ATHENA ROUTE OPTIMIZATION

Training Guide

Education Logistics, Inc.

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INTRODUCTION

Athena's Route Optimization feature allows you to develop the most efficient bus routes within the guidelines of your district's transportation policies. You can rapidly generate efficient routes with the runs in your system and quickly review the impact of changes in school times or in the number of vehicles used. You can create and examine these solutions, even as you use the system for your daily transportation work. If you decide you want to use one of these solutions to modify your existing data, you can easily incorporate it into the actual transportation system.

Route Optimization uses your geographic and transportation data to help you accomplish these tasks more efficiently and easily. The system performs previously routine and repetitive tasks automatically, reducing the amount of time required to prepare for a new school year or respond to changes in transportation requirements. You can use the various optimization features (Stop, Run, and Route) to perform a variety of transportation management tasks. These components are sold separately, so the items that appear in your system will reflect those which you have purchased.

Route optimization is simulation software. The data used in the optimization process is based on your existing transportation data, but it is a totally distinct data set. Think of optimization as a simulation which is based on your current transportation data but which you can modify safely without affecting your actual transportation data. What you do in Route Optimization does not affect your transportation system unless you choose to confirm the route solution (incorporate it into your actual data).

We encourage you to experiment with the Route Optimization data. Try the same problem several times, making different changes each time to see how well each approach works. You can then combine the best features of each approach to create the most efficient solution. This approach will enable you to develop specific strategies in optimizing your data. You can also use the automated optimization functions which often reveal improvements you may not have noticed.

Keep in mind that we are continuously updating and improving our software, so changes may be made to the program after the printing date of this guide. As a result, you may encounter parts of the system that vary somewhat from the steps and illustrations in this guide. Such differences should be minor, however, and the primary concepts that it discusses still apply.

Again, we encourage you to experiment with the various optimization features, to play with different scenarios, and compare the results. Changes will not affect your regular data unless you decide to confirm the run solution, so you can easily abandon results you do not like.

OPTIMIZATION PREP WORK

Listed below are prep work items you will need for optimization

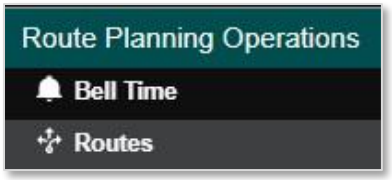
1. **Up to date map** - A very important part of prep work for transportation studies. It is the indicator whether the stop times Athena produces are close enough to real life stop time values. If you adjust times in Athena frequently, you may not be calibrated. The better calibration is, the less guess work must be done in the project.

2. **Student Match Rate** - Having kids matched is important for these studies so that the proper eligibility for ridership can be determined, and the distance to stops and stop assignments can be in place.
    a. What are unmatched students? - Students whose address cannot be located on the map.
    b. Recognizing unmatched students - Students that Geolocation is unmatched in the student import module.
3. **School Changes** - Any school changes should be handled before Optimization is done. School data input, Bell times in place, Boundaries posted, and Eligibility updated.
4. **Student Assignment to Stops** - If any work on student to stop assignments needs to be done; it should be done before run optimization takes place. The following changes can affect student assignment.
5. **Student Eligibility** - Again, any boundary changes should be posted to their schools so that eligibility of students can be updated, any students who do not need stops anymore can be removed from them and any students who become eligible for transportation can have a stop assigned, creating new stops as needed. Stop locations could come from other schools formerly transporting students in that area.
6. **Walk to school distances** - Any changes to walk to school boundaries should be posted as they affect eligibility as mentioned above. Depending upon the change stops and stop assignments may need to be added or removed for this work.
7. **Walk to stop distance** - Changes in walk to Stop distance can affect the number of stops used for eligible students, this could mean more stop locations needing to be created (for reduction in distance) or less stop locations needed (for increases in distance)
8. **Transportation Accuracy** - if using existing data in the study (for fleet reductions and evaluations), your transportation data needs to properly represent what is currently being done as much as possible.

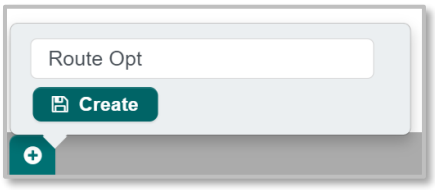
GETTING STARTED

1. Once logged in, go to Routing Management.

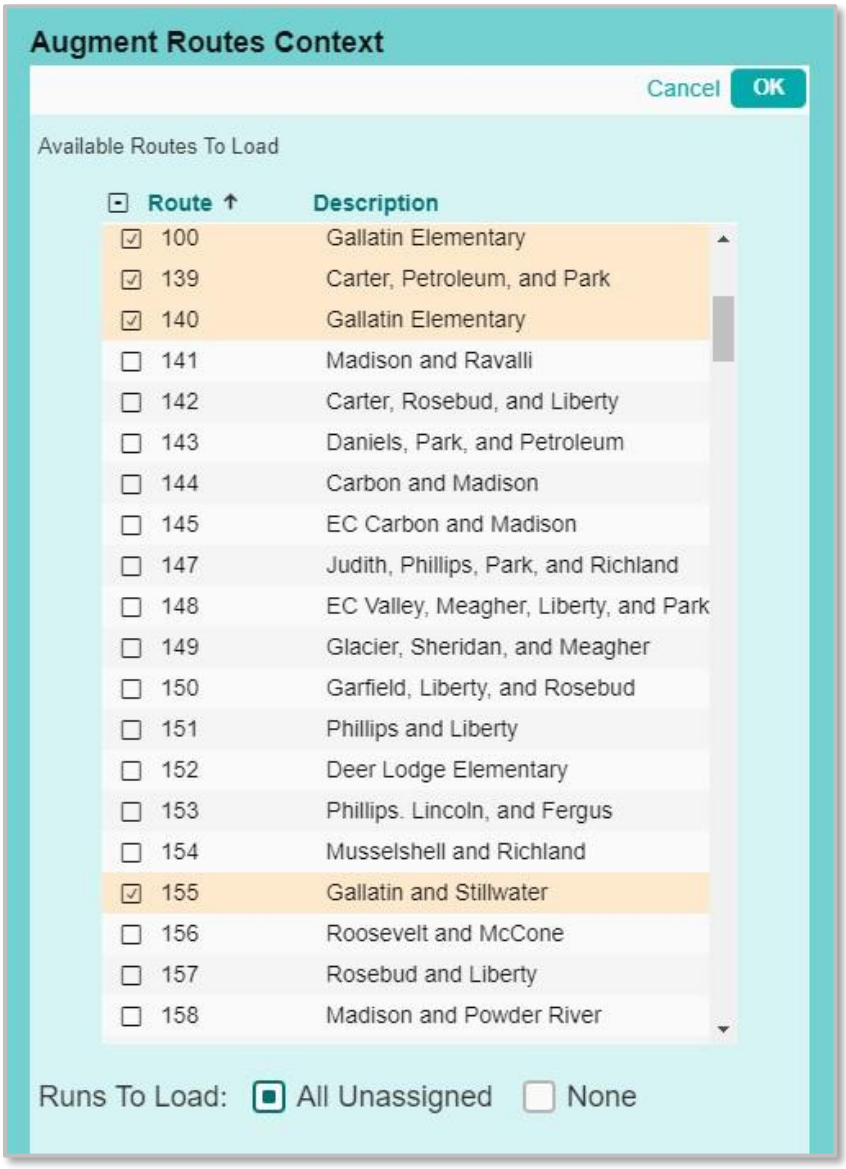
2. In the action bar, under Route Planning Operations, select Routes.



