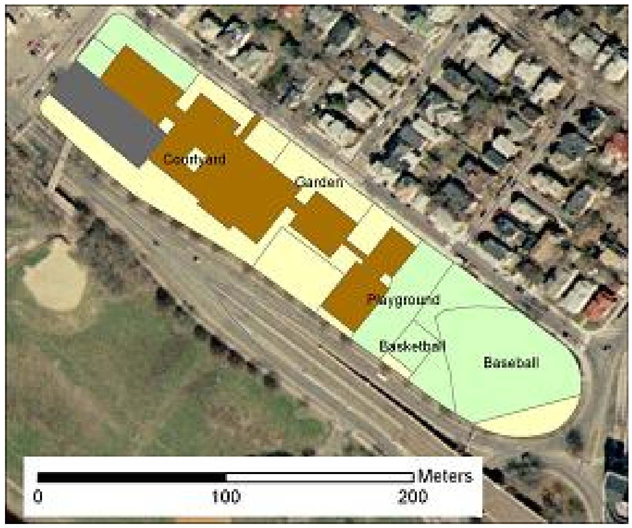
Environment Around Schools and Physical Activity: GIS Protocol



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This work was supported by funding provided by the Robert Wood Johnson Foundation's Active Living Research Grant #050376

January 30, 2007

Introduction:

In this document the format used by the Twin Cities Walking Study was followed. Where possible we adopted the same procedures used by the Twin Cities Study.

Spatial datasets are written in italics and listed in the Spatial Datasets section. Spatial datasets with the extension .shp are shapefiles, datasets with no extensions are feature classes that reside within personal geodatabases.

Grid Cell

Basic Concept

Following the work of Krizek (2003) we adopted 150-meter grid cells as our basic unit of analysis. As Krizek points out these units are small enough to introduce site and localized neighborhood characterictics efficiently, but not unreasonable from the standpoint of data management. Grid cells within various distances (e.g. 400 m and 800 m) of schools can be aggregated to provide summary variables for each school.

Basic Procedure

A continuous 150 m grid was created for eastern Massachusetts including the municipalities that contain study schools. A subset of these grid cells that intersect the four study municipalities was created.

Detailed Procedure

Using the Arc Toolbox from ArcGIS 8, under "Import to Coverage", the "Generate to coverage wizard", was used to create a "fishnet". Study area bounding coordinates (lower left and upper right) were manually entered to include the four study municipalities. 0 was entered for number of rows and columns and the grid size of 150 m was specified. The resulting coverage consisted of points and arcs. The "Build" function found under "Topology", was used to convert the arcs to polygons. The resulting coverage *grid150* includes the field "Grid150-ID which contains the unique identifier for each grid cell used throughout this study.

Select by location was used to select grid cells from *Grid150* that intersect *rwjstudytowns.shp*. The result was exported to *grid150studytownfc*. Select by location and the field calculator were used to create attributes to indicate whether or not a cell is within 400 or 800 m of each of the study school front doors or within 400 or 800 m along the street network from the front door. Attributes for square meters of open space within 800 m of cell center based on MassGIS open space data and number of persons within

800 m of cell center from 2000 census are also included. (See sections on open space below).

Comments and Explanations

Since school populations are for the most part drawn only from the municipalities where the schools are located, the municipal boundaries were used to delineate the study area. Grid cells that intersected any part of the municipalities were included in the study.

Microsoft Access queries were used to confirm that all cells that intersect 400m network buffers also intersect the corresponding 800m network buffers.

Procedures used to create polygon grid in ArcGIS 8 are no longer available in ArcGIS 9. One option is to use ET Geowizards which can be downloaded from http://www.ian-ko.com/ .

Network Buffer

Basic Concept

Pedestrians for the most part travel through their communities along the street network. Consequently, the environment of an area within a walkable distance along the street network is likely to influence people's decisions to walk. For this study, we created 400 m and 800 m buffers from school front doors along the street network as areas where Grid Cell level data could be aggregated by averaging to derive variables that might affect walkability around the study schools.

