Chapter 9: Interactive Scheduling

Purpose and Scope of Interactive Scheduling

Schedule changes occur during the work day. Keeping the schedule up to date is essential to maintain its quality and cost effectiveness. To accomplish this, Optibus OnSchedule™ provides an interactive manual editing facility. In addition, the manual editing facility enables you to fine-tune the schedule.

This chapter shows you how to open elements in the Gantts for editing and make changes using their information boxes. Most manual editing will be on the Drivers Gantt. Edits to the Vehicles Gantt are limited. You can only reschedule a trip in the Vehicles Gantt for a Vehicles-only schedule.

What follows will be based on editing the Drivers Gantt for a full schedule. At the end of the chapter there is a short section on editing the Vehicles Gantt elements for a Vehicles-only schedule.

You can test your edits one at a time. At any point you can save or discard your changes.

The following editing actions available that can be used alone or in combination:

Table 9-1: Interactive Editing Functions for a full schedule

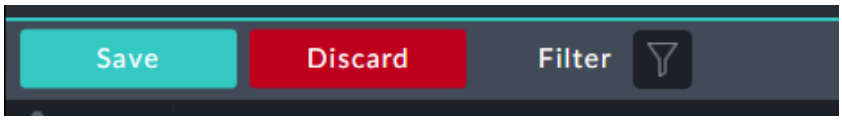
Function	Drivers		Vehicles	
	Available	Reference in Purpose and Scope of Interactive Scheduling	Available	Reference in Vehicles Gantt Interactive Editing
Move a trip to another Duty	Yes	Moving a trip to another Duty	N/A	
Change trip times	Yes	Changing trip times	Yes	Changing trip times
Delete a trip	Yes	Deleting a Trip	Yes	Deleting a trip
Changing a Depot Pull out/Pull in	Yes	Changing a Depot Pull out/Pull in	N/A	
Adding and Removing a Taxi	Yes	Adding and Removing a Taxi	N/A	
Replacing a Taxi with a Deadhead	Yes	Replacing a Taxi with a Deadhead	N/A	
Custom Types and Elements	Yes	Custom Types and Elements	No	
Block functions				
Block ID	Yes	Changing a Duty ID	Yes	Changing a Vehicle ID
Start/End stops	Yes	Changing Duty Start/End stops	No	
Vehicle type	N/A		Yes	Changing a Vehicle Type
Move block up or down	Yes	Moving a block up or down	Yes	Moving a block up or down
Create a new trip	Using Add Trip			

Table 9-2: Interactive Editing Functions for a vehicles-only schedule

Function	Reference in Using a Vehicles-only Schedule
Move one or more trips to another vehicle	**Moving on or more trips to another Vehicle**
Change trip times	**Changing trip times**
Delete a trip	**Deleting a trip**
Change a Depot Pull out/Pull in	**Changing a Depot Pull out/Pull in**
Custom Types and Elements	**Custom Types and Elements**
Block functions	
Block ID	**Changing a Vehicle ID**
Vehicle type	**Changing a Vehicle Type**
Move block up or down	**Moving a block up or down**
Create a new trip	**Using Add Trip**

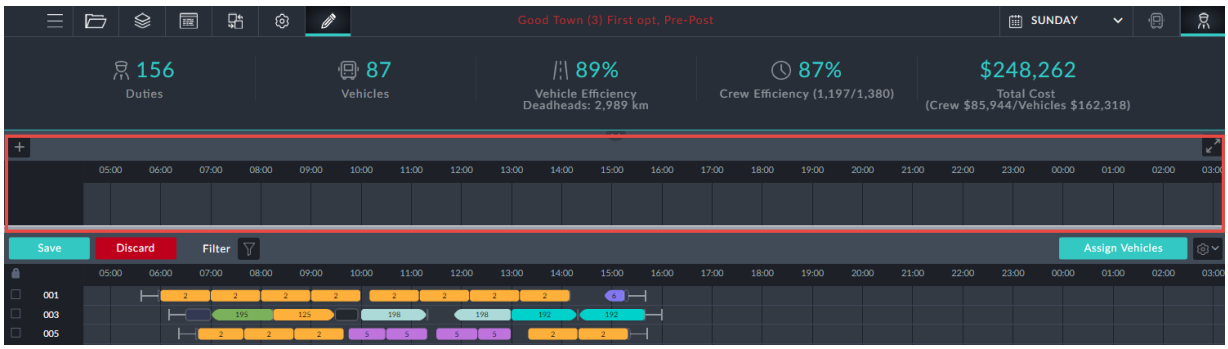
Preparing for an Interactive Scheduling Session

At the top of the Gantt display, you will have noticed that there is an option to save or discard your changes, for example after setting preferences or running an optimization:



The same applies to manual editing. Until you feel comfortable using manual editing, we suggest that you start by backing up your existing schedule using **Save As** from the  Context Menu.

To enter Manual Editing mode, click the  Manual Edit button in the top toolbar. An editing area (in the red box) called the **stack**, opens above the regular Gantt:



Drivers Gantt Interactive Scheduling

What can be edited

- Trips start and end times may be edited
- Trips may be removed
- Pull out/pull in: Depot pull out origin and pull in destination can be changed
- A taxi may be added, removed or replaced by a deadhead
- Driver block information boxes offer editable fields: Driver ID and start/end locations for the duty.

Moving a trip to another Duty

You can move a single trip or a block of trips to another duty. You can also move them to a completely new duty.

Moving a single trip

We will move the red-boxed trip in duty 201 in the Drivers Gantt below to a different duty:

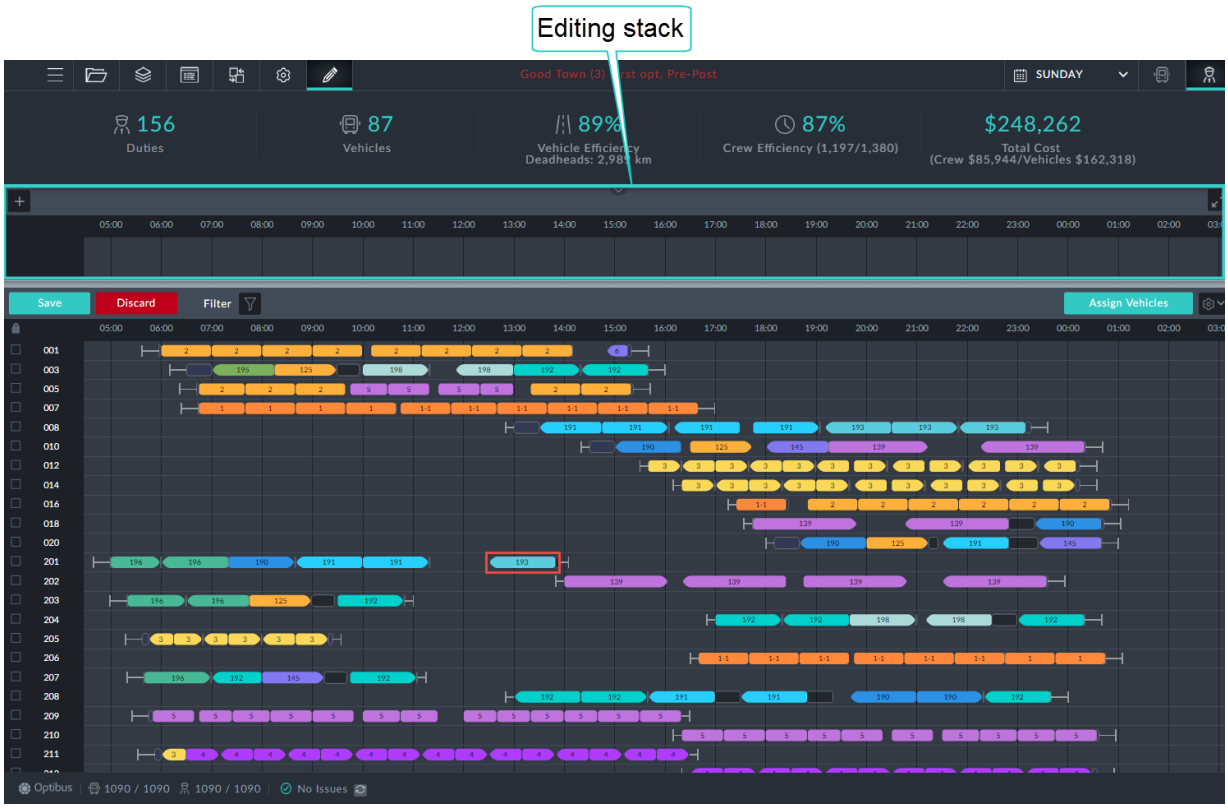


Figure 9-1: Drivers Gantt prepared for manual editing

➢ To move a trip to another Duty:

1. Enter Editing Mode as shown.
2. Double click the trip to be moved.

   A shaded area including possible trip slots is displayed.

   The system automatically recommends all possible options for relocation of the trip. There are two indications for each option:

   - A blue frame indicates that preferences are honored.
   - A red frame for an option indicates a violation of preferences.

   Inside the frame is a quality rating: 1 to 5 stars.

3. At duty 10 there is a slot with four stars in a red border. Click it to opens its information box:

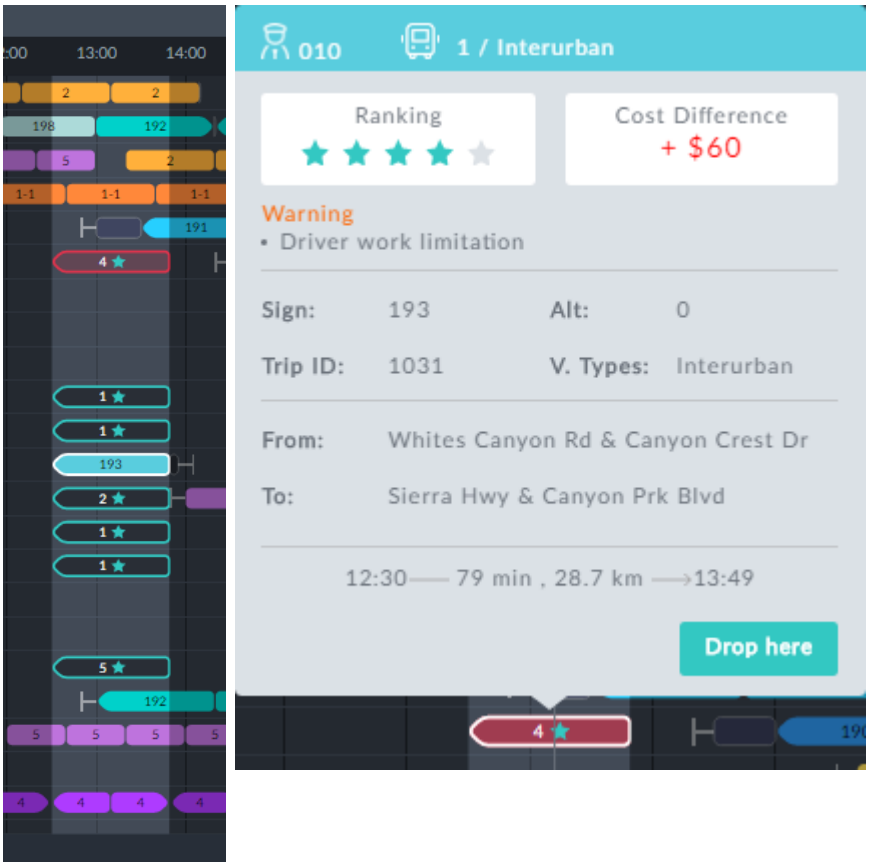
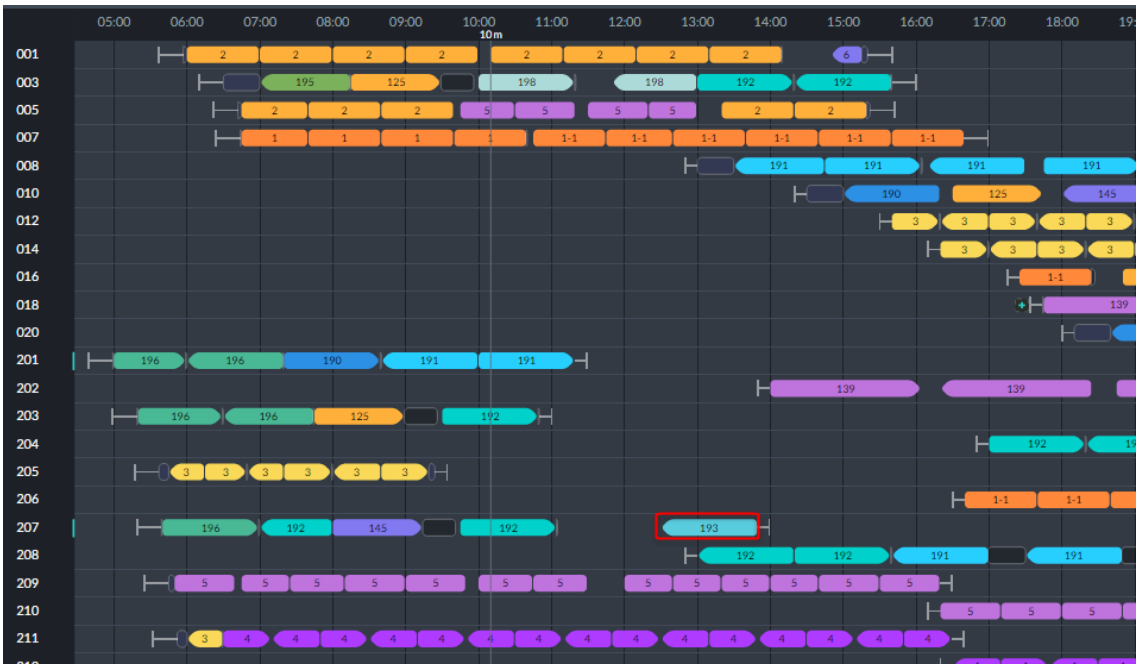


Figure 9-2: Left: Eligible slots; Right: Problematic red bordered slot: Work limitation violation

4. At the bottom of the eligible slots, there is one at duty 207 with a blue border and five stars. it is sufficient to double click it to move the trip.

Here is part of the changed Drivers Gantt showing the moved trip, shown in the red box. Notice also the new generated sign-off immediately after the trip.



