

Working with Geography: Los Angeles Gang Injunction Maps and Crime

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This coding exercise was from University of Pennsylvania's Criminal Justice Data Science Course taught by Dr. Gregory Ridgeway. Script has been modified from course examples to fit personal notation conventions. California city shapes, California Census tracts, and Los Angeles County Rods were acquired from the Census website. Los Angeles Safety Zones shapefiles were obtained by the Dr. Gregory K. Ridgeway from the Los Angeles City Attorney's Office. The 2014 crime data was taken from the Los Angeles Open Data website.

Key skills: Managing Spatial Data, Manipulating Spatial Object, Accessing Data Through JSON, Merging ACS/LAPD/Gang Injunction Data/Census TIGER files

Exploring Los Angeles Gang Injunction/Safety Zone Maps

Data Wrangling

Load map and packages

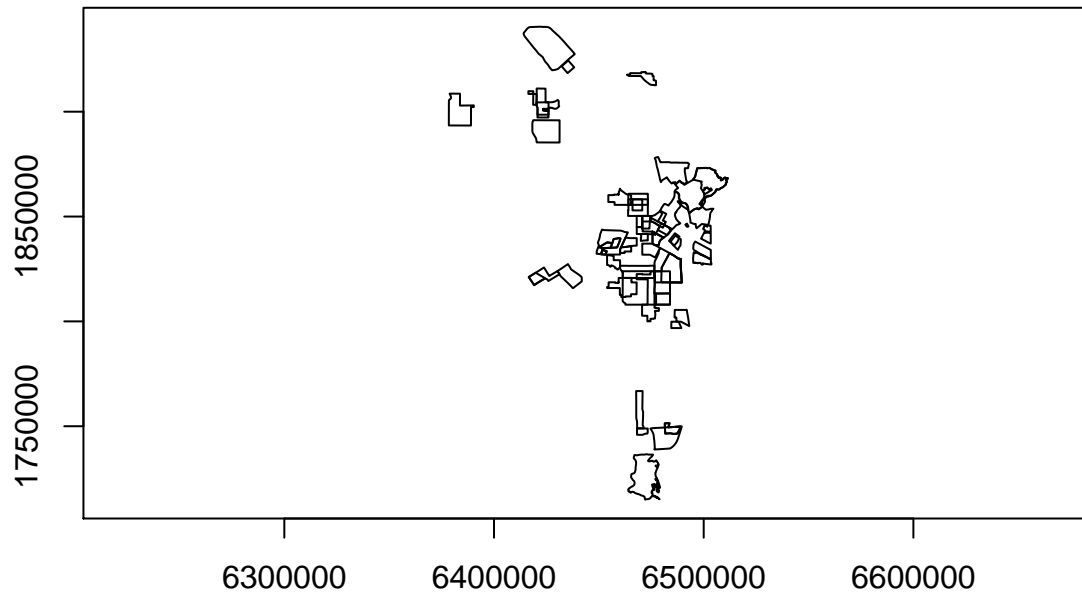
```
# Load packages
library(sf)
library(lubridate)

# Load Map
map_sz <- st_read("allinjunctions/allinjunctions.shp")

## Reading layer `allinjunctions' from data source `/Users/leng/Dropbox (Personal)/Programming/OG Github
## Simple feature collection with 65 features and 13 fields
## geometry type:  POLYGON
## dimension:      XY
## bbox:           xmin: 6378443 ymin: 1715015 xmax: 6511590 ymax: 1940541
## epsg (SRID):    2229
## proj4string:     +proj=lcc +lat_1=35.46666666666667 +lat_2=34.03333333333333 +lat_0=33.5 +lon_0=-118
```

Plot the geometry of the shapefile

```
plot(st_geometry(map_sz))
axis(1); axis(2); box() #add x and y axis for scale
```



View the map projection of the shapefile

```
st_crs(map_sz)
```

```
## Coordinate Reference System:
```

```
## EPSG: 2229
```

```
## proj4string: "+proj=lcc +lat_1=35.46666666666667 +lat_2=34.03333333333333 +lat_0=33.5 +lon_0=-118"
```

Examine the data attached to each polygon

```
map_sz[1:3,]
```

```
## Simple feature collection with 3 features and 13 fields
```

```
## geometry type: POLYGON
```

```
## dimension: XY
```

```
## bbox: xmin: 6378443 ymin: 1893403 xmax: 6438243 ymax: 1924413
```

```
## epsg (SRID): 2229
```

```
## proj4string: "+proj=lcc +lat_1=35.46666666666667 +lat_2=34.03333333333333 +lat_0=33.5 +lon_0=-118"
```

```
## AREA PERIMETER GANG_INJ11 GANG_INJ_1 SHADESYM NAME Inj_
```

```
## 1 18152790 17048.67 2 9 8 Foothill 09
```

```
## 2 11423653 20863.36 3 1 760 Langdon Street 04
```

```
## 3 129459650 54419.87 4 11 140 Canoga Park 11
```

```
## case_no Safety_Zn LAPD_Div Pre_Date Perm_Date
```

```
## 1 PC027254 Foothill Foothill <NA> Aug. 22, 2001
```

```
## 2 LC048292 Langdon Street Devonshire May 20, 1999 Feb. 17, 2000
```

```
## 3 BC267153 Canoga Park West Valley Feb. 25, 2002 April 24, 2002
```

```
## gang_name geometry
```

```
## 1 Pacoima Project Boys POLYGON ((6435396 1924413, ...
```

```
## 2 Langdon Street POLYGON ((6418722 1908442, ...
```

```
## 3 Canoga Park Alabama POLYGON ((6379791 1908614, ...
```

