Vancouver Project – Part 1: Assemble Map

Name(s): _____ Mark: _____ / **2**

In the first part of this project you will assemble, symbolize, and label various Vancouver Open Data datasets into an ArcGIS map. In part 2, you will use this data - and additional layers - to solve a series of Spatial Analysis problems.

A. Get data and examine with ArcCatalog

1. Create a **Vancouver** folder on your **H:** drive
2. Download shoreline 2002 SHP from **http://data.vancouver.ca** (click the [View the list of datasets] button)
3. Unzip the downloaded file and put into your new **H:\Vancouver** folder
4. Copy other datasets from **J:\GIST\7128\AB_7128_data\Vancouver\Part-1** to your new **H:\Vancouver** folder
5. Use ArcCatalog to examine spatial and attribute data for shoreline, neighbourhood, street, & 2 transit layers

B. Use ArcMap to add and symbolize layers

Listed below from simplest to most complex; use shape files and layer names as noted: **Layer Name** ← shape file

1. **Shoreline** ← shoreline2002.shp
    a. Symbology: Single Symbol, Coastline

2. **City Limit** ← city_boundary.shp
    a. Symbology: Single Symbol, Gray 40%, Width 3

3. **Skytrain** ← rapid_transit_line.shp
    a. Symbology: Unique Values, LINE, Purples, Add All, Disable <all other values>
    b. Width (for All Symbols): 2
    c. Colours (for Selected Symbol): Ultramarine, Anemone Violet, Dark Amethyst
    d. Label:
        i. Calibri, 8pt, Ultramarine (purple)
        ii. Adjust Case: Symbol…, Edit Symbol…, Formatted Text, Text Case= All Caps
        iii. Placement Properties: Parallel, Above/Left, Line, 2, At Best, Remove duplicates

4. **Skytrain Station** ← rapid_transit_stations.shp
    a. Symbology: Single Symbol, Circle 1, Black, 9
    b. Display > MapTips: STATION

5. **Park** ← park_polygons.shp
    a. Symbology: Single Symbol, Medium Lime, 1, Fir Green
    b. Label: NAME, Calibri, 8pt, Fir Green, Bold
        i. Placement Properties: Always Horizontal, Only place inside
    c. Display > MapTips: NAME and Transparency: 50%

6. **Neighbourhood** ← csg_neighbourhood_areas.shp
    a. Symbology: Unique Values, NAME, Muted Pastels, Burnt Umber, Add All, Disable <all other values>
    b. Display > Transparency: 50%
    c. Label: NAME, Calibri, 10pt, Burnt Umber, Bold, Scale Range: Don't Show… Out beyond 1:60,000

7. **Zoning District** ← zoning_districts.shp
    a. Close ArcCatalog if it is still open
    b. Add new label field
        i. Open attribute table
        ii. Add Field: ZoneID, Text, 4
        iii. Customize > Editor toolbar > Start Editing
        iv. Field Calculator (Python): *ZoneID* = **`!ZONE![0:4]`**
        v. Stop Editing (& Save)
    c. Symbology: Unique Values, ZoneID, Add All, Disable <all other values>
        i. colour ramp: Basic Random
        ii. *or* make gradient under Graduated Colours: Blue → Red, HSV, 80% bright, save as "Zoning"
    d. Display > MapTips: ZONE and Transparency: 50% (after air photos?)
    e. Label: ZoneID, Calibri, 9pt, White, Bold,
        i. Scale Range: Out beyond 1:50,000
        ii. Placement Prop: Only inside

    Reference: http://former.vancouver.ca/commsvcs/BYLAWS/zoning/sec09.pdf (see page 4)

8. **Street Segment** ← public_streets.shp
    a. Summarize attribute table on USE to create a dBASE file and confirm the Counts shown in this table:

