

What is PostGIS?

- Spatial DataBlade for Postgresql
- Store, Query, and Manipulate Spatial data objects as first-class citizens in the Database.
- Follows the OGC Simple Features for SQL specification.

Why Use PostGIS?

- Fast Application Development
 - SQL Interface (World's Only Standard)
 - Spatial and attribute query engine
 - Run functions in the database like `relate()` and `intersect()`
 - Leverage existing infrastructure
 - Already lots of interfaces to PostGIS

Why Use PostGIS?

- Extension of existing Interfaces
 - SQL
 - ODBC
 - JDBC
 - Other language bindings (i.e. python, perl, php, C, C++, java,...)
 - WMS
 - WFS
 - Mapserver
 - OGR
 - FME
 - Geotools/GeoServer
 - PostGRASS
 - Lots of other

Why Use PostGIS?

- DB Goodies
 - Concurrent updates
 - Backup/recovery
 - Real transactions
 - Triggers/validation
 - Attach to existing information
 - SQL interface

Future Direction

- GEOS integration (two weeks)
 - relate(): touches, contains, overlaps, crosses
 - union(), intersection()
 - buffer()
- Full OGC compliance certification (summer)
- Better Mapserver support
- Raster Storage
- Speed/Ease of use

Joining two tables.

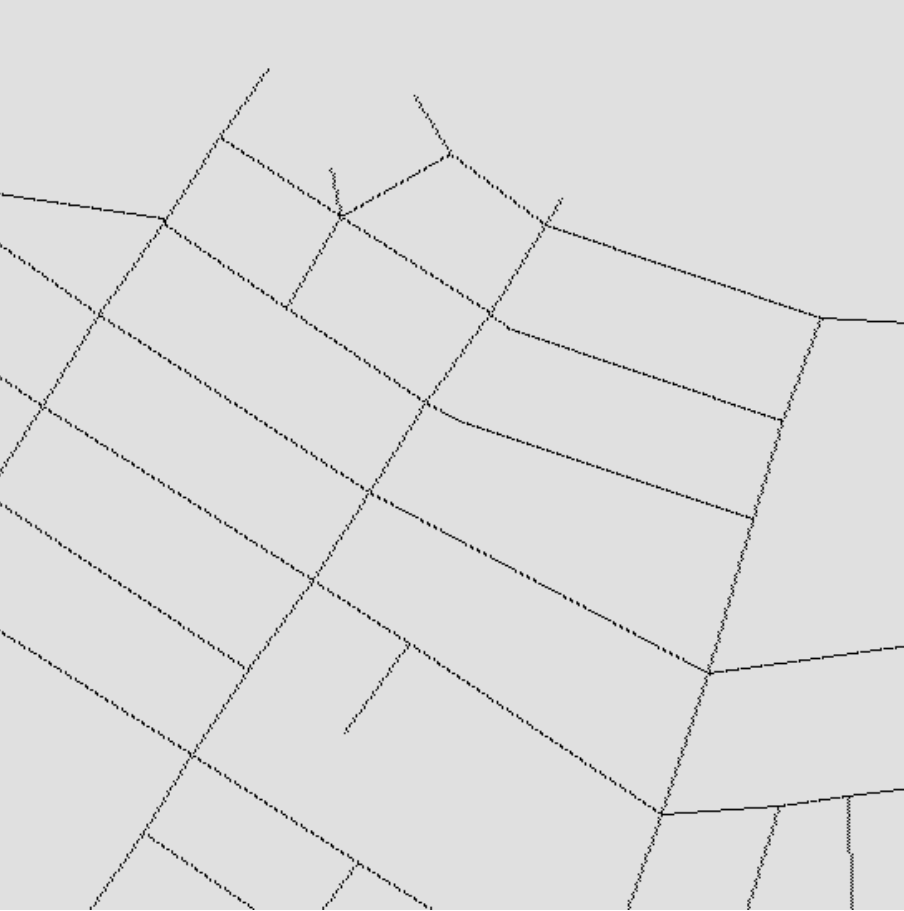


Table with Geometry



Table with Attributes

Query3 : Select Query

gid	the_geom
39	SRID=-1;MULTILINESTRING((1186612.49686778 412154.225646773,1186787.93818275 412200.49
40	SRID=-1;MULTILINESTRING((1188601.6141319 412040.242565786,1188630.17078341 412066.824
41	SRID=-1;MULTILINESTRING((1188601.6141319 412040.242565786,1188458.18146745 412129.481
42	SRID=-1;MULTILINESTRING((1186621.17610535 412117.878456623,1186657.7864044 412125.853
43	SRID=-1;MULTILINESTRING((1186621.17610535 412117.878456623,1186612.49686778 412154.22
44	SRID=-1;MULTILINESTRING((1187323.52583128 412080.842224138,1187312.13304856 412192.62
45	SRID=-1;MULTILINESTRING((1187530.79570325 412062.739009737,1187524.37542336 412241.36
46	SRID=-1;MULTILINESTRING((1187530.79570325 412062.739009737,1187603.61573285 412089.79
47	SRID=-1;MULTILINESTRING((1188369.42488573 412135.163115813,1188340.54696099 412117.45
48	SRID=-1;MULTILINESTRING((1189379.0654403 411968.428334032,1189398.35597626 412046.886
49	SRID=-1;MULTILINESTRING((1187996.52959626 412039.510052557,1188011.50907643 412033.36
50	SRID=-1;MULTILINESTRING((1189812.63784675 412018.620948245,1189873.09033488 411979.71
51	SRID=-1;MULTILINESTRING((1189735.40238545 411910.280139166,1189798.98786103 411988.13

Record: 4

Query4 : Select Query

gid	street	fromleft	toleft	fromright	toright	type
195	Oriole Ln	10968	11020	10991	11015	1
196	Clayton Rd	1188	1310	1347	1347	1
197	Heather Rd	11050	11050	11025	11035	1
198	Clayton Rd	1030	1136	1057	1075	1
199	West Saanich F	11004	11060	11005	11035	1
200	Clayton Rd	960	960	875	935	1
201	Rosborough Rd	11040	11120	0	0	1
202	Boas Rd	10855	10905	10862	10948	1
203	Tryon Rd	0	0	2129	2177	1
204	Clayton Rd	780	854	825	855	1
205	Baxendale Rd	11024	11124	11025	11117	1
206	Clayton Rd	700	730	711	711	1
207	Trillium Pl	11024	11118	11025	11125	1

