ORTEC Workforce Scheduling 7

User Manual

Module Travel Distance Calculation

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1 Travel Distance Calculation

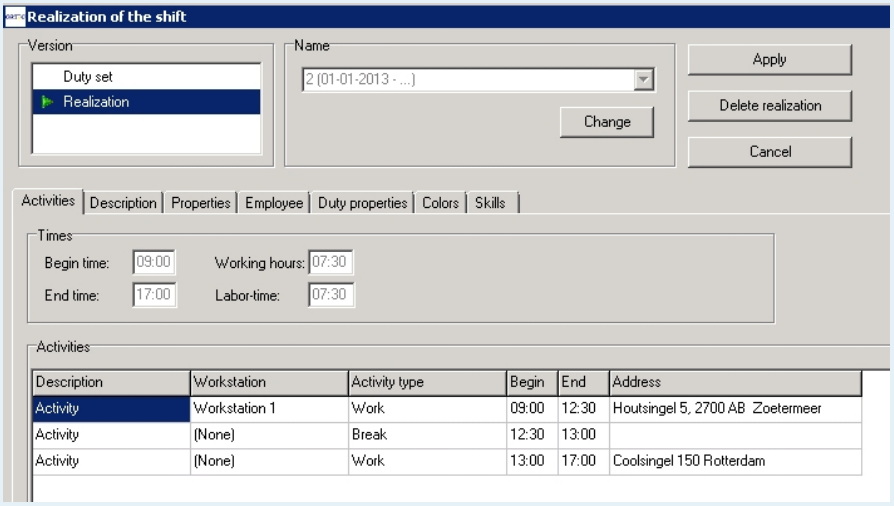
The Travel Distance Calculation module allows you to calculate travel distances for employees based on the shifts assigned to them. These travel distances can be used to determine the travel expenses that need to be paid to your employees, which can be exported to your payroll system. Travel distances are calculated using **ORTEC Map and Route (ORTEC MR)**, ORTEC's software application to calculate routes and distances between several addresses.

Travel distances in ORTEC WS are calculated for:

- Distance from the employee's home address to the address of the first activity in a shift.
- Distances between the addresses of different activities in a shift.
- Distance from the address of the last activity in a shift to the employee's home address.

Example

Assume the employee assigned to the shift below lives in Gouda.



The following travel distances will be calculated:

- From home to work: Gouda - Zoetermeer
- From 2nd activity to 3rd activity: Zoetermeer - Rotterdam
- From work to home: Rotterdam - Gouda.

2 Routing applications

The travel distance calculation module makes use of ORTEC's own routing applications to calculate routes and distances between several addresses. There are two options available:

- (Recommended) **ORTEC MapService**: ORTEC MapService is hosted by ORTEC as a cloud native solution. For more information, see "ORTEC MapService" on page 2. This is the recommended option to set up the travel distance calculations module.
- **ORTEC Map & Route**: This is an on-premises application that's installed on a separate server and was the main option until ORTEC MapService was introduced. For more information, see "OMR installation & configuration" on page 5. This option will be deprecated at some point in the future.

2.1 ORTEC MapService

The **ORTEC MapService** is part of the **ORTEC Cloud Services** made available through the Microsoft Azure cloud platform. ORTEC Cloud Services allow the integration of optimization intelligence into own or third-party software, exposing key functionalities of ORTEC software as REST-like resources via HTTP. ORTEC MapService utilizes HERE's geodata to provide continuously updated and reliable location content, with the delivery format tailored to the typical lines of business served by ORTEC.

> Contact your ORTEC representative when needed.

2.1.1 Cloud environment & map updates

A dedicated ORTEC MapService environment is provided for ORTEC WS customers. The main purpose of this dedicated environment is to better control map updates; a challenging topic with regards to retroactive corrections in ORTEC WS. Instead of having multiple updates per year, this environment receives an update once a year around a fixed time. There's a time window of several weeks in which the old and new maps are both available. The new map will first be activated on the ORTEC MapService test environment, most probably in the first half of January. After a few weeks, it will be pushed to the production environment, most probably in the second half of February. A map update and its exact time windows will be communicated in advance.

The environment currently hosts the latest maps for the Benelux and parts of Germany and France. Additional map data can be added on request.

2.1.2 Benefits

There are a number of benefits to using ORTEC MapService:

- Faster implementation time. Configuration takes a fraction of what it takes to install and configure ORTEC MR.
- Reduced customer costs because it no longer requires an on-premises ORTEC MR server.
- Geocoding addresses is more robust. It's for example no longer needed to have an exact format for the country code (Nederland, NL, Netherlands are all accepted).
- Because of improvements in ORTEC WS code, calculating distances in bulk is significantly faster than before.

2.1.3 Connect to ORTEC MapService

This alternative is available as of **ORTEC Workforce Scheduling 7 Update 1567656**.

Required: General settings UseDistanceMatrix and UseDistanceFromCloudMapService are enabled in **ORTEC WS Settings Manager**.
Please note that when using UseDistanceFromCloudMapService the old OMR setting UseDistanceFromOMR should be disabled.

Required: The application server which hosts the CloudMapService (see step 2 below) should be able to access the ortecapps.com domain, to be able to make a connection with the ORTEC MapService.
It's possible to use a proxy server to make a connection. This can be configured in **ORTEC System Configuration** > **Configuration** tab. Select **Settings Management** > **Settings Manager** > **SharedCFW** > **Network**.
Please note that other ORTEC components that require internet access will then also use this proxy server.

1. Open **ORTEC System Configuration**.
2. Make sure the CloudMapService process is running. This process can be added in the **Configuration** tab, **Process Configuration** > **Edit** > **Add process...**.
3. On the **Configuration**tab, select **Settings Management** > **Settings Manager** > **CloudMapService** > **General**folder.
4. Here you can view/adjust four settings:
   - **ApiVersion**
     Only needs to be adjusted when a new version is available. It's recommended to keep the default value unless communicated otherwise by ORTEC Product Support.
   - **Connection**
     Define the **URL** (endpoint of the ORTEC MapService), **Profile** and **Api key**.
     - For the Benelux, use the **URLs** https://benelux-ows.maps.ortecapps.com (production environment MapService) and/or https://benelux-ows.maps-test.ortecapps.com (test environment MapService). For **Profile** use Internal-EUR. The Api key is supplied by ORTEC Product Support via a Synergy license request.
     - For all other regions/environments, all information is supplied on request by ORTEC Product Support.

     When you modify the URL, be sure to re-enter the API key. This is necessary because the API key is stored in a hashed format, which includes the URL. After re-entering, it will be hashed again.

   - **Context**
     This setting defines the method to calculate travel distances. Choose for the shortest route: car_shortest or fastest route: car_fastest.

These methods are similar to how ORTEC MR calculates distances, but there are no options to tweak parameters. This, combined with the fact that underlying algorithms aren't identical, it could be that calculated distances (slightly) differ from the ones calculated in ORTEC MR. Please note that a regular map update in ORTEC MR could also result in changes in calculated distances.

Please be aware that there's no option available to check the calculated route visually, as the cloud service runs as a black box service.

- **LogsFolder**
  The location where log files are stored with information about the calls to ORTEC MapService. Used for debugging purposes only.