Extract coordinates of the first injunction

```
st_coordinates(map_sz[1,])
```

```
##           X           Y L1 L2
## [1,] 6435396 1924413  1  1
## [2,] 6435607 1924174  1  1
## [3,] 6435792 1923960  1  1
## [4,] 6435872 1923867  1  1
## [5,] 6436158 1923545  1  1
## [6,] 6436349 1923325  1  1
## [7,] 6437295 1922239  1  1
## [8,] 6438231 1921163  1  1
## [9,] 6438243 1921150  1  1
## [10,] 6437992 1920931  1  1
## [11,] 6437743 1920714  1  1
## [12,] 6437495 1920498  1  1
## [13,] 6437246 1920282  1  1
## [14,] 6436874 1919958  1  1
## [15,] 6436472 1919608  1  1
## [16,] 6435940 1919144  1  1
## [17,] 6435771 1918998  1  1
## [18,] 6435633 1918878  1  1
## [19,] 6435311 1918597  1  1
## [20,] 6435143 1918451  1  1
## [21,] 6435086 1918401  1  1
## [22,] 6434689 1918857  1  1
## [23,] 6434139 1919485  1  1
## [24,] 6433857 1919808  1  1
## [25,] 6433742 1919938  1  1
## [26,] 6433189 1920572  1  1
## [27,] 6433040 1920743  1  1
## [28,] 6432908 1920894  1  1
## [29,] 6432706 1921120  1  1
## [30,] 6432500 1921348  1  1
## [31,] 6432467 1921385  1  1
## [32,] 6432279 1921596  1  1
## [33,] 6432227 1921658  1  1
## [34,] 6432296 1921718  1  1
## [35,] 6432466 1921866  1  1
## [36,] 6433399 1922679  1  1
## [37,] 6433404 1922683  1  1
## [38,] 6433857 1923073  1  1
## [39,] 6434399 1923545  1  1
## [40,] 6434790 1923885  1  1
## [41,] 6434822 1923914  1  1
## [42,] 6435396 1924413  1  1
```

Clean up dates

```

map_sz$Pre_Date <- as.character(map_sz$Pre_Date)
map_sz$Pre_Date <- gsub("Jne", "June", map_sz$Pre_Date)
map_sz$Pre_Date <- gsub("Sept\\.", "September", map_sz$Pre_Date)
map_sz$Pre_Date <- mdy(map_sz$Pre_Date)
map_sz$Perm_Date <- as.character(map_sz$Perm_Date)
map_sz$Perm_Date <- gsub("Sept\\.", "September ", map_sz$Perm_Date)
map_sz$Perm_Date <- mdy(map_sz$Perm_Date)
map_sz$startDate <- pmin(map_sz$Pre_Date, map_sz$Perm_Date, na.rm = TRUE)

```

Combine overlapping injunctions into one polygon

```

# Combine polygons
map_sz_union <- st_union(map_sz)

# Check map units
st_crs(map_sz_union)$units

```

```
## [1] "us-ft"
```

Plot combined polygon with a buffer zone that is within 500 feet of an injunction

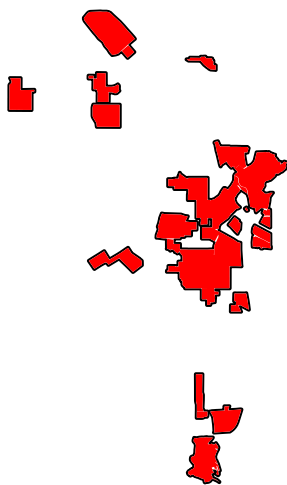
```

# Create buffer zone
map_sz_500 <- st_buffer(map_sz_union, dist=500)

# Plot buffer zone
plot(st_geometry(map_sz_500))

# "Fill in" the combined injunction polygon in red
plot(st_geometry(map_sz_union), col="red", border=NA, add=TRUE)

```



Create MS-13 Injunction Shapefiles

Double-check the LA City Attorney's Office website with the correct injunction posted on its website.

```

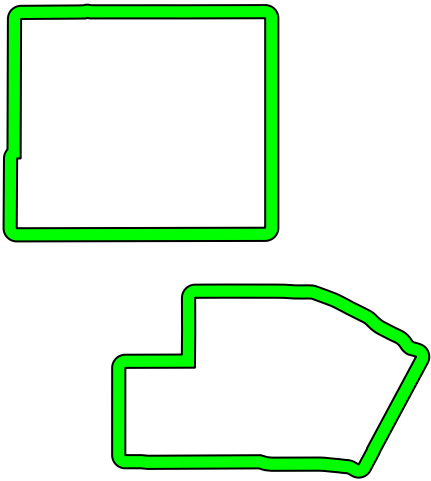
# Subset MS-13 data
map_ms13 <- subset(map_sz, case_no=="BC311766")

# Combine polygons
a <- st_union(map_ms13)

# Add back data
map_ms13 <- st_sf(map_ms13[1,c("NAME", "case_no", "Safety_Zn", "gang_name", "startDate")],
                  geometry=a)

# Plot MS-13 gang injunction safety zone and add 500ft buffer
map_ms13_buff <- st_difference(st_geometry(st_buffer(map_ms13, dist=500)),
                              st_geometry(map_ms13))
plot(st_geometry(map_ms13_buff), col="green")