Record: 1

gid	street	fromleft	toleft	fromright	toright	type	the_geom
255	Wain Rd	652	652	561	655	1	SRID=-1;MULTILINESTRING(((186116.68013982 410124.823562514,1
256	Deep Cove Rd	10872	10872	10891	10915	1	SRID=-1;MULTILINESTRING(((186116.68013982 410124.823562514,1
257	McMicken Rd	1830	1844	1833	1885	1	SRID=-1;MULTILINESTRING(((190095.84308027 409916.108614991,1
258	McDonald Park	0	0	10763	10763	1	SRID=-1;MULTILINESTRING(((190095.84308027 409916.108614991,1
259	Wain Rd	370	456	375	485	1	SRID=-1;MULTILINESTRING(((185585.81920926 410107.030644192,1
260	Madrona Dr	10876	10946	10879	10901	1	SRID=-1;MULTILINESTRING(((185585.81920926 410107.030644192,1
261	Coal Point Ln	286	316	273	291	1	SRID=-1;MULTILINESTRING(((185467.8586441 410102.837462937,11
262	Derrick Rd	10814	10814	10835	10835	1	SRID=-1;MULTILINESTRING(((186603.34899962 409933.370193744,1
263	Cromar Rd	518	626	525	655	1	SRID=-1;MULTILINESTRING(((186116.5075049 409922.651960664,11
264	Deep Cove Rd	10818	10842	10815	10851	1	SRID=-1;MULTILINESTRING(((186116.5075049 409922.651960664,11
265	Cromar Rd	462	480	455	479	1	SRID=-1;MULTILINESTRING(((185961.6392472 409918.242602524,11
266	Dallain Pl	10820	10830	10819	10829	1	SRID=-1;MULTILINESTRING(((185961.6392472 409918.242602524,11
267	Cromar Rd	420	436	0	0	1	SRID=-1;MULTILINESTRING(((185821.51650145 409914.362798994,1
268	Madrona Dr	10802	10858	10807	10833	1	SRID=-1;MULTILINESTRING(((185821.51650145 409914.362798994,1
269	Bayfield Rd	10704	10718	10707	10719	1	SRID=-1;MULTILINESTRING(((190207.99644392 409674.70243328,11
270	McDonald Park	10682	10714	10685	10725	1	SRID=-1;MULTILINESTRING(((190207.99644392 409674.70243328,11
271	West Saanich F	10770	10866	0	0	1	SRID=-1;MULTILINESTRING(((187613.34065271 409766.299973262,1
272	Downey Rd	688	966	707	945	1	SRID=-1;MULTILINESTRING(((186603.11528811 409733.417947828,1
273	Derrick Rd	10760	10774	0	0	1	SRID=-1;MULTILINESTRING(((186603.11528811 409733.417947828,1
274	Blue Heron Rd	10670	10690	10613	10675	1	SRID=-1;MULTILINESTRING(((190567.98205555 409521.2096306,119

SELECT *

FROM roads LEFT JOIN roads_attr ON roads.gid = roads_attr.gid;

For each gid in roads

Find the corresponding gid in road_attr

Combine the columns from the two tables

SELECT *

FROM roads, road_attr

WHERE roads.gid = road_attr.gid;

