

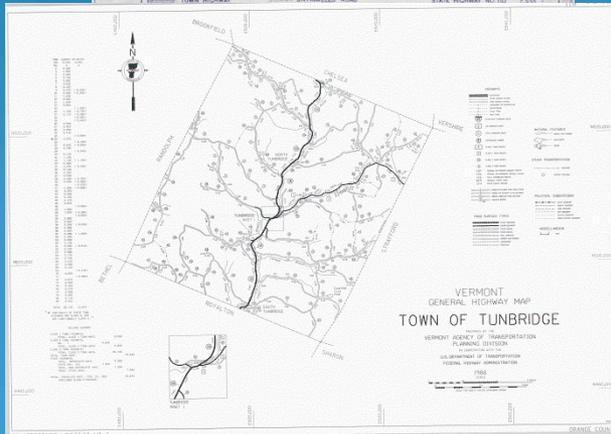
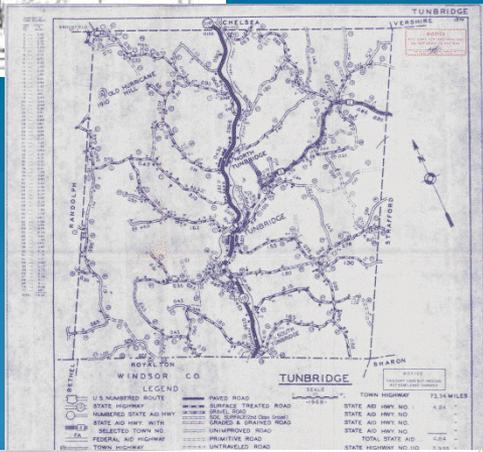
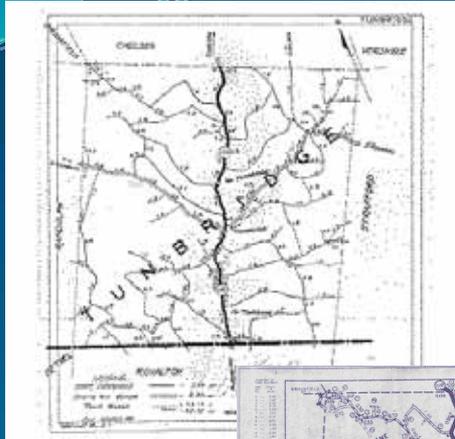
Leveraging Python to Revolutionize the Production of the Vermont Town Highway Maps

Vermont Agency of Transportation

Esri UC 2013

The Purpose

The Mapping Unit of the Agency of Transportation has produced Town Highway Maps since the first series in 1931, based on a statutory requirement. The chief purpose of these maps is to document highway classification and mileage of town highways for use in calculating State Aid for town highway maintenance. The Highway Mapping System (HMS) is the tool used to create the maps.



<http://vtransplanning.vermont.gov/maps/archive>

Annual Map Updates

District 12

CERTIFICATE OF HIGHWAY MILEAGE YEAR ENDING FEBRUARY 10, 2011

Fill out form, make and file copy with the Town Clerk, and mail ORIGINAL, before February 20, 2011 to:
Vermont Agency of Transportation, Division of Planning, Outreach and Community Affairs, One National Life
Drive, Montpelier, VT 05602.

We, the members of the legislative body of **EXAMPLE TOWN** in **ADAMS** County
on an oath state that the mileage of highways, according to Vermont Statutes Annotated, Title 19, Section 305,
added 1985, is as follows:

PART I - CHANGES TOTALS - Please fill in and calculate totals.

Town Highways	Previous Mileage	Added Mileage	Subtracted Mileage	Total	State Highways
Class 1	0.444			0.444	0.000
Class 2	0.040			0.040	0.000
Class 3	28.00	0.14	0.50	27.64	0.000
State Highway	8.907			8.907	0.000
Total	48.491			48.491	0.000
* Class 1 Lane	0.000				0.000
* Class 4	5.98	0.12		6.10	
* Legal Trail	0.82			0.82	
* Unidentified Corridor	0.00	0.76		0.76	

* Mileage for Class 1 Lane, Class 4, Legal Trail, and Unidentified Corridor classifications is NOT included in total.

PART II - INFORMATION AND DESCRIPTION OF CHANGES SHOWN ABOVE.

- NEW HIGHWAYS:** Please attach Selectmen's "Certificate of Completion and Opening".
0.14 mi CL3 Mountain Ln
- DISCONTINUED:** Please attach SIGNED copy of proceedings (minutes of meeting).
0.18 mi T14.7 Discontinued (Traverse Brook Rd, was CL3)
- RECLASSIFIED/REMEASURED:** Please attach SIGNED copy of proceedings (minutes of meeting).
0.12 mi T14.41 (reclassified from CL3 to CL4 (See R 188 R6))
0.04 mi Unidentified Corridor (JC #1), 0.12 mi Unidentified Corridor (JC #2)
- SCENIC HIGHWAYS:** Please attach a copy of order designating/discontinuing Scenic Highways.

IF THERE ARE NO CHANGES IN MILEAGE: Check box and sign below.

PART III - SIGNATURES - PLEASE SIGN.

Selectmen/ Aldermen/ Trustees Signatures: _____

TCV Clerk Signature: _____

Date Filed: _____

Please sign ORIGINAL and return it for Transportation signature.

AGENCY OF TRANSPORTATION APPROVAL: Signed copy will be returned to TCV Clerk.

APPROVED: _____

DATE: _____

Representative, Agency of Transportation

The maps are updated annually based on information supplied by municipalities on a formal Mileage Certificate. Typically between 50 and 100 municipalities submit changes during any given year.

These changes include additions, alterations, reclassifications and discontinuances.

Map Production

Master datasets maintained in ArcSDE are used to render the highways, structures, mileage annotation, shields, and other features.



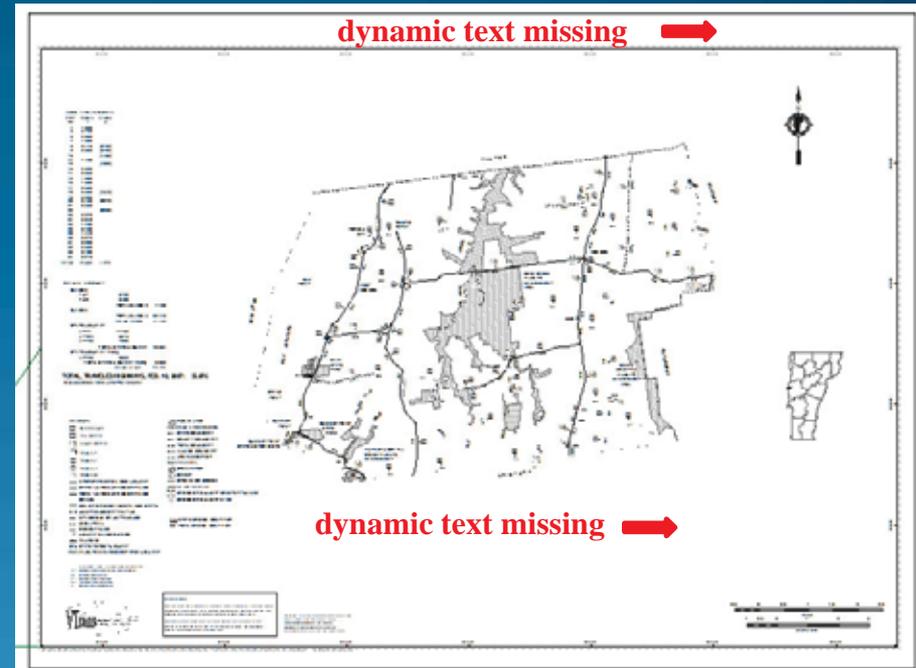
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ANDOVER_MILEAGE_2011.mxd	10/26/2011 8:43 AM	ArcGIS ArchMag D...	2,666 KB
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FAIRHAVEN_MILEAGE_2011.mxd	10/26/2011 8:50 AM	ArcGIS ArchMag D...	3,134 KB
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GUILDHALL_MILEAGE_2011.mxd	10/27/2011 8:48 AM	ArcGIS ArchMag D...	2,507 KB
HANCOCK_MILEAGE_2011.mxd	10/27/2011 8:49 AM	ArcGIS ArchMag D...	2,511 KB

319 individual MXD's were used until the 2012 series to generate the Town Highway Maps. Each MXD was updated individually to produce the Town Highway Map.

The Problem

Upgrades in the Esri software broke previously created MXD's, requiring the overhaul and rebuilding of each MXD to create the same Town Highway Map. Key issues included inserted Objects, such as the Mileage Reports and Dynamic Text through PLTS not supported the same way from one version to the next.

Components of the maps used VBA, as Esri ends its support of VBA this will become problematic



In 2007, about 100 MXD's using ArcInfo 9.1 were rebuilt for that year's production, plus another 100 in preparation for future years.

All the maps needed to be retooled due to changes in 9.2 PLTS dynamic text changes. Every MXD was rebuilt.

The Problem - continued

MILEAGE REPORTS

-- Mileage reports were RTF files generated out of MS Access and then insert into the map as an object -- this caused several problems.

-- 9.2 ArcMap didn't handle inserted objects well, couldn't produce the maps using 9.2, had to have a PC remain back at 9.1 until 9.3 came out

-- MS Access connected to the Default table of the SDE road centerline data - either we had to build a model to copy the data out to a personal geodatabase or wait until after the overnight compress moved the day's data edits to the Default table.