```



Merge LA City Gang Injunction and US Census Tract (TIGER) Shapefiles

Extract outline of the city of Los Angeles from California Shapefile

```

# Load TIGER shapefiles
map_ca <- st_read("tl_2014_06_place/tl_2014_06_place.shp") # california state polygon

## Reading layer `tl_2014_06_place' from data source `/Users/leng/Dropbox (Personal)/Programming/OG Git
## Simple feature collection with 1516 features and 16 fields
## geometry type:  MULTIPOLYGON
## dimension:      XY
## bbox:           xmin: -124.2695 ymin: 32.53417 xmax: -114.229 ymax: 41.99323
## epsg (SRID):    4269
## proj4string:     +proj=longlat +ellps=GRS80 +towgs84=0,0,0,0,0,0,0 +no_defs

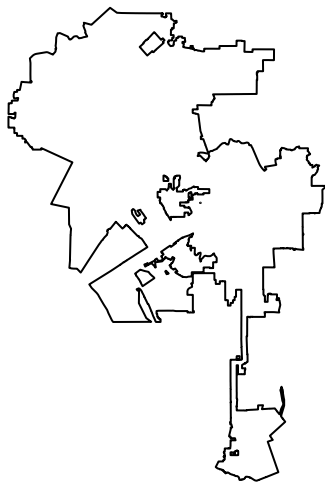
map_tract <- st_read("tl_2014_06_tract/tl_2014_06_tract.shp") # california census tracts polygon

```

```
## Reading layer `tl_2014_06_tract' from data source `~/Users/leng/Dropbox (Personal)/Programming/OG Git
## Simple feature collection with 8057 features and 12 fields
## geometry type:  MULTIPOLYGON
## dimension:      XY
## bbox:           xmin: -124.482 ymin: 32.52883 xmax: -114.1312 ymax: 42.00952
## epsg (SRID):    4269
## proj4string:     +proj=longlat +ellps=GRS80 +towgs84=0,0,0,0,0,0 +no_defs
```

```
# Extract LA city outline from CA shapefile
map_la <- subset(map_ca, NAMELSAD=="Los Angeles city")

# Plot LA city polygon
plot(st_geometry(map_la))
```



Coordinate map projections for each shapefile

```
# Check projections
st_crs(map_la) # longitude/latitude
```

```
## Coordinate Reference System:
##   EPSG: 4269
##   proj4string: "+proj=longlat +ellps=GRS80 +towgs84=0,0,0,0,0,0 +no_defs"
```

```
st_crs(map_tract) # longitude/latitude
```

```
## Coordinate Reference System:
##   EPSG: 4269
##   proj4string: "+proj=longlat +ellps=GRS80 +towgs84=0,0,0,0,0,0 +no_defs"
```

```
st_crs(map_sz) # lambert conformal conic
```

```
## Coordinate Reference System:
##   EPSG: 2229
##   proj4string: "+proj=lcc +lat_1=35.46666666666667 +lat_2=34.03333333333333 +lat_0=33.5 +lon_0=-118 +no_defs"
```

```
# Turn map projections into LCC projection
map_tract <- st_transform(map_tract, crs=st_crs(map_sz))
map_la <- st_transform(map_la, crs=st_crs(map_sz))
```

Merge LA City and Census Tract shapefiles

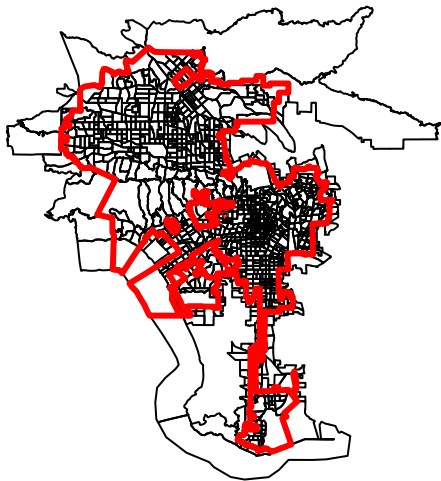
Determine which census tract intersects with LA map

```
# List of census tracts that intersect with map_la (only 1)
a <- st_intersects(map_la, map_tract)

# Create new column in map_tract to indicate if it's in LA
map_tract$inLA <- FALSE
map_tract$inLA[a[[1]]] <- TRUE
```

Create LA city shapefile with census tracts

```
map_la_tract <- subset(map_tract, inLA)
plot(st_geometry(map_la_tract))
plot(st_geometry(map_la), add=TRUE, border="red", lwd=3)
```