Label de-cluttering

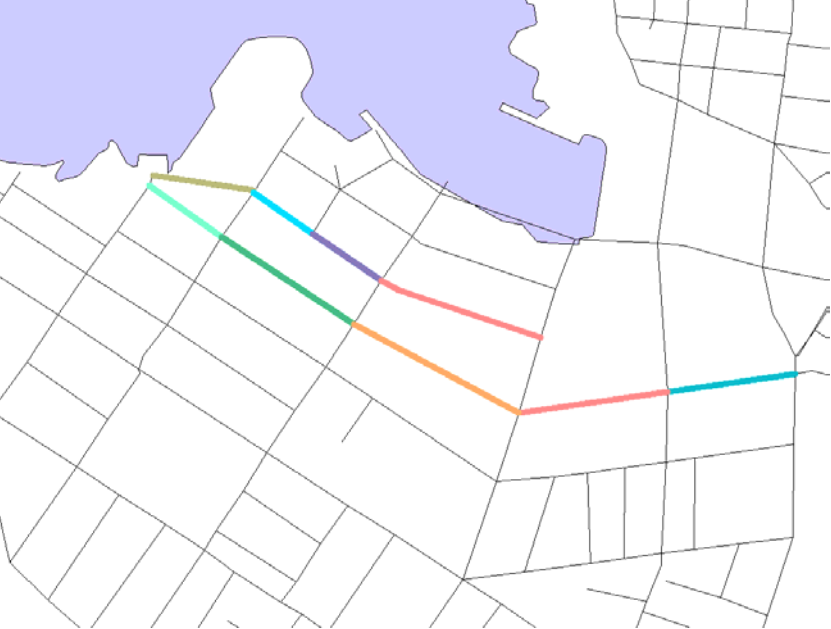




Query2 : Select Query

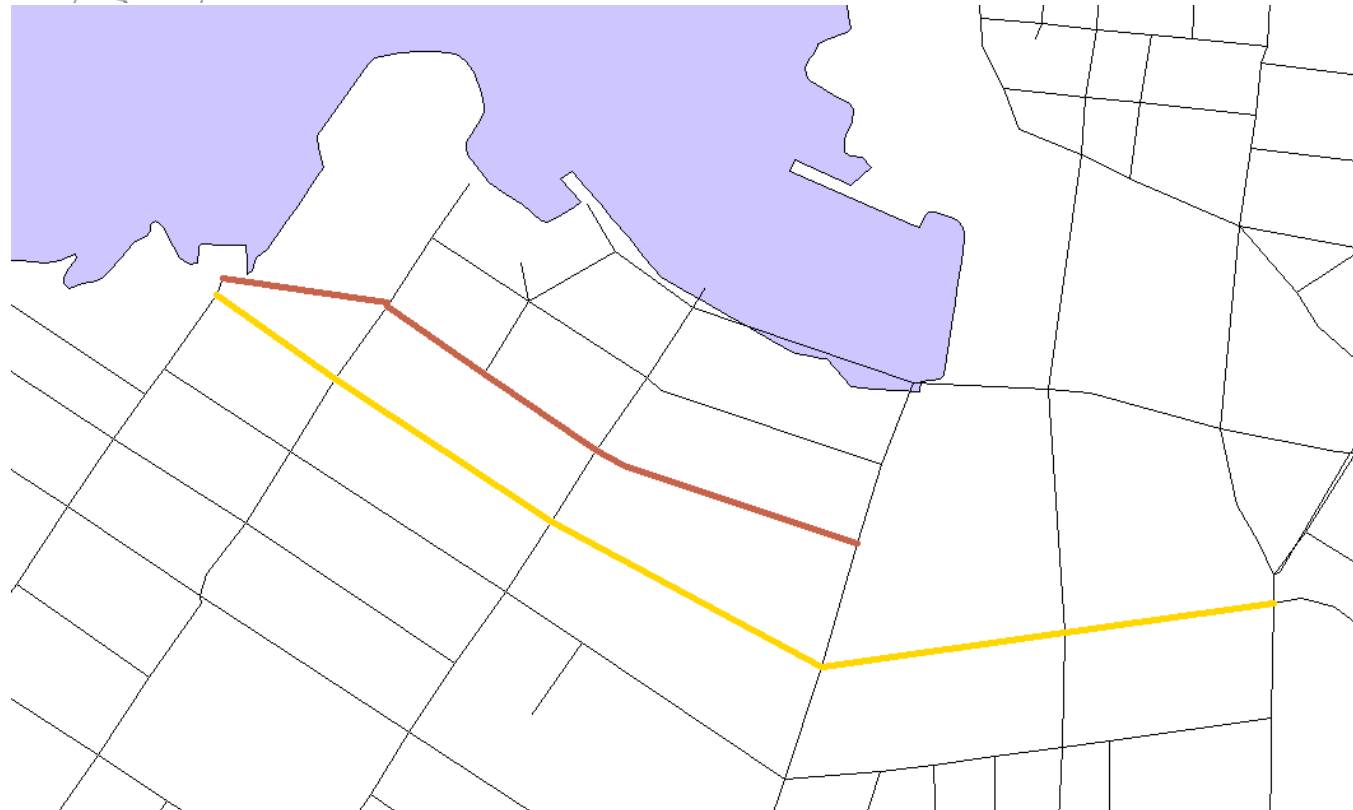
	gid	street	fromleft	toleft	fromright	toright	type	the_geom
▶	7585	Kingston St	120	150	117	135	1	SRID=-1;MULTILINESTRING(((1194308.18903323 382091.31407671,1194487.2713
	7617	Kingston St	224	236	201	243	1	SRID=-1;MULTILINESTRING(((1194487.43579317 382061.312123144,1194594.084
	7647	Kingston St	324	324	301	325	1	SRID=-1;MULTILINESTRING(((1194594.08438108 381987.539170222,1194715.930
	7671	Kingston St	0	0	403	461	1	SRID=-1;MULTILINESTRING(((1194715.93099657 381904.338846159,1194746.238
	7621	Superior St	106	148	111	139	1	SRID=-1;MULTILINESTRING(((1194301.43389941 382073.297784835,1194431.014
	7669	Superior St	204	290	209	285	1	SRID=-1;MULTILINESTRING(((1194431.01470475 381981.494296744,1194666.882
	7694	Superior St	620	668	601	675	1	SRID=-1;MULTILINESTRING(((1195228.09824784 381704.623016777,1195456.981
	7732	Superior St	0	0	509	553	1	SRID=-1;MULTILINESTRING(((1194962.23119794 381668.089368444,1195228.098
	7734	Superior St	404	442	401	491	1	SRID=-1;MULTILINESTRING(((1194666.88276431 381825.902591409,1194962.231
*								

Record: 1 of 9



Basic idea is to group all these independent segments together.

This forces MapServer to put at most one label per road, instead of one label for every segment.

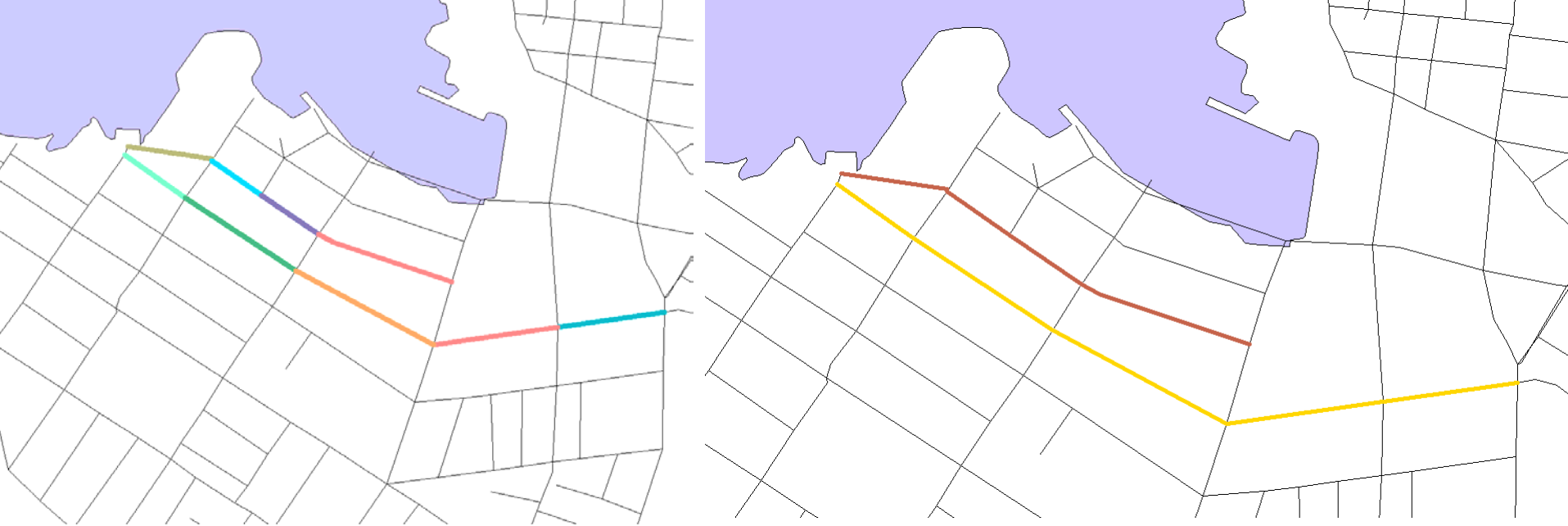


Group 2 Group 1

gid	street	fromleft	toleft	fromright	toright	type	the_geom
7585	Kingston St	120	150	117	135	1	SRID=-1;MULTILINESTRING((1194308.18903323 382091.31407671,1194487.2713
7617	Kingston St	224	236	201	243	1	SRID=-1;MULTILINESTRING((1194487.43579317 382061.312123144,1194594.084
7647	Kingston St	324	324	301	325	1	SRID=-1;MULTILINESTRING((1194594.08438108 381987.539170222,1194715.930
7671	Kingston St	0	0	403	461	1	SRID=-1;MULTILINESTRING((1194715.93099657 381904.338846159,1194746.238
7621	Superior St	106	148	111	139	1	SRID=-1;MULTILINESTRING((1194301.43389941 382073.297784835,1194431.014
7669	Superior St	204	290	209	285	1	SRID=-1;MULTILINESTRING((1194431.01470475 381981.494296744,1194666.882
7694	Superior St	620	668	601	675	1	SRID=-1;MULTILINESTRING((1195228.09824784 381704.623016777,1195456.981
7732	Superior St	0	0	509	553	1	SRID=-1;MULTILINESTRING((1194962.23119794 381668.089368444,1195228.098
7734	Superior St	404	442	401	491	1	SRID=-1;MULTILINESTRING((1194666.88276431 381825.902591409,1194962.231

What do we do with these groups?