5. (Optional) In **ORTEC WS Settings Manager** > **Other settings** > **SERVER** > **CLOUDMAPSERVICE** > **DISTANCEDECIMALS**, adjust the number of decimals that are used to round of the calculated distances.
   If this setting doesn't exist, a default value of 0 decimals is used.

2.1.4 Logging

There are two places where additional logging is kept about the communication with the ORTEC MapService. This logging can be used for debugging purposes:

1. The **LogsFolder** as described in step 4 above. This keeps track of all HTTP calls that are done from the CloudMapService process to the ORTEC MapService.
2. The table ROS_CLOUDMAPSERVICE_RUNS in the operational database of ORTEC WS keeps track of all calls done from ORTEC WS to the CloudMapService process. This table can also provide some interesting usage statistics.

2.2 OMR installation & configuration

2.2.1 ORTEC Map and Route server

A separate server is required to install ORTEC MR. Because ORTEC MR uses its own COMTEC framework, the ORTEC MR server cannot be combined with (for instance) an ORTEC WS Interface server. If a dedicated Database server is used for ORTEC software, then it is possible to combine ORTEC MR with that server. Please consult with the ORTEC Internal Architecture and Design (IAD) team if you're not sure how to extend the server setup.

Use version ORTEC Map and Route 2014 EP3 for your installation. Do not use ORTEC MR 10 because this version does not work in combination with ORTEC Workforce Scheduling! Contact your ORTEC representative when needed.

To install ORTEC MR, please follow the **ORTEC Map and Route 2014 EP3 Installation Guide**.

For the interface with ORTEC WS a Single Server Architecture (SSA) installation of ORTEC MR is sufficient. After the basic installation, install the GIS map server as well (follow the appendix **Deploying ORTEC GIS Webservice** in this Installation Guide). The GIS map server is what ORTEC WS actually uses to connect to ORTEC MR.

You cannot install the ORTEC MR client (CPGS) and ORTEC WS for Windows (ORTEC WS Windows Client) together on one workstation in version ORTEC WS EP3 and previous. This is possible from version ORTEC WS 2013 EP4 and higher.

2.2.2 Geodata map

Since zip codes are generally very accurate it is recommended to always use the latest available six character precision postal code map (6PPC) for the country of your customer. However, in ORTEC WS it is not required to use a 6PPC map.

Maps can be downloaded from the Synergy ORTEC products release portal. (https://portal.ortec.com/sites/oprel/SitePages/Home.aspx).

Maps are named to be able to quickly recognize what they contain.

Example

For example consider these map names:

- NBNL4pl26PPCC01
- NNL4pl26PPCB10
- NBeNeLuxB02

In these file names the following components can be recognized:

Supplier: Navteq or AND.

Countries: Country/region name and optional road detail level (1-4). A higher number means more detailed roads.

Bordering countries road detail level: **pl** or **plus** + (1-2) indicates that bordering countries are shown on the map. The number indicates what road detail level is available for the bordering countries.

Positions for postal code: Indicates the level of detail used for zip codes.

Version number: Hexadecimal code for year since 2000 (9 = 2009, A = 2010, B = 2011) and 2 digit decimal version number.

The Module Travel Distance Calculation is only used with Navteq maps so far. It should be possible to use AND maps as well.

2.2.3 ORTEC WS Settings Manager

ORTEC WS General Settings

Several general settings need to be enabled in ORTEC WS Settings Manager in order to use the Module Travel Distance Calculation.

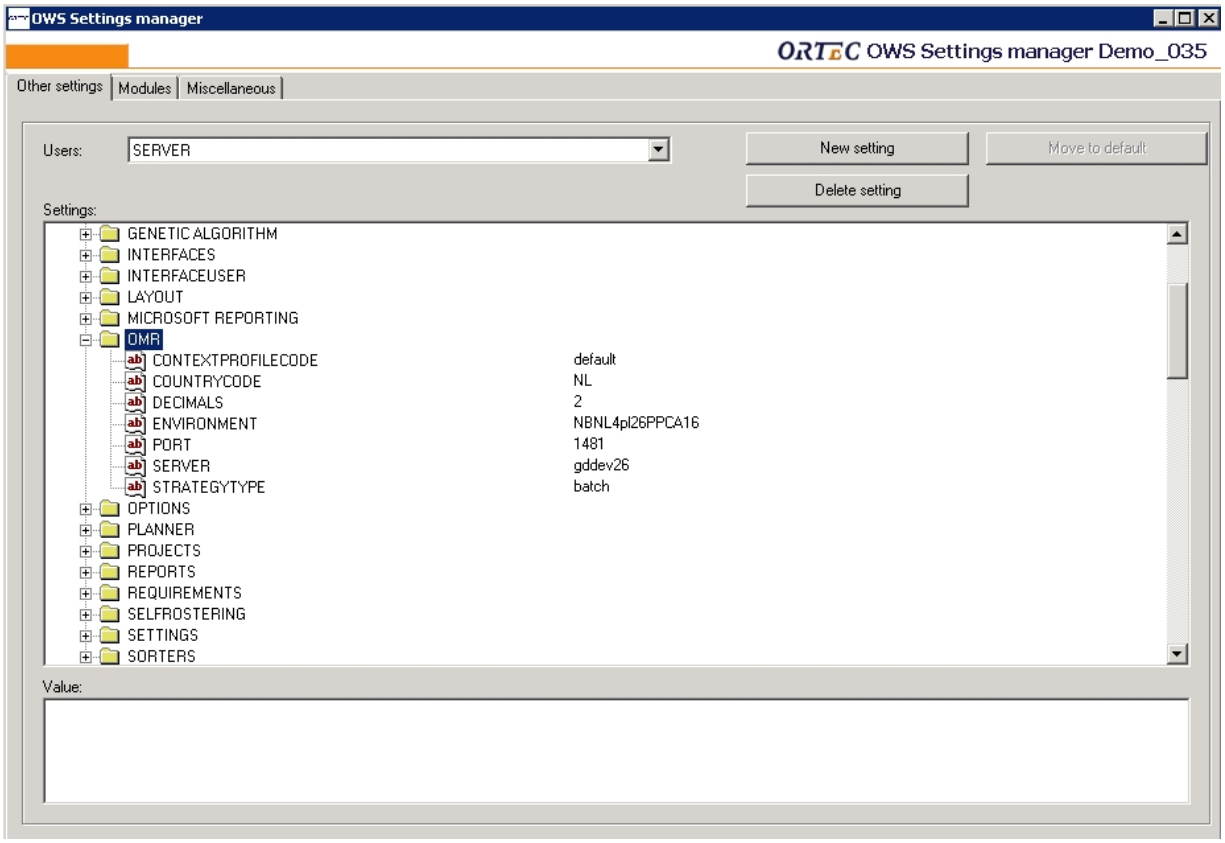
General Setting	Purpose
UseDistanceMatrix*	Setting to use distance calculations.
UseDistanceFromOMR	Setting to use ORTEC MR to calculate distances.
ShiftStartTravelDistanceRem	Setting to use the labor rule: Travel distance at the start of a shift.
ShiftEndTravelDistanceRem	Setting to use the labor rule: Travel distance at the end of a shift.
InShiftTravelDistanceRem	Setting to use the labor rule: Travel distance in shift.
UseAddressWithActivity**	Setting to be able to add addresses for activities.

