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Movable RSE, Locations, Safety and Instructions

Project: 105798-DE NL RDW Observation

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GLOSSARY

RSE	Road Side Equipment
RDW	Dienst Wegverkeer
RWS	Rijkswaterstaat
ARBO	Arbeidsomstandigheden WET
RVV	Regelement Verkeersregels en Verkeerstekens
REQ	REQUIREMENTS
CR	Change Request

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1.Dimensions

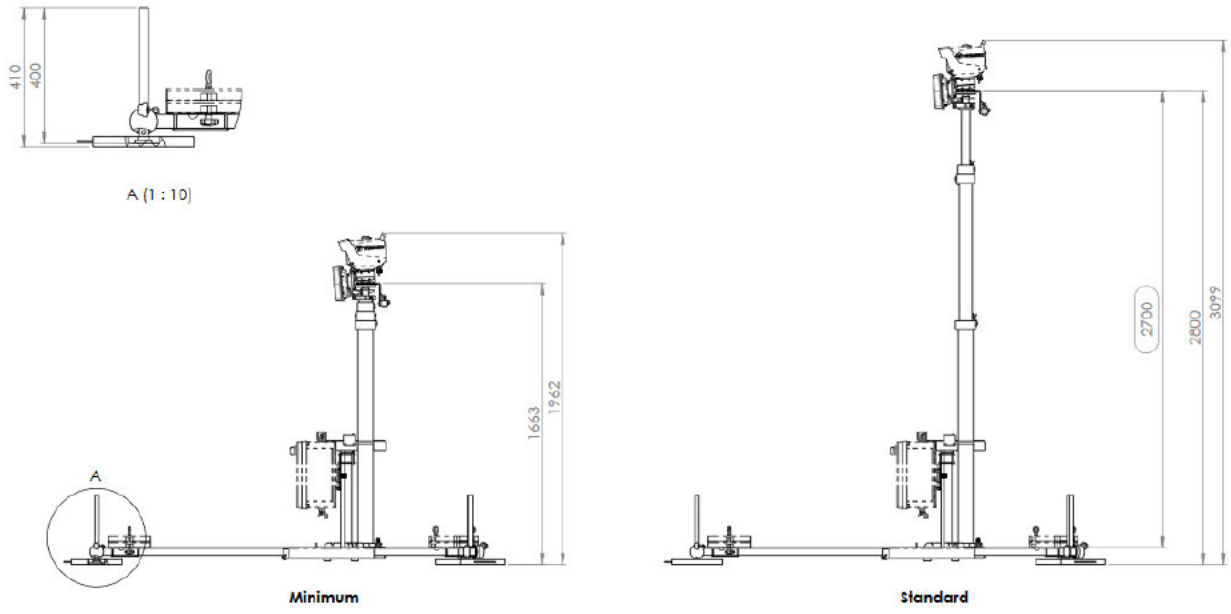

Figure 1 Dimensions minimum and standard

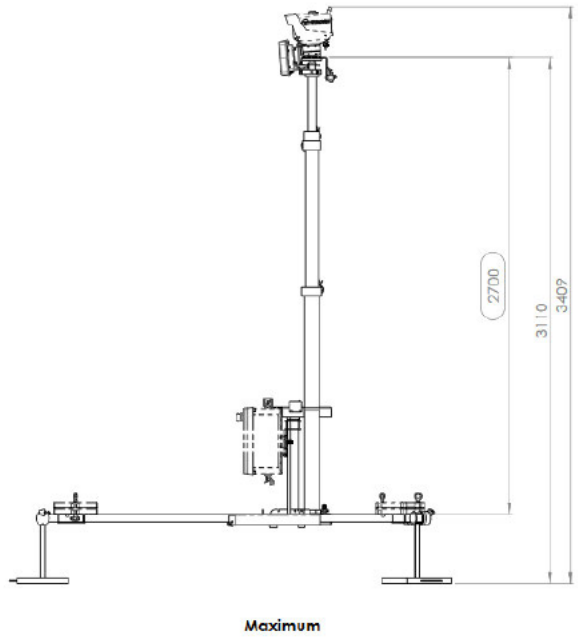

Figure 2 Dimension maximum

2. Locations, Safety and Regulations

2.1 Locations

The road sections that can serve as Variable Observation Locations are National and Provincial roads, so no roads owned or managed by other road owners like municipalities. National roads are managed by RWS and are designated by either an “A” number or a two digit “N” number. Provincial roads are managed by the (12) provinces and are designated a three-digit “N” number.

In REQ -1679 and REQ -1816, a clear set of criteria to which selected deployment locations should adhere is listed.

Indicated as suited and desirable are:

- Behind a guard rail
- On a flat area on the verge adjacent to the carriageway
- The location can be reached from the public road after crossing a maximum of 20 meters of unpaved terrain
- The movable RSE can be safely installed and removed
- If possible, the movable RSE shall be placed from a parallel road adjoining the Road Section.

Indicated as not suited are:

- Entrance or exit ramps
- A Hard shoulder of a National road
- Within 400 meters from the entrance of a tunnel
- On a bridge or viaduct
- Near entry or exit lanes

From this list of do’s and dont’s it can be derived that for the selection of enough potential locations the following three criteria, preferably combined, are:

- Flat terrain
- Behind a guardrail
- Accessible from behind

Our proposal is to use as a rule of thumb that only locations that meet at least two of the criteria will be selected.

This also is of major importance for safety in general because combining the three conditions mentioned above means that the equipment can’t be hit by any vehicle except in extreme circumstances. It also means technician(s) does not have to stop at an emergency lane , nor having to cross the guard rail several times to pick up the components of the set. Last but not least it speeds up the installation process because there is no need to compensate for slopes and / or uneven terrain.

