

# Building “Bridges” in Kentucky: *Using BrM Data Across the Enterprise*

Office of Information Technology  
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Deep in the past, people believed the world...  
was a bridge.

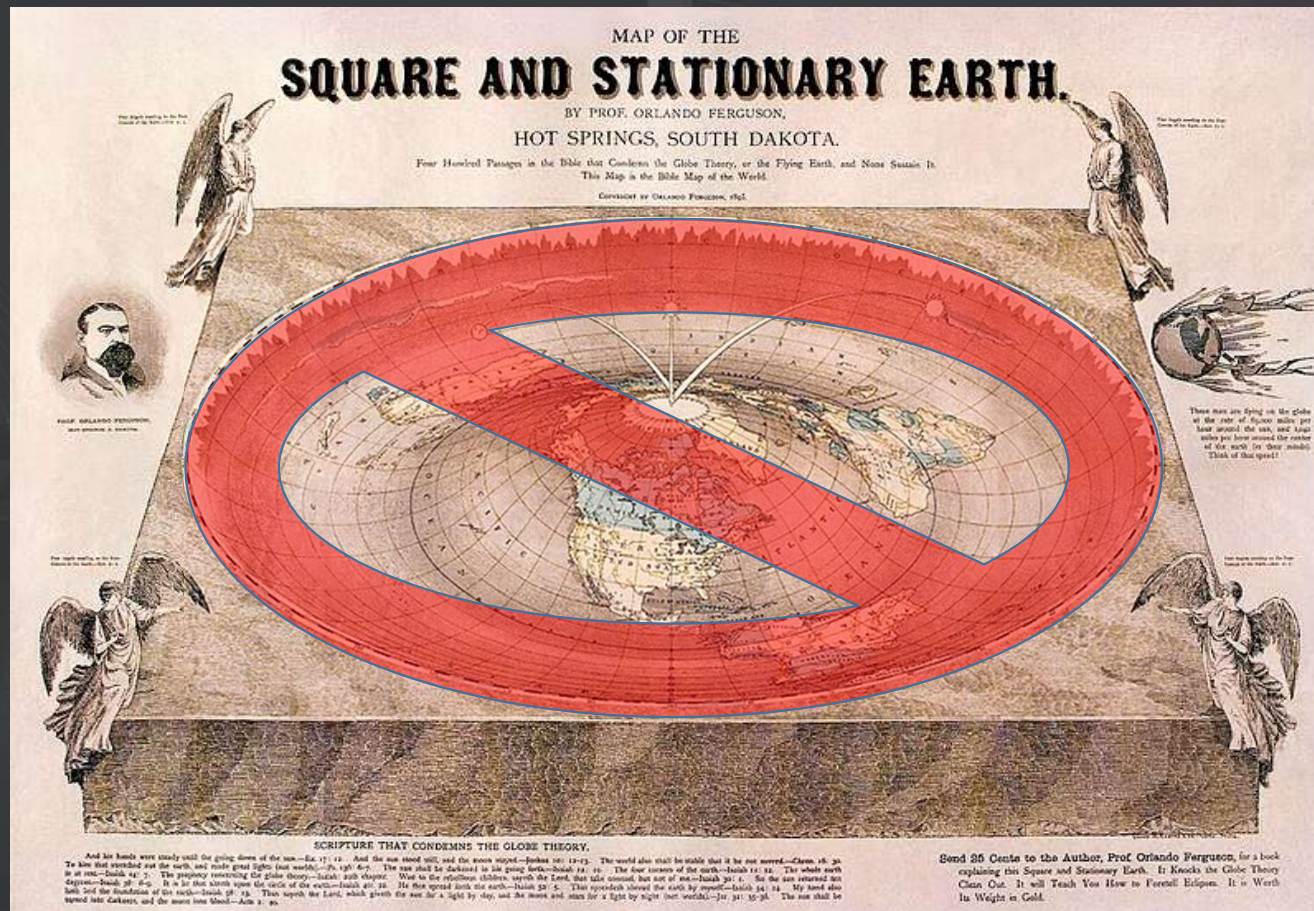


BrM

K

World Turtle in Hindu literature is found in [Jñānarāja](#) (Hindu Tradition)

# Our Understanding of the World "Evolved."



Flat Earth map drawn by [Orlando Ferguson](https://en.wikipedia.org/wiki/Orlando_Ferguson) in 1893. The map contains several references to biblical passages as well as various jabs at the "Globe Theory". From: [https://en.wikipedia.org/wiki/Flat\\_Earth#/media/File:Orlando-Ferguson-flat-earth-map\\_edit.jpg](https://en.wikipedia.org/wiki/Flat_Earth#/media/File:Orlando-Ferguson-flat-earth-map_edit.jpg)



What do these companies have in common... they failed to see the significance of changes and didn't adapt....

**GUIDING PRINCIPLE: Serve the customer at their point of need...  
in a format they are comfortable with.**



**NETFLIX**

**amazon**



These companies are “Disruptive” they are changing how we live our lives.

# DOT Software is changing...

- Integrating with other systems...
  - IHEEP → “Digital Twins.”
- Only a small portion of BrM’s value is delivered inside the application....
- KYTC has shared Bridge information in GIS for 15+ years.

# Why GIS?

“Maps are like campfires – everyone gathers around them, because they allow people to understand complex issues at a glance...”

--Sonoma Ecology Center (from Dan B.)

# “Maps” communicate patterns and relationships that remain hidden in spreadsheets & tables.

- *Make more informed decisions.*
- “More with less” demands synthesized information.
  - You can’t afford to use old information and compute by hand.



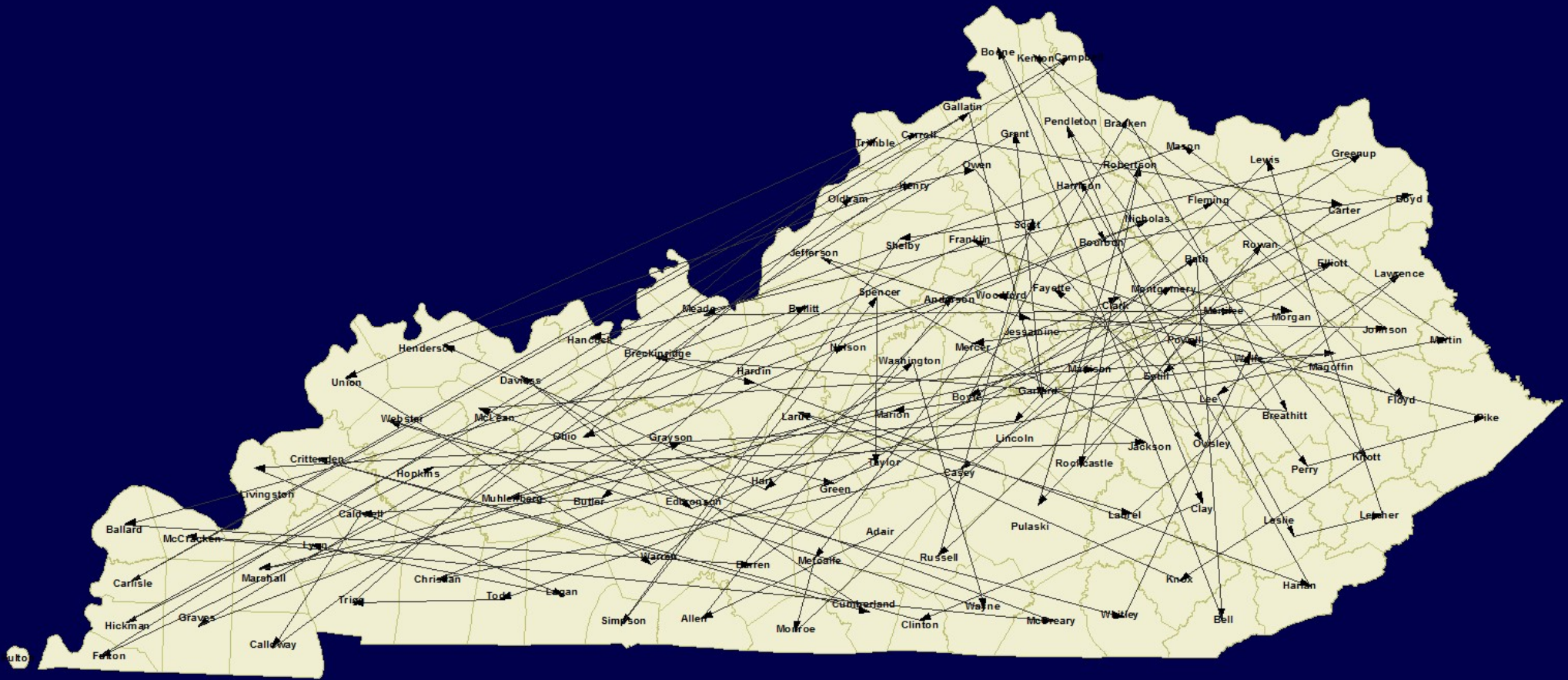
NAME	NAME2	SEAT	POP90	POP00	CH90_00	POP90S	POP00S	CHSQ90_0	CH00_10	MILES_S	NAME	NAME2	SEAT	POP90	POP00	CH90_00	POP90S	POP00S	CHSQ90_0	CH00_10	MILES_S
ADAIR	Adair	Columbia	15360	17244	12.2656	37.246	41.8145	12.2657	8.188365	412.39227	KNOX	Knox	Barbourville	29676	31795	7.1404	76.5264	81.9908	7.1405	0.276773	387.78734
ALLEN	Allen	Scottsville	14628	17800	21.6844	41.5629	50.5756	21.6844	-12.11236	351.94828	LARUE	Larue	Hodgenville	11679	13373	14.5046	44.3085	50.7354	14.5048	6.131758	263.58321
ANDERSON	Anderson	Lawrenceburg	14571	19111	31.1577	71.3456	93.5763	31.1577	12.08728	204.23110	LAUREL	Laurel	London	43438	52715	21.3568	97.902	118.8108	21.3568	11.636157	443.68845
BALLARD	Ballard	Wickliffe	7902	8286	4.8595	28.8709	30.2739	4.8595	-0.446536	273.70067	LAWRENCE	Lawrence	Louisa	13998	15569	11.2228	33.3292	37.0697	11.2228	1.869099	419.99204
BARREN	Barren	Glasgow	34001	38033	11.8584	67.9968	76.0602	11.8584	10.885284	500.03791	LEE	Lee	Beattyville	7422	7916	6.6558	35.1384	37.4772	6.6559	-0.366347	211.22133
BATH	Bath	Owingsville	9692	11085	14.3726	34.1319	39.0376	14.3727	4.564727	283.95651	LESLIE	Leslie	Hyden	13642	12401	-9.0969	33.734	30.6652	-9.097	-8.797678	404.39863
BELL	Bell	Pineville	31506	30060	-4.5896	87.2286	83.2251	-4.5896	-4.554225	361.18882	LETCHER	Letcher	Whitesburg	27000	25277	-6.3814	79.6399	74.5577	-6.3814	-2.998774	339.02580
BOONE	Boone	Burlington	57589	85991	49.3184	224.5114	335.2369	49.3184	38.166785	256.50808	LEWIS	Lewis	Vanceburg	13029	14092	8.1587	26.3024	28.4484	8.1589	-1.575362	495.35276
BOURBON	Bourbon	Paris	19236	19360	0.6446	65.9007	65.0661	0.6447	3.228306	291.53938	LINCOLN	Lincoln	Stanford	20045	23361	16.5427	59.5638	69.4174	16.5429	5.911562	336.52936
BOYD	Boyd	Catlettsburg	51150	49752	-2.7331	315.7351	307.1056	-2.7331	-0.422094	162.00285	LIVINGSTON	Livingston	Smithland	9062	9804	8.188	26.4726	28.6401	8.1877	-2.906977	342.31615
BOYLE	Boyle	Damville	25641	27697	8.0184	140.3968	151.6544	8.0184	2.653717	182.63227	LOGAN	Logan	Russellville	24416	26573	8.8343	43.8268	47.6986	8.8343	0.985963	557.10150
BRACKEN	Bracken	Brooksville	7766	8279	6.6057	37.1675	39.6227	6.6057	2.524459	208.94563	LYON	Lyon	Eddyville	6624	8080	21.9806	25.8209	31.4966	21.981	2.89604	256.53557
BREATHITT	Breathitt	Jackson	15703	16100	2.5281	31.7109	32.5126	2.5281	-13.80124	495.19120	MADISON	Madison	Richmond	57508	70872	23.2385	129.7637	159.9188	23.2384	16.994017	443.17474
BRECKINRIDGE	Breckinridge	Hardinsburg	16312	18648	14.3207	27.8596	31.8494	14.321	7.566495	585.50548	MAGOFFIN	Magoffin	Salyersville	13077	13332	1.9499	42.3063	43.1313	1.95	0.007501	309.10263
BULLITT	Bullitt	Shepherdsville	47567	61236	28.7363	158.4438	203.9747	28.7363	21.364883	300.21358	MARION	Marion	Lebanon	16499	18212	10.3824	47.5741	52.5135	10.3825	8.829343	346.80564
BUTLER	Butler	Morgantown	11245	13010	15.6958	26.0631	30.1154	15.6961	-2.459646	431.45180	MARSHALL	Marshall	Benton	27205	30125	10.7333	79.9661	88.5491	10.7332	4.391701	340.20640
CALDWELL	Caldwell	Princeton	13232	13060	-1.2998	38.0076	37.5135	-1.3	-0.58193	348.1405	MARTIN	Martin	Inez	12526	12578	0.4151	54.3281	54.5536	0.415	2.790587	230.56206
CALLOWAY	Calloway	Murray	30735	34177	11.1989	74.8151	83.1937	11.199	8.818796	410.81235	MASON	Mason	Maysville	16666	16800	0.804	67.6385	68.1824	0.8041	4.107143	246.39777
CAMPBELL	Campbell	Newport	83866	88616	5.6637	525.99	555.781	5.6637	1.940959	159.44409	MCCRACKEN	McCracken	Paducah	62879	65514	4.1905	234.4807	244.3068	4.1905	0.077846	268.19271
CARLISLE	Carlisle	Bardwell	5238	5351	2.1573	26.3217	26.8895	2.1571	-4.61596	198.99894	MCCREARY	McCreary	Whitley City	15603	17080	9.4661	36.1989	39.6255	9.466	7.177986	431.03471
CARROLL	Carroll	Carrollton	9292	10155	9.2875	67.669	73.9538	9.2875	6.459872	137.31543	MCLEAN	McLean	Calhoun	9628	9938	3.2197	37.5803	38.7903	3.2197	-4.095391	256.19758
CARTER	Carter	Carrollton	24340	26889	10.4724	59.0678	65.2536	10.4723	3.090483	412.06863	MEADE	Meade	Brandenburg	24170	26349	9.0153	74.4996	81.2159	9.0152	8.550609	324.43123
CASEY	Casey	Liberty	14211	15447	8.6974	31.8852	34.6584	8.6974	3.288664	445.69263	MENIFEE	Menifee	Frenchburg	5092	6556	28.7509	24.7314	31.8419	28.7508	-8.313301	205.89208
CHRISTIAN	Christian	Hopkinsville	68941	72265	4.8215	95.2073	99.7977	4.8214	2.338615	724.11457	MERCER	Mercer	Harrodsburg	19148	20817	8.7163	75.6054	82.1955	8.7164	2.469136	253.26200
CLARK	Clark	Winchester	29496	33144	12.3677	115.6185	129.9179	12.3677	7.449312	355.11479	METCALFE	Metcalfe	Edmonton	8963	10037	11.9825	30.78	34.4682	11.9824	0.617714	291.19545
CLAY	Clay	Manchester	21746	24556	12.9219	46.1585	52.1231	12.9219	-11.50838	471.11546	MONROE	Monroe	Tompkinsville	11401	11756	3.1137	34.3265	35.3954	3.1139	-6.745492	332.13310
CLINTON	Clinton	Albany	9135	9634	5.4625	44.4611	46.8898	5.4625	6.622379	205.46005	MONTGOMERY	Montgomery	Mont Sterling	19561	22554	15.3008	98.3842	113.4378	15.3008	17.491354	198.82247
CRITTENDEN	Crittenden	Marion	9196	9384	2.0443	24.7806	25.2872	2.0443	-0.735294	371.09623	MORGAN	Morgan	West Liberty	11648	13948	19.7458	30.3558	36.3498	19.7458	-0.179237	383.71509
CUMBERLAND	Cumberland	Burkville	6784	7147	5.3508	21.8161	22.9834	5.3506	-4.071638	310.96263	MUHLLENBERG	Muhlenberg	Greenville	31318	31839	1.6635	65.3318	66.4186	1.6635	-1.067873	479.36811
DAVISS	Daviess	Owensboro	87189	91545	4.996	182.9855	192.1276	4.996	5.583047	476.48017	NELSON	Nelson	Bardstow	29710	37477	26.1427	70.0708	88.389	26.1427	15.903087	424.00071
EDMONSON	Edmonson	Brownsville	10357	11644	12.4263	33.6288	37.8076	12.4262	4.440055	307.97975	NICHOLAS	Nicholas	Carlisle	6725	6813	1.3085	34.1711	34.6183	1.3087	4.726259	196.80316
ELLIOTT	Elliott	Sandy Hook	6455	6748	4.5391	27.4351	28.6805	4.5394	16.360403	235.28171	OHIO	Ohio	Hartford	21105	22916	8.5809	35.402	38.4398	8.5808	4.040845	596.15143
ESTILL	Estill	Irvine	14614	15307	4.742	57.1838	59.8955	4.742	-4.148429	255.56149	OLDHAM	Oldham	Lagrange	33263	46178	38.8269	169.3522	235.1065	38.8269	30.616311	196.41309
FAYETTE	Fayette	Lexington	22536	26051	15.595	789.4054	912.5138	15.595	13.546785	285.48828	OWEN	Owen	Owenton	9035	10547	16.7349	25.5065	29.775	16.7349	2.787523	354.22238
FLEMING	Fleming	Flmingsburg	12292	13792	12.203	34.9919	39.2619	12.2028	4.031323	211.28127	OWSLEY	Owsley	Booneville	5036	4858	-3.5345	25.4004	24.5026	-3.5345	-2.120214	198.26459
FLOYD	Floyd	Prestonsburg	43586	42441	-2.6269	110.1653	107.2712	-2.627	-7.045074	395.64177	PENDLETON	Pendleton	Falmouth	12036	14390	19.5579	42.7697	51.1346	19.558	3.384295	281.41399
FRANKLIN	Franklin	Frankfort	43781	47687	8.9216	206.5337	224.96	8.9216	3.351018	211.97983	PERRY	Perry	Hazard	30283	29390	-2.9488	88.3952	85.7886	-2.9488	-2.306907	342.58620
FULTON	Fulton	Hickman	8271	7752	-6.2749	35.853	33.6032	-6.275	-12.11300	230.6918	PIKE	Pike	Pikeville	72583	68736	-5.3001	92.045	87.1665	-5.3001	-5.400372	788.55954
GALLATIN	Gallatin	Warsaw	5393	7870	45.9299	51.5003	75.1544	45.93	9.135959	104.71767	POWELL	Powell	Stanton	11686	13237	13.2722	64.8917	73.5043	13.2722	-4.714059	180.08452
GARRARD	Garrard	Lancaster	11579	14792	27.7485	49.5036	63.2401	27.7484	14.332071	233.90207	PULASKI	Pulaski	Somerset	49489	56217	13.5949	73.0848	83.0206	13.5948	12.177811	677.14481
GRANT	Grant	Williamstown	15737	22384	42.238	60.3645	85.8612	42.2379	10.176912	260.69957	ROBERTSON	Robertson	Mount Olivet	2124	2266	6.6854	21.22	22.6387	6.6856	0.70609	100.09404
GRAVES	Graves	Mayfield	33550	37028	10.3666	60.2434	66.4886	10.3666	0.251161	556.90718	ROCKCASTLE	Rockcastle	Mount Vernon	14803	16582	12.0178	46.5414	52.1347	12.0179	2.858521	318.06048
GRAYSON	Grayson	Leitchfield	21050	24053	14.266	41.1974	47.0746	14.2659	7.038623	510.95414	ROWAN	Rowan	Morehead	20353	22094	8.554	71.1095	77.1922	8.5539	5.607857	286.22032
GREEN	Green	Greensburg	10371	11518	11.0596	35.9147	39.8868	11.0598	-2.257336	288.76712	RUSSELL	Russell	Jamesstown	14716	16315	10.8657	52.0206	57.673	10.8656	7.661661	282.88787
GREENUP	Greenup	Greenup	36742	36891	0.4055	103.6653	104.0857	0.4055	0.051503	354.42892	SCOTT	Scott	Georgetown	23867	33061	38.5218	83.6287	115.8441	38.5219	42.684734	285.39214
HANCOCK	Hancock	Hawesville	7864	8392	6.7141	39.5472	42.2025	6.7142	2.061487	198.85073	SHELBY	Shelby	Shelbyville	24824	33337	34.2934	64.3746	86.4508	34.2933	26.208117	385.61777
HARDIN	Hardin	Elizabethtown	89240	94174	5.5289	141.6453	149.4768	5.5289	12.072334	630.02399	SIMPSON	Simpson	Franklin	15145	16405	8.3195	64.0347	69.3621	8.3195	5.620238	236.51225
HARLAN	Harlan	Harlan	36574	33202	-9.2196	78.1147	70.9127	-9.2197	-11.81856	468.20885	SPENCER	Spencer	Franklinville	6801	11766	73.0039	35.4924	61.4033	73.004	45.00255	191.61807
HARRISON	Harrison	Cynthiana	16248	17983	10.6782	52.4407	58.0405	10.6783	4.798977	309.83511	TAYLOR	Taylor	Campbellsville	21146	22927	8.4223	76.3995	82.8341	8.4223	6.913246	276.78189
HART	Hart	Munfordville	14890	17445	17.1591	35.6378	41.753	17.1593	4.322155	417.81386	TODD	Todd	Elkton	10940	11971	9.4241	29.0101	31.744	9.4239	4.084872	377.10974
HENDERSON	Henderson	Henderson	43044	44829	4.1469	92.3322	96.1611	4.1468	3.169823	466.18615	TRIGG	Trigg	Cadiz	10361	12597	21.5809	21.5225	26.1672	21.5806	13.828689	481.40265
HENRY	Henry	New Castle	12823	15060	17.4452	44.0522	51.7372	17.4452	2.363878	291.08634	TRIMBLE	Trimble	Bedford	6090	812						

