PRISM

Release: 4/2020

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Best Practices - Road Design and Maintenance

Introduction:

In order to be effective, an agency must be “proactive” rather than “reactive” when it comes to roadway maintenance. Otherwise, they’re vulnerable to litigation in the event of a roadway hazard that leads to loss.

CA Government Code §835 states that public agencies may be liable for injury caused by dangerous conditions of public property if the plaintiff establishes that the entity had knowledge of the hazard and sufficient time to correct it. This means that agencies might be wary conducting inspections that may uncover hazards in their property that they know they do not have the budget to fix, in an effort to limit their liability. However, CA Government Code §835.2 states that an entity could still be found liable if:

1. Condition had existed for a long enough time that the agency should have been aware
2. Whether or not the agency had, maintained and operated a reasonably adequate inspection system that would have discovered the hazard

This means that an entity must still have a system in place for inspecting the roadways under its control for potential dangerous conditions and take actions to correct the hazards before they cause harm.

In addition, to liability concerns, all roadways will eventually need maintenance, at some point in the road’s lifetime; it’s not a matter of “if” but “when”. A more proactive approach to road maintenance will reduce overall and long-term costs associated with maintenance. Maintenance on severely damaged roadways is much more expensive than routine maintenance on roadways with less severe wear and degradation. So, the entity will be able to get more out of its budget for roadway maintenance if it addresses problems early, while they are small, before they become big expensive problems, or hazardous. On average, up to $6 can be saved for every $1 put into proactive maintenance strategies.

Purpose:

The purpose of this document is to provide best practice guidelines for local governments to assess the conditions of their roadways to help budget for, and prioritize, their maintenance and upkeep. Due to the fact that budgets are limited and since road maintenance can be expensive, it isn’t usually feasible to accomplish all of the required maintenance and repairs in any one year.

Realistically, most entities will have to create a long-term plan to triage and repair the highest priority issues and work down the list to lower priority issues over several years. This is best accomplished by developing a Maintenance Implementation Plan (MIP) that will provide a systematic framework for identifying, prioritizing and implementing the most effective maintenance plan within a given budget. (Sample plan)

This document will outline the process of creating a MIP that can either be used within existing maintenance infrastructure or in conjunction with Geographic Information Systems (GIS) technology for maximum effect and efficiency.

This document is divided into sections that correspond with the sequential steps needed in an ideal Maintenance Improvement Plan.

- Creation of Development Team
- Assessment of Available Assets
- Assessment of Current Road Conditions
- Risk Considerations for the Prioritization of Road Maintenance
- Development and Implementation of the Maintenance Improvement Plan
- Review and Inspections

Creation of Development Team:

Proper road maintenance is a process that involves input and support from many different stakeholders at all levels and departments within local government. Incorporating as many individuals from these different stakeholders into the development of the MIP as possible, decreases likelihood of encountering unexpected problems in implementing the plan and gives the plan the best chances of success.

When deciding who to consult for the initial development team, it is important to keep in mind all of the aspects of road construction, design and maintenance. Usually, the entity's public works department is responsible for the logistics and implementation of the actual construction task itself, but the entity's engineer provided the design and the CAO and City manager have also had input into creating the budget and approving projects. A list of the individuals that might have important information to share in the creation of a comprehensive plan are:

- City Manager and CAO or individuals responsible for budgeting
- Public Works Department Including:
    - Directors
    - Department Heads
    - Supervisors
- The entity's Engineer

In some cases, these individuals only need to be initially consulted for feedback and expertise. Then they can be consulted on an "as needed basis" and will not need to actively participate in the entirety of the development process. However, the ultimate success of the plan will depend on the support from all involved parties, from the Executive level through the road crews doing the work. Soliciting feedback during development can show what the organization's resources are and where there might not be sufficient resources or expertise to carry out particular tasks.

The next step, assessment of available assets, helps determine the scope of what the entity can accomplish.

Assessment of Available Assets:

In order to effectively implement the MIP once it has been created, a list of the assets available to the organization needs to be generated. This asset list will help the entity create a realistic and achievable plan during the implementation stage of the MIP. A sample asset list that entities should consider for the case of road management include:

- Budget (will determine annual scope of work)
- Software (availability of GIS systems, or databases)
- Systems or Policies (including limitations and processes implementing maintenance)
- Available Expertise (engineers, GIS experts, etc.)
- Vehicles
- Equipment
- Personnel
- Material Resources (concrete, asphalt, etc.)

During the process of assessment of the organization's available assets, it is important to specify what resources are available and if there is a shortcoming to either, outsource the specific task, or budget for more resources to cover the deficiency. Doing this early in the development stage can inform the entity of what a realistic scope of work per year would be, during the development a plan for implementation step. If the implementation plan is created without considering what assets are available, the entity might run into the problem of not having the resources needed to accomplish the plan.

It is important to solicit input from the team's experts in different departments for this phase of the MIP development. For example, the Public Works department can provide a list of the vehicles, personnel, equipment and material resources available, while the executives can provide information on the available budget.

Once available resources have been identified and the potential shortcomings addressed, the next phase is the assessment of the current conditions of the roadways.

Assessment of Current Road Conditions:

The next step in the development of the MIP is to assess the current conditions of the roadways and gather the necessary data on hazards and necessary maintenance. The data will allow the entity identify hazards, to prioritize issues and determine where the assets would be put the most effective use. However, before the data collection process begins, it is extremely important to establish what the data parameters are; specifically, what data will be gathered and how it will be gathered.

If the entity is utilizing Geographic Information Systems (GIS) it is important to discuss the process with the GIS manager (or whoever will be responsible for inputting the data) to ensure that the data that is gathered can be put into the GIS database. Otherwise the entity runs the risk of gathering a large amount of data that cannot be used.

If the organization is utilizing a different method of tracking, it is similarly important to discuss it with the individual who is responsible for tracking the data to ensure that they have the information they will need to enter it into their own tracking system.

Typically, the types of data that should be collected are:

- Location (either GPS coordinates for GIS or some kind of identifying marker)
- Hazard type
    - Road Surface Conditions
        - Pavement
        - Paint/Road Markings
    - Roadside Conditions
        - Shoulders
        - Foliage
        - Signage
        - Protective Devices (barriers, guard rails, etc.)
- Detailed Descriptions of Severity
    - Photos
    - Quantitative Assessments and Measurements

The best way to accomplish this is to create a comprehensive plan to physically survey all of the roads for hazardous conditions and maintenance needs. This can be a very large and time consuming phase of the project, but can be broken up over a period of time into systematic phases, depending on the availability of personnel and other assets. Although, there can be a lot of up-front time and expense associated with this, once gathered the data can be used for the entirety of the project and allow the entity to proactively manage road hazards and maintenance.

The most effective and efficient way to gather the data is to utilize GIS software and equipment to input the information into a database with GPS coordinates. This data can be later overlaid and graphically displayed onto a map, which makes tracking and analyzing the data much easier. However, the task can be accomplished by creating a spreadsheet and manually entering in the information, as well.

However the data is gathered, it is important to establish a quantitative measurement of the conditions of the roadways to help prioritize hazards and determine where resources and assets are best spent.

To assess the conditions of other aspects of the roadway (vegetation, signage, barricades, etc.) it is important to be aware of any local laws or ordinances that may apply. Some resources to utilize in determining the best practices and criteria are as follows:

Pavement: The method for the assessment of the conditions is up to the entity itself, but for assessing pavement conditions, the Pavement Surface Evaluation and Rating (PASER) method of evaluating conditions provides a comprehensive way to qualitatively determine conditions of the pavement.

Vegetation: The Federal Highway Administration has published a guide, Vegetation Control for Safety, which provides guidance and best practices for roadside vegetation management.

Barriers: CalTrans has published a Roadside Safety Pocket Guide that has guidelines for inspection and maintenance of roadside safety hardware for local county roads.

Signage: CalTrans has published the California Manual on Uniform Traffic Control Devices (CA MUTCD) that details the signage requirements in California. This can be used to determine if the signage is appropriate and in good repair.

Once the data has been gathered, it must be analyzed to determine how to prioritize the repairs.

Risk Considerations for the Prioritization of Road Maintenance:

In the next phase, the data gathered must be analyzed to establish ranking criteria for prioritizing repairs based on the level of relative risk posed by the hazards. (See Appendix A for an example of a ranking system) The best utilization of resources will go towards roads that have the highest risk associated with the hazards. The method of determining the relative risk is up to the entity, but the quantitative data gathered before can provide an objective basis of comparison of the condition of each roadway. However, there are more considerations to take into account when determining the priority ranking. Some things that might be considered in addition to the severity of the hazard or disrepair, are the traffic volume, and the utilization of the roadway. Roads that have higher volume of traffic have a higher risk ranking because of the increase in usage.

The roads that are in the highest level of disrepair might not be the highest priority roads if they do not have the highest traffic volume, or are not essential for access. For example, a very heavily traveled road that has 1,000 vehicles per day with a mid-level severity of disrepair might have a higher priority than a road with a high level of disrepair that only sees 50 vehicles per day. Similarly, if a roadway is essential for a community during an evacuation, or is the only access in or out of a particular area, it might be a higher priority despite better overall conditions than other roadways.

The determination of the rankings naming convention and the number of tiers are subjective, but they should be specific enough to allow a valid comparison to be made. An example of a three-tiered ranking system that might be used are high-, mid- and low-priority. Where a roadway might be listed as low-priority because it has limited traffic, or the severity of the hazard or maintenance needs are not as high, and it can be addressed at a later date.

The utilization of GIS has an advantage in this section because it allows multiple sources of data to be overlaid onto the same map for easier analysis and risk assessment.

Development & Implementation of the Maintenance Improvement Plan:

Once the requisite data has been gathered, assets list has been created and criteria for the prioritization of the hazards have all been accumulated, the last phase of development and implementation of the MIP can begin.

The first step in developing the plan is to assign rankings to all of the hazards and roadways requiring maintenance to determine what the most critical improvements are required. Then, a cost estimate for each of the improvements will need to be formulated. The type of repair, judging by the level of damage and degradation will be the largest factor in considering the cost of each improvement. However, there are some short term fixes that may be considered as well to extend the life of a roadway until a proper and more permanent fix can be applied (see Montana DOT Guide for more info on surface treatment types and applications).