3. On the Route landing page, create a task.

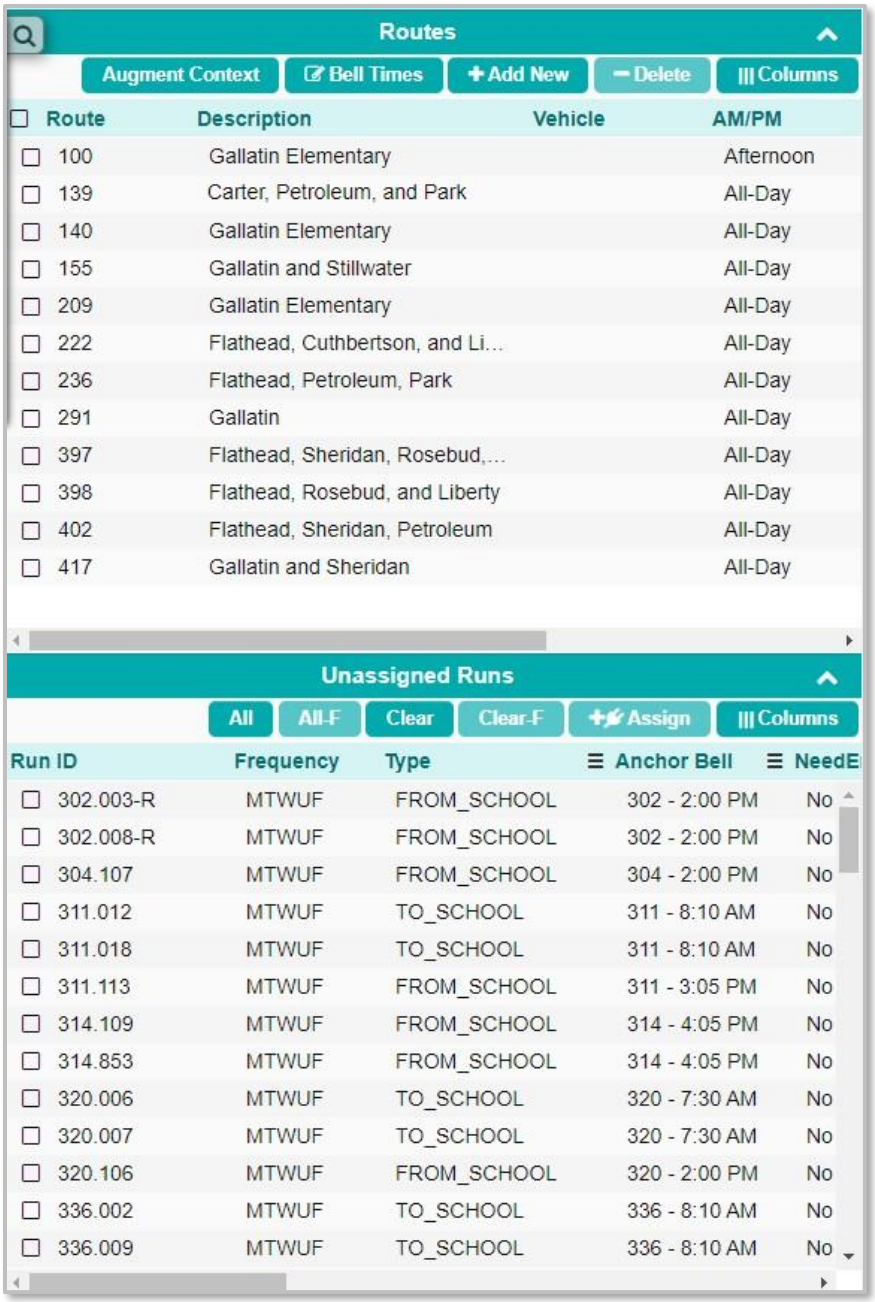


4. Select the routes you want to work with in the Augment Context window.

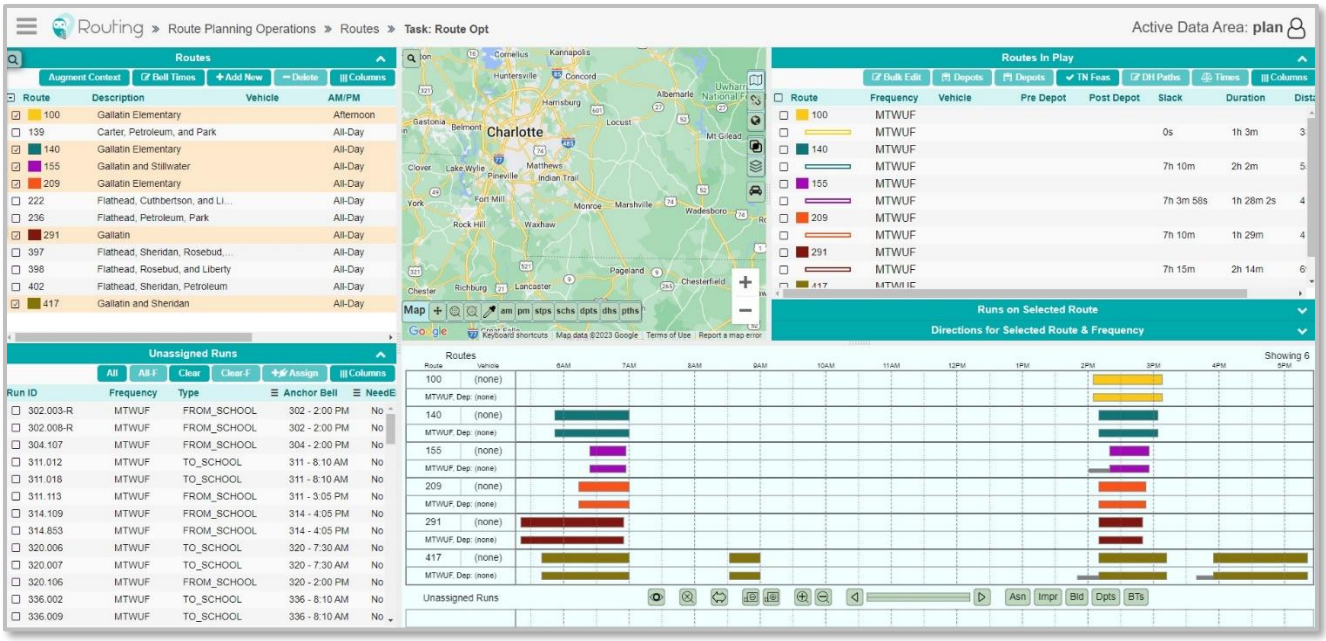


5. Select All Unassigned runs, then select OK.

6. Routes and Unassigned Runs will be listed in the data panel.



7. Select your Routes and the Unassigned Runs that you want to work with.



You will see the Unassigned Runs and Routes in the workspace and timeline.

8. Route Opt tools are in the Timeline Panel.

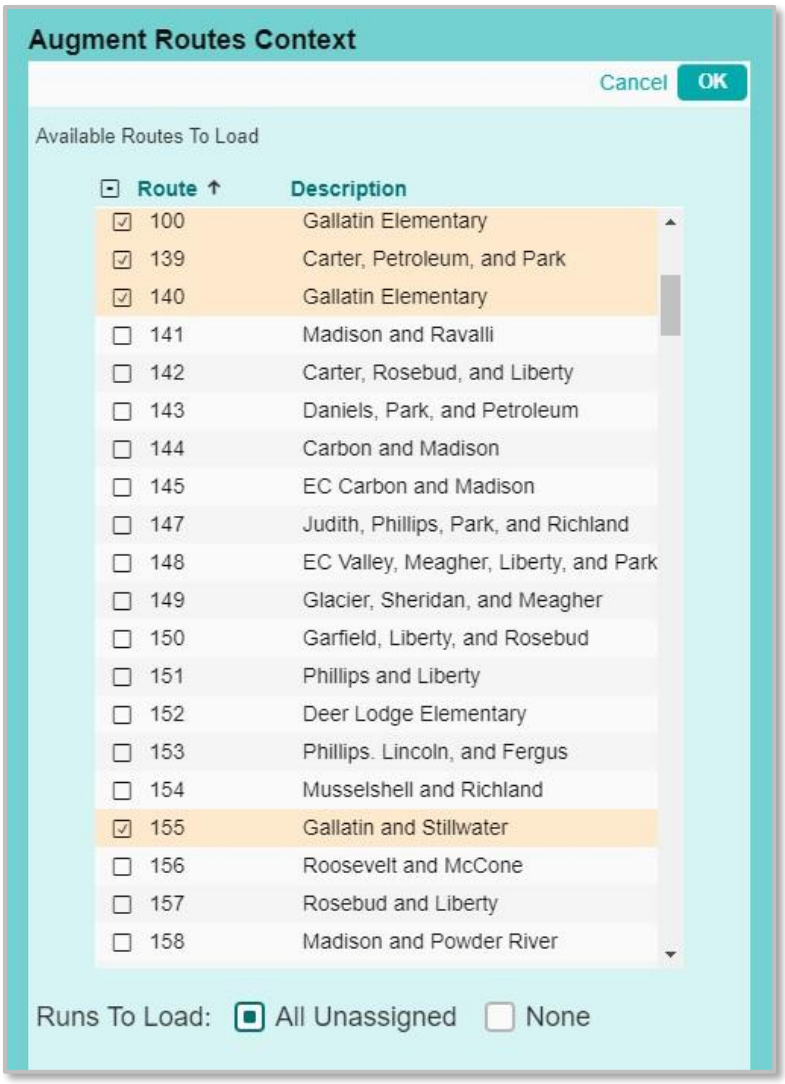
   a. Opt Assign
   b. Opt Improve
   c. Opt Build
   d. Opt Depots
   e. Opt Bell Times