1. Use the GEOS union() function to construct a single line
2. Use collect() which takes a set of lines and produces a MULTILINE.



```
SELECT
    street, collect(the_geom)
FROM roads
GROUP BY street;
```

Query2 : Select Query								
	gid	street	fromleft	toleft	fromright	toright	type	the_geom
▶	7585	Kingston St	120	150	117	135	1	SRID=-1;MULTILINESTRING(((1194308.18903323 382091.31407671,1194487.27139322 382065.747570319,1194487.43579317 382061.312123144),
	7617	Kingston St	224	236	201	243	1	SRID=-1;MULTILINESTRING(((1194487.43579317 382061.312123144,1194594.08438108 381987.539170222),
	7647	Kingston St	324	324	301	325	1	SRID=-1;MULTILINESTRING(((1194594.08438108 381987.539170222,1194715.93099657 381904.338846159),
	7671	Kingston St	0	0	403	461	1	SRID=-1;MULTILINESTRING(((1194715.93099657 381904.338846159,1194746.23892871 381887.697437655,1195001.76266679 381802.804208308),
	7621	Superior St	106	148	111	139	1	SRID=-1;MULTILINESTRING(((1194301.43389941 382073.297784835,1194431.01470475 381981.494296744),
	7669	Superior St	204	290	209	285	1	SRID=-1;MULTILINESTRING(((1194431.01470475 381981.494296744,1194666.88276431 381825.902591409),
	7694	Superior St	620	668	601	675	1	SRID=-1;MULTILINESTRING(((1195228.09824784 381704.623016777,1195456.98167575 381737.571813669),
	7732	Superior St	0	0	509	553	1	SRID=-1;MULTILINESTRING(((1194962.23119794 381668.089368444,1195228.09824784 381704.623016777),
	7734	Superior St	404	442	401	491	1	SRID=-1;MULTILINESTRING(((1194666.88276431 381825.902591409,1194962.23119794 381668.089368444),
*								