The costs along with the rankings will determine what the best usage of the allocated budget, and other assets will be for the first several years of the implementation plan. The plan should call for the

improvement of as many of the highest priority issues as possible, given budgetary constraints. Any additional high priority improvements will have to be addressed with future years' budgets. Due to the higher cost of larger projects, there might be an opportunity to address smaller projects that are not as expensive within the first couple of years in addition to the bigger items with "leftover" funds. These items may not have as high of a priority, but typically their lower cost may allow them to be addressed earlier than their priority would warrant.

For example, an entity may have a budget of $1,000,000 and three high priority projects estimated to cost $750,000 each. In the first three years, the entity may address the one high priority project per year and spend the remaining $250,000 on short term fixes to mitigate the higher priority risks temporarily or apply those funds to mid and low priority projects that can fit within the allocated amount.

This will create a "leap-frog" type approach, but will provide a comprehensive plan to identify and address hazards proactively, rather than a reactive approach, which can cost the entity more money in long-term maintenance costs and possible litigation.

The UC Davis Pavement Research Center (UCPRC) has several resources available to help in determining the cost and treatment options. Their Life Cycle Cost Analysis Comparison Spreadsheet can be a valuable tool to use in order to determine the most cost effective options given different scenarios.

Review & Inspections:

The final part of the effective implementation of the plan is to maintain a regular inspection schedule to update the conditions and priority rankings after the initial inspection. Once the initial data is gathered, the inspection schedule can be adjusted based on the needs and classification of the roadway and the condition of the roadway. (See Appendix B for sample inspection frequency). These inspections are crucial for the continued success of the plan because the roadways will continue to deteriorate and inspections are necessary to continue to update the MIP with the new data regarding conditions. In addition to roadway conditions, project progress should be monitored to determine if the goals were reached. If the project has not been completed, or requires more funds, that will need to be accounted for in the review of the MIP. Project review can also indicate if there are any areas for improvement within the processes or the plan.

The MIP should be reviewed at least annually and all of the new data that is gathered should be input into the MIP. The new data allows the entity to adjust the year-by-year improvement schedule with completed projects, project updates and new conditions. This is another area where the entity would benefit from utilizing GIS, because the data entry into the system can be automated and added as it is gathered by the inspectors.

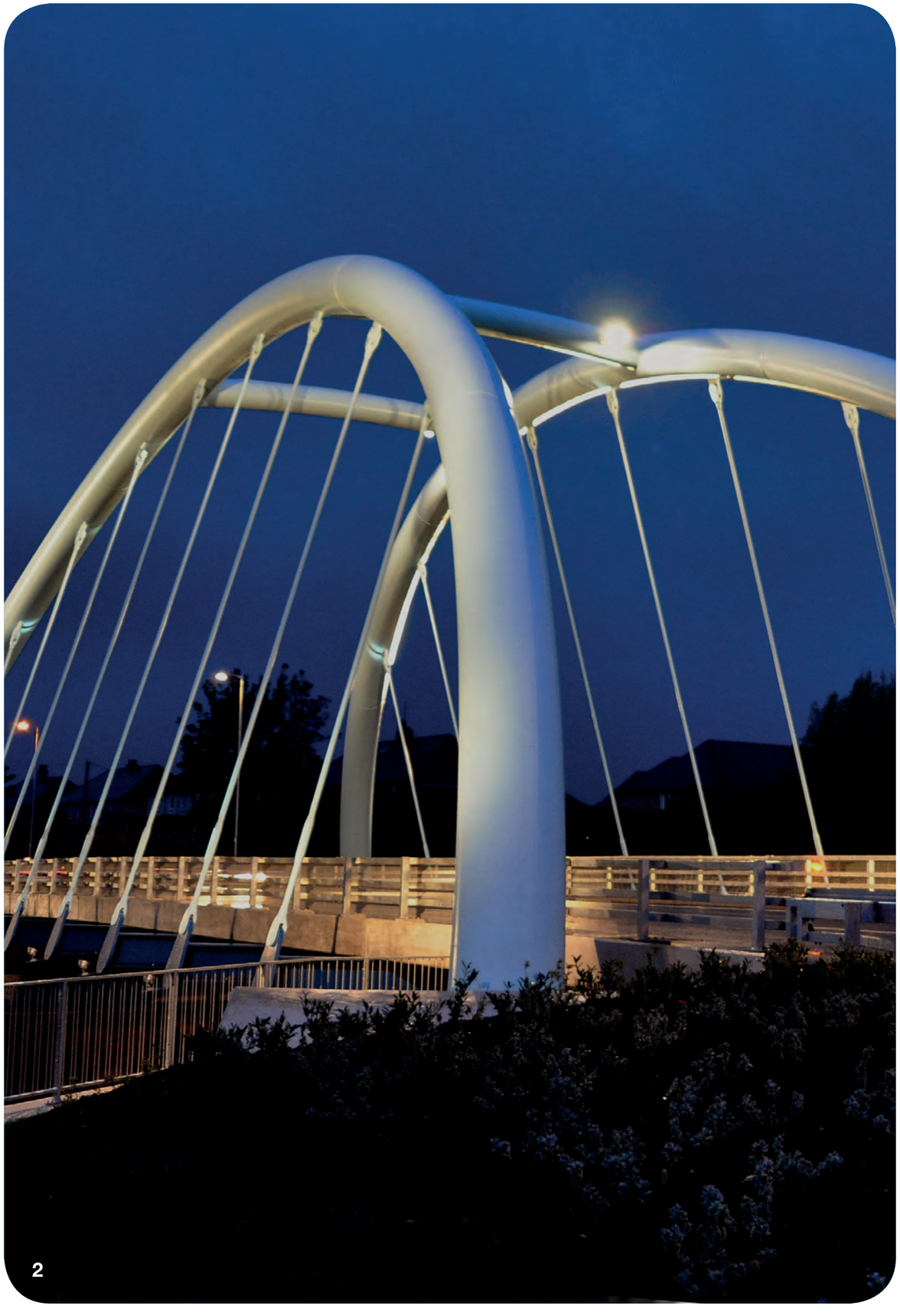
Summary:

A maintenance improvement plan allows an entity to be proactive about the management of their pavement and roadways. This proactive approach will allow an organization to address maintenance needs before they become hazardous situations, and to triage higher priority repairs and maintenance. In addition, there are significantly lower costs associated with preventative maintenance rather than reconstruction, so the entity will be able to save taxpayer dollars and resources in the long term.

The MIP also allows the entity to utilize their budget more efficiently and will lead to a higher overall quality roadway system for the public. While the MIP can be implemented without a GIS system, the MIP works best with the usage of a GIS system because it dramatically increases the ease of implementation and the ability to sustain the plan. It is strongly recommended that the entity look into leveraging GIS, since it can be integrated into the maintenance schedules for a myriad of projects and can be utilized to track nearly any kind of data related to any physical location.

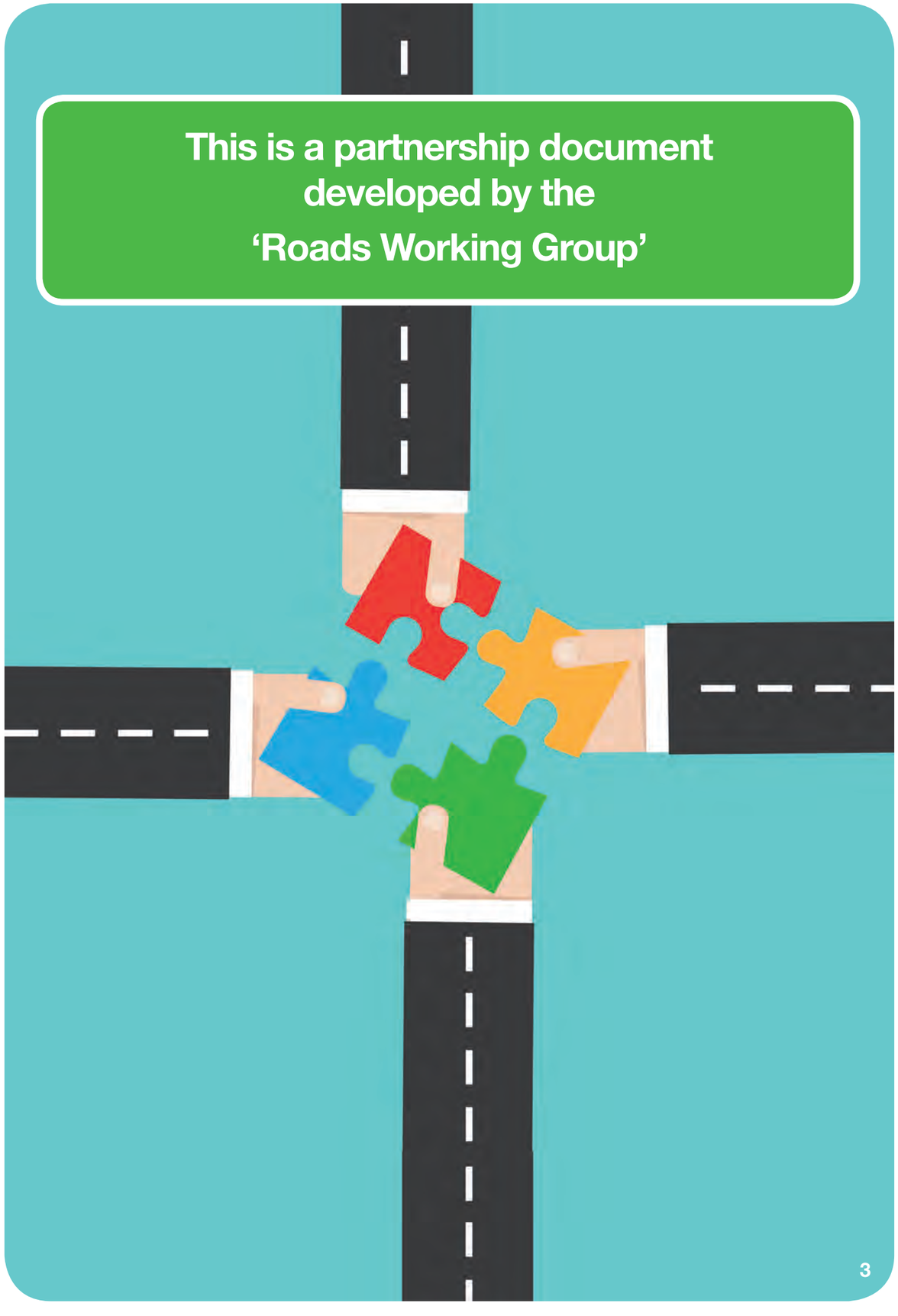
Appendix A – Guidance Document for Road Safety Inspections and Defect Categorization

