

# REST Service: FleetSolver- Retrieve

# WELCOME

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WELCOME TO THE FLEETSOLVER WEB SERVICE REFERENCE GUIDE. THIS SOLVER IS OUR MOST POWERFUL TOOL TO SOLVE FLEET-LEVEL ROUTING PROBLEMS THAT CAN INVOLVE DOZENS OF ROUTES AND HUNDREDS OF STOPS. THERE ARE TWO WEB SERVICES, ONE TO SUBMIT AND ONE TO RETRIEVE. THIS DOCUMENT COVERS THE RETRIEVE PORTION. BOTH WEB SERVICES ARE STRAIGHTFORWARD, POWERFUL, DEPENDABLE, AND ALLOW WEB DEVELOPERS TO RAPIDLY ADD CRITICALLY IMPORTANT ROUTE PLANNING CAPABILITIES TO THEIR SOLUTION(S).

THIS DOCUMENT PROVIDES INFORMATION RELATED TO THIS PARTICULAR WEB SERVICE ONLY. PLEASE KEEP IN MIND THAT WE OFFER A VARIETY OF PRE-BUILT WEB SERVICES. WE MAY ALSO ENHANCE EXISTING WEB SERVICES OR DEVELOP ENTIRELY NEW SERVICES CASE-BY-CASE. CONTACT US FOR MORE INFORMATION.

THE DOCUMENTATION IS INTENDED AS A COMPREHENSIVE REFERENCE MANUAL. AS A MEANS TO JUMP-START YOUR IMPLEMENTATION WE'D ALSO RECOMMEND OUR:



INTERACTIVE SDK



CODE EXAMPLES – READY TO RUN CODE FOR VARIOUS PLATFORMS

# BEFORE YOU BEGIN

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**API KEY** - TO GAIN THOSE LAVISH ACCOLADES FROM YOUR BOSSES, CUSTOMERS, PEERS AND GROUPIES, YOU FIRST NEED AN API KEY. CONTACT US FOR YOUR KEY TO GET STARTED.



**GEOCODING** - WE REQUIRE ALL YOUR INPUT STOPS TO BE GEOCODED (POSSESS LAT/LON COORDINATES). IF YOUR ADDRESSES ARE NOT CURRENTLY GEOCODED, YOU WILL NOT BE ABLE TO PASS THEM TO OUR SERVICE.

WE ARE AGNOSTIC AS TO WHAT DIGITAL MAP YOU PREFER TO USE. AS LONG AS YOU HAVE GEOCODED DATA YOU CAN TIE-IN TO OUR SERVICE SEAMLESSLY.



**GEOGRAPHIC DATA COVERAGE** - WE SUPPORT ALL OF NORTH AMERICA, THE UK, MOST ALL OF MAINLAND EUROPE, AUSTRALIA & NEW ZEALAND, A GOOD PORTION OF ASIA AND SOUTH AMERICA AND PORTIONS OF AFRICA AS WELL. IF YOU HAVE ANY QUESTIONS ABOUT YOUR LOCALE PLEASE CONTACT US.



**ENCRYPTION** - WE REQUIRE ALL WEB TRAFFIC BE PASSED AS ENCRYPTED (HTTPS & TLS1.2).



**REST/JSON** - THE SINGLEROUTER CALL IS A RESTFUL WEB SERVICE. WE USE JSON AS INPUT AND OUTPUT.

# SERVICE OVERVIEW & PURPOSE

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THIS DOCUMENT COVERS THE 'RETRIEVE' OF A ROUTING REQUEST THAT WAS PREVIOUSLY SENT VIA THE 'SUBMIT' PROCESS. YOU WOULD OF COURSE NEED TO READ THE 'SUBMIT' DOCUMENT AND IMPLEMENT A SUBMIT IN ORDER TO GET AS FAR AS TO RETRIEVE THE RESULTS VIA THIS WEB SERVICE.

EACH SUBMIT & RETRIEVE HAVE A ROUTINGJOBID IN COMMON. THE JOBS THEMSELVES MAY TAKE SEVERAL SECONDS OR SEVERAL MINUTES TO COMPLETE.