USING ROUTE OPTIMIZATION TOOLS

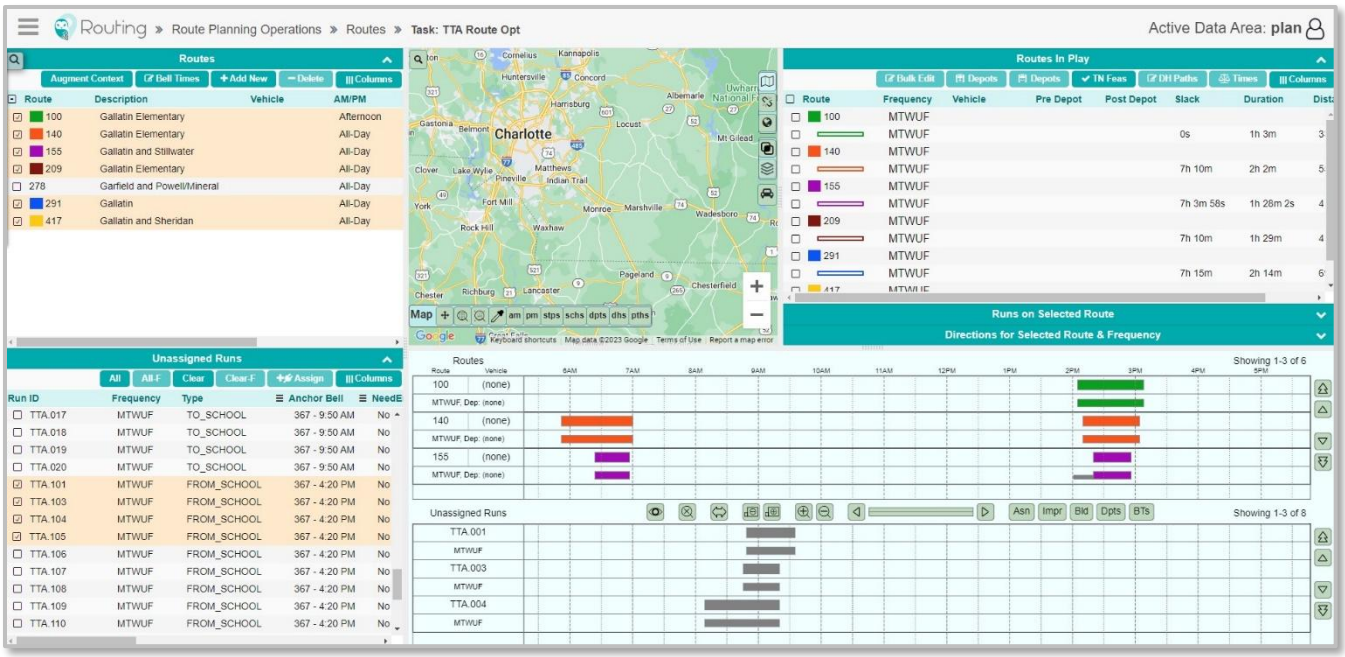
Optimize Assign

As a user, I would like to take a group of unassigned runs and assign them to routes.

1. After creating your task, select your routes in the Augment Context window.



2. Then select your routes and the Unassigned Runs in the data panel.

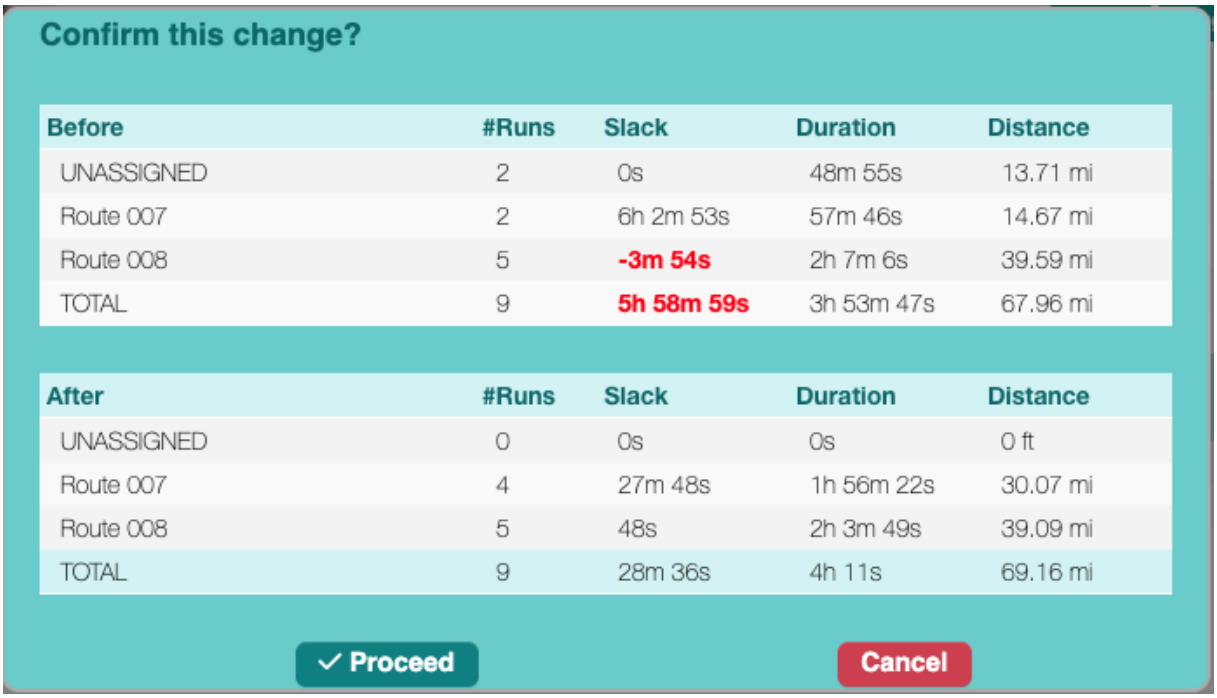


3. Then select the Assign button located on the timeline.

4. The Confirm the RouteOpt action window will open.

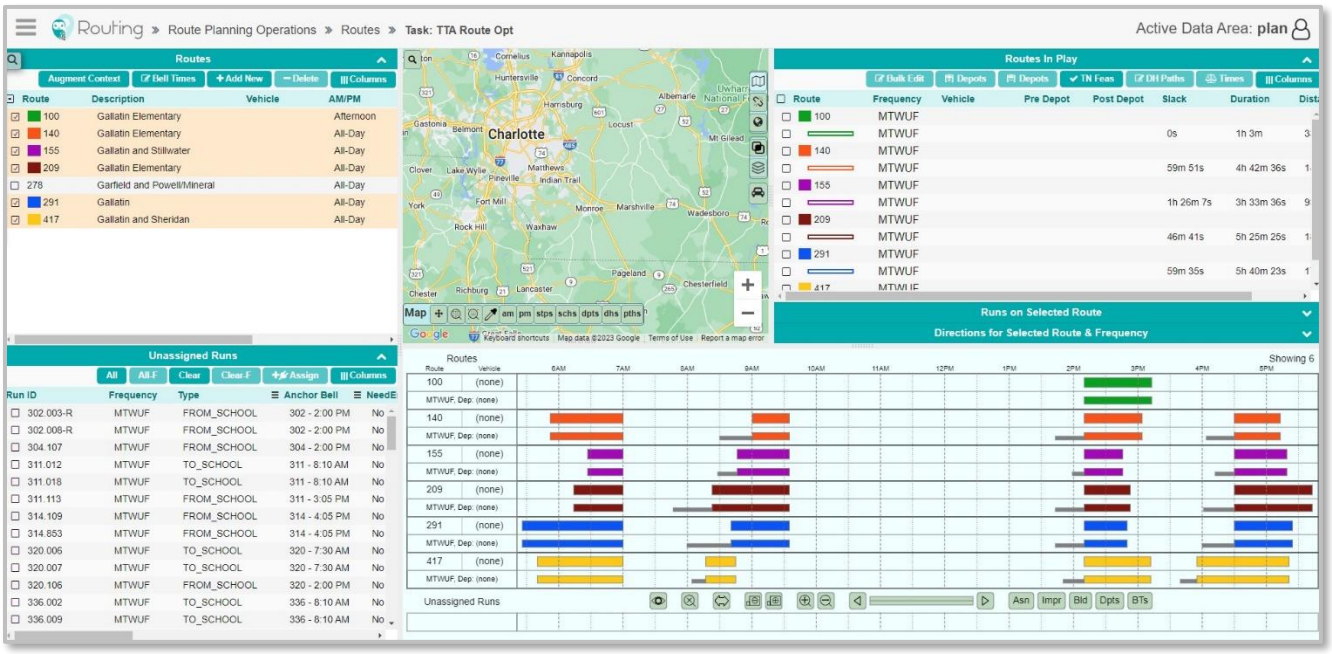
   a. The window will tell you what you are about to Opt Assign with.
   b. You can check the box to Consider AM/PM Run Mirroring.
   c. Then Name the new route with the Prefix and Start at.
   d. Then select Proceed.

