	Width of median.....(m)	0
	Width of footway left....(m)	0.6
	Width of footway right...(m)	1.95
	Width of carriageway.....(m)	5.5
	Width kerb-to-kerb.....(m)	5.5
	Width of approach..... (m)	5.5
	Area.....(m2)	542.55
	Minimum Parapet Height...(m)	1.25
	Width of Soft Verge.....(m)	0
	Approach Skew 1.....(deg)	0
	Approach Skew 2.....(deg)	0
	Bridge curved.....(Y/N)	N
	Skew.....(deg)	0

Span Lengths:

Span	1....(m):	19.55	Span	6....(m):	0.00	Span	11...(m):	0.00
Span	2....(m):	21.00	Span	7....(m):	0.00	Span	12...(m):	0.00
Span	3....(m):	0.00	Span	8....(m):	0.00	Span	13...(m):	0.00
Span	4....(m):	0.00	Span	9....(m):	0.00	Span	14...(m):	0.00
Span	5....(m):	0.00	Span	10...(m):	0.00			

Superstructure, principal type:

Standard design.....(Y/N):	Y
Design of cross section.....:	13 Slab/girder, 3 girders
Design of elevation.....:	20 Continuous, const. cross sect.
Material of primary members.....:	41 Prec. prestr. & insitu conc.

Superstructure, secondary type (if applicable):

Standard design.....(Y/N):	
Design of cross section.....:	
Design of elevation.....:	
Material of primary members.....:	

NRA EIRSPAN Printed Page
DF 04/10/2012
GC-M18-006.00 Carhoon Bridge Inspection report 2

Substructure:

Abutment :	Type.....:	10 Abutm. wall, integ. wing walls
	Material.....:	21 Reinforced concrete
	Foundation.....:	10 Spread footing
Pier.... :	Type.....:	30 2 or more separate columns
	Material.....:	21 Reinforced concrete
	Foundation.....:	10 Spread footing

Details:

Type of parapet.....:	61 Heavy steel railing
Type of safety barrier....:	23 Hot rolled asphalt
Type of wearing surface...:	23 Hot rolled asphalt
Type of expansion joint...:	92 Unknown
Type of fixed bearings on support....:	91 Not applicable
Type of free bearings on support....:	91 Not applicable
Type of fixed bearings in girders....:	91 Not applicable
Type of free bearings in girders.....:	91 Not applicable

Obstacle:

Type of passage.....:	14 Local road
Passage id.....:	Junction Crossing
Passage name.....:	Junction Crossing
Road side.....:	0
Chainage.....:	

Overpass passage:
Design load.....:
Load distribution class:
Technical standard used: Unknown standard
Bridge class normal....:
Bridge class restricted:
Max. axle load.....(t):

Vertical clearance:

Primary passage.....(m):	L:	5.66	LM:	RM:	R:	5.60
Secondary passage...(m):	L:		LM:	RM:	R:	

Owner.....: 10 Galway County Council
Maintaining Agent.....: 10 Galway County Council
Inspection Consultant....: 56 Roughan & O'Donovan
Designer.....: 92 Unknown

Technical documents.....:
Technical installations..: 0 No technical installation

Remarks:
M18 abutments protected by metal safety barriers on metal posts - metal barrier 900mm.
Pier protected by concrete barriers.
No mid span clearances taken, as traffic management only covered the hard shoulders.

NRA				EIRSPAN							Printed	Page
DF											04/10/2012	
GC-M18-006.00 Carhoon Bridge				Inspection report								3

Chronological overview :	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Date Activity	Br	Ex	Fo	Pa	Em	Wi	Ab	Pi	Be	De	Be	Ri	Ot	St
2012.07.24 Principal inspec	0	-	0	0	0	-	0	0	-	0	0	-	-	0

Last principal inspection:

Date.....:	2012.07.24
Team Leader Name.....:	Steven Devenney
Initials.....:	SD
Weather.....:	Overcast
Temperature.....(deg. C):	20

Traffic:

Annual Average Daily Traffic.....:	2354
Percentage, light vehicles..... :	92
Percentage, heavy vehicles..... :	7
Year for next principal inspection....:	2018

Remark:

New structure.