THE 'RETRIEVE' CALL BOTH INFORMS YOU IF THE JOB COMPLETED, AND ALSO RETURNS RESULTS, ONCE COMPLETED. YOU MAY WISH TO CALL THE 'RETRIEVE' ON A TIMED PROCESS TO CONTINUE TO CHECK IF THE JOB HAS COMPLETED. THE POLLING TO DETERMINE THE JOB STATUS SHOULD BE CALLED NO MORE THAN EVERY 10 SECONDS. ANY CALLS MADE MORE FREQUENTLY WILL RESULT IN THE CANCELLATION OF THE JOB.

RESULTS ARE KEPT FOR 24 HOURS ONCE FINALIZED. YOU CAN RETRIEVE THEM SEVERAL TIMES WITHIN THAT 24-HOUR PERIOD ALTHOUGH TYPICALLY ONLY 1 RETIEVE IS REQUIRED, OF COURSE.

JOBS THAT CANNOT COMPLETE RETURN WITH AN ERROR CODE TO HELP YOU TO DIAGNOSE THE ISSUE AT HAND.

IT IS VERY POSSIBLE THAT SOME (OR ALL) STOPS AREN'T ROUTED. IN SUCH CASES YOU CAN INSPECT THEM IN THE UNROUTED AREA ALONG WITH THE VIOLATED CONSTRAINTS THAT PREVENTED THE ROUTE INCLUSION FOR EACH STOP ITEM.

# REQUESTS

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THIS SERVICE ACCEPTS POST REQUESTS VIA HTTPS. THE PARAMETERS AND VALUES ARE TRANSFERRED IN THE BODY OF THE REQUEST AS JSON. THIS SERVICE RUNS ASYNCHRONOUSLY. THE 'SUBMIT' CALL WILL SEND THE JOB TO THE SERVICE AND THE 'RETRIEVE' CALL WILL LATER BE CALLED TO GATHER RESULTS. SYNTAX REQUIRED IS OUTLINED BELOW. JOBS CAN TAKE UP TO SEVERAL MINUTES TO COMPLETE. WE ASK THAT YOU CHECK ON THE RETRIEVE REQUEST NO MORE THAN EVERY 30 SECONDS.

## ↔ Sample Code: Request URI

*Utilizing this endpoint verifies that you have read and agree to the EULA in the appendix of this document.*

`https://www.routeperform.com/services/v2/fleet-solver-submit/` (noted here, but documented elsewhere)

<https://www.routeperform.com/services/v2/fleet-solver-retrieve/>

HTTP Headers:

X-RP-ApiKey (Required)

X-RP-PassThroughGUID (Required - see below for explanation)

see below for information on body parameters

# RETRIEVE REQUEST PARAMETERS

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THE BODY TEXT OF THE REQUEST WILL CONTAIN ALL INPUT PARAMETERS. THIS BODY TEXT NEEDS TO BE JSON-FORMATTED.

ABOUT JSON:

[HTTPS://EN.WIKIPEDIA.ORG/WIKI/JSON](https://en.wikipedia.org/wiki/JSON)

## ↔ Sample Request: An Example

```
{  
  "routingJobID": "{IDReturnedfromSubmitServiceResponse}",  
}
```

RETRIEVE REQUEST - GENERAL PARAMETERS - IN HEADERS (SEE URI ABOVE)

Parameter name	Type	Description
apiKey	string	Your unique authentication token gathered from our portal.
passthroughGUID	string	A GUID provided to uniquely identify each request. You may also pass this as a request header (recommended). The GUID should be truly unique, do not re-use the GUID from the submit request.

## RETRIEVE REQUEST - GENERAL PARAMETERS

Parameter name	Type	Description
routingJobID	string	The 'submit' web service's response will provide you with this ID that then is supplied as input for your 'retrieve' request.

# RETRIEVE RESPONSE - OVERVIEW

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REVIEW THE HTTPSTATUSCODE FIRST. VALUE 200 'OK' CONFIRMS THE SERVICE RETURNED A RESPONSE BUT DOES NOT VERIFY THAT THE ROUTE ACTIVITY COULD BE RETURNED. IN THE EVENT SUCH AS BAD INPUT DATA IT COULD FOR INSTANCE RETURN A 200 'OK' BUT LACK ROUTE RESULTS.