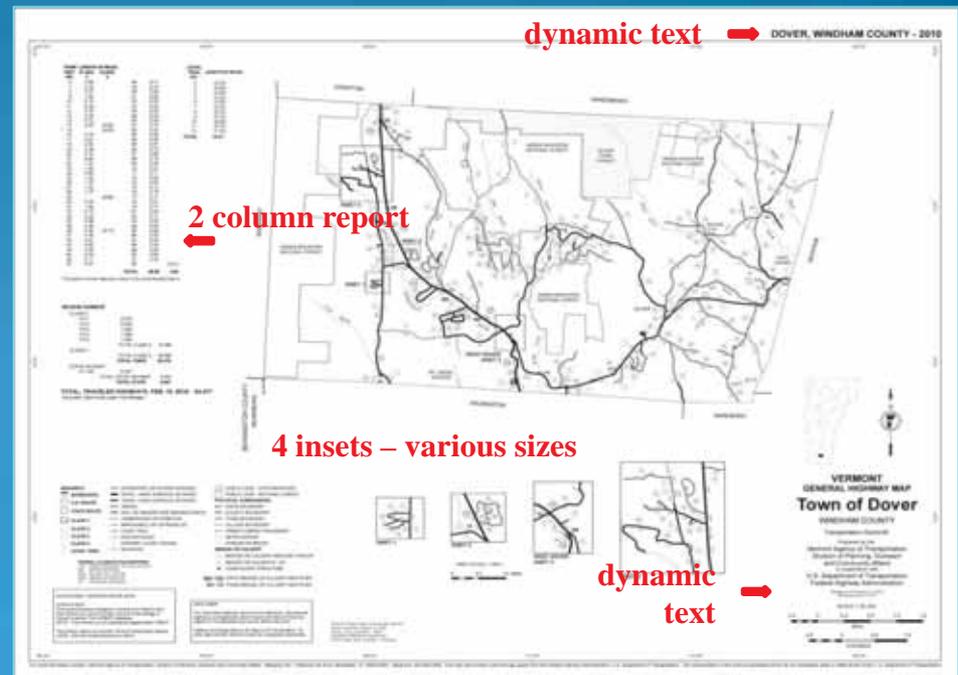
-- Because of the Object - couldn't use script to auto generate the PDFs from multiple MXDs, had to go into each MXD and export the PDF

TOWN HWY. NO.	LENGTH IN MILES	
	CLASS 3	CLASS 4
4	4.050	
5	3.750	
6	2.950	
7	1.200	
8	0.440	(0.150)
9	0.060	(0.780)
10		(1.400)
11	1.450	
12		(1.090)
13	2.520	
14	0.950	
15	1.080	
16	1.600	
17	0.550	
18	0.560	(1.340)
19	0.200	
20	0.450	(0.070)
21	0.550	
22		(0.250)
23	0.070	
24	3.640	
25	1.700	
26	0.160	
28	1.470	
30	0.070	
31	0.220	
32	0.350	
33	0.190	
34	0.210	
TOTAL	30.440	5.080

Solution - Data Driven Pages or Production Mapping???

NO!!! - There is too much variability in each map to be able to leverage Data Driven Pages (DDP) or Production Mapping.

- Variable Map Scales
- Variable Insets – #, Size & Scale
- Variable Mileage Summary Sizes
- Variable Reports -
 - Class 3 & 4
 - Legal Trail
 - Not-Up-To-Standards
- Variable Town Shapes and Sizes