# Kentucky Counties



Here's the same list as a map...

# Counties Linked in Alphabetical Order

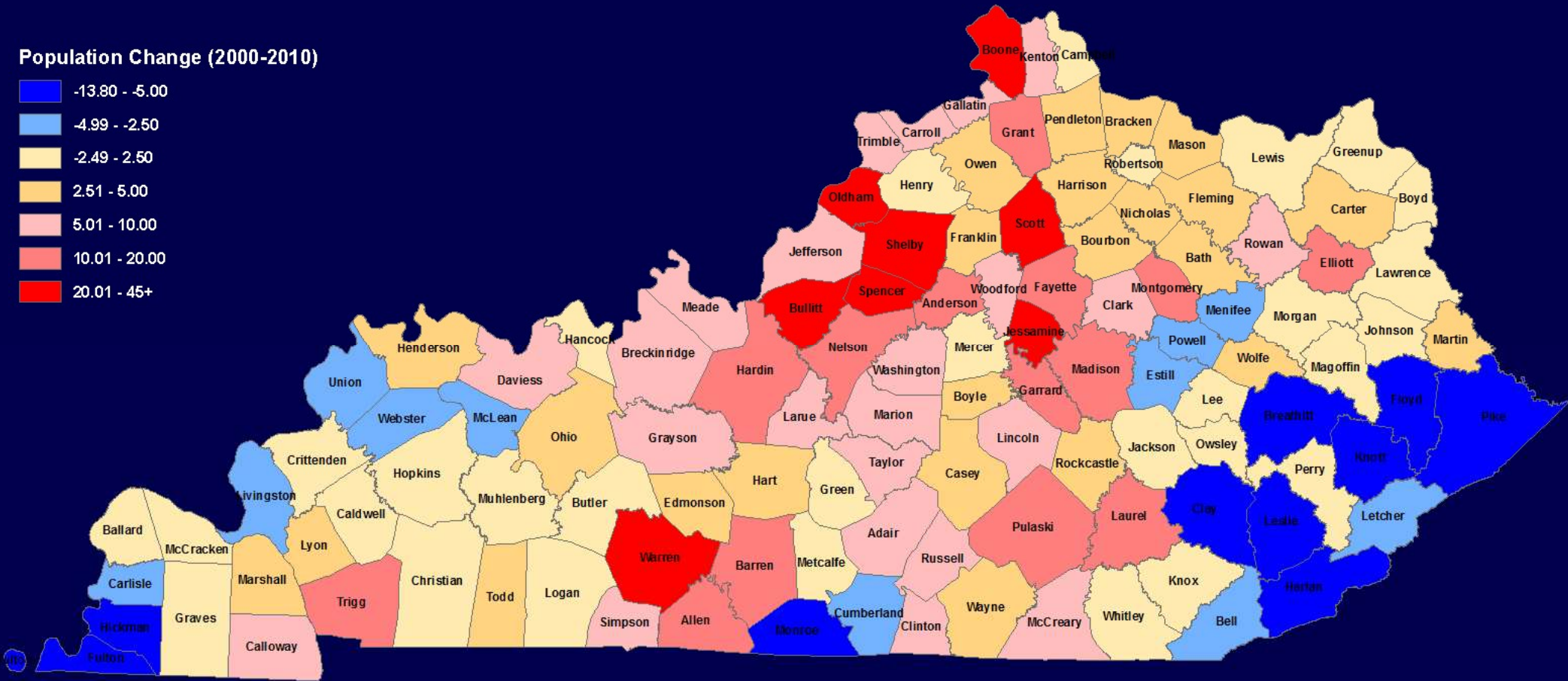
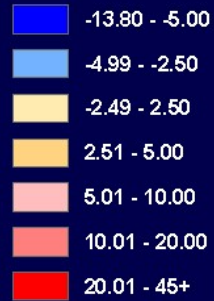


ONLY Two Counties Are Adjacent.... Metcalf & Monroe

NAME	NAME2	SEAT	POP90	POP00	CH90_00	POP90S	POP00S	CHSQ90_0	CH00_10	MILES_S	NAME	NAME2	SEAT	POP90	POP00	CH90_00	POP90S	POP00S	CHSQ90_0	CH00_10	MILES_S
ADAIR	Adair	Columbia	15360	17244	12.2656	37.246	41.8145	12.2657	8.188365	412.39227	KNOX	Knox	Barbourville	29676	31795	7.1404	76.5264	81.9908	7.1405	0.276773	387.78734
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BRECKINRIDGE	Breckinridge	Hardinsburg	16312	18648	14.3207	27.8596	31.8494	14.321	7.566495	585.50548	MAGOFFIN	Magoffin	Salyersville	13077	13332	1.9499	42.3063	43.1313	1.95	0.007501	309.10263
BULLITT	Bullitt	Shepherdsville	47567	61236	28.7363	158.4438	203.9747	28.7363	21.364883	300.21358	MARION	Marion	Lebanon	16499	18212	10.3824	47.5741	52.5135	10.3825	8.829343	346.80564
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CAMPBELL	Campbell	Newport	83866	88616	5.6637	525.99	555.781	5.6637	1.940959	159.44409	MCCRACKEN	McCracken	Paducah	62879	65514	4.1905	234.4807	244.3068	4.1905	0.077846	268.19271
CARLISLE	Carlisle	Bardwell	5238	5351	2.1573	26.3217	26.8895	2.1571	-4.61596	198.99894	MCCREARY	McCreary	Whitley City	15603	17080	9.4661	36.1989	39.6255	9.466	7.177986	431.03471
CARROLL	Carroll	Carrollton	9292	10155	9.2875	67.669	73.9538	9.2875	6.459872	137.31543	MCLEAN	McLean	Calhoun	9628	9938	3.2197	37.5803	38.7903	3.2197	-4.095391	256.19758
CARTER	Carter	Carrollton	24340	26889	10.4724	59.0678	65.2536	10.4723	3.090483	412.06863	MEADE	Meade	Brandenburg	24170	26349	9.0153	74.4996	81.2159	9.0152	8.550609	324.43123
CASEY	Casey	Liberty	14211	15447	8.6974	31.8852	34.6584	8.6974	3.288664	445.69263	MENIFEE	Menifee	Frenchburg	5092	6556	28.7509	24.7314	31.8419	28.7508	-8.313301	205.89208
CHRISTIAN	Christian	Hopkinsville	68941	72265	4.8215	95.2073	99.7977	4.8214	2.338615	724.11457	MERCER	Mercer	Harrodsburg	19148	20817	8.7163	75.6054	82.1955	8.7164	2.469136	253.26200
CLARK	Clark	Winchester	29496	33144	12.3677	115.6185	129.9179	12.3677	7.449312	255.11479	METCALFE	Metcalfe	Edmonton	8963	10037	11.9825	30.78	34.4682	11.9824	0.617714	291.19545
CLAY	Clay	Manchester	21746	24556	12.9219	46.1585	52.1231	12.9219	-11.50838	471.11546	MONROE	Monroe	Tompkinsville	11401	11756	3.1137	34.3265	35.3954	3.1139	-8.745492	332.13310
CLINTON	Clinton	Albany	9135	9634	5.4625	44.4611	46.8898	5.4625	6.622379	205.46005	MONTGOMERY	Montgomery	Mont Sterling	19561	22554	15.3008	98.3842	113.4378	15.3008	17.491354	198.82247
CRITTENDE	Crittenden	Marion	9196	9384	2.0443	24.7806	25.2872	2.0443	-0.735294	371.09623	MORGAN	Morgan	West Liberty	11648	13948	19.7458	30.3558	36.3498	19.7458	-0.179237	383.71509
CUMBERLAND	Cumberland	Burkville	6784	7147	5.3508	21.8161	22.9834	5.3506	-4.071638	310.96263	MUHLLENBERG	Muhlenberg	Greenville	31318	31839	1.6635	65.3318	66.4186	1.6635	-1.067873	479.36811
DAVISS	Daviess	Owensboro	87189	91545	4.996	182.9855	192.1276	4.996	5.583047	476.48017	NELSON	Nelson	Bardstow	29710	37477	26.1427	70.0706	88.389	26.1427	15.903087	424.00071
EDMONSON	Edmonson	Brownsville	10357	11644	12.4263	33.6288	37.8076	12.4262	4.440055	307.97975	NICHOLAS	Nicholas	Carlisle	6725	6813	1.3085	34.1711	34.6183	1.3087	4.726259	196.80316
ELLIOTT	Elliott	Sandy Hook	6455	6748	4.5391	27.4351	28.6805	4.5394	16.360403	235.28171	OHIO	Ohio	Hartford	21105	22916	8.5809	35.402	38.4398	8.5808	4.040845	596.15143
ESTILL	Estill	Irvine	14614	15307	4.742	57.1838	59.8955	4.742	-4.148429	255.56149	OLDHAM	Oldham	Lagrange	33263	46178	38.8269	169.3522	235.1065	38.8269	30.616311	196.41309
FAYETTE	Fayette	Lexington	22536	26051	15.595	789.4054	912.5138	15.595	13.546785	285.48828	OWEN	Owen	Owenton	9035	10547	16.7349	25.5065	29.775	16.7349	2.787523	354.22238
FLEMING	Fleming	Flmingsburg	12292	13792	12.203	34.9919	39.2619	12.2028	4.031323	251.28127	OWSLEY	Owsley	Booneville	5036	4858	-5.5345	25.4004	24.5026	-5.5345	-2.120214	198.26459
FLOYD	Floyd	Prestonsburg	43586	42441	-2.6269	110.1653	107.2712	-2.627	-7.045074	395.64177	PENDLETON	Pendleton	Falmouth	12036	14390	19.5579	42.7697	51.1346	19.558	3.384295	281.41399
FRANKLIN	Franklin	Frankfort	43781	47687	8.9216	206.5337	224.96	8.9216	3.351018	211.97983	PERRY	Perry	Hazard	30283	29390	-2.9488	88.3952	85.7886	-2.9488	-2.306907	342.58620
FULTON	Fulton	Hickman	8271	7752	-6.2749	35.853	33.6032	-6.275	-12.11300	230.6918	PIKE	Pike	Pikeville	72583	68736	-5.3001	92.045	87.1665	-5.3001	-5.400372	788.55954
GALLATIN	Gallatin	Warsaw	5393	7870	45.9299	51.5003	75.1544	45.93	9.135959	104.71767	POWELL	Powell	Stanton	11686	13237	13.2722	64.8917	73.5043	13.2722	-4.714059	180.08452
GARRARD	Garrard	Lancaster	11579	14792	27.7485	49.5036	63.2401	27.7484	14.332071	233.90207	PULASKI	Pulaski	Somerset	49489	56217	13.5949	73.0848	83.0206	13.5948	12.177811	677.14481
GRANT	Grant	Williamstown	15737	22384	42.238	60.3645	85.8612	42.2379	10.176912	260.69957	ROBERTSON	Robertson	Mount Olivet	2124	2266	6.6854	21.22	22.6387	6.6856	0.70609	100.09404
GRAVES	Graves	Mayfield	33550	37028	10.3666	60.2434	66.4886	10.3666	0.251161	556.90718	ROCKCASTLE	Rockcastle	Mount Vernon	14803	16582	12.0178	46.5414	52.1347	12.0179	2.858521	318.06048
GRAYSON	Grayson	Leitchfield	21050	24053	14.266	41.1974	47.0746	14.2659	7.038623	510.95414	ROWAN	Rowan	Morehead	20353	22094	8.554	71.1095	77.1922	8.5539	5.607857	286.22032
GREEN	Green	Greensburg	10371	11518	11.0596	35.9147	39.8868	11.0598	-2.257336	288.76712	RUSSELL	Russell	Jamesstown	14716	16315	10.8657	52.0206	57.673	10.8656	7.661661	282.88787
GREENUP	Greenup	Greenup	36742	36891	0.4055	103.6653	104.0857	0.4055	0.051503	354.42892	SCOTT	Scott	Georgetown	23867	33061	38.5218	83.6287	115.8441	38.5219	42.684734	285.39214
HANCOCK	Hancock	Hawesville	7864	8392	6.7141	39.5472	42.2025	6.7142	2.061487	198.85073	SHELBY	Shelby	Shelbyville	24824	33337	34.2934	64.3746	86.4508	34.2933	26.208117	385.61777
HARDIN	Hardin	Elizabethtown	89240	94174	5.5289	141.6453	149.4768	5.5289	12.072334	630.02399	SIMPSON	Simpson	Franklin	15145	16405	8.3195	64.0347	69.3621	8.3195	5.620238	236.51225
HARLAN	Harlan	Harlan	36574	33202	-9.2196	78.1147	70.9127	-9.2197	-11.81856	468.20885	SPENCER	Spencer	Franklin	6801	11766	73.0039	35.4924	61.4033	73.004	45.00255	191.61807
HARRISON	Harrison	Cynthiana	16248	17983	10.6782	52.4407	58.0405	10.6783	4.798977	309.83511	TAYLOR	Taylor	Campbellsville	21146	22927	8.4223	76.3995	82.8341	8.4223	6.913246	276.78189
HART	Hart	Munfordville	14890	17445	17.1591	35.6378	41.753	17.1593	4.322155	417.81386	TODD	Todd	Elkton	10940	11971	9.4241	29.0101	31.744	9.4239	4.084872	377.10974
HENDERSON	Henderson	Henderson	43044	44829	4.1469	92.3322	96.1611	4.1468	3.169823	466.18615	TRIGG	Trigg	Cadiz	10361	12597	21.5809	21.5225	26.1672	21.5806	13.828689	481.40265
HENRY	Henry	New Castle	12823	15060	17.4452	44.0522	51.7372	17.4452	2.363878	291.08634	TRIMBLE	Trimble	Bedford	6090	8125						