Attribute	Record	LINE		LABEL		
USE	**Count**	**Colour**	**Width**	**Size**	**Colour**	**Scale**
Arterial	2,220	Gray 70%	2.5	9	Gray 80%	40,000
Secondary Arterial	1,136	Gray 60%	2.0	8	Gray 70%	20,000
Collector	507	Gray 50%	1.5	7	Gray 60%	10,000
Residential	13,923	Gray 40%	1.0	6	Gray 50%	5,000

    b. Remove 3 records for "Closed" and "Leased" segments from attribute table
    c. Symbolize this layer:
        i. Colour Ramp: Cool Gray
        ii. reorder classes as shown in table above
        iii. revise each class with LINE Colour & Width in table above
    d. Set MapTips: HBLOCK
    e. Label 1: Standard Method
        i. Label with HBLOCK field
        ii. Method: Define classes…, [Get Symbol Classes], revise with LABEL Size, Colour, Scale above
        iii. Placement Properties: Parallel, Line, Above/Left, 2, At Best, Remove duplicates
        iv. 2 label problems: hblock number and repetition (fixed below)
    f. Add new label field for street name
        i. Open attribute table
        ii. Add Field: StreetName, Text, 20
        iii. Customize > Editor toolbar > Start Editing
        iv. Field Calculator: Python, Show Codeblock
        v. *Pre-Logic:*
```
def DelNum(hblock):
    ◆◆return hblock.lstrip('1234567890-◆')
```
← "◆" = space
        vi. *StreetName* = **`DelNum(!HBLOCK!)`**
        vii. Stop Editing (& Save)

g. Label 2: Maplex Method (OPTIONAL)
    i. Customize > Labeling toolbar > Use Maplex
    ii. Placement Properties (different now) *or* use Label Manager
        1. Label Position tab: Regular Placement, Label Offset: Above Line
        2. Label Density tab: Connect Features, Options: Minimize labels
    iii. Parallel, Left, Line, 2, At Best, Remove duplicate

9. Traffic Camera ← webCameras.shp
a. Definition Query: "TYPE" = 'traffic cameras'
b. Symbology: Single Symbol, Asterisk 4, Tuscan Red, 16
c. Display > MapTips: LOCATION / Hyperlinks: URL, URL
d. Test with the Hyperlink tool

10. Aerial Photo 2013 ← BCVANC13.ecw
a. Connect to **J:\GIST\7128\xxx7128_data\Vancouver\Part-1-ecw** folder
b. Add the ECW raster image file as a layer to you map

C. Finish Up and save your map

1. Reorder layers as follows:

(1) Shoreline	(6) Neighbourhood
(2) City Limit	(7) Zoning District
(3) Skytrain Station	(8) Street Segment
(4) Skytrain	(9) Traffic Camera
(5) Park	(10) Aerial Photo 2009

2. Save your map document as ***Your-Name*_Van-1.mdx** (where ***cc*** = your initials) in your H:\...\Vancouver folder.
3. When finished, call the instructor over to evaluate your work. If not possible, copy your MXD to the **I:** drive.

Vancouver Zoning Districts

Limited Agriculture

RA-1

One-Family Dwelling

RS-1
RS-1A
RS-1B
RS-2
RS-3
RS-3A
RS-4
RS-5
RS-6
RS-7

Two-Family Dwelling

RT-1
RT-2
RT-3
RT-4
RT-4A
RT-4AN
RT-4N
RT-5
RT-5A
RT-5AN
RT-5N
RT-6
RT-7
RT-8
RT-9
RT-10 *and* RT-10N

Multiple Dwelling

RM-1 and RM-1N
RM-2
RM-3
RM-3A
RM-4
RM-4N
RM-5
RM-5A
RM-5B
RM-5C
RM-6
FM-1

Commercial

C-1
C-2
C-2B
C-2C
C-2C1
C-3A
C-5
C-6
C-7
C-8
FC-1

Industrial

MC-1 & MC-2
M-1
M-1A
M-1B
M-2
IC-1
IC-2
IC-3
I-1
I-2
I-3

Historical Area

HA-1 (Chinatown)
HA-1A (Chinatown)
HA-2 (Gastown)
HA-3 (Yaletown)

Comprehensive Development

CD-1
FCCDD
DD
CWD
DEOD
FSD
BCPED

Vancouver Project – Part 2: Spatial Analysis

Name(s): _____ Mark: _____ / **10**

This part of the City of Vancouver project consists of a series of GIS problem solving exercises. You should work in a team with 1 (or 2) other students on a single computer. Record your answers on a single evaluation sheet (this handout); and when finished, or if time runs out, transcribe your answers to another handout, print the names of all team members at the top.