Basic Procedure

400 m and 800 m network buffers along streets accessible to pedestrians were created around each of the study schools.

Detailed Procedure

ArcGIS 9.1 Network Analyst Extension was used to create network buffers. The MassHighway 2002 roads excluding highways (function class 1 and 2) that were assumed to be inaccessible to pedestrians were used as the street network. In addition to interstates, the function 1 and 2 roads in our study area included some multi-lane state highways and parkways that in our judgment are truly barriers to pedestrians. Multi-lane roads in commercial areas were generally not function 1 and 2. Although analyses of road attributes such as sidewalks, used 1997 roads, in this case we chose to use 2002 roads because in working with networks it is important that any errors in the street network such as discontinuities are eliminated. The basic street network is not likely to have changed significantly in our study area between 1997 and 2002, and MassHighway and MassGIS are regularly identifying and correcting errors in the street network unrelated to new construction. ArcCatalog was used to convert the geodatabase feature class *rdsnofc1_2_6_7* to a network.

Network buffers, or in Network Analyst terms “service areas”, were created by loading *frontdoor.shp* as facilities. Service areas for default breaks of 400 m and 800 m were determined separately. The “detailed” polygon type polygon generation option was chosen. The results were saved as *91_800m_netwkbuf.shp* and *91_400m_netwkbuf.shp.*

Comments and Explanations

Using the street network to create buffers does not take into account the fact that pedestrians can take paths that are not part of the network. This is particularly a problem for large suburban campuses that might have multiple connections to residential neighborhoods, for example by crossing athletic fields. . The network buffers follow the shortest route from the school front door to the nearest road and continue on all the other streets of the network within the specified distance.

The network buffers were intersected with the 150 m grid cells to identify which grid cells fall within the network buffers of each school. Rather than averaging variables over a ¼ mile radius as Krizek (2003) did, we averaged variables over the grid cells that intersect the 400 m and 800 m network buffers. If any part of a grid cell intersects the buffer, the entire grid cell is considered part of the buffer. (In other words average of grid cells is not weighted for the fraction of grid cells that fall within the buffer). Grid cells with null values were set to 0 for the purpose of averaging.

Housing Units per Unit Land Area (excluding water)

Basic Concept

Housing units per acre are a proxy for population density. However, housing units rather than population is what is regulated by such mechanisms as zoning (Forsyth 2004). Excluding water from housing density calculations in areas with many bodies of water or a complex coastline provides a more accurate representation of the true housing density of an area.

Basic Procedure

Total housing units as counted by the census per unit land area (excluding water).

Detailed Procedure

It was assumed that housing units are spread uniformly throughout the dry land of each census block.

Water was defined as surface water (poly_code = 1, 6 or 8) as shown in 1:25000 hydrography from MassGIS. Hydrography shapefiles were downloaded from MassGIS for the watersheds that cover the study municipalities (Charles, Concord, Mystic and North Coastal). These were combined into one shapefile *hd25k_emass.shp.* This water data was used to calculate the percent dry land in census blocks, grid cells, and in grid block intersections. Using this approach, the percent dry land in census blocks will not match the percent dry land provided by the census because the census used a different source for water boundaries. In cases where the census dry land was 0 for a block, the calculated dry land was set to 0.

The 2000 census blocks that intersect *grid150studytownfc.shp* were selected from *census2000blocks_poly.shp* and exported to *rwjstudy00blksv2.shp.* These blocks were intersected with *grid150studytownfc.shp* to create *grid150intblocks.shp.* Attributes include calcaream which is the area of the original census block in square meters. New attributes created include campus area = area of study school campuses within each polygon, grid_block = grid150_ID &"_"& blk_ID, blkintarea = area in square meters, blkfrac = blkintarea/calcaream.

