```
##### Libraries #####
{
  library(lubridate)
  library(readr)
  library(tidyverse)
  library(formattable)
  library(htmltools)
  library(htmlwidgets)
  library(webshot2)
  library(osmdata)
  library(sf)
  library(leaflet)
  library(ggmap)
}
```

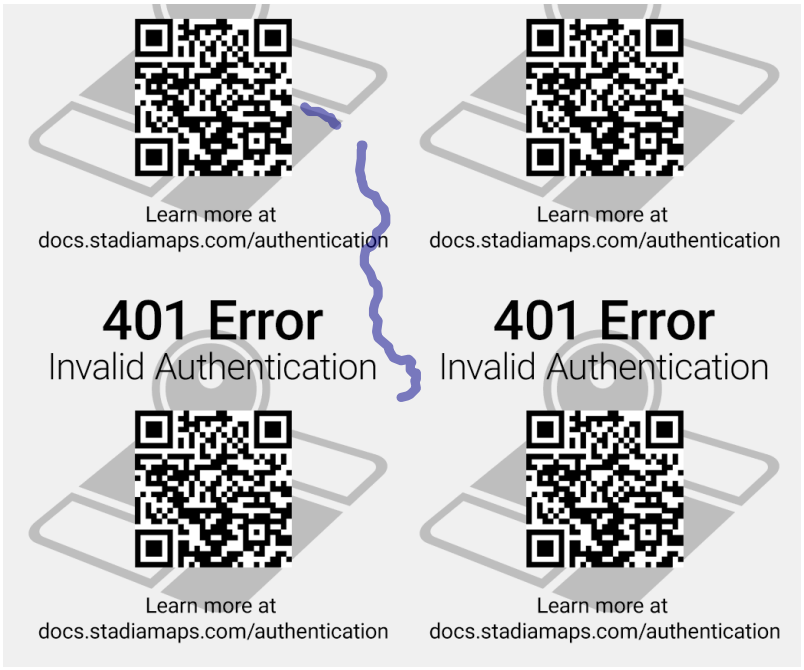
```
##
## Attaching package: 'lubridate'
```

```
## The following objects are masked from 'package:base':
##
##     date, intersect, setdiff, union
```