Notice also the light blue change-bar at the beginning of duty block 207.

> **Note** All interactive edits will display a change-bar for altered duty blocks.

5. Click **Assign Vehicles** to commit your changes.

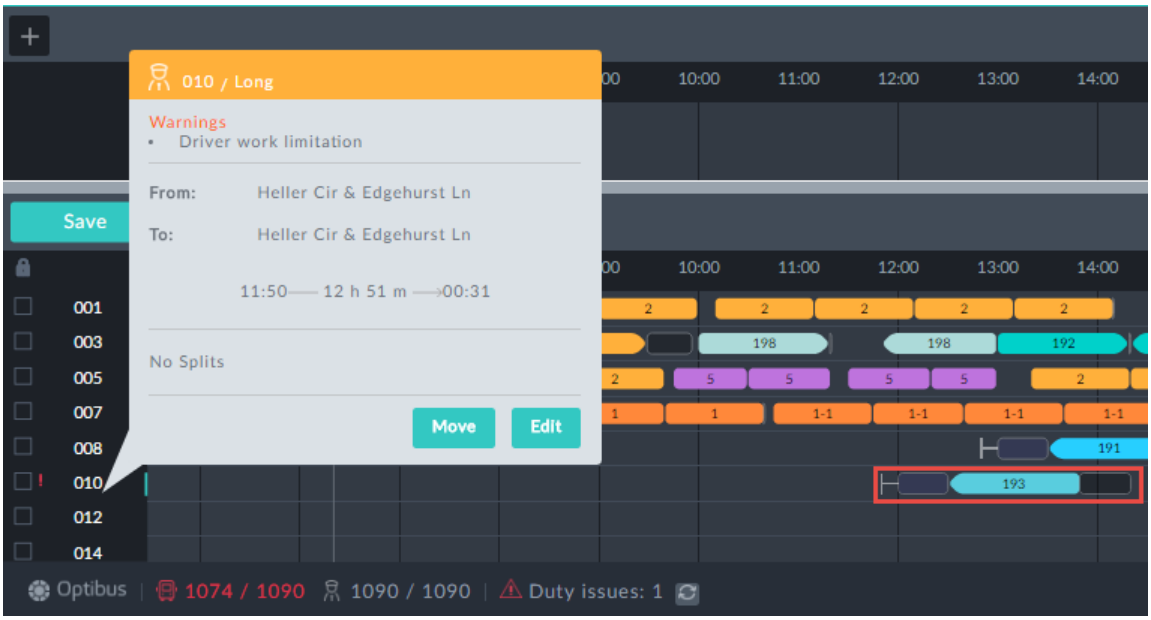
   The change is committed to the currently open schedule. As usual you can disard or permanently save your changes to the schedule.

> **Note** For advanced use of **Assign Vehicles**, see **Completing the Edit Session**.

If in step 4 above, we had chosen the red recommendation, the outcome would be different.

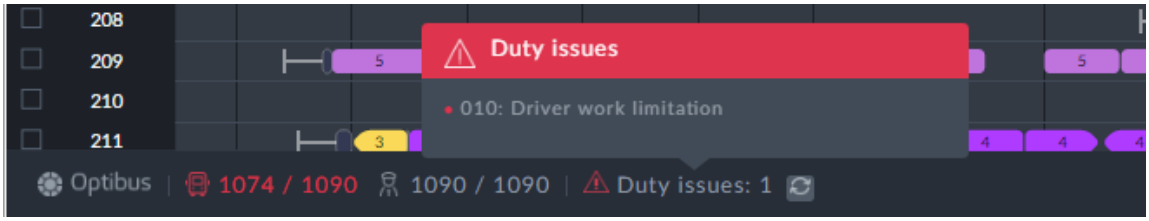
➢ Moving a Single Trip with a Violation:

1. (This replaces steps 4 on, above.) Chose the red recommendation shown in **Figure 9-2** above. Here is a segment of the Drivers Gantt:



The moved trip is in the red rectangle. We have shown the driver block information box - with a warning. Notice that a pre trip, pull out and and deadhead have also been added. In addition, there is a red warning sign next to Duty issues in the status line.

2. Click the Status line Duty issues area:



Again, a warning is posted for dviver 10.

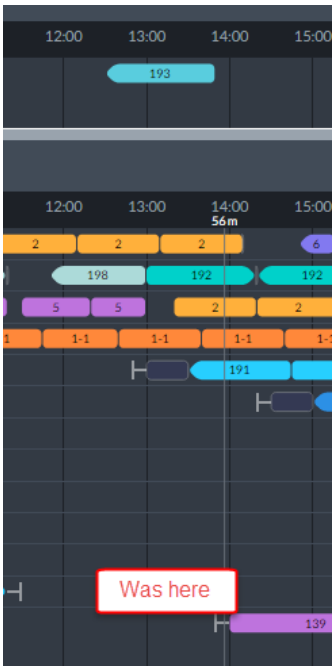
3. Click **Assign Vehicles** to commit your changes.

Using the Editing Stack

The editing Stack is the area indicated in **Figure 9-1**. Trips can be de-assigned to the stack or re-assigned from the stack to the schedule.

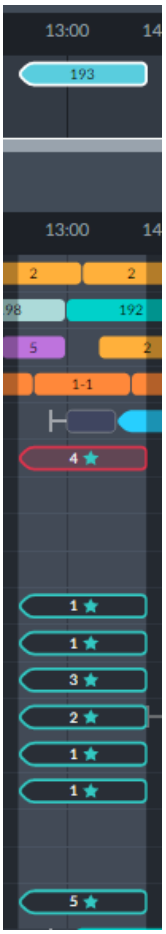
➢ To de-assign a trip to the editing stack:

❁ In the left side of **Figure 9-2**, double click the stack. It will de-assign the trip and move it to the stack:



- **To re-assign a trip from the editing stack:**

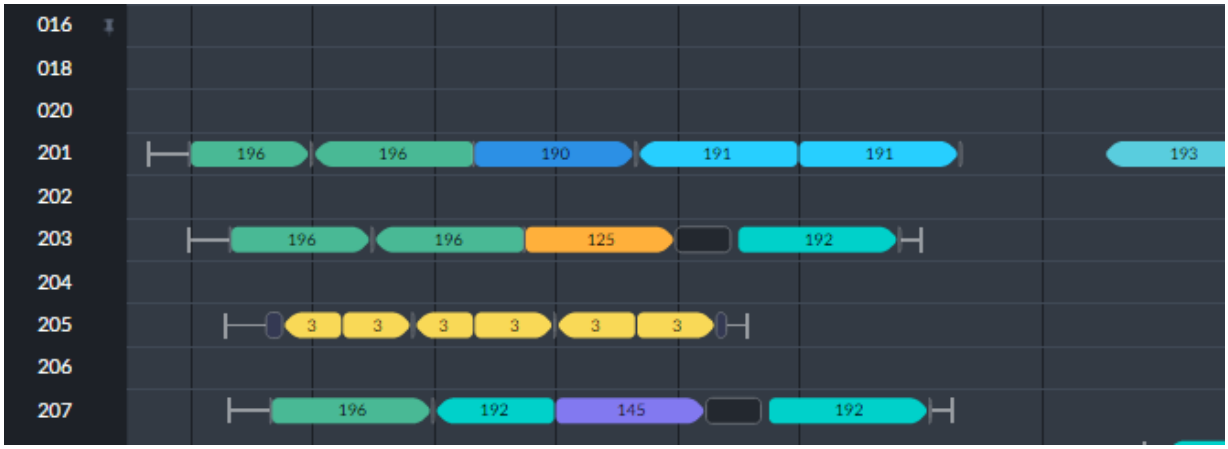
  1. Double click it.
  2. Click the target slot in the eligible trip slots:



3. Click **Assign Vehicles** to commit your changes.

Moving Multiple Trips to Another Duty

Moving multiple trips works the same way as moving a single trip with one difference: Instead of selecting a single trip, you select a range. We demonstrate the method using the following Drivers Gantt segment:

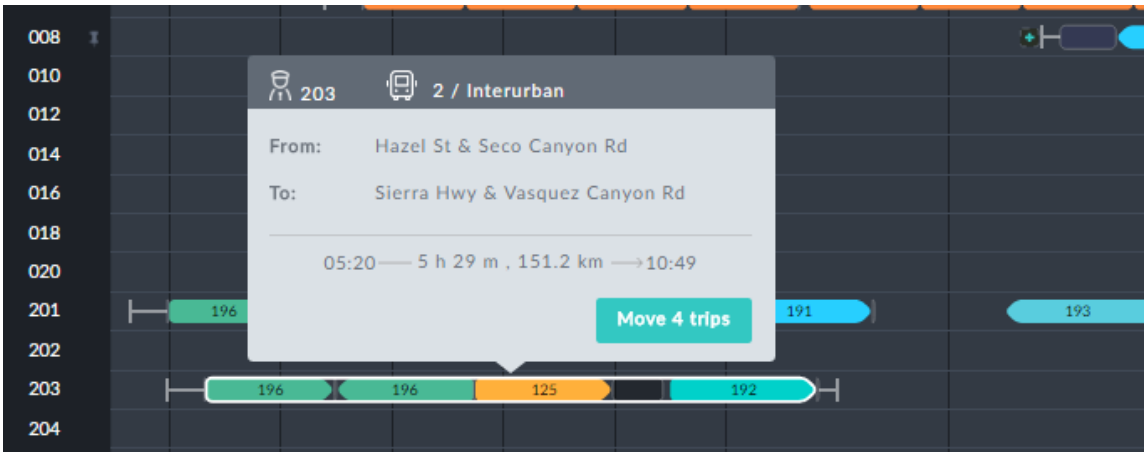


We will move the group of trips shown in driver block 203.

➢ **To move a group of trips:**

1. Click the first trip in block 203.
2. Shift-click the last trip in block 203.

   The information box confirms your selection:



3. Click the green **Move** button.

   The time range is highlighted and available slots are shown in the same manner as for moving a single trip.

4. Proceed in the same manner as for a single trip.

Note

This method can only be used for blocks of contiguous trips.

Tip

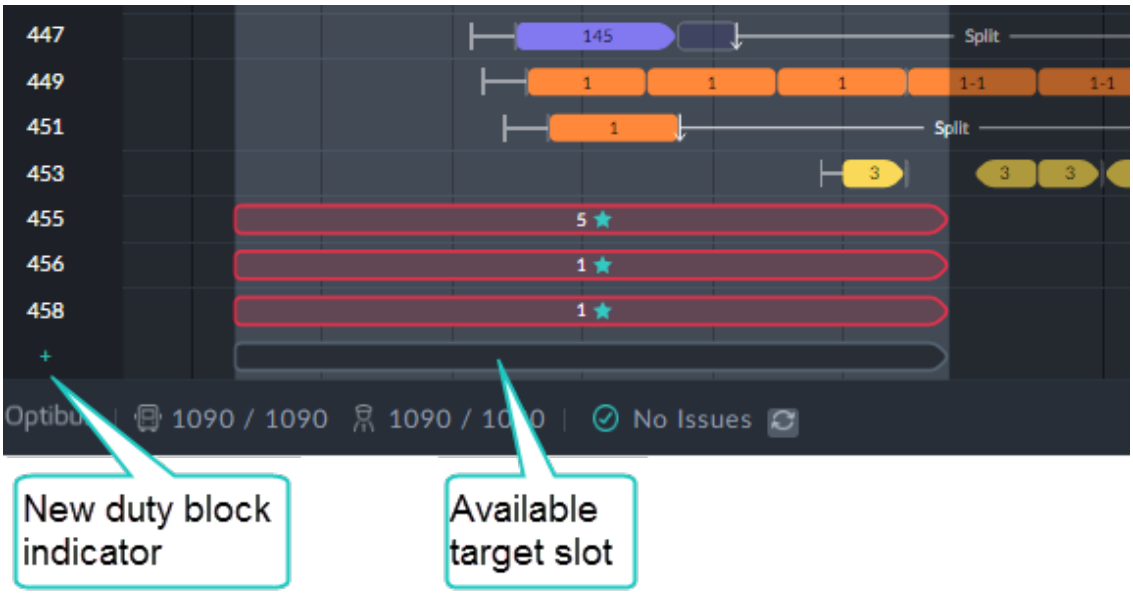
Moving multiple trips is a useful device for "cutting" a block of drips and using them to create a new duty. See **Moving Trips to a New Duty**.

Moving Trips to a New Duty

We will use the example from **Moving Multiple Trips to Another Duty** to create a new duty.

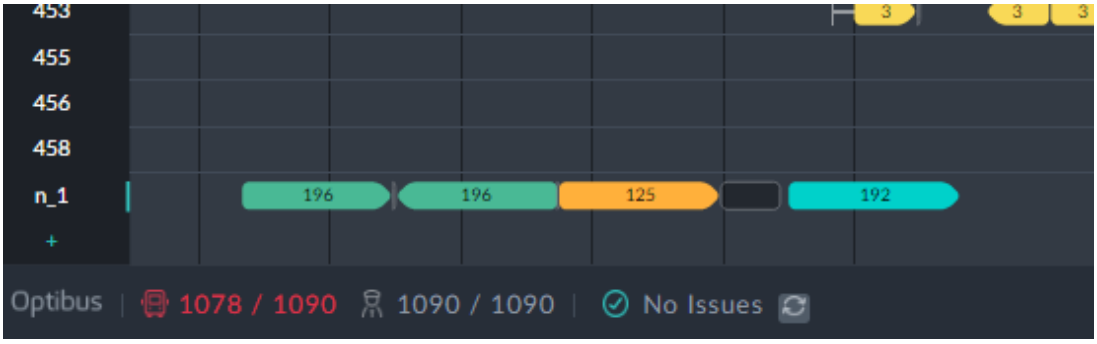
➢ **To create a new duty in the Drivers Gantt:**

1. Scroll down to the bottom of the Drivers Gantt:

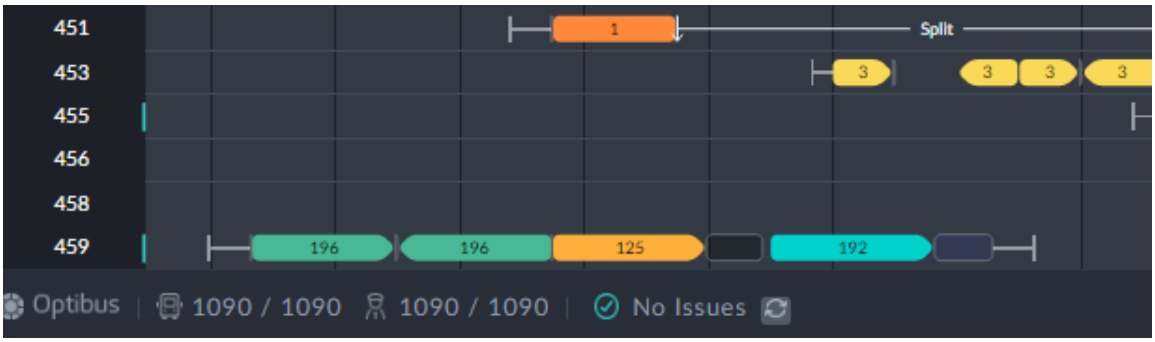


The blue + sign below the last duty (458) is a place-holder for a new duty.