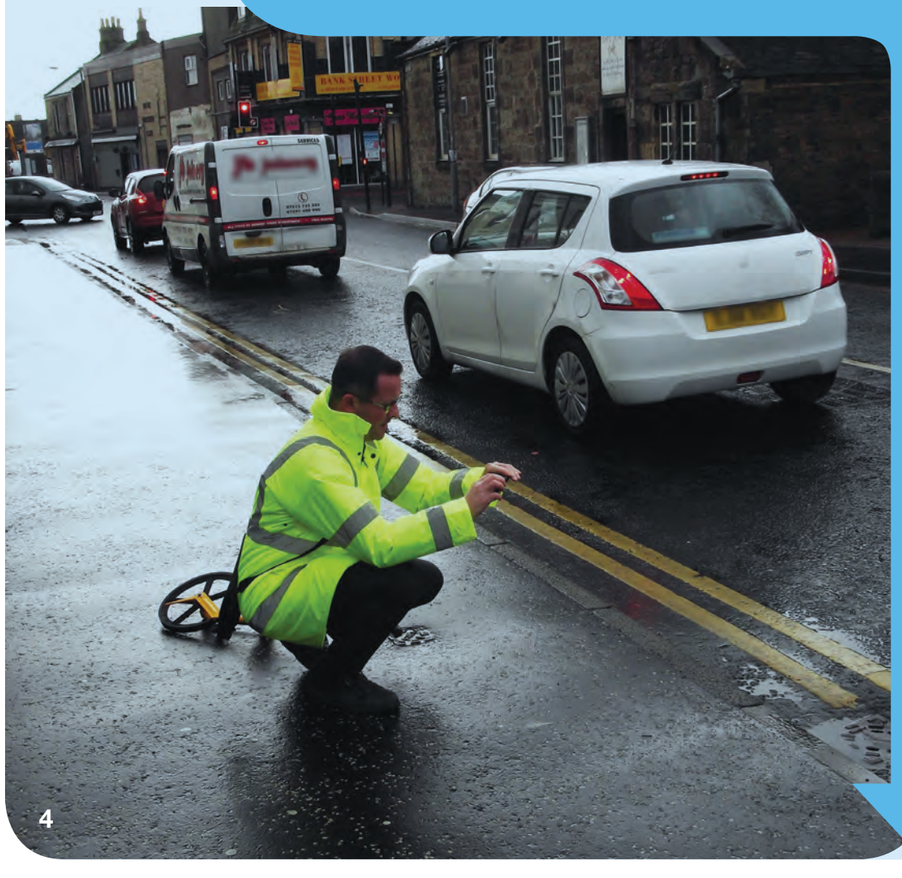
Guidance Document for Road Safety Inspections and Defect Categorisation



This is a partnership document developed by the

‘Roads Working Group’





Procedure for Road Safety Inspections and Defect Categorisation

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1. INTRODUCTION

The Roads (Scotland) Act 1984 under section 1, states that "…a local roads authority shall manage and maintain all such roads in their area as are for the time being entered in a list (in this Act referred to as their "list of public roads") prepared and kept by them under this section."

The 'Well-maintained Highways' Code of Practice for Highway Maintenance Management has specific recommendations regarding inspections of all road elements. This guidance document specifically relates to the procedures for carrying out safety inspections.

The establishment of an effective regime of safety inspections is a crucial component of road maintenance and this guidance document has been developed in accordance with the Code of Practice, recognising areas of best practice from each of the participating Councils.

This guidance document has been developed in partnership with the Roads Authorities of Argyll & Bute, Dumfries & Galloway, East Ayrshire, East Dunbartonshire, East Renfrewshire, Glasgow City, Inverclyde, North Ayrshire, Renfrewshire, South Ayrshire, South Lanarkshire and West Dunbartonshire Councils as part of the collaborative group known as the 'Roads Working Group'.

The Roads Working Group comprises Senior Officers from the above Councils who recognise that Councils are currently faced with delivering services within an environment of increasing fiscal austerity and are aware of the benefits that can be achieved by adopting a common approach and minimum standards which follows the principles set out in the Well Maintained Highways Code of Practice.

Adoption of the new procedure will enable Councils, where appropriate to develop resilience enabling them to inspect and maintain additional roads assets not contained within their list of public roads, where the Council also has a maintenance responsibility.

The new procedure will provide a consistent methodology for the management of the road network that focuses on delivering a proactive programme of permanent repairs to improve the condition and safety of the road network. It is intended that the implementation of this new procedure will also allow performance to be monitored and reviewed, while implementing any necessary improvements identified through its use.

The consistent approach will also assist Councils when defending any public liability claims that may be intimated against them.

2. SAFETY INSPECTIONS

Safety inspections identify defects within the road network, including those that are likely to create a danger or serious inconvenience to road users or the wider community and therefore require immediate or urgent attention.

Safety inspections are normally undertaken by an inspector in a slow moving vehicle. (In heavily used urban areas, particularly when inspecting footways, walked inspections will be required.) It may also be appropriate to inspect cycle routes on a bicycle.

During safety inspections, all observed defects that provide any foreseeable degree of risk to users will be recorded. The degree of deficiency in the road elements will be crucial in determining the nature and speed of response. Judgement will always need to take account of particular circumstances. For example the degree of risk from a pothole depends upon not only its depth but also its surface area and location within the road network.

Items for Inspection

The following are examples of the types of defect which when identified should be assessed and an instruction for repair issued with an appropriate response time specified. The list identified below is not exhaustive.

Carriageway

Carriageway defects such as:

- Surface defects and other local defects
- Abrupt level differences in running surface
- Edge deterioration of the running surface and other local defects
- Excessive standing water and water discharging onto and or flowing across the road
- Blocked gullies and obstructed drainage channels or grips which could lead to ponding or flooding
- Debris and/or spillages
- Missing cats eyes
- Missing or damaged covers

Footway, footpath & cycleway

Footway defects such as:

- Surface and other local defects
- Excessive standing water and water discharging onto and or flowing across the foot/cycleway
- Dangerous rocking paving slabs
- Large cracks or gaps between paving slabs
- Missing or damaged covers
- Debris and or spillages likely to be a hazard

Street Furniture Defects

- Damaged safety fencing
- Damaged parapet
- Damaged handrail
- Damaged road structures
- Damaged boundary fence where children or animals could gain access

Traffic Signs

- Missing, damaged or faded regulatory or warning sign
- Major sign plate or structural failure
- Electrically or otherwise unsafe apparatus
- Damage which may cause a dangerous obstruction to road traffic or other road users

Road Lighting

- Damaged Column
- Exposed, live electrical equipment

Road Markings

- Badly worn Stop, Give Way or double continuous white line

Other Safety Defects

- Overhead wires in dangerous condition
- Sight-lines obstructed by trees and other vegetation
- Trees in a dangerous condition
- Earthslips where debris has encroached or is likely to encroach the road
- Rocks or rock faces constituting a hazard to road users

3. FREQUENCY OF INSPECTION

Based on the 'Well-maintained Highways' the Code of Practice for Highway Maintenance Management, the carriageway and footway hierarchy for inspections and the recommended frequencies for inspections are set out in the following tables.

Table 1 - Carriageway Hierarchy

Urban and residential carriageway inspections may be carried out either on foot or from a vehicle, with rural carriageway inspections being carried out from a vehicle.

Carriageway Category	Hierarchy Description	Type of Road General Description	Description
1	Motorway	N/A	N/A
2	Strategic Route	Principal A Roads between Primary Destinations	Routes for fast moving long distance traffic with little frontage access or pedestrian traffic. Speed limits generally in excess of 40mph with few junctions.
3a	Main Distributor	Major Urban Network & Inter-Primary Links. Short to medium distance traffic.	Routes between strategic routes and linking urban centres to the strategic network with limited frontage access. In urban areas speed limits are usually 40mph or less.
3b	Secondary Distributor	Classified Roads (B & C Class) and unclassified urban bus routes carrying local traffic with frontage access and frequent junctions.	In rural areas these roads link the larger villages and HGV generators to the Strategic and Main Distributor Network. In built up areas these roads have 30mph speed limits and high pedestrian activity.
4a	Link Road	Roads linking between the Main & Secondary Distributor Network with frontage access and frequent junctions.	In rural areas these roads link the smaller villages to the distributor roads. They are of varying width and not always suitable of carrying two-way traffic. In urban roads they are residential or industrial inter connecting roads with 30mph speed limit.
4b	Local Access Road	Roads serving limited numbers of properties carrying only access traffic.	In rural areas these roads serve small settlements and provide access to individual properties and land. They are often single lane and unsuitable for HGV. In residential areas they are residential loop roads or cul-de-sacs.

Table 2 - Footway Hierarchy

Footway inspections may be carried out either on foot or from a vehicle.

Category	Category Name	Description
1(a)	Prestige Walking Zones	Very busy areas of town centres with high public space and streetscene contribution.
1	Primary Walking Routes	Busy urban shopping and business areas and main pedestrian routes.
2	Secondary Walking Routes	Medium usage routes through local areas feeding into primary routes, local shopping centres etc.
3	Link Footways / Footpaths	Linking local access footways through urban areas and busy rural footways.
4	Local Access Footways / Footpaths	Footways associated with low usage, short estate roads to the main routes and cul-de-sacs.

Table 3 - Safety Inspection Frequency

Feature	Description	Category	Frequency
Roads	Strategic Routes	2	Up to 12 per annum (Min ten)
	Main Distributor	3 (a)	Up to 12 per annum (Min ten)
	Secondary Distributor	3 (b)	Up to 12 per annum (Min ten)
	Link Road	4 (a)	Four per annum
	Local Access	4 (b)	One per annum
	All other locations (Carparks)		One per annum
Footways	Prestige Walking Zones	1(a)	Up to 12 per annum (Min ten)
	Primary Walking Routes	1	Up to 12 per annum (Min ten)
	Secondary Walking Routes	2	Four per annum
	Link Footway	3	Two per annum
	Local Access Footways	4	One per annum
Cycle Route	Part of Carriageway		As per associated road
	Remote from Carriageway		Two per annum
	Cycle Trails		One per annum

Additional inspections may be necessary in response to user or community concerns, as a result of incidents or extreme weather conditions, or in the light of monitoring information.