# Population Change (2000 – 2010)

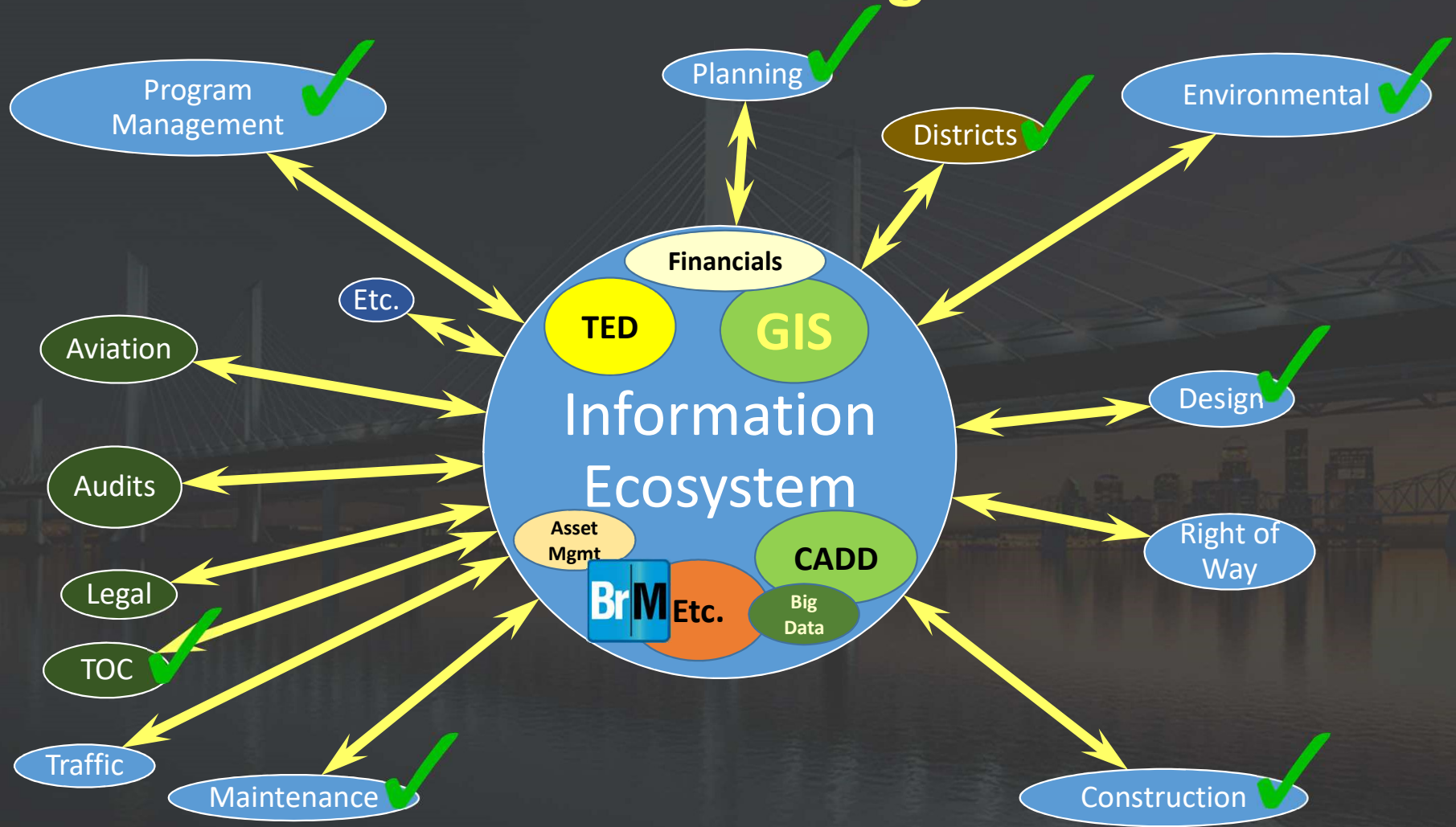
## Population Change (2000-2010)



Highlights areas of rapid growth and loss.

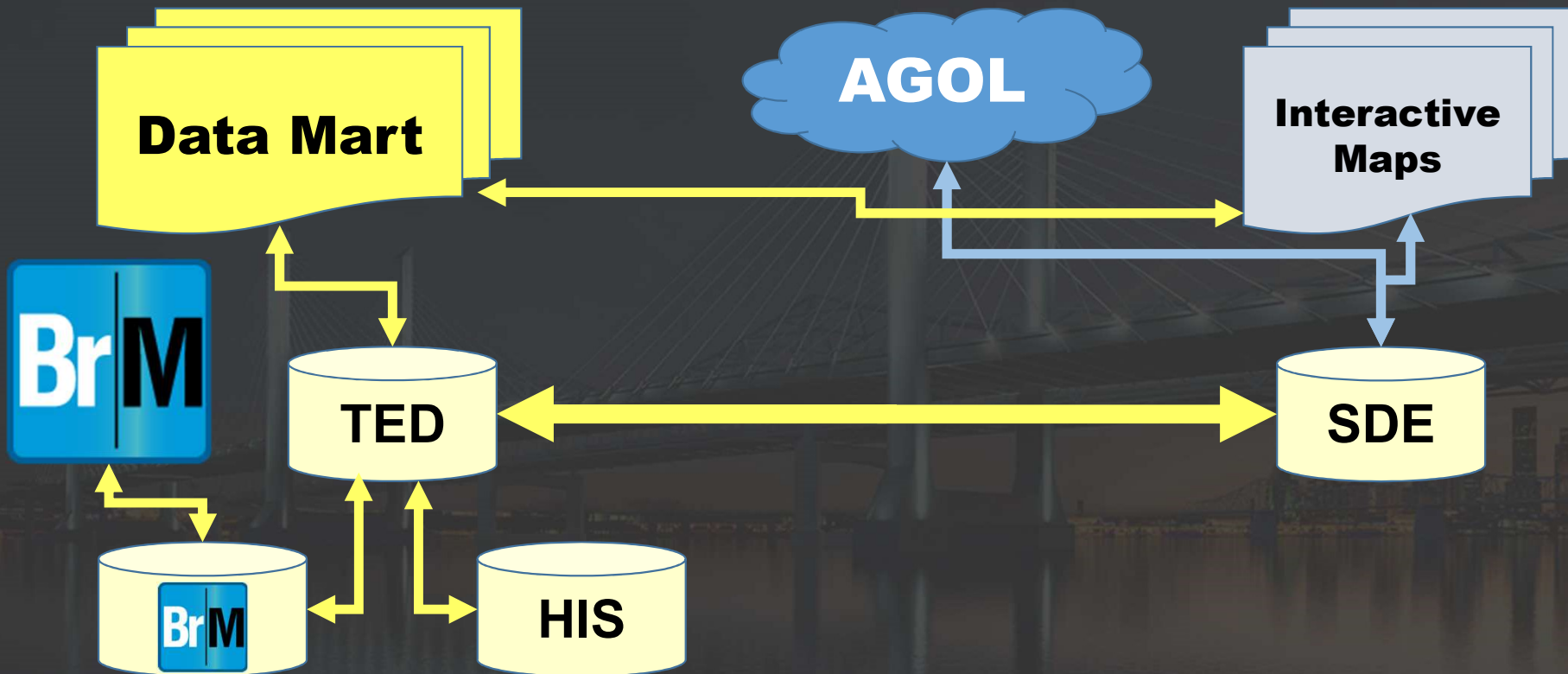
# How does BrM fit in KYTC?

# BrM information is used throughout the Cabinet...



Where we are now

# BrM is part of a larger *Data Ecosystem*

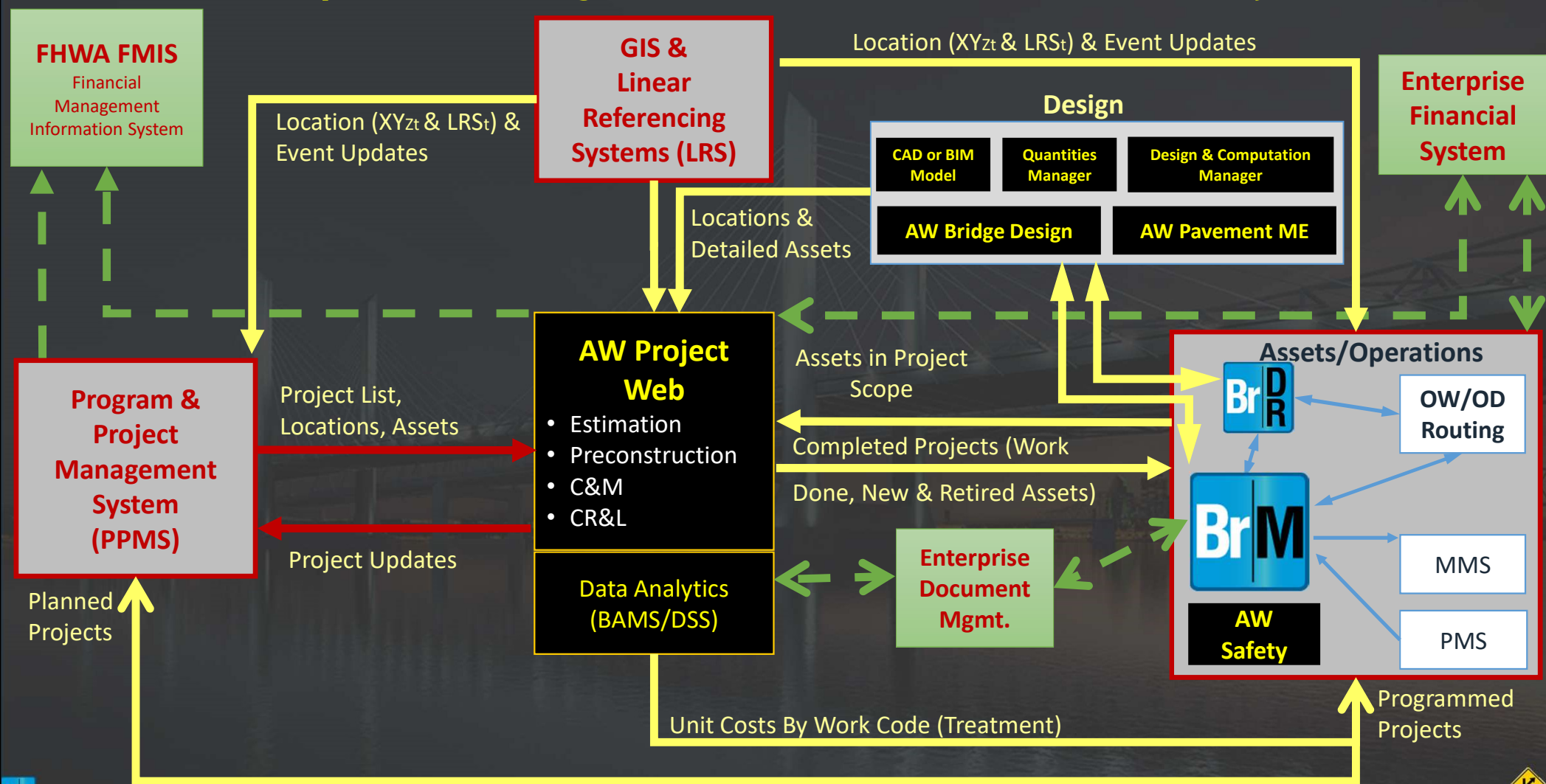


- Data is refreshed every week.

Thanks to: Divisions of Maintenance, Planning & OIT-EDSB



# BrM is part of a larger AASHTOWare/DOT Data Ecosystem



After: WSP Data Summit Visualization (1/2019)



Because DOT MANAGEMENT needs information to flow across organizational boundaries and GIVE ANSWERS beyond ONE SYSTEM.

Financials need to talk to Project & BrM. Designs need to flow into Project. .... PROJECTS need to flow into Asset Management...