The detailed description of the selection process for deployment locations is described in the Realisation plan. In the Exploitation plan the selection of new deployment locations during Exploitation is covered.

2.2 Safety

The SkyToll / Connection Safety Management System, which is part of the updated overall Safety plan, covers the deployment of movable equipment.

This overall Safety applies to the activities during the realisation and exploitation phase of the project on the Dutch road infrastructure. These are the activities that are required for:

- Installing, testing and maintaining the fixed observation at the contracted locations
- The deployment (placements) of the mobile observation at the locations included in the camera plan.
- Any other activities (area inspection, necessary investigations, etc.) along the roads related to the above activities.

This document applies to all employees, subcontractors and parties managed by VITRONIC. This document also provides RDW, RWS and other external stakeholders with insight into the approach to Occupational Health and Safety in this contract.

The focus lies on preventing accidents, compliance with laws and regulations (such as ARBO) and creating a safe working environment for all involved. Safety management is set up according to the recognized standards and procedures, including the safety management system VCA (Safety, Health and Environment Checklist Contractors), and is coordinated with the processes of subcontractors and VITRONIC.

For mobile equipment, it is mainly about the Exploitation phase, in which the daily deployment activities take place, this of course apart from the test activities during Realisation. If the three location criteria as discussed earlier apply, there is a relatively low risk profile. The greatest risk arises here if a stop has to be made on the hard shoulder and components have to be transported from the trailer to the actual installation location or vice versa. The duration of this activity should be limited as much as possible. Risk-limiting measures are :

- Optimal design of equipment to enable a minimum of operations
- Components weigh less than 23 kg
- Considering installation with two people, with an optimal division of labour
- As little activity as possible in the dark
- Equipment at one location for a longer period of time
- Clear job description and training in a safe location before personnel are deployed.
- Proper certification of both company and staff

In some special cases traffic measurements like the closing of lanes might be needed for a safe working environment.

Subcontractor SkyToll assumes responsibility for the specific activities and, together with its Dutch partner Connection Systems, introduces its own safety management system, which is tailored to the project and the activities on, along and in the vicinity (work area and free space) of the road. SkyToll's systems and reports are integrated with VITRONIC's processes to ensure consistency in safety. SkyToll's /Connection Systems safety system is leading in this and is also tailored to Dutch legislation and regulations.

2.3 Permits and Legislation

Deploying movable equipment along roads in the Netherlands requires multiple types of permits, approvals and certifications.

Certifications
To begin with both the company or entity that performs the deployments and its roadside working employees need to be certified to work alongside roads. All relevant employees need to carry their personal certification form with them during actual deployments. The process to apply for a certification is described in the Exploitation Plan.

Exemptions RVV
To be allowed to temporarily stop on emergency lanes, to either unload or load equipment, requires an exemption from the Dutch road regulations.

Traffic safety must be guaranteed under all circumstances. In a pedestrian zone or on sidewalks, driving is only allowed at walking pace.

Disruption to traffic must be kept to a minimum, if necessary the vehicle used for the performance of the task must be moved.

The vehicles used in the service of the RDW, as well as those used by third parties who carry out this work on behalf of the RDW, need to be distinctive (comply with CROW guidelines) for supervisors and other road users.

In accordance with the CROW guidelines, the 'Work traffic' sign and a yellow rotating, flashing or flashing light are mounted in accordance with Article 5 paragraph 2 of the Optical and Sound Signals Regulations 2009 (Rogs 2009).

When entering and exiting the work area, yellow flashing lights must always be used, which are visible from every direction. In addition, the vehicle must be equipped with a sign with the inscription 'work traffic'. Work in progress (CROW-WIU 2020).

Work vehicles that cannot be recognised as such by other road users must be provided with a sign with the inscription 'work traffic' (CROW-WIU 2020).

Commercial vehicles (work vehicles) may be lettered, but passenger cars and replacement vehicles for maintenance and repair are often not provided with this imprint.

The persons charged with the actual work, such as the Realisation of traffic measures during work in progress on the public road, must be trained and expert in working on and along the public road.

If the use of the exemption may cause danger or nuisance to other road users, the yellow flashing light as referred to in the Optical and Sound Signals Regulation 2009 must be used.

Contrary to Article 6(b) of the Rogs 2009 (work for roads, works or facilities on, on, in or above roads, including ice control or snow removal), the CROW WIU 2020 requires the use of yellow flashing lights for work on and near the road where deviating road behaviour by the work vehicles is to be expected.

The use of yellow attention lighting is also mandatory when crossing the perimeter on N-roads in order to reach a (semi) paved parking lane on the verge in order to alert road traffic in time.
All actions on the hard shoulder (including the placement of the vehicle, but excluding driving on it) must take place outside the high-risk zone of 1 metre from the edge line of the hard

shoulder, subject to the provisions below. If the actions have to take place within the high-risk zone of 1 metre , the right lane (via the RWS Traffic Centre) must first be closed off and secured or a section of track must be crossed. The deployment vehicles are, where appropriate, equipped with at least 5 traffic cones/cones with a minimum height of 50 cm but preferably 75 cm, reflective, at least class II but preferably class III, with which the vehicle used must be secured when stationary on the hard shoulder. When parking on the hard shoulder or on the verge of a road without an emergency lane,5 within the influence of the road, an action window is also necessary.

When using the hard shoulder, yellow flashing lights must be used and the speed there may not exceed 50 km per hour.