```
## -- Attaching core tidyverse packages ------------------------ tidyverse 2.0.0 --
## v dplyr   1.1.4     v stringr 1.5.1
## v forcats 1.0.0     v tibble  3.2.1
## v ggplot2 3.5.1     v tidyr   1.3.1
## v purrr   1.0.2
## -- Conflicts ------------------------------------------ tidyverse_conflicts() --
## x dplyr::filter() masks stats::filter()
## x dplyr::lag()    masks stats::lag()
## i Use the conflicted package (<http://conflicted.r-lib.org/>) to force all conflicts to become errors
## Data (c) OpenStreetMap contributors, ODbL 1.0. https://www.openstreetmap.org/copyright
##
## Linking to GEOS 3.12.1, GDAL 3.8.4, PROJ 9.3.1; sf_use_s2() is TRUE
##
## i Google's Terms of Service: <https://mapsplatform.google.com>
##   Stadia Maps' Terms of Service: <https://stadiamaps.com/terms-of-service/>
##   OpenStreetMap's Tile Usage Policy: <https://operations.osmfoundation.org/policies/tiles/>
## i Please cite ggmap if you use it! Use `citation("ggmap")` for details.
```

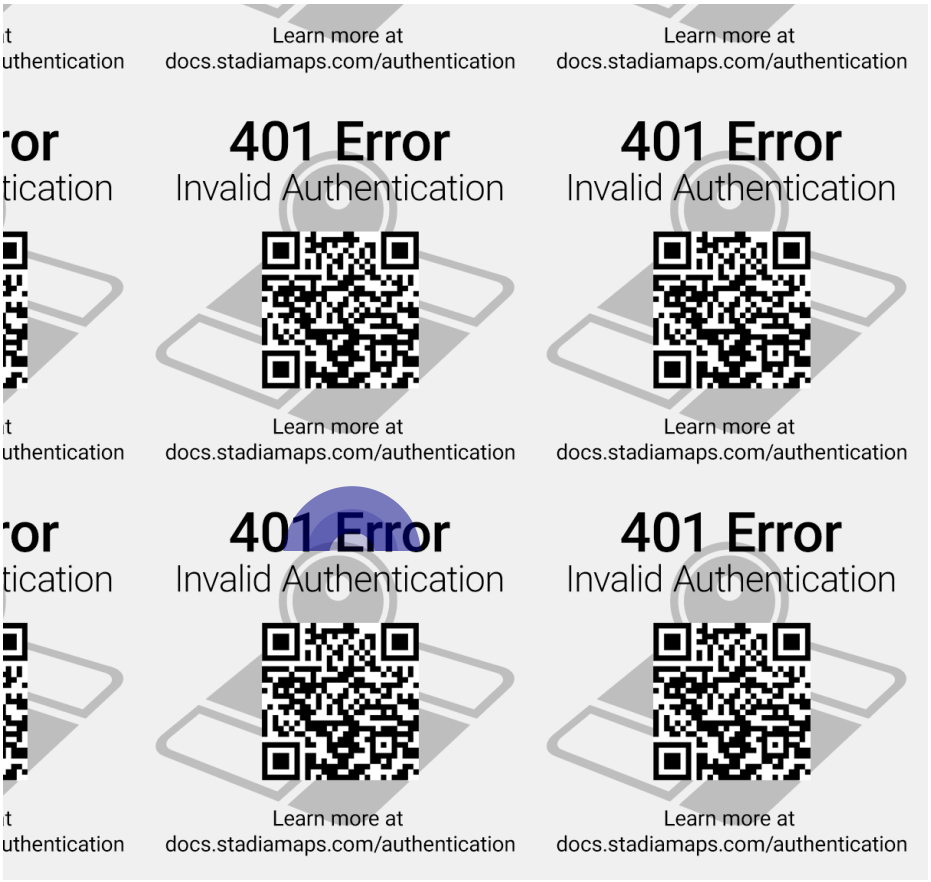
```
##### Load Data #####
luke1 <- (opq(bbox = "Europe") |>
  add_osm_feature(key = "name", value = "Luke Brook") |>
  osmdata_sf())$osm_lines |>
  select(-c(osm_id, layer, tunnel))

luke1.5 <- (opq_osm_id(type = "way", id = c(750121826, 323363094)) |>
  opq_string () |>
  osmdata_sf ())$osm_lines |>
  select(-c(layer, source, tunnel)) |>
  mutate(name = "Luke Brook") |>
  relocate(name, .before = waterway)
```

```
luke2 <- (opq(bbox = "America") |>
  add_osm_feature(key = "name", value = "Luke Brook") |>
  osmdata_sf())$osm_lines |>
  select(-c(osm_id, source, layer, tunnel))

luke2.5 <- (opq_osm_id(type = "way", id = c(152749107, 152749181, 152749223, 152749151)) |>
