

This document provides guidance to airports on conducting visual observations for assessing runway surface conditions. It is a set of best practices and lessons learned based on feedback from ACI airport members.

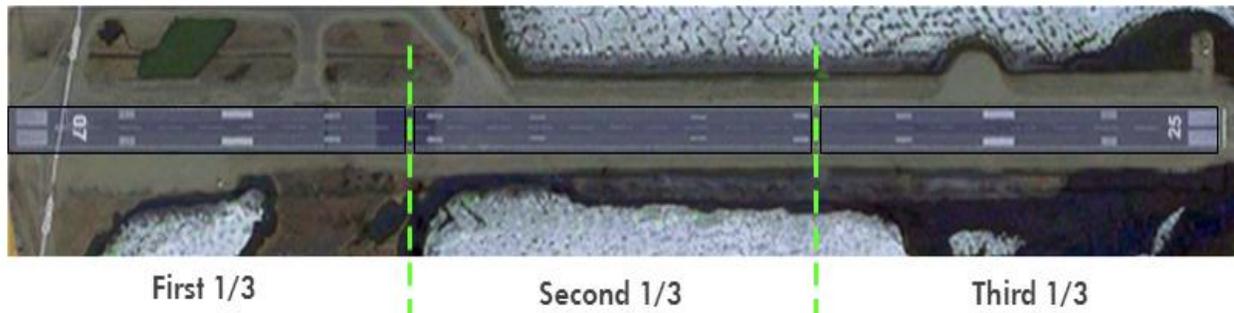
The GRF methodology requires the aerodrome operator to assess and report the runway surface condition whenever there is presence of a contaminant. The assessment is not a measurement. It is based on the judgement and experience of the trained aerodrome inspector conducting the runway assessment.

The aerodrome operator should perform visual observations of the runway to gather the necessary information for the assessment as listed below:

- Percentage of each runway third that is covered by contaminant
- Depth of the contaminant(s)
- Runway surface condition and type of contaminant(s)

1. How should a visual observation be conducted?

Visual observations are performed for each tier (third) of the runway.



The runway inspector drives down the runway along the centerline and assesses visually the type, the coverage and the depth of contaminant for each tier. The runway inspector may choose to deviate from the centerline to observe specific areas of the runway that are known to have issues (standing water, ice, etc.)

Time available for such visual observations may be limited due to traffic. To reduce the runway occupancy time, if several runway inspectors are available, the inspection of each tier can be conducted simultaneously.

The aerodrome inspector should use his specific knowledge of the runway and his experience to identify where to perform localised checks and prioritize areas of inspection. He may stop at specific locations to make isolated depth assessments or manual assessments of the contaminant type and get a better overall understanding of the conditions of each tier of the runway.

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Best practices

- **Use runway markings or runway lights to identify in which tier of the runway you are** and estimate the percentage of coverage of the contaminant. A dedicated marking along the runway could be a solution to help identify the thirds.
- **Use onboard GPS devices or moving maps to identify the tiers of the runway** to facilitate the situational awareness of the runway inspector.

2. What tools can be used to conduct the assessments?

The GRF methodology requires an assessment of the runway surface conditions, not a measurement. The objective of the assessment being to provide clear and standardised information to support pilots in their decision making.

The runway inspector should primarily rely on his experience and knowledge of the runway to assess the type, the percentage of coverage and the depth of the contaminant. He can use tools to support his assessment.

Best practices - Assess the depth of a contaminant

- **Use a ruler:** It could be a regular ruler or a ruler with predefined depths (3mm, 6mm, 9mm and 12mm).
- **Use calibrated coins or pieces of metal of thickness 3 mm and 6 mm:** This will give a quick indication of the depth of the contaminant in the area inspected, in particular for water.
- **Use Tire Tread Gauge:** The gauge can be an easy and practical way to assess the depth of the contaminant. Readings are in millimetres.
- **Use a Vernier Calliper:** A vernier calliper is a visual aid that can be used to support the aerodrome operator in his assessment. Readings are also in millimeters.
- **Use electronic measuring systems:** A number of automated or electronic measuring systems are available on the market to measure contaminant depth, in particular for water.