2. Double click the slot in the new duty block. A new duty is generated with a temporary duty ID as shown:



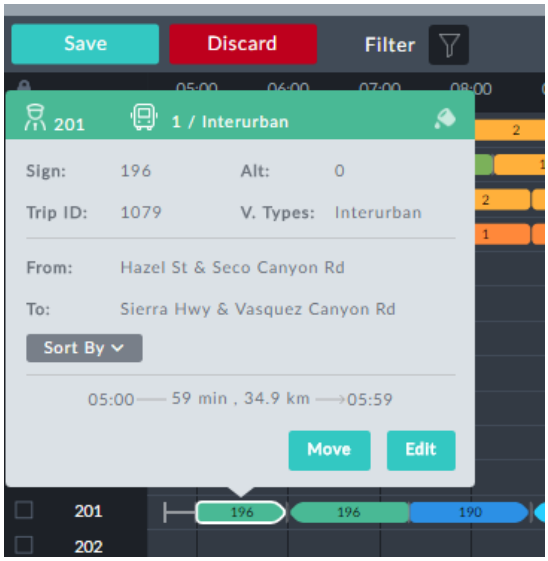
3. Click **Assign Vehicles** to commit your changes. Here is the outcome:



The new duty has been assigned ID 459 as expected. Also duty 455 has been modified as indicated by the change-bars. (No other duties in this schedule were affected.) As expected, an extra vehicle has also been assigned (not shown).

Changing trip times

To illustrate the procedure we will use duty 201 from **Figure 9-1**. The first duty for the day is a trip on sign 196. Here is its information box:



Suppose that it is found that on Sunday morning this trip has a delay of 7 minutes. We will edit this trip to reflect the situation.

➢ To change the trip times:

1. Click **Edit** in the information box:

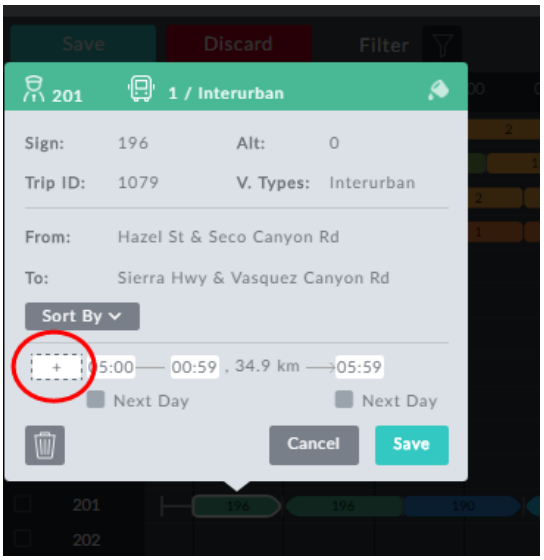
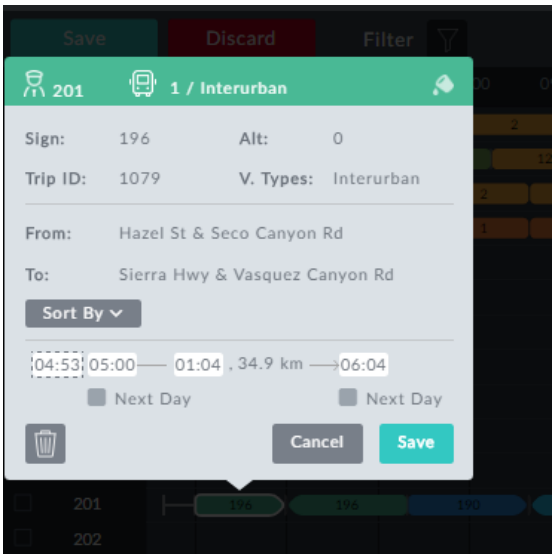


Figure 9-3: Information box ready for editing

All of the time fields are open for editing. In addition, the left hand time field (red circle) allows us to add boarding time to the the trip by entering an earlier time than the shown trip start time.

2. By default it sets itself to the start time of 05:00. Enter 04:53.
3. Also extend the trip length by 5 min by increasing the shown length of 59 min to 64 min:



Note

We could have changed the trip end time to 06:04 and the trip duration would have been updated.

4. Click **Save**.

   In **Figure 9-4** below, observe that in addition to the change-bar, the changed trip element has a black dot indicating that it has been manually changed. Notice also the red exclamation mark at the beginning of the row. It indicates a duty issue , that can be found from the bottom status line. Our edit has caused a warning to be issued as shown by the Duty Issues warning:

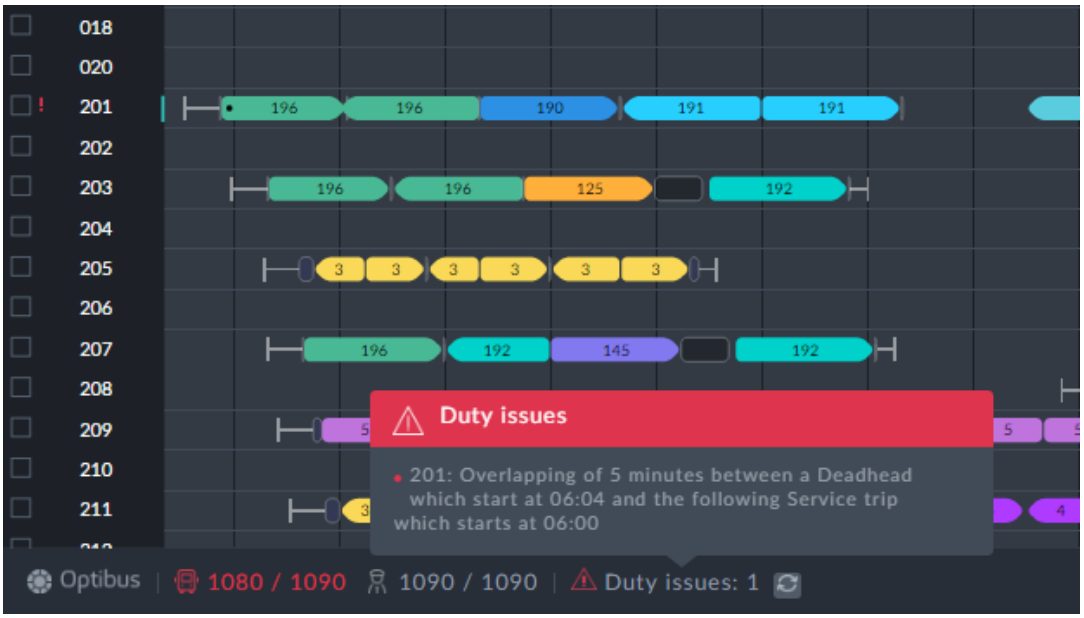


Figure 9-4: Duty Issue caused by the edit

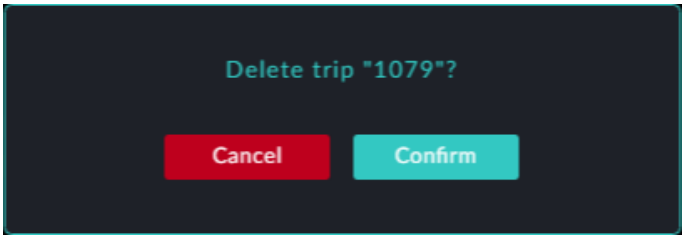
5. Click **Assign Vehicles** to commit your changes.

Deleting a Trip

We will use the same example as in **Changing trip times** (the red-boxed trip in duty 201).

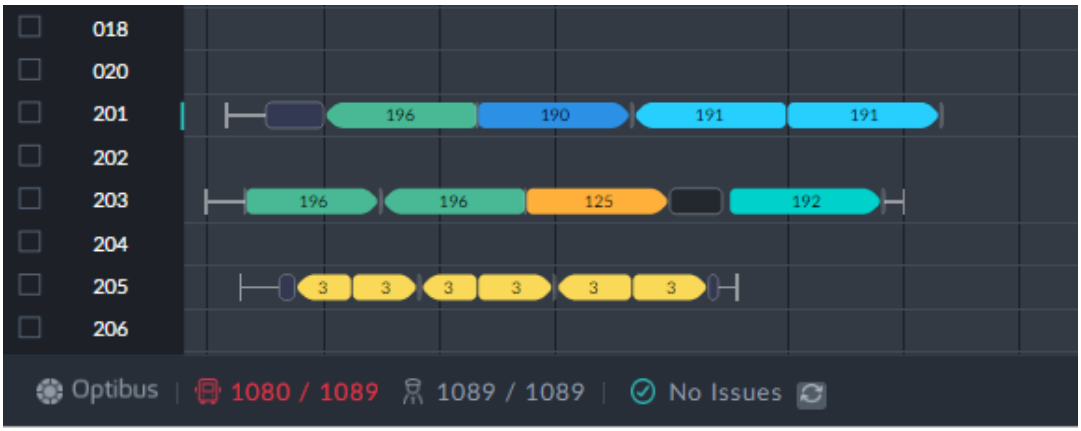
➢ **To delete a trip:**

1. Open the information box for the trip.
2. Click the  button.
3. Click **Save**. You are asked to confirm:



4. Click **Confirm** to accept the deletion.

   The trip is deleted from the Drivers Gantt:



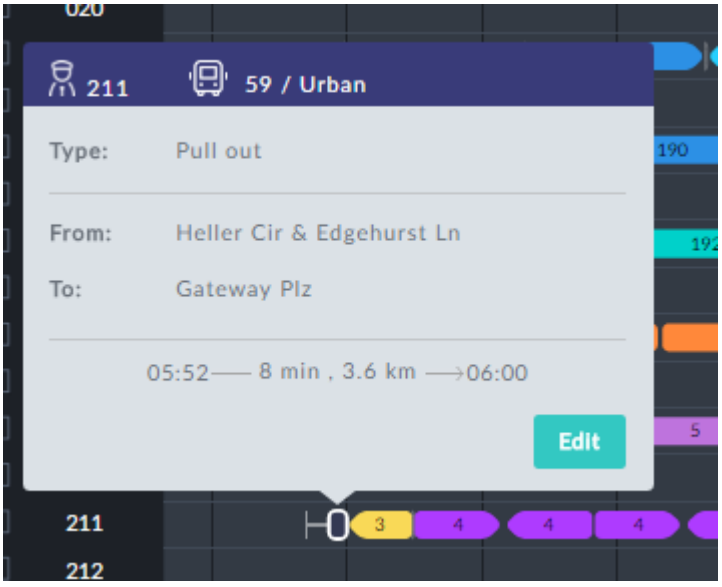
5. Click **Assign Vehicles** to commit your changes.

Changing a Depot Pull out/Pull in

You can change a depot pull in destination or depot pull out origin at the end or beginning of a duty or at he beginning or ending of split break. We use a depot pull out as an example:

➢ **To change the origin of a depot pull out:**

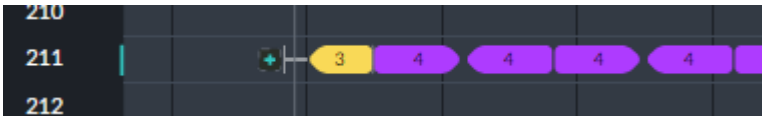
1. Open the information box for the pull out to be changed.



2. Click **Edit**.
3. In the Edit box click  .

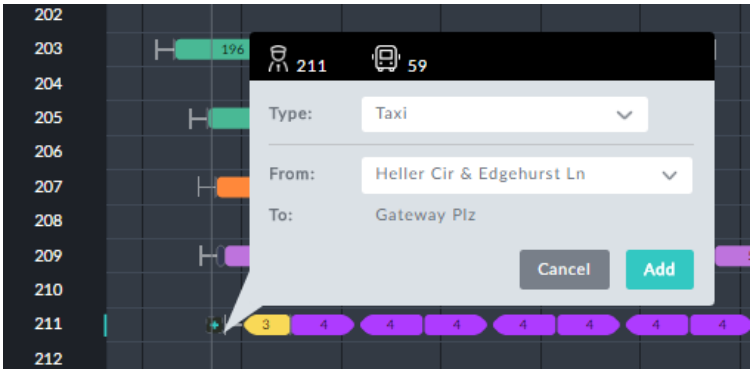
   The pull out is removed from the Drivers Gantt.

4. Mouse-over the pre trip or the first trip of duty 211:

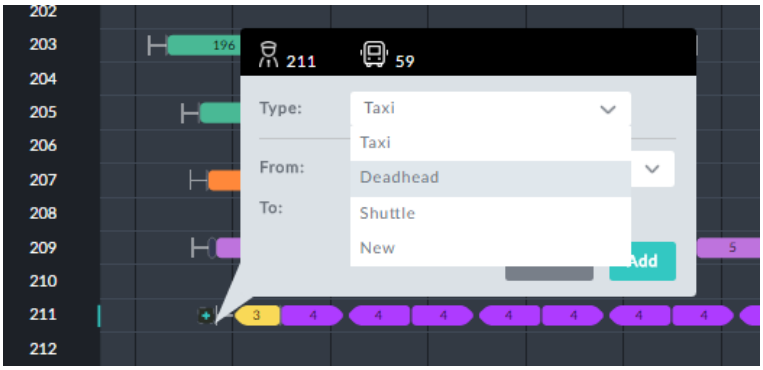


Notice the small blue + sign before the duty.

