

Culvert Program

March 25, 2021



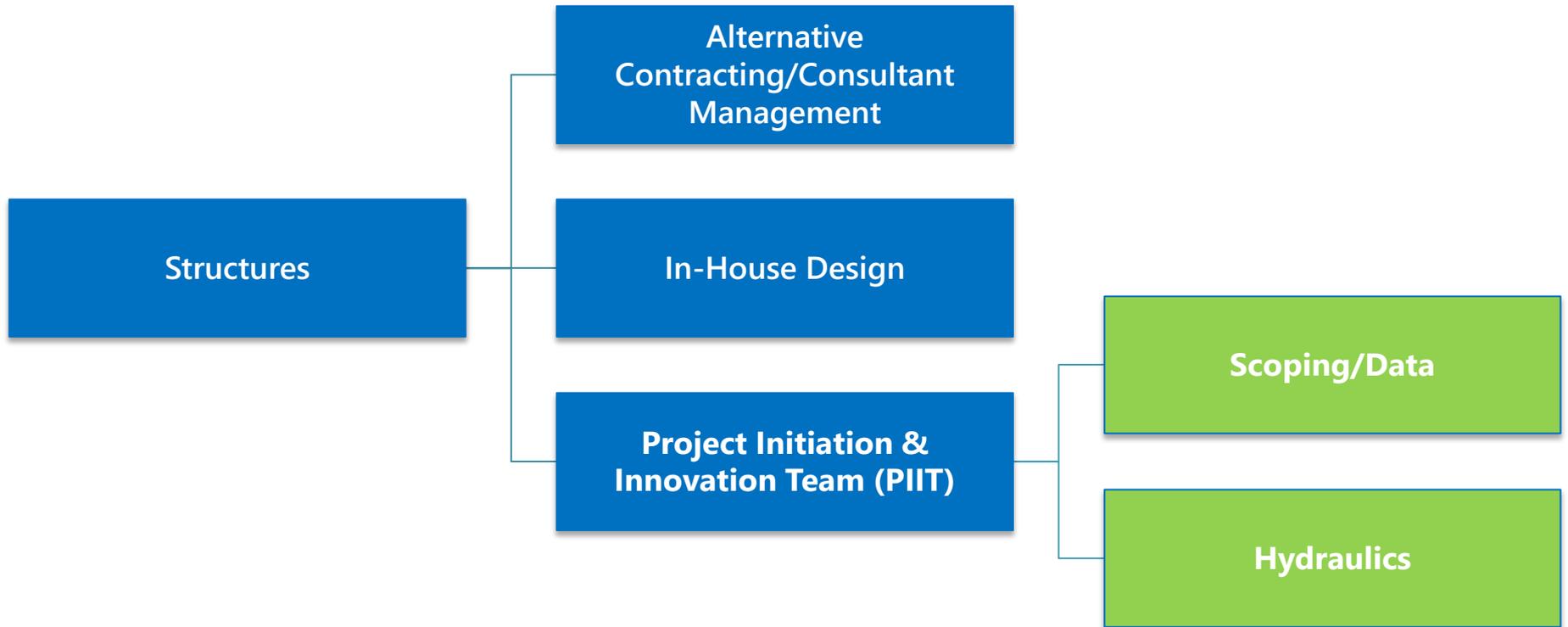
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Presentation Outline:

- PIIT/Hydraulics Partnership
- Culvert Statistics
- Hot 200 Background and Current State
- Programmed Projects
- Completed Projects
- Questions

Hydraulics and PIIT Partnership



Statistics – State and Town Owned Structures

	Long Structures (>20')	Short Structures (6'-20')	Total
Bridges	2569	167	2736
Culverts	230	1096	1326
Total	2799	1263	4062

Number of Culverts on Public Roads

- 2,799 Long structures
 - 230 are culverts (8.2%)
- 1,263 short structures
 - 1,096 are culverts (86.8%)
- 4,062 structures total on Town, State, and Interstate system
 - 1,326 are culverts (32.6%)