Grid150intblocks.shp was intersected with the surface water polygons of *hd25k_emass.shp* to create *grid150intswaterblk.shp*

Housing density calculations were done in the MS Access database popdensnowater.mdb. The dbfs from *grid150intblocks.shp* and *grid150intswaterblk.shp* were imported into popdensnowater.mdb. An update query dryblkintareaq was used on table grid150intblkssumv2 to calculate the dry area of each grid block intersection:

Dryblkintarea = blkintarea – [grid150intswaterblk]![calcaream2]

For each grid block intersection the fraction of the original block dry land area found in the grid block intersection was calculated and exported to the table dafract using dafract12_05q:

dafract = blkintarea/dryblkarea   If dafract >1 because of rounding errors, then dafract was set to 1 using dafractupdtq

The number of housing units in each grid block intersection was estimated in hsginblkgridq:

Hsgunitsinblkgrid = dafract * tothsgunits

The result was then summed by grid cell (hsgingridq) and exported to the table griddryhsgdens with hsgsqkm set to 0. For grid cells with dry area > 0 hsgsqkm was updated to total housing units/dry land area in square kilometers using updtgriddryhsgdensq.

Population per Unit Land Area (excluding water)

Basic Concept

Excluding water from population density calculations in areas with many bodies of water and a complex coastline provides a more accurate representation of the true population density of an area.

Basic Procedure

Total persons as counted by the census per unit land area (excluding water).

Detailed Procedure

It was assumed that population is spread uniformly throughout the dry land of each census block.

Water was defined in the same way as for housing density described above. The dry area fraction for each grid block intersection found in the dafract table created for the housing density calculation was used in popinblkgridq to calculate the estimated population in each grid block intersection.

The result was then summed by grid cell (popingridq) and exported to the table griddrypopdens with popsqkm set to 0. For grid cells with dry area > 0 popsqkm was updated to total population/dry land area in square kilometers using updtgriddrypopdensq.

Density of Employees in Major Retail Subcategories: General Merchandise, Food Stores, Eating and Drinking Places; Miscellaneous Retail

Basic Concept

Retail jobs in these categories are thought to be an important predictor of walkability (Krizek 2003).

Basic Procedure

Density of Employees in Major Retail Subcategories = Total Employees in Major Retail Subcategories per unit land area (excluding water).

Detailed Procedure

Data on 1997 employers with less than 250 employees was purchased from INFOUSA (www.infousa.com) for the major SIC codes 53 (retail), 54 (food stores), 58 (eating and drinking places) and 59 (miscellaneous retail) for the study towns. These data included latitudes and longitudes and a range of number of employees in 6 categories. To calculate the number of employees the midpoint of each range was used.

LOCATION_EMPLOYMENT_SIZE_CODE	Description	AvgEmp
A	1-4	2.5
B	5-9	7
C	10-19	14.5
D	20-49	34.5

LOCATION_EMPLOYMENT_SIZE_CODE	Description	AvgEmp
E	50-99	74.5
F	100-249	174.5

The employers were added as xy data to the map document cradockinfousa.mxd and converted to the shapefile *infousa9_29prj.shp*. This file was intersected with the grid cells to create *infousa9_29prjintgrid.shp.* The table associated with this shapefile was imported into Landuse1997.mdb. gridtotemp9_29krizekq was used to join employers to the number of employee midpoints (avgemp) and to sum by grid cell. Griddryempdensq was used to calculate the total employees/dry land area in square kilometers. None of the grid cells with employers had 0 dry land area.

Density of Employees in Youth Destinations

Basic Concept

Youth destinations in addition to the retail job subcategories described above may be a predictor of youth walking.

Basic Procedure

Density of Employees in Youth Destinations = Total Employees in Youth Destinations per unit land area (excluding water).