It is accepted by all participating Councils that other factors may preclude some inspections being carried out on road hierarchy category 2, 3(a), 3(b) and footway category 1(a) and 1. In such cases the target of 1 per month will reduce to a minimum of 10 per year. The frequency of inspections contained within Table 3 represents the minimum requirements to be adopted, with authorities applying a risk based approach to when each inspection is programmed to be undertaken.

4. INTERVENTION LEVELS AND RESPONSE TIMES FOR DEFECTS

Defect Risk Assessment

Inspectors undertaking safety inspections or responding to reported incidents require to use judgement in determining response times to observed or reported defects. The Well Maintained Highways Code of Practice recommends that roads authorities adopt a system of defect risk assessment for determining the response times to road defects.

The risks identified through this process have to be evaluated in terms of their significance. This means assessing the likely impact should the risk occur and the probability of it actually happening. The impact is quantified by assessing the extent of damage likely to be caused should the risk become an incident. As the impact is likely to increase with increasing speeds, the volume of traffic and category of road are important considerations in the assessment. The probability is quantified by assessing the likelihood of users passing by or over the defect encountering the risk. As the probability is likely to increase with increasing vehicular or pedestrian flow, the network hierarchy and defect location are consequently important considerations in the assessment.

Response times for which a defect should be repaired or made safe will depend upon:

1. The depth, surface area or other extent of the defect.
2. The volume, characteristics and speed of traffic.
3. The location of the defect relative to road features such as junctions and bends.
4. The location of the defect relative to the positioning of users, especially vulnerable users, such as in traffic lanes or wheel tracks.
5. The nature and extent of interaction with other defects.
6. Forecast weather conditions, especially potential for freezing of surface water.

All defects identified therefore require to be evaluated in terms of their significance. That means assessing the likely impact should the risk occur and the probability of it actually happening. Having identified a particular risk, the Risk Matrix below will be used to determine the defect category and response time.

The Defect and Priority tables at Appendix 1 use the risk based approach contained within this document and have been populated on the basis of individual defect types. These tables provide examples of how the risk based approach should be used to help assess risk for any defect noted.

Probability ▶ Impact ▼	Very Low (1)	Low (2)	Medium (3)	High (4)
Negligible (1)	1	2	3	4
Low (2)	2	4	6	8
Noticeable (3)	3	6	9	12
High (4)	4	8	12	16
Response Category	Cat 4 (Monitor)	Cat 3 (30 Days)	Cat 2 (7 Days)	Cat 1 (4 Hours)
Risk Value	(1 - 4)	(6 – 8)	(9 – 12)	(16)

Category 1: Represent a high risk to road users and should be corrected or made safe at the time of inspection, if reasonably practicable. In this context, making safe may constitute displaying warning signs or/and coning off to protect the public from the defect. If it is not possible to correct or make safe the defect at the time of inspection, emergency repairs to make safe should be carried out within four hours. Where practicable, safety defects of this category should not be left unattended until a temporary or permanent repair has been carried.

Category 2: Repair within seven working days. This allows a more proactive approach to be adopted for those defects that represent a medium risk to road users or because there is a risk of short-term structural deterioration.

Category 3: Repair within 30 working days - defects that require attention because they represent a low risk to road users. This allows defects of this nature to be included onto longer planned programmes of work. Defects in category 3 are not classed as safety defects.

Category 4: Monitor and Review condition based on an assessment of the risk of deterioration at next inspection. Defects in category 4 are not classed as safety defects.

It may not be possible, particularly at certain times of year, to meet target response times, due to pressure on resources. This could, but not exclusively, be due to the high number of defects that can arise in a short period of time or after periods of adverse weather, such as prolonged spells of heavy rain or snow, or freeze / thaw conditions. Prolonged periods of adverse weather may also prevent remedial measures being carried out.

Records of all safety inspections and works instructions issued following inspections shall be documented within an electronic Routine Maintenance Management System where possible.

5. DEFECTS THAT ARE NOT THE RESPONSIBILITY OF THE COUNCIL

5.1 During an inspection, defects may be identified which are not the responsibility of the Council to repair. The Council does however have a duty of care to the users of the road. Therefore the defect must be recorded and the party responsible for the repair must be made aware of the defect. If the defect is identified as a Category 1 defect, it should be made safe either by signing and coning or by a temporary repair.

Statutory Undertakers' Defective Apparatus

5.2 Where defective apparatus belonging to undertakers is identified, the defect must be recorded and the utility contacted in accordance with the New Roads & Street Works Act 1991 – Code of Practice for Inspections. The initial procedure is summarised in Figure 1 on page 15.

Defects that are the responsibility of other Third Parties

5.3 Where the defect is the responsibility of another party who is not a Statutory Undertaker, for example an adjacent landowner, the defect should be recorded and the landowner contacted with a request to carry out the necessary remedial works within an appropriate period of time. A number of scenarios may arise from an inspection, which are covered by provisions contained within the Roads (Scotland) Act 1984, for which it may be appropriate to inform the party responsible for the defect/ hazard of their responsibilities under the Act.

5.4 Some selected examples of the above are;

a. Prevention of danger to road users from nearby vegetation and fences etc. or from retaining walls being inadequate (Section 91)

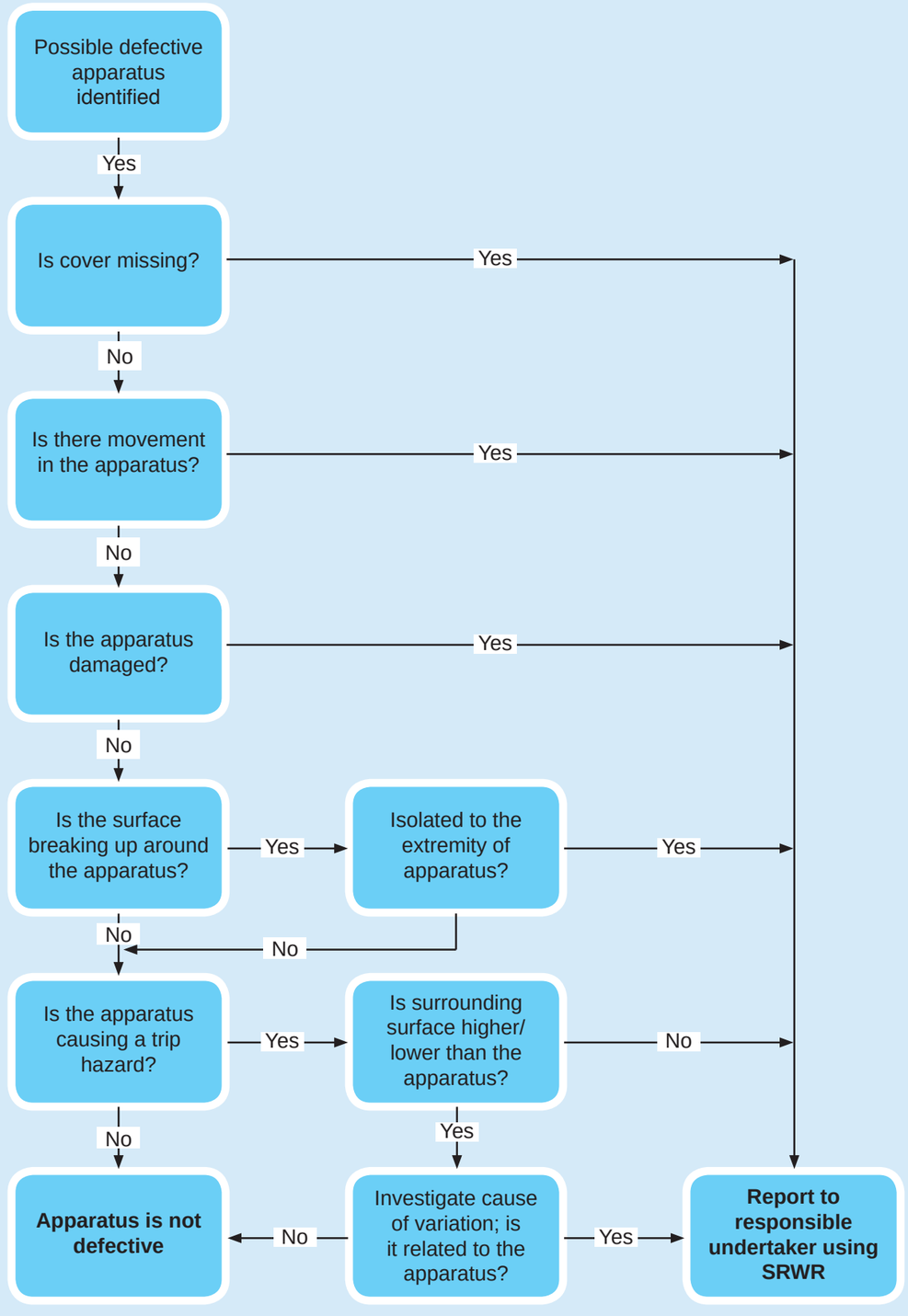
b. Deposit of mud from vehicles on road (Section 95)

c. Control of flow of water etc onto roads (Section 99)

5.5 A number of these provisions within the Act allow the Roads Authority to carry out remedial works to address the defect/hazard either immediately or after a suitable period of notice, and further may give powers to recover any expenses reasonably incurred in doing so.

5.6 Any decision to undertake such remedial work should not be done without the agreement of a suitably responsible person. In the first instance the preferred option is to have constructive discussion with the responsible party, in order to resolve the issue.

FIGURE 1: Initial Procedure for Defective Apparatus



6. HEALTH AND SAFETY

General

6.1 In general road inspections are carried out from a slow moving vehicle or on foot. However, it would seem logical that cycle routes be inspected by bicycle. The vehicle should be driven at an appropriate speed to allow any defects to identified and recorded.

Health and Safety

6.2 Inspections are to be conducted in accordance with each council's procedures for the health, safety and welfare of its employees and others.

As a minimum:

a. All staff engaged in inspections must wear high visibility clothing to BS EN 471 class 3.

b. All vehicles used to carry out inspections shall be liveried to an appropriate standard and all necessary vehicles checks shall be carried out prior to inspections being undertaken.

6.3 All surveys should make use of two-way communications (ie radio or mobile telephone). Driven safety inspections on Strategic, Main Distributor and Secondary Distributor roads should be undertaken by two people. Note: The Council's Lone Working Procedures should be followed when an inspector is undertaking a safety inspection on their own.