All photographs taken on 24.07.2012.

Minor routine maintenance required, see components for details.

NRA DF GC-M18-006.00 Carhoon Bridge	EIRSPAN Inspection report							Printed 04/10/2012	Page 4
No	Component Repair work - Damage description Type of Damage	Con rtg	Mtn rtg	Spe Ins	Repair work TP	Repair work Qty	Repair work Year	Repair work Cost	Photos
1	Bridge surface Minor vegetation removal at kerbs under RM. Photograph 1 - showing vegetation at kerbs Photograph 2 - showing West approach to structure	0	-						2
2	Expansion joints	-							
3	Footways/median Good condition. Photograph 1 - showing footway	0	+						1
4	Parapets/Safety barrier Good condition. Photograph 1 - showing parapet	0	-						1
5	Embankments/Revetments Minor vegetation removal under routine maintenance. Photograph 1 - showing vegetation on embankment	0	-						1
6	Wing/Spandrel/Retaining Walls	-							
7	Abutments Good condition. Photograph 1 - general photo of abutment	0	+						1
8	Piers Good condition. Photograph 1 - showing piers	0	+						1
9	Bearings	-							
10	Deck/slab/arch barrel Photo 1 - general photo of bridge deck	0	+						1
11	Beams/girders/transverse beams Good condition. Photograph 1 showing beams	0	+						1
12	Riverbed	-							
13	Other elements	-							
14	Structure in general South elevation. Photograph 1 - showing south elevation	0	-						1

NRA		EIRSPAN	Printed	Comp
DF		Inspection report	12.10.04	1
GC-M18-006.00	Carhoon Bridge			

Component.....: 1 Bridge surface

Condition/Mainten.: 0 / -

Damage/Remarks....: Minor vegetation removal at kerbs under RM.
Photograph 1 - showing vegetation at kerbs
Photograph 2 - showing West approach to structure

NRA		EIRSPAN	Printed	Comp
DF		Inspection report	12.10.04	1
GC-M18-006.00	Carhoon Bridge			

Component.....: 1 Bridge surface

Condition/Mainten.: 0 / -

Damage/Remarks....: Minor vegetation removal at kerbs under RM.
Photograph 1 - showing vegetation at kerbs
Photograph 2 - showing West approach to structure

NRA		EIRSPAN	Printed	Comp
DF		Inspection report	12.10.04	3
GC-M18-006.00	Carhoon Bridge			

Component.....: 3 Footways/median

Condition/Mainten.: 0 / +

Damage/Remarks....: Good condition.
Photograph 1 - showing footway

NRA		EIRSPAN	Printed	Comp
DF		Inspection report	12.10.04	4
GC-M18-006.00	Carhoon Bridge			

Component.....: 4 Parapets/Safety barrier

Condition/Mainten.: 0 / +

Damage/Remarks....: Good condition.
Photograph 1 - showing parapet

NRA		EIRSPAN	Printed	Comp
DF		Inspection report	12.10.04	5
GC-M18-006.00	Carhoon Bridge			

Component.....: 5 Embankments/Revetments

Condition/Mainten.: 0 / -

Damage/Remarks....: Minor vegetation removal under routine maintenance.
Photograph 1 - showing vegetation on embankment

NRA		EIRSPAN	Printed	Comp
DF		Inspection report	12.10.04	7
GC-M18-006.00	Carhoon Bridge			

Component.....: 7 Abutments

Condition/Mainten.: 0 / +

Damage/Remarks....: Good condition.
Photograph 1 - general photo of abutment

NRA		EIRSPAN	Printed	Comp
DF		Inspection report	12.10.04	8
GC-M18-006.00	Carhoon Bridge			

Component.....: 8 Piers

Condition/Mainten.: 0 / +

Damage/Remarks....: Good condition.
Photograph 1 - showing piers

NRA		EIRSPAN	Printed	Comp
DF			12.10.04	10
GC-M18-006.00	Carhoon Bridge	Inspection report		