# Some Examples of BrM Data Used in KYTC...

# Chief District Engineer

“...To look up bridge conditions.”

- USED: 1-2X per Week
- DEVICE: iPhone or iPad
- SAVES: Days of delay in getting an answer.
  - “If I didn’t have the app, I would have to ask the Structures TES to look up the information while he was in the office, which would take several days.”

Map Service: Bridges	
Hopkins	
OBJECTID	452946
BRIDGE_ID	0548001226
DESC_STATUS	NOT DEFICIENT
STRUCT_NUM_8	0548001226
COUNTY_NAME	Hopkins
FACILITY_7	KY 502
BRG_LENGTH_312	71
STRUCTURE_LENGTH_49	32
FEAT_SECT_6	SR OF CLEAR CREEK
SUFFICIENCY_RATING	66.4
LATITUDE_16	37.289167
LONGITUDE_17	-87.674664
YEAR_BUILT_27	1989
ADTTOTAL_29	250
INSP_YEAR	1004

Thanks to: Deneatra Henderson, D2 CDE

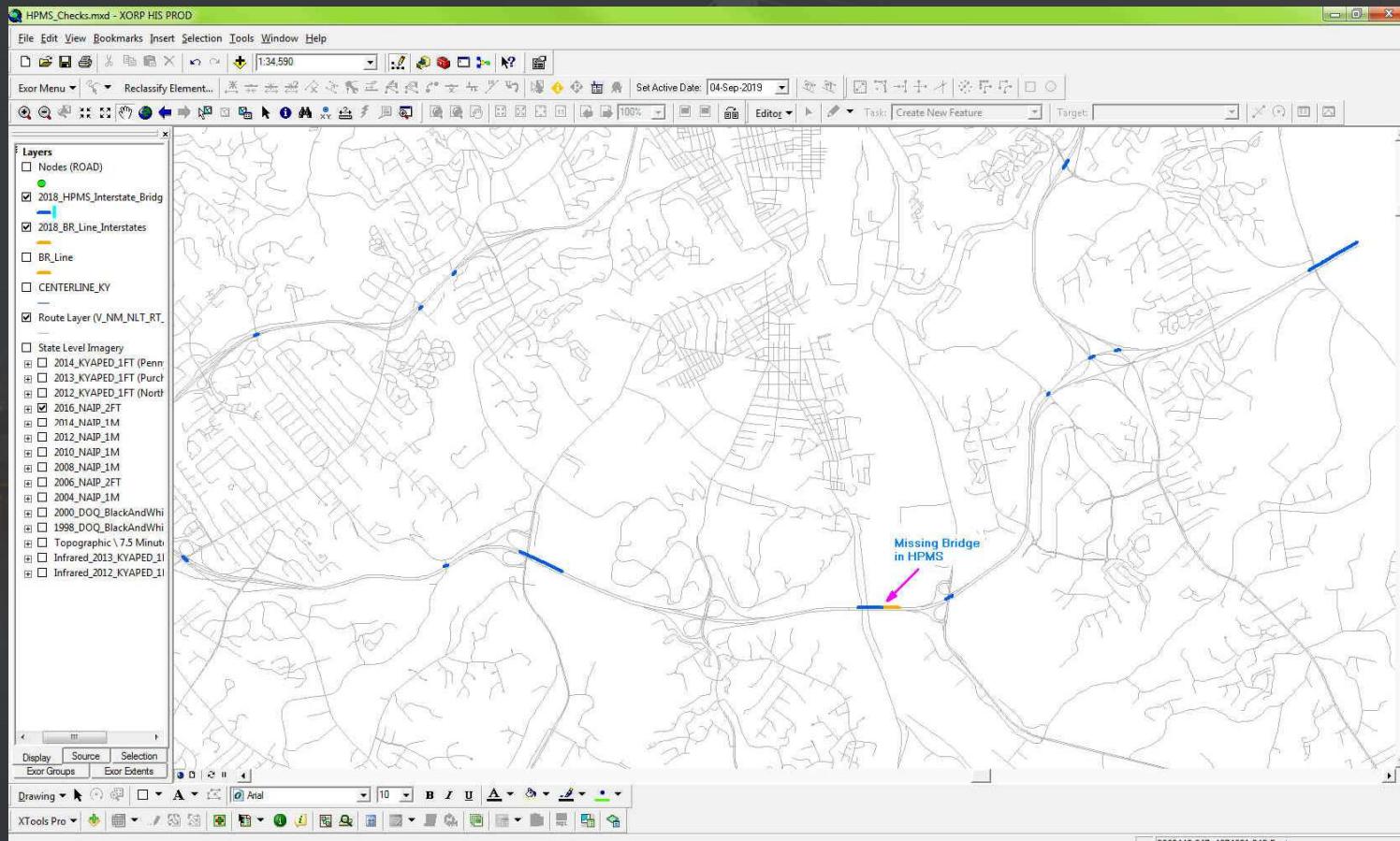


# Planning: HPMS Submittal QA/QC

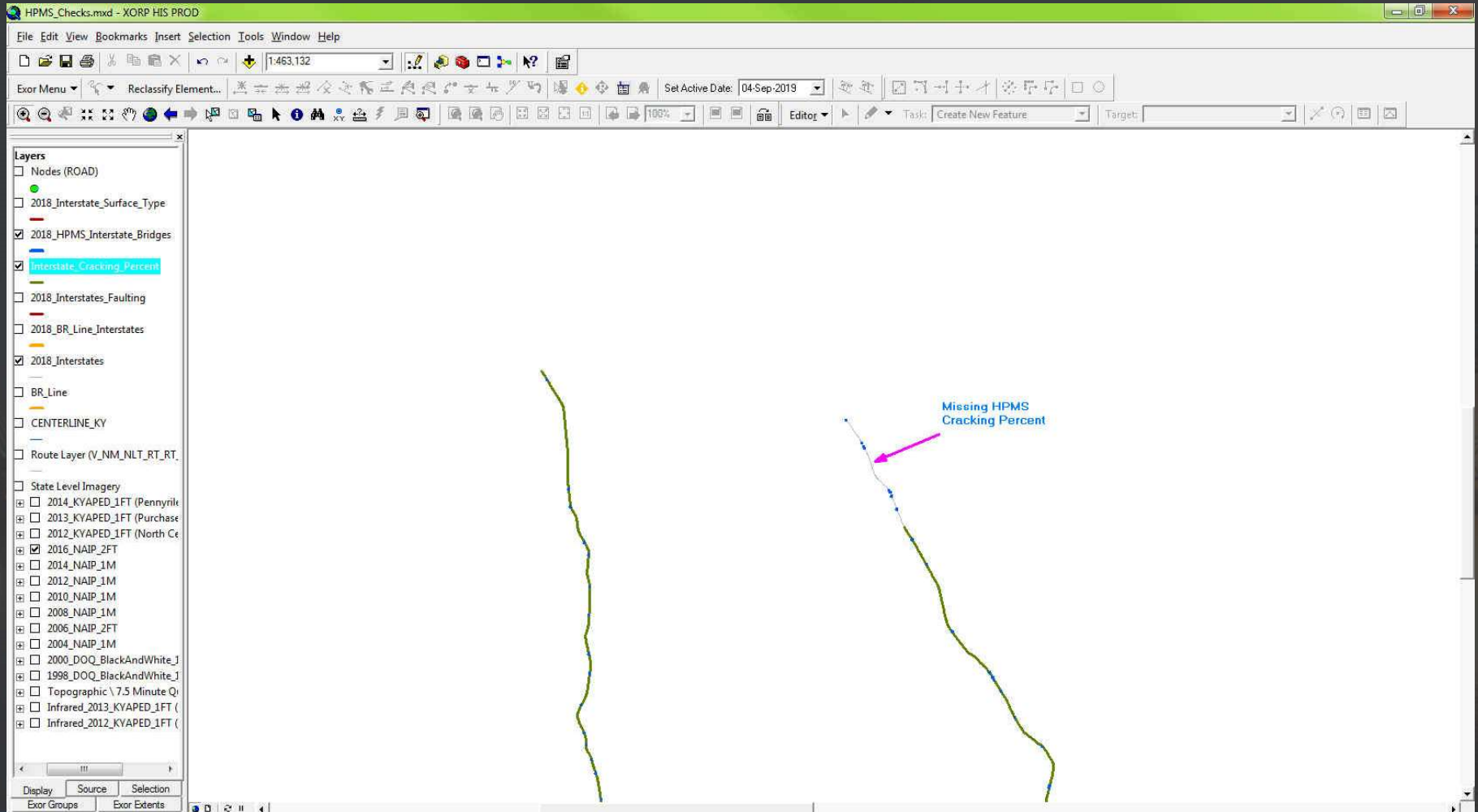
- Using Desktop GIS to Compare Bridge locations to pavement...
  - Breaks...
  - Cracks
  - Faulting
- Visual QA/QC
  - Errors stand out.
- Without GIS, HPMS submittal probably would have carried the errors.

Thanks to: Gretchen Sanford

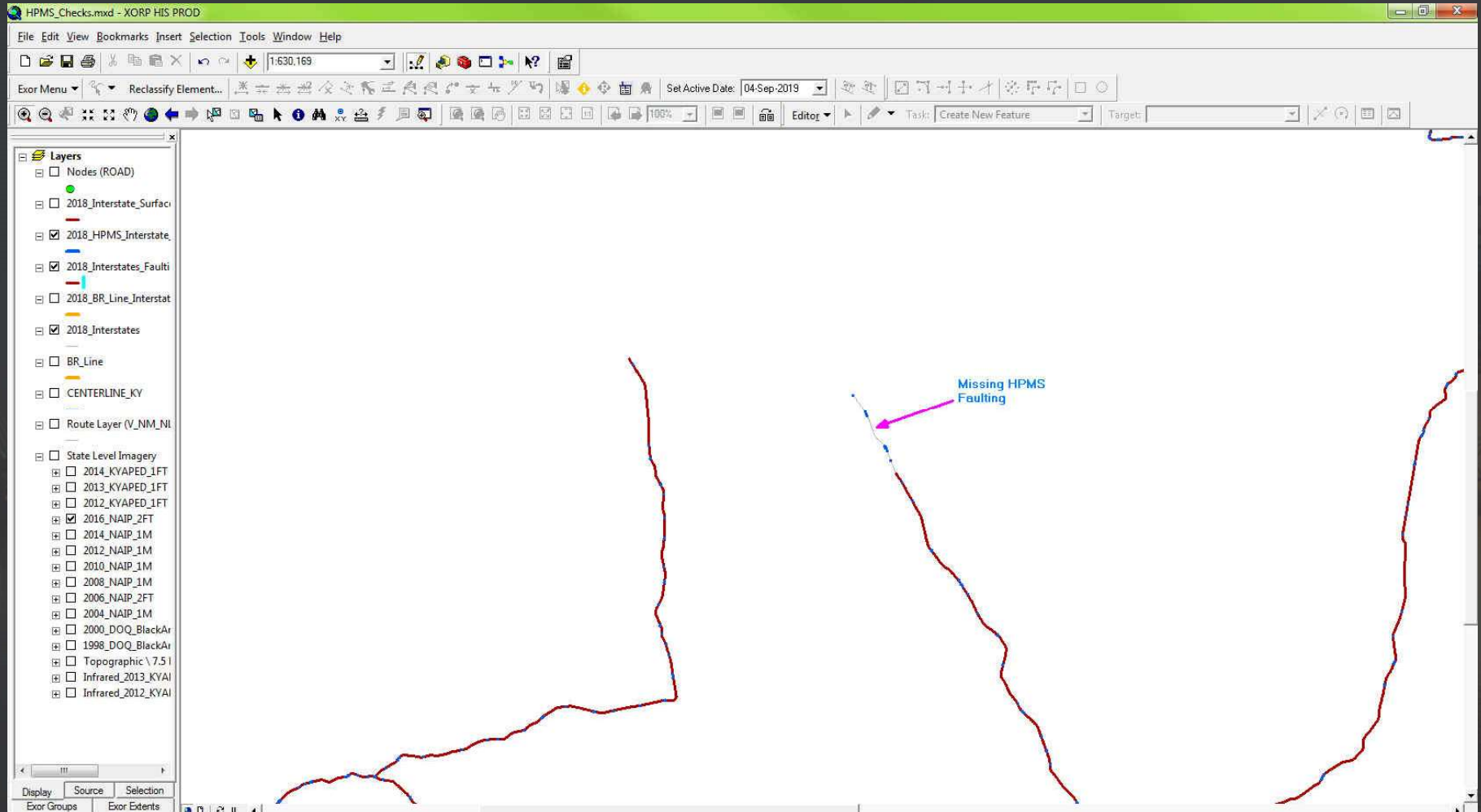
# Planning: HPMS Submittal – Pavement Breaks



# Planning: HPMS Submittal – Pavement Cracking

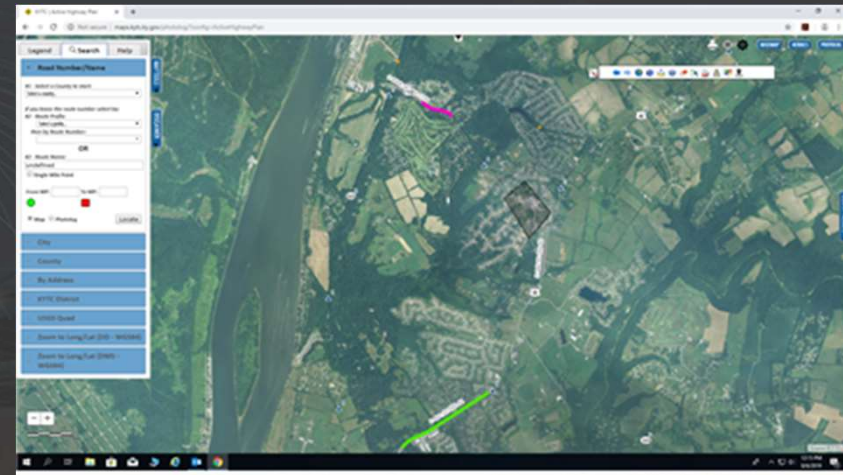


# Planning: HPMS Submittal – Pavement Faulting



# Planning: Data Needs Analysis

- High level understanding of potential project, challenges, and rough costs.
- Where: North Oldham County High School
- DNA Study for a Turn Lane
- USAGE: Daily
- SAVES: hours of phone calls and ½- Full Day of field survey.





# Div. Of Hwy. Design: Drainage

- To improve search for Drainage information
  - Bridge location
  - Basic Bridge Information
- USED: Monthly
- SAVES: undefined time per search

Thanks to: Rokshad Khan

# Div. of Environmental Analysis (DEA)

- Biology
- Cultural Resources

# DEA-Biology: Trip Planning

- Identify/verify *CORRECT* bridge and its location.
- USAGE: Weekly
- Prior to using GIS...
  - Project location description was often too vague....
    - Had to guess “which one.”
  - Multiple times the wrong bridge was evaluated.
    - Required additional trip to perform field work.

Thanks to: Nathan Click



This is not rocket science, but it is critical to the Cabinet’s business functions.

# DEA: Cultural Resource Management

PROJECT: Bridging Kentucky.

- USAGE: Every day.
- SEARCH: by bridge number... “to go directly to the BK bridge location.”
- FOR: Assessing/reviewing structure and its Area of Potential Effect (APE)
  - Determine if there are any previously identified historic or archaeological resources in the APE
  - Are there any previously unidentified historic structures, historic cemeteries, historical markers, etc.) in the APE.

Thanks to: Dan Davis

For cultural historic, BK is supposed to use a 150' radius based on the centerline of the project (in this case, the bridge) as their APE – at a minimum. In practice, however, BK has typically been using a 150' radius based on the center point of the bridge, meaning any bridge greater than 300 feet in length has an APE smaller than itself. I've pointed this out to BK, but I'm not seeing much improvement. To aid that process, I created a layer in GIS for every bridge in the state. It's a 150' buffer based on the bridge line, so the APE actually extends past the end of the bridge (as below).