Statistics – State Owned Structures

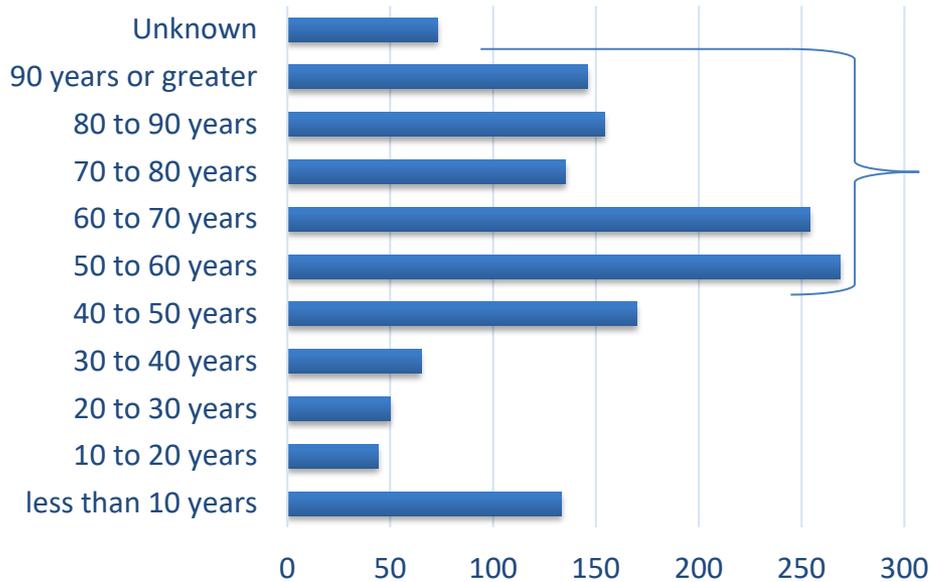
	Long Structures (>20')	Short Structures (6'-20')	Total
Bridges	1029	167	1196
Culverts	97	1096	1193
Total	1126	1263	2389

Number of Culverts on State and Interstate Roads

- 1,126 Long structures
 - 97 are culverts (8.6%) – 23 on Interstate
- 1,263 short structures
 - 1,096 are culverts (86.8%) – 204 on Interstate
- 2,389 structures total on State and Interstate system
 - 1,193 are culverts (49.9%)
- It is notable that there are an additional 49,018 culverts in the small culvert inventory (<6' span)

Statistics – Remaining Service Life

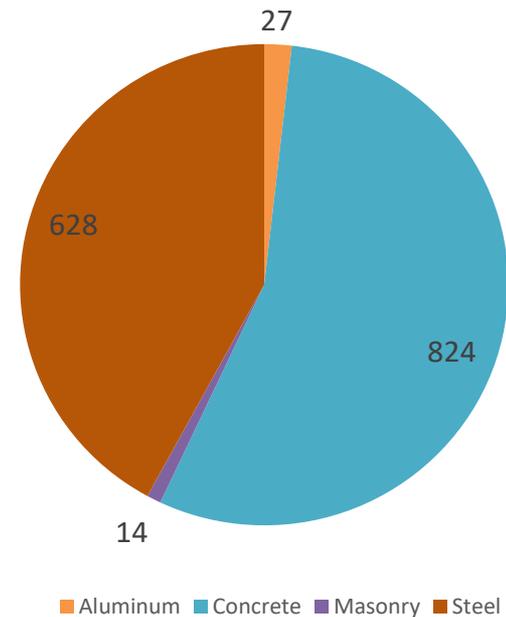
Number of culverts by Age



958 culverts are older than 50 years old, 424 of those are metal (aluminum or steel)

- Average lifespan of concrete culvert: 75 years
- Average lifespan of aluminum or steel culvert: 25 to 50 years

Total Number of Culverts by Material Type



The Need





VT Route 100 in Stowe



VT Route 100 in Duxbury



VT Route 105 in Richford



I-89 in Georgia



I-89 SB Off Ramp in Georgia

"HOT 200"