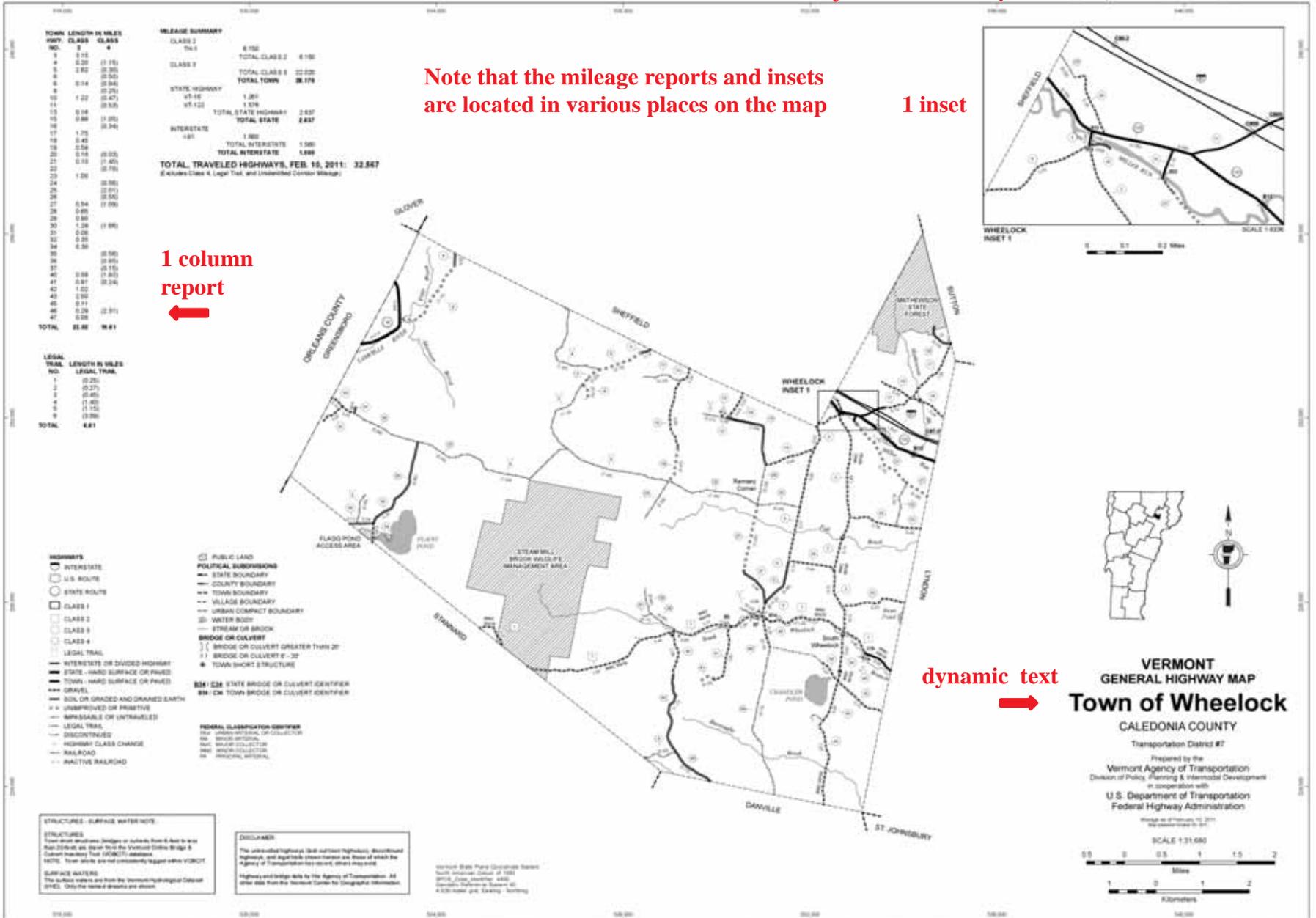
TOWN	LENGTH IN MILES	LEGAL	TRAIL	LENGTH IN MILES
NO. 1	2	NO.	NO.	
1	0.20	48	3	0.20
2	0.24	49	4	0.20
3	0.27	50	5	0.20
4	0.31	51	6	0.20
5	0.35	52	7	0.20
6	0.39	53	8	0.20
7	0.43	54	9	0.20
8	0.47	55	10	0.20
9	0.51	56	11	0.20
10	0.55	57	12	0.20
11	0.59	58	13	0.20
12	0.63	59	14	0.20
13	0.67	60	15	0.20
14	0.71	61	16	0.20
15	0.75	62	17	0.20
16	0.79	63	18	0.20
17	0.83	64	19	0.20
18	0.87	65	20	0.20
19	0.91	66	21	0.20
20	0.95	67	22	0.20
21	0.99	68	23	0.20
22	1.03	69	24	0.20
23	1.07	70	25	0.20
24	1.11	71	26	0.20
25	1.15	72	27	0.20
26	1.19	73	28	0.20
27	1.23	74	29	0.20
28	1.27	75	30	0.20
29	1.31	76	31	0.20
30	1.35	77	32	0.20
31	1.39	78	33	0.20
32	1.43	79	34	0.20
33	1.47	80	35	0.20
34	1.51	81	36	0.20
35	1.55	82	37	0.20
36	1.59	83	38	0.20
37	1.63	84	39	0.20
38	1.67	85	40	0.20
39	1.71	86	41	0.20
40	1.75	87	42	0.20
41	1.79	88	43	0.20
42	1.83	89	44	0.20
43	1.87	90	45	0.20
44	1.91	91	46	0.20
45	1.95	92	47	0.20
46	1.99	93	48	0.20
47	2.03	94	49	0.20
48	2.07	95	50	0.20
49	2.11	96	51	0.20
50	2.15	97	52	0.20
51	2.19	98	53	0.20
52	2.23	99	54	0.20
53	2.27	100	55	0.20
54	2.31	101	56	0.20
55	2.35	102	57	0.20
56	2.39	103	58	0.20
57	2.43	104	59	0.20
58	2.47	105	60	0.20
59	2.51	106	61	0.20
60	2.55	107	62	0.20
61	2.59	108	63	0.20
62	2.63	109	64	0.20
63	2.67	110	65	0.20
64	2.71	111	66	0.20
65	2.75	112	67	0.20
66	2.79	113	68	0.20
67	2.83	114	69	0.20
68	2.87	115	70	0.20
69	2.91	116	71	0.20
70	2.95	117	72	0.20
71	2.99	118	73	0.20
72	3.03	119	74	0.20
73	3.07	120	75	0.20
74	3.11	121	76	0.20
75	3.15	122	77	0.20
76	3.19	123	78	0.20
77	3.23	124	79	0.20
78	3.27	125	80	0.20
79	3.31	126	81	0.20
80	3.35	127	82	0.20
81	3.39	128	83	0.20
82	3.43	129	84	0.20
83	3.47	130	85	0.20
84	3.51	131	86	0.20
85	3.55	132	87	0.20
86	3.59	133	88	0.20
87	3.63	134	89	0.20
88	3.67	135	90	0.20
89	3.71	136	91	0.20
90	3.75	137	92	0.20
91	3.79	138	93	0.20
92	3.83	139	94	0.20
93	3.87	140	95	0.20
94	3.91	141	96	0.20
95	3.95	142	97	0.20
96	3.99	143	98	0.20
97	4.03	144	99	0.20
98	4.07	145	100	0.20
99	4.11	146	101	0.20
100	4.15	147	102	0.20
101	4.19	148	103	0.20
102	4.23	149	104	0.20
103	4.27	150	105	0.20
104	4.31	151	106	0.20
105	4.35	152	107	0.20
106	4.39	153	108	0.20
107	4.43	154	109	0.20
108	4.47	155	110	0.20
109	4.51	156	111	0.20
110	4.55	157	112	0.20
111	4.59	158	113	0.20
112	4.63	159	114	0.20
113	4.67	160	115	0.20
114	4.71	161	116	0.20
115	4.75	162	117	0.20
116	4.79	163	118	0.20
117	4.83	164	119	0.20
118	4.87	165	120	0.20
119	4.91	166	121	0.20
120	4.95	167	122	0.20
121	4.99	168	123	0.20
122	5.03	169	124	0.20
123	5.07	170	125	0.20
124	5.11	171	126	0.20
125	5.15	172	127	0.20
126	5.19	173	128	0.20
127	5.23	174	129	0.20
128	5.27	175	130	0.20
129	5.31	176	131	0.20
130	5.35	177	132	0.20
131	5.39	178	133	0.20
132	5.43	179	134	0.20
133	5.47	180	135	0.20
134	5.51	181	136	0.20
135	5.55	182	137	0.20
136	5.59	183	138	0.20
137	5.63	184	139	0.20
138	5.67	185	140	0.20
139	5.71	186	141	0.20
140	5.75	187	142	0.20
141	5.79	188	143	0.20
142	5.83	189	144	0.20
143	5.87	190	145	0.20
144	5.91	191	146	0.20
145	5.95	192	147	0.20
146	5.99	193	148	0.20
147	6.03	194	149	0.20
148	6.07	195	150	0.20
149	6.11	196	151	0.20
150	6.15	197	152	0.20
151	6.19	198	153	0.20
152	6.23	199	154	0.20
153	6.27	200	155	0.20
154	6.31	201	156	0.20
155	6.35	202	157	0.20
156	6.39	203	158	0.20
157	6.43	204	159	0.20
158	6.47	205	160	0.20
159	6.51	206	161	0.20
160	6.55	207	162	0.20
161	6.59	208	163	0.20
162	6.63	209	164	0.20
163	6.67	210	165	0.20
164	6.71	211	166	0.20
165	6.75	212	167	0.20
166	6.79	213	168	0.20
167	6.83	214	169	0.20
168	6.87	215	170	0.20
169	6.91	216	171	0.20
170	6.95	217	172	0.20
171	6.99	218	173	0.20
172	7.03	219	174	0.20
173	7.07	220	175	0.20
174	7.11	221	176	0.20
175	7.15	222	177	0.20
176	7.19	223	178	0.20
177	7.23	224	179	0.20
178	7.27	225	180	0.20
179	7.31	226	181	0.20
180	7.35	227	182	0.20
181	7.39	228	183	0.20
182	7.43	229	184	0.20
183	7.47	230	185	0.20
184	7.51	231	186	0.20
185	7.55	232	187	0.20
186	7.59	233	188	0.20
187	7.63	234	189	0.20
188	7.67	235	190	0.20
189	7.71	236	191	0.20
190	7.75	237	192	0.20
191	7.79	238	193	0.20
192	7.83	239	194	0.20
193	7.87	240	195	0.20
194	7.91	241	196	0.20
195	7.95	242	197	0.20
196	7.99	243	198	0.20
197	8.03	244	199	0.20
198	8.07	245	200	0.20
199	8.11	246	201	0.20
200	8.15	247	202	0.20
201	8.19	248	203	0.20
202	8.23	249	204	0.20
203	8.27	250	205	0.20
204	8.31	251	206	0.20
205	8.35	252	207	0.20
206	8.39	253	208	0.20
207	8.43	254	209	0.20
208	8.47	255	210	0.20
209	8.51	256	211	0.20
210	8.55	257	212	0.20
211	8.59	258	213	0.20
212	8.63	259	214	0.20
213	8.67	260	215	0.20
214	8.71	261	216	0.20
215	8.75	262	217	0.20
216	8.79	263	218	0.20
217	8.83	264	219	0.20
218	8.87	265	220	0.20
219	8.91	266	221	0.20
220	8.95	267	222	0.20
221	8.99	268	223	0.20
222	9.03	269	224	0.20
223	9.07	270	225	0.20
224	9.11	271	226	0.20
225	9.15	272	227	0.20
226	9.19	273	228	0.20
227	9.23	274	229	0.20
228	9.27	275	230	0.20
229	9.31	276	231	0.20
230	9.35	277	232	0.20
231	9.39	278	233	0.20
232	9.43	279	234	0.20
233	9.47	280	235	0.20
234	9.51	281	236	0.20
235	9.55	282	237	0.20
236	9.59	283	238	0.20
237	9.63	284	239	0.20
238	9.67	285	240	0.20
239	9.71	286	241	0.20
240	9.75	287	242	0.20
241	9.79	288	243	0.20
242	9.83	289	244	0.20
243	9.87	290	245	0.20
244	9.91	291	246	0.20
245	9.95	292	247	0.20
246	9.99	293	248	0.20
247	10.03	294	249	0.20
248	10.07	295	250	0.20
249	10.11	296	251	0.20
250	10.15	297	252	0.20
251	10.19	298	253	0.20
252	10.23	299	254	0.20
253	10.27	300	255	0.20
254	10.31	301	256	0.20
255	10.35	302	257	0.20
256	10.39	303	258	0.20
257	10.43	304	259	0.20
258	10.47	305	260	0.20
259	10.51	306	261	0.20
260	10.55	307	262	0.20
261	10.59	308	263	0.20
262	10.63	309	264	0.20
263	10.67	310	265	0.20
264	10.71	311	266	0.20
265	10.75	312	2	

Note that the mileage reports and insets are located in various places on the map

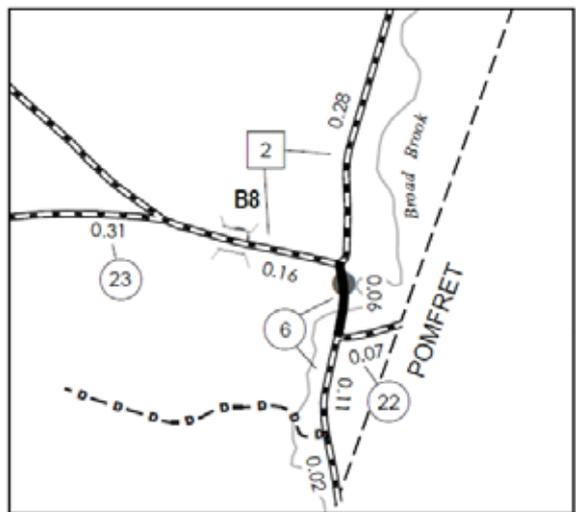
1 inset

1 column report

dynamic text →



Challenges & System Requirements



EAST BARNARD
INSET 2
INSET SCALE
1:12672

TOWN HWY. No.	LENGTH IN MILES "NOT UP TO STANDARD"
18	(0.10)
21	(0.22)
53	(0.08)
91	(0.06)
101	(0.08)
TOTAL	0.54

* The sections of the town highways listed above are legally Class 3, but have been deemed "Not Up To Standard" and are functionally Class 4 Town Highways

The Solution needed to accommodate the following requirements:

Multiple Insets – MPS-Atlas and Data Driven Pages couldn't handle them

Mileage reports – couldn't use the reporting tool in ArcMap – it wouldn't limit the report data to just the map town's data, also dynamic graphic table didn't work – the reports were too sophisticated

Variable Town Shape, Size and Page Layout

Need to eliminate annual Retooling

ArcMap Master MXD Template

The screenshot displays the ArcMap interface for a Master MXD Template. The window title is "MasterTemplate_36x27test_v10.mxd - ArcMap - ArcInfo". The menu bar includes File, Edit, View, Bookmarks, Insert, Selection, Geoprocessing, Customize, Windows, and Help. The toolbar shows various editing and production tools, including Node Renderer, Convert Coverage Annotation, and Labeling. The Table of Contents on the left lists the following layers:

- MainDF
 - rdsmall_arc
 - Town Index
 - HMS - Anno
 - HMS - Grouped Layers
- Inset1
 - HMS - Anno
 - HMS - Grouped Layers
- Inset2
 - HMS - Anno
 - HMS - Grouped Layers
- Inset3
 - HMS - Anno
 - HMS - Grouped Layers
- Inset4
 - HMS - Anno
 - HMS - Grouped Layers
- Inset5
 - HMS - Anno
 - HMS - Grouped Layers
- Inset6
 - HMS - Anno
 - HMS - Grouped Layers

The main map area shows a highway map of Vermont with a title block that reads "VERMONT GENERAL HIGHWAY MAP Town of XXXXXX". The drawing toolbar at the bottom shows a font of Arial, size 10, and a scale of 19.06 28.99 Inches.