6.4 Should it be necessary to stop the vehicle it shall be parked off the live carriageway wherever possible. If this cannot be achieved then there must be clear visibility in both directions and the roof mounted beacon must be switched on. Traffic must not be forced across any continuous solid white centre line. If this cannot be achieved, advanced temporary traffic signing must be installed.

Making Safe

6.5 If a defect is considered to be a serious hazard to road users, full traffic management should be called for and the safety inspection vehicle should remain at the hazard until full traffic management is in place.

Equipment

6.6 All inspection vehicles should carry a minimum of six 750mm traffic cones. The cones should be kept clean and should be inspected quarterly and replaced as necessary. A record of these inspections must be kept within the vehicle.

6.7 In addition to any other equipment they consider necessary, Inspectors should also carry a digital camera to record defects and, if available, a GPS enabled system to accurately record the location of defects.

Documents

6.8 The safety inspection team should also carry a copy of:

a. This guidance document
b. New Roads & Street Works Act 1991 – Code of Practice for Inspections
c. Safety at Street Works and Road Works, A Code of Practice

APPENDIX A : DEFECT AND PRIORITY TABLES

Defect and Priority Table 1:

Carriageway Defects		Response Category – Probability			
Description	Investigatory Level	Very Low	Low	Medium	High
Carriageway Defects					
Surface Defect	<40mm	4	4	3	3
	>40mm < 100mm	4	3	2	2
	>100mm	4	3	2	1
Failed patch or defective trench	Yes	4	4	3	3
Missing ironwork cover	Yes	4	3	2	1
Badly cracked or damaged ironwork	Yes	4	4	3	3
Cracking around ironwork frame	Yes	4	4	3	3
Crowning / Depression	>40mm level difference	4	3	2	2
Rutting	>20mm	4	4	3	3
Missing / defective skid resistant surfacing	Yes	4	4	3	3
Debris/ Spillage	Yes	4	3	2	1
Edge Deterioration	>40mm <100mm	4	3	2	2
	>100mm	4	3	2	1
Displaced metal stud	Yes	4	3	2	1
Missing studs / reflectors	<20% missing	4	4	4	4
	>20% missing	4	4	3	3
Missing or worn lines / markings	Stop/Give Way	4	3	2	2
	Double white line	4	3	2	2
	Other	4	4	4	4

Defect and Priority Table 2:

Kerb Defects		Response Category – Probability			
Description	Investigatory Level	Very Low	Low	Medium	High
Kerb Defects					
Loose, missing or damaged kerbs	Yes	4	3	2	2
Dislodged kerb	50mm horizontally, 25mm vertically	4	3	2	2

Defect and Priority Table 3:

Other Paved Area Defects		Response Category – Probability			
Description	Investigatory Level	Very Low	Low	Medium	High
Shared Surfaces/Footway/Path/Cycleway/Path and Car Park Defects					
Surface Defect	>25mm <50mm	4	3	2	2
	>50mm	4	3	2	1
Failed patch or defective trench	Failed	4	4	3	3
Missing ironwork cover	Yes	4	3	2	1
Badly cracked or damaged ironwork	Yes	4	3	2	2
Cracking around ironwork frame	Yes	4	4	4	4
Crack, gap or trip	>10mm <25mm	4	4	3	3
	>25mm trip	4	3	2	1
Rocking slabs	>10mm <25mm vertical movement	4	4	3	3
	>25mm vertical movement	4	3	2	1
Crowning/ Depression	>25mm <50mm	4	4	3	3
	>50mm	4	3	2	1
Debris/ Spillage	Potential danger to pedestrian	4	3	2	1
	Unauthorised obstruction	4	4	3	3

Defect and Priority Table 4:

Debris/Spillage (and Obstructions)		Response Category – Probability			
Description	Investigatory Level	Very Low	Low	Medium	High
Debris/ Spillage (and Obstructions)					
Litter problem	Potential danger to pedestrian or road user	4	3	2	2
Fly tipping	Potential danger to pedestrian or road user	4	4	3	3
Other debris/ spillage	Potential danger to pedestrian or road user	4	4	3	3
Obstruction (signage/trees/bushes/hedges etc)	Potential danger to pedestrian or road user	4	3	3	2

Defect and Priority Table 5:

Signs, Signals and Lighting Defects		Response Category – Probability			
Description	Investigatory Level	Very Low	Low	Medium	High
Signs, Signals and Lighting Defects					
Light(s) out	>3 Lights out	4	3	2	1
	<3 Lights out	4	4	4	4
Damaged signal or light fitting or damaged column	Likely to fall	4	3	2	1
	Not dangerous	4	4	4	4
Exposed wires	Yes	4	3	2	1
Missing/ loose cover	Yes	4	3	2	1
Lighting obscured by vegetation	Yes	4	4	3	3
Unauthorised sign	Potential danger to pedestrian or road user	4	4	3	3
	Other	4	4	4	4
Missing/ damaged sign face	Regulatory/ Warning signs	4	3	2	2
	Other Signs	4	4	4	4
Obscured or dirty sign	Regulatory/ Warning signs	4	3	2	2
	Other Signs	4	4	4	4

Defect and Priority Table 6:

Safety Fence/ Barrier Defect		Response Category – Probability			
Description	Investigatory Level	Very Low	Low	Medium	High
Safety Fence/ Barrier Defect					
Safety fence/ barrier or guardrail damaged or loose	Potential danger to pedestrian or other road user	4	3	2	1
	Other	4	4	4	4

Defect and Priority Table 7:

Tree/ Hedge Defects		Response Category – Probability			
Description	Investigatory Level	Very Low	Low	Medium	High
Tree/ Hedge Defects					
Loose branch	Potential hazard	4	3	2	1
	Unlikely to fall onto road	4	4	4	4
Overhanging branch	Yes	4	4	4	3
Sight-lines obscured	Yes	4	3	2	2
Other tree/ hedge defect	Potential danger to pedestrian or road user	4	3	2	2
	Other	4	4	3	3

Defect and Priority Table 8:

Drainage Defects & Standing/Running Water		Response Category			
		Probability			
Description	Investigatory Level	Very Low	Low	Medium	High
Drainage Defects & Standing/ Running Water					
Blocked drain, gully or grip	Potential danger to pedestrian or road user	4	3	2	2
	Other	4	4	4	4
Missing gully frame	Yes	4	3	2	1
Broken gully frame/cover	Potential danger to pedestrian or road user	4	3	2	1
	Other	4	4	3	3
Water discharging onto road or trash screen/grid blocked	Potential danger to pedestrian or road user or flooding to property	4	3	2	1
	Primary salting route in winter	4	3	2	2
	Other	4	4	4	4

Defect and Priority Table 9:

Structures Defects		Response Category			
		Probability			
Description	Investigatory Level	Very Low	Low	Medium	High
Structures Defects					
Parapet damaged	Yes	4	3	2	2
Bridge defect - other	Potential danger to pedestrian or road user	4	3	2	1
	Other	4	4	3	3
Retaining wall problem	Yes	4	3	2	2
Earthworks/embankment defect	Yes	4	3	2	2

Defect and Priority Table 10:

Utility Defects		Response Category			
		Probability			
Description	Investigatory Level	Very Low	Low	Medium	High
Utility Defects					
Signing/guarding	Not to code of Practice requirements	4	3	2	1
Reinstatement	Not to code of Practice requirements	4	3	2	1
Overhead wires, poles etc in poor condition	Yes	4	3	2	1
Utility ironwork	Missing	4	3	2	1
	Badly cracked or damaged	4	3	2	2
	Cracking round frame	4	4	3	3
Other utility defect	Potential danger to pedestrian or road user	4	3	2	1
	Other	4	4	3	3

Published by:
North Ayrshire Council, Cunninghame House, Irvine KA12 8EE

Appendix B – Road Safety Inspection Manual

ABERDEEN
CITY COUNCIL

Road Safety Inspection Manual

June 2018

Contents Page

Revision	Purpose	Date	Approved By
CMT Final	For Approval by CMT Committee	June 18	

1.0 CONTROL OF DOCUMENT

1.1 The Roads Operations Manager will hold the signed original copy of each revision of the Aberdeen City Council (ACC), Roads Safety Inspection Manual.

2.0 INTRODUCTION TO THE POLICY

2.1 As required by Section 1 Roads (Scotland) Act 1984, "a local authority shall manage and maintain all such roads in their area as are for the time being entered in a list prepared and kept by them". ACC is bound to comply with this legislation and manage its roads accordingly.

2.2 The establishment of an effective regime of inspection, assessment and recording is the most crucial component of road maintenance. The safety inspection regime provides the basic information for addressing the first core objective of roads maintenance, network safety.

2.3 In line with the principles of 'Well-managed Highway Infrastructure: A Code of Practice (CoP)(October 2016)', guidance for safety inspections has been established with consideration given to specific local circumstances and the relative risks and consequences associated with these. The characteristics of the regime, including the frequency of inspection, items to be recorded, and the nature of response are defined by this Road Safety Inspection Manual, which is set in the context of ACC's overall policy and maintenance strategy.

3.0 PURPOSE OF SAFETY INSPECTIONS

3.1 Safety inspections are designed to identify all defects likely to cause danger or serious inconvenience to users of the network or the wider community. Such defects include those that require urgent attention as well as those where the locations and sizes are such that longer periods of response are appropriate.

3.2 The Safety inspection regime forms a key aspect of ACC's strategy for managing liability and risk. The computerised inspection system, used by ACC, effectively manages the inspection patterns and frequency. Built in safeguards minimize the chance of inspections being missed or duplicated.

3.3 ACC uses its safety inspection process, monitoring information and a regime of proactive maintenance to reduce risk and provide the public with a safer roads network.

3.4 When a repair is made to correct a safety defect, the only consideration made will be to eliminate the risk associated with that defect as quickly and safely as reasonably possible. Repairs made may be temporary or permanent and may not necessarily be made using the same materials as those surrounding the defect, especially in areas of non-standard road or footpath construction material.

4.0 DEFINITIONS

4.1 Unless otherwise stated, terms used in this manual are as defined in CoP.

4.2 Defects are classed in:

- Category 1 - Immediate action: Those that require prompt attention because they represent an immediate or imminent hazard or because there is a risk of short-term structural deterioration. Category 1 defects shall be corrected or made safe at the time of the inspection and cannot be left without intervention.