Record: 1 of 9

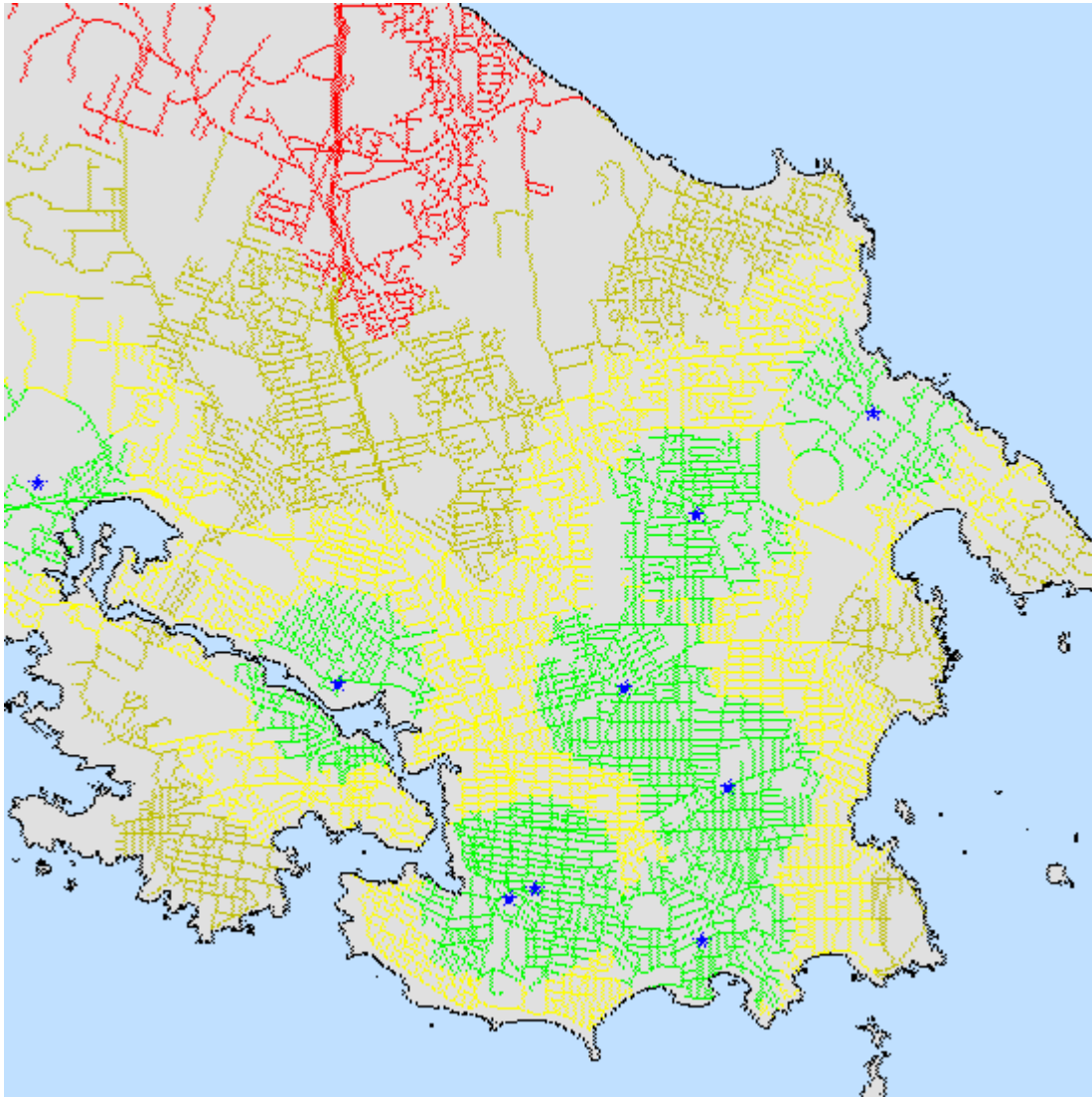
MULTILINESTRING (

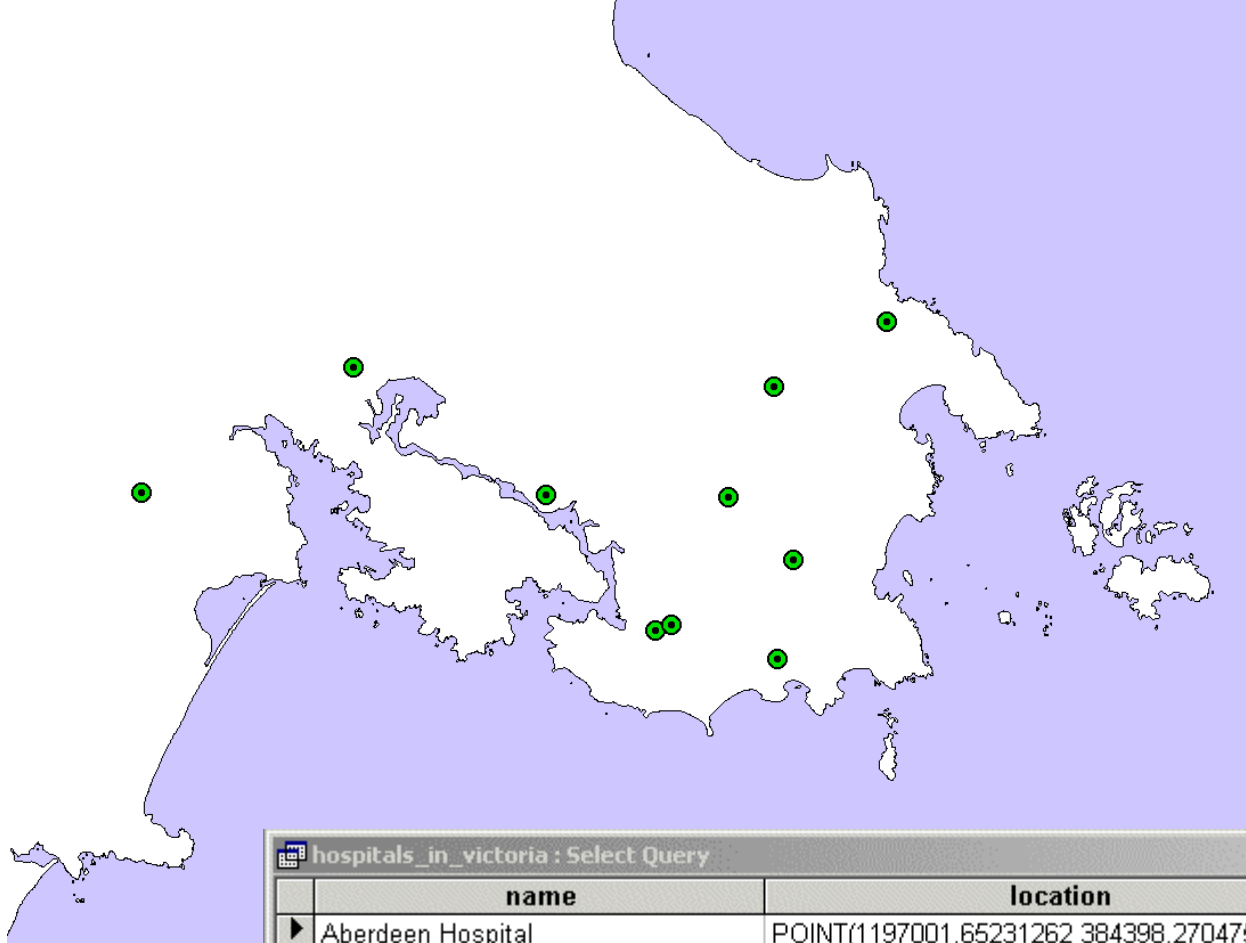
(1194308.18903323 382091.31407671,1194487.27139322 382065.747570319,1194487.43579317 382061.312123144),
(1194487.43579317 382061.312123144,1194594.08438108 381987.539170222),
(1194594.08438108 381987.539170222,1194715.93099657 381904.338846159),
(1194715.93099657 381904.338846159,1194746.23892871 381887.697437655,1195001.76266679 381802.804208308)
)

MULTILINESTRING (

(1194301.43389941 382073.297784835,1194431.01470475 381981.494296744),
(1194431.01470475 381981.494296744,1194666.88276431 381825.902591409),
(1195228.09824784 381704.623016777,1195456.98167575 381737.571813669),
(1194962.23119794 381668.089368444,1195228.09824784 381704.623016777),
(1194666.88276431 381825.902591409,1194962.23119794 381668.089368444)
)







hospitals_in_victoria : Select Query

name	location
▶ Aberdeen Hospital	POINT(1197001.65231262 384398.270475177)
Fairfield Health Centre	POINT(1195656.24647344 381944.573517462)
Glengarry Hospital	POINT(1197905.18862936 381440.608596903)
Gorge Road Hospital	POINT(1193660.45242158 384433.153379774)
Mount St Mary Hospital	POINT(1195956.67018638 382058.203488371)
Mount Tolmie Hospital	POINT(1197829.67761525 386402.810630837)
Priory Hospital	POINT(1186271.98258414 384464.968142696)
Queen Alexandra Centre for Children	POINT(1199897.96322968 387588.909663164)
Royal Jubilee Hospital	POINT(1198193.92380713 383235.126501604)
Victoria General Hospital	POINT(1190145.27946905 386773.706085023)
Saanich Peninsula Hospital	POINT(1191394 401311)
*	