In order to draw the attention of road traffic to the presence of persons on the hard shoulder in a timely manner, the user is obliged to wear safety clothing that at least complies with the RWS Standard Guidelines and Specifications for Safety Clothing 2019-12 if he is outside any vehicle in order to carry out the aforementioned work. Class 2 or 3 (depending on the area of influence of the road).

The exemption can not be used in the event of fog, snowfall or other conditions, in particular of an atmospheric nature, which limit visibility to a distance of less than 200 metres.

The driver of a vehicle who stops or parks this vehicle using the Declaration is obliged, if he is outside the vehicle, to affix the Declaration behind the windscreen of the vehicle in such a way that it is clearly legible from the outside of the vehicle. The numberplates of cars used and the names of drivers need to be kept updated in a register. RDW has acquired an nationwide exemption already that can be used by the service provider.

Permits

For each selected deployment location a permit needs to be requested, within the so called Omgevingsvergunning. This is a one-time activity. As this obligation was not mentioned in the tender material it is RDW's responsibility to discuss this issue with RWS and the 12 Provinces. Ideally a overall exemption would be reached. SkyToll / Connection Services will support RDW in this endeavour. More details on the matter are found in the Realisation plan and the Exploitation plan. The Realisation plan describes the "setting the stage" period until going live. The Exploitation plan covers the situation during Exploitation, for instance to add new deployment locations. The permit remains valid for the duration of the project, except in situations where the location is fundamentally changed.

Notifications (SPIN)

At least 10 days before an individual deployment the road owner needs to be notified about the planned deployment. For RWS this notification is called a SPIN-notification. For provinces the process is more or less comparable. On the day of the deployment the notification needs to be repeated. For this reason last minute changes in locations are normally not possible. The operations supervisor within the movable deployment organization perform these contacts. In case a last moment change of location is needed the individual deployment officer gets into contact with the supervisor. The supervisor handles the contacts with the road owners and the operational staff within RDW. He also takes care of the proper reporting when it comes to the quarterly report on successful deployments, according to the Camera plan.

This notification process prevents last minute surprises with regards to actual deployment, with an exception of last minute accidents that might require revoking the permission to use a certain location. In those rare cases the deployment officers refer back to the central deployment

supervisor for instructions. The deployment supervisors communicates with road owners and the operations staff of RDW.

Time window

Usually work at roadsides locations is only allowed between 10.00 and 15.00, to avoid rush hours and darkness and therefore reduction of risks for both workers and traffic. This might require deployments a day ahead or a prolonged deployment at the same location. The equipment can be switched on and off remotely.

3. Assembly instructions Moveable Road Side Equipment

Introduction

The design and characteristics of the movable RSE are described in de Detailed Design Document Movable Equipment. This chapter focusses on the proper set up and testing of the system on location.



WARNING

High risk of accident and injury caused by street traffic

Lethal danger or risk of injury
1. Keep sufficient safe distance to the roadway and the flowing traffic.
2. Wear high-visibility vests.
3. Avoid any risks for the traffic and yourself.**4**Follow up all instructions mentioned inchapter 4



WARNING

Heavy load can fall down.

Risk of injuries at toes and feet
Wear safety shoes



WARNING

Suspended load can fall.

Lethal danger or risk of injury
1. Do not step under the suspended load.
2. Wear a protection helmet.

Preparation

For the proper assembly of the RSE, thorough preparation of the components is required before installation can begin.

The equipment needs to be set up within a 9 meter distance to the center of the right lane of the road.

Visual Inspection of the Tripod

First, a thorough visual inspection of the tripod is carried out to ensure that there are no damages such as cracks, deformations, or other defects that could affect the stability or functionality of the system. Special attention is given to the joints, locking mechanisms, and attachment points, as these critical components are essential for the safety and stability of the entire system.

Cleaning the Connection Points

All connection points and moving parts of the tripod are carefully cleaned to remove dirt, dust, corrosion, or other deposits that could impair proper functioning. It is also checked whether the locks engage properly and if the connecting elements move smoothly without resistance.

Cleaning of the camera lens

The cleanness of the lens of the camera needs to be checked. If need be clean with clean cloth and cleaning fluid.

Checking for Damage or Wear

After cleaning, a re-inspection is carried out to check for signs of wear, scratches, notches, or other anomalies at the connection points, tubes, or locking blocks.

If any defects are found, the affected area must be repaired or the tripod replaced if necessary before continuing with the installation.

Installation process

After the successful inspection and cleaning of the tripod, the next step involves mounting the tripod foot into its designated position, on a safe location

Installation Requirements

- Make sure that the system is installed on a surface that is as horizontal as possible.

Installing the System

- Place the 3 support plates onto the ground.

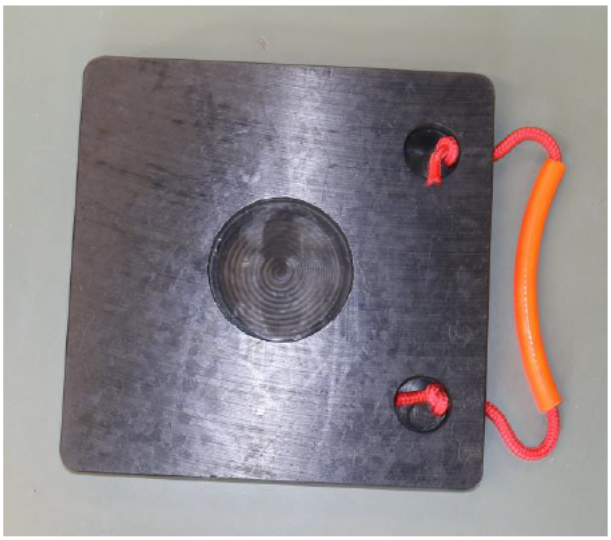

Figure 3 Support Plate

- Pull the 3 feet of the tripod out of the square tube.
- Insert the feet of the tripod horizontally and tighten them.