ORTEC WS Other Settings

After ORTEC MR has been installed you need to create and configure the following settings in **ORTEC WS Settings Manager** for the **SERVER** user in the folder **OMR**.

Other Setting	Default	Purpose
CONTEXTPROFILECODE	Default	Enter the route calculation profile name as configured in ORTEC MR data management. This is used to determine if the distance from the shortest or fastest route should be returned. The value of this setting is case sensitive.
COUNTRYCODE	NL	Enter the country code to use if no country code is supplied.
DECIMALS	2	The number of decimals for the distance to be returned.
ENVIRONMENT	-	The CSCS environment name as configured in ORTEC MR. Usually, something like “CUSTOMER_PROD” or “CUSTOMER_TEST”.
PORT	1481	The port number for the GIS web service on the ORTEC MR server.
SERVER	-	The hostname of the server on which ORTEC MR is installed.
STRATEGYTYPE	Batch	The Geocoding strategy to use. Please use only **batch**.

Changes to these setings require a restart of all the OWS CPMS processes with the "CWSServer.exe" (main CWSS and InterfaceWorker processes).



2.2.4 Licenses and modules

The following licenses and modules are required.

One set of licenses is required for the Navteq* map, and the other set is required for ORTEC MR.

> *The Module Travel Distance Calculation is only used with Navteq maps so far. It should be possible to use AND maps also.

Navteq

- Key: Navteq map data server.

  Description: Navteq map server data license for server.

  - NL_Zipcodelevel = 6

- Key: Navteq map data client.

  Description: Navteq ORTEC Logistics License fee.

  - NL_ZipcodeLevel = 6

ORTEC Map & Route

- Key: SHORTROUTE Server.

  Description: SHORTROUTE Server License.

  - Geocoding
  - Route
  - TDS
- Key: SHORTROUTE GUI 2010.

  Description: ORTEC MR GUI license 2010.

  - Routing

2.2.5 Configuration ORTEC MR

In this chapter the possibilities to fine-tune the ORTEC MR configuration for the needs of the customer are explained.

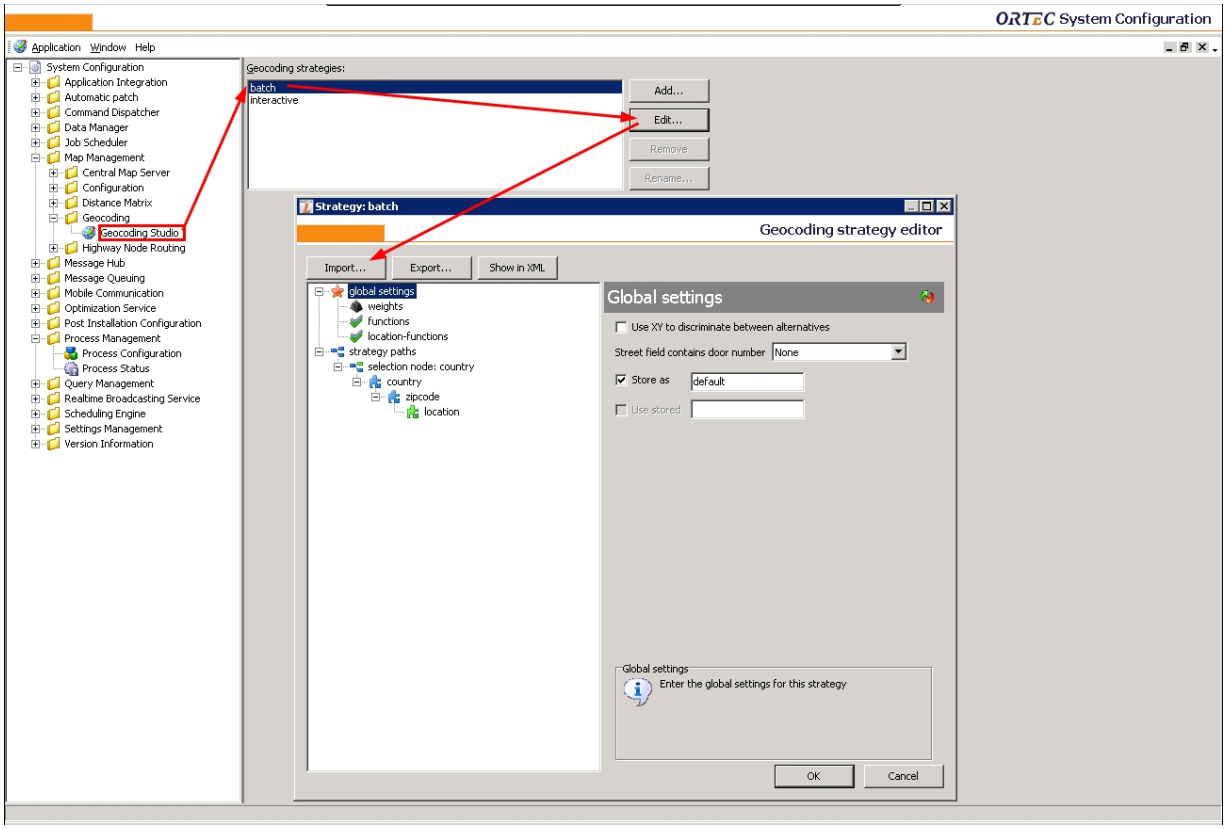
Geocoding strategy

Geocoding is the process of locating the position on the map based on the available address fields for a location.

All the available address fields entered in ORTEC WS can be used to Geocode an address.

More information about Geocoding strategies and how to create or modify them to suit your specific needs is available in the **ORTEC Logistics Manual Geocoding Studio** (Synergy document 00.094.005).

In the System Configuration for OMR go to the **Map Management** section and enter the **Geocoding Studio**.



Default Geocoding strategy for ORTEC WS

Because ORTEC WS can use all available address fields to Geocode an address you can use the default Geocoding strategy that comes with the map that is installed.

Route Calculation Profile

The Route Calculation Profile is used to indicate whether you want to use the fastest or the shortest route.