THE POSSIBLE HTTPSTATUSCODE RETURN VALUES ARE PLENTIFUL. FOR EXAMPLE: [HTTPS://EN.WIKIPEDIA.ORG/WIKI/LIST\\_OF\\_HTTP\\_STATUS\\_CODES](https://en.wikipedia.org/wiki/List_of_HTTP_status_codes)

THE BODY TEXT OF THE RESPONSE WILL CONTAIN ALL OUTPUT RESULTS. THIS BODY TEXT RETURNED WILL BE JSON-FORMATTED.

THE HTTP CONTENT-TYPE IS "APPLICATION/JSON;CHARSET=UTF-8"

ABOUT JSON:

[HTTPS://EN.WIKIPEDIA.ORG/WIKI/JSON](https://en.wikipedia.org/wiki/JSON)

THE RESULTCODE VALUE WILL VERIFY THE SUCCESS OR FAILURE OF THE REQUEST. APPENDIX B LISTS ALL POSSIBLE RESULT CODES.

## Sample Response

```
{
  "passThroughGUID": "{GUIDfromRequest}",
  "outcome": {
    "resultCode": 2000,
    "resultCodeDesc": "Successfully retrieved",
    "routingJobID": "{fromRequest}",
    "routingJobStatus": "JobSucceeded"
  },
  "outputRoutes": [
    {
      "routeID": "123",
      "routeDisplayName": "Joe Smith",
      "totalMeters": 51981.81,
      "totalMiles": 32.3,
      "totalMinutes": 172.3,
      "routedItems": [
        {
          "stopType": 1,
          "stopID": "1",
          "stopDisplayName": "HQ",
          "latitudeY": 32.728328,
          "longitudeX": -117.171133,
          "itemSequence": 1,
          "stopSequence": "1",
          "serviceMinutes": 5,
          "violatedConstraints": "B,N",
          "violatedConstraintsText": "reason1|reason2"
        },
        ...
      ],
      "polyline": [
        {
          "latY": 32.48828,
          "lonX": -117.48828
        },
        ...
      ]
    },
    ...
  ],
  "unroutedItems": [
    {
      "stopType": 3,
      "stopID": "95753",
      "stopDisplayName": "Main Street Station",
      "latitudeY": 32.223328,
      "longitudeX": -117.564133,
      "violatedConstraints": "B,N",
      "violatedConstraintsText": "reason1|reason2"
    },
    ...
  ]
}
```



# RETRIEVE RESPONSE - CONTENT

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THE BODY TEXT OF THE RESPONSE WILL CONTAIN ALL OUTPUT RESULTS. THIS BODY TEXT RETURNED WILL BE JSON-FORMATTED.

## RESPONSE - GENERAL OUTPUT

Element name	Type	Description
passthroughGUID	string	A GUID provided to uniquely identify each request that is output in the response.
outputRoutes	(see below)	
unroutedItems	(see below)	
outputMessages	(see below)	

## RESPONSE-OUTCOME

Element name	Type	Description
resultCode	integer	See Appendix B for full information. The result code is specific to if the 'retrieve' service could complete as expected. Consult the routingJobStatus for information pertaining to the success of the internal routing job itself. If the status indicates the processing is ongoing then you can wait 10+ seconds and then perform the request again until the status finally indicates success or failure.
resultCodeDesc	string	Text that is a readable representation of the result code returned.
routingJobId	string	The 'submit' web service's response will provide you with this ID that then is supplied as input for your 'retrieve' request and subsequently passed-back within the response.
routingJobStatus	string	See Appendix C for full information. You should only utilize this value if the resultCode returned success.
routesCount	integer	Only routes that were assigned 1 or more route stops will be returned and included within this count.
routedStopsCount	integer	Stops only, not inclusive of depots, breaks, etc.
unroutedStopsCount	Integer	Stops only, not inclusive of depots, breaks, etc.