- Category 2a - Repair within 2 working days: Defects which, following a risk assessment, are deemed not to represent an immediate or imminent hazard or risk of short term structural deterioration. Defects that represent a medium risk to road users but are liable to deteriorate at a rate, or in a manner, to move them to a category 1 defect if not addressed promptly.

- Category 2b - Repair within 7 working days: Defects which, following a risk assessment, are deemed not to represent an immediate or imminent hazard or risk of short term structural deterioration. Defects that represent a medium risk to road users or have a risk of short term deterioration.

- Category 3 - Repair within 28 working days: Defects which, following a risk assessment, are deemed not to represent an immediate or imminent hazard or risk of short term structural deterioration. Defects that represent a low risk to road users.

- Category 4 - Defects that do not present a safety risk at the time of inspection and are not likely to become safety issues before the time of the next scheduled inspection.

4.3 Further guidance about the level of response to defects is contained in Section 5.0 and Appendix A of this document.

5.0 FREQUENCY AND METHODOLOGY OF INSPECTIONS

5.1 The CoP sets out advice for authorities regarding safety inspections frequencies based upon categories within the network hierarchy (Table 1). These have been linked to ACC's network to determine the frequency of safety inspections on the ACC network. Where appropriate the following considerations have been taken into account:

- The hierarchy of the network
- Traffic use
- Incident or insurance history
- Characteristics of adjoining network elements
- Wider policy and operational considerations

Where two categories of the network intersect, the category with the higher intervention levels shall be applied to both at that location.

Table 1 – ACC Roads Hierarchy

The below table is an adaption of the one found in the CoP and explains how roads are categorised within ACC's network.

Carriageway category	Hierarchy description	Type of road general description	description
1	**Motorway**	**N/A**	**N/A**
2	**Strategic Route**	Principal A Roads between Primary Destinations	Routes for fast moving long distance traffic with little frontage access or pedestrian traffic. Speed limits generally in excess of 40mph with few junctions.
3a	**Main Distributor**	Major Urban Network and Inter-Primary Links. Short to medium distance traffic.	Routes between strategic routes and linking urban centres to the strategic network with limited frontage access. In urban areas speed limits are usually 40mph or less.
3b	**Secondary Distributor**	Classified Roads (B and C Class) and unclassified urban bus routes carrying local traffic with frontage access and frequent junctions.	In rural areas these roads link the larger villages and HGV generators to the Strategic and Main Distributor Network. In built up areas these roads have 30mph speed limits and high pedestrian activity.
4a	**Link Road**	Roads linking between the Main and Secondary Distributor Network with frontage access and frequent junctions.	In rural areas these roads link the smaller villages to the distributor roads. They are of varying width and not always suitable of carrying two-way traffic. In urban roads they are residential or industrial inter connecting roads with 30mph speed limit.
4b	**Local Access Road**	Roads serving limited numbers of properties carrying only local access traffic.	In rural areas these roads serve small settlements and provide access to individual properties and land. They are often single lane and unsuitable for HGV and in residential areas they are generally residential loop roads or cul-de-sacs.

Table 2 – ACC Footway Hierarchy

The below table is an adaption of the one found in the CoP and explains how footways are categorised within ACC's network.

Category	Category name	Description
1a	Prestige Walking Zones	Very busy areas of town centres with high public space and street scene contribution.
1	Primary Walking Routes	Busy urban shopping and business areas and main pedestrian routes.
2	Secondary Walking Routes	Medium usage routes through local areas feeding into primary routes, local shopping centres etc.
3	Link Footways/Footpaths	Linking local access footways through urban areas and busy rural footways.
4	Local Access Footways/Footpaths	Footways associated with low usage, short estate roads to the main routes and cul-de-sacs.

5.2 Planned Safety Inspections shall be carried out at the frequencies shown in Table 3 and within the tolerances shown in Table 4.

Table 3 – ACC Roads Inspection Frequencies

Feature	Description (as per CoP)	Category (as per CoP)	Inspection frequency
Roads	Strategic Routes	2	Monthly (Min 10/year)
	Main Distributor	3a	Monthly (Min 10/year)
	Secondary Distributor	3b	Monthly (Min 10/year)
	Link Road	4a	Every 3 months
	Local Access	4b	Annually
	All other locations (Carparks)	4b	Annually
Footways	Prestige Walking Zones	1a	Monthly (Min 10/year)
	Primary Walking Routes	1	Monthly (Min 10/year)
	Secondary Walking Routes	2	Every 3 months
	Link Footway	3	Every 6 months
	Local Access Footways	4	Annually
Cycle Route	Part of Carriageway		As per associated road
	Remote From Carriageway		Every 6 Months
	Cycle Trails		Annually

Table 4 - Safety Inspection Tolerances

For each inspection frequency listed in table 3, the below table outlines the maximum time there will be between each inspection.

Frequency of inspection	**1 month**	**3 months**	**6 months**	**1 year**
Tolerance	+/- 5 days	+/– 7 days	+/–20 days	+/– 27days
Max period between inspection	36 days	100 days	200 days	392 days

Note: all time periods are in calendar days NOT working days.

5.3 The inspection frequencies found in table 3 will be the minimum number of inspections (Excepting that other factors may preclude some inspections, e.g. weather, sickness etc).

5.4 Safety inspections are designed to identify all defects likely to create danger or serious inconvenience to the users of the network or the wider community. The risk of danger is assessed on site and the defect is categorised as either Category 1, 2a, 2b, 3 or 4 and the appropriate response time is then allocated based on the guidelines in Appendix A.

5.5 Safety inspections are undertaken in a slow-moving vehicle by a single person driving and inspecting. Consideration must be given to the safety of the inspection personnel and other road users during the driven inspections. The inspection covers all areas within the City boundary along that road. In urban areas, particularly when inspecting footways, it may be difficult to ensure that the inspection is carried out correctly by vehicle and it may be necessary to carry out these inspections by foot. Walked inspections will be the normal method for town centre inspections. Cycle ways may also be inspected by visual inspection from a vehicle or by bicycle.

5.6 Defects that are reported by the public will be inspected within 5 working days and the appropriate level of response will be determined using the guidelines set out within this document.

5.7 Section 140 of the New Roads and Street Works Act 1991 (NRSWA) places a duty on undertakers (utilities) to maintain their apparatus to the reasonable satisfaction of the Roads Authority. However recent case law has shown that Roads Authorities have a joint liability with the undertakers.

5.8 When an inspection identifies a particular piece of defective apparatus that is deemed to be unsafe and requiring attention, notification will be sent to the appropriate party requiring them to carry out remedial action under Section 140 of the Act. This notification should detail the apparatus and its location complete with maps, postcode and grid reference.

5.9 If remedial action is not carried out within a reasonable timescale, the Roads Authority may carry out repairs themselves and recharge their reasonable costs (as per Section 140 of the NRSWA 1991).

6.0 ADDITIONAL INSPECTIONS AND EXCEPTIONAL CIRCUMSTANCES

Additional inspections may be necessary in response to user or community concern, as a result of incidents, extreme weather conditions or monitoring information. These have been identified through the risk management process and have been summarised below. The occurrence of any such inspection and its outcome is recorded in the same format as a programmed safety inspection but is recorded as being an additional inspection.

6.1 Reactive inspections -

An appropriate person with the relevant experience and knowledge responds to user or community concerns and requests for service. Based upon the severity of the situation, a site visit may be required to make a more thorough assessment of the safety or service request. The defects are assessed with the same criteria and intervention levels as those within the programmed Safety Inspection process.

6.2 Find and Fix -

This type of operation can be beneficial when dealing with multiple defects in a particular area. Response gangs are allocated to routes on a prioritized basis for initial assessment and making safe where possible. Defects that cannot be made safe immediately are referred to an appropriate person for prioritisation and additional resources.

6.3 Historic Features -

Many roads have been adopted with historic features that would not be acceptable in a current road design. This might include steps, cellar openings or drainage arrangements that present potential trip situations worse than the intervention levels suggested in this document. These should not be recorded as defects, as in law the road has been adopted with these encumbrances and the public must take appropriate care.

6.4 Monitoring of protection -

Where defects with potentially serious consequences for network safety are made safe by means of temporary signing or other protection, arrangements may be made for a special inspection regime to ensure the continued integrity of the protection is maintained until a repair can be made. This should be recorded by the work operative.

6.5 Exceptional circumstances -

In exceptional circumstances, inspections may not be able to be carried out. For instance, where road defects are hidden by static objects such as bins, parked vehicles, skips etc.

6. 6 During periods of extreme weather, the safety inspection policy may be suspended. The authority for such action lies with ACC's Roads Operations Manager. Suitable records of these instances are kept.

7.0 ITEMS FOR INSPECTION

7.1 Items included in safety inspections are outlined in Appendix A. The roads inspectors also record any other defects not included on this list that they consider are likely to create danger or serious inconvenience to the community.

7.2 Additional inspections relating to centre and edge line road markings, road studs and road signs may be carried out in the hours of darkness to assess reflectivity. The occurrence of any such inspection and its outcome is recorded in the same format as a programmed Safety Inspection but is recorded as being an additional inspection. Any work resulting is carried out as programmed work.

7.3 All trees within the adopted road network are required to be inspected during the routine safety inspections. Any defect or feature likely to cause an obvious danger by encroachment, visibility obstruction, damage, ill health or trip hazard is recorded and the appropriate action taken. Under Section 83, or 91, of the Roads (Scotland) Act 1984, ACC deals, by consultation with the owners and if required a Notice, with hedges, trees and shrubs growing on adjacent land which overhang the road. ACC carries out additional tree inspections with qualified arboriculturalists.

7.4 All Safety Inspectors receive some basic arboricultural guidance but a qualified arboricultural advisor carries out an inspection when specialist knowledge is required. Their advice is also sought before any work is carried out on tree roots causing a problem to a footway surface. Qualified tree surgeons will be used when conducting tree maintenance work for ACC.

8.0 DEGREE OF DEFICIENCY AND NATURE OF RESPONSE

8.1 The risk-based approach to defect categorisation provided within this document takes consideration of the roads hierarchy on which a defect lies. An assessment, based upon a number of risk factors (outlined below and in Appendix A) will consider the context of the defect as well as its nature, is used to determine an appropriate response time.

8.2 Defects that represent an immediate or imminent hazard shall be corrected or made safe at the time of the inspection.

8.3 Other significant defects which, following a risk assessment, are deemed not to represent an immediate or imminent hazard, or when there is not deemed to be a risk of rapid structural deterioration, shall be repaired within the timescales shown in Table 5.