Figure 4 Tripod Feet

- Unfold the legs of the tripod and place the feet on the 3 support plates.

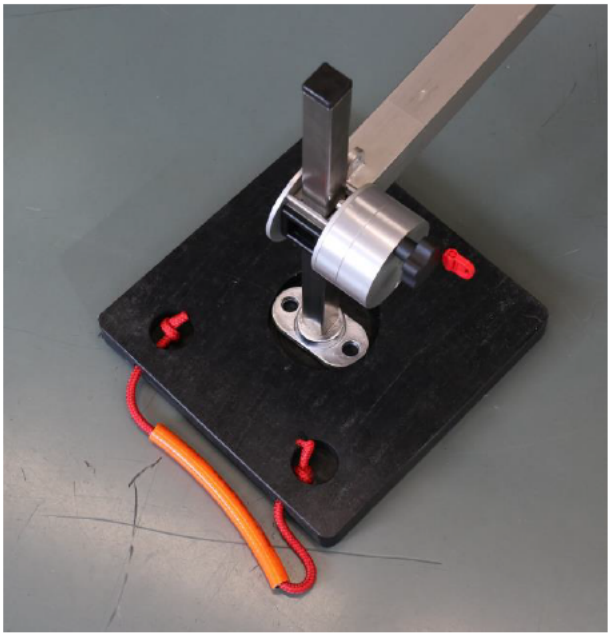

Figure 5 Feet on support plates

- Tighten the legs to the feet using the safety five-lobed knobs.
- Snap the legs of the tripod onto the bar.
- Place a spirit level on each leg of the tripod and bring the legs into the exact horizontal position.
- Insert the mast into the tripod rail and fasten it using the wing screws.



Figure 6 Mast on Tripod

- Attach the 3 tension ropes to the tripod feet and the tripod head using the snap hooks.

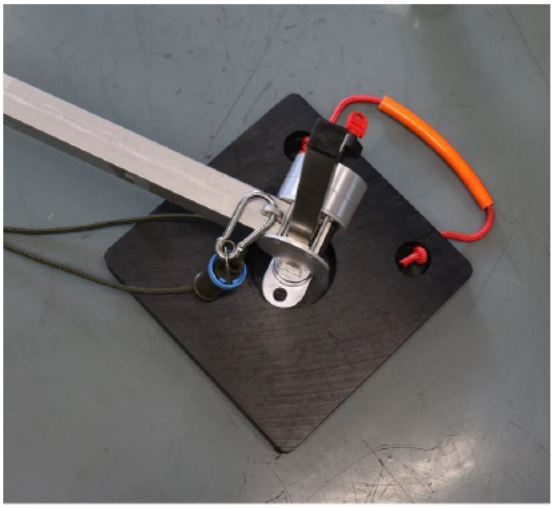



Figure 7 Tension Ropes

➤ Slide the battery box into the holder on the tripod rail.

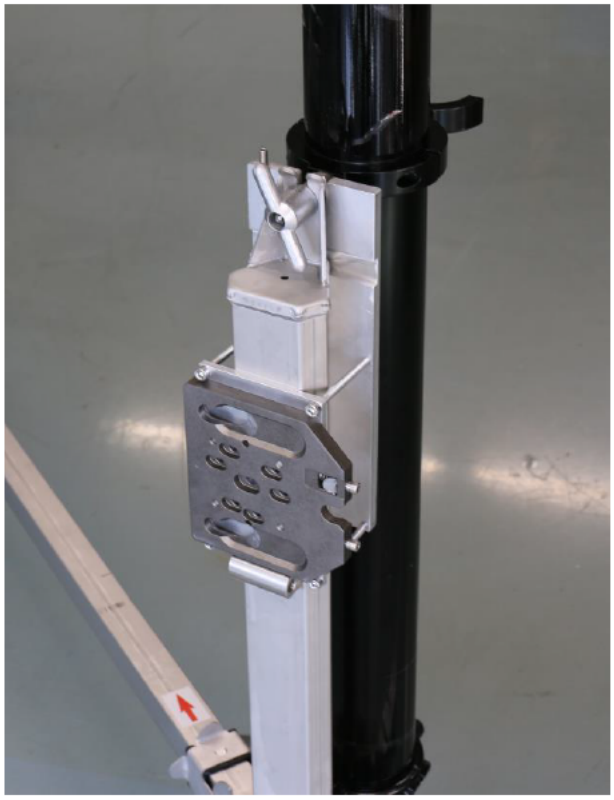

Figure 8 Battery box holder

➤ Secure the battery box with the knurled nut.



Figure 9 Battery box attached

1	Knurled nut

- Open the door of the battery box using the security key and press the power button once to switch on the battery box.
- Close the door of the battery box and lock it using the security key.
- Slide the cover unit over the 3 legs of the tripod.
- Attach the cover unit with the bolts and screw the bolts together using the safety five-lobed knobs.