5. Then confirm the change. Verify the before and after information.



6. Then select Proceed.

7. You will see the changes reflect in the timeline. Runs have been assigned to existing routes.

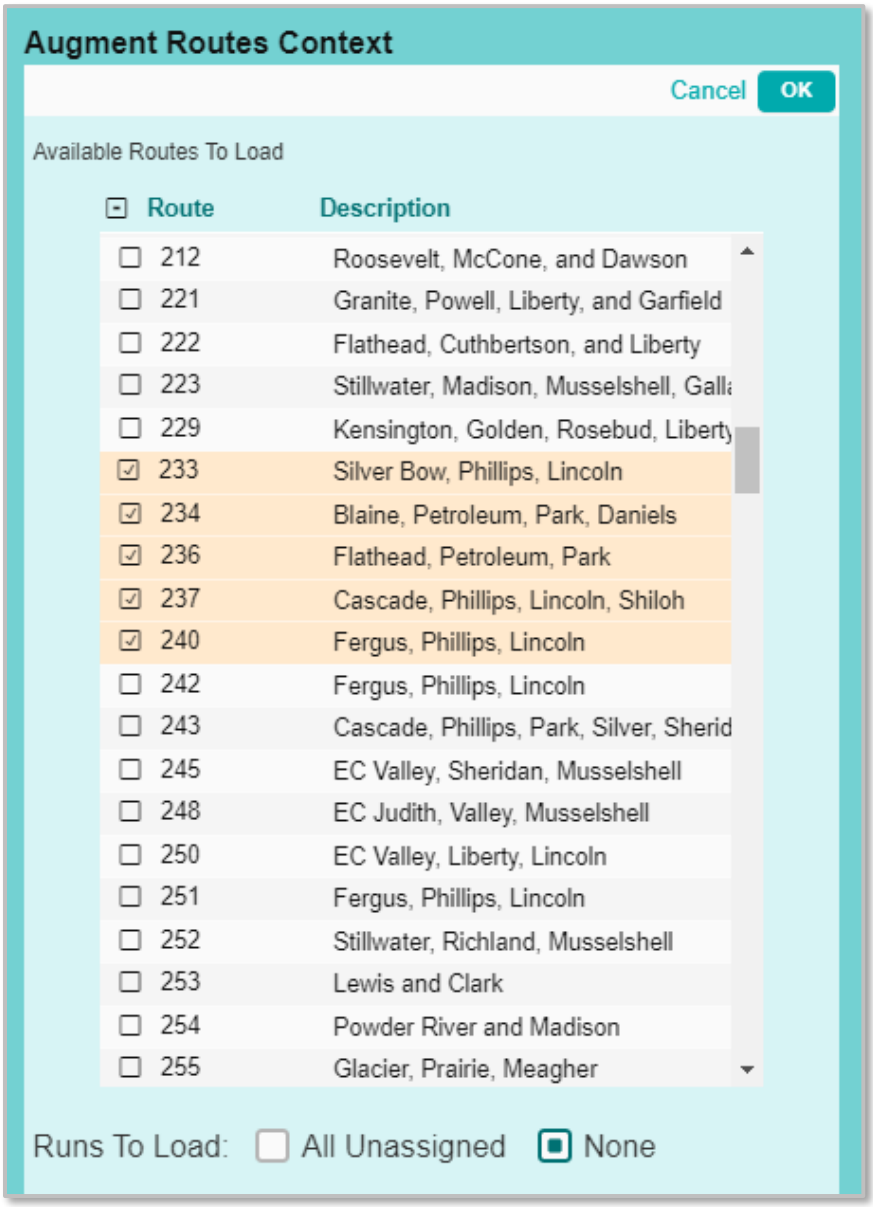


Note, the Assign tool will not interfere with your current route assignments. The current runs assigned are fixed. If it cannot find a place to assign the run, it will create a new route.

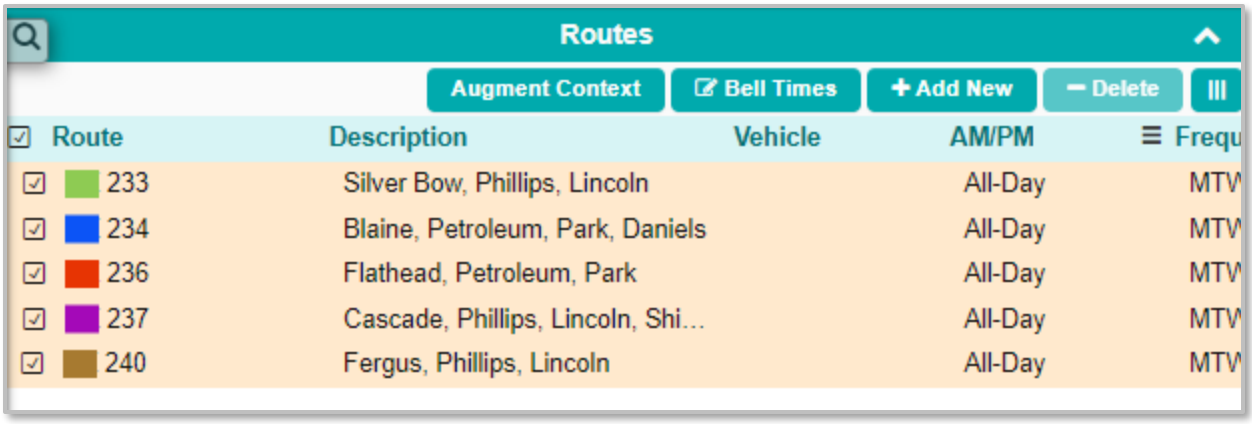
Optimize Improve

As a user, I would like to improve my routes for better efficiency.

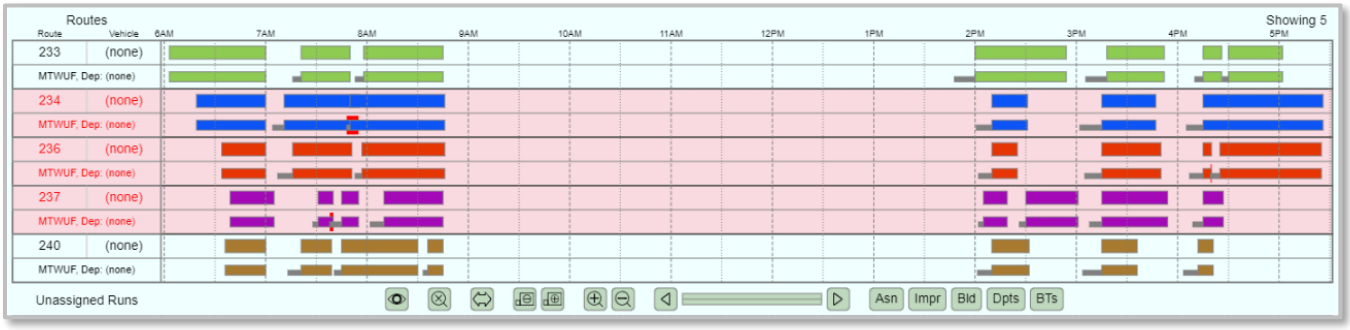
1. After creating your task, select your routes in the Augment Context window.



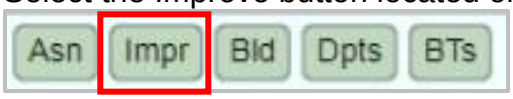
2. Then select your routes in the data panel.