Page Layout Elements Table

Each record represents the layout specifications for a map, and each field contains the layout parameters for a Data Frame or other layout element within that map.

Town

OBJECTID *	CTCODE	MainDF	Inset1	
1	0107	[0.9,0.9,24.8,34.5,459394,487317,157306,177262,31680]	[21.74,21.26,3.24,6.17,468768,470759,165635,166680,12672,"INSET 1"]	[17.45,21.5]
2	0406	[0.9,0.9,24.8,34.5,441051,468976,216649,236607,31680]	[24.9,17.38,7.48,9.61,448381,451312,222621,224903,12000,"INSET 1"]	<Null>
3	1016	[0.9,0.9,24.8,34.5,500486,528247,259145,279101,31680]	[21.22,4.11,4.91,6.28,514819,515830,271801,272591,6336,"NEWPORT CENTER \nINSET 1"]	[51.0,19.5]

[Data Frame X_{position}, Y_{position}, height, width, extent, scale]

Possible to include formatted text

Inset6	LocatorAndNorthArrow	TextBoxesAndLegend	Reports	Year	Layout
<Null>	[31.9,10.5]	[-4.96,0.26,23.11,1.5,15.88,1.5,2.0,1.5]	[2.0,24.0,1,2.0,17.0,5.5,24.0,40.0,12.36]	2012	36x27
<Null>	[31.9,10.5]	[-4.96,0.26,1.5,1.5,6.85,1.5,12.45,20.7]	[1.5,24.0,2,7.05,23.83,40.0,13.65,1.5,6.78]	2012	36x27
[51.0,1.5,3.0,4.0,510151,535447,61766,80738,248973,"Inset6 Text"]	[31.9,10.5]	[-4.96,0.26,2.0,1.5,2.0,3.94,1.5,10.33]	[2.0,24.0,1,6.28,23.83,51.0,17.08,6.39,18.21]	2012	36x27
[51.0,5.02,3.75,2.68,497389,498254,140526,141737,12672,"INSET 6"]	[31.8392,10.3765]	[-4.96,0.26,2.0,1.5,7.7,1.5,12.19,1.5]	[2.0,18.13,3,2.0,10.16,9.53,24.45,13.0,23.93]	2012	36x27
[10.55,21.63,3.17,5.05,494246,495061,122148,122659,6336,"INSET 6"]	[25.75,3.9]	[-4.96,0.26,2.0,5.67,2.0,8.07,2.0,1.5]	[2.0,24.0,3,2.0,16.0,9.5,20.0,51.0,23.93]	2012	36x27

(Page Layout Elements Tables continued)

Python Scripting

Can produce individual maps or batch production of PDFs

Updates CTCODE (town) in layer definition queries

Moves layout elements according to properties saved in Page Layout Elements Table (moves unwanted elements off the page)

Updates data-driven text:

Town Map title block,
production year,
margin text, etc.

Reads mileage data from
primary data, processes
it, and updates “Mileage
Report” text elements

```
1 import arcpy, json, os, sys, time
2
3 arcpy.env.overwriteOutput = True
4 relPath = os.path.dirname(sys.argv[0])
5
6 #CURRENT - Get GP tool CTCODE value
7 inputValue = arcpy.GetParameterAsText(0)
8
9 #Function that arranges data frames based on PageLayoutElements table
10 def arrangeDFs(row, dfName, dfText, dfScaleText, dfScaleBar):
11     rowInfo = json.loads(row.getValue(dfName))
12     df = arcpy.mapping.ListDataFrames(mxd, dfName) [0]
13     df.elementPositionX = rowInfo[0]
14     df.elementPositionY = rowInfo[1]
15     df.elementHeight = rowInfo[2]
16     df.elementWidth = rowInfo[3]
17     newExtent = df.extent
18     newExtent.XMin = rowInfo[4]
19     newExtent.XMax = rowInfo[5]
20     newExtent.YMin = rowInfo[6]
21     newExtent.YMax = rowInfo[7]
22     df.extent = newExtent
23     #Must perform second time in 10.0 SP4
24     newExtent = df.extent
25     newExtent.XMin = rowInfo[4]
26     newExtent.XMax = rowInfo[5]
27     newExtent.YMin = rowInfo[6]
28     newExtent.YMax = rowInfo[7]
29     df.extent = newExtent
30     df.scale = rowInfo[8]
31     if not dfName == "MainDF":
32         dfText.text = rowInfo[9]
33         dfText.elementPositionX = df.elementPositionX
34     # next line modified since 2012-04-26 Moulton / 2012-6-1
35     dfText.elementPositionY = df.elementPositionY - 0.00
36     dfScaleText.elementPositionX = df.elementPositionX + df.elementWidth
```

Suite of Python Scripts

Core.py

Geoprocessing to make map layout according to PageLayoutElements table.

Gateway Scripts: Generate lists of towns to be mapped by **Core.py**

ZoomToPage.py

(one town)

ExportToPDF.py

(batch of towns by year and layout size)

SetLayoutInfo.py

Inserts or updates page layout information for a map in PageLayoutElements table based on current mxd layout.

```
import arcpy, Toolbox2_Core

mxdPath = "CURRENT"
inputValue = arcpy.GetParameterAsText(0)

ctCodeList = []
ctCodeList.append(inputValue)

Toolbox2_Core.mainScript(ctCodeList, mxdPath)

arcpy.RefreshActiveView()
```

```
import arcpy, string, Toolbox2_Core

mxdPath = "CURRENT"
pageSize = arcpy.GetParameterAsText(0)
year = arcpy.GetParameterAsText(1)
ctCodeList = string.split(arcpy.GetParameterAsText(2), ";")

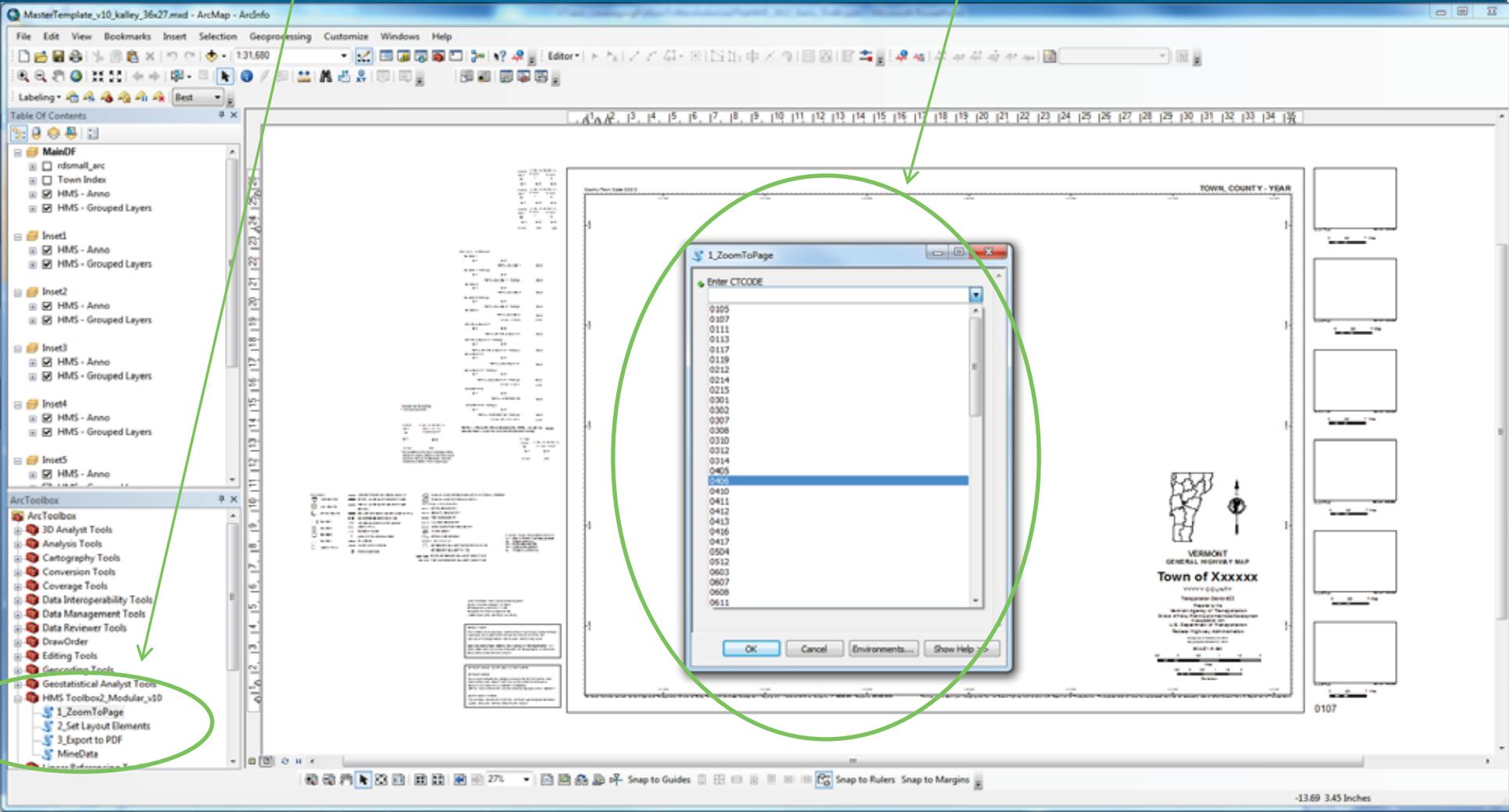
Toolbox2_Core.mainScript(ctCodeList, mxdPath, year)

arcpy.RefreshActiveView()
```