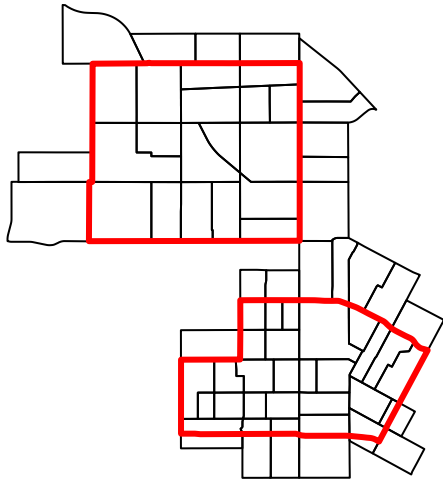
Merge LA map with census tracts with MS-13 injunction map

```
# Create a TRUE / FALSE indicate of whether a tract is in MS-13
st_intersects(map_ms13, map_la_tract)
```

```
## Sparse geometry binary predicate list of length 1, where the predicate was `intersects'
## 1: 8, 9, 10, 11, 12, 49, 72, 78, 79, 80, ...
```

```
map_la_tract$inMS13 <- FALSE
map_la_tract$inMS13[st_intersects(map_ms13, map_la_tract)[[1]]] <- TRUE

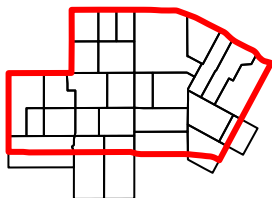
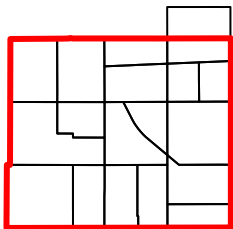
# Merge shape files
plot(st_geometry(subset(map_la_tract, inMS13)))
plot(st_geometry(map_ms13), border="red", lwd=3, add=TRUE)
```



Remove census tracts not in the MS-13 safety zone

```
i <- st_intersects(st_buffer(map_ms13, dist = -200), map_la_tract)[[1]]
map_la_tract$inMS13 <- FALSE
map_la_tract$inMS13[i] <- TRUE

# Merge shape files
plot(st_geometry(subset(map_la_tract, inMS13)))
plot(st_geometry(map_ms13), border="red", lwd=3, add=TRUE)
```



Merge in Demographic Data from the American Community Survey

Access ACS data via Javascript Object Notation (JSON)

For each census tract in LA County, extract total population (B03002001), number of non-Hispanic white residents (B03002003), non-Hispanic black residents (B03002004), and Hispanic residents (B03002012).

```
# Load relevant packages
library(jsonlite)

# Total Number of People by Specific Census Tracts
acs_race <- fromJSON("https://api.census.gov/data/2017/acs/acs5?get=B03002_001E,B03002_003E,B03002_004E,B03002_012E")

# Convert into data frame
a <- data.frame(acs_race[-1,], stringsAsFactors = FALSE)
names(a) <- acs_race[1,]
names(a)[1:4] <- c("total", "white", "black", "hisp")
acs_race <- a
for(i in c("total", "white", "black", "hisp"))
  acs_race[[i]] <- as.numeric(acs_race[[i]])

# Add column of resident of other race groups
acs_race$other <- with(acs_race, total-white-black-hisp)
```

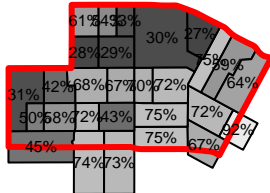
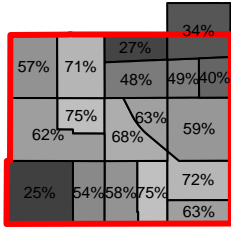
Add race information to MS-13 injunction data

```
# Match tract IDs and merge in percent hispanic
i <- match(map_la_tract$TRACTCE, acs_race$tract)
map_la_tract$pctHisp <- with(acs_race[i,], ifelse(total > 0 & !is.na(hisp), hisp/total, 0))
```

Plot and format of percent hispanic residents within MS-13 safety zone by census tract

```
# Format shading by percentage
col <- with(map_la_tract, gray(pctHisp[inMS13]))
plot(st_geometry(subset(map_la_tract, inMS13)), col = col)
plot(st_geometry(map_ms13), border = "red", lwd = 3, add = TRUE)

# Text overlay
labs <- with(map_la_tract, paste0(round(100*pctHisp[inMS13]), "%"))
text(st_coordinates(st_centroid(subset(map_la_tract, inMS13))),
     labels = labs,
     cex = 0.5)
```



Working with Point Data Using LA Crime Data

Data Management of Data Taken from LA Open Data Portal

```
# Load file
crime_data<- read.csv("LAPD_Crime_and_Collision_Raw_Data_-_2014.csv.gz",
                      as.is=TRUE)

# Locate any geospatial variables
names(crime_data)

## [1] "Date.Rptd"      "DR.NO"          "DATE.OCC"       "TIME.OCC"       "AREA"
## [6] "AREA.NAME"     "RD"             "Crm.Cd"         "Crm.Cd.Desc"    "Status"
## [11] "Status.Desc"   "LOCATION"        "Cross.Street"   "Location.1"

# Extract latitude and longitude information
a <- gsub("[()]", "", crime_data$Location.1)
crime_data$lat <- as.numeric(gsub(".*", "", a))
crime_data$lon <- as.numeric(gsub("[^,]*", "", a))
crime_data$Location.1 <- NULL
crime_data <- subset(crime_data, !is.na(lat))
```

Convert data frame into a simple features spatial object

```
# Set to latitude/longitude coordinate system
crime_data <- st_as_sf(crime_data,
                      coords = c("lon", "lat"),
                      crs = 4326)

# Set to the same coordinate system as the MS-13 map
crime_data <- st_transform(crime_data, st_crs(map_ms13))
```

Identify crime data occurring within 1 mile of MS-13 injunction.