Part 1 of the Vancouver project should be finished before starting part 2, although this is not critical. To get started with part 2, open one team member's ***name_Van-1.mdx*** and save it as ***aabbcc*_Van-2.mxd** (where ***aa,bb,cc*** = initials of team members).

Additional data is available on **J:\GIST\7128\AB_7128_data\Vancouver\Part-2** – copy the contents of this folder to your **H:\Vancouver** folder and add data to your new project as needed (new layers are specified with each problem below).

Complete as many of the following seven tasks as possible. Don't be concerned with cosmetics; focus instead on technical problem solving aspects; with the exception of the map in problem 4, which requires rudimentary design and symbology. An outline of major steps is included with each problem. Ask for help if needed: the first three answers are "free", after which ½ mark will be deducted for each answer provided. You may want to use Microsoft Excel for some of the calculations.

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1. SkyTrain Access for Vancouver Residents

Problem: The number of residences within 500, 1000, and 2000 meters of a skytrain stations are required.

Required Layers

- Part 1: **Skytrain Station**
- Part 2: **property_addresses**

Steps

(1) **Buffer** the skytrain stations 3 times, with radii of 500, 1000, and 2000 meters *[dissolve polygons!]*.
(2) **Intersect** each of these buffers with property_addresses and count the results.

Results

(1) Fill in the **Properties** column in the table below with the number of property address points within each buffer.
(2) Calculate and fill in the **Percentage** of properties for each buffer over the **Total Properties =** _____.

Buffer	Properties	Percentage
500 m		
1,000 m		
2,000 m		

Rounded to zero decimal places

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2. Vancouver Bikeways

Problem: Basic statistics of existing bike lanes in Vancouver are required.

Required Layers

- Part 1: *none*
- Part 2: **bikeways**

Steps

(1) **Add Field** to the bikeways layer to store the length of each bike lane *[Long Integer]*.
(2) **Calculate Geometry** to populate this new field.
(3) Calculate **Statistics** to get the required results.

Results

(1) Fill in the table below with the required **Values**, being sure to use the **Units** and rounding off to the **Precision** specified.

Statistic	Value	Units	Precision
Count		n/a	0 decimal places
Total		**kilometers**	1 decimal places
Average		**meters**	0 decimal places

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3. Vancouver Street Segments

Problem: Basic statistics of street segments in Vancouver are required.

Required Layers

- Part 1: **Street Segment**
- Part 2: *none*

Steps

(1) Same as problem 2 above.

Results

(1) Fill in the table below with the required **Values**, being sure to use the **Units** and rounding off to the **Precision** specified.

Statistic	Value	Units	Precision
Count		n/a	0 decimal places
Total		**kilometers**	1 decimal places
Average		**meters**	0 decimal places

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4. Vancouver Schools Analysis and Map

Problem: Analysis of existing school data to generate required statistics and a map.