Component.....: 10 Deck/slab/arch barrel

Condition/Mainten.: 0 / +

Damage/Remarks....: Photo 1 - general photo of bridge deck

NRA		EIRSPAN	Printed	Comp
DF		Inspection report	12.10.04	11
GC-M18-006.00	Carhoon Bridge			

Component.....: 11 Beams/girders/transverse beams

Condition/Mainten.: 0 / +

Damage/Remarks....: Good condition.
Photograph 1 showing beams

NRA		EIRSPAN	Printed	Comp
DF		Inspection report	12.10.04	14
GC-M18-006.00	Carhoon Bridge			

Component.....: 14 Structure in general

Condition/Mainten.: 0 / -

Damage/Remarks....: South elevation.
Photograph 1 showing south elevation

Appendix E:

Photographic Illustration of Condition Ratings

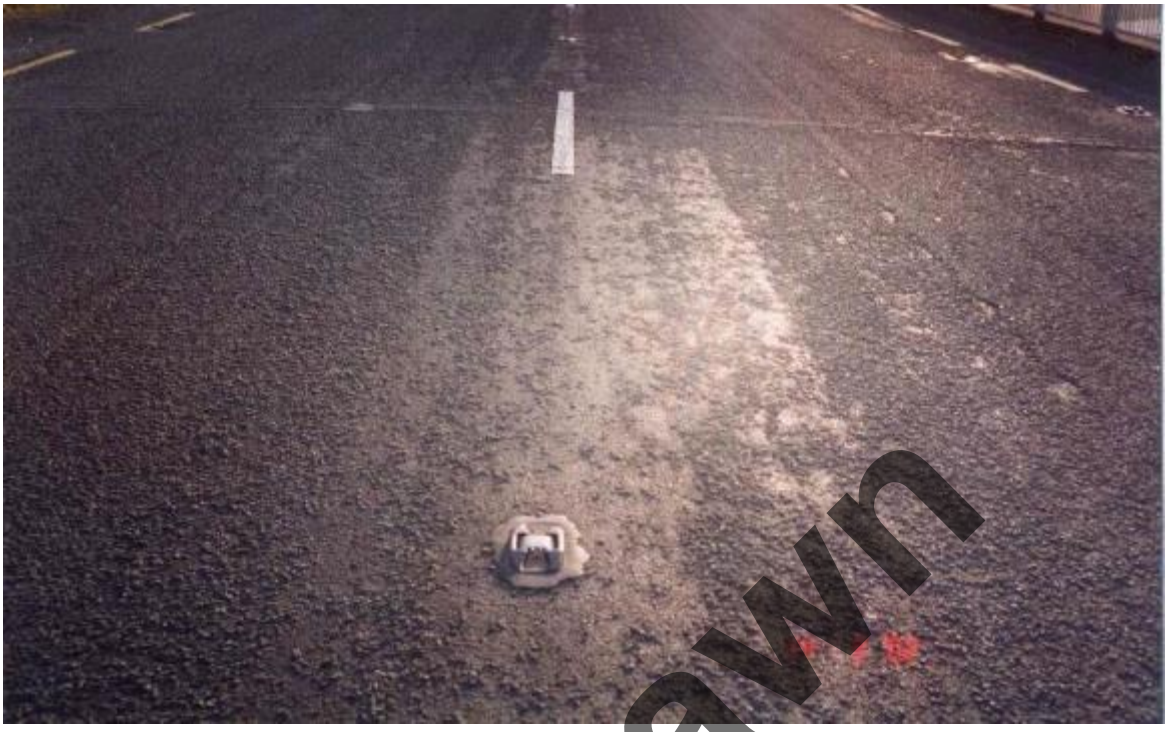


Figure 1: Component No. 1 Surfacing - Condition Rating 2

Figure 2: Component No.1 Surfacing - Condition Rating 3

Figure 3: Component No.1 Surfacing - Condition Rating 3

Figure 4: Component No.2 Expansion Joints - Condition Rating 3

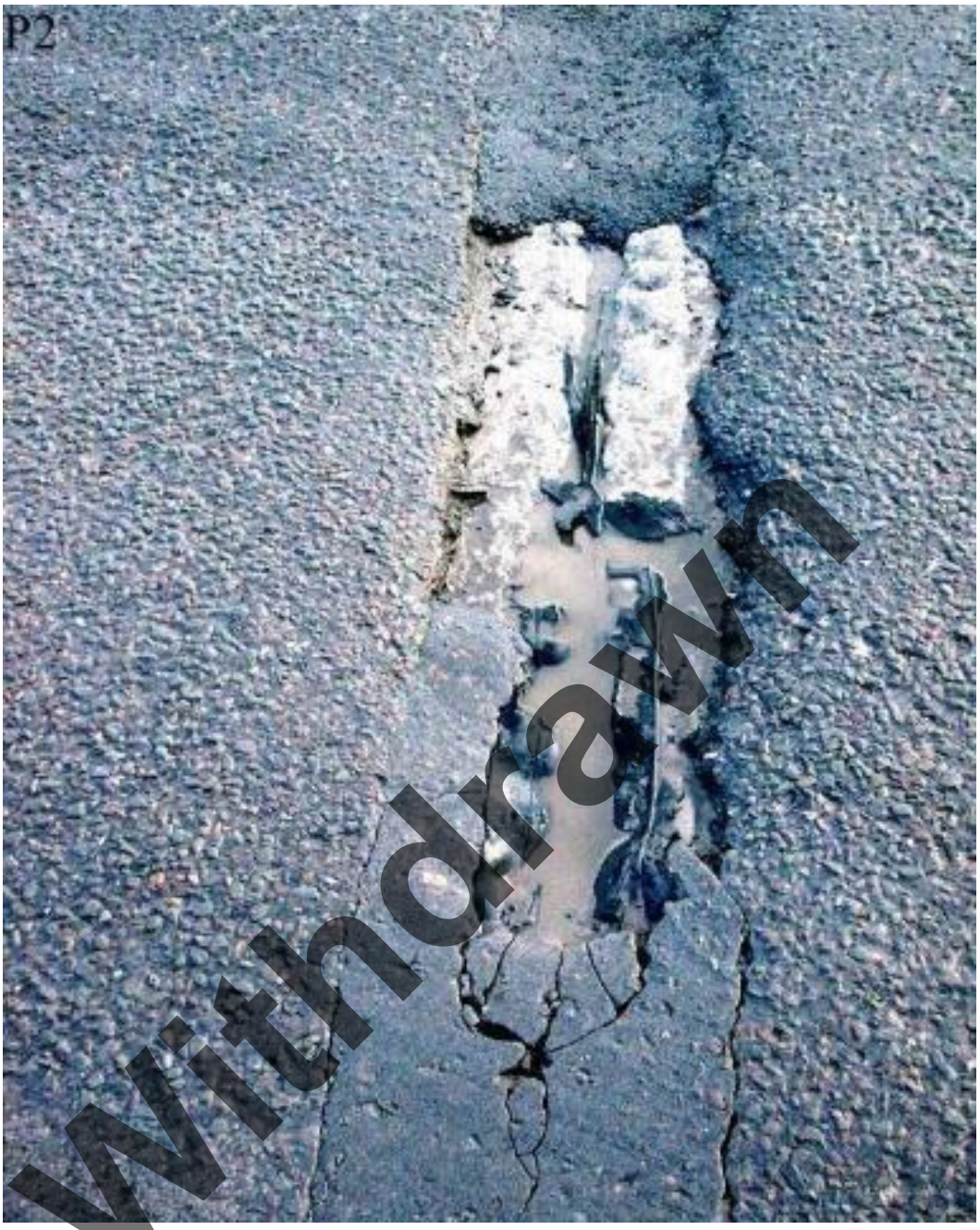


Figure 5: Component No.2 Expansion Joints - Condition Rating 4

Figure 6: Component No.2 Expansion Joints (view above)