Detailed Procedure

Data on 1997 employers with less than 250 employees was purchased from INFOUSA (www.infousa.com) for the major SIC codes 53 (retail), 54 (food stores), 58 (eating and drinking places), 59 (miscellaneous retail), 78 (motion pictures), 83 (social services) and 84 (museums, art galleries & gardens) for the study towns. These data included latitudes and longitudes and a range of number of employees in 6 categories. To calculate the number of employees the midpoint of each range was used.

LOCATION_EMPLOYMENT_SIZE_CODE	Description	AvgEmp
A	1-4	2.5
B	5-9	7
C	10-19	14.5
D	20-49	34.5
E	50-99	74.5
F	100-249	174.5

The employers were added as xy data to the map document cradockinfousa.mxd and converted to the shapefile *infousa9_29prj.shp*. The table majorsickey was used to assign a legend field to each employer based on the major SIC code. Two additional points were merged to the file for a YMCA and YWCA to create the file *youthdestinations.shp.* A NewLegend field was created to further subdivide "social services" into child care services, child activity (e.g. YMCA), youth organizations (e.g. Big Brother/Big Sister), and educational services based on the company name. A map legend was developed using the NewLegend field and saved as the layer file infousalegend.lyr *youthdestinations.shp* was intersected with the grid cells to create *youthdestinationsintgrid.shp.* The table associated with this shapefile was imported into Landuse1997.mdb. gridtotempyouthdestq was used to join employers to the number of employee midpoints (avgemp) and to sum by grid cell. Griddryyouthdestdensq was used to calculate the total employees/dry land area in square kilometers. None of the grid cells with employers had 0 dry land area.

Median Census Block Area

Basic Concept

Census blocks are roughly equivalent to city blocks. Block area is an easy to calculate approximation for street pattern. Bigger blocks have fewer streets and/or more culs-de-sac and unless they also have additional pedestrian routes they will be harder to get around. Block size is only an approximation, as the shape of the blocks also affects the street pattern (Dill 2003). Median block size is preferred over average block size as an approximation of street patterns, since areas with mostly small blocks, but one large block (e.g. a golf course or large industrial area) may have a high average block size but low median block size which is more consistent with the characteristics of the entire area.

Basic Procedure

For each grid cell calculate the median area of the census blocks that intersect the cell.

Detailed Procedure

Dbf file associated with *grid150intblocks.shp* was imported to MS Excel and sorted on grid ID. Subtotals of the sum of the block areas in square meters were calculated at each change of grid id. A global find and replace was used to replace in the subtotal formulas "subtotal(9," with "median("
=subtotal(9,*addressrange)* where 9 is the summary function number for sum (median is not one of the summary function options available)
was changed to:
=median(*addressrange*)

To extract just the medians, the median formulas were copied and pasted as values and the spreadsheet was filtered for grid id contains “total”. The filter results were copied and pasted into a new spreadsheet, medianblocksize.xls,that contains fields for the median block size area in square meters, medblkszm, and the grid cell id, grid150_ID.

Sidewalk Length Divided by Road Length

Basic Concept

More complete and continuous sidewalks are thought to support walking. This measure focuses on the proportion of the road network that has sidewalks.

Basic Procedure

Sidewalk Length Divided by Road Length = Sum together the length of all sidewalk segments along public rights of way and divide by the length of all road centerlines, excluding interstates and principal arterials.

Detailed Procedure

Electronic files containing ARC/INFO coverages associated with the 1997 road inventory were obtained from MassHighway. 1997 data were used because it was the available data closest to the date of the physical activity data. Sidewalk width was found in the table Mass.inv which were joined to the road coverages using a unique id for each road segment. Highways ([FUNC_CLASS] 1 and 2) were excluded from the analysis, since it was assumed that these would not be desirable places to walk. In the study towns there are not very many function class 2 roads. The remaining roads for the study area were saved as *studytown97rds.shp*. These roads were intersected with *grid150studytowns.shp* and saved as *97rdsintgrid.shp*. The field calculator was used to calculate the length in meters of the road segments that result from this intersection (calclthm). The associated table was exported to MS Access (pedacc.mdb). The variable sidewalk multiplier (swmult) was created and assigned the value 2 if the sidewalk width on both sides of the street segment was greater than 0, 1 if the sidewalk width on only one side was greater than 0 and 0 if the sidewalk width was 0 on both sides. The variable swlthm was calculated to be [calclthm]*[swmult]. Swlthm and caclclthm were summed up by grid cell id. Swcomp for each grid cell was calculated to be the sum of swlthm divided by the sum of calclthm. Many grid cells do not intersect any roads and were assigned a null value for swcomp.