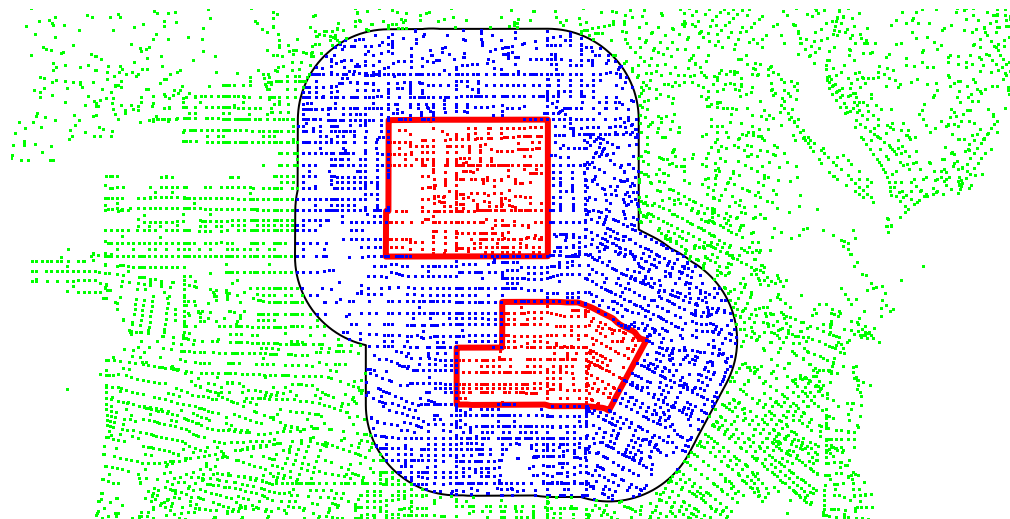
Subset LAPD areas (1,2,3,6,7, and 20) that intersected with MS-13 safety zone.

```
crime_ms13 <- subset(crime_data, AREA %in% c(1,2,3,6,7,11,20))
```

Create variable to code location around MS-13 injunction (within safety zone, buffer, and outside)

```
# create variable to label crime's location
crime_ms13$place1 <- "outside"
i <- st_intersects(map_ms13, crime_ms13)[[1]]
crime_ms13$place1[i] <- "SZ"
i <- st_intersects(st_difference(st_buffer(map_ms13, dist = 5280), map_ms13), crime_ms13)[[1]]
crime_ms13$place1[i] <- "buffer"

# plot to see if correctly labeled
plot(st_geometry(st_buffer(map_ms13, dist = 5280)))
plot(st_geometry(map_ms13), border = "red", lwd = 3, add = TRUE)
plot(st_geometry(subset(crime_ms13, place1 == "SZ")), pch = ".", col = "red", add = TRUE)
plot(st_geometry(subset(crime_ms13, place1 == "buffer")), pch = ".", col = "blue", add = TRUE)
plot(st_geometry(subset(crime_ms13, place1 == "outside")), pch = ".", col = "green", add = TRUE)
```



```
# combine geometries of three polygons
map_a <- c(st_geometry(map_ms13),
           st_geometry(st_difference(st_buffer(map_ms13, dist = 5280), map_ms13)),
           st_geometry(st_difference(st_buffer(map_ms13, dist = 80*5280), st_buffer(map_ms13, dist = 5280))))

# create sf object
map_a <- st_sf(place2 = c("SZ", "buffer", "outside"), geom = map_a)
crime_ms13 <- st_join(crime_ms13, map_a)
```

Creating New Geographic Objects

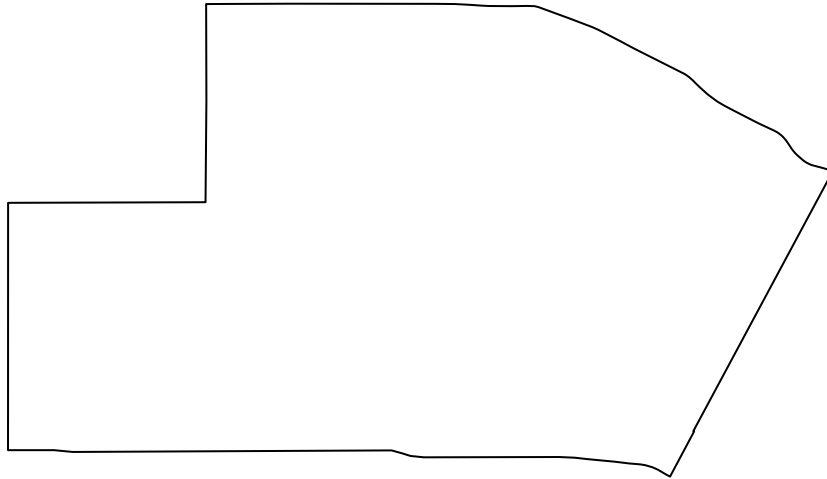
Extract the Southern Component of the MS-13 Map

```
# get sf object information
is(st_geometry(map_ms13))

## [1] "sfc_MULTIPOLYGON" "sfc"          "oldClass"

# break apart multipolygon object into polygons
a <- st_cast(map_ms13, "POLYGON")

# store southern polygon
ms13_south <- a[1,]
plot(st_geometry(ms13_south))
```



Overlaying a Street Map

Merge TIGER maps with streets with injunction map

```
# load TIGER line file
la_street <- st_read("tl_2014_06037_roads/tl_2014_06037_roads.shp")

## Reading layer `tl_2014_06037_roads' from data source `/Users/leng/Dropbox (Personal)/Programming/OG
## Simple feature collection with 142641 features and 4 fields
## geometry type:  MULTILINESTRING
## dimension:      XY
## bbox:           xmin: -118.9445 ymin: 32.80628 xmax: -117.6497 ymax: 34.8233
## epsg (SRID):    4269
## proj4string:     +proj=longlat +ellps=GRS80 +towgs84=0,0,0,0,0,0,0 +no_defs
```