Figure 7: Component No.2 Expansion Joints (view below) - Condition Rating 2

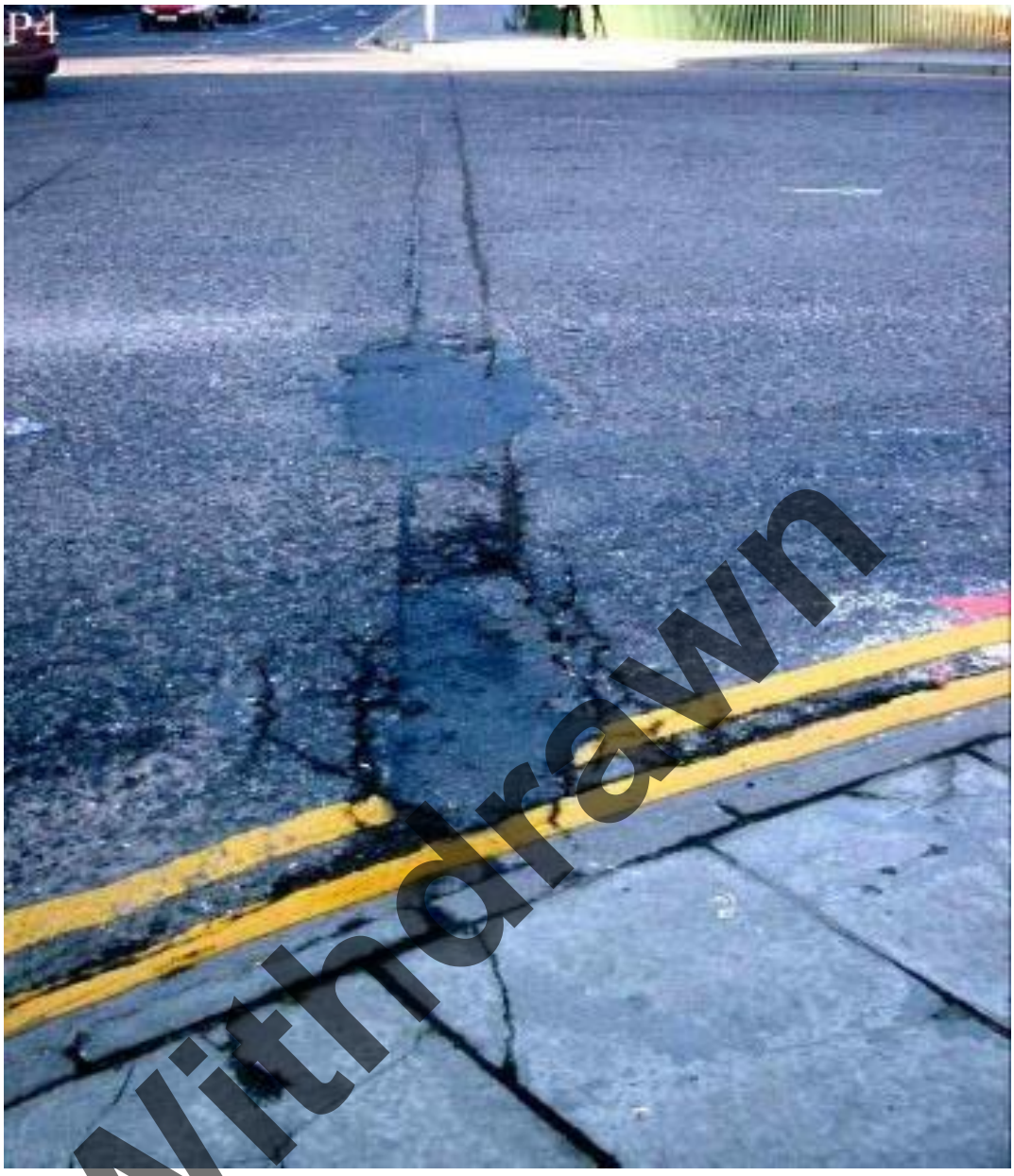


Figure 8: Component No.2 Expansion Joints - Condition Rating 3

Figure 9: Component No.3 Footways/Median - Condition Rating 4

Figure 10: Component No.4 Parapets/Safety Barrier - Condition Rating 5

Figure 11: Component No.4 Parapets/Safety Barrier - Condition Rating 4

Figure 12: Component No.4 Parapets - Condition Rating 3.