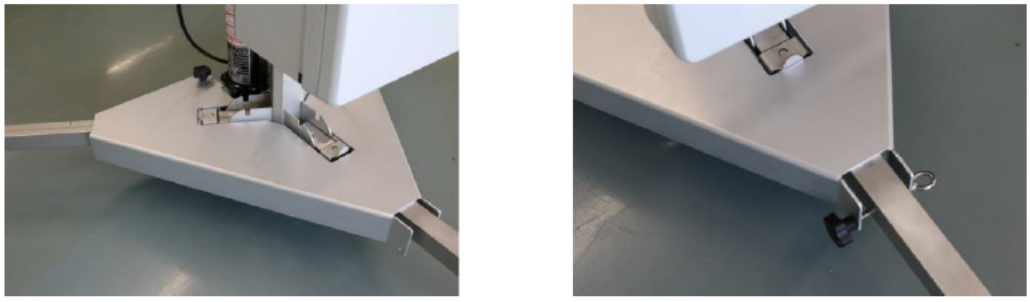

Figure 10 Cover Unit

- Place the sensor head with the DSRC beacon on the mast and secure it with the wing screw.



Figure 11 Sensor head with DSRC beacon

- Slide the SSP-X1 onto the bracket and secure it with the knurled screw.



Figure 12 Sensor head with SSP--X1

- If necessary, adjust the pitch unit of the sensor head:
  Slightly unscrew the middle screw and loosen both outer screws. Move the sensor head to the desired angle and refasten the two outer screws. The further out the two outer screws are, the higher the number of degrees. Each position of the screws corresponds to a change in angle of 2 degrees.

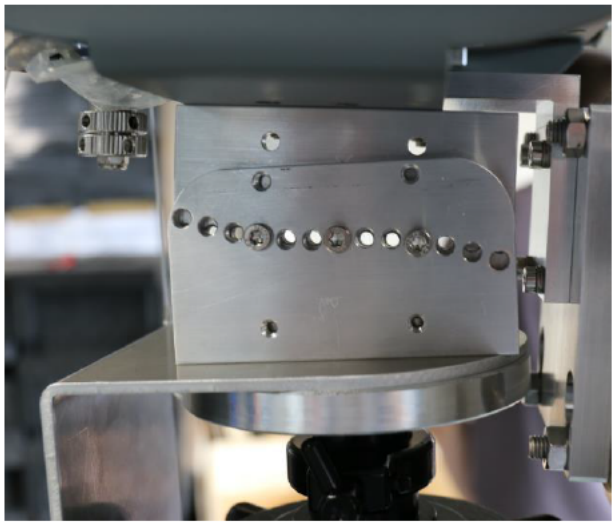

Figure 13 Pitch unit sensor head

- Connect the cables of the battery box to the sensor box.

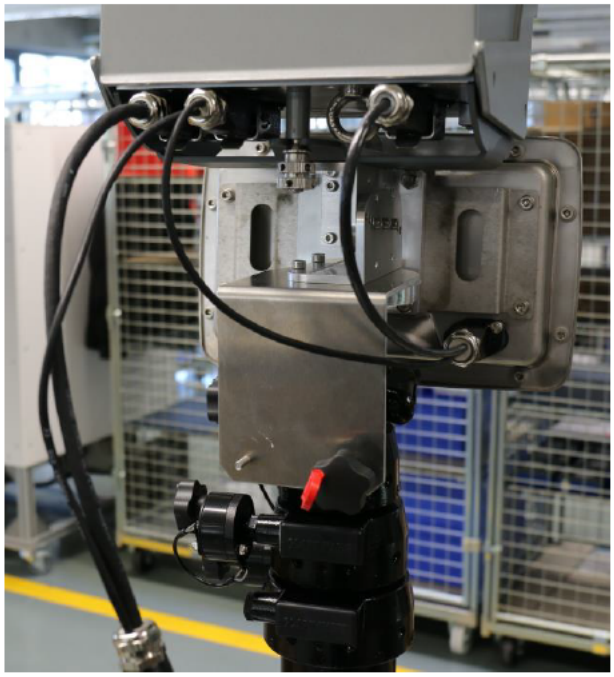

Figure 14 Sensor box connected

- Connect the wiring harness to the SSP-X1 and the DSRC beacon and secure it with the safety five-lobed knobs.
- Place 2 weights on each foot of the tripod into the provided contours.

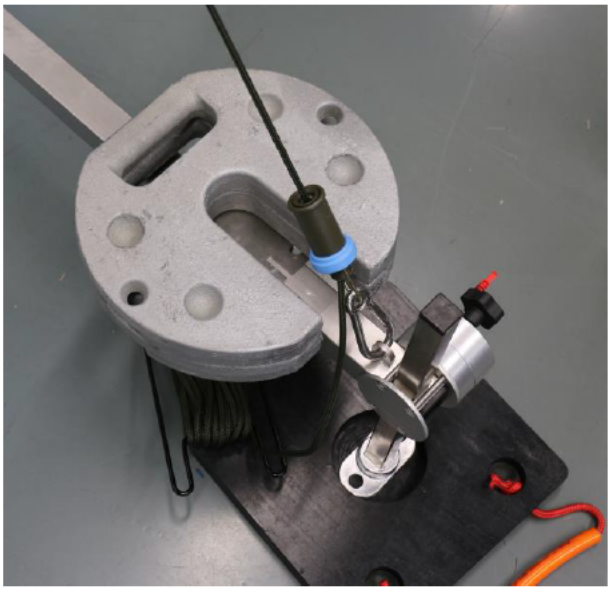

Figure 15 Weights

- Insert the bolts through the weights and screw them together using the knurled screws.