Average Road Width

Basic Concept

Wide roads might be associated with heavier, faster traffic and could be a barrier to pedestrians.

Basic Procedure

Grid cell average road width = Sum of (width X length)/(grid cell total length) for each road segment within the cell.

Detailed Procedure

The 1997 road data used to determine sidewalk length was also used for road width. For this analysis all roads were included (including function class 1 and 2). All 1997 roads were intersected with *grid150studytownfc.shp* and saved as *all97rdsintgridfc*. The field Shape_Length is automatically created for geodatabase feature classes. The attribute Sur_Wid is right side surface width in feet for divided roadway or surface width for entire undivided roadway. A new variable adjsurwid was created and set to equal Sur_Wid, except for divided roads (Med_wid >0) adjsurwid = 2 * [Sur_wid] and when Sur_wid = 0 (No data) adjsurwid was set to the minimum Sur_Wid of 8. Sur_wid is coded as 99 if over 100 feet, but only 3.5 km out of the 1249 km of study area roads are coded this way. A new field wthxlth was created and calculated to be [Shape_Length]*[adjsurwid]. The sum of wthxlth and sum of Shape_length = totlth for each grid cell was calculated and avgwth for each grid cell was calculated to be [sumofwthxlth]/[totlth].

Average Daily Traffic

Basic Concept

High traffic areas as determined by Average Daily Traffic measurements and estimates from MassHighway are barriers to pedestrians.

Basic Procedure

Grid cell average daily traffic = Sum of (average daily traffic X length)/(grid cell total length) for each road segment within the cell.

Detailed Procedure

The 1997 Mass Highway roads data used in this study includes an estimate of the Average Annual Daily Traffic (ADT). These are based on actual counts for interstates and other major roads and are estimates where counts were not available. The estimates for local roads are very rough numbers used as placeholders in the database.

Average Daily Traffic estimates for study area:
Min = 0
Max = 173285
9% of total study road length has ADT estimate of 0

Type of ADT derivation	Percent of total study roads length
Not specified	85.9
1997 counts	2.2
Counts within previous 3 yrs	1.3
Counts 3 or more yrs olfd	0.3
Estimate	0.4
Working code for principal arterial	10.1

A new variable adtxlth was created and set equal to Shape_Length*ADT. The sum of adtxlth and sum of Shape_length = totlth for each grid cell was calculated and avgadt for each grid cell was calculated to be [sumofadtxlth]/[totlth].

Open Space

Basic Concept

Areas with more available open space per capita might be associated with greater physical activity. People may use the open space directly for physical activity, or they might do increased physical activity in the neighborhood near the open space because of improved aesthetics, safety or other factors associated with nearby open space. Because many grid cells contain no open space, and people might be willing to walk to nearby open space, we considered open space within 800 m in this analysis.

Basic Procedure

Grid cell open space per person = the area of open space in square meters per person within 800 m of the center of the grid cell.

Detailed Procedure

Open space including Chapter 61 open space was downloaded from MassGIS for the study towns and merged together in the shapefile *os2005studytowns.shp* This file was intersected with *grid150studytownsfc*, saved as *os2005intgrid* and the field calculator was used to calculate the area of open space in square meters within each grid cell. Os2005intgrid was converted to the raster file *osrast.* The ArcGIS Spatial Analyst extension was used to calculate neighborhood statistics – the sum of open space within an 800 m circle - and the results were saved as *os800m.* The grid cell populations were converted to the raster psnrast, and neighborhood statistics was used to calculate population within 800 m. The raster calculator was used to calculate
os_psn = os800m/psn800m.