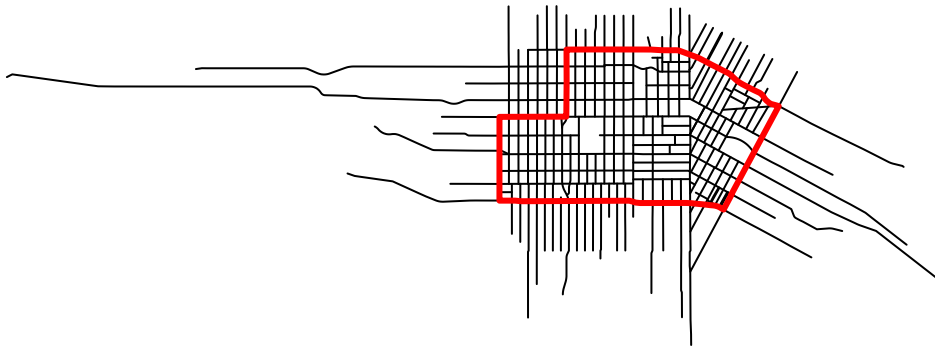
```

# use the same projection as a the injunction map
la_street <- st_transform(la_street, st_crs(ms13_south))

# extract only the streets that instersect with the MS-13 south safety zone
la_street$inSZ <- FALSE
i <- st_intersects(ms13_south, la_street)[[1]]
la_street$inSZ[i] <- TRUE
ms13_south_st <- subset(la_street, inSZ)

# plot
plot(st_geometry(ms13_south_st))
plot(st_geometry(ms13_south), border = "red", lwd = 3, add = TRUE)

```



Add street names

Function on where and what angle to place street names

```

# extract coords for every street segment
a <- lapply(st_geometry(ms13_south_st), st_coordinates)

# get x,y, and angle for each street segment
labs <- sapply(a, function(coord)
{
  # which parts of the street are inside MS13 safety zone
  i <- which((coord[, "X"] > st_bbox(ms13_south_st)["xmin"] &
    (coord[, "X"] < st_bbox(ms13_south_st)["xmax"] &
    (coord[, "Y"] > st_bbox(ms13_south_st)["ymin"] &
    (coord[, "Y"] < st_bbox(ms13_south_st)["ymax"])))

  # don't select the last one, too close to the edge
  i <- setdiff(i, nrow(coord))
  # if none are in bounding box just use the first coordinate
  if(length(i)==0) i <- 1
  # randomly choose a point on the street for the label
  i <- sample(i, size=1)
  # compute the slope of the street, change in y/change in x
  streetSlope <- (coord[i+1,2]-coord[i,2]) / (coord[i+1,1]-coord[i,1])
  # compute the angle of the slope with the arc-tangent
  angle <- atan(streetSlope)
  # atan() returns radians, convert to degrees

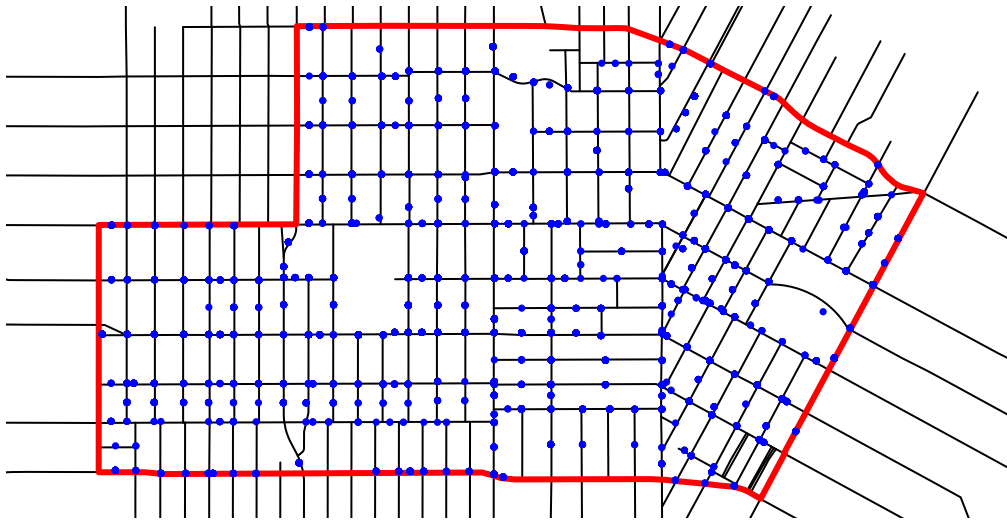
```



```

i <- st_intersects(ms13_south, crime_ms13)[[1]]
crime_ms13_south <- crime_ms13[i,]
plot(st_geometry(ms13_south), border = "red", lwd = 1)
plot(st_geometry(ms13_south_st), add = TRUE)
plot(st_geometry(ms13_south), border = "red", lwd = 3, add = TRUE)
plot(st_geometry(crime_ms13_south),
      add = TRUE, col = "blue", pch = 16, cex = 0.5)

```



Compute the distance for each point to the closest street in ms13_south_st

```

d <- st_distance(crime_ms13_south, ms13_south_st)
dim(d) # row for each crime, column for each street