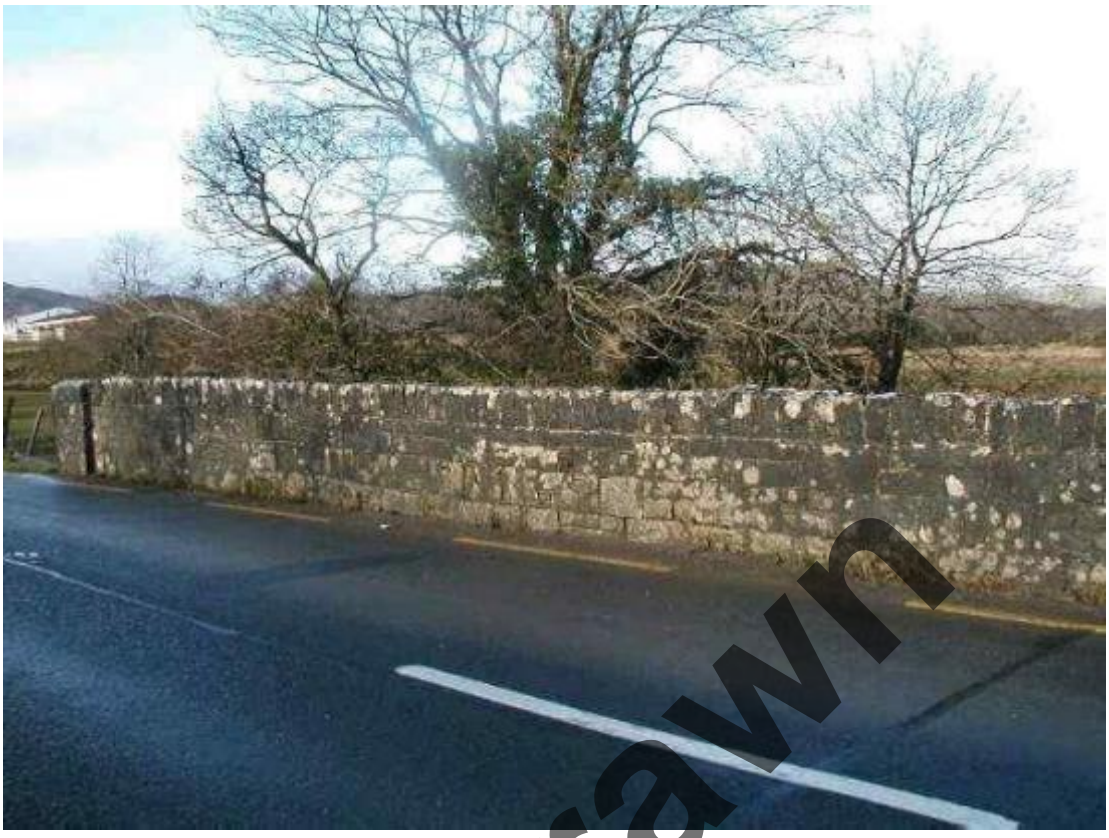


Figure 13: Component No.4 Parapets - Condition Rating 0.