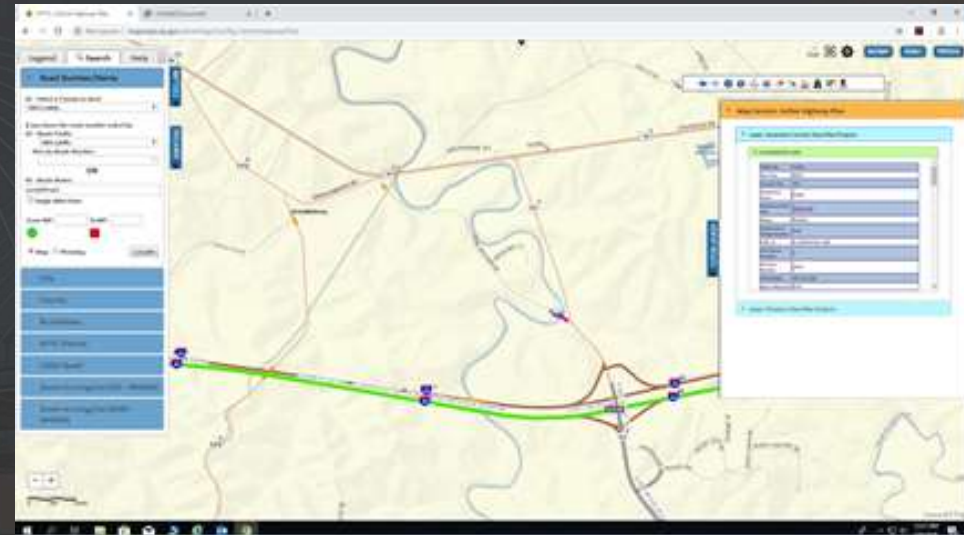
# DEA: Cultural Resource Evaluation in Bridge APE



# Construction (For Bridging KY)

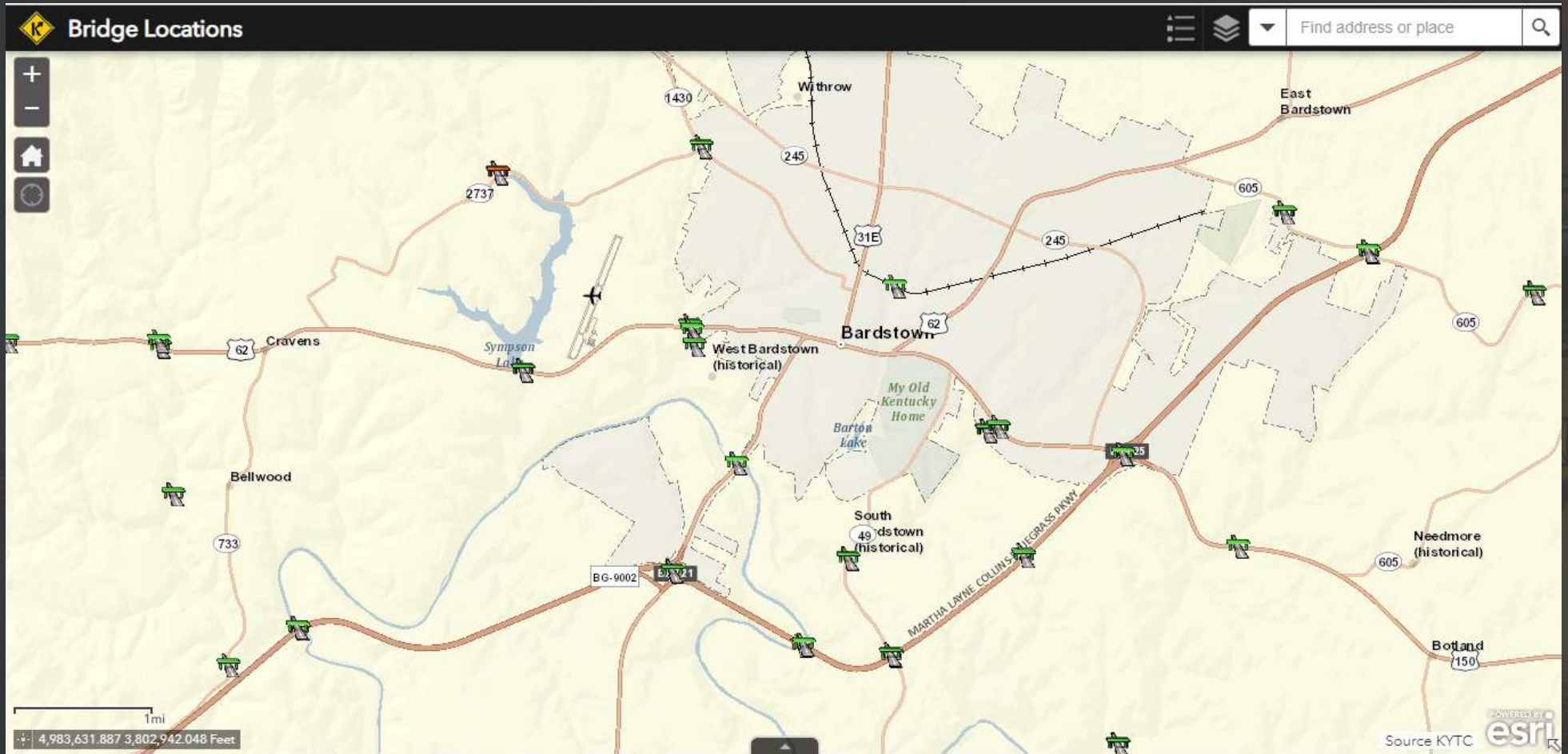
## Crab Orchard Road Project

- Bridge location
- Basic Bridge Information
- USED: Weekly
- SAVES: ½ to full day+ for each project.



Thanks to: Jacob Huber

# Bridge Data Miner



<http://kytc.maps.arcgis.com/apps/webappviewer/index.html?id=d08e346fc29743d9a72e0e120a10a392>

# Bridge Strikes

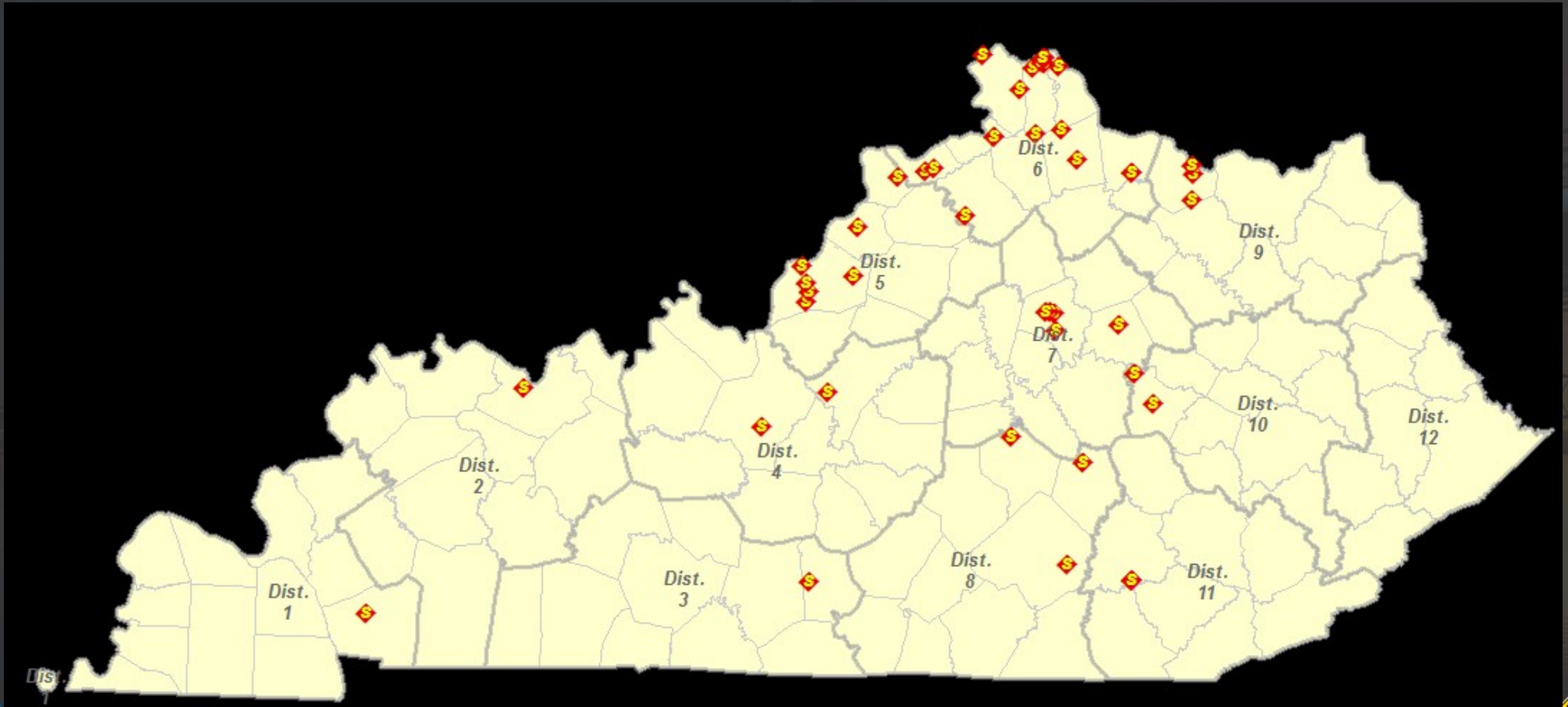


# Finding the needles in the Haystack...

- How do you find these?
  - DMS conversion...
  - GIGO

	A	B	C	H	O	P	Q	R	S	T	U
1	Other Special Inspection TYPE	BRIDGE_ID	LATITUDE (NBI-DMS)	LONGITUDE (NBI-DMS)	INSPECTION DATE						
35	IMPACT	096B00002N	384047	842045	5/16/2019						
36	IMPACT	039B00017N	384642	844600	11/19/2018						
37	IMPACT	039B00017N	384642	844600	9/6/2018						
38	IMPACT	041C00029N	384722	843331	7/9/2018						
39	IMPACT	096B00026N	384812	842532	3/14/2019						
40	IMPACT	008B00071N	385758	843809	7/18/2019						
41	IMPACT	059B00096R	390302	843405	3/15/2018						
42	IMPACT	019B00040R	390325	842550	8/16/2018						
43	IMPACT	059R00608N	390415	843019	12/6/2018						
44	IMPACT	059B00044R	390436	843111	2/14/2018						
45	IMPACT	059B00040N	390512.54	-843122.11	5/26/2017						
46	IMPACT	059B00085N	390523	843033	10/29/2018						
47	IMPACT	059B00085N	390523	843033	4/17/2019						
48	IMPACT	059B00048N	390534	843036	3/20/2018						
49	IMPACT	008B00052N	390615	844933	6/20/2017						
50	IMPACT	008B00052N	390615	844933	6/1/2018						

# Bridge Strikes (2017-2019)



What districts have a problem?

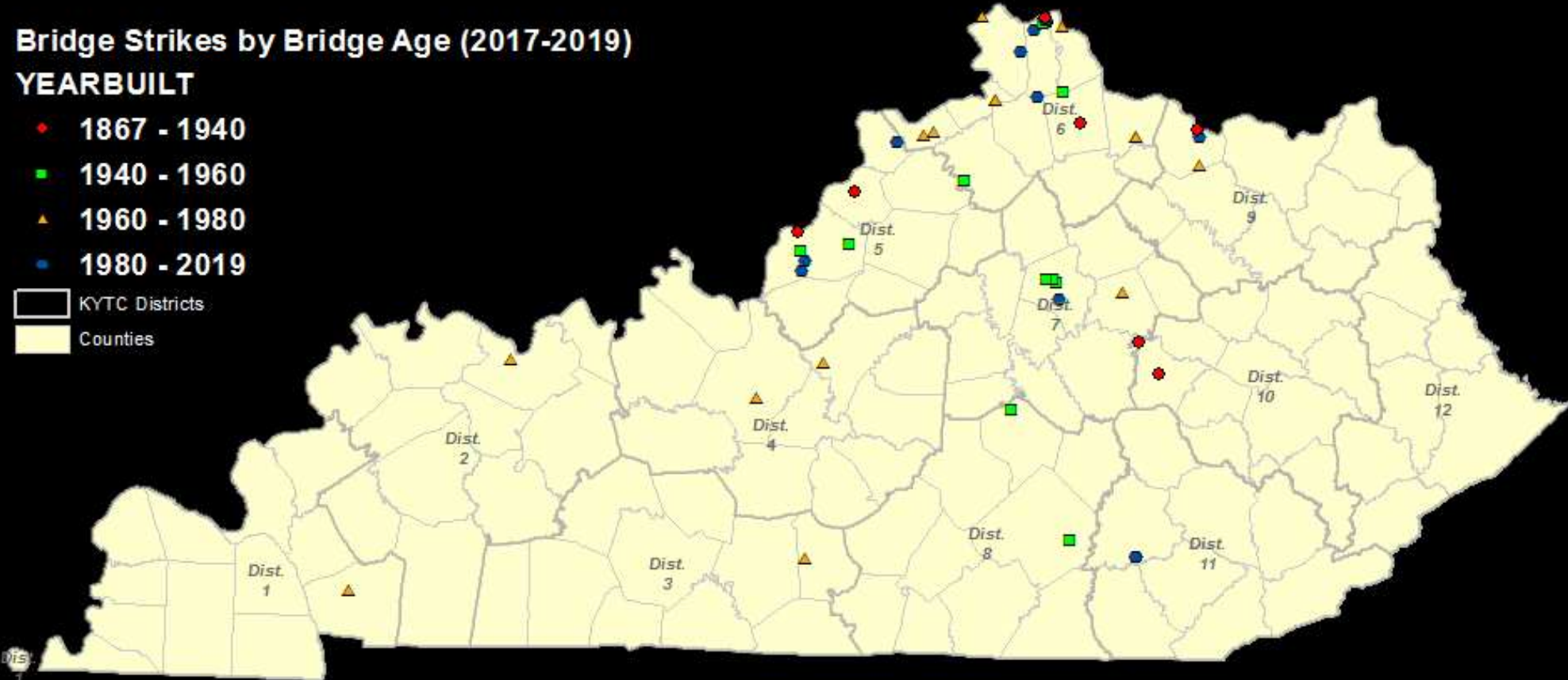
# Bridge Strikes by Bridge Age

Bridge Strikes by Bridge Age (2017-2019)

**YEARBUILT**

- 1867 - 1940
- 1940 - 1960
- ▲ 1960 - 1980
- 1980 - 2019

□ KYTC Districts  
□ Counties



# Bridge Strikes by Vertical Clearance

Bridge Strikes (2017-2019)

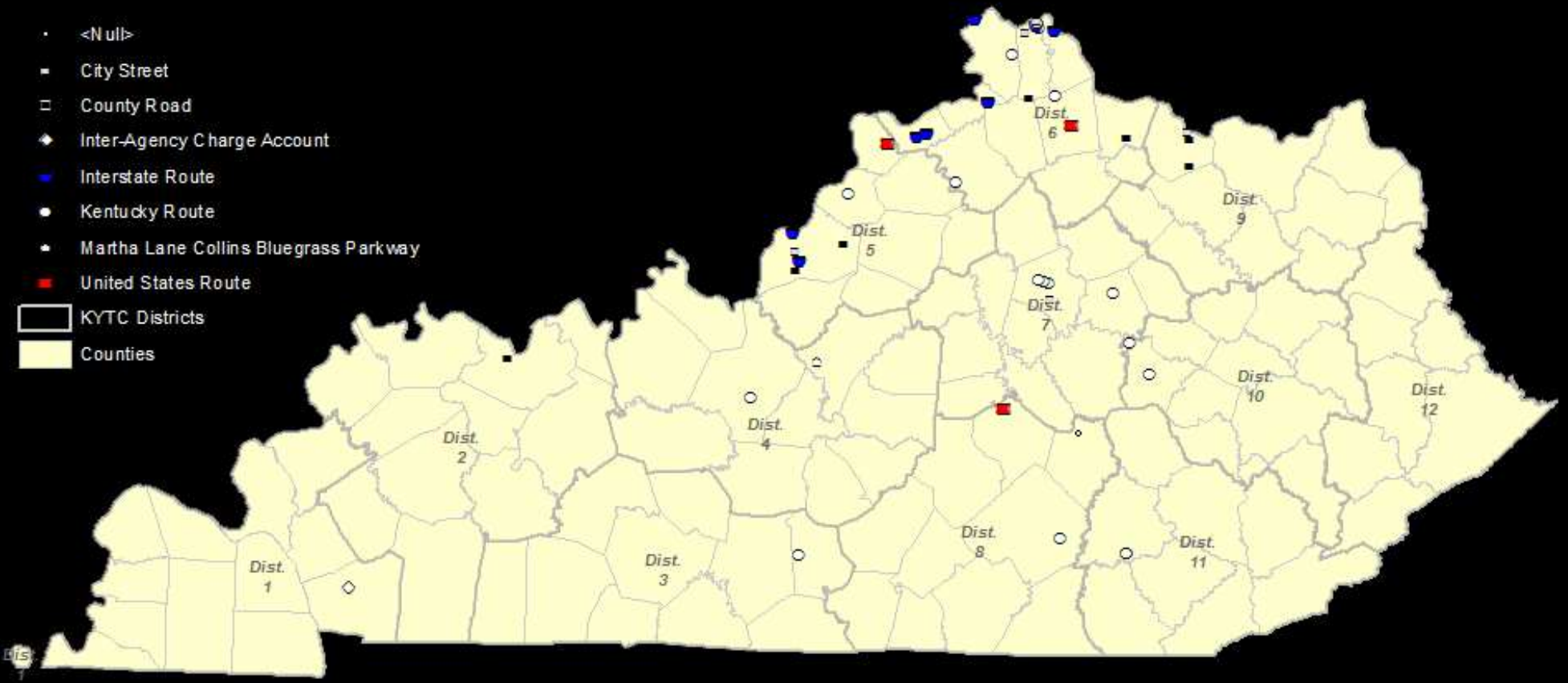
LMVCDEC (Ft.)