RESPONSE-OUTPUTROUTES

Element name	Type	Description
routeID	string (50)	
routeDisplayName	string (50)	
totalMeters	double	
totalMiles	double	
totalServiceMinutes	double	
totalDriveMinutes	double	
totalEarlyMinutes	double	Total minutes of early arrival accrued waiting for time windows to become available. Early minutes are unproductive but are a necessity at times as they are less costly than departing and returning.
totalBreakMinutes	double	
totalRefreshMinutes	double	Minutes, if any, spent refreshing the vehicle in terms of capacities filling or emptying.
totalMinutes	double	Service minutes + drive minutes + break minutes + early minutes + refresh minutes. Late minutes aren't included as they are noteworthy but don't actually accrue time.
totalLateMinutes	double	A note of the total minutes of lateness for time windows.
totalItemsCount	integer	Count of stops, breaks and depots in total on this route.
routedStopsCount	integer	Stops only for this route, not inclusive of depots, breaks, etc.
totalCapacityToDeliver1	double	
totalCapacityToPickUp1	double	
polyline	(See below)	

## RESPONSE - ROUTED ITEMS

Element name	Type	Description
stopID	string	
stopDisplayName	string	
stopType	integer	Valid values: <ul style="list-style-type: none"> <li>• 0 - None</li> <li>• 1 - Start Depot</li> <li>• 2 - End Depot</li> <li>• 3 - Stop</li> <li>• 4 - Break</li> <li>• 5 - Refresh</li> </ul>
latitudeY	double	Latitude portion of the geographic coordinate that was supplied with the request. Example: 32.708328
longitudeX	double	Longitude portion of the geographic coordinate that was supplied with the request. Example: -117.161133
itemSequence	integer	Present for all items including stops, depots, breaks, etc.
stopSequence	string	Only present for stopType = 3. This provides the sequenced value of the routed stops and only the routed stops.
serviceMinutes	double	The pass-through service minutes for a routed stop, or the break minutes for a break.
earlyArrivalMinutes	double	Minutes (if any) of early arrival awaiting a time window to become available.
lateArrivalMinutes	double	Minutes (if any) of late arrival in relation to the time window.
driveMinutesFromPrevious	double	
metersFromPrevious	double	
etaUTC	string	Estimated time of arrival in UTC time in <code>yyyymmdd hhmmss</code> .
etdUTC	string	Estimated time of departure in UTC time in <code>yyyymmdd hhmmss</code> .
etaEpochUTC	long	Estimated time of arrival in UTC time in epoch format. See Appendix A for time format information.
etdEpochUTC	long	Estimated time of departure in UTC time in epoch format. See Appendix A for time format information.
CapacityToDelivery	double	
capacityToPickUp	double	

## RESPONSE-POLYLINE



Note: The polyline is an array of coordinates that create a visual representation of each route path traveled.

Element name	Type	Description
latY	double	Latitude portion of the geographic coordinate that will, in totality, create a polyline to show the route shape. Example: 32.708328
lonX	double	Longitude portion of the geographic coordinate that will, in totality, create a polyline to show the route shape. Example: -117.161133

## RESPONSE – UNROUTEDITEMS

Element name	Type	Description
stopType	string	Valid values: <ul style="list-style-type: none"> <li>• 0 – None</li> <li>• 1 – Start Depot</li> <li>• 2 – End Depot</li> <li>• 3 – Stop</li> <li>• 4 – Break</li> <li>• 5 – Refresh</li> </ul>
stopID		
stopDisplayName		
latitudeY	double	Latitude portion of the geographic coordinate that was supplied with the request. Example: 32.708328
longitudeX	double	Longitude portion of the geographic coordinate that was supplied with the request. Example: -117.161133
violatedConstraints	string	(see appendix D) Comma delimited as there may be 1 or more responsible constraints.
violatedConstraintsText	string	(see appendix D) Pipe delimited as there may be 1 or more responsible constraints.

## RESPONSE – OUTPUTMESSAGES



Note: Messages are returned in an array (if any) and may exist for notes, warnings and errors.

Element name	Type	Description
messageType	string	
messageText	string	



# APPENDIX A – OUTPUT TIMES

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HANDLING TIMES IS TRICKY, MAINLY BECAUSE ROUTE PLANS CAN SPAN TIME ZONES. ROUTE PLANS CAN ALSO SPAN DAYS (PAST MIDNIGHT AND BEYOND). TIME OF DAY ALSO MATTERS FOR TRAFFIC-RELATED ASPECTS. THE SIMPLE SYSTEM DESCRIBED BELOW MUST BE USED FOR FORMATTING TIMES TO SAFEGUARD AGAINST ANY AMBIGUITY RELATED TO DATES AND TIMES.