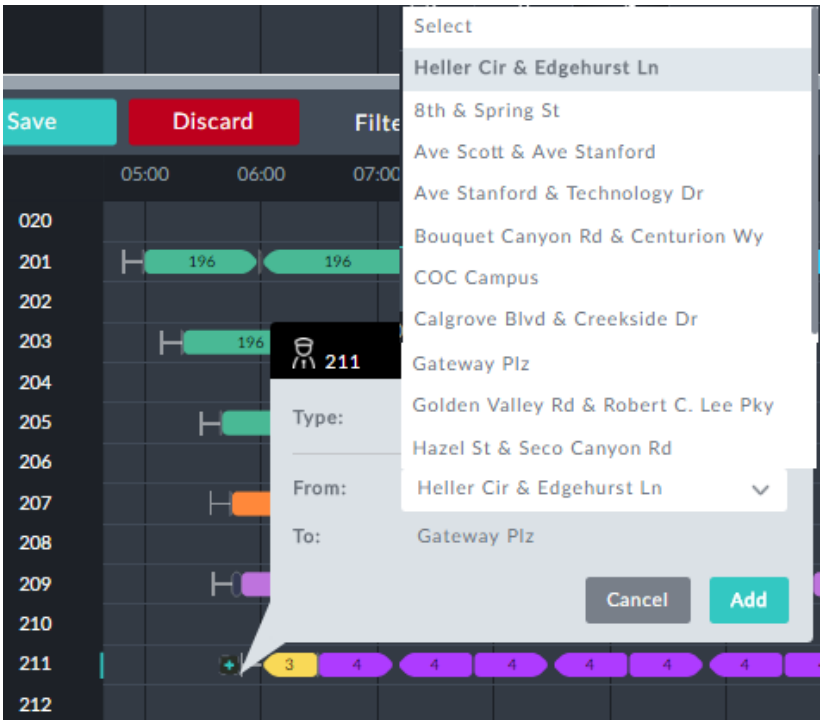
5. Click the + sign. The following dialog opens:



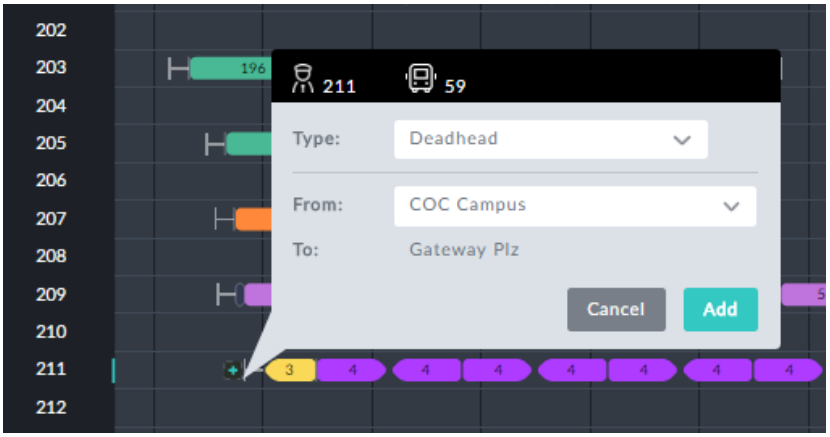
6. Click the **Type** field. A drop down list of available types opens:



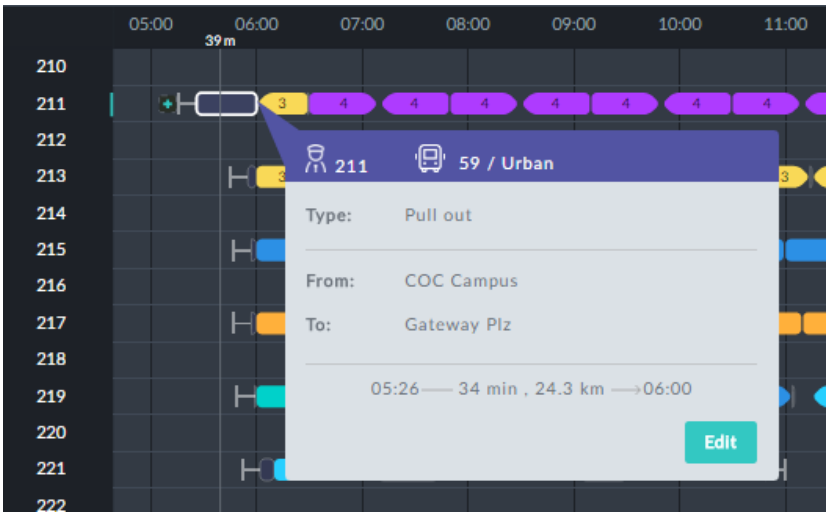
7. Choose Deadhead and then click the **From**: field:



8. Choose COC Campus.



9. Click Add. The Pull out is added:

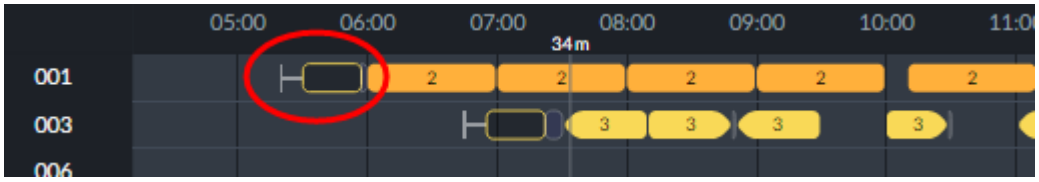


10. Click **Assign Vehicles** to commit your changes.

> **Note** The same method is applicable to pull ins, pull ins before a split break and pull outs after a split break.

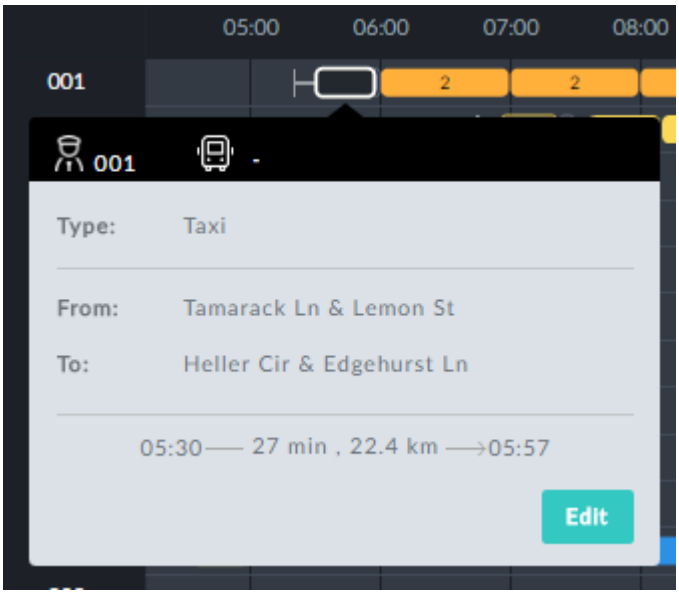
Adding and Removing a Taxi

A taxi can be added to the beginning and end of a duty and the beginning and end of a split break. In the following example, we remove a Taxi (circled)from the beginning of duty 1:

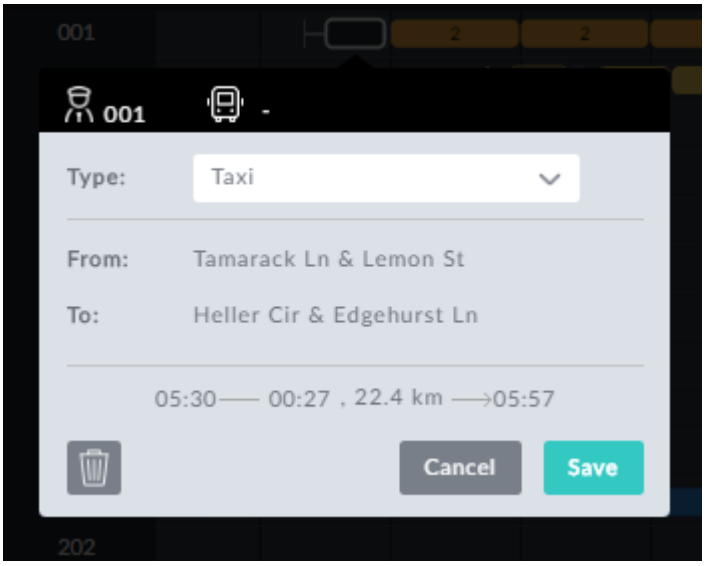


➢ **To remove a taxi:**

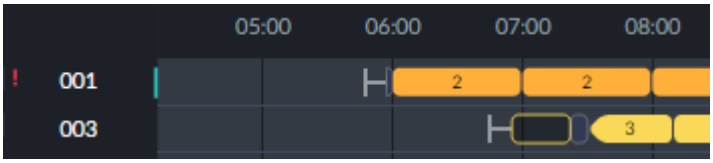
1. Click it to display its information box:



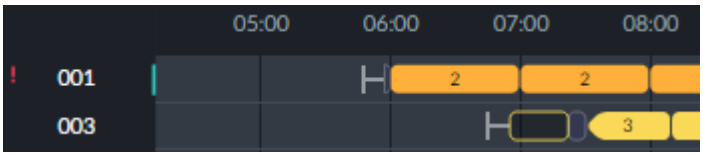
2. Click **Edit**.



3. Click  . The taxi has been removed:



4. Click **Assign Vehicles**. Here is the Gantt segment:



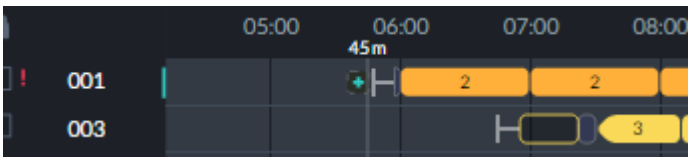
Note

The red exclamation mark indicates a Duties issue. The reason for it is that we removed a taxi that was allocated during the optimization. In doin g so, we “violated” the schedule preferences by removing it.

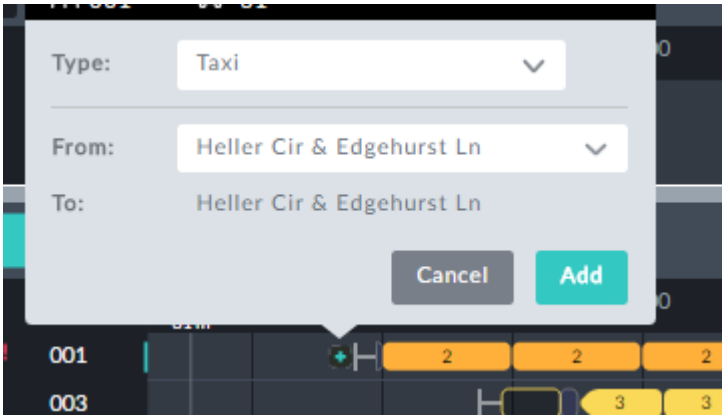
We next reverse the process and show how to add a taxi. We will add a taxi to the beginning of duty 1.

To add a taxi:

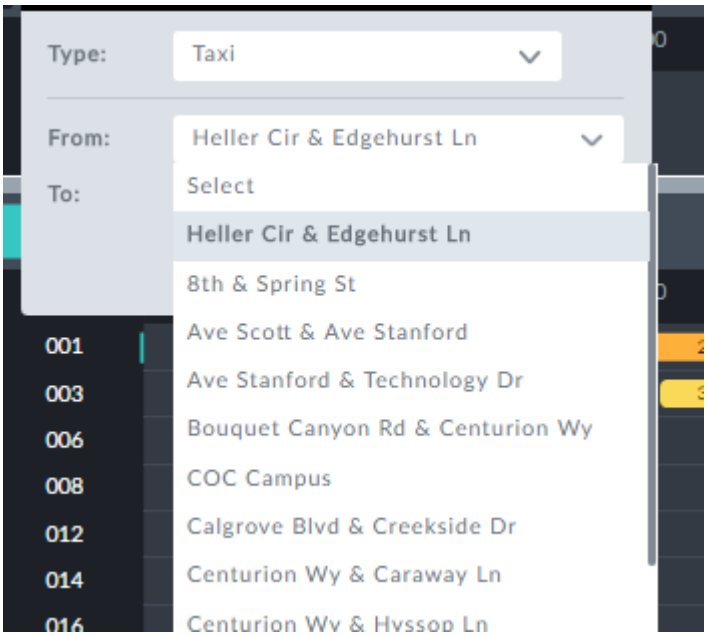
1. Mouse over the beginning of duty - the Sign on or first trip. You will see a little blue + sign:



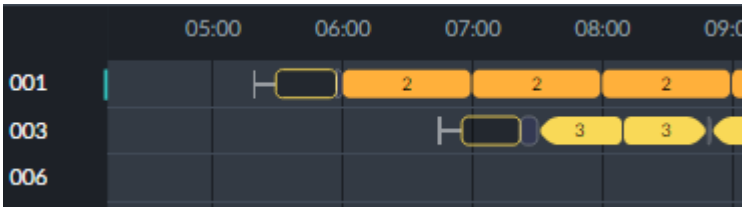
2. Click it. The following dialog opens:



3. Leave **Type**: as is. **From**: opens a drop-down list of origins.



4. Choose COC Campus and click **Add**. The taxi is added:



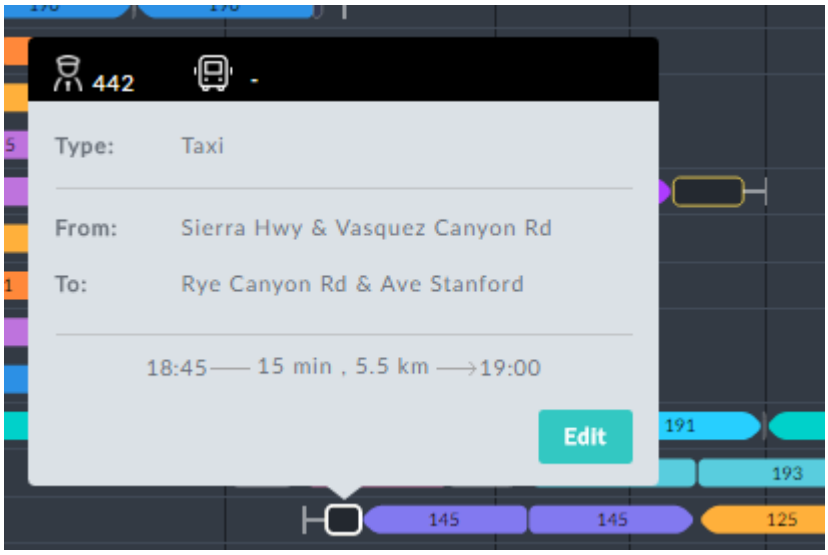
5. Click **Assign Vehicles** to commit your changes.