Figure 14: Component No.5 Embankment/Slopes - Condition Rating 3

Figure 15: Component No.5 Embankment/Slopes - Condition Rating 3

Figure 16: Component No.6 Wing/Spandrel/Retaining Walls - Condition Rating 4

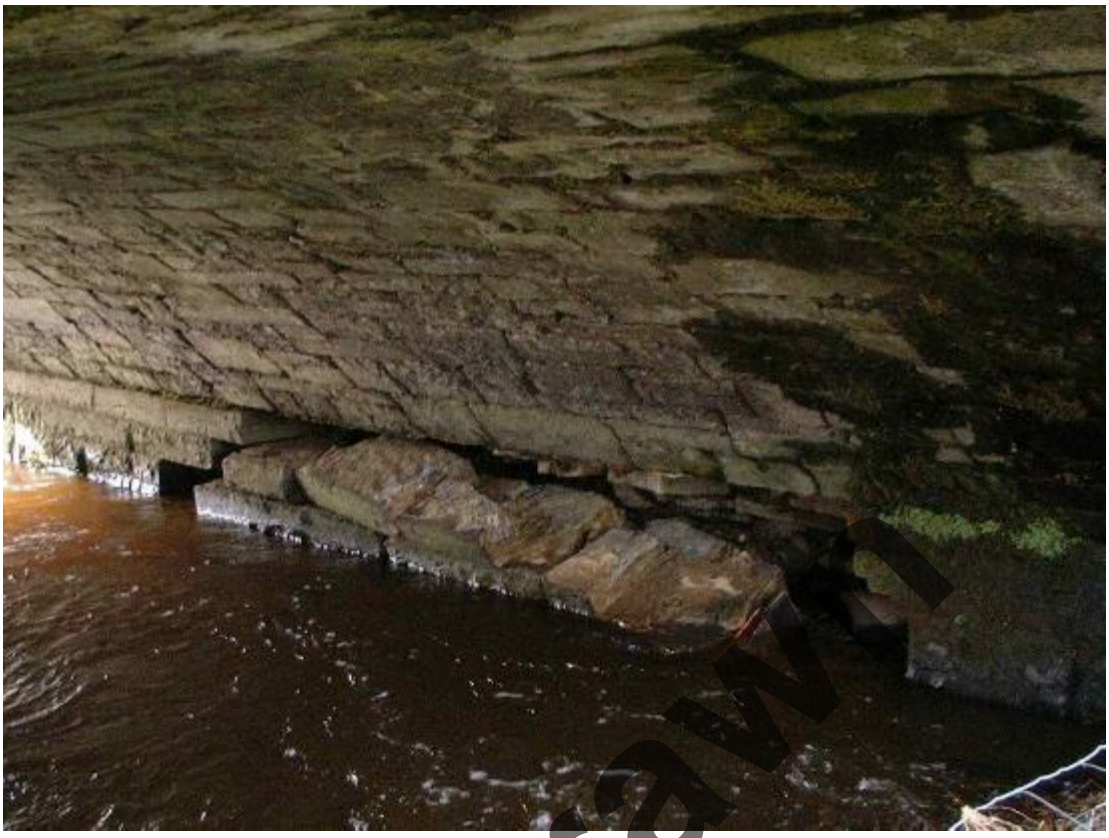


Figure 17: Component No.7 Abutments - Condition Rating 5

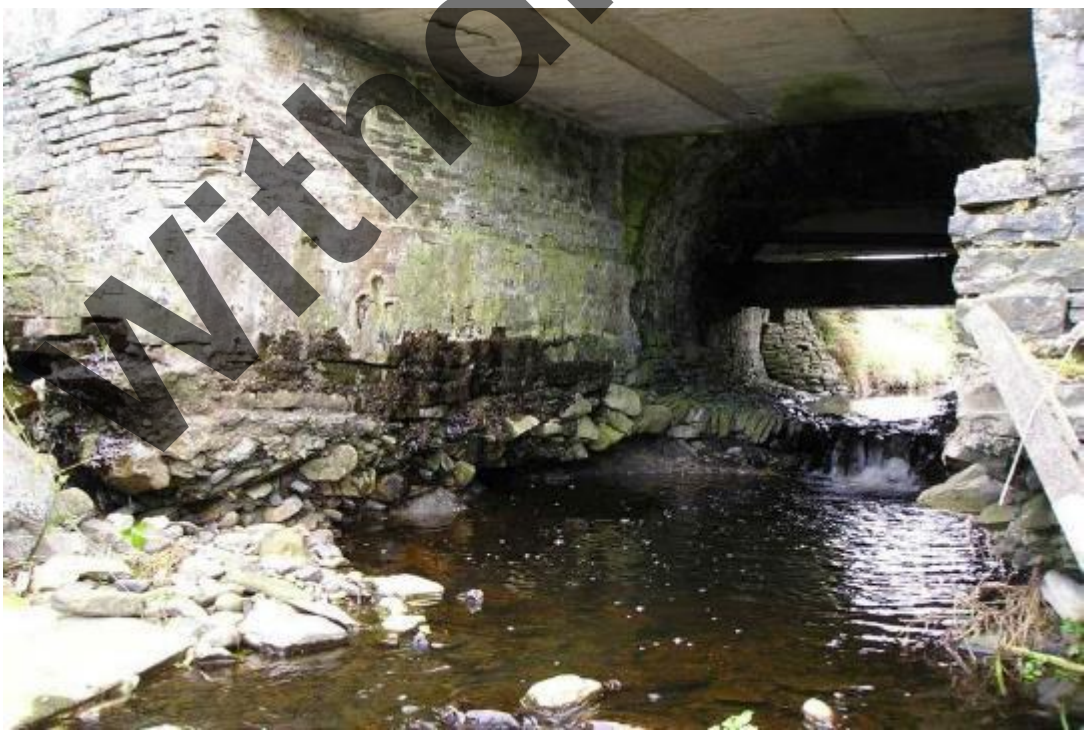


Figure 18: Component No.7 Abutments - Condition Rating 5

Figure 19: Component No.8 Piers - Condition Rating 3

Figure 20: Component No.9 Bearings - Condition Rating 3

Figure 21: Component No.9 Bearings - Condition Rating 1

Figure 22: Component No.10 Deck/Slab - Condition Rating 3