- 12 - 15
- 15 - 20
- 20 - 25
- 25+

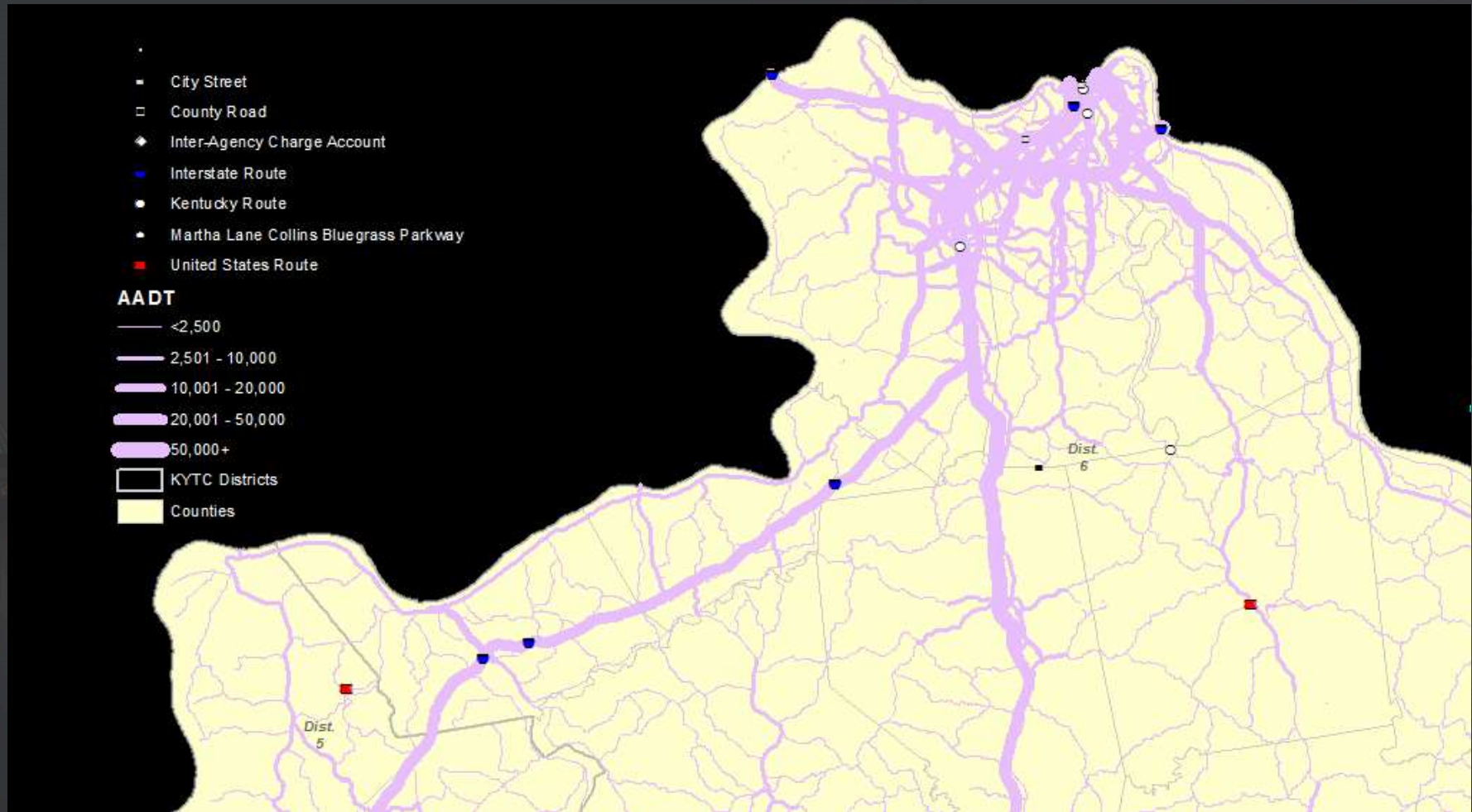
KYTC Districts  
Counties



# Bridge Strikes by Route Type



# Bridge Strikes with AADT



# Bridge Strikes with Combo Truck % AADT



# Communicating with the General Public



# KYTC Data Mart

Not secure | datamart.business.transportation.ky.gov

DataMart **K**

County Roads Bridges Traffic Vehicle Safety Fiscal Documents Spatial Adv. Query

Bridges

Bridges

Powered by **TED** Transportation Enterprise Database

## Bridge Portal

Select a County on the left to see the State Maintained Bridges in that County. Select the Structure# for details about the specific bridge.



Select County **ADAIR**

### Bridges in Adair County

Show 10 rows

Copy

Excel

PDF

Print

Search:

Structure #	Route	Over	Location
<a href="#">001800004N</a>	KY-76	Blue Branch	.6 MI NW OF N-JCT KY 206
<a href="#">001800005N</a>	KY-76	BR OF CASEY CREEK	.65 MI N OF JCT KY 551
<a href="#">001800006N</a>	KY-76	CASEY CREEK	.5 MI S OF JCT KY 551
<a href="#">001800007N</a>	KY-206	RUSSELL CREEK	.05 MI SW OF JCT KY 1323
<a href="#">001800008N</a>	KY-206	BARNETT CREEK	2 MI NE OF N-JCT KY 76
<a href="#">001800009N</a>	KY-206	SPRUCE PINE CREEK	1.0 MI WEST OF CASEY CL
<a href="#">001800010N</a>	KY-76	GREEN RVR @NEATSVILLE	.5 MI S OF N-JCT KY 206
<a href="#">001800011N</a>	KY-76	FRYE BRANCH	1.1 MI N OF S-JCT KY 206
<a href="#">001800013N</a>	KY-80	RUSSELL CREEK	1.5 MI WEST OF RUSSELL CL
<a href="#">001800014N</a>	KY-55	GLENS FORK	10 MI WEST OF JCT KY 87

<http://datamart.business.transportation.ky.gov/DMbridge.asp>



KY-76: Green River@NEATSVille

# Data Mart: Bridge Portal...



## Adair County

Bridge #001B00010N over GREEN RVR  
@NEATSVILLE 5 MI S OF N-JCT KY 206 in  
Adair county was last inspected in 2019 and  
will be inspected next in 07/2021.

**Sufficiency Rating:** 84.9%  
**NBI Rating:** NOT DEFICIENT

## Kentucky's Weight-Posted Bridges

### All Postings

[Select All Counties](#)

Select County

#### Kentucky's Weight-Posted Bridges

County	Route	Facility	Location	MP	Bridge ID	Gross (tons)	KY Type 1 (tons)	KY Type 2 (tons)	KY Type 3 (tons)	KY Type 4 (tons)	SU5 (tons)	SU6 (tons)	SU7 (tons)
Adair	KY-76	KY-76	1.1 MI N OF S-JCT KY 206	4.671	001B00011N		20	27	31	31	31	31	31
Adair	KY-900	KY-900	.25 MI SOU. OF JCT KY 55	5.05	001B00027N		24	37					
Adair	KY-704	KY-704	2.7 MI N OF CUMBERLAND CL	2.509	001B00028N		30	32	36	44	39	40	43
Adair	KY-1323	KY-1323	.3 MI NE OF JCT KY 206	0.41	001B00032N		31	32	36	44	39	39	42
Adair	KY-531	KY-531	2.0 MI SOU. OF JCT KY 206	3.319	001B00033N		27	28	31	44	34	34	36
Adair	KY-551	KY-551	.50 MI NOR. OF JCT KY 901	0.863	001B00035N		21	27	31	42	35	37	42

<http://datamart.business.transportation.ky.gov/BrWeightPosted.asp>



# Data Mart: Weight Posted Bridges ... to Excel

xlsx - Excel

File Home Insert Page Layout Formulas Data Review View ACROBAT Tell me what you want to do... Holmes, Will F (KYTC) Share

Clipboard Font Alignment Number Styles Cells Editing

Exported data

Exported data																
	A	B	C	D	E	F	G	H	I	J	K	L	M	N		
1	County	Route	Facility	Location	MP	Bridge ID	Gross (tons)	KY Type 1 (tons)	KY Type 2 (tons)	KY Type 3 (tons)	KY Type 4 (tons)	SU5 (tons)	SU6 (tons)	SU7 (tons)		
2	Adair	KY-76	KY-76	1.1 MI N OF S-JCT KY 206	4.671	001B00011N			20	27	31	31	31	31		
3	Adair	KY-900	KY-900	.25 MI SOU.OF JCT KY 55	5.05	001B00027N			24	37						
4	Adair	KY-704	KY-704	2.7 MI N OF CUMBERLAND CL	2.509	001B00028N			30	32	36	44	39	40	43	
5	Adair	KY-1323	KY-1323	.3 MI NE OF JCT KY 206	0.41	001B00032N			31	32	36	44	39	39	42	
6	Adair	KY-531	KY-531	2.0 MI SOU. OF JCT KY 206	3.319	001B00033N			27	28	31	44	34	34	36	
7	Adair	KY-551	KY-551	.50 MI NOR. OF JCT KY 901	0.863	001B00035N			21	27	31	42	35	37	42	
8	Adair	KY-551	KY-551	.70 MI NOR. OF JCT KY 901	1.103	001B00036N	17									
9	Adair	KY-551	KY-551	1.3 MI EAST OF 084 C.L.	1.832	001B00037N	17									
10	Adair	KY-92	KY-92	.40 MI WEST OF JCT KY 768	3.551	001B00043N	22									
11	Adair	KY-92	KY-92	.60 MI EAST OF JCT KY 768	4.702	001B00044N			37	39	44	44				
12	Adair	KY-767	KY-767	1.9 MI.N. JCT KY 439	1.828	001B00074N			32	34	36	44	38	39	41	
13	Adair	KY-704	KY-704	.85 MI S. JCT KY 55	11.909	001B00078N			20	27	31	31	31	31	31	
14	Adair	CR-1106	ARNOLDS LANDING RD	.05 MI E OF JCT CR 5067	1.881	001C00007N	18									
15	Adair	CR-1162	WIDS ROAD	100' NE OF JCT CR 5156	0.027	001C00011N	3									
16	Adair	CR-1318	LEATHERWOOD CHURCH	.15 MI SE OF JCT KY 80	2.472	001C00017N	29									
17	Adair	CR-1031	DUNNVILLE RD	1.75 MI E OF JCT KY 2289	1.673	001C00024N	18									
18	Adair	CR-1031	DUNNVILLE RD	1 MI E OF JCT KY 2289	0.932	001C00025N	18									
19	Adair	CR-1031	DUNNVILLE RD	.5 MI E OF JCT KY 2289	0.526	001C00026N	18									
20	Adair	CR-1205	OLD GLENSFORK RD	.1 MI W OF JCT KY 55	0.251	001C00033N	18									
21	Adair	CR-1361	ROLLEN COOMER RD.	.5 MI FROM CR 1175	0.01	001C00035N	3									
22	Adair	CR-1016	SULPHUR CREEK RD	1 MI. S-JCT. KY 206	3.75	001C00036N	18									
23	Adair	CR-1001	TAYLOR FORD RD	0.9 MI SE OF JCT KY 206	2.552	001C00037N	18									
24	Adair	CR-1291	CORBIN RD	.25 MI. S.E. OF JCT.KY 61	0.297	001C00039N	11									
25	Adair	CR-1008	ALLEN SCHOOLHOUSE	150' E OF JCT KY 531	5.754	001C00040N	5									

Sheet1

Ready



# Bridge Weight Limits

**K** Bridge Weight Limits

(1 of 2) [Clear](#)

[Zoom to](#) [Clear Selected](#) ...

040800008N

District	7
Latitude	37.58
Longitude	-84.56
County	Garrard
Feature Intersected	GILBERTS CREEK
Feature Carried	KY-39
EV Single Axle (Tons)	16
EV Tandem Axle (Tons)	22
EV Gross (Tons)	29
Gross (Tons)	
Truck Type 1 (Tons)	20
Truck Type 2 (Tons)	27
Truck Type 3 (Tons)	31
Truck Type 4 (Tons)	31
SUV 5 (Tons)	31
SUV 6 (Tons)	31
SUV 7 (Tons)	31
Open/Posted/Closed	Posted for load (may include other restrictions)

Search Address or Place

+- -84.929 37.566 Degrees

KYTC | Source KYTC | Esri, HERE, NPS

# Bridge Weight Limits...

## Bridge Weight Limits

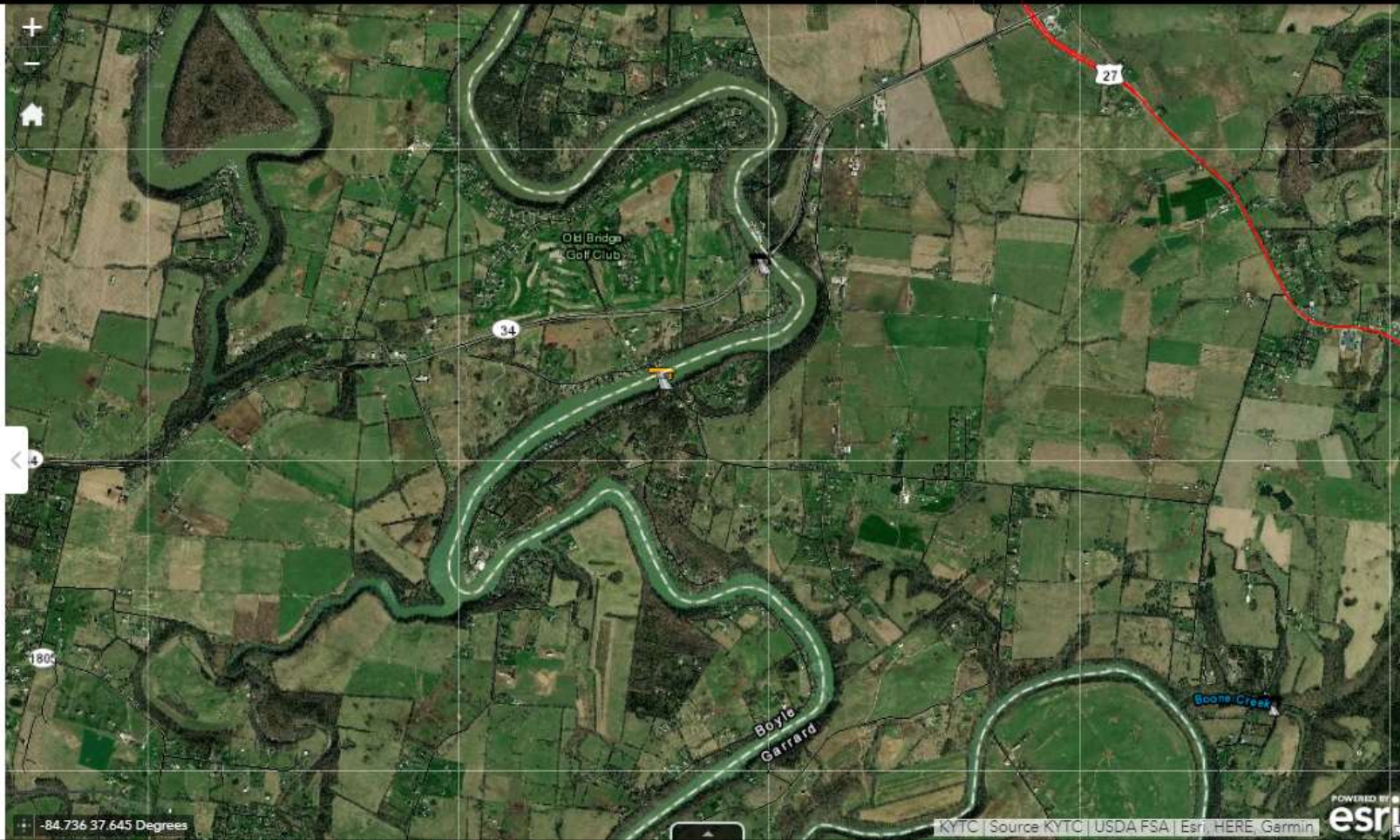
Search Address or Place

(1 of 2) [Clear](#)

Zoom to [Clear Selected](#) ...