8.4 Using a risk-based approach to defect categorisation, Inspectors will use on-site judgement when determining the required response to any defect. In determining the correct response time and intervention they will consider all relevant factors that determine the potential safety implications of a defect. These include, but are not limited to:

- The size - width, length and depth and general extent of the defect (see intervention categories in Appendix A)
- The road class and hierarchy

- The location of the defect relative to the probable positioning of road users, especially vulnerable road users – e.g. is a defect in a normal wheel track or on a crossing
- The volume of traffic at the defect location
- Local knowledge of the road and how it is utilised by road users
- The speed limit of the road
- The nature of the defect and its interaction with other defects
- The weather conditions and potential results thereof e.g. potential of freezing surface water in low temperatures.

8.5 The intervention levels, the making safe, and the permanent repair times for each item listed for inspection have been determined for each category of the network by evaluating the likely impact (should the risk occur) and the probability of it actually occurring. The resulting risk factor determines the category and timescale to rectify the defect. The subsequent intervention levels apply as a minimum (unless the feature is by design) and are set out in Table 6 and Appendix A.

8.6 Where a permanent repair will necessitate obtaining details of equipment from statutory undertakers before work can be safely carried out, a timescale of 3 months will apply. This will generally only apply where excavations are required.

8.7 ACC has a varied road and footway network. From high volume dual-carriageway in congested urban environments to single lane rural roads connecting the outlying areas. Road and footway users should expect to find a condition which is safe and consistent with the type of and location of that particular infrastructure. A road user could reasonably expect the condition of a principal class A road, carrying high volumes of traffic at speed, to be in a higher state of repair to an unclassified road in a very rural environment. This concept of fit for purpose roads is captured in the Code of Practice by dividing road types up into classes and maintenance hierarchies. As such, Aberdeen's approach to Local Access Roads will be to consider safety defects as those having a lower intervention level, or longer response time, than those on other parts of the network. Table 5, below, and Appendix A outline the detailed requirements for each defect type.

Table 5 - Safety Defect Repair Times

The following table outlines the timescales within which ACC aim to repair defects in each category.

Defect Category	Timescale for the repair of safety defects
Category 4	No action – review condition of defect at next inspection
Category 3	Repair within 28 working days
Category 2b	Repair or make safe within 7 working days
Category 2a	Repair or make safe within 2 working days
Category 1	Repair or make safe within 4 hours
	Other – pass to Technical and Traffic Management Team

Table 6 – General Defect Matrix

The table below demonstrates the possible response options depending on the road hierarchy and defect severity. Table 5, above, acts as a key for response times.

Hierarchy / Impact	4b	4a	3b	3a	2
Negligible – Minor defects that are not considered a danger/hazard					
Low – some defects present but unlikely to create danger/hazard					
Noticeable – Significant defects that could be a danger/hazard					
High – Major defects that could result in a serious danger/hazard					
Non Safety Related Defects – Defects worthy of note/Potential future work programme					

Where two intervention levels are shown for a given impact category, the inspector has discretion to determine which level of response is appropriate. E.g., a high impact, major defect could have a 4 hour or 2 day response time.

9.0 RECORDING AND MONITORING OF INFORMATION

9.1 All information obtained from safety inspections, together with the nature of response, including nil returns, shall be recorded consistently. The data obtained shall be able to be reviewed independently and in conjunction with other survey information. It shall be stored electronically on a server which is backed-up on a daily basis. Service requests, complaints, reports or information from

users and other third parties shall also be recorded, along with the nature of response, including nil returns.

9.2 All inspection records automatically store the date and the name of the person conducting the inspection.

9.3 The network and its hierarchy are fluid and as a minimum the network shall be reviewed for changes with regard to hierarchy annually. Changes in safety inspection frequency shall subject to the approval by ACC's relevant committee and may be altered in response to the factors listed below:

- Traffic growth or reduction
- Accident rates
- Pedestrian/cyclist growth or reduction
- Sections of network being promoted as safer routes to school or for leisure use
- Recurring defects of the same nature being identified at a location where non-routine maintenance work is required to resolve the issue
- Non-routine maintenance work carried out to resolve recurring defects identified at a specific location

10.0 HEALTH, SAFETY AND TRAINING

10.1 Highway safety inspections require concentration on the identification and recording of defects, but not at the expense of the safety of the inspector or road user.

10.2 Health and safety risk assessments and safe systems of work must cover all inspection activities identifying potential hazards to inspectors and road users and appropriate control measures. These risk assessments and safe systems of work must be reviewed regularly to consider newly identified risks, new or amended legislation, new or revised inspection methods and new or revised defect repair methods. Reference should be made to the Corporate Health and Safety Policy and the Roads Operations Risk Assessments.

10.3 All personnel involved in managing or carrying out road safety inspections must be fully familiar and compliant with the safe systems of work set out. Should a roads inspector feel that a safe system of work does not provide sufficient protection at a specific location on the network, he/she must stop work immediately and inform their Line Manager. It may then be necessary to amend or develop a new risk assessment and safe system of work for that particular location or inspection before the inspection is continued.

10.4 The following guidelines relate to the various ways in which a safety inspection may be carried out. These guidelines are not exhaustive and any unique situation which may arise associated with an inspection needs to be carefully appraised to ensure that appropriate systems of work are identified and implemented.

10.5 In general, road safety inspections are carried out from a slow-moving vehicle or on foot. General control measures are listed below but should not be considered exhaustive.

10.6 Inspections from a vehicle:

- The vehicle must be fitted with the appropriate beacons and reflective signing, and the equipment used where appropriate
- Appropriate personal protective equipment and clothing will be used at all times
- Should it be necessary for the vehicle to stop, the vehicle shall be parked off the live road wherever possible. If this cannot be achieved then there must be clear visibility in both directions and the roof mounted beacon must be switched on. Traffic must not be forced across any continuous white centre lining. If this cannot be achieved, advanced temporary traffic signing must be installed
- Planned road inspections shall not be carried out under conditions of adverse weather conditions e.g. snow, fog or heavy rain
- When possible, inspections shall not be carried out during morning and evening peak periods when pedestrian and vehicle movements are high.

10.7 Inspections on foot:

- Lone working procedures must be followed
- Appropriate personal protective equipment and clothing will be used at all times
- Inspections will be conducted from footways or verges where possible
- When conducting an inspection on foot in the carriageway or on a verge closer than one metre to the carriageway then adequate temporary signing and traffic management arrangements shall be provided
- Only special inspections of, for example, road markings and studs, shall be carried out during the hours of darkness/dusk
- When possible, inspections shall not be carried out during morning and evening peak periods when pedestrian and vehicle movements are high.

10.8 Appropriate experience and/or training is essential to ensure that personnel responsible for managing and carrying out highway inspections understand the reasons and importance of highway inspections. These reasons include public safety and the council's ability to defend liability claims.

10.9 The aim will be for Inspectors to be trained in accordance with the Scottish Credit and Qualifications Framework (Level 6) where reasonably practicable. New inspectors joining the organisation without this level of training will be given inhouse training provided by the safety inspection team (and assessed by the Technician) to achieve consistency in the identification of safety defects and the prioritisation of defect repairs in accordance with the guidance set out in this policy.

11.0 REFERENCE DOCUMENTS

Roads (Scotland) Act 1984

Well-managed Highway Infrastructure, A Code of Practice, October 2016.

Appendix A – Inspection Criteria

A.1 CARRIAGEWAY - POTHOLE

A pothole is a sharp-edged depression anywhere in a carriageway where part or all of the surface layers have been removed including carriageway collapses (including surrounds to ironwork and missing cats' eyes). A pothole will be classed as a safety defect when the maximum depth, of the sharp edge, is greater than 50mm deep, or through the full depth of the bituminous surface. If at any point the depth exceeds 100mm the pothole will be deemed as a safety defect. At controlled pedestrian crossing or other defined crossing points, e.g. at junctions or dropped crossings, intervention level will be when the maximum depth, of the sharp edge, is greater than 20mm. Where purpose designed shared surfaces exist then the lower intervention limit will be applicable.

Intervention Categories

Edge Depth	**<35 mm**	**35 – 50mm**	**> 50mm**

These measurements will be considered alongside the other assessment criteria when determining an appropriate level and timescale of response.

A.2 CARRIAGEWAY - ABRUPT LEVEL DIFFERENCES

An abrupt level difference in the carriageway will be classed as a safety defect when it has a vertical displacement of greater than 50mm.

Intervention Categories

Depth	**<35 mm**	**35 – 50mm**	**> 50mm**

These measurements will be considered alongside the other assessment criteria when determining an appropriate level and timescale of response.

A.3 CARRIAGEWAYS - CRACKS OR GAPS

Longitudinal and transverse cracking or gaps in the carriageway will be classed as safety defects when they are greater than 50mm deep and of sufficient width to present a hazard.

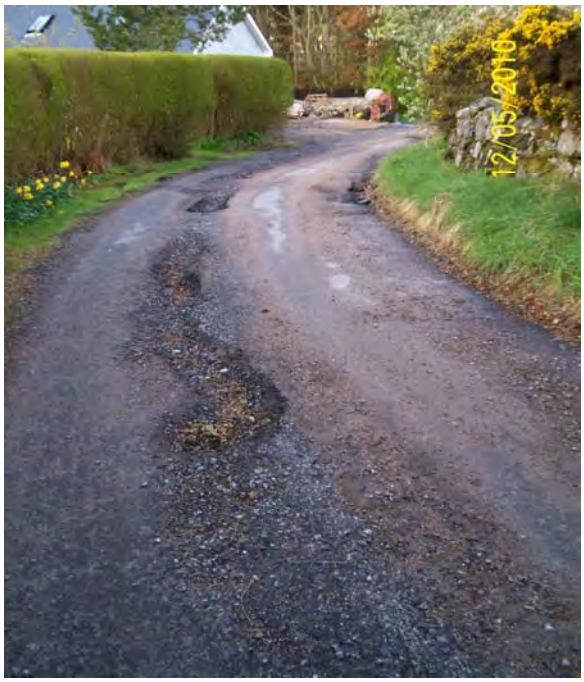
Intervention Categories

Width	**<30 mm**	**30 – 40mm**	**> 40mm**

These measurements will be considered alongside the other assessment criteria when determining an appropriate level and timescale of response.

A.4 CARRIAGWAY - CROWNING, RUTTING, EDGE DETERIORATION, OVER-RIDING AND DEPRESSIONS

Crowning, rutting, edge deterioration, over-riding and depressions will be classed as safety defects when they are greater than 75mm over a short distance.