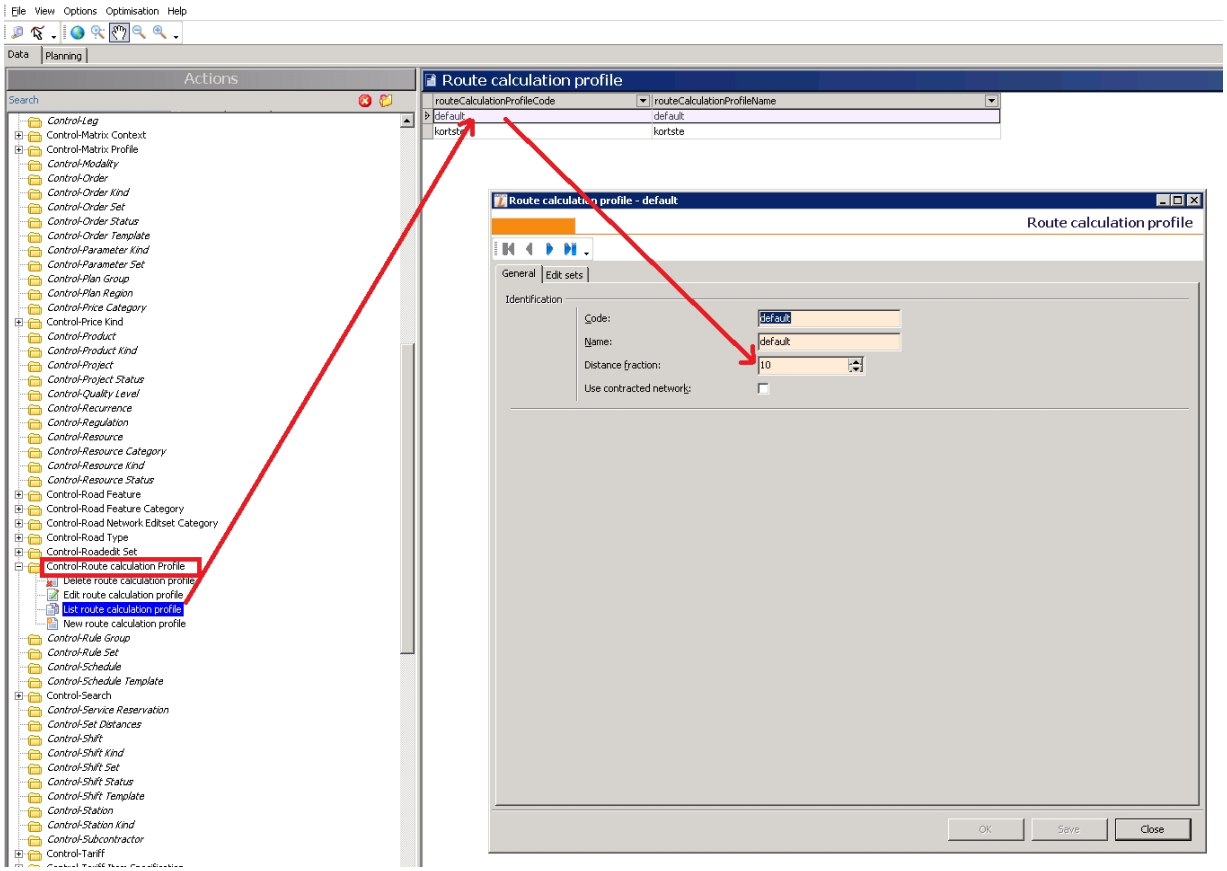
In the ORTEC MR client open the tab **Data** and the section **Control – Route calculation profile**.

Open the **default** profile and modify the **Distance fraction** setting to match the preference of the customer for the route calculation:

- Shortest route = less kilometers = (usually) more time to travel. If the customers wants this then set the value to “90” (more weight for distance in the route).
- Fastest route = (usually) more kilometers = less time to travel. If the customers wants this then set the value to “10” (less weight for distance in the route).

Please do not go above 90 or below 10 for the **Distance fraction** without extensive testing of the results that you get with that value.

You can create multiple route calculation profiles and give them a short name like **shortest** and **fastest** instead of **default**. This is also helpful when testing calculations with the ORTEC MR client to compare distances. You can select the profile to use in the routing screen.



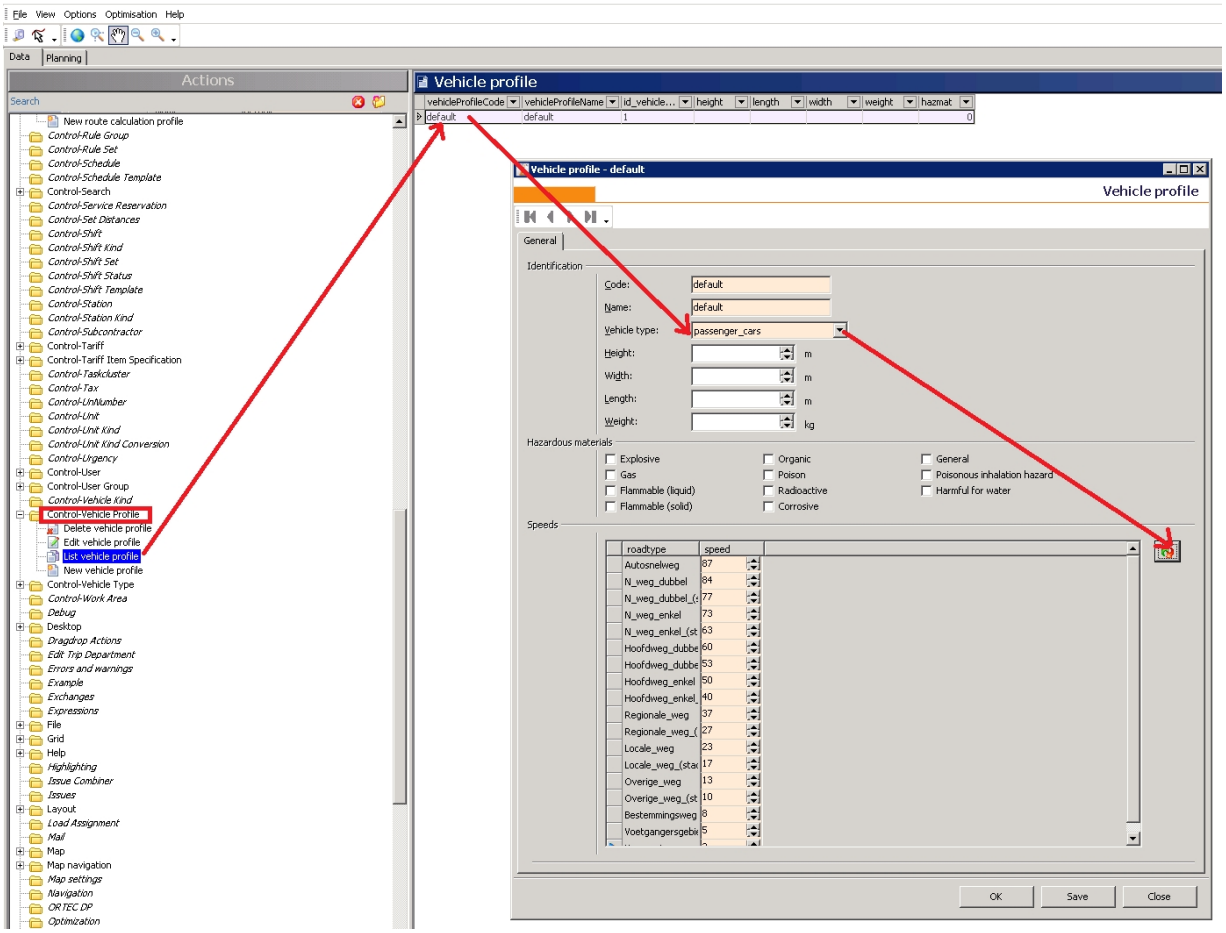
Vehicle Profile

The vehicle profile is used to determine average driving speeds for different types of roads.

In the ORTEC MR client open the tab **Data** and the section **Control – Vehicle profile**.

By default ORTEC MR is set to **Delivery truck**.