Required Layers

- Part 1: *none*
- Part 2: **schools**, **secondary_school_boundaries**

Steps

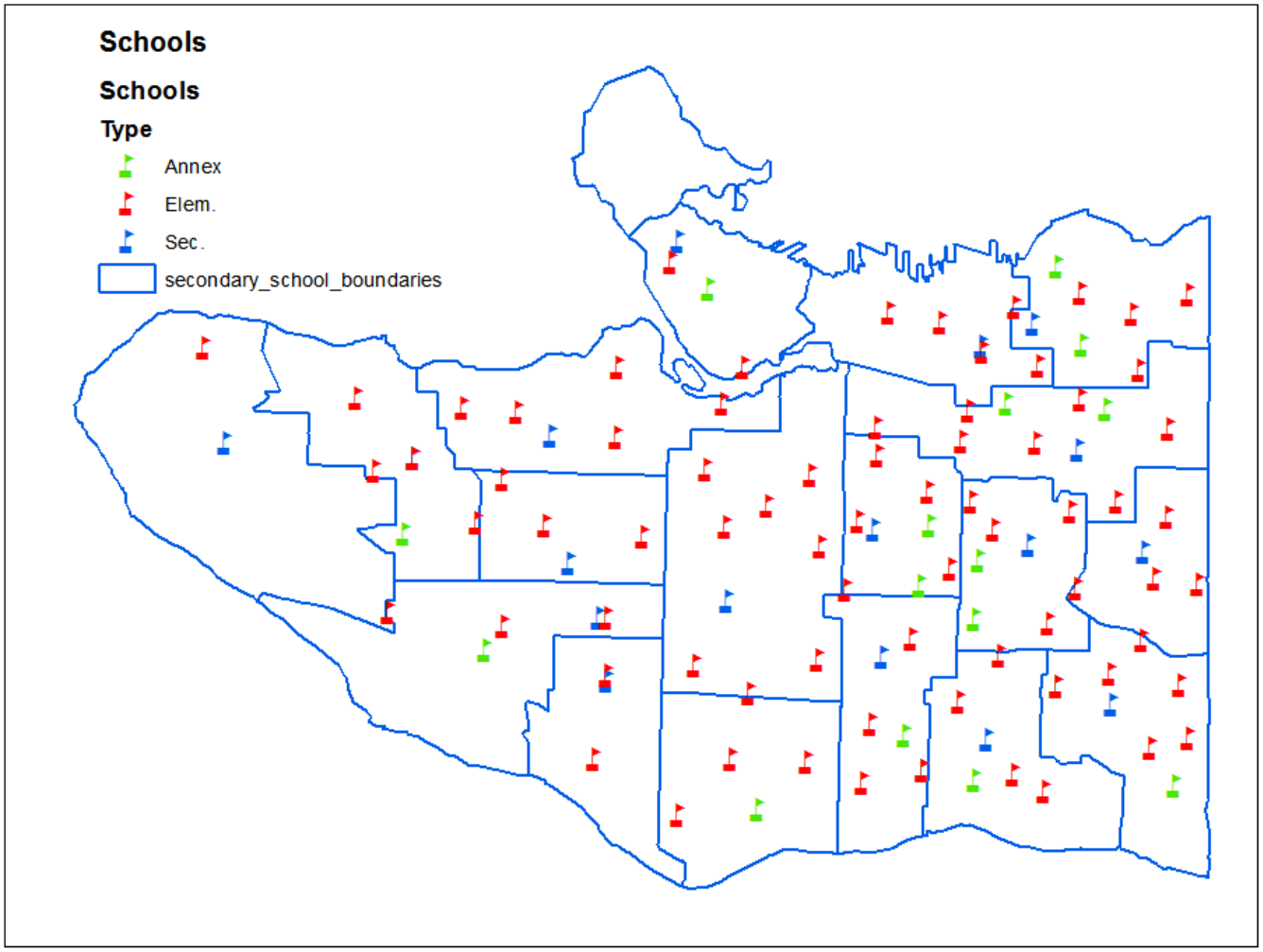
(1) **Add Field** to the schools layer to store the type of each school (text with length of 5).

(2) Use the **Field Calculator** (twice) to populate this new "Type" field, like so:
   - Settings: VB, string
   - 1. Type = `Right([Name],5)`
   - 2. Type = `LTrim([Type])`

(3) Manually revise a few inconsistent records, with FIDs shown:
   - 62 → Elem.
   - 108 → Annex
   - 111 → Sec.
   - 112 → Elem.

(4) **Summarize** on the new populated field.