Intervention Categories

Depth	**<75 mm**	**> 75mm**

These measurements will be considered alongside the other assessment criteria when determining an appropriate level and timescale of response.

A.5 FOOTWAY - POTHOLES AND EDGE DETERIORATION

A pothole is a sharp-edged depression anywhere in a footway where part, or all, of the surface layers have been removed (including footway collapses and surrounds to ironwork). A pothole will be classed as a safety defect when it is greater than 20mm deep in a generally acceptable footway however, on certain footways, where the surface profile is undulating, this depth may increase.

Intervention Categories

Depth	**<20 mm**	**> 20mm**

These measurements will be considered alongside the other assessment criteria when determining an appropriate level and timescale of response.

A.6 FOOTWAYS - ABRUPT LEVEL DIFFERENCES

An abrupt level difference in the footway will be classed as a safety defect when it has a vertical displacement greater than 20mm deep in a generally acceptable footway. Footways constructed from natural materials (e.g. granite) may be uneven and tolerance allowances should be made in these circumstances.

Intervention Categories

Depth	**<20 mm**	**> 20mm**

These measurements will be considered alongside the other assessment criteria when determining an appropriate level and timescale of response.

A.7 FOOTWAYS - CRACKS OR GAPS

Longitudinal or transverse cracking or gaps in the footway will be classed as safety defects when they are greater than 20mm deep.

Intervention Categories

Depth	**<40 mm**	**> 40mm**

These measurements will be considered alongside the other assessment criteria when determining an appropriate level and timescale of response.

A.8 FOOTWAYS - CROWNING, RUTTING AND DEPRESSIONS

Crowning, rutting and depressions will be classed as safety defects when they are greater than 25mm in depth over a distance of 600mm. All measurements will exclude tree pits around the base of trees.

Intervention Categories

Depth/Height	**<25 mm**	**25 – 100mm**	**> 100mm**

These measurements will be considered alongside the other assessment criteria when determining an appropriate level and timescale of response.

A.9 FOOTWAYS - ROCKING OR UNSTABLE SLABS

A rocking or unstable slab will be classed as a safety defect when the vertical displacement is greater than 20mm in height or depth, at the extremities of their movement, in a generally satisfactory footway.

Intervention Categories

Depth/Height	**<20 mm**	**> 20mm**

These measurements will be considered alongside the other assessment criteria when determining an appropriate level and timescale of response.

A.10 FOOTWAYS - KERBING DEFECTS

Individual cracked, chipped, rocking, uneven or missing kerbs will be classed as safety defects where they represent a tripping hazard, of a height greater than 20mm (but not close to or behind trees, street furniture and the like) or outwards in excess of 50mm.

Intervention Categories

Depth/Height	<20 mm	> 20 mm	Protruding > 50 mm

These measurements will be considered alongside the other assessment criteria when determining an appropriate level and timescale of response.

A.11 CYCLEWAYS

Where cycleway forms part of the carriageway – carriageway criteria apply.

Where cycleway forms part of the footway or is off road – footway criteria apply.

A.12 MANHOLE COVERS, GRATINGS AND FRAMES

A cover, grating or frame in the carriageway, footway, cycle route or verge that is significantly damaged, dislodged, missing or not seated correctly will be classed as a safety defect. Privately owned rainwater channels, cellar flaps, area lights, coal holes etc., that are significantly damaged, dislodged, missing or not seated correctly will be made safe and/or the property owner notified by letter.

Intervention levels and defect repair period for Manholes will be identified using the General Defect Matrix

A cover, grating or frame which is higher or lower (>50mm carriageways and >20mm footways) than the adjacent carriageway or footway will be classed as a safety defect. At controlled pedestrian crossing or other defined crossing points, investigatory levels will be as for the adjacent footway (>20mm).

A.13 EMBANKMENTS AND CUTTINGS

Where a safety inspection identifies an embankment or cutting that is apparently unstable and represents an immediate or imminent hazard or there is a risk of short term failure, the area will be made safe within an appropriate timescale. These will then be referred to the Structures, Flooding and Coastal Protection Manager for further investigation and reactive inspections.

A.14 OVERGROWN VEGETATION

Hedges and trees that encroach within the envelope described below will be identified as a safety defect. Clearance envelope: 6m over carriageways and 2.4m over footways, cycle routes and verges. Vegetation on roads verges that significantly obscures forward visibility, visibility to signs or traffic lights, and visibility splays will be identified as a safety defect.

Vegetation obscuring street lighting will be reported to the Team Leader Technical - Street Lighting.

Intervention levels and defect repair period will be identified using the General Defect Matrix

A15. SAFETY FENCES AND PEDESTRIAN BARRIERS

Safety fencing, pedestrian guardrails or boundary fencing which is significantly damaged or protruding into the footway or carriageway will be classed as a safety defect.

Intervention levels and defect repair period will be identified using the General Defect Matrix.

Significant or major defects will generally be made safe by the end of the next working day and permanent repairs carried out as programmed work.

A16. ROAD MARKINGS

White line markings on strategic and main distributor roads of high safety risk or with relevant accident record should be renewed when they are no longer adequate for their intended purpose.

Intervention levels and defect repair period for worn road markings will be identified using the General Defect Matrix.

Yellow parking restrictions will only be deemed a safety defect where parking would cause a danger to other road users.

A17. TRAFFIC SIGNALS, ILLUMINATED BOLLARDS, PELICAN CROSSING LAMPS AND STREET LIGHTING

Damaged, missing or dirt obscuring any of the above that represents a significant or major hazard will be classed as a safety defect.

Intervention levels and defect repair period will be identified using the General Defect Matrix.

Generally, all defects will be made safe and reported as soon as possible to the Intelligent Traffic Systems Engineer or Team Leader Technical - Street Lighting.

A.18 GULLIES, DRAINS OR GRIPS

Damaged gullies, drains or grips that represent a significant or major hazard will be classed as a safety defect.

Intervention levels and defect repair period will be identified using the General Defect Matrix.

A.19 ILLEGAL SIGNS, FLY POSTERS AND ADVERTISING BOARDS

Illegal signs, fly posters or advertising boards that represent a significant or major hazard will be classed as a safety defect.

Intervention levels and defect repair period will be identified using the General Defect Matrix.

Generally, signs will be removed at the time of inspection if possible; otherwise the relevant information will be passed to the Roads Operations Manager for action.

A.20 UNSAFE STRUCTURES

Highways inspections will only be required to identify significant or major defects that can be identified visually during the normal course of inspections e.g. damage to the superstructure or supports of over-bridges, parapets and expansion joints. Significant or major defects will be reported to the Structures, Flooding and Coastal Protection Manager immediately who will arrange for the appropriate action to be taken.

A.21 DEBRIS, SPILLAGE OR CONTAMINATION, TREES WITH UNSTABLE BRANCHES

Intervention levels and defect repair period will be identified using the General Defect Matrix.

A.22 GRAFFITI

Graffiti that represents a significant or major hazard will be classed as a safety defect, e.g. obscured traffic lights.

Table 7 – Graffiti response matrix - this outlines how graffiti affecting various items of street furniture will be classed for response times (see tables 5 and 6 for further response detail and colour key).

GRAFFITI					
	2	**3a**	**3b**	**4a**	**4b**
Directional and other signs					
Warning signs					
Stop, give way and chevron signs					
A major hazard that could result in a serious danger/hazard or deemed offensive.					

A.23 TRAFFIC SIGNS AND BOLLARDS (Inc posts and plates)

Significant or major defects caused by damage to traffic signs will be classed as a safety defect. Stop, give way and chevron signs that are significantly damaged, missing or are not legible such that a sign is not effective or presenting a physical hazard to road users will be temporarily replaced by the end of the next working day and permanently repaired within 28 days. Other repairs will be carried out as programmed work.

Table 8 – Traffic Signs and Bollards response matrix – this outlines how defects affecting various street furniture will be classed for response times (see tables 5 and 6 for response detail and colour key)

TRAFFIC SIGNS AND BOLLARDS					
Type	**2**	**3a**	**3b**	**4a**	**4b**
Directional and other signs					
Warning signs					
Stop, give way and chevron signs					
Defect that is a major hazard that could result in a serious danger/hazard					

A.24 ELECTRICAL

A traffic sign that has damaged or exposed electrical components will be classed as an emergency and should be reported to the Team Leader Technical - Street Lighting.

Intervention levels and defect repair period will be identified using the General Defect Matrix.

Generally, damaged or exposed electrical components will be made safe as an emergency and reported to the Street Lighting team to arrange for repair.

A.25 BOLLARDS

A bollard that is significantly damaged or missing such that it presents a hazard to highway users will be classed as a safety defect.

Intervention levels and defect repair period for will be identified using the General Defect Matrix.

A.26 STREET FURNITURE

Damage to street furniture that represents a significant or major hazard will be classed as a safety defect.

Intervention levels and defect repair period will be identified using the General Defect Matrix.

Damage to street furniture will be reported to the relevant owner. Litter bins are the responsibility of Environmental Services. Damage to bus stops should be reported to the Public Transport Unit for action.

A.27 FLOODING AND PONDING

Any blocked gully which is giving (or could give) rise to flooding or severe ponding should be reported. Particular note should be taken of excessive standing water and water discharging onto and/or flowing across the carriageway where this is of a depth causing a potential danger.

Specific attention should be paid to water laying on or crossing the running surface of the carriageway or locations where pedestrians cross, e.g. dropped kerb crossing points.

Blocked gullies which are not at low points and are therefore not liable to give rise to ponding, but which require cleaning will be treated with a lower priority.

Instances of flooding which are temporarily covering, by water from any source, land not normally covered by water (not including a flood solely from a sewerage system) shall be recorded and passed to the Structures, Flooding and Coastal Engineering Manager by electronic means.

A.28 SKIPS, SCAFFOLDING, HOARDINGS AND OTHER ROAD OCCUPATIONS

Instances of road occupation which are temporarily occupying a part of the road shall be recorded and passed to the Team Leader – Roadworks Coordination by electronic means. If there is an immediate danger caused by this occupation then the Traffic Engineering manager should be immediately.

Instances of traffic signal faults shall be recorded and passed to the Intelligent Traffic Systems Engineer by electronic means. If there is an immediate danger caused by this occupation then the Intelligent Traffic Systems Engineer should be informed immediately.