3. The routes will display in the timeline. Note: All routes in pink have negative slack.

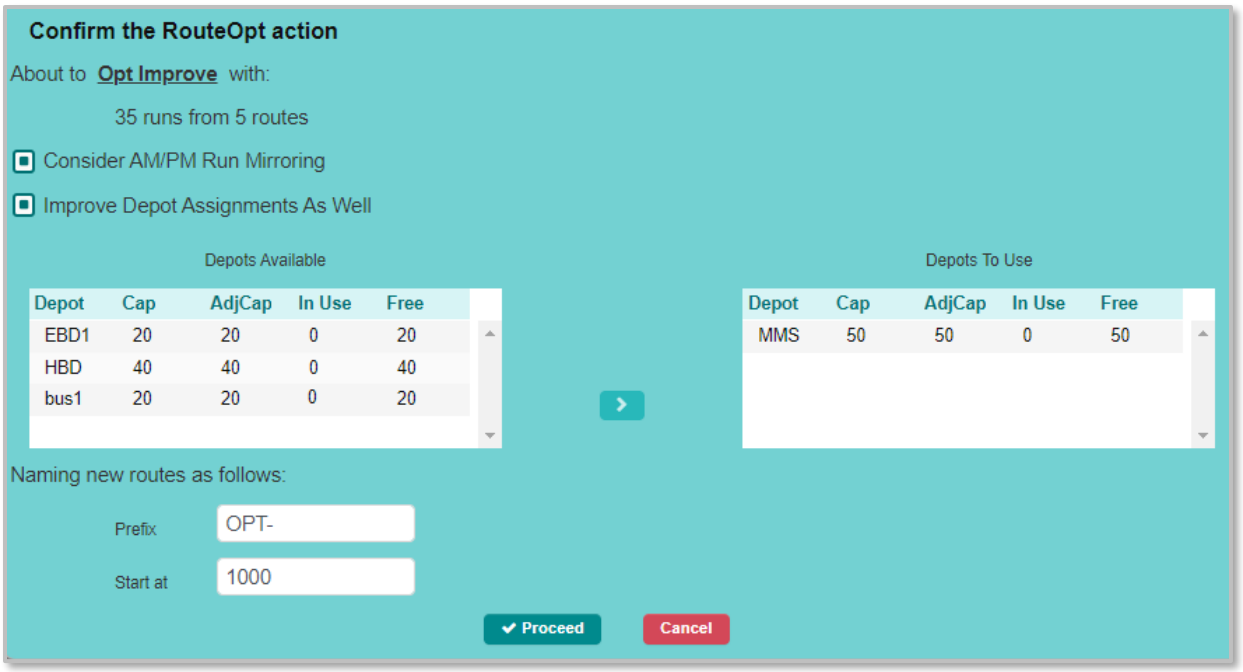


4. Select the Improve button located on the timeline.



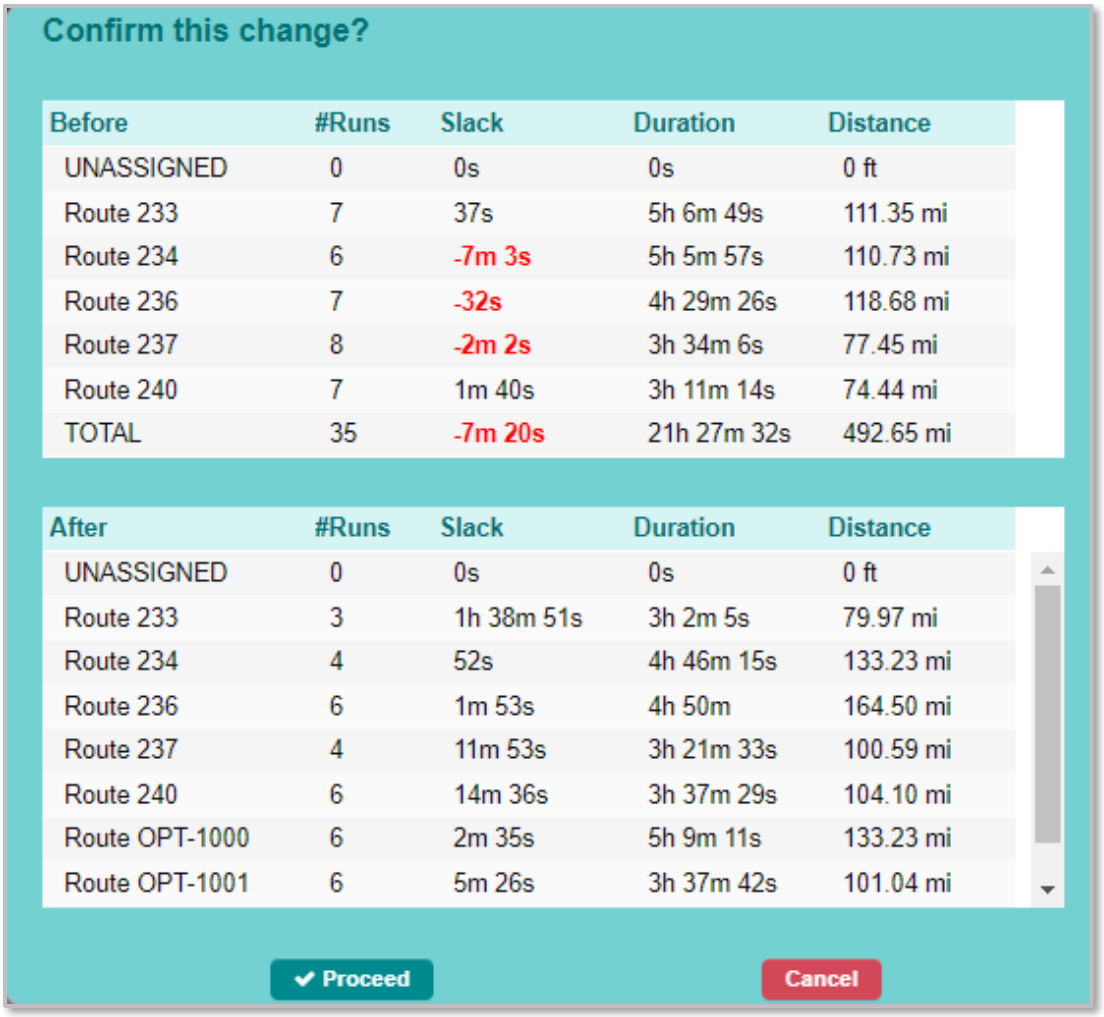
5. The Confirm the RouteOpt action window will open.

   a. The window will tell you what you are about to Opt Improve with.
   b. You can check the box to Consider AM/PM Run Mirroring.
   c. You can also check the box to Improve Depot Assignments as well.
   d. Then you need to select Depots Available and move them over to Depots to use with the arrow in the middle of the two windows.
   e. Then Name the new routes with the Prefix and Start at.

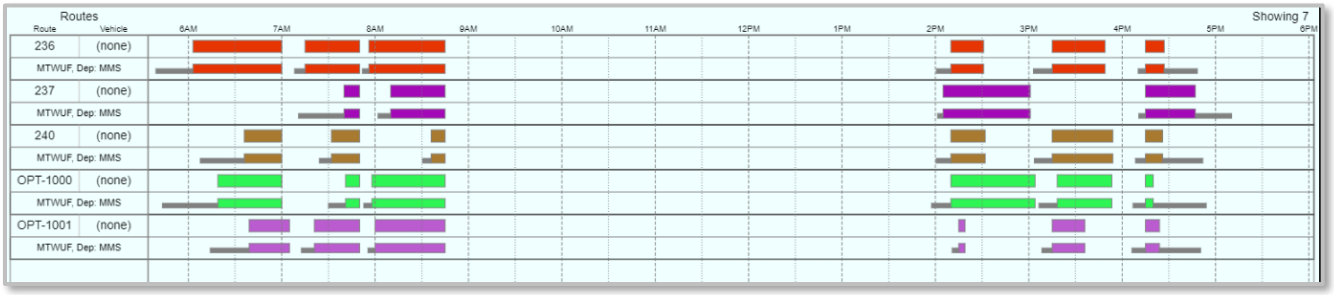


f. Then select Proceed.

6. The Confirm this change window will open. Notice there is not negative slack.



7. Routes have been improved and new Opt routes have been created.



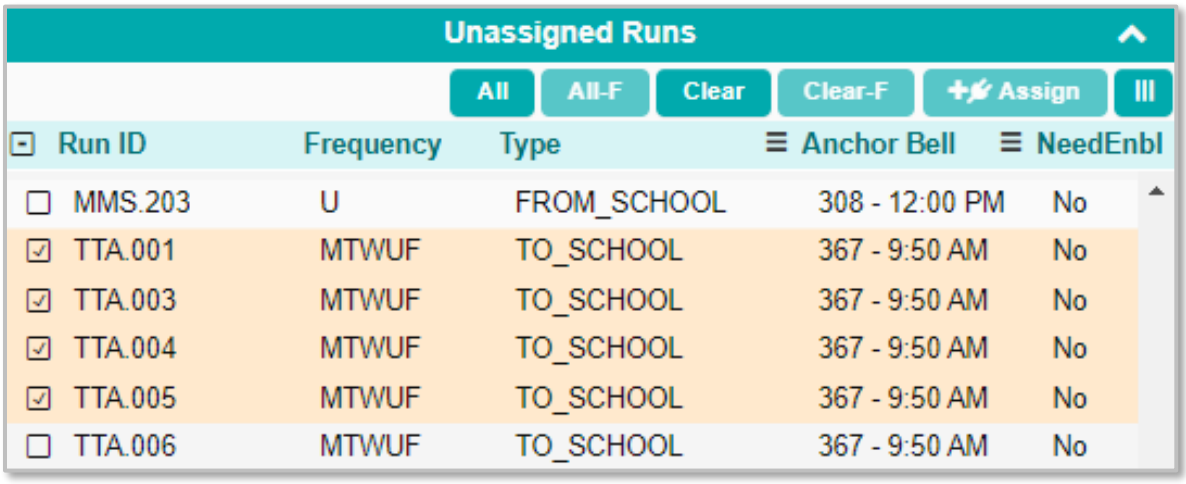
Optimize Build

As a user, I would like to take a selected group of and build efficient routes.

Note: you can include existing routes in this data and the runs from those routes will be added to the build process. Those routes will be gone after optimized.