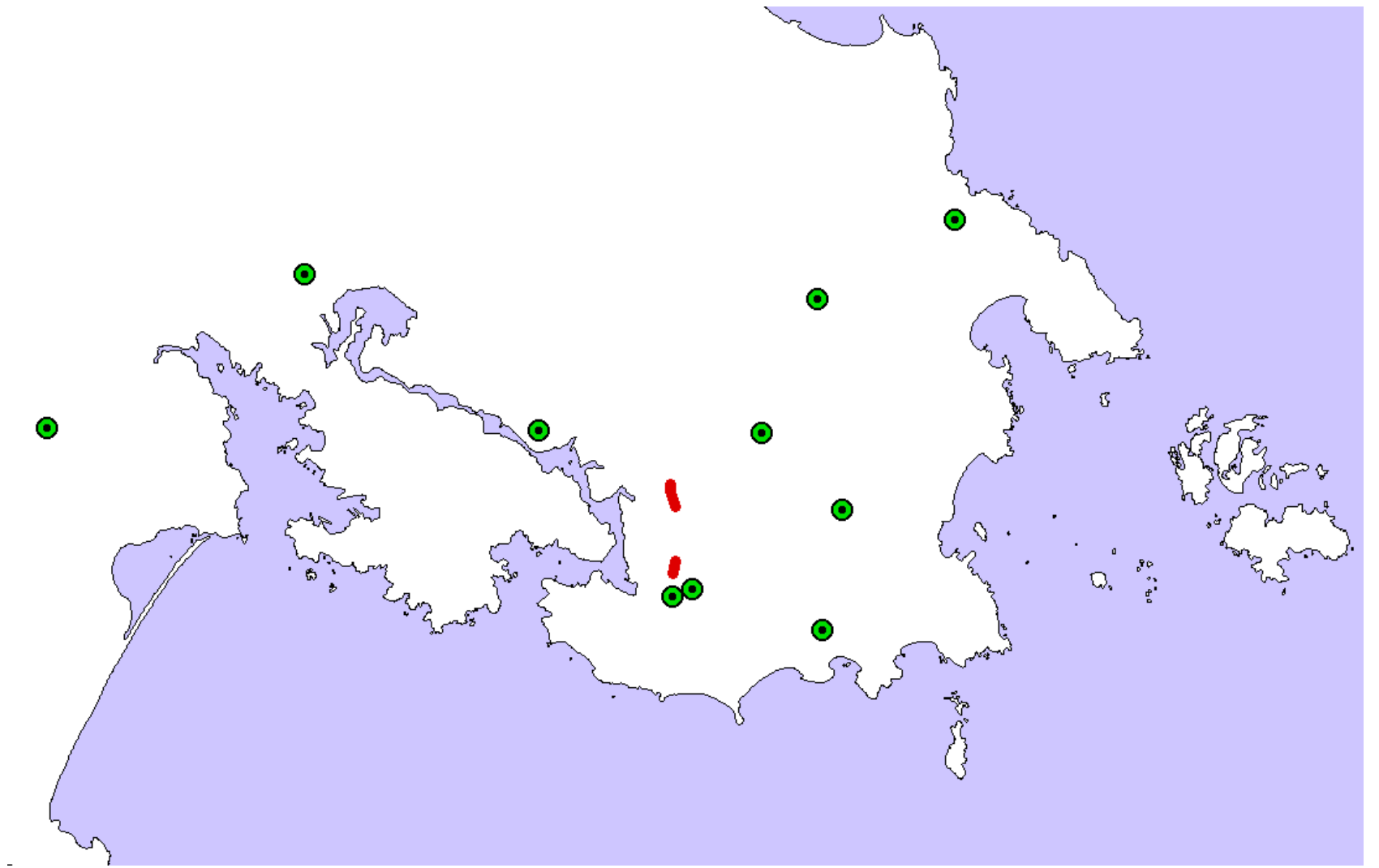
Record: 1 of 11

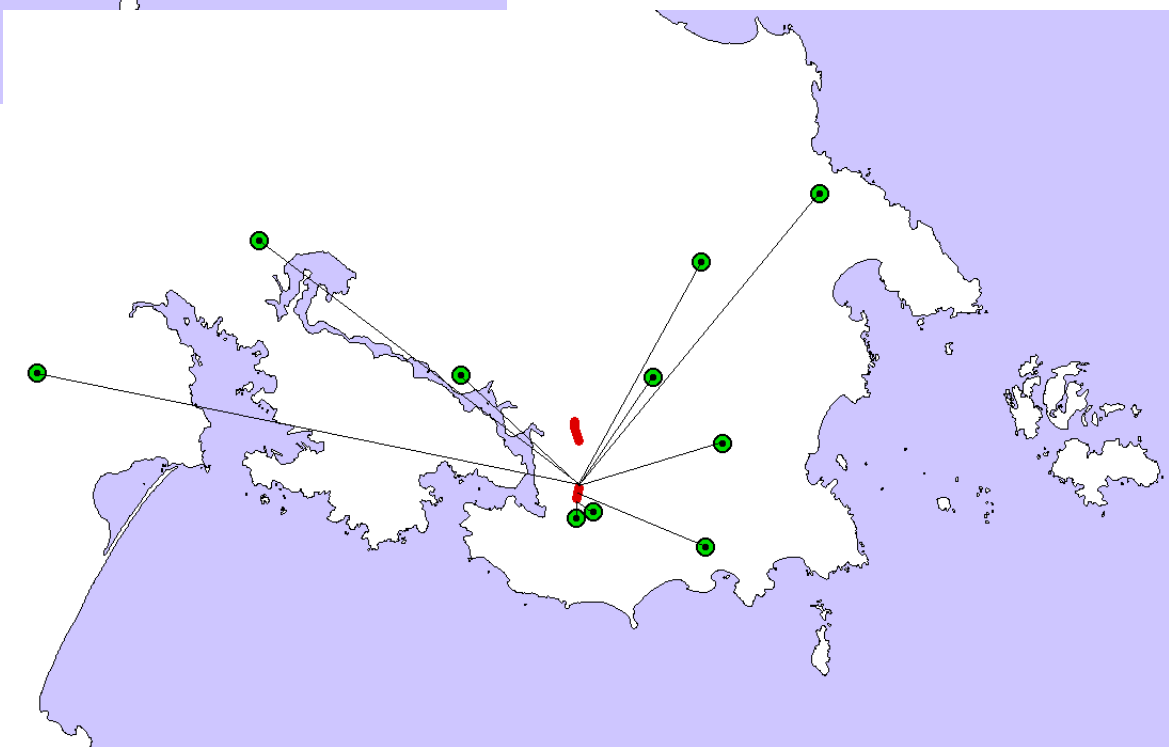
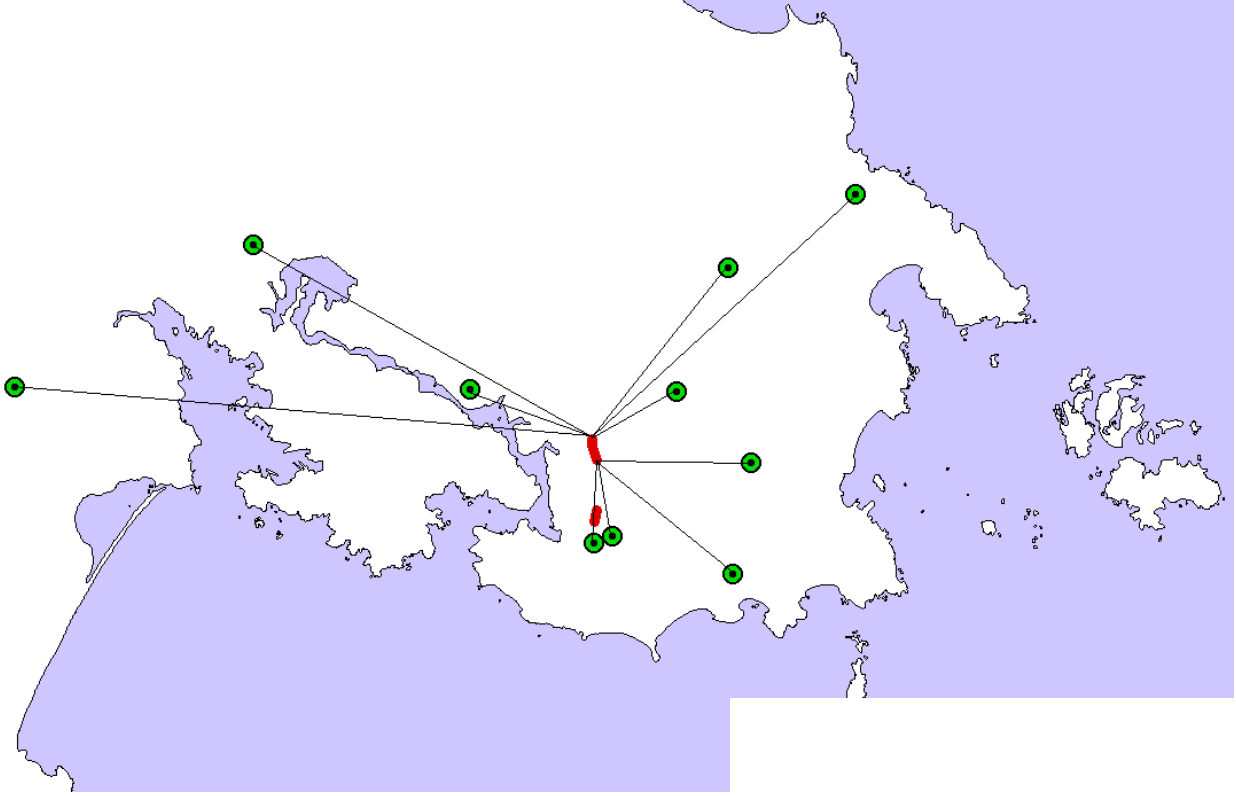