3. Knowledge of the runway is critical!

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Weather conditions can change quickly and access to the runway can be restricted due to the volumes of traffic. Additionally, ongoing traffic usually leaves very little time to review in detail the pavement conditions. Overall, time available for performing the runway assessments is often limited.

Performing runway assessments in such conditions can be challenging. To be efficient, the runway inspector may have to prioritize areas known as critical or those prone to specific conditions. This will allow them to perform specific checks and provide more accurate information to pilots. Known problem areas should be inspected first or with additional care to detect contamination as early as possible.

To be able to assess the runway surface conditions in the most effective manner possible, the runway inspector must have a detailed understanding and knowledge of the runway and its characteristics. These may include:

- **Location of rubber deposits:** Areas with rubber are more likely to be slippery when contaminated.
- **Areas with drainage issues:** Problematic drainage areas are more likely to see the formation of standing water. During winter conditions, it is important to treat these areas before the water turns into ice.
- **Location of ruts or cracks:** Areas where the pavement is uneven or degraded are more likely to cause standing water. Contaminants may be deeper in those areas than on the leveled pavement.
- **Friction characteristics:** Past results from friction testing and friction characteristics of the runway are good indicators of the areas that could potentially impact the take-off/landing performance of an aircraft. Focus on areas with known lower levels of friction following testing may be necessary.
- **Any other information** that will help the aerodrome operator in identifying specific areas of concern that could negatively impact the aircraft performance when landing or taking-off.

Best practices – How to ensure proper knowledge of the runway

- **Training & Familiarization:** On-the-job training is important to train the runway inspectors and improve their knowledge of the runway(s). Pairing less experienced runway inspectors with more experienced ones can also help ensure knowledge transfer and continuity in the exchange of information. Characteristics of the runways and all special features, deficiencies or problem areas should be included in the training material for new runway inspectors during the training and familiarization period.
- **Information sharing:** Coordination with the maintenance department in charge of pavement repairs is critical. Location of faults (ruts or cracks) on the runway should be known and reported until they are repaired. Regular exchanges with the relevant maintenance personnel is needed to ensure information sharing and exchange as well as take action on any identified faults. Regular exchange amongst operational colleagues conducting runway inspections, for

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example during shift handovers or through a logbook, is essential to ensure continuity in the flow of information.

- **Access to documentation on runway characteristics:** Having access to airport maps, cheat sheets containing key information, and other operational information or check-lists, whether electronic or paper copy, are invaluable to those on the field. Daily runway inspections records are also an important source of information on the most current runway information and characteristics.

4. Key lessons learned from airport operators

The following table provides a synthesis of some of the key lessons learned from airport operators about conducting visual observations to determine runway surface conditions.

Lessons learned

- Conducting visual observations in teams of two runway inspectors onboard a single vehicle can improve accuracy of the assessment.
- Using several vehicles with a single runway inspector onboard can help cover more surface rapidly. The vehicles can drive either side of the centerline, can enter the individual thirds of the runway or even enter from opposite ends of the runway. A risk assessment including all relevant stakeholders is necessary before implementing any of these types of practices.
- Conducting mock trials prior to implementation and ensuring adequate amounts of practical experience for runway inspectors is necessary to allow them to be familiar with the information, tools and procedures required to perform visual observations. Regular practice on site during relevant weather events will also help to mitigate any uncertainty in their ability to make observations and conduct a runway assessment.
- Use of advanced systems such as Runway Weather Information Systems (RWIS) may provide additional support in the decision making for the runway inspector at airports with higher levels of traffic and severe weather conditions. These systems are made up of mobile weather sensors that can be installed on vehicles to deliver information about temperatures, water film heights, dew points, contaminant conditions, relative humidity, etc. It is recommended to perform a cost/benefit analysis to ensure such equipment is needed and suitable for the specific airport environment.

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- Exchange of information and best practices with other airport operators in similar operating environments can help develop common practices and sharing of experiences. Also, regular meetings with flight crews and air traffic control to receive their feedback on the quality of the assessments is important to improve visual observations practices. This can be done through the Local Runway Safety Team at the airport, or through other ad-hoc means.

4. Additional resources

Additional resources and information on the practical application of GRF, including training for airport operators, can be found on the ACI World website at www.aci.aero/grf as well as on the ICAO website <https://www.icao.int/safety/Pages/GRF.aspx>.

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