(5) Create a quick map using the following image as a guide.
   - Colour PDF copy available in the **docs** folder on the J: drive.



Map: symbols | boundary | overall : **/6**

Results

(1) Fill in the table below with the **Count** of records for each School **Type**.

(2) Export your map as a PNG file named ***aabbcc*_Van-2_SSmap.png** and copy to the I: drive.

Type	Count
Annex	
Elem.	
Sec.	
TOTAL	

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5. Residents in each Vancouver Secondary School District

Problem: The number of residences in each secondary school district is required.

Required Layers

- Part 1: *none*
- Part 2: **property_addresses**, **secondary_school_boundaries**

Steps

(1) **Intersect** the two layers (with Attributes set to ALL and Output Type set to INPUT).
(2) **Summarize** on the NAME field.

Results

(1) Fill in the number of **Properties** for each of the sample **Secondary School** districts noted in the table below.

Secondary School	Properties
Britannia Sec.	
Kitsilano Sec.	
Windermere Sec.	

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6. Vancouver Intersections with Traffic Signals

Problem: The number of intersections with traffic lights is required together with actuation types and percentages.

Required Layers

- Part 1: *none*
- Part 2: **traffic_signal**, **street_intersections**

Steps

(1) Counts in attribute table
(2) Summarize on traffic_signal.TYPE to get total number of traffic signals
(3) Summarize on street_intersections.ONATSTREET to get number of *unique* intersections

Results

(1) Enter the total number of **Signals** and unique **Intersections** in the left-hand table below.
(2) Enter the percentage of **Intersections with Signals** (rounded off to 1 decimal place).
(3) Populate the **Count** column in the table on the right with the **number** of Traffic Signals by **Actuation** type.
(4) Add the **Percentage** of Total Traffic Signals (rounded off to 1 decimal place) for each **Actuation** type.

Features	Total Number
Total Traffic Signals	
Unique Street Intersections	
Features	**Percentage**
Intersections with Signals	

Actuation	Count	Percentage
Bus		
Fixed Time		
Fully		
Pedestrian		
Semi		
Crosswalk		

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7. Vancouver Intersections with Segment Counts

Problem: The number of street segments connecting at each intersection is required.

Required Layers

- Part 1: **Street Segment**
- Part 2: **street_intersections**

Steps

(1) Spatial Join
  - Target Features: street_intersections
  - Join Features: Street Segment
  - Output: generate a shape file for results (errors may occur if a file geodatabase is used)
  - Join Operation: JOIN_ONE_TO_ONE
  - Field Map: keep only the XSTREET field (with Merge Rule set to First) *[right-click]*
  - Match Option: WITHIN_A_DISTANCE
  - Search Radius: 1 meter

(2) Summarize on the Join_Count field.

Results

(1) Fill in the number of **Intersections** corresponding to each **Join_Count** in the table below on the left.

(2) Find an intersection with **0** segments and another with **1** segment and record the **FID** for each in the right-hand table.

(3) Enter a brief **Answer** to the **Validation Question** for each intersection with the specified **FID** and **Join_Count** *[hint: use the aerial photo layer to check]*.

Join_Count	Intersections
0	
1	
2	
3	
4	
5	
6	
7	

FID	Join	Validation Question	Answer
	0	Why are there no segments at this intersection?	
	1	Why is there only one segment at this intersection?	
7554	2	Why are there only two segments at this intersection?	
11250	5	What is the third street here?	
7167	6	What is the third street here?	

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Evaluation

When finished, call the instructor over to evaluate your team's work.

If not possible, ensure your map from problem 4 is submitted to the I: drive, and hand in a clean copy of this handout with team member names on it.

Vancouver Part 1	2.0	
Labs: 18 19 (20)	3.0	
Previous Term Mark	65.0	
FINAL TERM MARK	**80.0**	

Problem	Value	Mark
1	**14**	
2	**12**	
3	**12**	
4	**14**	
5	**12**	
6	**18**	
7	**18**	
TOTAL	**10.0**	