Figure 23: Component No. 10 Deck/Slab - Condition Rating 2

Figure 24: Component No.10 Deck/Slab - Condition Rating 5

Figure 25: Component No.10 Deck/Slab - Condition Rating 5

Figure 26: Component No.10 Deck/Slab - Condition Rating 3

Figure 27: Component No.11 Beams/Girders/Transverse Beams - Condition Rating 4

Figure 28: Component No.11 Beams/Girders - Condition Rating 3

Figure 29: Component No.11 Beams/Girders/Transverse Beams - Condition Rating 3

Figure 30: Component No.11 Beams/Girders - Condition Rating 3

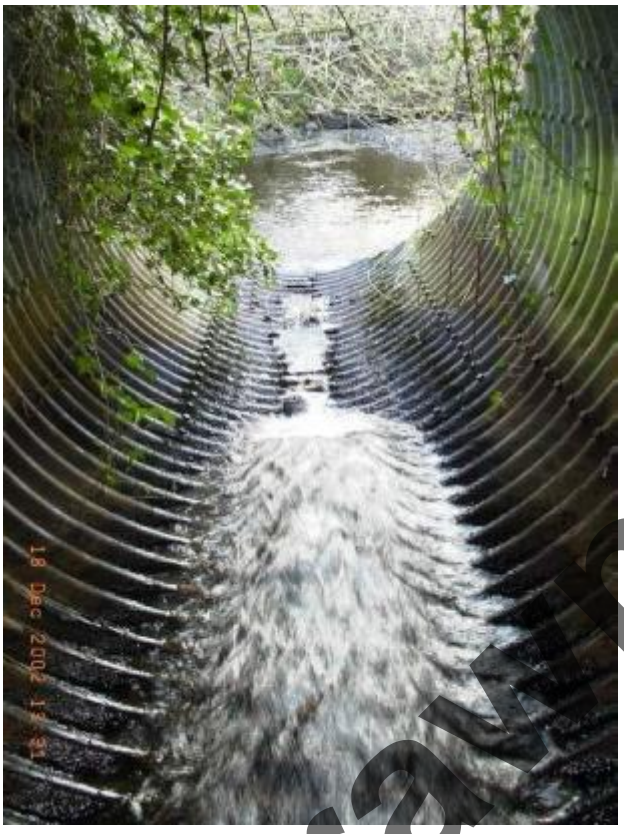


Figure 31: Component No.13 Other Element - Condition Rating 4

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