PLEASE REVIEW THE ‘SUBMIT’ DOCUMENT FOR FULL INFORMATION ON THE FORMATTING AND EXAMPLES OF SPECIFIC INPUT TIMES. THE INPUT TIMES WILL INFLUENCE THE OUTPUT TIMES, OF COURSE. GENERALLY SPEAKING, ALL OUTPUT TIMES ARE PROVIDED IN UTC. IN MOST CASES THE OUTPUT TIMES ARE PROVIDED BOTH IN EPOCH (MACHINE-READABLE) AND TRADITIONAL (HUMAN-READABLE) FORMATS.

FOR CONVERTING VALUES TO/FROM EPOCH, YOU MAY WISH TO UTILIZE THIS WEBSITE AS A RESOURCE: [HTTPS://WWW.EPOCHCONVERTER.COM/](https://www.epochconverter.com/)



# APPENDIX B – RESULT CODES

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## RESULTCODES

Result Code	Value	Notes
SuccessfullyRetrieved	2000	Not to be confused with the http result code of 200.
NotProcessed	0	
ErrorNoAPIKeySupplied	1	
ErrorInvalidAPIKeySupplied	2	
ErrorNoRoutingJobIDSupplied	3	
ErrorInvalidRoutingJobIDSupplied	4	
ErrorInvalidRequestSupplied	10	Please verify your JSON data is in valid format.
ErrorDuringPreValidation	20	General error when validating input data.
ErrorDuringRoutingJobStatusDetermination	25	Internal
ErrorReturnedForRoutingJob	26	Internal
ErrorDuringRoutingJobStatusDeterminationHandling	27	Internal
ErrorDuringProcessingJobStatusCheck	28	Internal
ErrorDuringProcessingRetrievingResultStops	29	Internal
ErrorReturnedForRoutingJobFetchStopsPortion	30	Internal
ErrorDuringFetchingStopsHandling	31	Internal
ErrorDuringFetchStopsProcedure	32	Internal
ErrorDuringSortingReturnStops	33	Internal
ErrorDuringInternalProcessingWhileRetrievingResultStops	34	Internal
ErrorDuringProcessingRetrievingRouteSummaryInfo	40	Internal
ErrorDuringInternalProcessingWhileRetrievingResultRoutesSummaryInfo	41	Internal
ErrorReturnedForRoutingJobFetchRouteSummaryPortion	42	Internal
ErrorDuringFetchingRouteSummaryHandling	43	Internal

ErrorDuringFetchRouteSummaryProcedure	44	Internal
ErrorDuringFetchRouteGeometryProcedure	54	Internal
ErrorDuringProcessingWhileRetrievingUnrouted	60	Internal
ErrorReturnedForRoutingJobFetchUnroutedPortion	61	Internal
ErrorDuringFetchingUnroutedStopsHandling	62	Internal
ErrorDuringFetchUnroutedStopsProcedure	63	Internal

# APPENDIX C – ROUTING JOB STATUS CODES

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## ROUTINGJOBSTATUS CODES

Result Text	Notes
failedToProcess	Check output messages and unrouted stops constraint violations for additional information.
stillProcessing	Please wait at least 10 seconds before trying again.
completedSuccessfully	

# APPENDIX D – VIOLATED CONSTRAINT CODES

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## VIOLATEDCONSTRAINTS

Result Code	Readable Constraint
A	Unknown constraint.
B	Break maximum work time violation.
C	Break maximum travel time violation.
D	Refresh could not be inserted along target route without introducing constraint violations.
E	Break could not be inserted along target route without introducing constraint violations.
F	Stop is unreachable from previous stop.
G	Stop cannot be routed due to constraint violation on paired stop.
H	Stop pair constraint violation.
I	Stop does not fall within the hard route zone of the target route(s).
J	Rules required by an order were not found on any target route(s).
K	Stop, depot, refresh, or break hard time window constraint violation.
L	Route MaxTotalDistance constraint violation.
M	Route MaxTotalTravelTime constraint violation.
N	Route MaxTotalTime constraint violation.
O	Route Capacities constraint violation.
P	Route MaxOrderCount constraint violation.

# APPENDIX E – END USER LICENSE AGREEMENT (EULA)

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