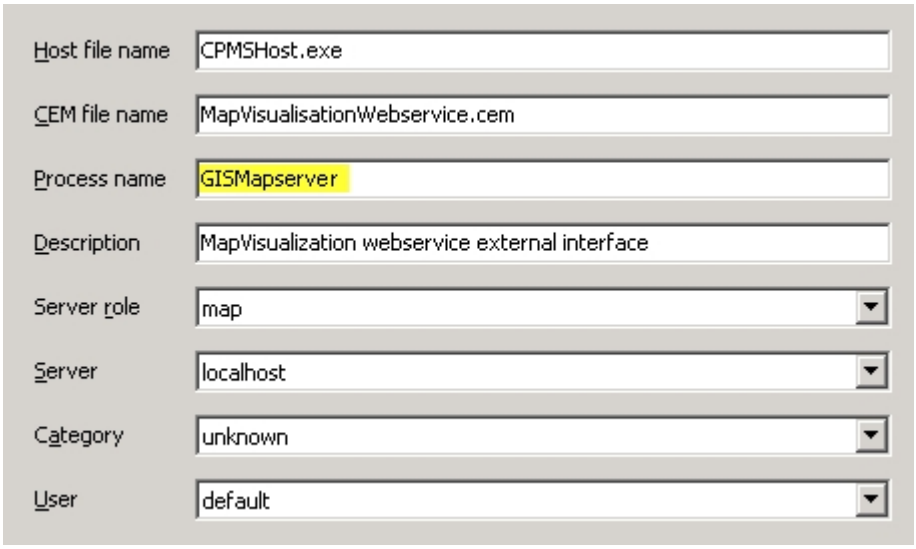
Open the **default** profile and modify the **Vehicle type** setting to **Passenger_cars**.



OMR CPMS Processes

In the System Configuration for OMR make sure that the following processes are running (for ORTEC MR EP3):

- BNMapServer - mapvisualizationBeNomad
- CQMS – CQMS2
- CUAS - CUAS
- Geocoding - geocoding
- MapVisualisationWebservice – MapVisualisationWebservice (you can rename the **Process name** for this process to **GISMapserver** in CPMS in order to have more recognizable process names).
- HNRCalculator – HNRCalculator
- LocalizeAddress – LocalizeAddress
- NetworkDataProvider – networkdataprovider
- RevisionManager – RevisionManagerPlugin
- XmlStore – CPMSAssemblyHost



2.2.6 Test the ORTEC MR GIS Interface

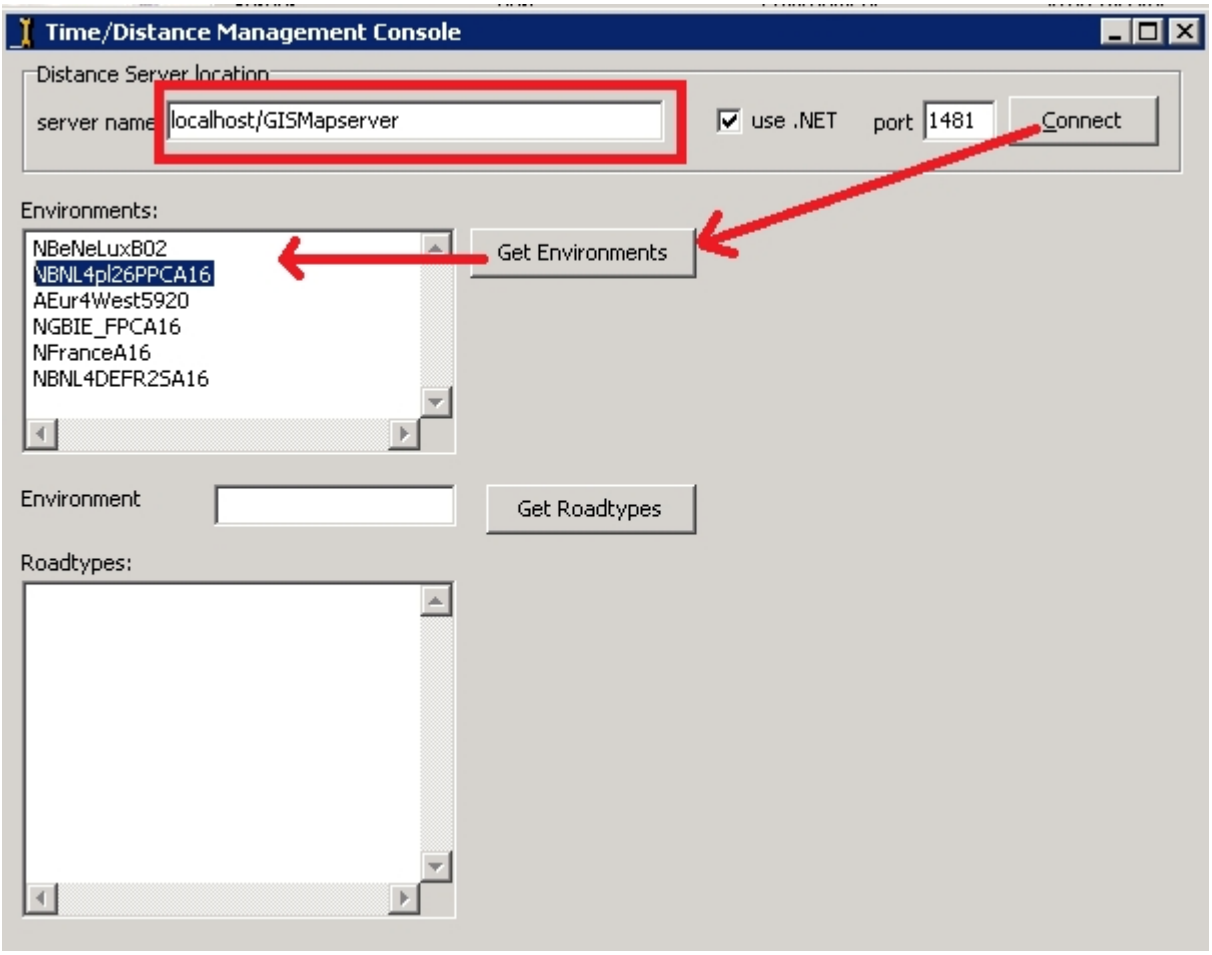
In order to test whether the ORTEC WS server can connect to the ORTEC MR server you can run the following tools on the ORTEC WS server (using a network share or UNC path) to the executables that exist on the ORTEC MR server.

Connecting to OMR GIS webservice

Start the **ORTEC\Map and Route\Server\Utilities\SHORTROUTEDistanceSettings.exe** utility.

Enter the fields in the **Distance Server location** section and click **Connect**.

If successful than you will see all the available CSCS environments on that server.