TwoRoads : Select Query

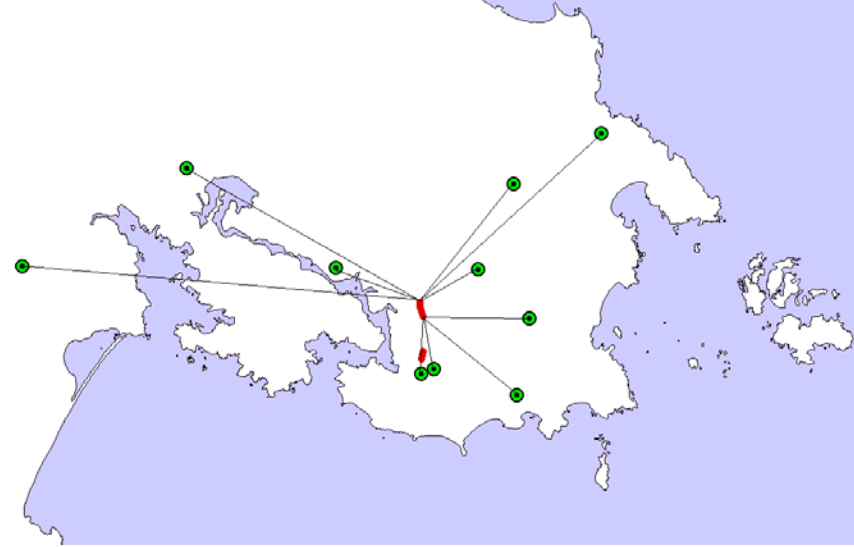
	gid	street	geometry
▶	6054	Blanshard St	MULTILINESTRING(((1195688.20565039 383299.641477636,1195644.90887161 383465.699418957,1195627.81412174 383465.699418957,1195627.81412174 383465.699418957)))
*	6087	Blanshard St	MULTILINESTRING(((1195666.13837426 382299.452647313,1195677.48827297 382393.149398271)))

Record: 1 of 2





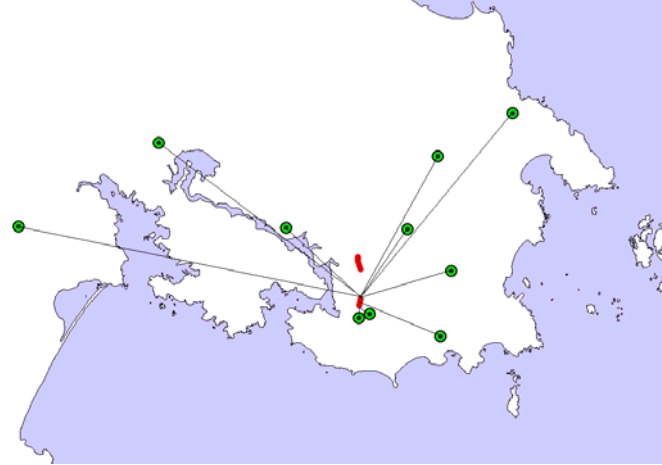
SELECT *
FROM hospitals, roads;



xproduct : Select Query

	name	location	gid	street	geometry
▶	Aberdeen Hospital	POINT(1197001.65231262 384398.270475177)	6054	Blanshard St	MULTILINESTRING((1195688.20565039 383299.641477636,1195644.90887161 383299.641477636))
	Fairfield Health Centre	POINT(1195656.24647344 381944.573517462)	6054	Blanshard St	MULTILINESTRING((1195688.20565039 383299.641477636,1195644.90887161 383299.641477636))
	Glengarry Hospital	POINT(1197905.18862936 381440.608596903)	6054	Blanshard St	MULTILINESTRING((1195688.20565039 383299.641477636,1195644.90887161 383299.641477636))
	Gorge Road Hospital	POINT(1193660.45242158 384433.153379774)	6054	Blanshard St	MULTILINESTRING((1195688.20565039 383299.641477636,1195644.90887161 383299.641477636))
	Mount St Mary Hospital	POINT(1195956.67018638 382058.203488371)	6054	Blanshard St	MULTILINESTRING((1195688.20565039 383299.641477636,1195644.90887161 383299.641477636))
	Mount Tolmie Hospital	POINT(1197829.67761525 386402.810630837)	6054	Blanshard St	MULTILINESTRING((1195688.20565039 383299.641477636,1195644.90887161 383299.641477636))
	Priory Hospital	POINT(1186271.98258414 384464.968142696)	6054	Blanshard St	MULTILINESTRING((1195688.20565039 383299.641477636,1195644.90887161 383299.641477636))
	Queen Alexandra Centre for Children	POINT(1199897.96322968 387588.909663164)	6054	Blanshard St	MULTILINESTRING((1195688.20565039 383299.641477636,1195644.90887161 383299.641477636))
	Royal Jubilee Hospital	POINT(1198193.92380713 383235.126501604)	6054	Blanshard St	MULTILINESTRING((1195688.20565039 383299.641477636,1195644.90887161 383299.641477636))
	Victoria General Hospital	POINT(1190145.27946905 386773.706085023)	6054	Blanshard St	MULTILINESTRING((1195688.20565039 383299.641477636,1195644.90887161 383299.641477636))
	Saanich Peninsula Hospital	POINT(1191394 401311)	6054	Blanshard St	MULTILINESTRING((1195688.20565039 383299.641477636,1195644.90887161 383299.641477636))
	Aberdeen Hospital	POINT(1197001.65231262 384398.270475177)	6087	Blanshard St	MULTILINESTRING((1195666.13837426 382299.452647313,1195677.48827297 382299.452647313))
	Fairfield Health Centre	POINT(1195656.24647344 381944.573517462)	6087	Blanshard St	MULTILINESTRING((1195666.13837426 382299.452647313,1195677.48827297 382299.452647313))
	Glengarry Hospital	POINT(1197905.18862936 381440.608596903)	6087	Blanshard St	MULTILINESTRING((1195666.13837426 382299.452647313,1195677.48827297 382299.452647313))
	Gorge Road Hospital	POINT(1193660.45242158 384433.153379774)	6087	Blanshard St	MULTILINESTRING((1195666.13837426 382299.452647313,1195677.48827297 382299.452647313))
	Mount St Mary Hospital	POINT(1195956.67018638 382058.203488371)	6087	Blanshard St	MULTILINESTRING((1195666.13837426 382299.452647313,1195677.48827297 382299.452647313))
	Mount Tolmie Hospital	POINT(1197829.67761525 386402.810630837)	6087	Blanshard St	MULTILINESTRING((1195666.13837426 382299.452647313,1195677.48827297 382299.452647313))
	Priory Hospital	POINT(1186271.98258414 384464.968142696)	6087	Blanshard St	MULTILINESTRING((1195666.13837426 382299.452647313,1195677.48827297 382299.452647313))
	Queen Alexandra Centre for Children	POINT(1199897.96322968 387588.909663164)	6087	Blanshard St	MULTILINESTRING((1195666.13837426 382299.452647313,1195677.48827297 382299.452647313))
	Royal Jubilee Hospital	POINT(1198193.92380713 383235.126501604)	6087	Blanshard St	MULTILINESTRING((1195666.13837426 382299.452647313,1195677.48827297 382299.452647313))
	Victoria General Hospital	POINT(1190145.27946905 386773.706085023)	6087	Blanshard St	MULTILINESTRING((1195666.13837426 382299.452647313,1195677.48827297 382299.452647313))
	Saanich Peninsula Hospital	POINT(1191394 401311)	6087	Blanshard St	MULTILINESTRING((1195666.13837426 382299.452647313,1195677.48827297 382299.452647313))