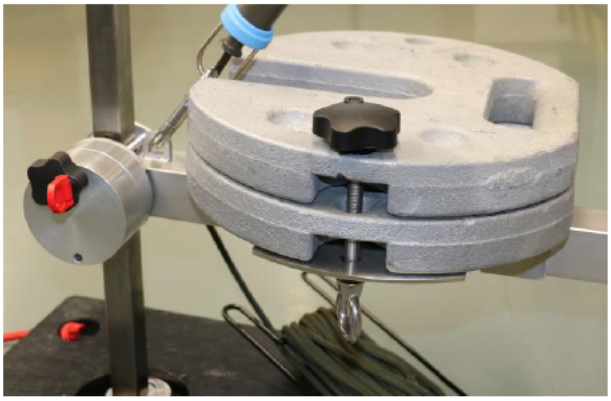

Figure 16 Weights attached

- Screw the nuts for the height adjustment as tightly as possible.
- Unscrew the star grip of the wing nuts on the mast using the safety wrench.
- Connect the hand pump to the bottom of the mast using the bayonet lock.

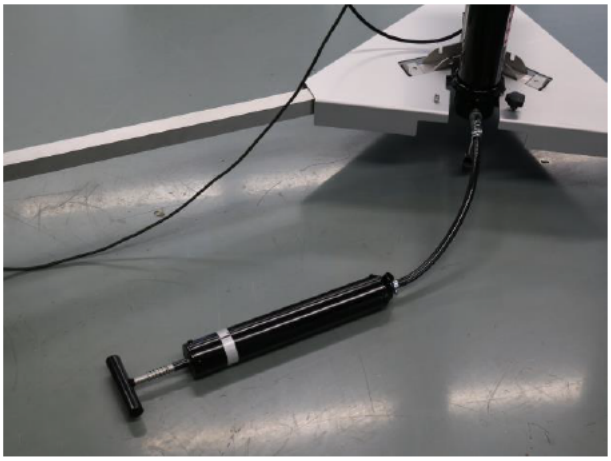

Figure 17 Hand pump

- Open the top step of the mast.



Figure 18 Mast Steps

- Pump up the mast to the maximum height.
- Close the top step of the mast.
- Open the lower step of the mast.
- Pump up the mast with the hand pump until the tensioning ropes are taut.
- Close the lower step of the mast.
- Remove the hand pump from the mast and close the bayonet lock.
- Slide the locking plate into the gap of the cover unit and secure it with the safety five-lobed knobs.

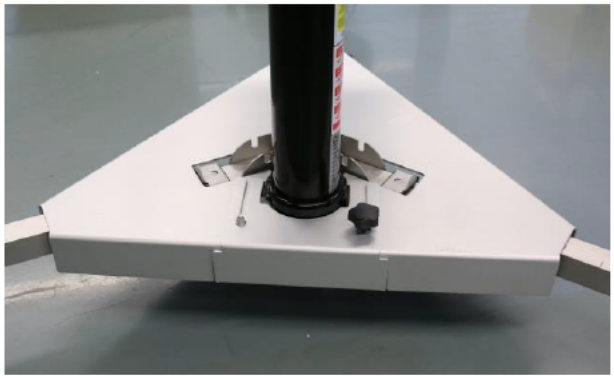

Figure 19 Locking Plate

→ The system is installed.

Setting Up the System

After the Moveable system has been installed, the system has to be set up.

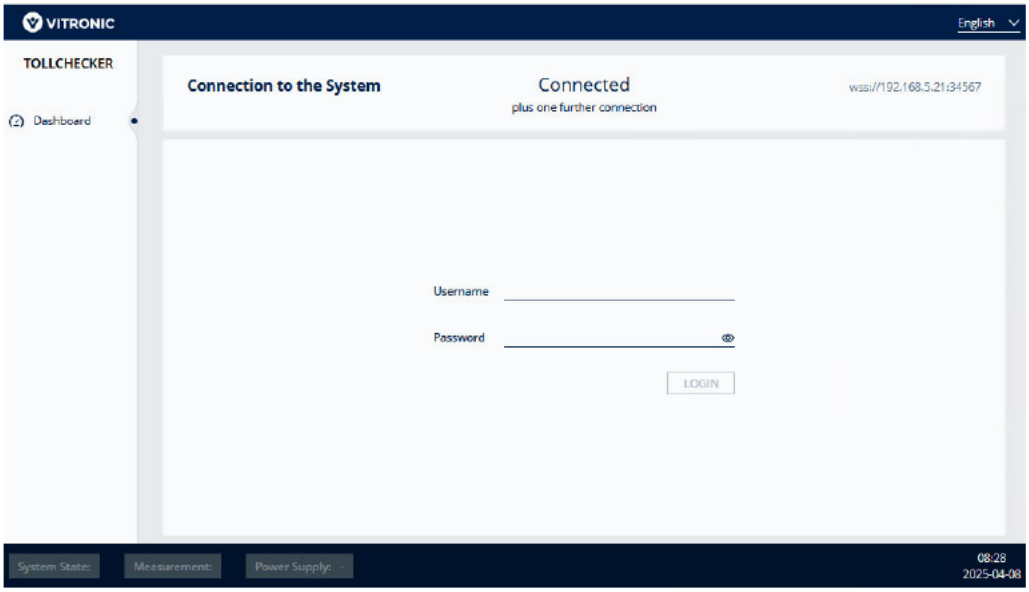

Figure 20 Login

- Switch on Wi-Fi on the service laptop.
- Open the web browser.
- Enter the IP address of the system: 192.168.5.21
- Call up the following port: 34567
  - The browser displays a warning message.
- Click the *Accept risk* button.
- Call up the following port: 8080
  - The browser displays a warning message.
- Click the *Accept risk* button.
- Call up the following port: 3000
  - The browser displays a warning message.
- Click the *Accept risk* button.
  - The *Login* window opens.