1. After creating your task, select the All Unassigned runs at the bottom of the Augment Context Window.

2. All unassigned runs will be listed at the bottom of the Data Panel.

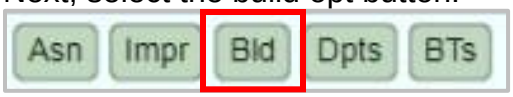


Run ID	Frequency	Type	Anchor Bell	NeedEnbl
MMS.203	U	FROM_SCHOOL	308 - 12:00 PM	No
TTA.001	MTWUF	TO_SCHOOL	367 - 9:50 AM	No
TTA.003	MTWUF	TO_SCHOOL	367 - 9:50 AM	No
TTA.004	MTWUF	TO_SCHOOL	367 - 9:50 AM	No
TTA.005	MTWUF	TO_SCHOOL	367 - 9:50 AM	No
TTA.006	MTWUF	TO_SCHOOL	367 - 9:50 AM	No

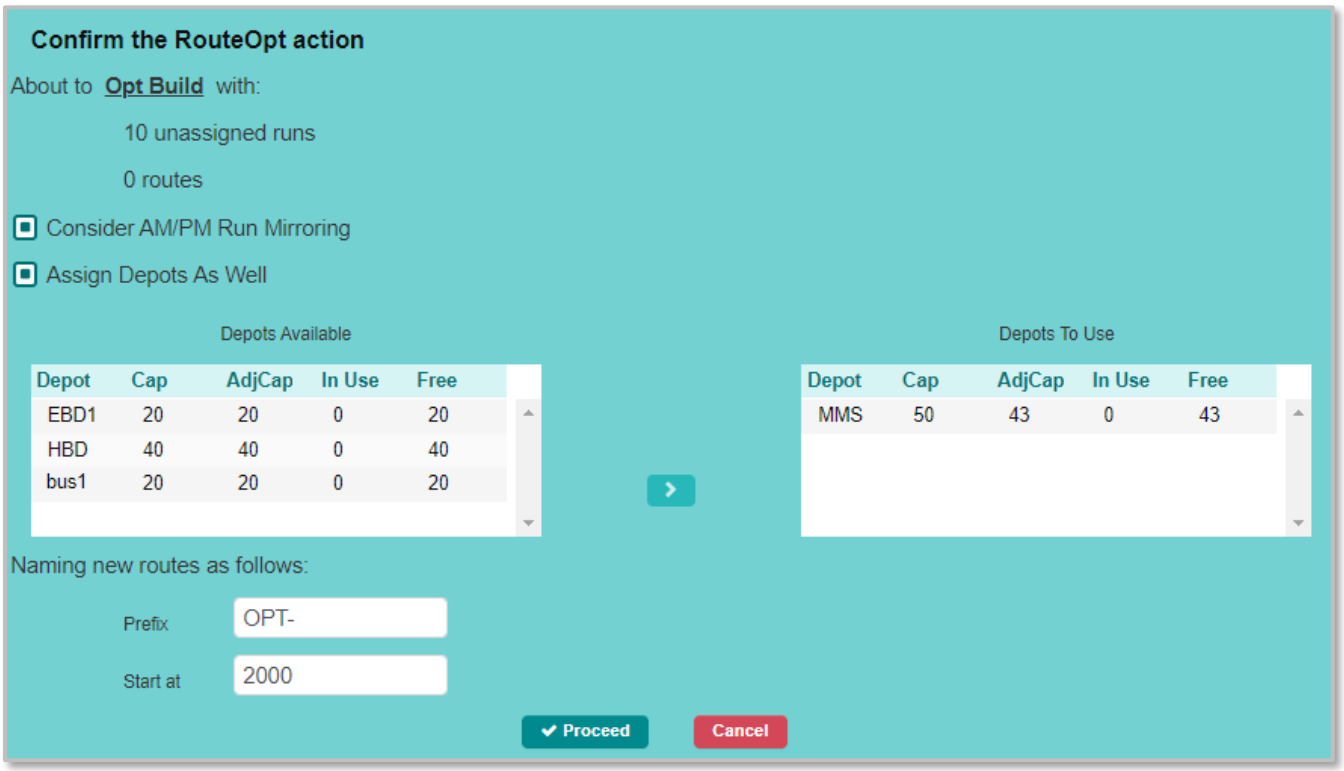
TTA.104	MTWUF	FROM_SCHOOL	367 - 4:20 PM	No
TTA.105	MTWUF	FROM_SCHOOL	367 - 4:20 PM	No
TTA.106	MTWUF	FROM_SCHOOL	367 - 4:20 PM	No
TTA.107	MTWUF	FROM_SCHOOL	367 - 4:20 PM	No
TTA.108	MTWUF	FROM_SCHOOL	367 - 4:20 PM	No
TTA.109	MTWUF	FROM_SCHOOL	367 - 4:20 PM	No
TTA.110	MTWUF	FROM_SCHOOL	367 - 4:20 PM	No

3. Unassigned runs will display in the Timeline Panel.

4. Next, select the build opt button.

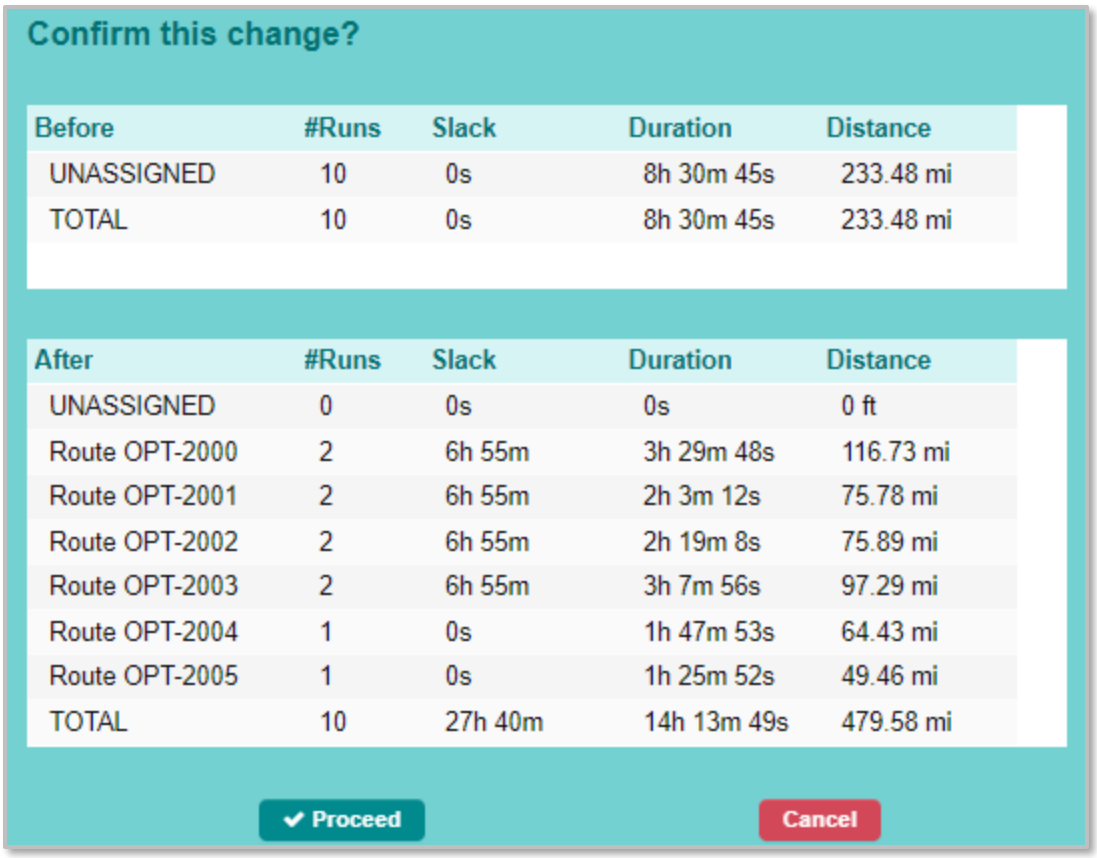


5. The Confirm the RouteOpt action window will open.



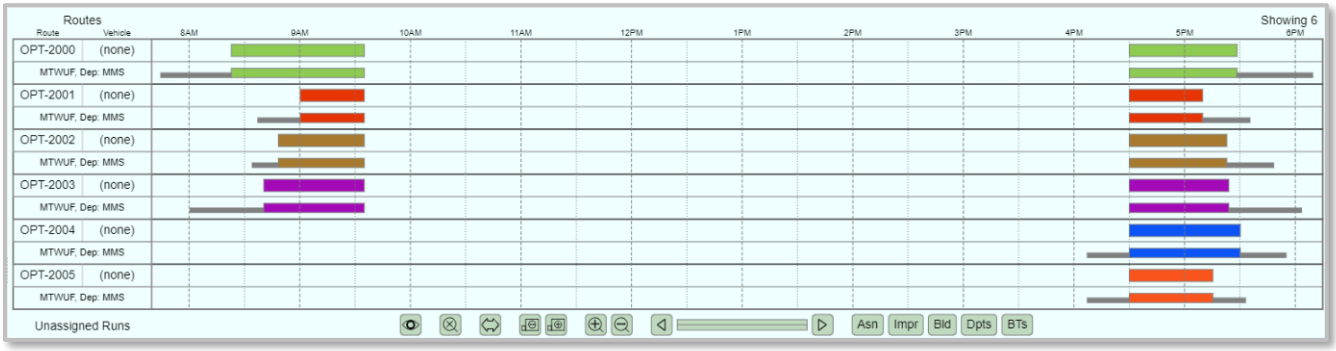
6. Then select Proceed.