Record: 1 of 22



xp_dist : Select Query

	gid	street	name	distance
▶	6054	Blanshard St	Aberdeen Hospital	1577.27593528119
	6054	Blanshard St	Fairfield Health Centre	1355.44478518361
	6054	Blanshard St	Glengarry Hospital	2893.27094837131
	6054	Blanshard St	Gorge Road Hospital	2121.2483008994
	6054	Blanshard St	Mount St Mary Hospital	1270.13443708716
	6054	Blanshard St	Mount Tolmie Hospital	3542.84726905516
	6054	Blanshard St	Priory Hospital	9386.87450800767
	6054	Blanshard St	Queen Alexandra Centre for Children	5825.5838973516
	6054	Blanshard St	Royal Jubilee Hospital	2506.54855591294
	6054	Blanshard St	Victoria General Hospital	6316.3394359813
	6054	Blanshard St	Saanich Peninsula Hospital	18179.5759637329
	6087	Blanshard St	Aberdeen Hospital	2402.89844499405
	6087	Blanshard St	Fairfield Health Centre	355.016966503909
	6087	Blanshard St	Glengarry Hospital	2398.11574945584
	6087	Blanshard St	Gorge Road Hospital	2868.80634939711
	6087	Blanshard St	Mount St Mary Hospital	377.637247294229
	6087	Blanshard St	Mount Tolmie Hospital	4550.74742926543
	6087	Blanshard St	Priory Hospital	9630.99009304678
	6087	Blanshard St	Queen Alexandra Centre for Children	6693.90271743296
	6087	Blanshard St	Royal Jubilee Hospital	2653.55859933779
	6087	Blanshard St	Victoria General Hospital	7056.52968080051
	6087	Blanshard St	Saanich Peninsula Hospital	19396.7353741296

SELECT

distance(hospitals.the_geom,roads.the_geom)

FROM hospitals, roads;

Group 1

Group 2

gid	street	name	distance
6054	Blanshard St	Aberdeen Hospital	1577.27593528119
6054	Blanshard St	Fairfield Health Centre	1355.44478518361
6054	Blanshard St	Glengarry Hospital	2893.27094837131
6054	Blanshard St	Gorge Road Hospital	2121.2483008994
6054	Blanshard St	Mount St Mary Hospital	1270.13443708716
6054	Blanshard St	Mount Tolmie Hospital	3542.84726905516
6054	Blanshard St	Priory Hospital	9386.87450800767
6054	Blanshard St	Queen Alexandra Centre for Children	5825.5838973516
6054	Blanshard St	Royal Jubilee Hospital	2506.54855591294
6054	Blanshard St	Victoria General Hospital	6316.3394359813
6054	Blanshard St	Saanich Peninsula Hospital	18179.5759637329
6087	Blanshard St	Aberdeen Hospital	2402.89844499405
6087	Blanshard St	Fairfield Health Centre	355.016966503909
6087	Blanshard St	Glengarry Hospital	2398.11574945584
6087	Blanshard St	Gorge Road Hospital	2868.80634939711
6087	Blanshard St	Mount St Mary Hospital	377.637247294229
6087	Blanshard St	Mount Tolmie Hospital	4550.74742926543
6087	Blanshard St	Priory Hospital	9630.99009304678
6087	Blanshard St	Queen Alexandra Centre for Children	6693.90271743296
6087	Blanshard St	Royal Jubilee Hospital	2653.55859933779
6087	Blanshard St	Victoria General Hospital	7056.52968080051
6087	Blanshard St	Saanich Peninsula Hospital	19396.7353741296

The groups are defined by gid, street.

Group 1

Group 2

gid	street	name	distance
6054	Blanshard St	Aberdeen Hospital	1577.27593528119
6054	Blanshard St	Fairfield Health Centre	1355.44478518361
6054	Blanshard St	Glengarry Hospital	2893.27094837131
6054	Blanshard St	Gorge Road Hospital	2121.2483008994
6054	Blanshard St	Mount St Mary Hospital	1270.13443708716
6054	Blanshard St	Mount Tolmie Hospital	3542.84726905516
6054	Blanshard St	Priory Hospital	9386.87450800767
6054	Blanshard St	Queen Alexandra Centre for Children	5825.5838973516
6054	Blanshard St	Royal Jubilee Hospital	2506.54855591294
6054	Blanshard St	Victoria General Hospital	6316.3394359813
6054	Blanshard St	Saanich Peninsula Hospital	18179.5759637329
6087	Blanshard St	Aberdeen Hospital	2402.89844499405
6087	Blanshard St	Fairfield Health Centre	355.016966503909
6087	Blanshard St	Glengarry Hospital	2398.11574945584
6087	Blanshard St	Gorge Road Hospital	2868.80634939711
6087	Blanshard St	Mount St Mary Hospital	377.637247294229
6087	Blanshard St	Mount Tolmie Hospital	4550.74742926543
6087	Blanshard St	Priory Hospital	9630.99009304678
6087	Blanshard St	Queen Alexandra Centre for Children	6693.90271743296
6087	Blanshard St	Royal Jubilee Hospital	2653.55859933779
6087	Blanshard St	Victoria General Hospital	7056.52968080051
6087	Blanshard St	Saanich Peninsula Hospital	19396.7353741296

SELECT

road.gid,

road.street,

min(distance(hospitals.the_geom,r.the_geom)) as min_distance

FROM roads,hospitals

GROUP BY road.gid, street;

gid	street	min_distance
6054	Blanshard St	1270.13443709
6087	Blanshard St	355.016966504

Record: of 2