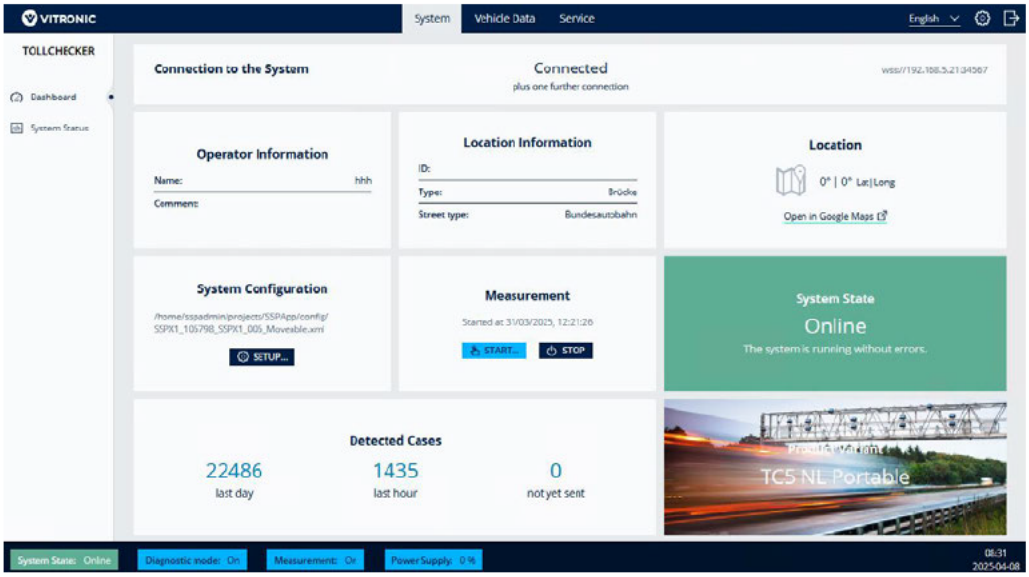

Figure 21 Dashboard

- Enter username and password and click the *LOGIN* button.
  - You are logged in to the system and the dashboard is displayed.

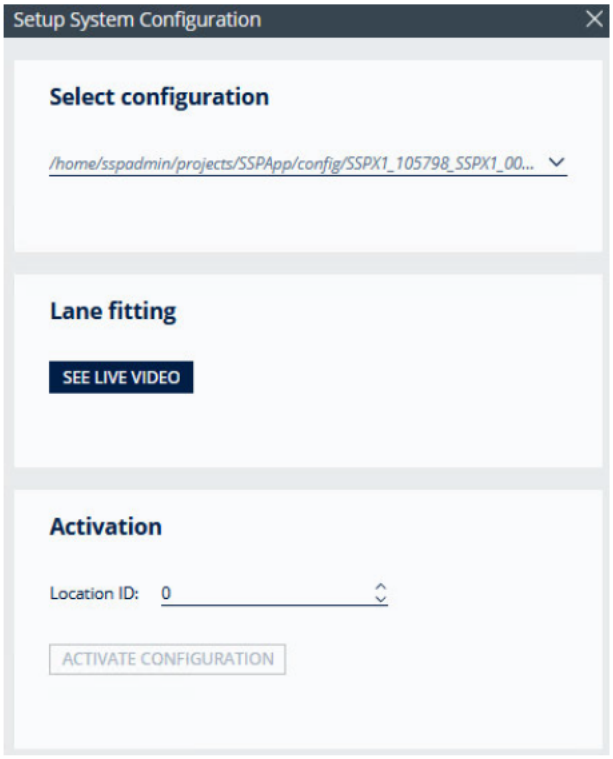

Figure 22 Setup System Configuration dialog box

- In the *System Configuration* section, click the *SETUP* button.
  - The *Setup System Configuration* dialog box opens.

- Click the *SEE LIVE VIDEO* button.
  - A live video stream from the location showing the camera's field of view is displayed.
- Adjust the Moveable system based on the live video stream for optimum vehicle detection.
- In the *Measurement* section, click the *START* button.
  - The *Measurement* dialog box opens.

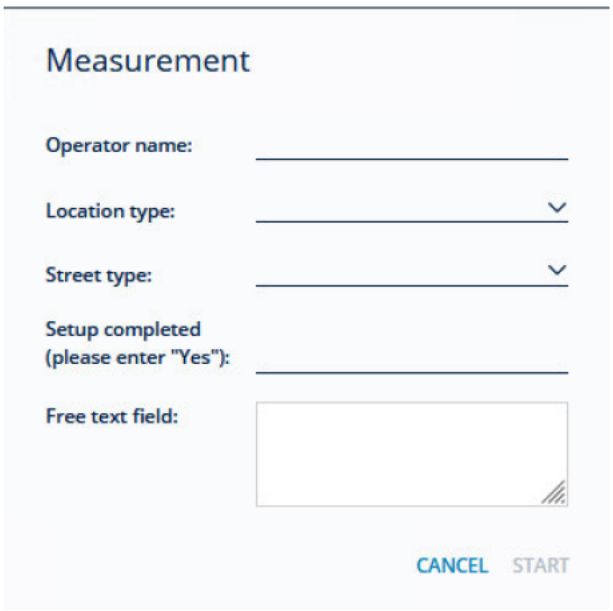

Figure 23 Measurement dialog box

- In the *Operator name* field, enter the operator name.
- From the *Location type* dropdown menu, select the location type: *Roadside*.
- Also from the *Location type* dropdown menu select the proper deployment location. This info will be added to the individual VPM's generated by the system
- From the *Street type* dropdown menu, select the street type: *Federal Highway* or *Provincial Road*.
- In the *Setup completed* field, enter *Yes*.
- Optionally, you can enter free text in the *Free text field*.
- Click the *START* button.
  - The measurement starts.