Replacing a Taxi with a Deadhead

It may be possible to replace a taxi with a deadhead:

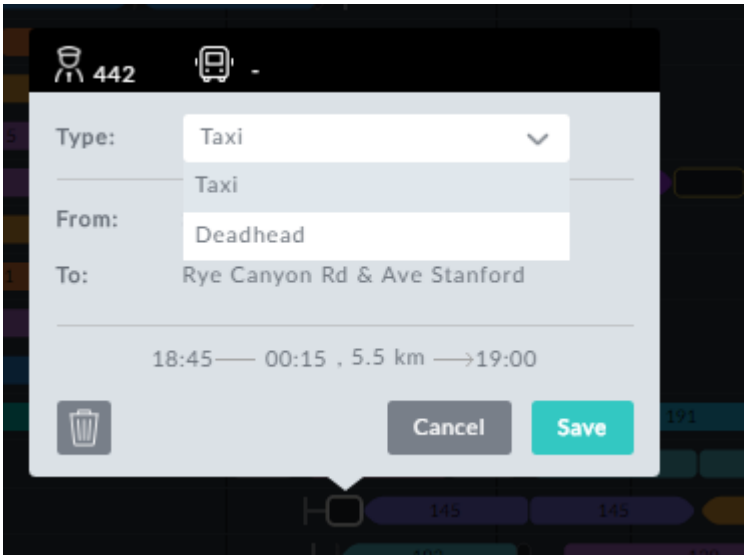
- A pull out at the beginning of a duty
- A pull in at the end of a duty

Here is an example:

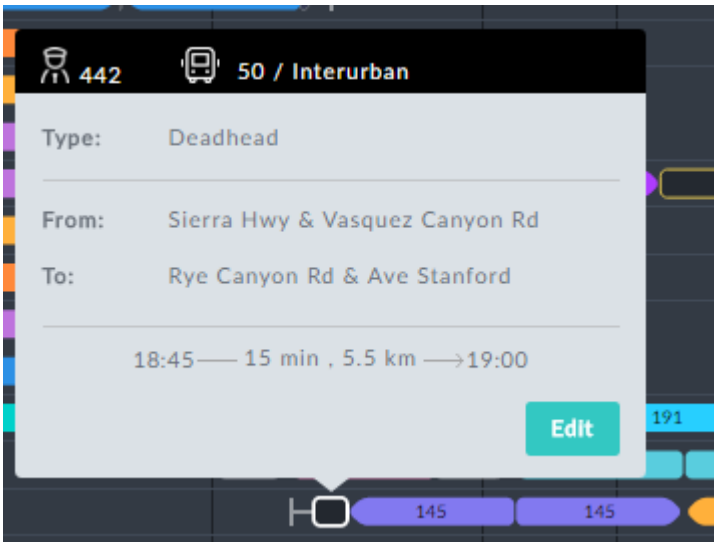


➢ **To replace a taxi with a deadhead at the beginning or end of a duty:**

1. Open its information box, as above.
2. Click Edit.

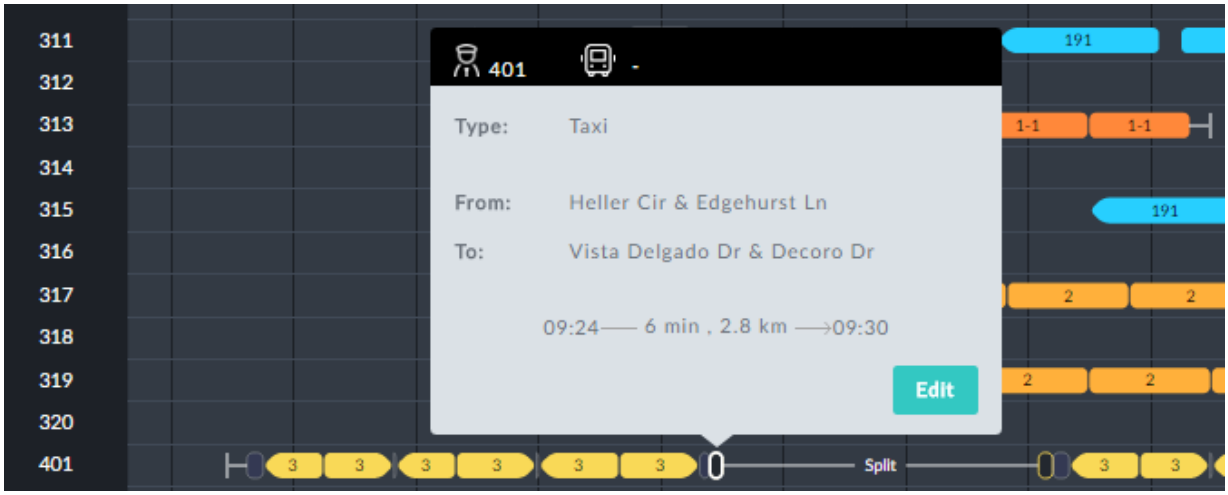


3. Change Taxi to Deadhead. Here is the result:



4. Click **Assign Vehicles** to commit your changes.

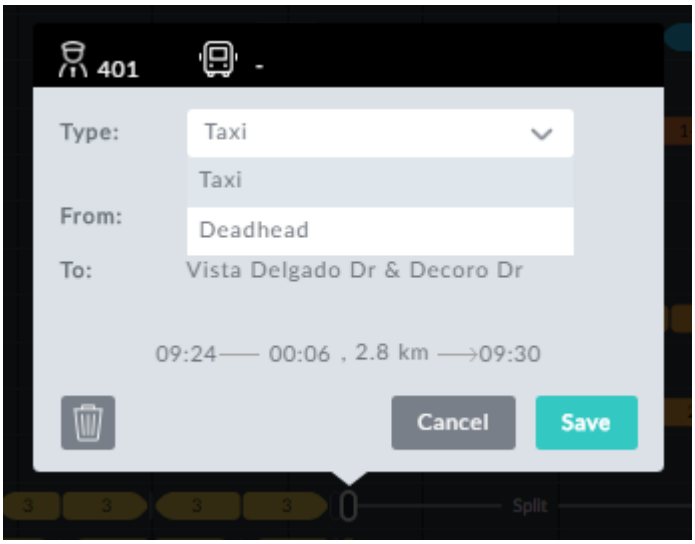
The situation at the beginning or end of a split break is similar. Here is an example:



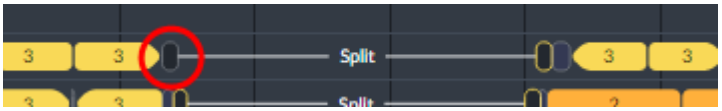
Notice that the indicated taxi follows a pull in.

➢ **To replace a taxi with a deadhead at the beginning or end of a duty:**

1. Open its information box, as above.
2. Click Edit.



3. Change Taxi to Deadhead. Here is the result:



The taxi and the pull in have coalesced into a single pull in deadhead (circled).

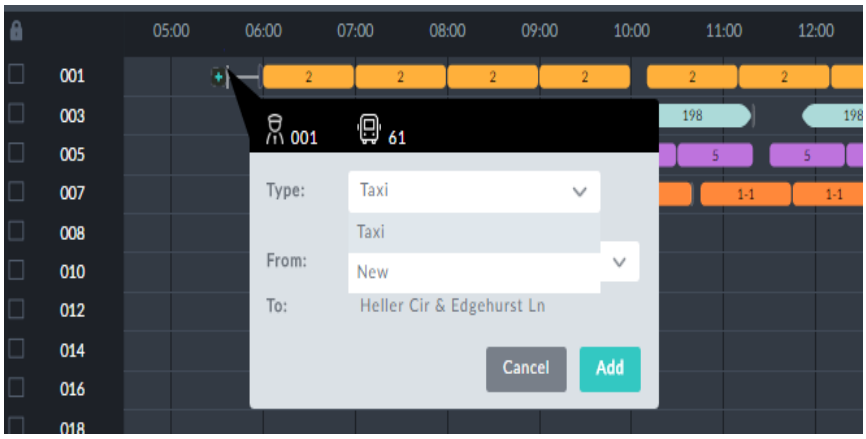
4. Click **Assign Vehicles** to commit your changes.

Custom Types and Elements

You can create and use custom elements for the Drivers Gantt.

A custom element can be created / added anywhere on the Drivers Gantt where a mouse-over open the little blue + sign.

- They occur at the beginning or end of a trip. Clicking one of them opens its information box:



- They also occur in any un-assigned gap between trips. Again we show an example with its information box open:

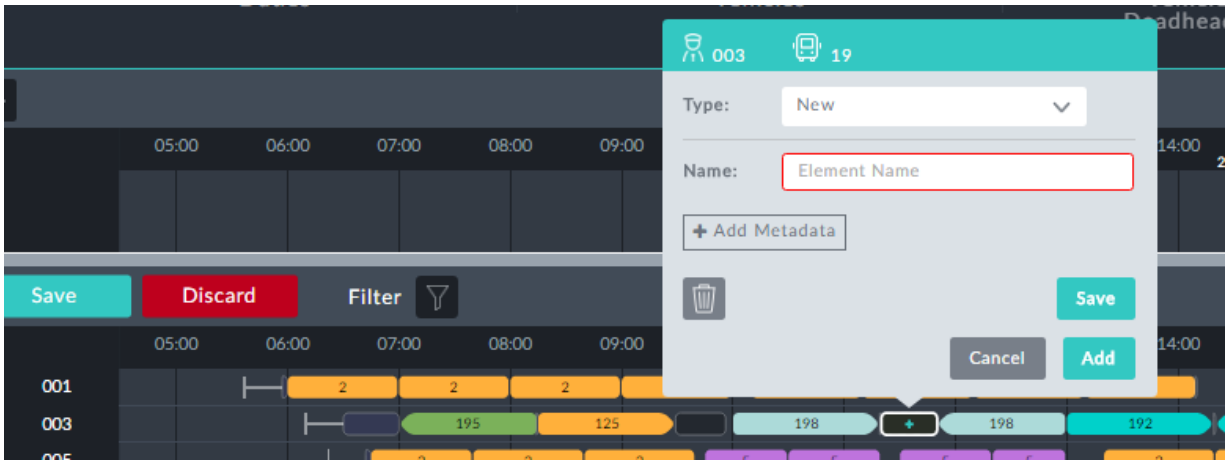


Figure 9-5: Creating a custom element in an un-assigned gap

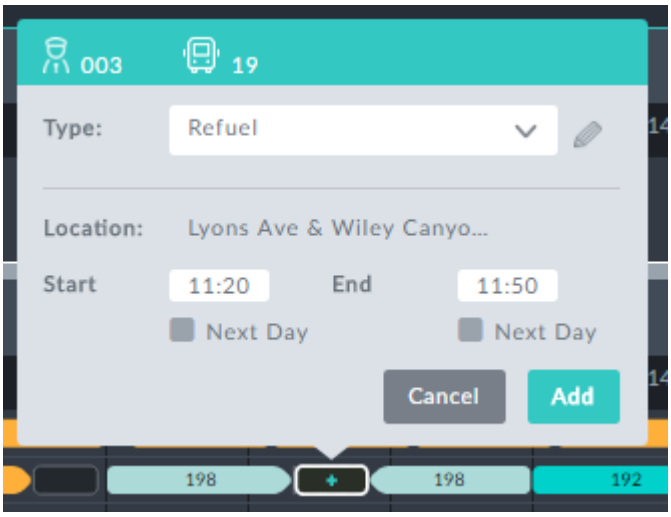
By way of illustration, we will use the second example to create several new element types, "Refuel" and "Standby". We then use the Refueling element type to create a refueling break.

➢ To create and use several new elements:

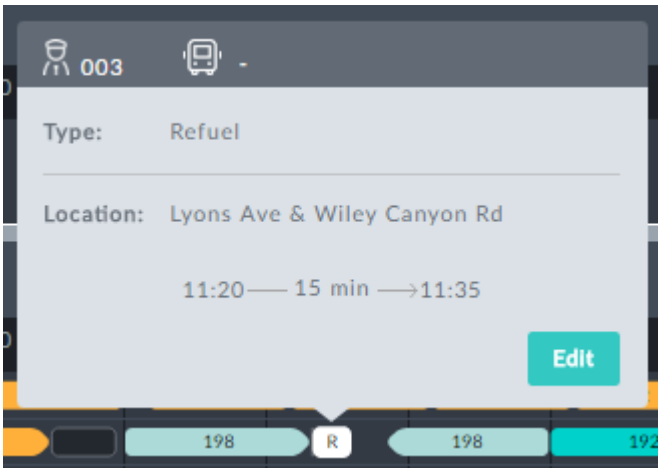
1. Mouse-over a gap between two trips and click as in **Figure 9-5**. The information box opens as shown.

> **Note**
>
> If there are already custom types in the schedule, you may see one of them instead of *New* in the **Type** field. Click it to open a drop list of available types. *New* will appear at the bottom of the list. Select *New* and continue to the next step.