References

Forsyth A, Koepp J, Oakes M, Schmitz MK, Zimmerman J. 2004. "Environment and Physical Activity: GIS Protocols." Twin Cities Walking Study

Dill, Jennifer. 2003. Measuring network connectivity for bicycling and walking. July 17 draft. Presented at the Joint Cong. of ACSP-AESOP, Leuven, Belgium. (http://web.pdx.edu/~jdill/Dill_ACSP_paper_2003.pdf accessed 6/21/06)

Krizek KJ. 2003. "Operationalizing Neighborhood Accessibility for Land Use-Travel Behavior Research and Regional Modeling." *Journal of Planning Eucation and Research* 22:270-287.

Spatial Datasets

All spatial datasets are in the MA State Plane Projection NAD 1983 which is used by MassGIS. All datasets are located in the directory f:\cradockRWJ\cradockRWJGISfiles unless otherwise specified on Steve Melly's computer in Landmark Center West Room 407, 401 Park Drive, Boston. Xx and on the cd. Metadata for all datasets was created as .xml files using ArcCatalog following FGDC standards.

✓ Verified August 2006 - file saved with metadata

Name	**Location**	**Source**	**Comments**
✓*91_400m_netwkbuf.shp*	cradockRWJGISFiles/	HSPH	400 m network buffers
✓*91_800m_netwkbuf.shp*	cradockRWJGISFiles/	HSPH	800 m network buffers
97rdsintgrid.shp	cradockRWJGISFiles/ MassHighway97	Mass Highway	1997 roads intersected with grid cells excluding interstates and principal arterials.
all97rdsintgridfc	cradockRWJGISFiles/ MassHighway97/ 97rdsintgridsum.mdb	MassHighway	
Census2000blocks_poly.shp	C:\gisdata\census\blocks	MassGIS	2000 block boundaries clipped by coast
✓*Frontdoor.shp*	CradockRWJGISFiles	HSPH	Location of main entrance to schools

Name	**Location**	**Source**	**Comments**
✓frontdoorbuffers.shp	CradockRWJGISFiles	HSPH	400 & 800 m circular buffers around front doors.
Grid150	cradockRWJGISfiles	HSPH	Coverage. 150 m grid covering eastern MA from Framingham to Lynn
grid150intblocks.shp	cradockRWJGISfiles	HSPH	Intersection of *rwjstudy00blksv2* with *grid150studytowns*
grid150intswaterblk.shp	cradockRWJGISfiles	HSPH	Intersection of *grid150intblocks.shp* with surface water polygons of *hd25k_emass.shp*
Grid150studytownfc	cradockRWJGISfiles\ 150grid.mdb	HSPH	150 m grid cells that intersect study municipalities with attributes indicating whether cells lie within buffers around schools
✓*Grid150studytowns_int400mnetwkbuf*	cradockRWJGISfiles	HSPH	150 m grid cells intersected with 400 m network buffers
✓*Grid150studytowns_int800mnetwkbuf*	cradockRWJGISfiles	HSPH	150 m grid cells intersected with 800 m network buffers
hd25k_emass.shp	C:\gisdata\water\ water2005	MassGIS	Appended together data from Charles, Mystic, North Coastal and Concord watersheds.
✓*Infousa9_29prj*	Infousa	INFOUSA	Latest version of organizations with selected SICs geocoded by INFOUSA. Includes all of Cambridge.
Infousa9_29prjintgrid	Infousa	INFOUSA	Selected SICs intersected with grid cells.