  opq_string () |>
  osmdata_sf ())$osm_lines |>
  select(-c(source)) |>
  mutate(name = "Luke Brook") |>
  relocate(name, .before = waterway)

luke_brook <- rbind(luke1, luke1.5, luke2, luke2.5) |>
  distinct(name, waterway, geometry) |>
  rownames_to_column("osm_id") |>
  mutate(group = c(1,1,1,1,1,1,2,2,3,3,3,3,3),
         length = st_length(geometry)) |>
  group_by(name, waterway, group) |>
  summarise(geometry = st_union(geometry),
            length = sum(length),
            LB_length = length / 1.8,
            .groups = "drop") |>
  mutate(centre = st_centroid(geometry))

##### Maps #####
# Map 1 - Britain #
map1 <- leaflet(options = leafletOptions(zoomControl = FALSE)) |>
  addProviderTiles(providers$Stadia.Outdoors) |>
  addPolylines(data = luke_brook[1,],
               weight = 6,
               color =  "#00008B",
               label = "Luke Brook, Marstow, Herefordshire, England, United Kingdom",
               smoothFactor = 0)
map1
```



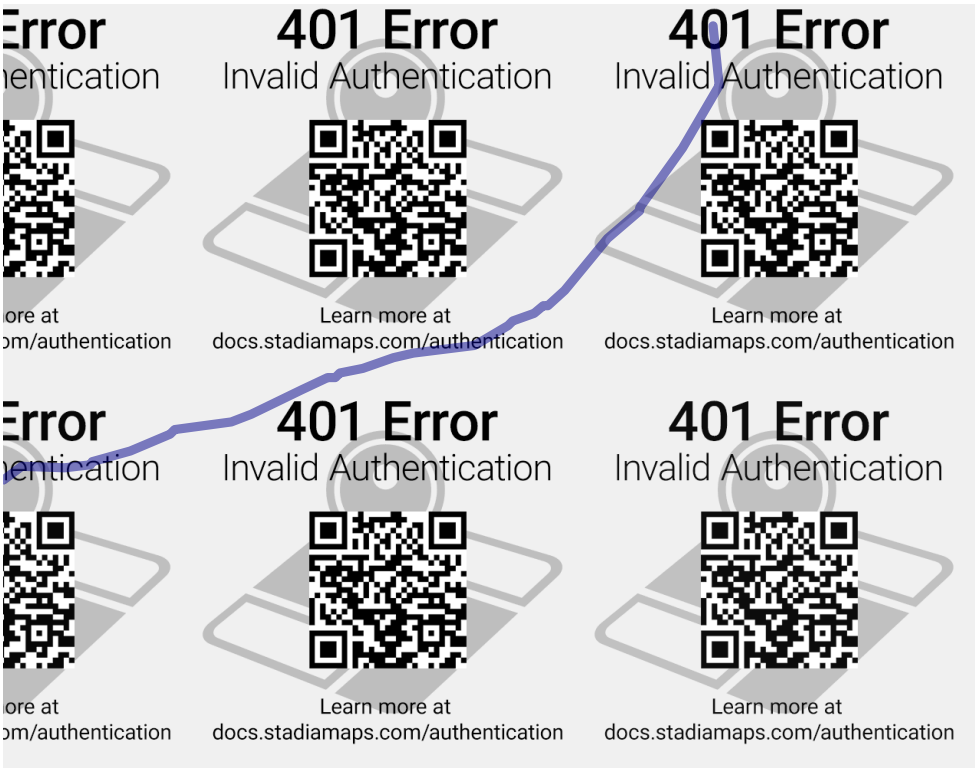

```
map1_inset <-leaflet(options = leafletOptions(zoomControl = FALSE)) |>
  addProviderTiles(providers$Stadia.Outdoors) |>
```

```
  addCircleMarkers(data = (luke_brook |> st_drop_geometry() |> st_set_geometry("centre"))[1,],
                   weight = 30,
                   radius = 30,
                   color =  "#00008B") |>
  setView(lng = -2.5, lat = 54.5, zoom = 6)
map1_inset
```




```
#
# saveWidget(map1, "plots/luke_brooks/map1.html", selfcontained = FALSE)
```

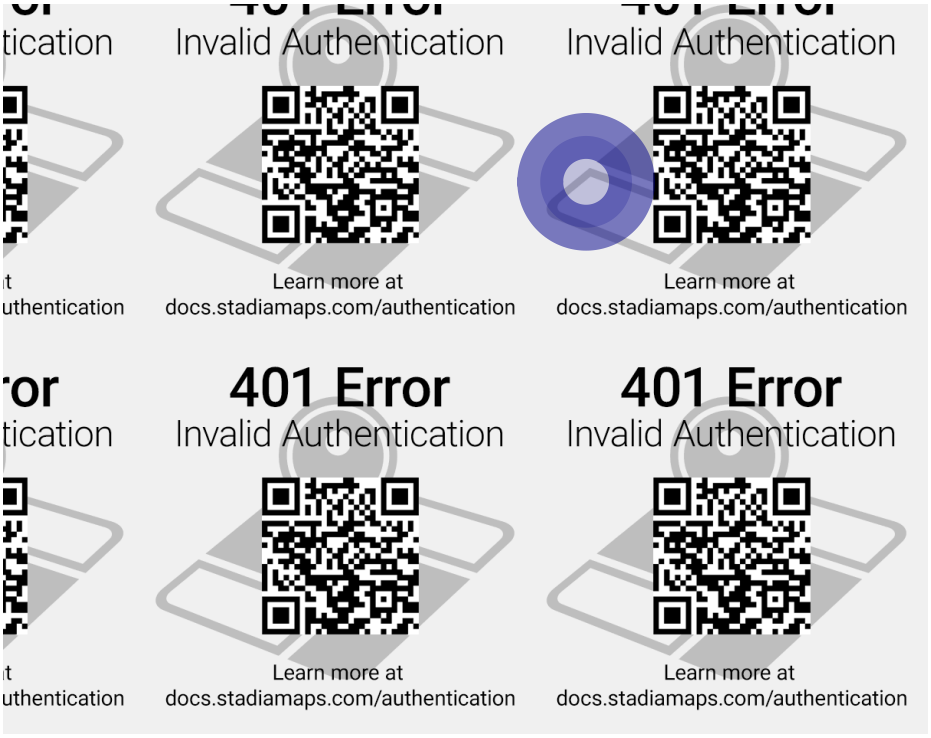
```r