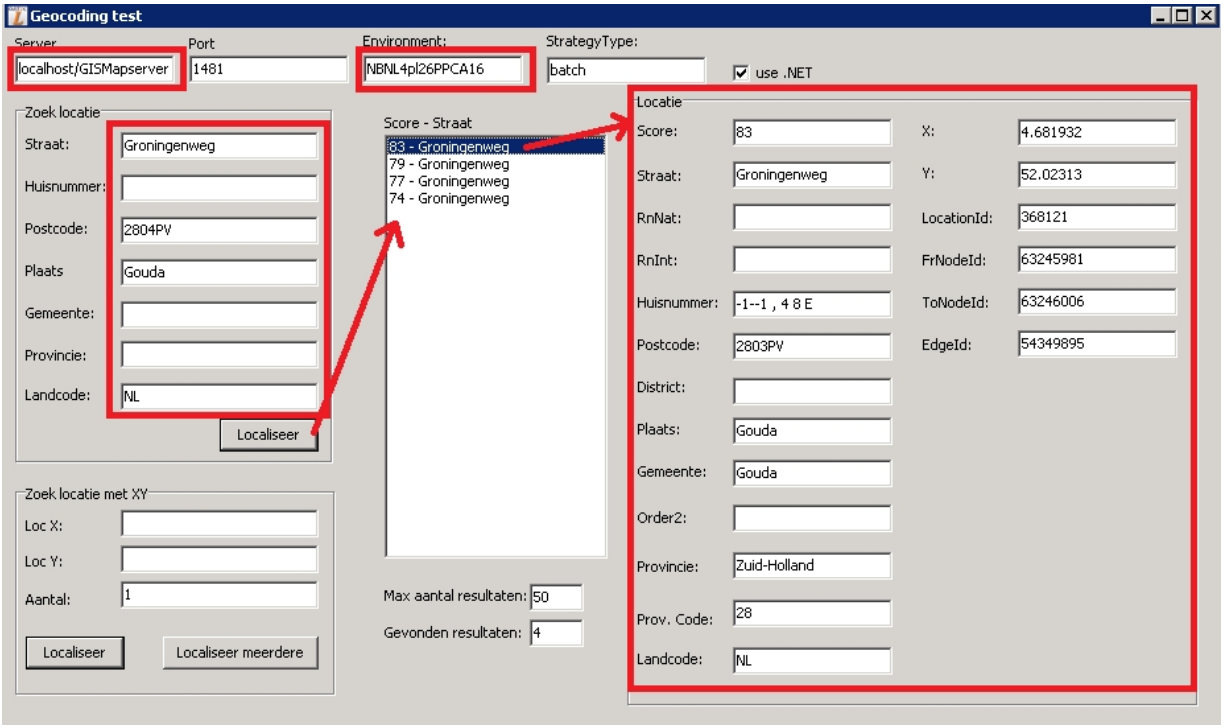
Test Geocoding (localization)

Start the **ORTEC\Map and Route\Server\Utilities\SHORTROUTEGeoCodingTest.exe.**

Enter the fields **Server**, **Port**, **Environment**, **StrategyType** and check the **use .NET** checkbox.

Now enter at least the **Landcode** and **Postcode** fields in the **Zoek locatie** section and click the **Localiseer** button.

In **Score – Straat** all the results that match your search fields are shown. The score is determined from the Geocoding strategy **batch** that is configured in the ORTEC MR System Configuration. See the **ORTEC Logistics Manual Geocoding Studio** (document 00.094.005) for more information.



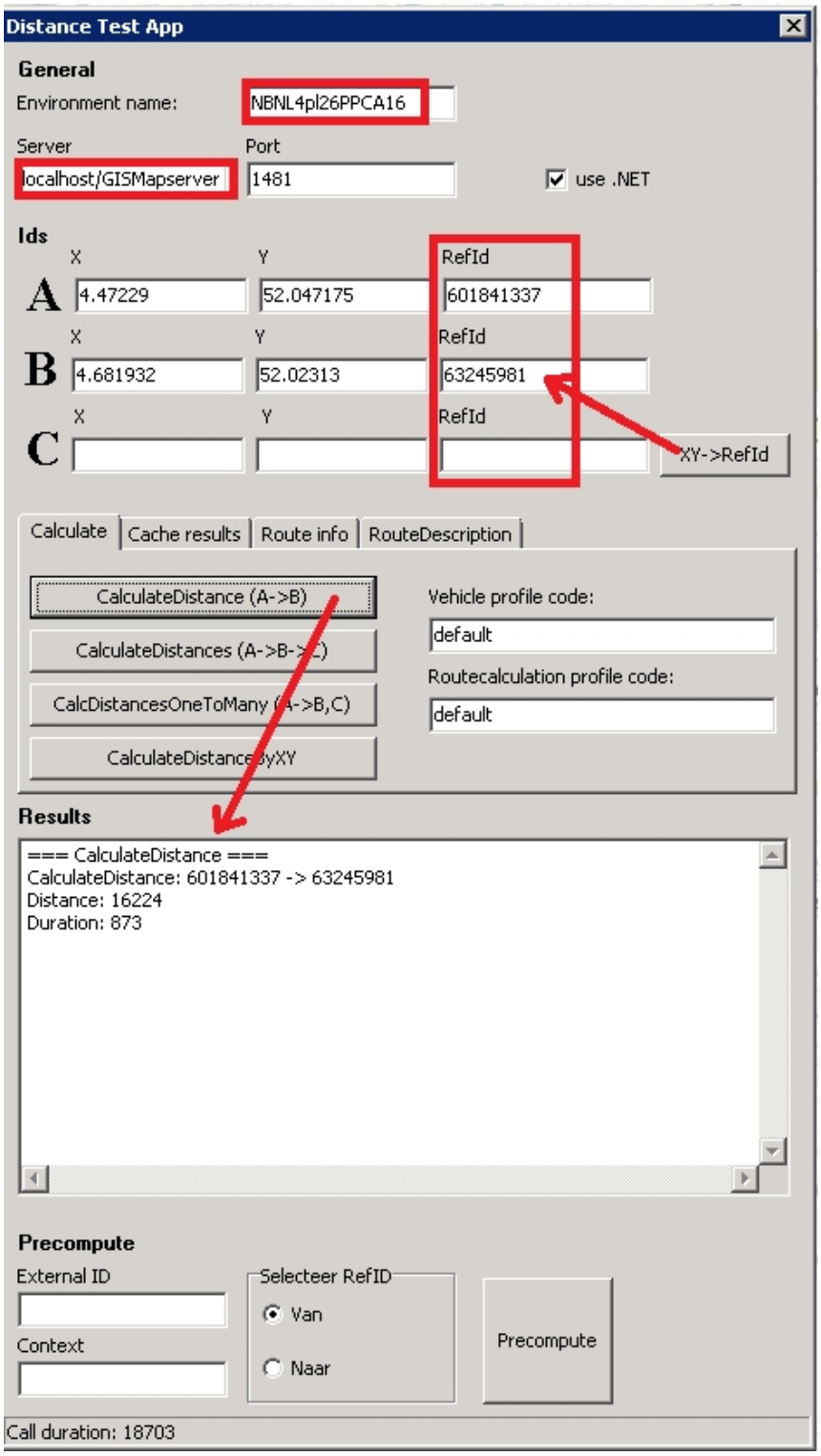
Distance calculation testing

Start the **ORTEC\Map and Route\Server\Utilities\SHORTROUTEDistanceTest.exe.**

In the **General** section enter the fields **Environment**, **Server**, **Port** and check the **use .NET** checkbox.

Click **XY -> RefId**to retrieve the map Id that matches the given X and Y locations for the A, B and C locations.

Click **CalculateDistance**to calculate the distance between the locations using the **Vehicle profile code** and **Route calculation profile** that are entered. If these two fields are left blank then the default values for these will be used.



2.2.7 Search addresses manually in ORTEC MR

When using the travel distance calculation module of ORTEC WS all addresses available in ORTEC WS will automatically be localized in ORTEC MR. However, some addresses might not be available on the map used in ORTEC MR. This section explains how to localize these addresses manually.