HMS Toolbox – Making the Map

HMS Toolbox: ZoomToPage
Set Layout Elements
Export to PDF

ZoomToPage interface



HMS Toolbox - ZoomToPage

Elements not used in layout

The screenshot displays the ArcMap interface with a map layout titled "ESSEX, CHITTENDEN COUNTY - 2012". The layout includes a main map area, a legend, a north arrow, a scale bar, and an inset map. The Table of Contents on the left lists various layers, including "HMSADMN.HIGHWAY.MAPPING.SYSTEM" and "HMSADMN.HIGHWAY.SHIELDS.ARCS". The ArcToolbox on the bottom left shows the "ZoomToPage" tool selected. Green circles and arrows highlight the "ZoomToPage" tool in the ArcToolbox, a small box in the map area, and a vertical list of elements on the right side of the layout.

MasterTemplate_v10_kalley_36x27.mxd - ArcMap - ArcInfo

File Edit View Bookmarks Insert Selection Geoprocessing Customize Window Help

1:250,000

Editor

Labeling Best

Table of Contents

MainDF

- sde.DEFAULT (AOTGIS)
- GDB_HMS.HMSADMIN.HighwayMappingSystem
 - rdsmall_arc
 - GDB_HMS.HMSADMIN.Anno_insetExtents
 - GDB_HMS.HMSADMIN.Anno_Boundary_31680
 - GDB_HMS.HMSADMIN.Anno_FAS_31680
 - GDB_HMS.HMSADMIN.Anno_Major_31680
 - GDB_HMS.HMSADMIN.Anno_Mileage_31680
 - GDB_HMS.HMSADMIN.Anno_Water_31680
 - HIGHWAYS
 - GDB_HMS.HMSADMIN.hmc_shields_arcs
 - RAILROAD
 - HIGHWAY CLASS CHANGE
 - PAVED
 - PAVED_UC
 - PAVED_alternate
 - GRAVEL
 - GRAVEL_UC
 - GRAVEL_alternate
 - LT-DISC
 - LT-DISC_alternate
 - BRIDGE OR CULVERT
 - CR_SERVICE_OR_CULVERT

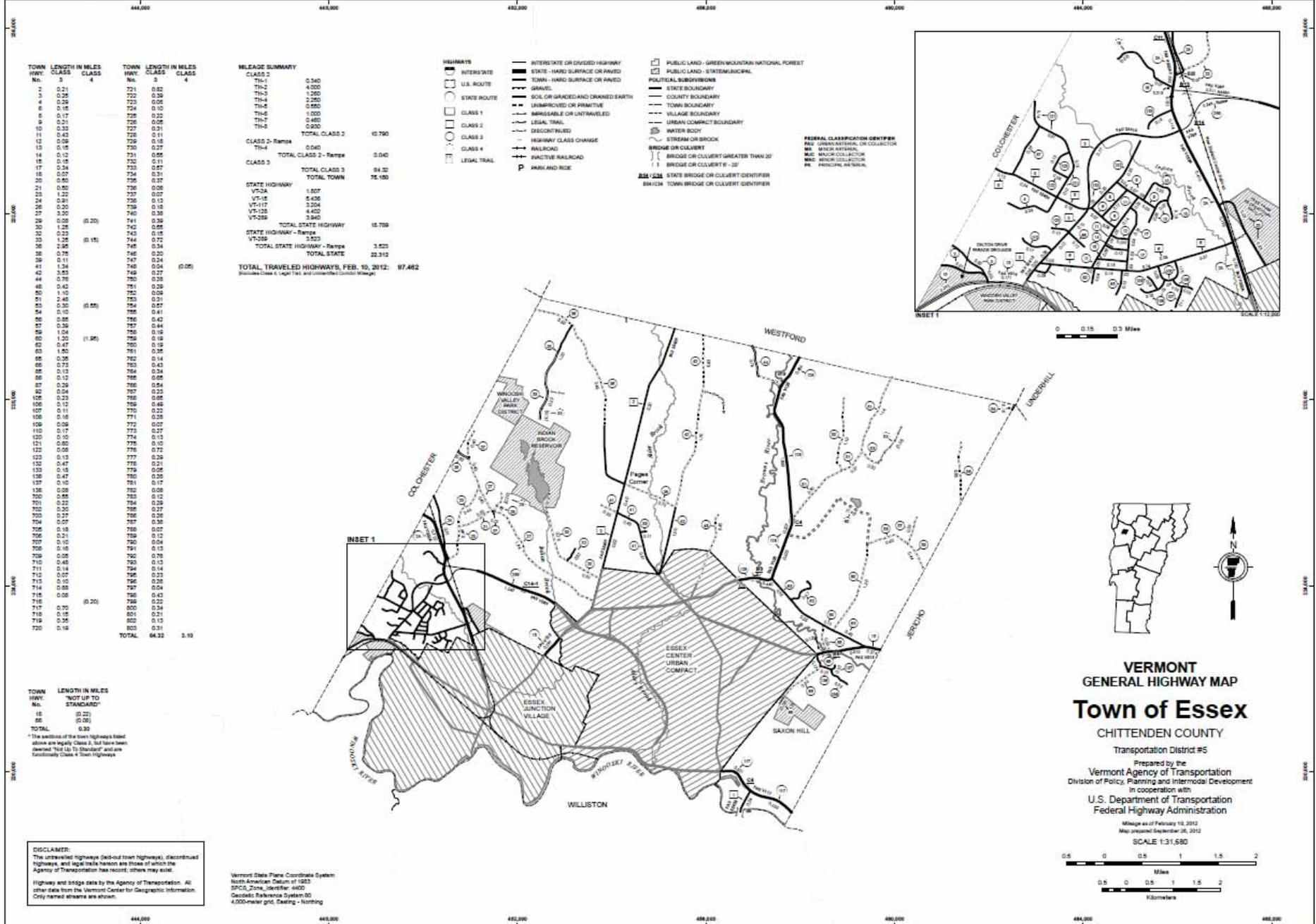
ArcToolbox

- Conversion Tools
- Coverage Tools
- Data Interoperability Tools
- Data Management Tools
- Data Reviewer Tools
- DrawOrder
- Editing Tools
- Geocoding Tools
- Geostatistical Analyst Tools
- HMS Toolbox2_Modular_v10
 - 1_ZoomToPage
 - 2_Set Layout Elements
 - 3_Export to PDF
 - MineData
- Linear Referencing Tools
- Multidimension Tools
- Network Analyst Tools
- Parcel Fabric Tools
- Production Mapping Tools

ESSEX, CHITTENDEN COUNTY - 2012

VERMONT GENERAL HIGHWAY MAP
Town of Essex
CHITTENDEN COUNTY

15.02 -1.41 Inches



legend

HIGHWAYS

- INTERSTATE
- U.S. ROUTE
- STATE ROUTE
- CLASS 1
- CLASS 2
- CLASS 3
- CLASS 4
- LEGAL TRAIL

INTERSTATE OR DIVIDED HIGHWAY

STATE - HARD SURFACE OR PAVED

TOWN - HARD SURFACE OR PAVED

GRAVEL

SOIL OR GRADED AND DRAINED EARTH

UNIMPROVED OR PRIMITIVE

IMPASSIBLE OR UNTRAVELED

LEGAL TRAIL

DISCONTINUED

HIGHWAY CLASS CHANGE

RAILROAD

RAILTIVE RAILROAD

RAIL AND RIDE

PUBLIC LAND - GREEN MOUNTAIN NATIONAL FOREST

PUBLIC LAND - STATE/MUNICIPAL

POLITICAL SUBDIVISIONS

STATE BOUNDARY

COUNTY BOUNDARY

TOWN BOUNDARY

VILLAGE BOUNDARY

URBAN COMPACT BOUNDARY

WATER BODY

STREAM OR BROOK

BRIDGE OR CULVERT

BRIDGE OR CULVERT GREATER THAN 20'

BRIDGE OR CULVERT - 20'

STATE BRIDGE OR CULVERT IDENTIFIER

TOWN BRIDGE OR CULVERT IDENTIFIER

RELEASE SUMMARY

CLASS 2	CLASS 3	CLASS 4
TH-1	0.540	
TH-2	4.000	
TH-3	1.250	
TH-4	2.250	
TH-5	0.800	
TH-6	1.000	
TH-7	0.400	
TH-8	0.000	
TOTAL CLASS 2 - Range	12.790	
TOTAL CLASS 3	84.30	
TOTAL CLASS 4	76.150	