7. The Confirm the change window will open.



8. Select Proceed.

9. Routes have been created.



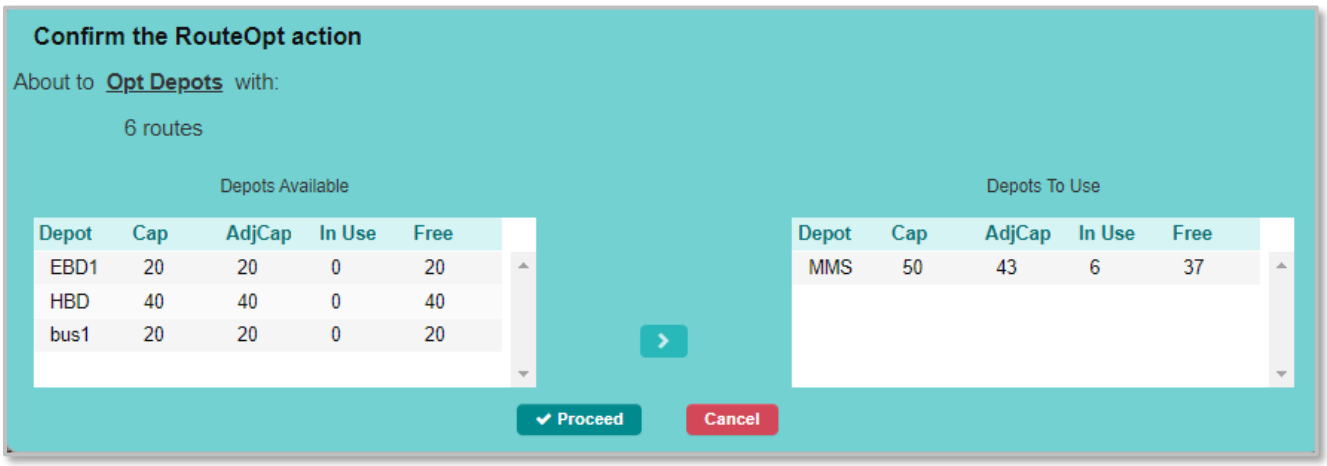
Optimize Depots

As a user, I would like to assign depots to my routes.

1. In the data panel, select the routes you want to work with.

2. Then select the Depots opt tool.

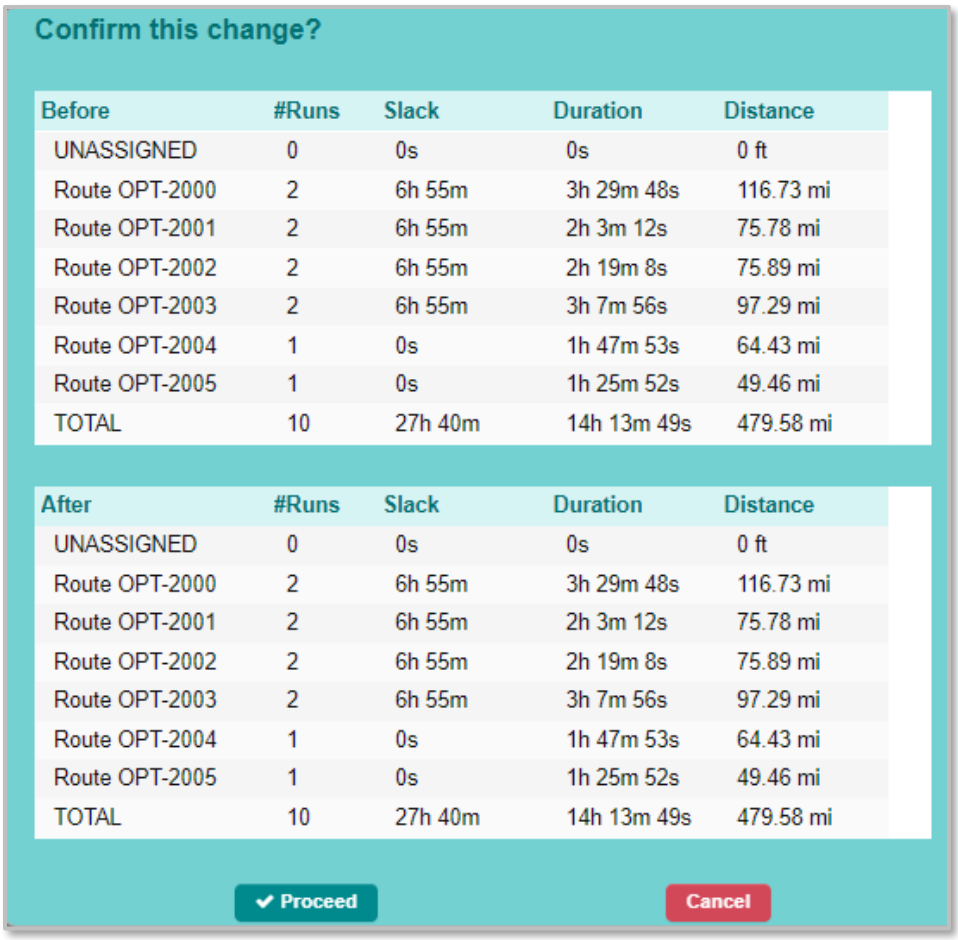
3. The Confirm RouteOpt action window will open.



   a. It will show you about the Opt Depots you will be working with.
   b. Then select the Depots available and move them over to Depots to Use with the arrow in the middle of the two windows.

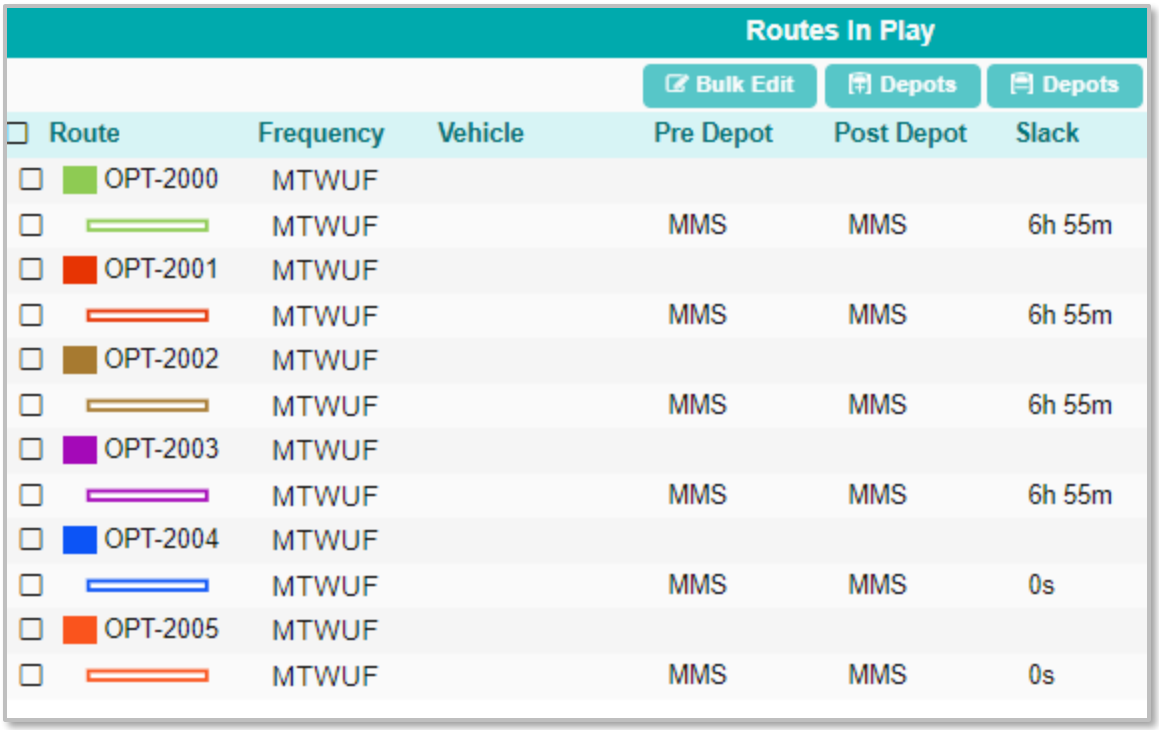
4. Then select Proceed.