```

```
## [1] 5288 136
```

```

# for each row (crime) find out which column (street)
iClose <- apply(d, 1, which.min)

# for the first crime check that the original address is similar to closest street
crime_ms13_south[1,]

```

```

## Simple feature collection with 1 feature and 16 fields
## geometry type: POINT
## dimension: XY
## bbox: xmin: 6477078 ymin: 1846700 xmax: 6477078 ymax: 1846700
## epsg (SRID): 2229
## proj4string: +proj=lcc +lat_1=35.46666666666667 +lat_2=34.03333333333333 +lat_0=33.5 +lon_0=-118
## Date.Rptd DR.NO DATE.OCC TIME.OCC AREA AREA.NAME RD Crm.Cd
## 31 08/23/2014 140216309 08/23/2014 430 2 Rampart 251 997
## Crm.Cd.Desc Status Status.Desc
## 31 TRAFFIC DR # IC Invest Cont
##
## LOCATION
## 31 3RD ST

```

```
##                               Cross.Street place1 place2          geometry
## 31      BENTON                               WY      SZ      SZ POINT (6477078 1846700)
##      inWilbuf
## 31      FALSE
```

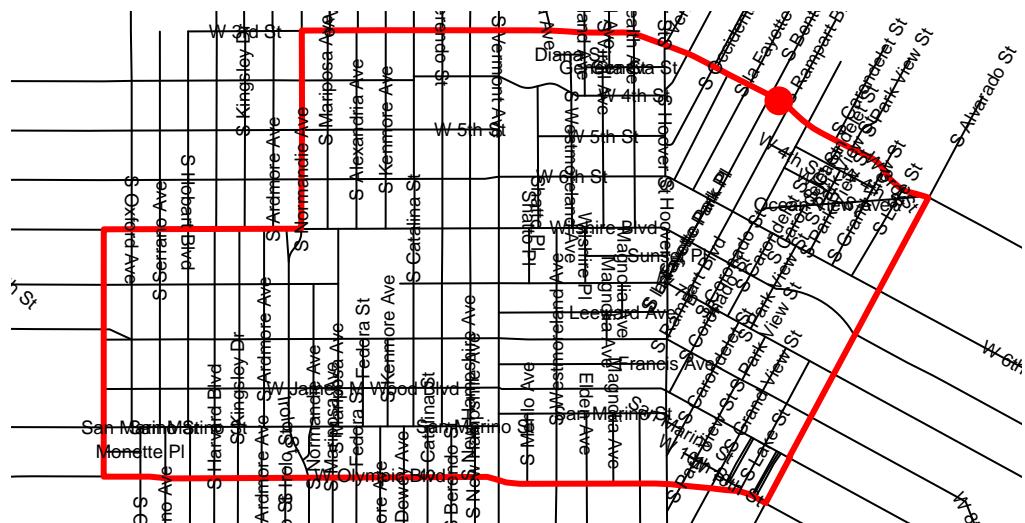
```
ms13_south_st[iClose[1],]
```

```
## Simple feature collection with 1 feature and 5 fields
## geometry type:  MULTILINESTRING
## dimension:      XY
## bbox:           xmin: 6471078 ymin: 1843009 xmax: 6484007 ymax: 1847641
## epsg (SRID):    2229
## proj4string:     +proj=lcc +lat_1=35.46666666666667 +lat_2=34.03333333333333 +lat_0=33.5 +lon_0=-118
##                LINEARID FULLNAME RTTYP MTFCC                geometry inSZ
## 18769 1101576650149 W 3rd St      M S1400 MULTILINESTRING ((6484007 1... TRUE
```

```
plot(st_geometry(ms13_south), border = "red", lwd = 1)
plot(st_geometry(ms13_south_st), add = TRUE)
plot(st_geometry(ms13_south), border = "red", lwd = 3, add = TRUE)

for(i in 1:nrow(labs))
{
  text(labs$x[i], labs$y[i],
       ms13_south_st$FULLNAME[i],
       srt = labs$angle[i],
       cex = 0.6)
}

plot(st_geometry(crime_ms13_south[1,]),
     add = TRUE, col = "red", pch = 16, cex = 2)
```



Streets with the most incidents using distance calculation

```
a <- table(ms13_south_st$FULLNAME[iClose])
rev(sort(a))[1:10]
```

```
##
##          W 6th St      Wilshire Blvd      W 8th St      W 7th St
##          668          599          304          290
##      S Vermont Ave      W 4th St W James M Wood Blvd      W Olympic Blvd
##          242          206          191          175
##      S Catalina St      San Marino St
##          160          158
```