040B00008N

District	7
Latitude	37.58
Longitude	-84.56
County	Garrard
Feature Intersected	GILBERTS CREEK
Feature Carried	KY-39
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Truck Type 4 (Tons)	31
SUV 5 (Tons)	31
SUV 6 (Tons)	31
SUV 7 (Tons)	31
Open/Posted/Closed	Posted for load (may include other restrictions)



**Kentucky's Bridge Weight Limits for Emergency Vehicles per the FAST Act**

**Kentucky Emergency Vehicles**

1 ton = 2000 pounds

Pursuant to Section 1410 of the FAST Act, Emergency Vehicles (EVs) are designed to be used under emergency conditions to transport personnel and equipment to suppress fires and mitigate other hazardous situations (23 U.S.C. 127(r)(2)). Under this provision, the gross vehicle weight (GVW) limit for EVs is 86,000 pounds. The statute authorizes the following additional weight limits, depending upon vehicle configuration:

[Select All Counties](#)

Select County **Adair**

**WEIGHT LIMITS FOR EMERGENCY VEHICLES PER THE FAST ACT**

*Bridge weight limits for Emergency Vehicles displayed in the four columns below are based on axles or a gross posting. If an emergency vehicle exceeds the axle weight or gross posting, the bridge is restricted from use.*

Search:


County ▲	Route ▼	Facility ▼	Location ▼	MP ▼	Bridge ID ▼	Gross (tons) ▼	Single Axle (tons) ▼	Tandem Axle (tons) ▼	EV Gross (tons) ▼
Adair	KY-76	KY-76	1.1 MI N OF S-JCT KY 206	4.671	001B00011N		16	22	29
Adair	KY-531	KY-531	2.0 MI SOU. OF JCT KY 206	3.319	001B00033N		16	26	37
Adair	KY-551	KY-551	.50 MI NOR. OF JCT KY 901	0.863	001B00035N		16	22	29
Adair	KY-551	KY-551	.70 MI NOR. OF JCT KY 901	1.103	001B00036N	17			
Adair	KY-551	KY-551	1.3 MI EAST OF 084 C.L.	1.832	001B00037N	17			

<http://datamart.business.transportation.ky.gov/BrFAST.asp>





# Bridging KY



## Bridging Kentucky

created by Stantec Consulting

County Filter

Filter by County

Select county below

---

District Filter

Filter by District

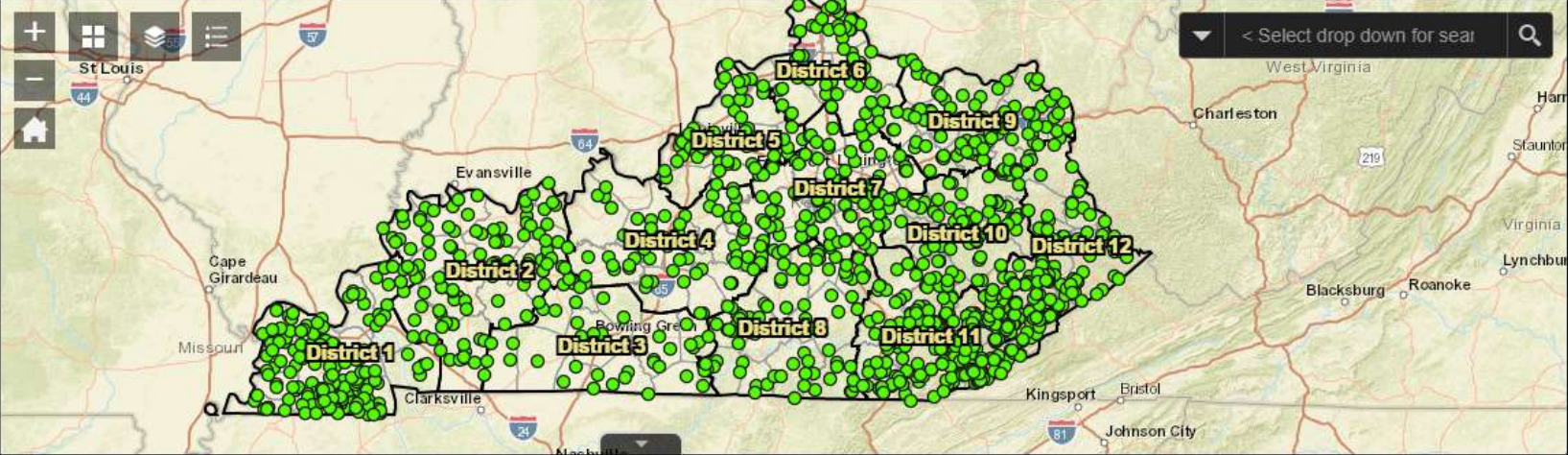
Select district below

---

Summary

**Bridge Count**

**1,217**



Bridging Kentucky Bridge Locations

Options  Filter by map extent  Zoom to  Clear selection  Refresh

Bridge ID	Bridging Ky Program Status	Bridging Ky Disposition	District	County	Item No.	Facility Carried/Intersect	Owner	To Construction By
011C00041N	Screening Pending		7	Boyle		Medlock Road Over No. Rolling Fork		2020-2024
011C00044N	Screened	Rehab - Typical	7	Boyle		South 2Nd Street Over Clarks Run	County Hwy Agency	2020-2024

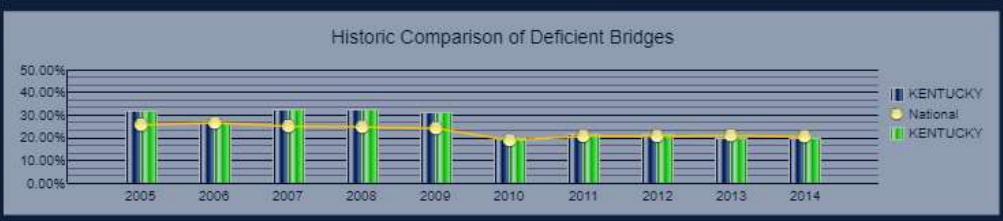
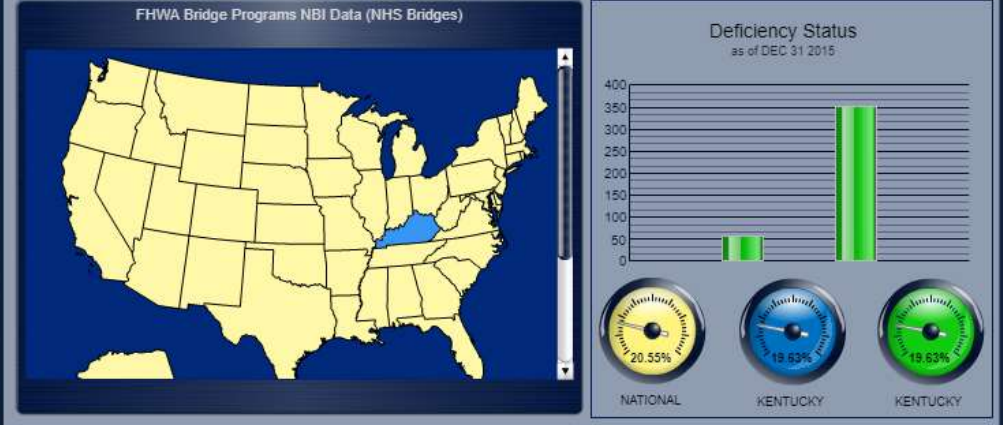
1217 features 0 selected

<https://stantec.maps.arcgis.com/apps/webappviewer/index.html?id=7588bcbe2b3a490db874c046dea4922c>

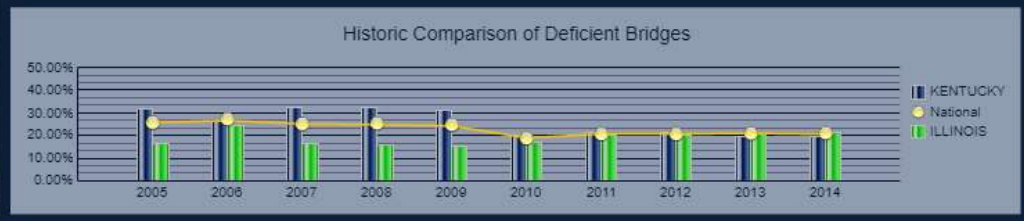
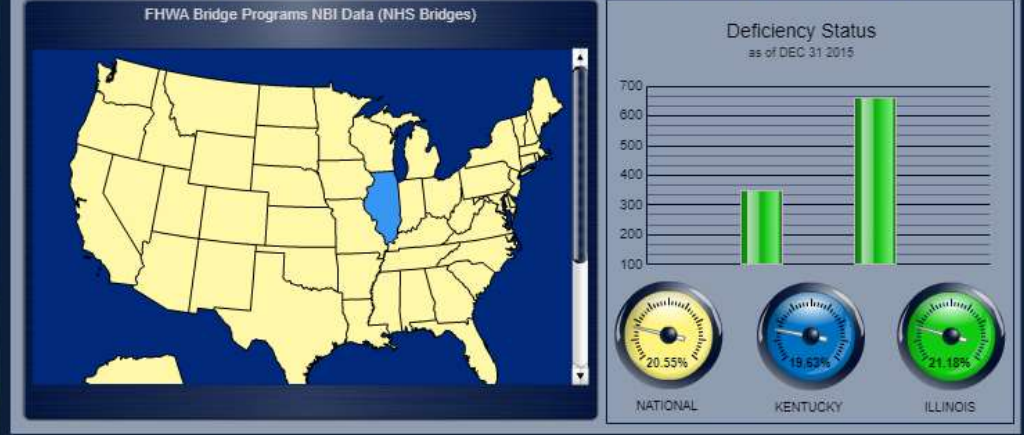


“Repair/replace 1,000 bridges.”

# National Bridge Comparison (NBI 2015)

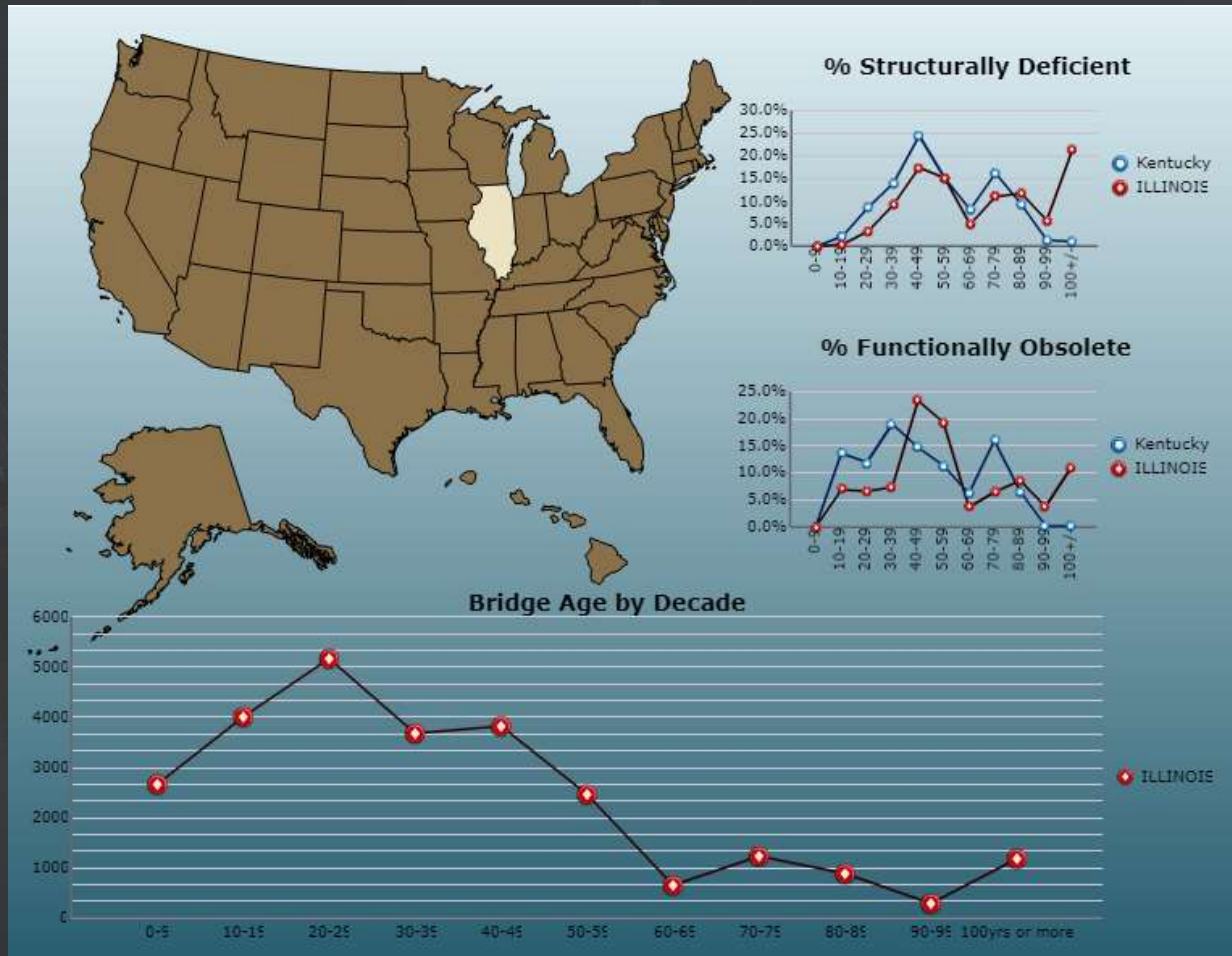


All data collected within this diagram is from the FHWA Bridge Programs NBI DATA website (<http://www.fhwa.dot.gov/Bridge/deficient.cfm>) as of Dec. 2015