STATE HIGHWAY

CLASS 2 - Range	CLASS 3	CLASS 4
VT-24	1.807	
VT-15	5.596	
VT-117	3.204	
VT-125	4.402	
VT-335	3.840	
TOTAL STATE HIGHWAY	18.759	

STATE HIGHWAY - Range

CLASS 2 - Range	CLASS 3	CLASS 4
VT-352	3.523	
TOTAL STATE HIGHWAY - Range	3.523	
TOTAL STATE	22.312	

TOTAL TRAVELED HIGHWAYS, FEB. 10, 2012: 97.462
(Includes Class 4, legal trail, and discontinued Class 2/3/4)

TOWN HWY. No.	LENGTH IN MILES CLASS 4	TOWN HWY. No.	LENGTH IN MILES CLASS 4
1	0.00	721	0.82
2	0.21	722	0.36
3	0.22	723	0.06
4	0.29	724	0.10
5	0.15	725	0.22
6	0.17	726	0.11
7	0.21	728	0.06
8	0.33	729	0.18
9	0.28	730	0.27
10	0.28	731	0.11
11	0.43	732	0.56
12	0.28	733	0.87
13	0.15	734	0.07
14	0.11	735	0.11
15	0.15	736	0.07
16	0.15	737	0.07
17	0.24	738	0.13
18	0.27	739	0.10
19	0.20	740	0.08
20	0.50	741	0.38
21	0.20	742	0.05
22	1.22	743	0.72
23	0.91	744	0.34
24	0.20	745	0.18
25	3.20	746	0.28
26	0.38	747	0.24
27	1.28	748	0.34
28	0.28	749	0.27
29	0.15	750	0.28
30	1.28	751	0.35
31	0.28	752	0.09
32	0.28	753	0.43
33	0.28	754	0.07
34	0.11	755	0.41
35	0.11	756	0.42
36	2.95	757	0.44
37	0.15	758	0.16
38	0.11	759	0.16
39	0.11	760	0.16
40	0.11	761	0.16
41	0.11	762	0.14
42	3.23	763	0.43
43	0.28	764	0.34
44	0.76	765	0.05
45	0.43	766	0.05
46	1.00	767	0.25
47	0.28	768	0.06
48	0.30	769	0.05
49	0.10	770	0.22
50	0.39	771	0.28
51	0.39	772	0.07
52	0.39	773	0.27
53	0.39	774	0.13
54	0.39	775	0.10
55	0.39	776	0.72
56	0.39	777	0.29
57	0.39	778	0.47
58	0.39	779	0.05
59	0.39	780	0.39
60	1.20	781	0.17
61	0.39	782	0.08
62	1.20	783	0.12
63	0.39	784	0.29
64	0.39	785	0.27
65	0.39	786	0.28
66	0.39	787	0.35
67	0.39	788	0.07
68	0.39	789	0.04
69	0.39	790	0.15
70	0.39	791	0.15
71	0.48	792	0.76
72	0.48	793	0.15
73	0.48	794	0.14
74	0.48	795	0.23
75	0.48	796	0.26
76	0.48	797	0.04
77	0.48	798	0.42
78	0.48	799	0.22
79	0.48	800	0.34
80	0.48	801	0.31
81	0.48	802	1.13
82	0.48	803	0.31
83	0.48	804	0.31
84	0.48	805	0.31
85	0.48	806	0.31
86	0.48	807	0.31
87	0.48	808	0.31
88	0.48	809	0.31
89	0.48	810	0.31
90	0.48	811	0.31
91	0.48	812	0.31
92	0.48	813	0.31
93	0.48	814	0.31
94	0.48	815	0.31
95	0.48	816	0.31
96	0.48	817	0.31
97	0.48	818	0.31
98	0.48	819	0.31
99	0.48	820	0.31
100	0.48	821	0.31
101	0.48	822	0.31
102	0.48	823	0.31
103	0.48	824	0.31
104	0.48	825	0.31
105	0.48	826	0.31
106	0.48	827	0.31
107	0.48	828	0.31
108	0.48	829	0.31
109	0.48	830	0.31
110	0.48	831	0.31
111	0.48	832	0.31
112	0.48	833	0.31
113	0.48	834	0.31
114	0.48	835	0.31
115	0.48	836	0.31
116	0.48	837	0.31
117	0.48	838	0.31
118	0.48	839	0.31
119	0.48	840	0.31
120	0.48	841	0.31
121	0.48	842	0.31
122	0.48	843	0.31
123	0.48	844	0.31
124	0.48	845	0.31
125	0.48	846	0.31
126	0.48	847	0.31
127	0.48	848	0.31
128	0.48	849	0.31
129	0.48	850	0.31
130	0.48	851	0.31
131	0.48	852	0.31
132	0.48	853	0.31
133	0.48	854	0.31
134	0.48	855	0.31
135	0.48	856	0.31
136	0.48	857	0.31
137	0.48	858	0.31
138	0.48	859	0.31
139	0.48	860	0.31
140	0.48	861	0.31
141	0.48	862	0.31
142	0.48	863	0.31
143	0.48	864	0.31
144	0.48	865	0.31
145	0.48	866	0.31
146	0.48	867	0.31
147	0.48	868	0.31
148	0.48	869	0.31
149	0.48	870	0.31
150	0.48	871	0.31
151	0.48	872	0.31
152	0.48	873	0.31
153	0.48	874	0.31
154	0.48	875	0.31
155	0.48	876	0.31
156	0.48	877	0.31
157	0.48	878	0.31
158	0.48	879	0.31
159	0.48	880	0.31
160	0.48	881	0.31
161	0.48	882	0.31
162	0.48	883	0.31
163	0.48	884	0.31
164	0.48	885	0.31
165	0.48	886	0.31
166	0.48	887	0.31
167	0.48	888	0.31
168	0.48	889	0.31
169	0.48	890	0.31
170	0.48	891	0.31
171	0.48	892	0.31
172	0.48	893	0.31
173	0.48	894	0.31
174	0.48	895	0.31
175	0.48	896	0.31
176	0.48	897	0.31
177	0.48	898	0.31
178	0.48	899	0.31
179	0.48	900	0.31
180	0.48	901	0.31
181	0.48	902	0.31
182	0.48	903	0.31
183	0.48	904	0.31
184	0.48	905	0.31
185	0.48	906	0.31
186	0.48	907	0.31
187	0.48	908	0.31
188	0.48	909	0.31
189	0.48	910	0.31
190	0.48	911	0.31
191	0.48	912	0.31
192	0.48	913	0.31
193	0.48	914	0.31
194	0.48	915	0.31
195	0.48	916	0.31
196	0.48	917	0.31
197	0.48	918	0.31
198	0.48	919	0.31
199	0.48	920	0.31
200	0.48	921	0.31
201	0.48	922	0.31
202	0.48	923	0.31
203	0.48	924	0.31
204	0.48	925	0.31
205	0.48	926	0.31
206	0.48	927	0.31
207	0.48	928	0.31
208	0.48	929	0.31
209	0.48	930	0.31
210	0.48	931	0.31
211	0.48	932	0.31
212	0.48	933	0.31
213	0.48	934	0.31
214	0.48	935	0.31
215	0.48	936	0.31
216	0.48	937	0.31
217	0.48	938	0.31
218	0.48	939	0.31
219	0.48	940	0.31
220	0.48	941	0.31
221	0.48	942	0.31
222	0.48	943	0.31
223	0.48	944	0.31
224	0.48	945	0.31
225	0.48	946	0.31
226	0.48	947	0.31
227	0.48	948	0.31
228	0.48	949	0.31
229	0.48	950	0.31
230	0.48	951	0.31
231	0.48	952	0.31
232	0.48	953	0.31
233	0.48	954	0.31
234	0.48	955	0.31
235	0.48	956	0.31
236	0.48	957	0.31
237	0.48	958	0.31
238	0.48	959	0.31
239	0.48	960	0.31
240	0.48	961	0.31
241	0.48	962	0.31
242	0.48	963	0.31
243	0.48	964	0.31
244	0.48	965	0.31
245	0.48	966	0.31
246	0.48	967	0.31
247	0.48	968	0.31
248	0.48	969	0.31
249	0.48	970	0.31
250	0.48	971	0.31
251	0.48	972	0.31
252	0.48	973	0.31
253	0.48	974	0.31
254	0.48	975	0.31
255	0.48	976	0.31
256	0.48	977	0.31
257	0.48	978	0.31
258	0.48	979	0.31
259	0.48	980	0.31
260	0.48	981	0.31
261	0.48	982	0.31
262	0.48	983	0.31
263	0.48	984	0.31
264	0.48	985	0.31
265	0.48	986	0.31
266	0.48	987	0.31
267	0.48	988	0.31
268	0.48	989	0.31
269	0.48	990	0.31
270	0.48	991	0.31
271	0.48	992	0.31
272	0.48	993	0.31
273	0.48	994	0.31
274	0		