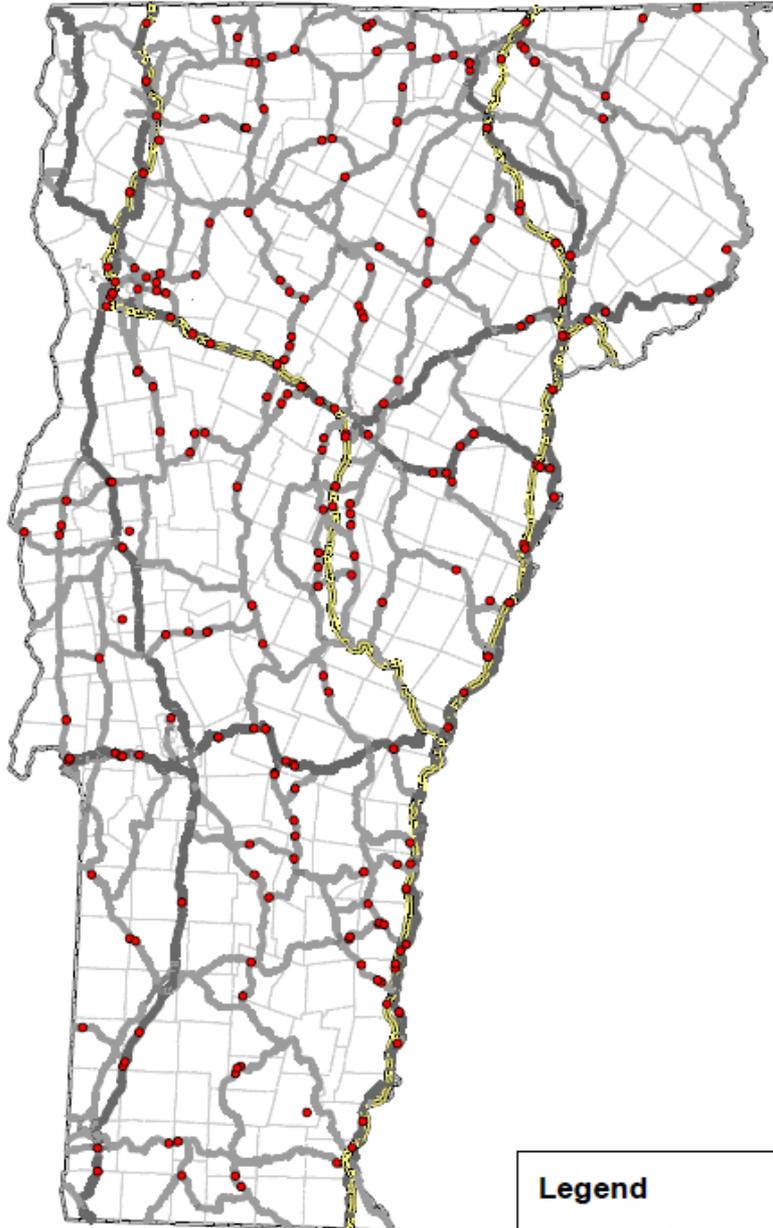
Forming a basis to develop a multi-year capital program to address deteriorating culverts on the State and Interstate Systems

"HOT 200"

- In 2017 there were exactly 200 culverts rated 5 or less
- Gathered additional information
- Allows dialogue with ANR
- Quickly identify rehabilitation vs replacement options