How to use

Localize addresses manually

1. Open a browser and a map where you can find the address (for instance Google Maps).
2. Open the **ORTEC MR Client** and select the tab **Planning**.
3. Open the **Road features** window.
4. Use the following tools  to zoom into the correct location on the map. Compare the location with the map as used in step 1 to find the correct location.

> If these tools are not available in your ORTEC MR client, the tools can be added through the customize menu. Right click the menu bar and select **Customize...**. Search for the **zoom**, **pan** and **segment** tools.

5. When the correct location is visible, select the location using the button: 
6. Write down X and Y coordinates as indicated in the **Road features** window.
7. Open **ORTEC WS**.
8. Open the **Data Management Window**.
9. Select data entity **Address** and click **List address**.
10. Right click the address you are localizing manually and select **Edit address**.
11. Enter the X and Y coordinates that were written down in the fields **Given X** and **Given Y**.
12. Click **Save** to save the changes.

3 Configuration ORTEC WS

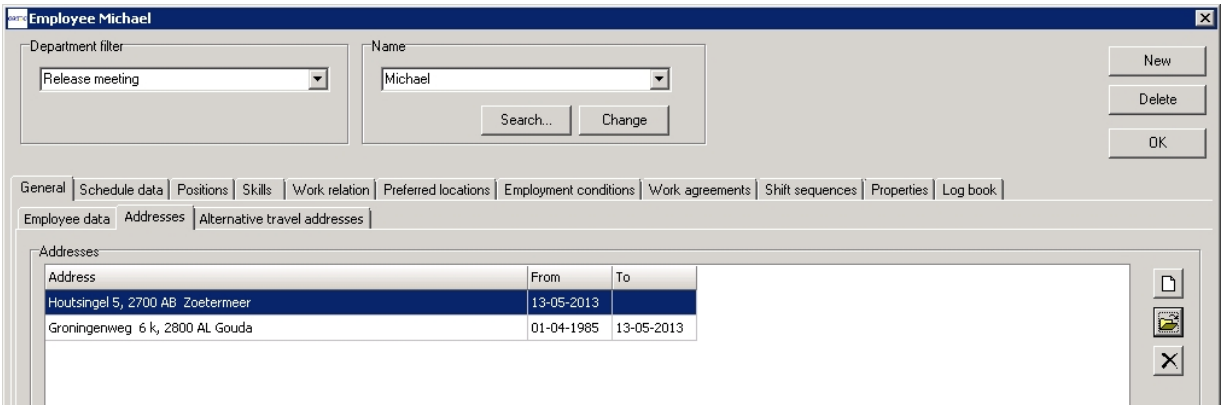
Configure **ORTEC WS** to use the **Travel Distance Calculation** module. In order to calculate travel distances, the following information is needed:

- Employee addresses
- Addresses for activities
- An account that presents the travel distances (and the applicable compensation rules)

3.1 Employee addresses

The employee's home address is used to calculate the travel distances from and to work. The employee's home address is either the alternative travel address or the address entered for an employee via **Employee** > **Employee management** window > **Addresses** or **Alternative travel addresses** tab.

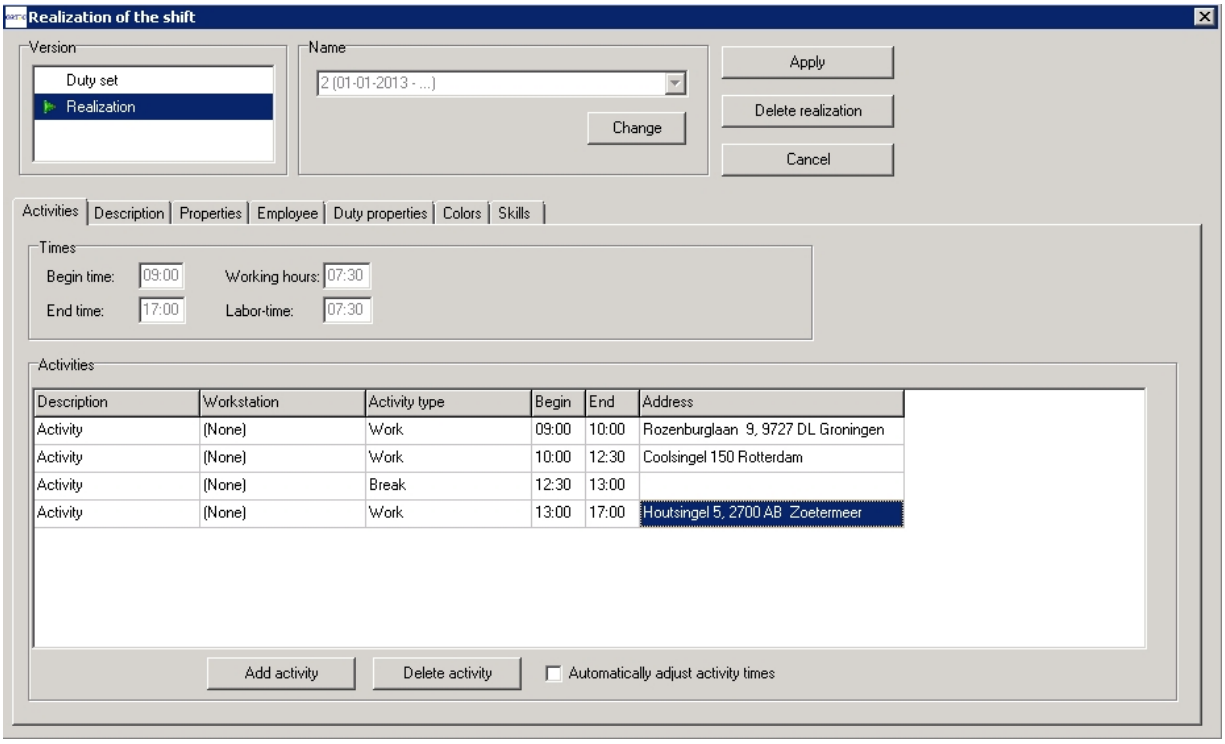
If an alternative travel address is available on a certain day, the alternative travel address will be used as the employee's home address for that specific day. If no alternative travel address is available, the employee's address will be used to calculate travel distances.



3.2 Addresses for activities

If your system is configured to use addresses for activities, an address field is available for every activity. These addresses are shown on the **Activities** tab.

You can only enter addresses for activities if either the selected activity type allows for an address entry, or if you've chosen a workstation that has an associated address (location)for the activity.