TOWN HWY. CLASS	LENGTH IN MILES	TOWN HWY. CLASS	LENGTH IN MILES	TOWN HWY. CLASS	LENGTH IN MILES
3	4	3	4	3	4
5	3.81	41	0.71	73	0.10
7	2.98	43	1.06	74	0.27
8	0.40	43	0.41	75	0.20
9	1.32	44	0.18	76	0.17
10	0.46	46	0.80	77	0.17
11	1.29	46	0.85	78	0.21
12	2.53	47	2.33	80	0.11
13	3.22	48	1.19	81	0.16
14	1.38	49	1.40	82	0.36
15	0.38 (1.31)	50	0.10	83	0.12
16	0.86 (0.85)	51	0.42	84	0.08
17	2.38	52	0.20	85	0.32
18	0.80	53	0.20	86	0.21
20	0.50	54	0.31	87	0.03
21		55	0.28	88	0.11
22	1.94	56	0.80	89	0.25
23	1.45	57	0.04	92	0.04
24	0.14	58	0.03	93	0.07
25	0.83	59	0.11	94	0.28
26	0.10	60	0.06	95	0.28
27	0.15	61	0.07	96	0.10
28	0.15	62	0.41	97	0.11
29	0.51	63	0.09	98	0.20
30	0.30	64	0.05	99	0.13
32	0.44	65	0.10	100	0.18
33	0.15	66	0.12	101	0.16
34	0.24	67	0.61	102	
35	3.03	68	0.21	103	
36	2.36	69	0.06	104	
37	0.86 (1.31)	70	0.06	105	
38	3.57	71	0.04	106	
39		72	0.06	108	
				TOTAL	66.79 8.61

three columns

MILEAGE SUMMARY

CLASS	LENGTH	TOTAL CLASS	TOTAL TOWN
CLASS 2			
TH-1	2,560		
TH-2	2,540		
TH-3	1,840		
TH-4	2,220		
TH-5	1,260		
TH-6	4,130		
TH-7	0,040		
TOTAL CLASS 2	15,410		
CLASS 3		95,79	71,250
STATE HIGHWAY			
VT-14	9,121		
VT-107	2,320		
VT-110	2,320		
TOTAL STATE HIGHWAY	13,871		
TOTAL STATE	13,871		
INTERSTATE			
I-89	7,720		
TOTAL INTERSTATE	7,720		
INTERSTATE - Ramps			
I-89	1,266		
TOTAL INTERSTATE - Ramps	1,266		
TOTAL INTERSTATE	8,986		
TOTAL, TRAVELED HIGHWAYS, FEB. 10, 2012: 84,167			

no ramps

TOWN HWY. CLASS	LENGTH IN MILES	"NOT UP TO STANDARD"
37	0.07	
46	0.10	
TOTAL	0.28	

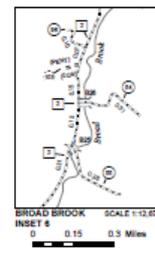
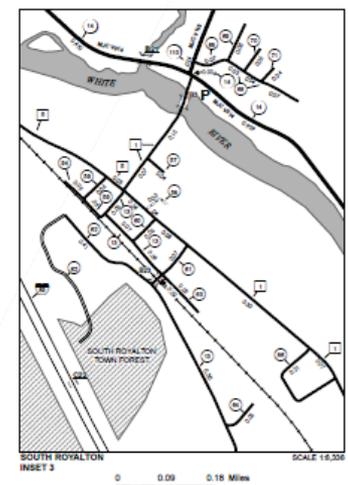
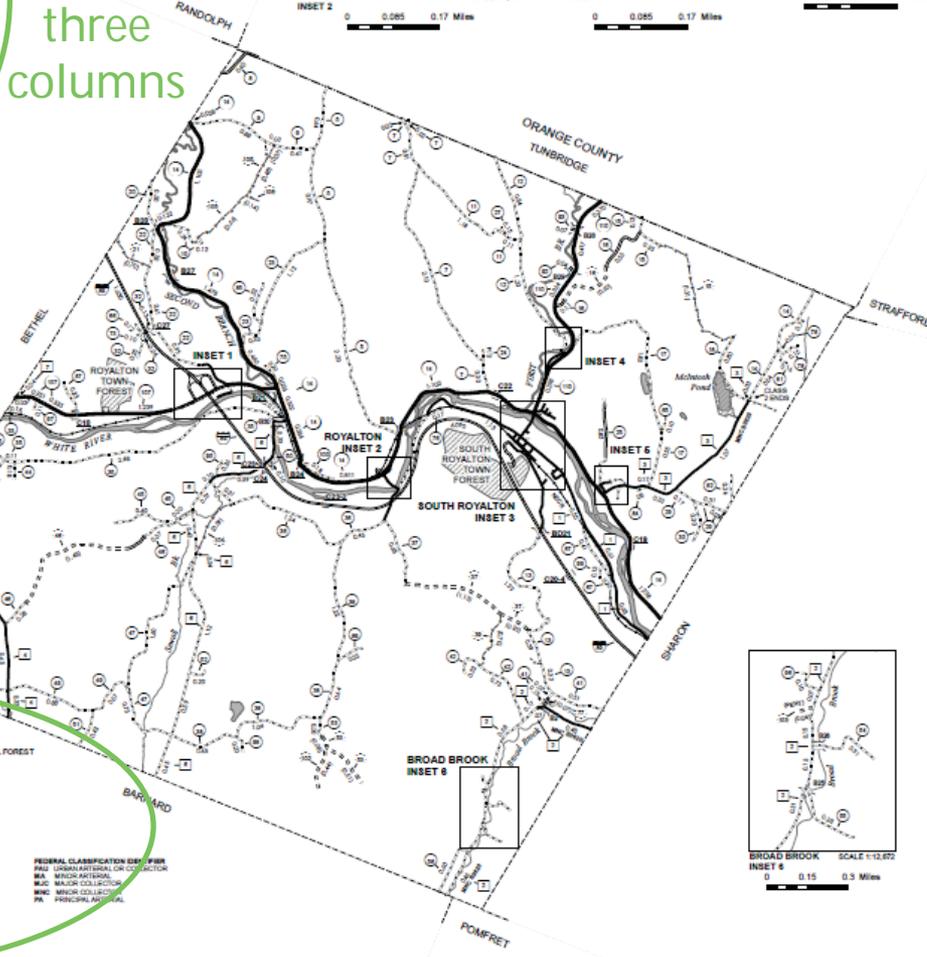
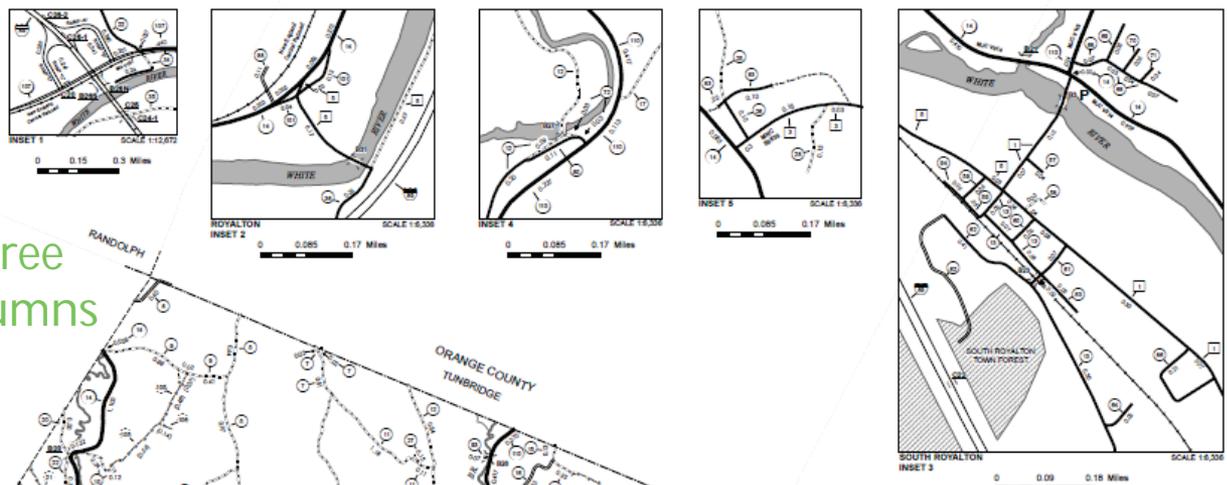
*The sections of the town highways listed above are highly Class 3, but have been deemed "Not Up To Standard" and are functionally Class 4 Town Highways

legend

- INTERSTATE OR DIVIDED HIGHWAY
- STATE - HARD SURFACE OR PAVED
- TOWN - HARD SURFACE OR PAVED
- U.S. ROUTE
- STATE ROUTE
- CLASS 1
- CLASS 2
- CLASS 3
- CLASS 4
- LEGAL TRAIL
- INTERSTATE
- STATE
- TOWN
- UNIMPROVED OR PRIMITIVE
- IMPASSABLE OR UNTRAVELED
- LEGAL TRAIL
- DISCONTINUED
- HIGHWAY CLASS CHANGE
- RAILROAD
- INACTIVE RAILROAD
- PAVN AND RIDE
- PUBLIC LAND - GREEN MOUNTAIN NATIONAL FOREST
- PUBLIC LAND - STATE/MUNICIPAL
- TOWN - STATE/MUNICIPAL
- COUNTY BOUNDARY
- TOWN BOUNDARY
- VILLAGE BOUNDARY
- URBAN COMPACT BOUNDARY
- WATER BODY
- STREAM OR BROOK
- BRIDGE OR CULVERT
- BRIDGE OR CULVERT GREATER THAN 20'
- BRIDGE OR CULVERT P. 20'
- STATE BRIDGE OR CULVERT IDENTIFIER
- TOWN BRIDGE OR CULVERT IDENTIFIER
- FEDERAL CLASSIFICATION
- MAJOR ARTERIAL
- MINOR ARTERIAL
- MAJOR COLLECTOR
- MINOR COLLECTOR
- PRINCIPAL ARTERIAL

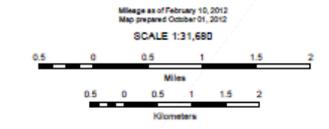
DISCLAIMER:
The untraveled highways (held-out town highways), and legal trails herein are those of which the Agency of Transportation has record; others may exist.
Highway and bridge data by the Agency of Transportation. All other data from the Vermont Center for Geographic Information. Only named streams are shown.