Name	**Location**	**Source**	**Comments**
Os_psn	CradockRWJGISFiles/ openspace/	HSPH	*Os800m/psn800m*
✓*Os2005intgrid*	CradockRWJGISFiles/ openspace/	HSPH	Intersection of open space with grid cells.
✓*os2005studytowns.shp*	CradockRWJGISFiles/ openspace/	MassGIS	Merged together open space and Chapter 61 open space for study towns.
✓*Os800m*	CradockRWJGISFiles/ openspace/	HSPH	Neighborhood statistics, sum of open space within 800 m circle
✓*Osrast*	CradockRWJGISFiles/ openspace/	HSPH	*Os2005intgrid* converted to raster
Psn800m	CradockRWJGISFiles/ openspace/	HSPH	Neighborhood statistics, sum of population within 800 m circle
Psnrast	CradockRWJGISFiles/ openspace/	HSPH	Population of grid cell as raster
✓*rdsnofc1_2_6_7*	C:\gisdata\MassHighway\ cradockstudyrds.mdb	MassGIS	2002 roads excluding function class 1 and 2 with driveway to Walsh School added manually
Rwjstudy00blksv2.shp	cradockRWJGISfiles	HSPH	2000 blocks that intersect *grid150studytowns*
✓*Rwjstudyschools.shp*	cradockRWJGISfiles	MassGIS	Study school locations from MassGIS
✓*Rwjstudytowns.shp*	cradockRWJGISfiles	MassGIS	Boundaries of Framingham, Cambridge, Somerville & Lynn.

Name	**Location**	**Source**	**Comments**
Schoolcatchmentdis.shp *[Xx not mentioned in text]*	cradockRWJGISFiles/ Framingham/	Framingham Public Schools	Framingham elementary school catchment areas digitized from paper maps. Census block boundaries used when possible. Boundaries are approximate. Link with catchmentlut.dbf to get school names and associated middle schools.
Studytown97rds.shp	cradockRWJGISFiles/ MassHighway97	Mass Highway	1997 roads for study towns joined to mass.inv file, excluding interstates and principal arterials.
✓*Youthdestinations.shp*	cradockRWJGISFiles/	INFOUSA	*Infousa9_29prj* plus Cambridge YMCA & YWCA
✓*Youthdestinationsintgrid.shp*	cradockRWJGISFiles/		*Youthdestinations.shp* intersected with *grid150studytowns*

Redundant GIS files – saved because used in Map documents

Grid150studytowns.shp

MS Access Databases

In general make table queries associated with tables are named [tablename]&"q".
In some cases ArcGIS was used to transfer tables directly to MS Access databases. When this is done, the database takes on the appearance of a personal geodatabase and includes many tables generated automatically associated with the ArcGIS personal geodatabase format. These tables are not described below. Only tables used for analyses are mentioned here.

Popdensnowater.mdb

Key Tables

Rwjstudyblocksv2 – provides list of blocks included in rwj study n = 3676

Blockswaterarea – total water area in square meters for blocks that include some water n = 417

Grid150intswaterblk – intersection of blocks with water

Grid150intblkssumv2 – intersection of blocks with grid cells. Includes dry area of each grid block intersection

Dafract – includes dry area fraction for grid block intersection

Griddryhsgdens – includes housing units per dry land area in square kilometers for grid cells

Griddrypopdens – includes persons per dry land area in square kilometers.

Queries

Blocksdryareaq – updated rwjstudyblocksv2 calcdryarem using waterarеam from blockswaterarea

Landuse1997.mdb

InfoUSA data on employers.

Pedacc.mdb

Used to calculate sidewalk length divided by road length for grid cells.

Glossary

Study municipalities: Framingham, Cambridge, Somerville, Lynn

MassGIS – Office within MA Executive Office of Environmental Affairs that acts as a clearinghouse for MA spatial datasets. http://www.mass.gov/mgis/massgis.htm

Service areas – Network buffers. Polygons that represent a buffer of a specified distance along the street network