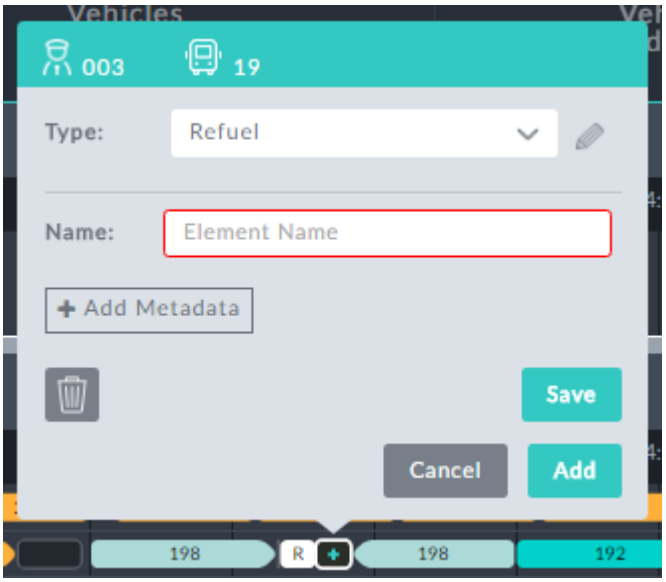
2. In the **Name** field, enter the name of the new element and click **Save**. The new type is saved and an information box is opened:



3. You can modify the times here - you do not have to assign the whole gap. Set the **End** field to 11: 35
4. Click **Add**. Here is the result, with the information box opened:



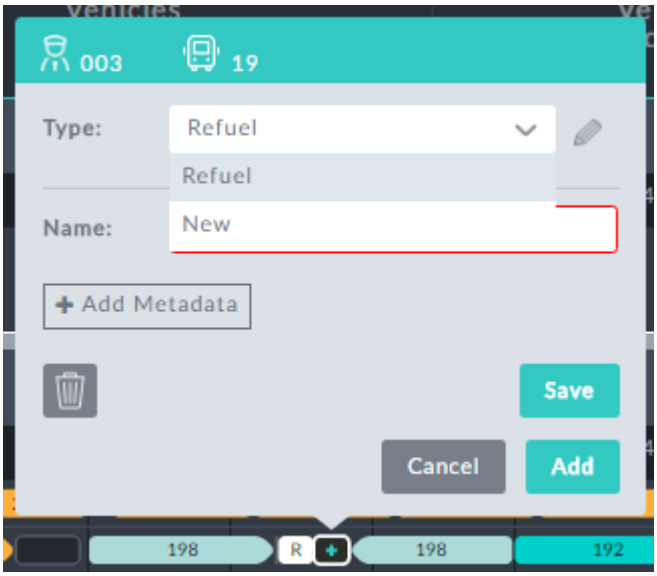
5. Mouse-over the remaining part of the gap and click it. The following dialog opens:



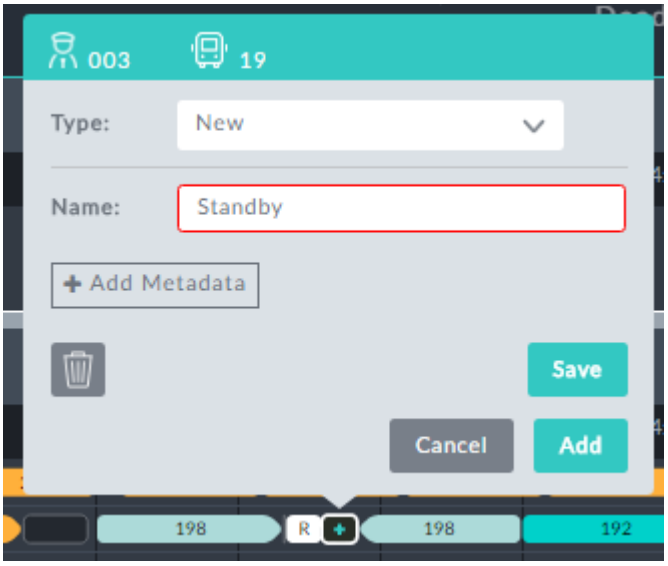
Adding Metadata is for use in conjunction with Optibus Professional Services.

We will turn this into a new Standby type.

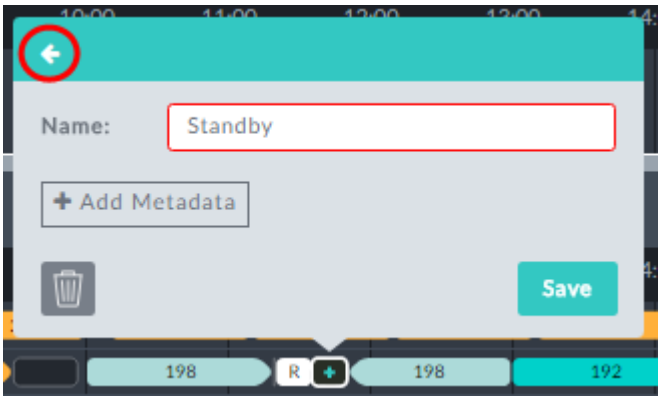
6. Open the Type drop down list:



7. Choose **New**.
8. In the **Name** field, enter "Standby":



9. Click **Save**.
10. Save saves the new type. Add saves the type and adds a new element of the new type to the Drivers Gantt.
11. If you see this,

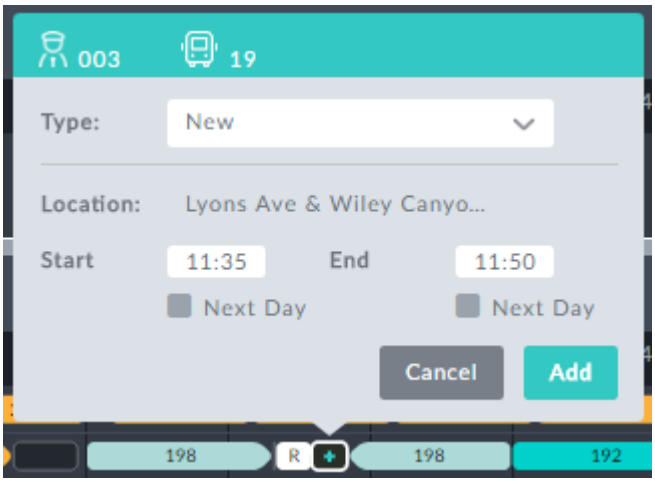


click the circled arrow.

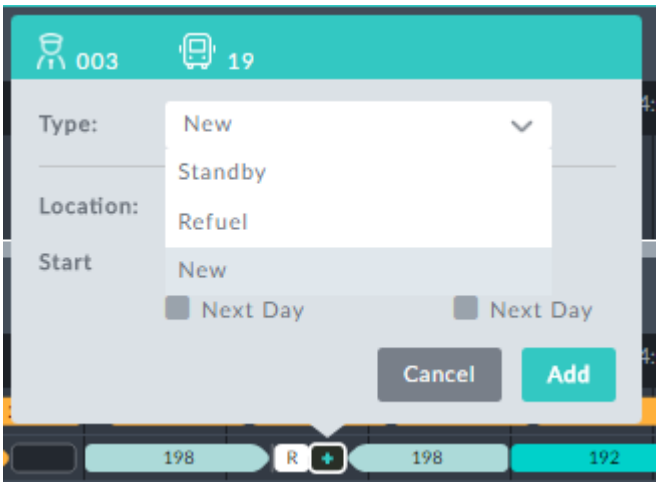
Note

You can use this box to rename the type to something else, for example, "Standby (special)". Clicking **Save** commits the change for this case and takes you to the next step.

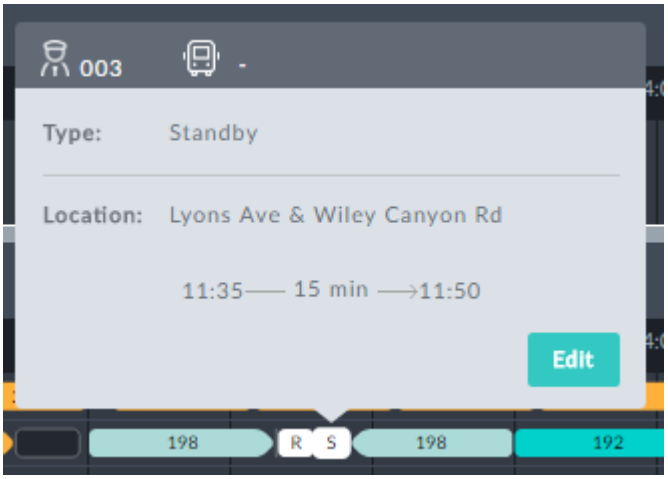
An editable information box for the reming part of the gap is displayed:



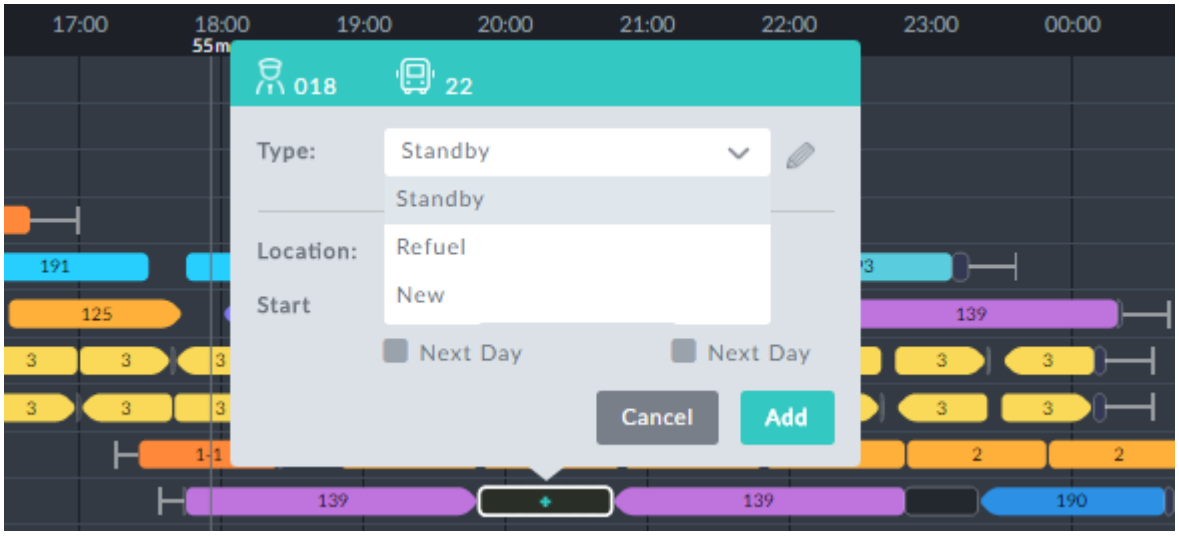
12. Open the **Type** drop down and chose Standby:



13. Click **Add**. Here is the outcome (with the information box opened):



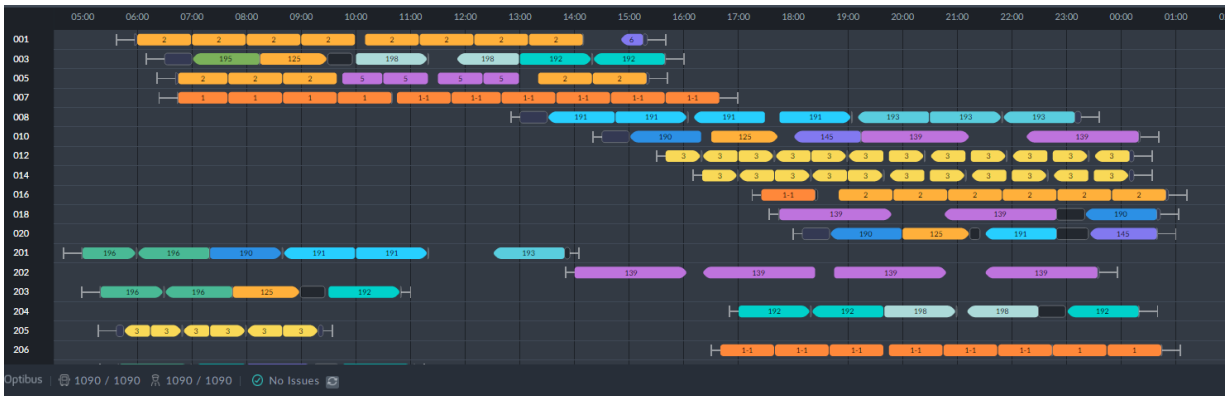
At any point the two new elements, "Refuel" and "Standby" are available. Mouseing-over any other gap and opening its information box shows something similar to this:



Proceed as above to add custom elements to the gap.

Block level editing

We will use the following Drivers Gantt segment (opened for editing), for illustration:



For driver 201, click the block to display its information box:

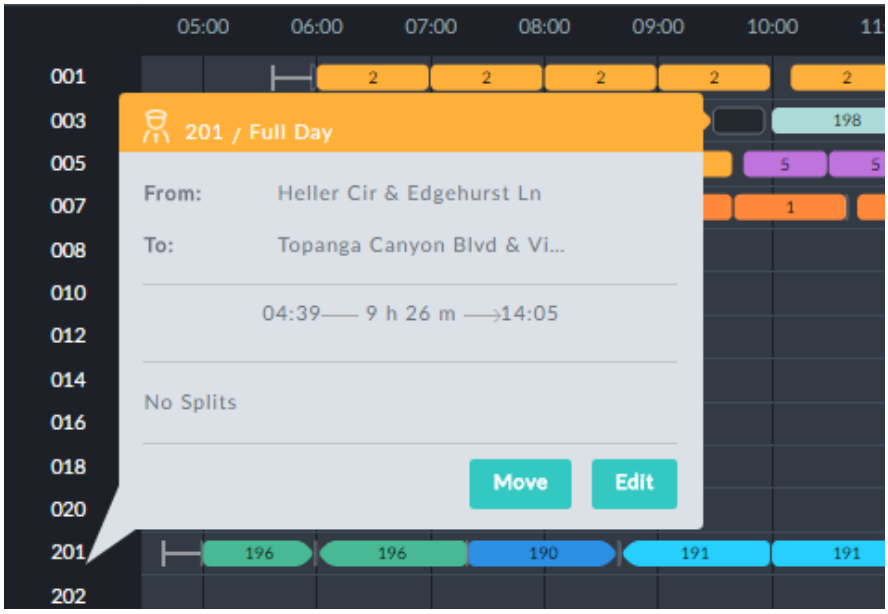


Figure 9-6: Editing or moving a Driver block

Click **Edit** to open it for editing:

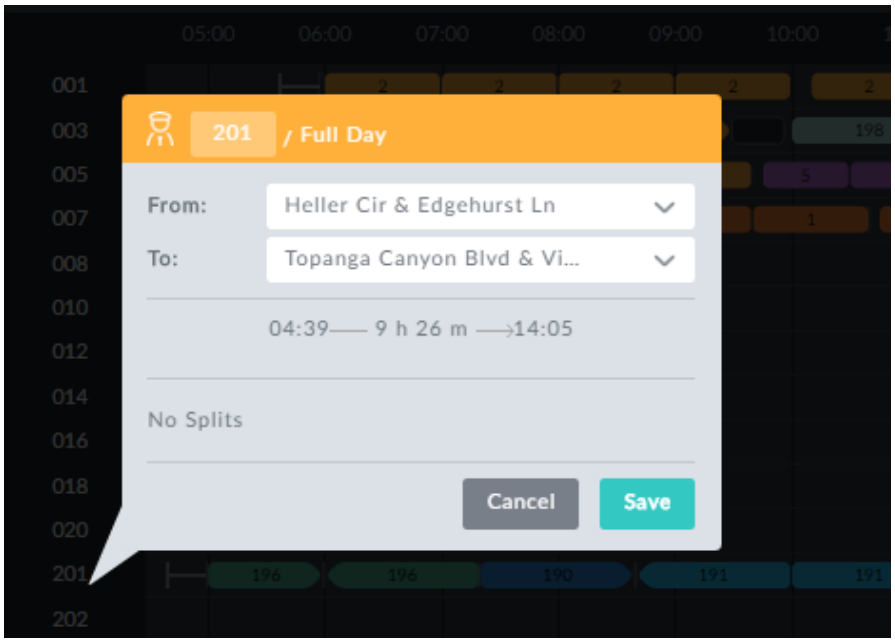
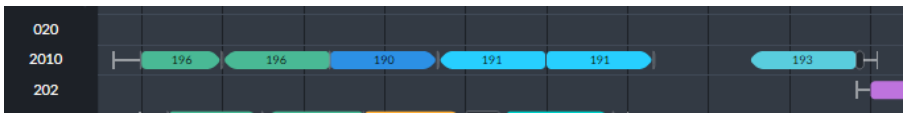


Figure 9-7: Editing Driver block parameters

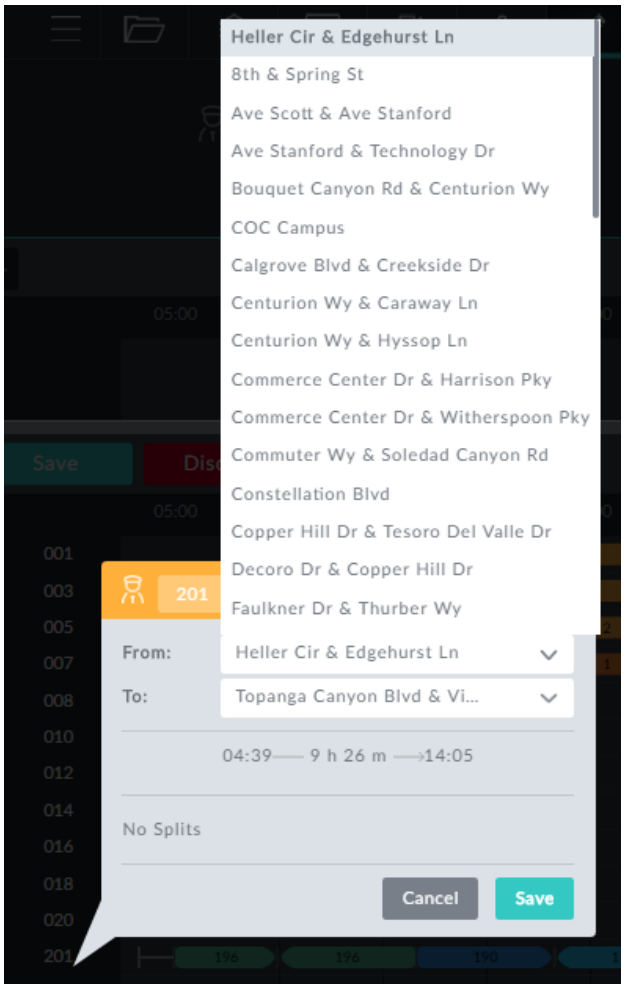
Changing a Duty ID

In **Figure 9-7**, change the driver ID 20 2010 and save:



Changing Duty Start/End stops

The **From**: and **To:** fields are drop-down lists of eligible duty start and finish stops. Here for example is the **From** field:



Moving a block up or down

In **Figure 9-6** click **Move**. A horizontal blue cursor line is displayed:

Moving the mouse up or down drags the cursor line. Drag it to between 203 an 204:

A double click effects the change:

Note

Moving a driver block is a convenient way of moving it to a convenient position on the screen. There is **no** need to click **Assign Vehicles**.

Vehicles Gantt Interactive Editing

What can be edited

- Trips can start and end times may be edited
- Trips may be removed
- Vehicle block information boxes offer editable fields: Vehicle ID and vehicle type

Changing trip times

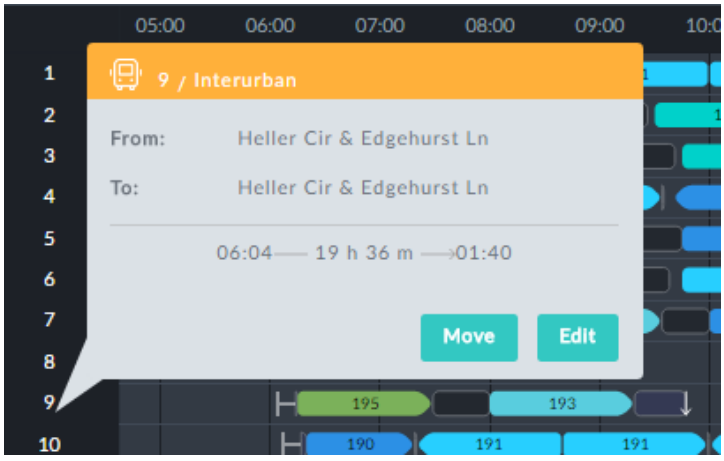
The method is the same as for changing Driver trip times. See Drivers Gantt: **Changing trip times**.

Deleting a trip

Deleting a trip is the same as for deleting a Driver trip. See Drivers Gantt: **Deleting a Trip**

Block level editing

In the Vehicles Gantt, clicking a Vehicle block number opens the bock information box:



To open it for editing, click **Edit**:

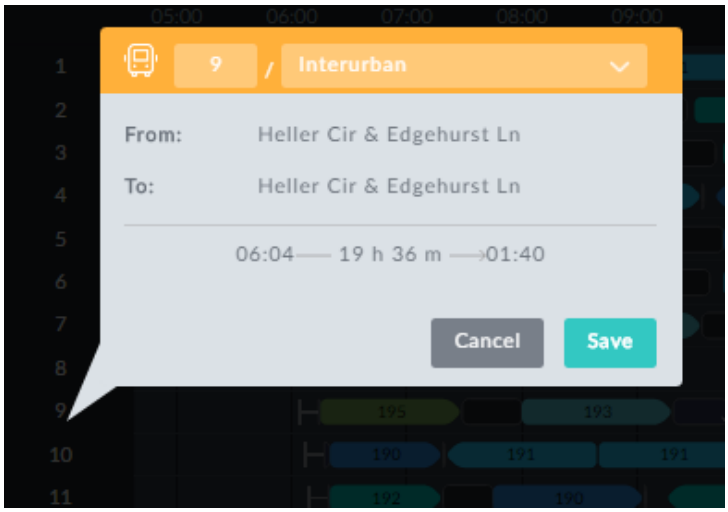


Figure 9-8: Editing Vehicle block information box

Changing a Vehicle ID

In **Figure 9-8**, you can change the Vehicle ID. You will be prevented from entering an ID already in use. In this example, you could enter something like 9a.

Changing a Vehicle Type

Here you are offered a choice of Vehicle Types from those defined in the schedule.

Moving a block up or down

This feature works the same way as it does for Driver blocks. See Drivers Gantt: **Block level editing**

Using a Vehicles-only Schedule

What can be edited

- Trips can start and end times may be edited
- Trips may be removed
- Pull out/pull in: Depot pull out origin and pull in destination can only be removed and replaced
- Vehicle block information boxes offer editable fields: Vehicle ID and vehicle type

Moving on or more trips to another Vehicle

The method is the same as used in Drivers Gantt: **Moving a single trip** and **Moving Multiple Trips to Another Duty**.

Changing trip times

Click a trip element for editing.

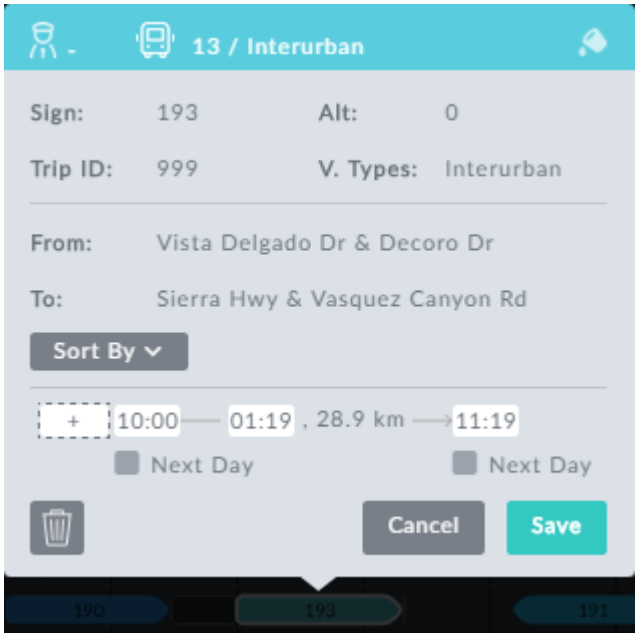


Figure 9-9: Editing a vehicle through its information box

Otherwise, changing trip start/end times works the same way as it does for Drivers Gant, **Changing trip times**.

Deleting a trip

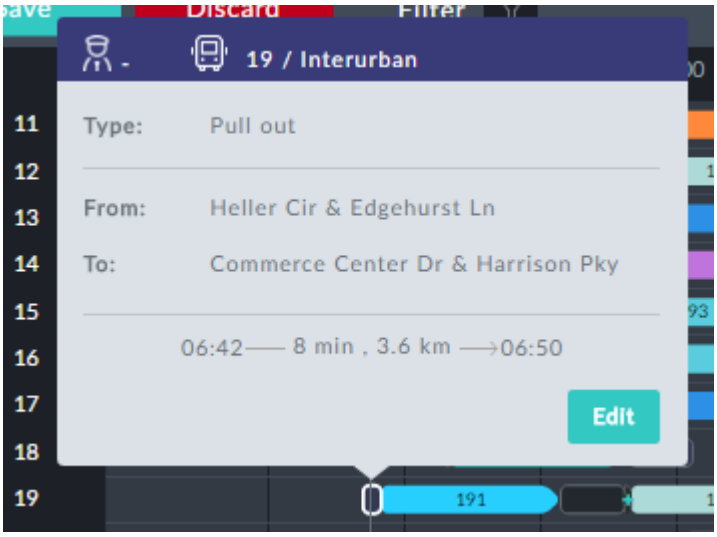
Deleting a trip works the same way as it does for Drivers Gant, **Changing trip times**.

Changing a Depot Pull out/Pull in

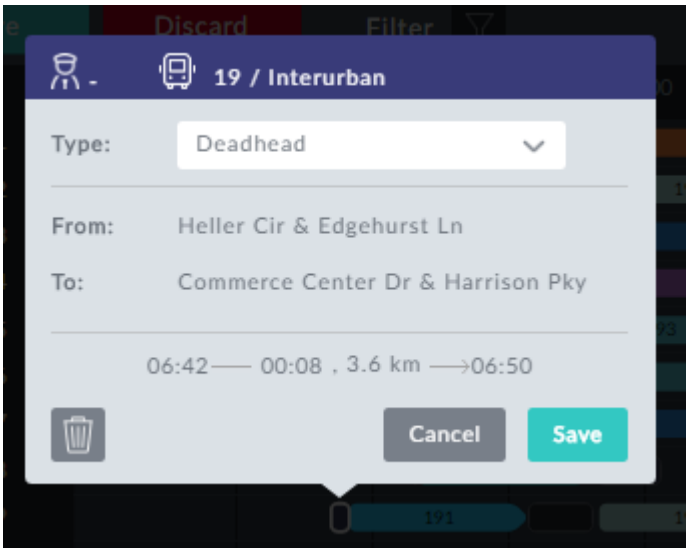
You can only delete these elements and replace them:

➢ **To delete a pull out:**

1. Open its information box:

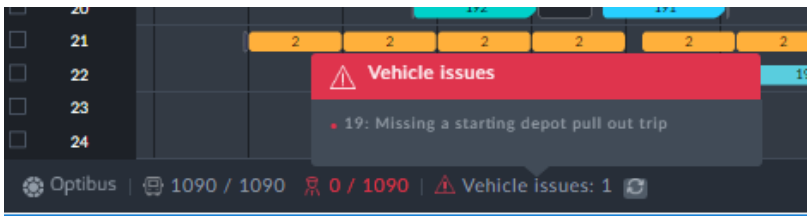


2. Click **Edit**.



3. Click the  button. The pull out is deleted.

This will result in a Vehicle issue warning:



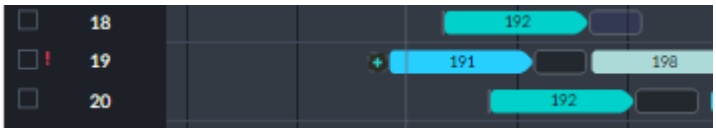
You should add back missing pull outs and pull ins..


Note

A pull out or pull in can only be added where one was previously deleted.

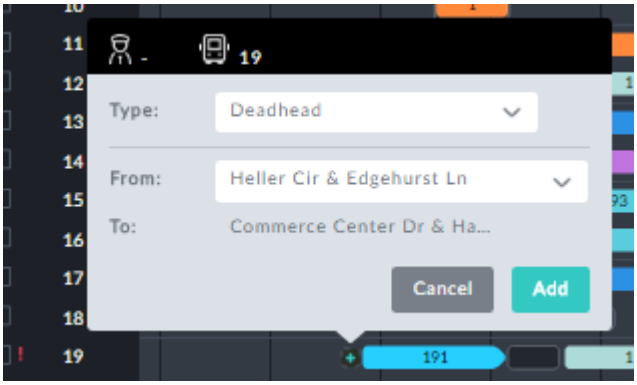
➢ **To add a pull out:**

1. Locate the block with the missing pull out.



It will show a red exclamtion mark to the left and a small blue plus sign when you mous-over the beginning of the trip.