3.2.1 Location addresses

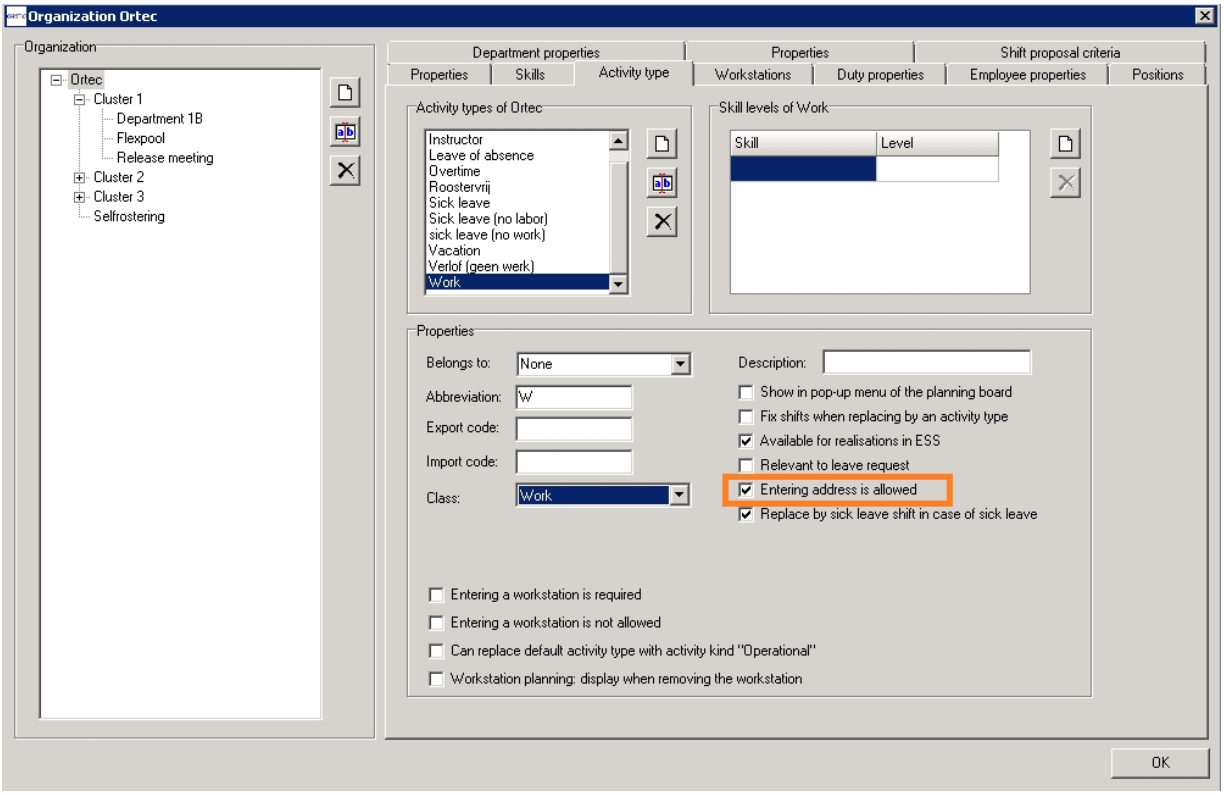
Each location can have its own address. Workstations at the same location share this address. If a workstation is linked to an activity, the location's address becomes the activity's address, and it cannot be altered. Changing a location's address won't affect existing activities, but new activities will use the updated address.

3.2.2 Department addresses

For every department in **ORTEC WS** you can also enter an address. This address will be added as the default address for activities with activity types that can use addresses. These default addresses can be adjusted manually if the activity is at another address.

Addresses are typically used for activity types like *work* and *training* and usually it is not possible to enter addresses for activity types like *vacation* or *sick time* since employees will not be traveling for work if they take vacation or when being sick. For each activity type you can indicate whether it is possible to enter an address via **Maintenance** > **Organization** window > **Activity type** tab.

When changing the address of a department, addresses already assigned in existing activities (in schedules and in the duty set) will not be updated. New activities will use the new address.



3.2.3 Manually adjusting addresses

Addresses of activities can be adjusted in the shift window (in a duty set or in the realization window). It is only possible to adjust the address of activities with activity types that are allowed to use addresses if no workstation is assigned to the activity. Click the **Address** field in the shift window, and then click **Edit** in the **Address window** to adjust the address. In the **Realization window**, click **Enter realization** before you can adjust the address.

3.3 Account and compensation rules

- Travel distances are presented on an account. Therefore, it is required to configure an account and account categories to record the travel distances. The account **Type of entry** needs to be set to **Amount**.
- Account entries for travel expenses are typically split into at least 2 categories: commuting travel and travel expenses. Of course this depends on the rules applicable for the customer.
- Travel distances may be multiplied with the travel allowance per kilometer / mile in order to calculate the actual travel allowances that need to be paid.

3.3.1 Compensation rules for travel distances

Travel distance at the start of a shift

Use this rule to enter travel distances between the employee's home address and the address of the first activity of a shift on an account category (usually commuting travel).

> **Example**
>
> Assume an employee lives in Rotterdam and is assigned to the following activities:
>
> 1. Sales meeting at the office in Amsterdam.
> 2. Visit customer in Den Haag.
> 3. Administration at the office in Amsterdam.
>
> The rule above can be used to enter the travel distance from Rotterdam to Amsterdam (travel to work) on an account.

Travel distance in shift

Use this rule to enter travel distances between the addresses of different activities in a shift on an account category (usually travel expenses).

> **Example**
>
> Continuing the example above, this rule can be used to enter the travel distance from Amsterdam to Den Haag (from activity 1 to 2) and back from Den Haag to Amsterdam (from activity 2 to 3).

Travel distance at the end of a shift

Use this rule to enter travel distances between the address of the last activity of a shift and the employee's home address on an account category (usually commuting travel).

> **Example**
>
> Continuing the example above, this rule can be used to enter the travel distance from Amsterdam to Rotterdam when the employee returns home.

3.3.2 Additional functionality regarding travel distances

Corrections for certain addresses

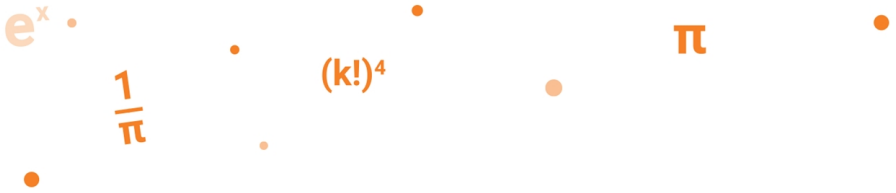
Some locations are so wide spread that the calculated travel distances to and from these locations are not realistic. For instance travel to an airport. The airport usually has one address, but it makes a difference if you need to be at one end or the other. Therefore, corrections may be added to addresses in the **Address Window**. These corrections will be added to the calculated travel distances automatically when traveling to or from this location.

Different rates (or other exceptions) for certain locations

In case different rates apply to certain locations (actual locations; not addresses) or if you want to add an additional allowance for certain locations, it is possible to add a location property to these locations. In the compensation rule an option is available to apply the rules only or not to locations with a certain property.

The **Travel Distance Calculation** module is added to export travel expense to payroll systems. It is **NOT** intended to show travel distances in employee calculations, daily calculations, KPI calculations or to use calculated distances in the candidates for shift window. Using travel distances in employee calculations, daily calculations, KPI calculations or in the candidates for shift window might influence the performance of your system.

ORTEC WS saves calculated distances between 2 locations in memory after **ORTEC MR** initially returned the distance. However, after a restart of **ORTEC WS** all distances will be calculated again since the distances will no longer be available in memory. Therefore, it is advised to use the functionality to save entries when approving a schedule for account entries regarding travel expenses.



Contact information

For further information contact ORTEC, either through your existing ORTEC representative or by using the appropriate contact details listed on www.ortec.com

Our website offers case studies, white papers, brochures, demos and much more.

ORTEC