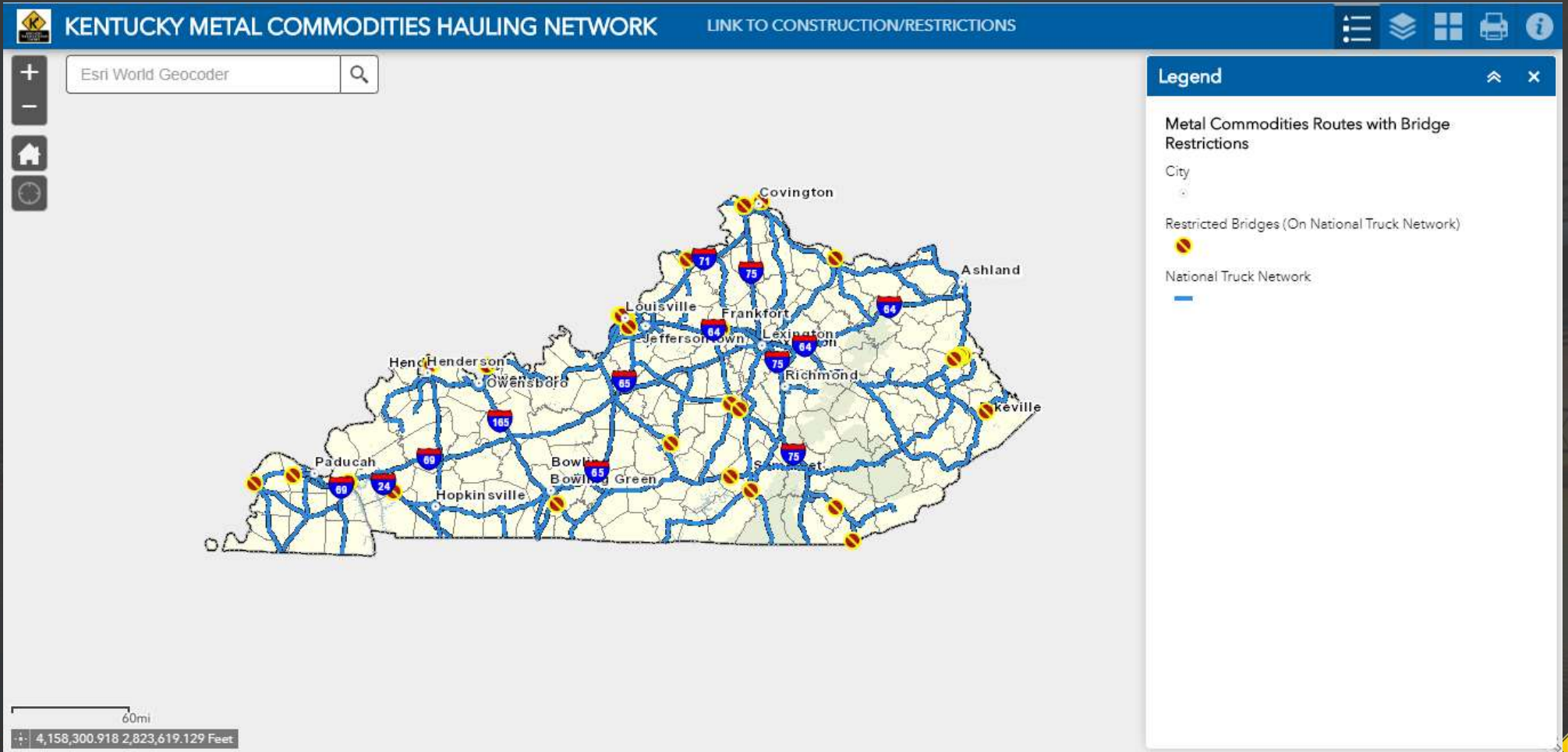


All data collected within this diagram is from the FHWA Bridge Programs NBI DATA website (<http://www.fhwa.dot.gov/Bridge/deficient.cfm>) as of Dec. 2015

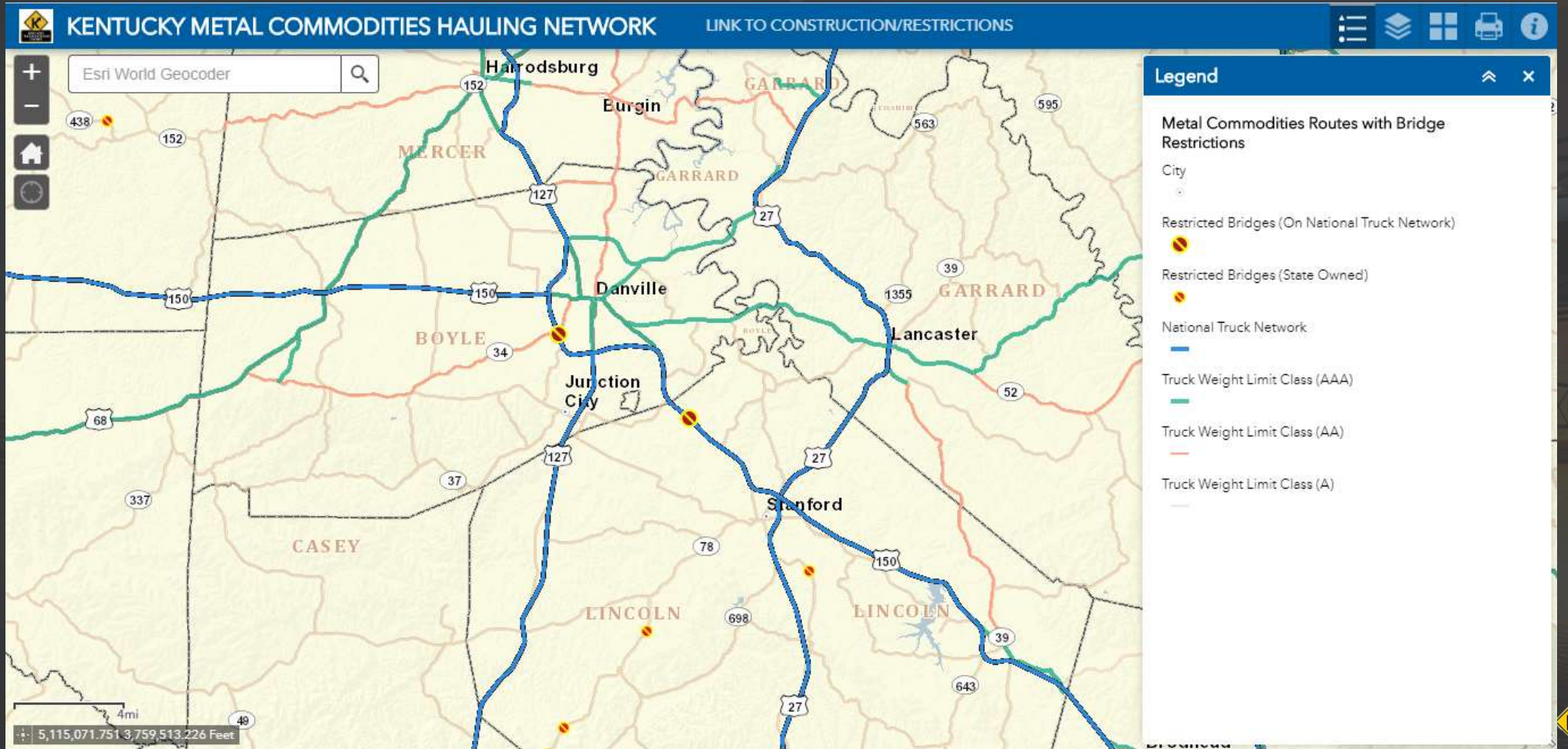
# Bridge Comparison: KY vs. .... By Decade



# Metal Commodities Hauling Network (KRS 189.2713)

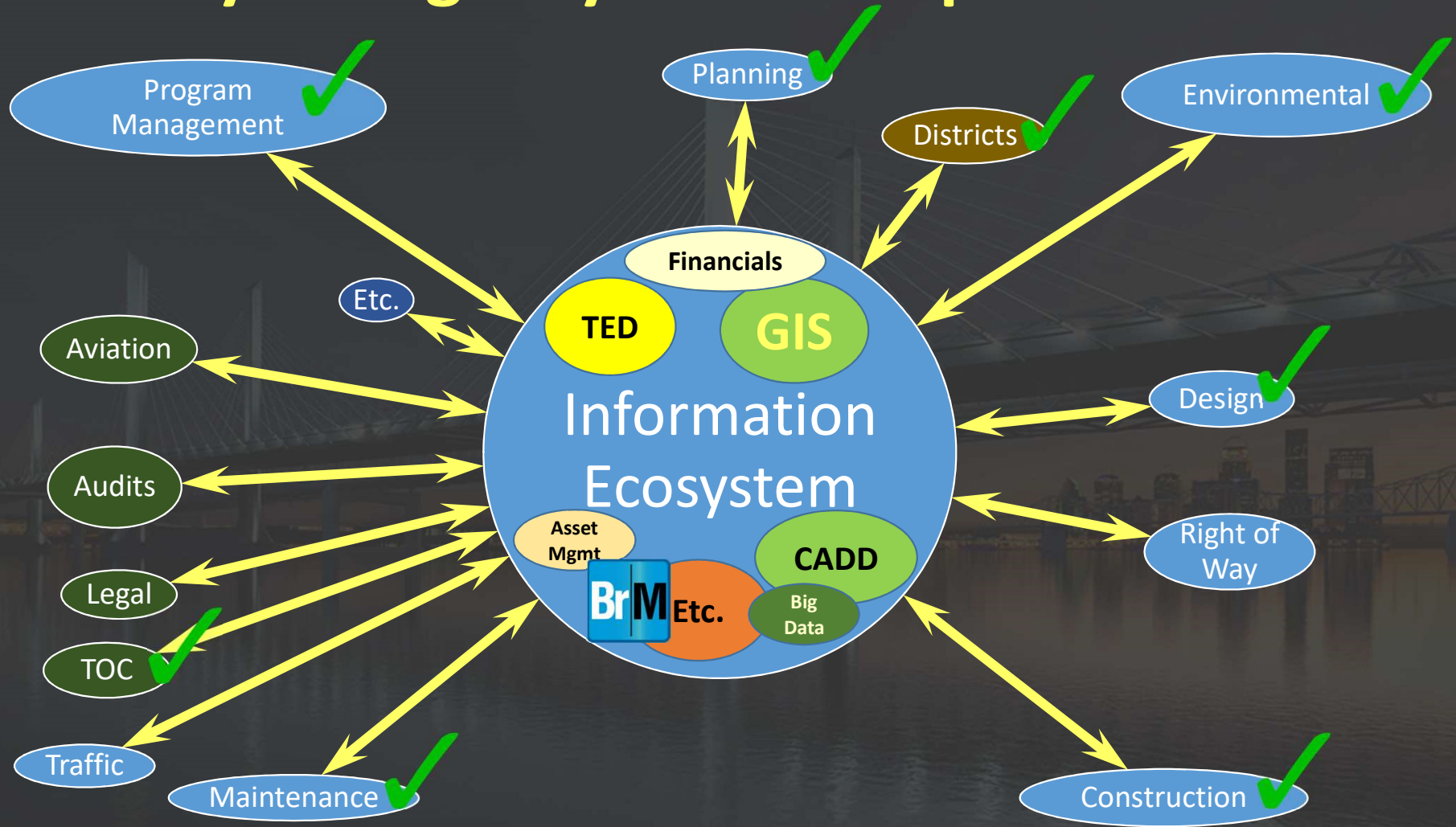


# Metal Commodities Hauling Network (KRS 189.2713)



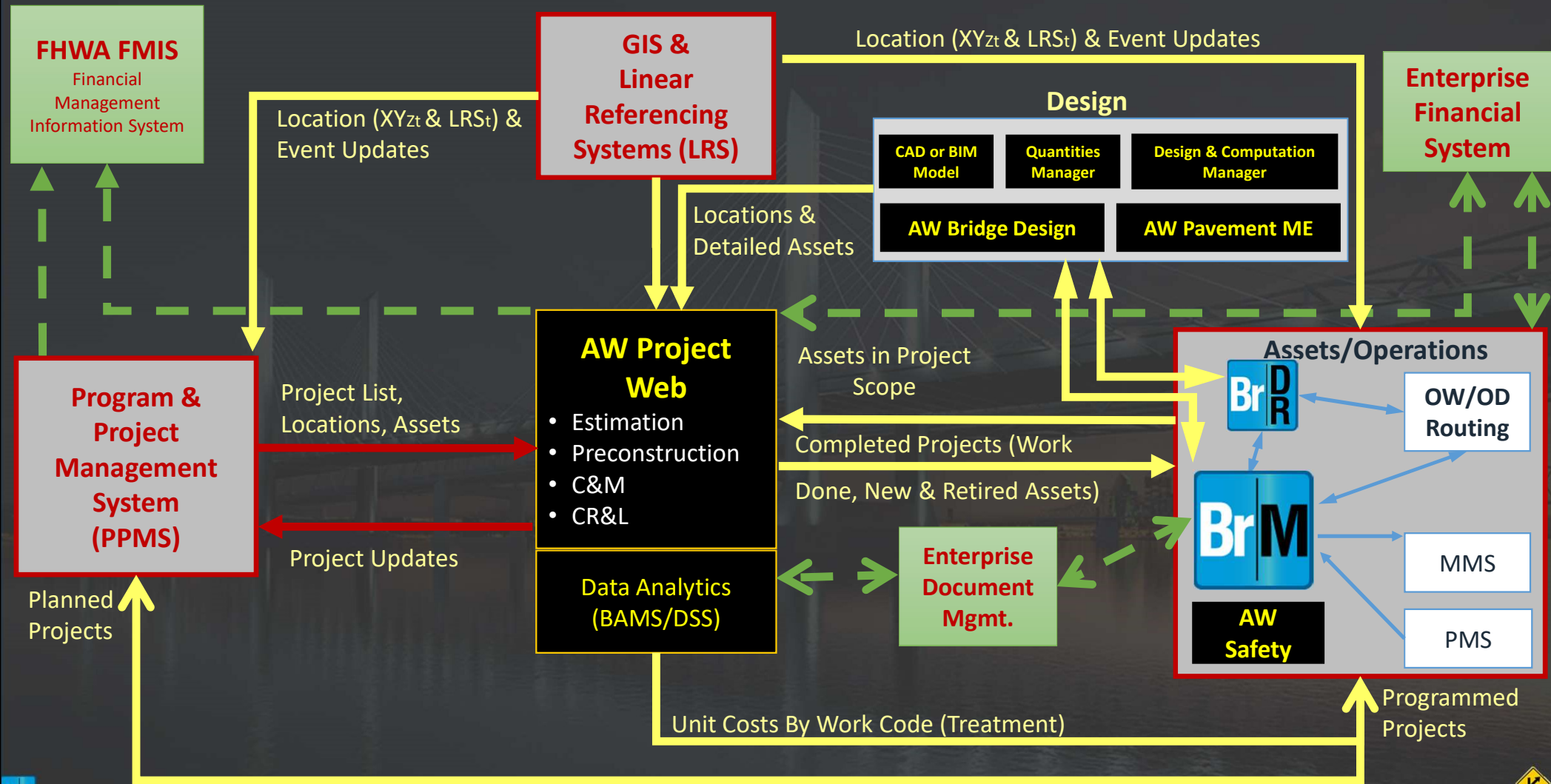
# Building Bridges to the *Information* Enterprise...

# Feed your Agency... at their point of need.



Where we are now

# Help AASHTOWare Integrate the Data Ecosystem



After: WSP Data Summit Visualization (1/2019)



Because DOT MANAGEMENT needs information to flow across organizational boundaries and GIVE ANSWERS beyond ONE SYSTEM.

Financials need to talk to Project & BrM. Designs need to flow into Project. .... PROJECTS need to flow into Asset Management...



# Remember Why We Work to Build A Safe Transportation System



# Thank You!

*Special thanks to  
Div. of Maintenance,  
Bridge Preservation Branch*

**KYTC, Office of Information Technology**  
**Heather Stout, Exec Dir. OIT**  
**Will Holmes**



Josh and company....