2. Click the plus sign. An information box opens:



3. Click **Add**. The pull out is re-instated.

Custom Types and Elements

Adding custom types and elements works the same way as it does for Drivers Gantt, **Custom Types and Elements**

Block level editing

Block level editing works the same way as it does for Drivers Gant, **Changing trip times**.

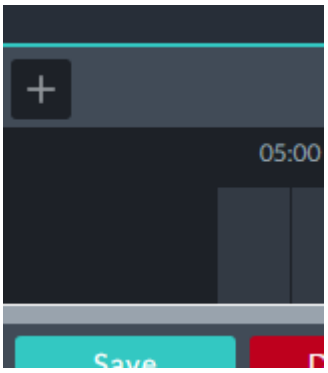
Using Add Trip

Add Trip is available from the top of the Gantt display. To demonstrate the use of this feature, we start out with a segment of the Vehicles Gantt from the schedule we have used throughout this manual:

We will add an inter-urban trip for sign 192 at 10:35.

➢ To add a trip:

1. Click the plus sign button at the top left of the Stack area:



It opens up the following dialog:

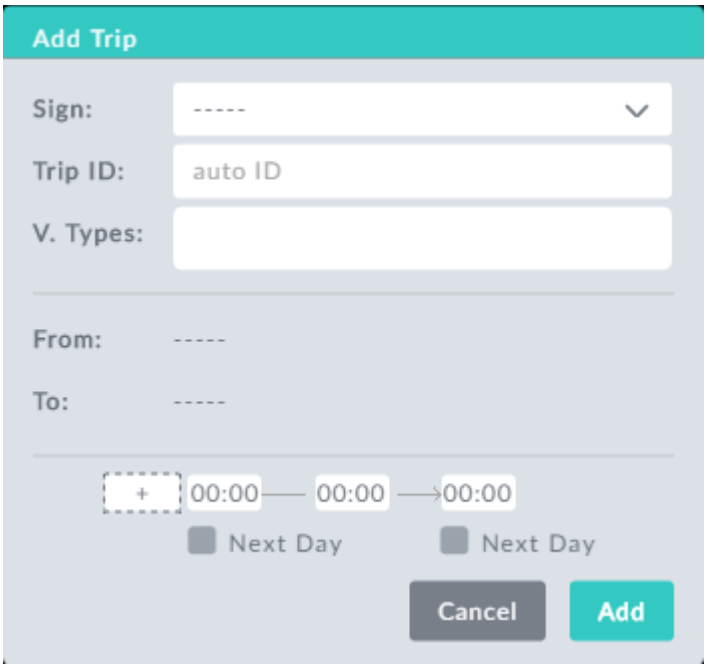
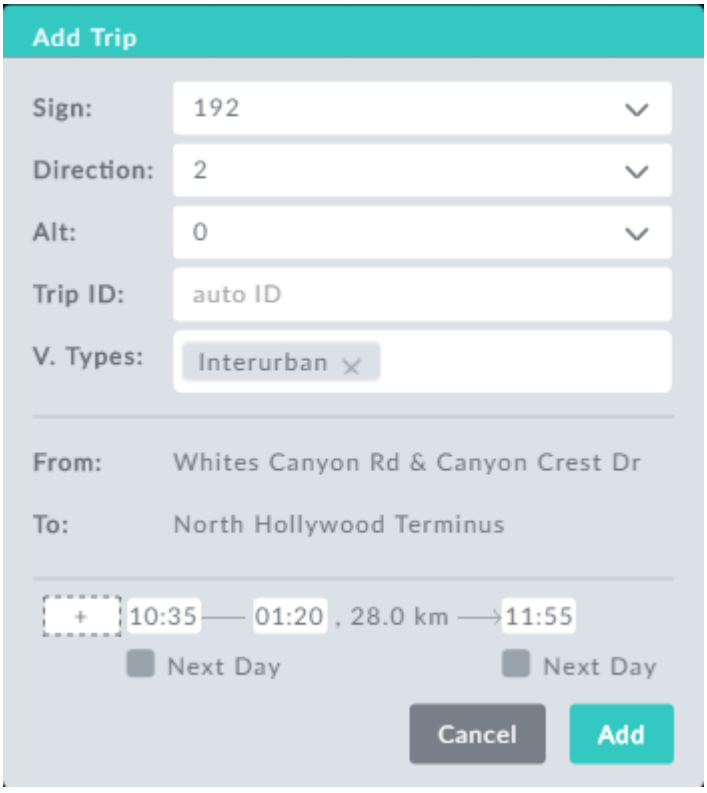
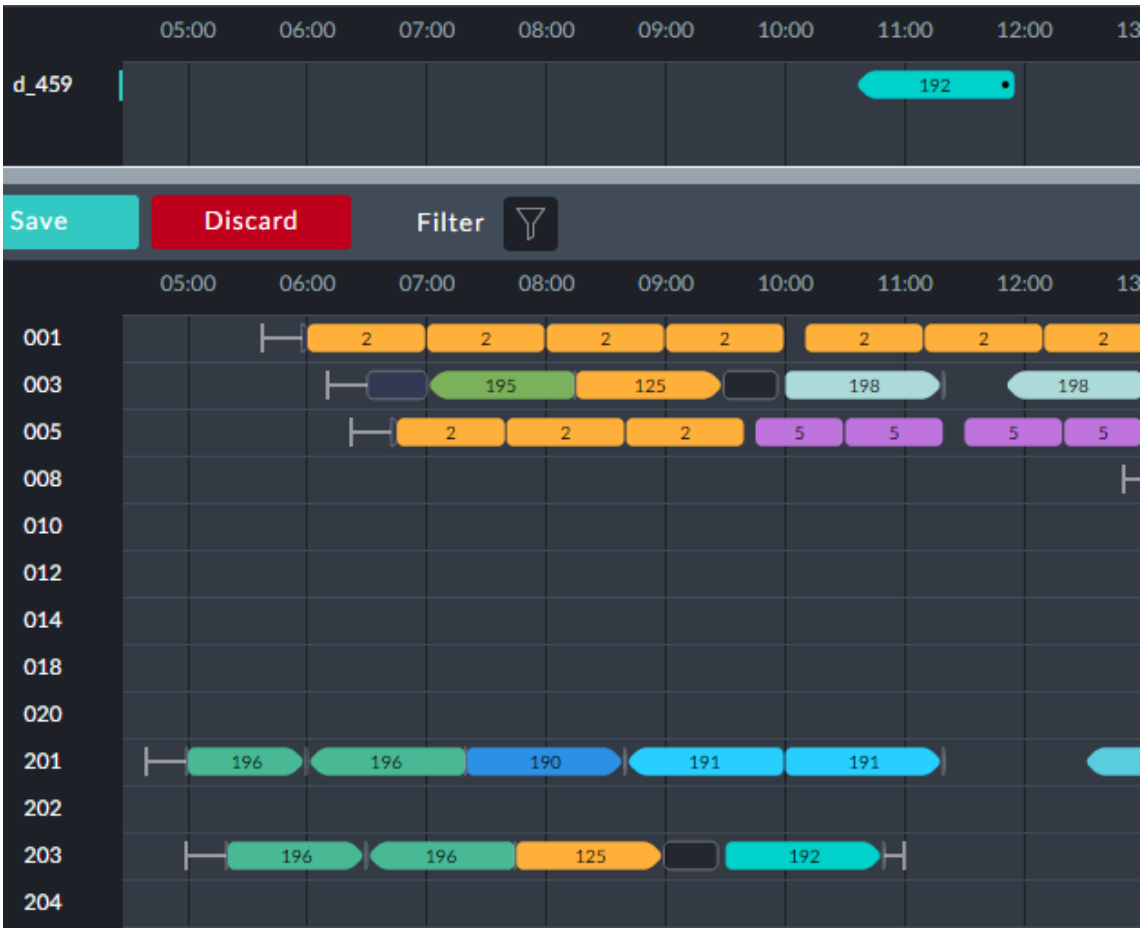


Figure 9-10: Add Trip dialog

2. Fill out the dialog, setting the direction, start time and trip duration.



3. Click **Add**: The new trip in the editing stack ready for assignment:



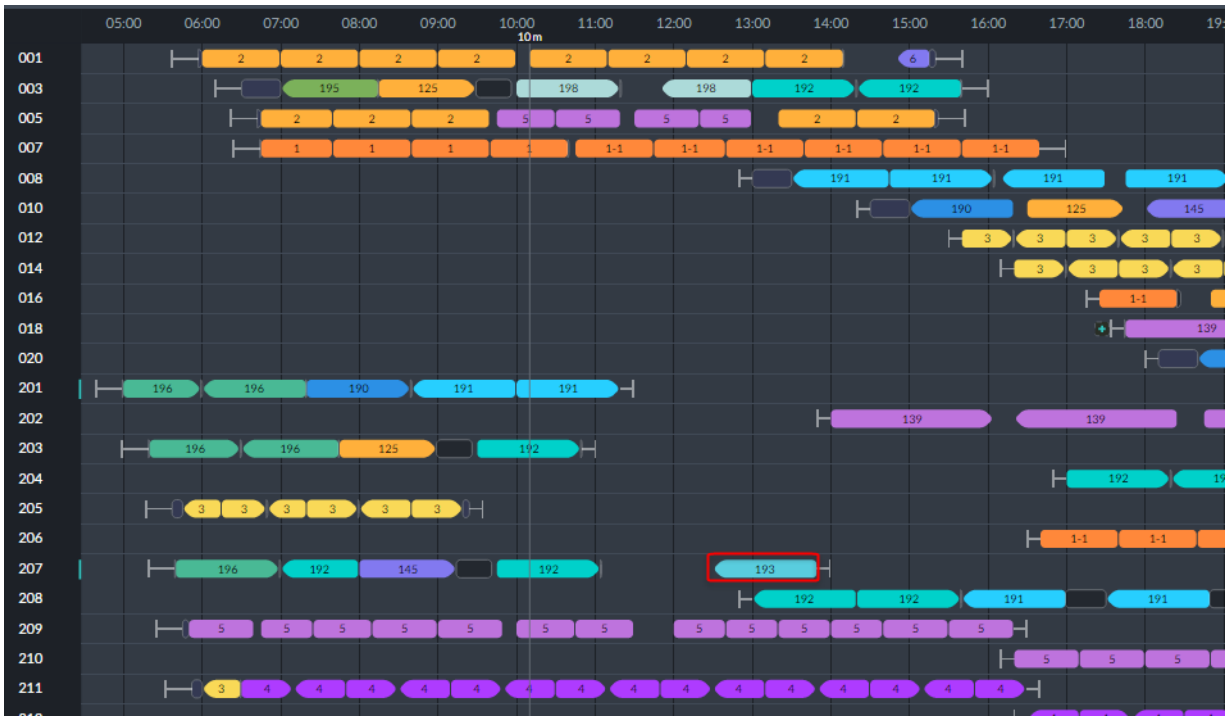
4. Double click the new trip in the editing stack.
5. From this point, proceed as in **Moving a trip to another Duty** and **Using the Editing Stack**.

Completing the Edit Session

Before Completing the Session

Almost any change to the drivers schedule has some effect on the vehicles schedule. Consider the example in **Moving a trip to another Duty**:

Here is part of the changed Drivers Gantt showing the moved trip, shown in the red box. Notice also the new generated sign-off immediately after the trip.



The re-assignment affects the Vehicles schedule: In the Vehicles Gantt, vehicle 3, (which is slotted to do the new trip) and also vehicle 1:

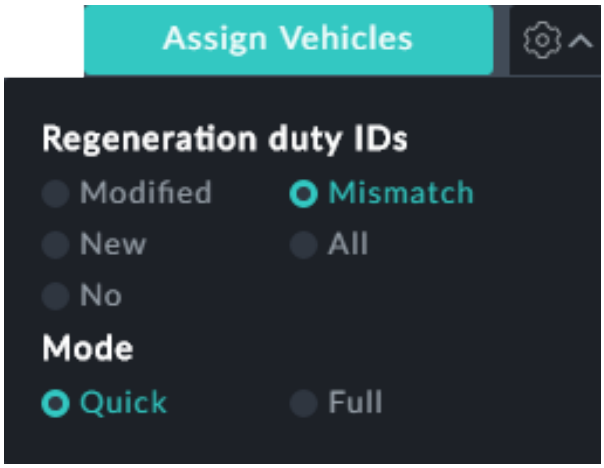
In the end vehicle 3 does not do it.

What you see in the edit stack are minimal vehicle schedule changes. In an **Assign Vehicles** run, the changes will flow to other vehicles. To see the actual result, click the **Assign Vehicles** button. We will not display it here. The new trip has been assigned to vehicle 88. An examination of the KPIs shows that the change has increased the vehicles count from 87 to 89.

Using the Assign Vehicles Button

To complete any interactive scheduling session, click the **Assign Vehicles** button.

Advanced usage is available by opening button's context menu:



Regeneration duty IDs

If you have moved trips or added new elements youcan choose to regenerate some or all of the duty IDs. You can choose between the following:

- **Modified**: Regenerate duty IDs only for those duties that have been manually modified
- **New**: Regenerate duty IDs only for manually added duties
- **No**: The duty IDs will stay the same. There is no regeneration.
- **Mismatch**: Change as few duty IDs as possibleprovided that they conform to the system ID generation rules. (Only non-conforming IDs are changed. See **Duty ID Generator**.)
- **All**: Regenerate all of the duty IDs

Mode:

- **Quick:** The system takes only the duties that have been “touched” and whose vehicles are in the stack (as in the example above) and assigns them with the rest of the duties to vehicles. It attempts to connect them with the other duties to assigned vehicles. It is easier to recognize the changes when you are using the Quick mode. Use it when you do not want a major change in the vehicles schedule and in the appearance of the Drivers Gantt.
- **Full**: The system takes all of the duties and assigns them to vehicles. It attempts to connect successive duties (one below the other in the Drivers Gantt) under the same vehicle. (This is how the manual option to move duties and reorder them can affect the vehicles assignment). Use this for the best results when you do not mind that the Gantts will change.