Vermont State Plane Coordinate System
North American Datum of 1983
SPCS_Zone_Identifier: 4600
Geoid: Reference System ID
4000-meter grid, Easting - Northing



VERMONT GENERAL HIGHWAY MAP
Town of Royalton

WINDSOR COUNTY
Transportation District #4
Prepared by the
Agency of Transportation
Division of Policy, Planning and Intermodal Development
in cooperation with
U.S. Department of Transportation
Federal Highway Administration



Other HMS Templates/Scripts

Eleven templates:

Paper size (27 x 36, 36 x 27, 36 x 30, 36 x 36, 48 x 36)
Town, Village, Urban Compact, City

Requires
Additional
Templates



Four versions of scripts:

Town, Village, Urban Compact, City

Different templates/scripts facilitated:

Simpler script for most maps (fewer conditional statements)
Legend flexibility
Map rotation, Definition Queries, etc.

Additional Variations

Class 3 & 4 Town Highway Mileage Summaries:

Village

TOWN HWY. No.	LENGTH IN MILES CLASS		TOWN ROAD NAME
	3	4	
30	0.07		NORTHRIDGE RD
32	0.43		SCHOOL ST
33	0.10		BRIDGE ST
34	0.20		CHURCH ST
35	0.13		HIGH ST
36	0.16		DEPOT ST
53	0.05		POST OFFICE RD
54	0.03		TH 32
54		(0.12)	CHASE HILL RD

Town

TOWN HWY. No.	LENGTH IN MILES CLASS		TOWN HWY. No.	LENGTH IN MILES CLASS	
	3	4		3	4
2	0.21		721	0.82	
3	0.25		722	0.39	
4	0.29		723	0.06	
6	0.15		724	0.10	
8	0.17		725	0.22	
9	0.21		726	0.05	
10	0.33		727	0.31	
11	0.43		728	0.11	
12	0.09		729	0.18	
13	0.15		730	0.27	
14	0.12		731	0.55	
15	0.15		732	0.11	
17	0.34		733	0.57	
18	0.07		734	0.31	
20	0.50		735	0.37	
21	0.50		736	0.06	
23	1.22		737	0.07	
24	0.91		738	0.13	
26	0.20		739	0.18	
27	3.20		740	0.38	
29	0.08	(0.20)	741	0.39	
30	1.25		742	0.55	
32	0.23		743	0.15	
33	1.25	(0.15)	744	0.72	
36	2.95		745	0.34	

Summarized by Town Highway Number *and* Road Name

The Transition – Building New Maps

Two approaches used to upgrade to the new system:

Extract size, position, and extent of the Main Map and Inset data frames from the mxds of recent editions of Maps:

Python script opens mxd, obtains desired parameters, and provides a string output that can be copied and pasted into PageLayoutElements table

Start from scratch to develop layout:

Open template, select town, and run HMS script to create a default layout

Manually set Data Frame extents and move elements to desired layout positions

Run a script that dumps updated layout parameters into PageLayoutElements Table

Benefits of the New HMS

One Core MXD Structure and Scripts

Data Driven Reports – if Data is correct, Report is correct

Significant efficiencies and cutting 2 months out of the process

More Rigorous QA/QC on data and full use of data

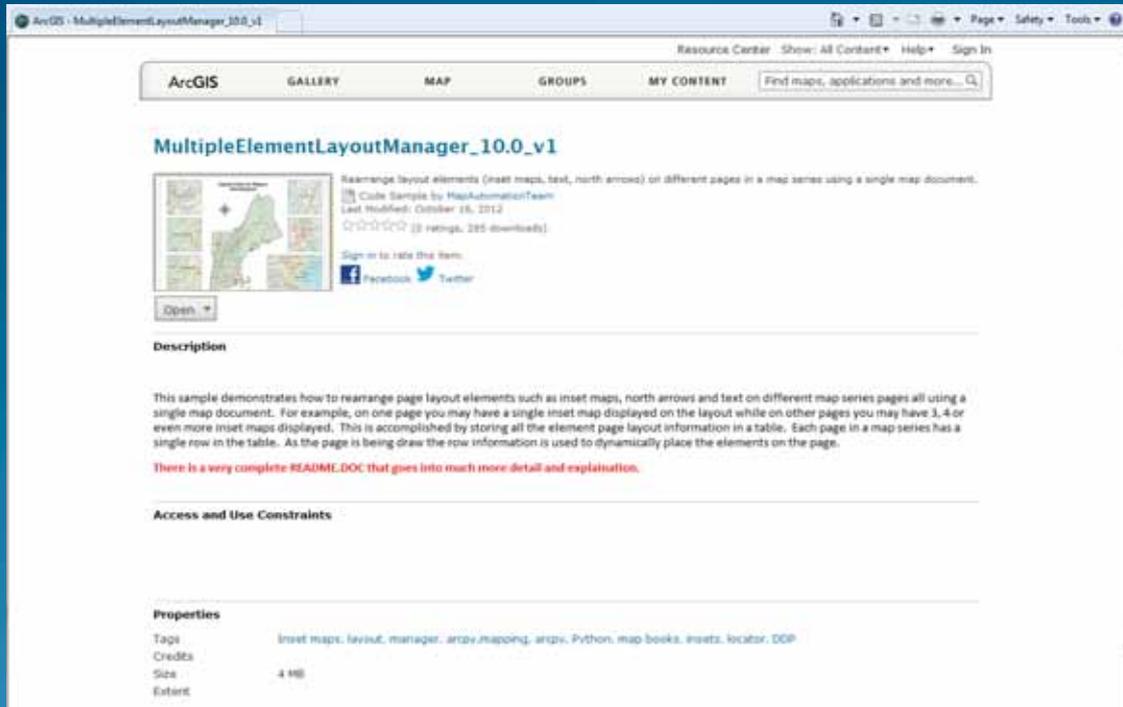
Resolution of issues in data that we didn't know existed

System should be compatible with the next version of ArcGIS and works at the ArcView level (ArcGIS Basic)

Implemented the new system and produced the maps faster in 2012, than in a standard year with the old process

Multiple Element Layout Manager 10.0 v1

The ESRI Map Automation Team has posted a developer sample on the Resource Center. So, you too can leverage Python to generate a custom map series.



The screenshot shows the ArcGIS Resource Center interface. At the top, there is a navigation bar with 'ArcGIS', 'GALLERY', 'MAP', 'GROUPS', and 'MY CONTENT'. Below this, the title 'MultipleElementLayoutManager_10.0_v1' is displayed. A small thumbnail image shows a map series with multiple inset maps. The description text reads: 'Rearrange layout elements (inset maps, text, north arrow) on different pages in a map series using a single map document. Code Sample by MapAutomationTeam. Last Modified: October 16, 2012. (3 ratings, 285 downloads). Sign in to rate this item. Facebook Twitter'. Below the description, there is a 'Description' section with more details: 'This sample demonstrates how to rearrange page layout elements such as inset maps, north arrows and text on different map series pages all using a single map document. For example, on one page you may have a single inset map displayed on the layout while on other pages you may have 3, 4 or even more inset maps displayed. This is accomplished by storing all the element page layout information in a table. Each page in a map series has a single row in the table. As the page is being draw the row information is used to dynamically place the elements on the page. There is a very complete README.DOC that goes into much more detail and explanation.' Below this is an 'Access and Use Constraints' section. At the bottom, there is a 'Properties' section with the following details: Tags: 'inset maps, layout, manager, arcgis, mapping, arcgis, Python, map books, insets, locator, DDP'; Credits: '4 MB'; Extent: (empty).

The Multiple Element Layout Manager 10.0 v1 provides the same Python functionality that is used to generate the Town Highway Map Series.

<http://esriurl.com/5907>

Questions???

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VT Agency of Transportation
Policy, Planning & Intermodal
Development Division -
Mapping Unit

The screenshot shows the website for Vermont's Agency of Transportation, specifically the 'VTTrans Town Highway Maps' section. The header includes the Vermont state logo and the text 'VERMONT Agency of Transportation'. Below the header are navigation links: 'Online Map Center', 'Site Map', 'Contact Us', and 'Search'. The main content area is titled 'Current Town Highway Maps' and contains a welcome message and a description of the mapping process. It features a 'Select by:' section with two dropdown menus: 'County' and 'Town'. The 'Town' dropdown is open, showing a list of Vermont towns including Addison, Albany, Albany Village, Alburgh, Andover, Arlington, Athens, Averill, Averys Gore, Bakersfield, Baltimore, Barnard, Barre City, Barre Town, Barton, Barton Village, Bellows Falls Village, Belvidere, Bennington, Bennington U.C., Benson, Berkshire, Berlin, Bethel, and Blomefield. A 'Copyright' notice is partially visible on the right side of the page.

Town Highway Maps on-line at the following link:

http://vtransplanning.vermont.gov/maps/town_maps