# webshot(url = "plots/luke_brooks/map1.html",
#         file = "plots/luke_brooks/map1.png",
#         delay = 1, zoom = 5,
#         vwidth = 535)

map2 <- leaflet(options = leafletOptions(zoomControl = FALSE)) |>
  addProviderTiles(providers$Stadia.Outdoors) |>
  addPolylines(data = luke_brook[2,],
               weight = 6,
               color =  "#00008B",
               label = "Luke Brook, Saint-Paul Parish, Kent County, New Brunswick, Canada",
               smoothFactor = 0)
map2
```



Leaflet | © Stadia Maps © OpenMapTiles © OpenStreetMap contributors

```
map2_inset <-leaflet(options = leafletOptions(zoomControl = FALSE)) |>
  addProviderTiles(providers$Stadia.Outdoors) |>
```

```
  addCircleMarkers(data = (luke_brook |> st_drop_geometry() |> st_set_geometry("centre"))[2,],
                   weight = 30,
                   radius = 30,
                   color =  "#00008B") |>
  setView(lng = -70, lat = 46, zoom = 6)
map2_inset
```



Leaflet | © Stadia Maps © OpenMapTiles © OpenStreetMap contributors

```
map3 <- leaflet(options = leafletOptions(zoomControl = FALSE)) |>
  addProviderTiles(providers$Stadia.Outdoors) |>
```

```
  addPolylines(data = luke_brook[3,],
               weight = 6,
               color =  "#00008B",
               label = "Luke Brook, Stanley Parish, New Brunswick, Canada",
               smoothFactor = 0)
map3
```


```
map3_inset <-leaflet(options = leafletOptions(zoomControl = FALSE)) |>
  addProviderTiles(providers$Stadia.Outdoors) |>
```

```
  addCircleMarkers(data = (luke_brook |> st_drop_geometry() |> st_set_geometry("centre"))[3,],
                   weight = 30,
                   radius = 30,
                   color =  "#00008B") |>
  setView(lng = -70, lat = 46, zoom = 6)
map3_inset
```