5. The Confirm this change window will open.



6. Select Proceed.

7. All routes have been assigned depots and you can see them in Routes in Play.



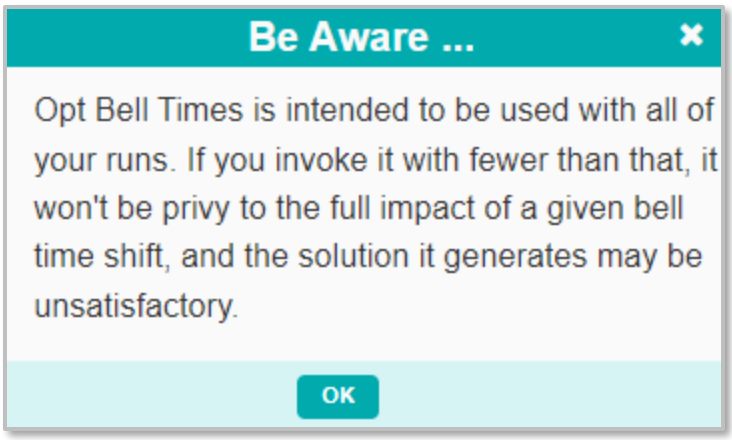
Optimize Bell Times

As a user, I would like to optimize my bell times to create efficient routes.

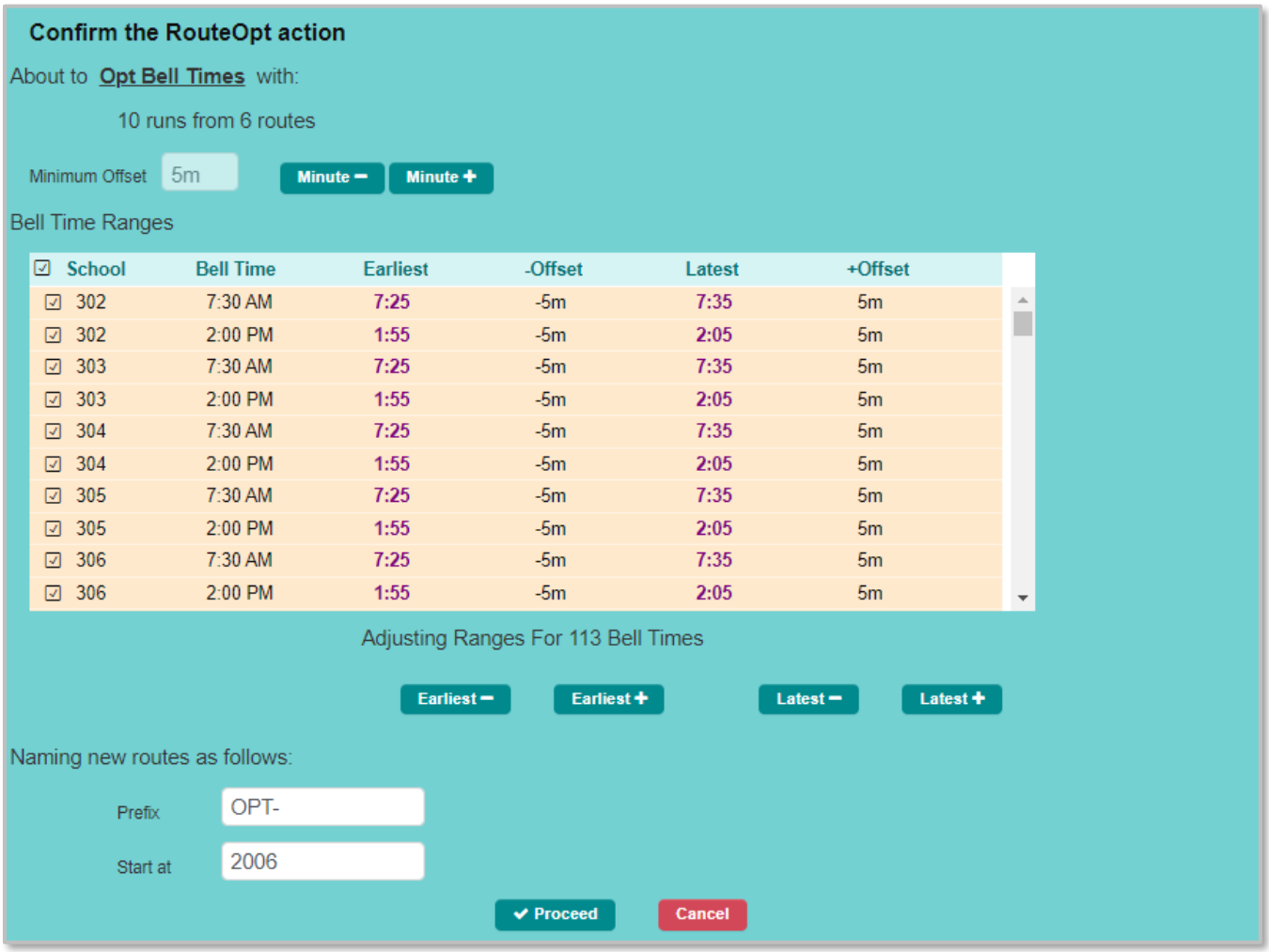
1. Select your routes.

2. Then select to Bell Time Opt tool.

3. The Confirm the RouteOpt action window will open.

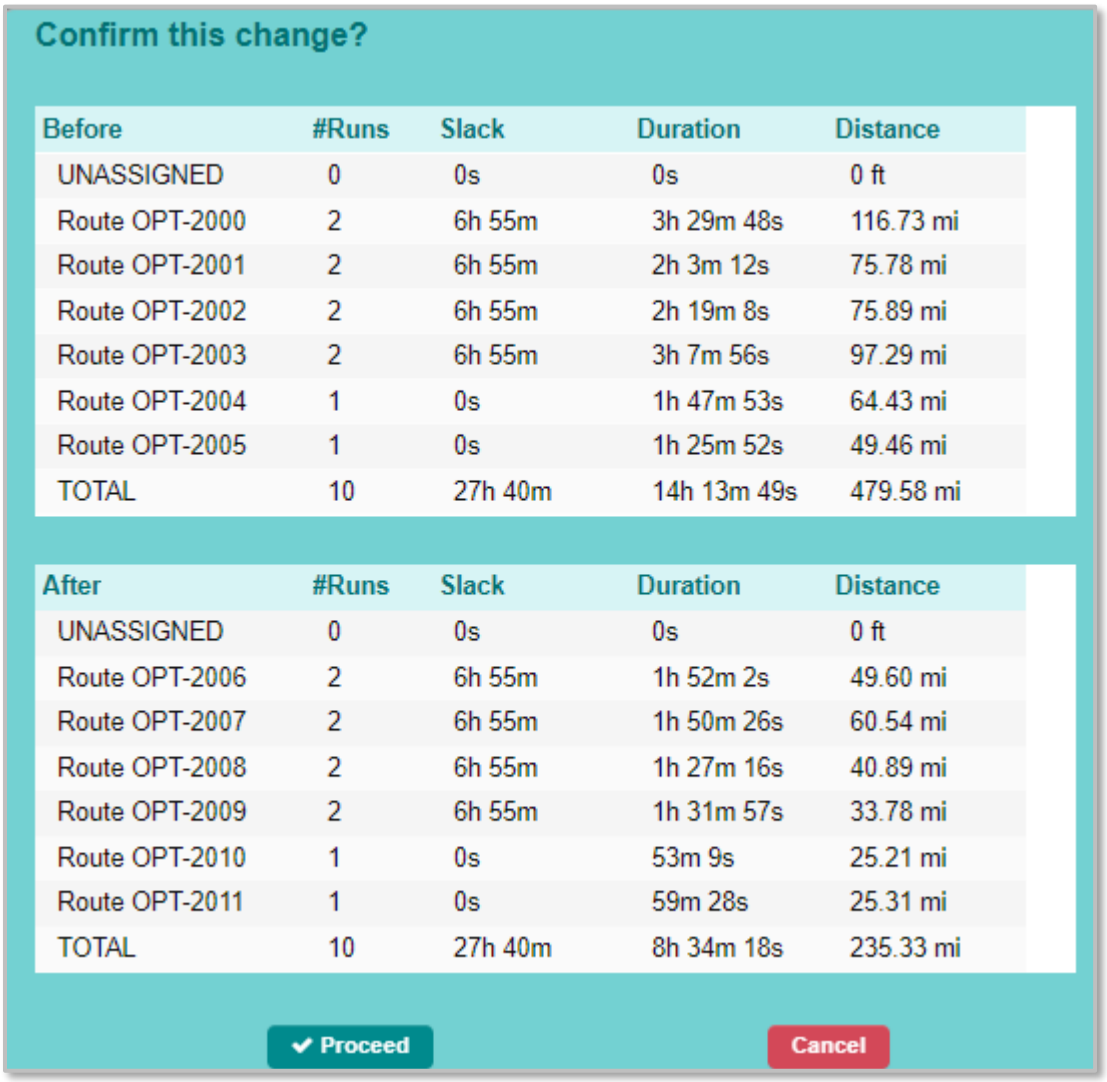


4. The Confirm the RouteOpt action window will open.



a. It will show you the Opt Bell Times it will be working with.
b. You can set your Minimum Offset
c. Then select your Bell Time Ranges
d. Adjust your Ranges for Earliest and Latest offsets.
e. Then name your new routes with the Prefix and Start at.
f. The select Proceed.

5. The Confirm this change window will open.



6. Select Proceed.