Ten minute test

- After the successful assembly of the system the mandatory 10 minute test needs to be performed. The following steps are required:Verify system operation: Check if the system generates VPM´s and photos in the WebGUI Test data communication: Ensure data transmission with the back office is functioning properly.
- Report Installation: Notify the movable deployment headquarters the installation has been successful

- Finalize setup: After a successful test gather all remaining potential material on the site, store the material in the vehicle and leave the location.

4.Working at Deployment Locations

It is essential that work on deployment locations is performed safe and in line with safety regulations and procedures.

When there is a need to stop at the emergency lane to unload equipment all safety instructions need to be followed to the letter with regards to the mandatory signs and illumination of the vehicle.

Before the actual unloading of the system a visual inspection of the deployment site is carried out to ascertain if any issue is hampering with a safe deployment and operation of the system. In case of such an issue or when in doubt the deployment officer first refers bck to the deployment supervisor for instructions.

Equipment needs to be unloaded as quickly as possible, although the safety measures should be followed at all times and deposited at the “safe” side of the guardrail. All components need to be deposited on the side of the guardrail, which is opposite to the road, on which the traffic flow will be measured.

Unloading will be handled from the side of the vehicle facing the guardrail or from the back of the vehicle.

In case of an accident the Security Coordinator within SkyToll / Connections System needs to be notified immediately to safeguard the proper follow up of the incident, in accordance with the Safety Management System.

5. Appendix: checklist for individual deployments.

Introduction

Although (almost) all important steps to be taken before, during and after an individual deployment are mentioned in the document, this appendix is meant to be used as an aid for the deployment officer, to make sure all needed steps are followed.

Before leaving the deployment hub

The installation follows the approved camera plan, and the contractor prepares for each deployment based on it, making sure to follow all the safety procedures in this document.

5.1.1 Location

- ☐ At least 15 days before checked with the road owner deployment location.
- ☐ One day before or latest at the day of deployment checked with the road owner deployment location.

5.1.2 Equipment check

- ☐ Verification of the number of equipment according to the daily plan.
- ☐ Inspection of all equipment components – all parts are available and ready for installation.

Instruction for equipment check and cleaning

- First, a thorough visual inspection of the tripod needs to be carried out to ensure that there are no damages such as cracks, deformations, or other defects that could affect the stability or functionality of the system. Special attention is given to the joints, locking mechanisms, and attachment points, as these critical components are essential for the safety and stability of the entire system.
- All connection points and moving parts of the tripod are carefully cleaned to remove dirt, dust, corrosion, or other deposits that could impair proper functioning. It is also checked whether the locks engage properly and if the connecting elements move smoothly without resistance.
- After cleaning, a re-inspection is carried out to check for signs of wear, scratches, notches, or other anomalies at the connection points, tubes, or locking blocks.

5.1.3 Other items to be checked

- ☐ Is the plan for installation available?
- ☐ Is vehicle proper and all materials on board?
- ☐ Is the battery of the RSE fully charged?
- ☐ Is the lens of the equipment clean?
- ☐ Is the exemption for the RVV on board an easily available?
- ☐ Is the mandatory safety clothing on board and in proper state?
- ☐ Is a means of communication between the deployment officer and the deployment hub available and in good order?

At location

5.1.4 Arrival on site

- ☐ The vehicle must have signalling elements of car turned on upon arrival.
- ☐ Safety elements must be deployed (according to the conditions of individual locations).
- ☐ Visual inspection of the deployment (if some issue to contact an authorized person).

Safety instructions for equipment unloading

- Equipment needs to be unloaded as quickly as possible, although the safety measures should be followed at all times and deposited at the "safe" side of the guardrail. All components need to be deposited on the side of the guardrail, which is opposite to the road, on which the traffic flow will be measured.
- Unloading will be handled from the side of the vehicle facing the guardrail or from the back of the vehicle.

5.1.5 Installing the equipment

- ☐ The equipment was installed on site according to the plan?
- ☐ All components for the given equipment were usable and not damaged?

5.1.6 Commissioning

After commissioning the equipment, the connection to the central system needs to be set up, followed by a 10-minute connection test.

- ☐ Commissioning of equipment is successful.

Instruction for commissioning

- In the *Operator name* field, enter the operator name.
- From the *Location type* dropdown menu, select the location type: *Roadside*.
- Also from the *Location type* dropdown menu select the proper deployment location. This info will be added to the individual VPM's generated by the system
- From the *Street type* dropdown menu, select the street type: *Federal Highway* or *Provincial Road*.
- In the *Setup completed* field, enter *Yes*.
- Optionally, you can enter free text in the *Free text field*.
- Click the *START* button.

5.1.7 10 Minute test

- ☐ The connection test was completed?
- ☐ Check if the system generates VPM´s and photos in the WebGUI?
- ☐ Test data communication - ensure data transmission with the back office is functioning properly?
- ☐ Notify the movable deployment headquarters the installation has been successful.

Removal of equipment

The steps for equipment removal, like arrival at the site and parking the vehicle, are the same as during installation. The equipment will be taken to the hub for check and cleaning.

In all case of an issue or accident the Security Coordinator within SkyToll / Connections System needs to be notified immediately to safeguard the proper follow up of the incident, in accordance with the Safety Management System.