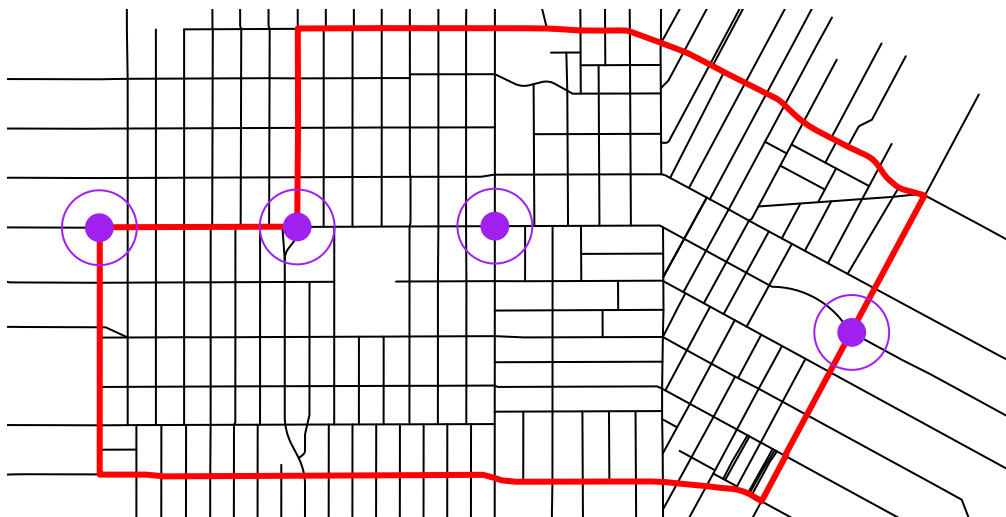
CRIME COUNT within 500ft of a Metrorail station

Map stations (Wilshire at Western Ave, S Normandie Ave, S Vermont Ave, Alvarado) and buffer zone

```
map_metro <- st_intersection(subset(la_street, FULLNAME %in%
                                   c("S Western Ave", "S Normandie Ave",
                                     "S Vermont Ave", "S Alvarado St")),
                             subset(la_street, FULLNAME == "Wilshire Blvd"))

plot(st_geometry(ms13_south), border = "red", lwd = 1)
plot(st_geometry(ms13_south_st), add = TRUE)
plot(st_geometry(ms13_south), border = "red", lwd = 3, add = TRUE)
plot(st_geometry(map_metro), col = "purple", add = TRUE, pch = 16, cex = 2)

plot(st_geometry(st_buffer(map_metro, dist = 500)), add = TRUE, border = "purple")
```



Crime counts for each station

```
# Each station
i <- st_intersects(st_buffer(map_metro, dist = 500), crime_data)
sapply(i, length)
```

```
## [1] 156 147 99 115
```

```
# Overall
length(unlist(i))
```

```
## [1] 517
```

CRIME COUNT within 500ft of the RFK Community School

Plot the school area and buffer

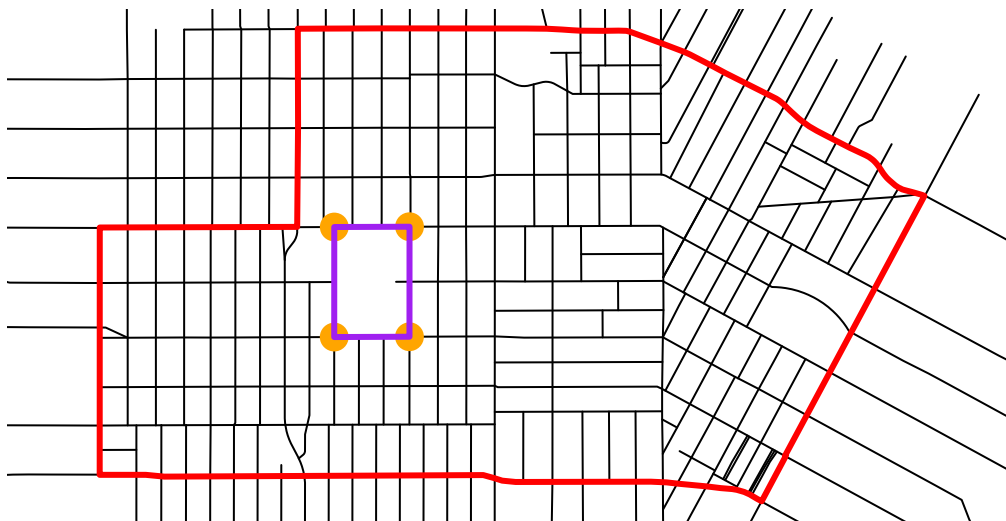
```
# plot the intersection points
a <- st_intersection(subset(la_street, FULLNAME %in% c("S Mariposa Ave", "S Catalina St")),
                    subset(la_street, FULLNAME %in% c("W 8th St", "Wilshire Blvd")))

plot(st_geometry(ms13_south), border = "red", lwd = 1)
plot(st_geometry(ms13_south_st), add = TRUE)
plot(st_geometry(ms13_south), border = "red", lwd = 3, add = TRUE)

a <- a[-which.min(st_coordinates(a)[,1]),] #drop Maripose/Wilshire intersection

plot(st_geometry(a), col = "orange", add = TRUE, pch = 16, cex = 2)

# compute the convex hull of all 4 points
map_rfk <- st_convex_hull(st_union(a))
plot(st_geometry(map_rfk), border = "purple", add = TRUE, lwd = 3)
```



Total crime count within 500ft of RFK School

```
length(st_intersects(st_buffer(map_rfk, dist = 500), crime_ms13_south))
```

```
## [1] 1
```

Keyhole Markup Language (KML) File for Google Maps

```
a <- st_transform(map_ms13, crs = 4326)
```

```
st_write(a,  
  dsn = "ms13.kml",  
  layer = "ms13",  
  driver = "KML",  
  delete_dsn = TRUE)
```

```
## Deleting source `ms13.kml' using driver `KML'  
## Writing layer `ms13' to data source `ms13.kml' using driver `KML'  
## Writing 1 features with 5 fields and geometry type Multi Polygon.
```