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A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Record ID	System	X	Y	Latitude	Longitude	Route	Town Name	Route Name	Bridge No.	Culvert Type	Design	Construc	Bridge Type	Year Built	Year Recon	Culvert Length	Culvert Span (provided)	Average Cover over	Watershed Area (SQM)	QSD Flow	Calculated BFW	Floodplain	Wetlands	Threatened Species	Historic Feature	Historic Culvert			
3	29	short	490541.6	17545.87	44.0931482	-72.434176	BRIDGFIELD	189	34-25	steel culvert	3	19	CGMP	1970	258	6	50	1.17	204	14.04	unknown	no	no	no	no	no	no		
4	30	short	491473.6	17965.04	44.1170418	-72.6065197	WILLIAMSTOWN	189	35-1	steel culvert	3	19	CGMP	1970	400	7	32	1.45	246	15.43	unknown	yes	no	no	no	no	no		
5	31	short	493493.6	18871.1	44.2094479	-72.5814103	BERLIN	189	36-3	concrete culvert	1	19	R C BOX	1970	297	10	18	10.30	69.7	36.55	yes	yes	no	no	no	no	no		
6	32	short	493481.8	18998.1	44.2093806	-72.5815048	BERLIN	189	36-4	concrete culvert	1	19	R C BOX	1970	296	7	25	0.04	10.1	1.34	yes	yes	no	no	no	no	no		
7	33	short	491326.1	19567.8	44.2028266	-72.6085997	MONTELEONE CITY	189	42-1	steel culvert	3	19	CGMP	1960	420	7	40	0.78	107	11.74	no	no	no	no	no	no	no		
8	35	short	488259.8	19725.04	44.2753947	-72.6470625	MIDDLESEX	189	43-2	steel culvert	3	19	ACGMP	1960	204	6	18	0.00	1.31	1.11	yes	yes	no	no	no	no	no		
9	41	short	479579.1	20475.3	44.3442343	-72.7361012	WATERBURY	189	47-1	concrete culvert	1	19	R C PIPE	1960	328	6	10	0.08	19.4	4.19	no	yes	no	no	no	no	no		
10	61	short	445458.4	21875.0	44.4699213	-73.1854393	S. BURLINGTON	189	67-2	concrete culvert	1	19	LOCKED MANHOLE COVER	1962	280	6	12	NG			no	no	no	no	no	no	no		
11	62	short	445868.3	21985.7	44.4749046	-73.1830807	S. BURLINGTON	189	68-1	steel culvert	3	19	CGMP	1962	352	7	32	0.45	54.8	9.22	no	yes	no	no	no	no	no		
12	63	short	445954	21976.0	44.4760503	-73.1793178	S. BURLINGTON	189	68-2	steel culvert	3	19	CGMP	1962	304	7	37	0.32	43.4	7.93	no	yes	no	no	no	no	no		
13	64	short	446434.7	22025.8	44.4864733	-73.1735096	WINDSOR	189	73-1	concrete culvert	1	19	LOCK MANHOLE COVER	1961	209	7	10	0.12	15.4	5.15	yes	no	no	no	no	no	no		
14	65	short	444896.2	22026.2	44.5235577	-73.1911476	COLCHESTER	189	74-1	steel culvert	3	19	STEEL CULVERT	1964	296	9	45	4.15	308	24.50	yes	yes	yes	yes	no	no	no		
15	69	short	446925.9	24921.1	44.6646298	-73.1946726	MILTON	189	82-10	steel culvert	3	19	ACGMP	1967	128	6	14	0.55	61	10.07	no	yes	no	no	no	no	no		
16	70	short	449473.6	24063.7	44.6641694	-73.1371295	MILTON	189	82-15	steel culvert	3	19	ACGMP	1967	130	6	14	0.55	61	10.07	no	yes	no	no	no	no	no		
17	74	short	452242	24470.8	44.7009948	-73.1026019	GEORGIA	189	85-1C	steel culvert	3	19	CGMP	1967	132	11	17	5.79	430	28.37	unknown	no	no	no	no	no	no		
18	87	short	444800.9	25198.64	44.6310075	-73.1925093	S. BURLINGTON	1189	02-1W	steel culvert	3	19	C.G.M.P.P	1962	206	8	19	1.14	156	15.88	no	yes	no	no	no	no	no		
19	102	short	502043.5	32212.4	43.1300595	-72.4748744	ROCKINGHAM	191	21-2	concrete culvert	1	19	R C BOX	1963	164	5	10	NG			no	no	no	no	no	no	no		
20	104	short	503712.9	37940.02	43.2117831	-72.4540238	ROCKINGHAM	191	24-3	steel culvert	3	19	CGMP	1965	330	6	44	0.76	157	11.61	no	yes	no	no	no	no	no		
21	113	short	506097.2	36399.51	43.3695955	-72.4326881	WEATHERSFIELD	191	29-6	steel culvert	3	19	CGMP	1965	454	9	37	1.88	253	17.29	no	no	no	no	no	no	no		
22	116	short	506875.4	33139.8	43.122026	-72.151991	WEATHERSFIELD	191	30-1	steel culvert	3	19	CGMP	1966	302	8	23	1.67	272	16.42	no	yes	no	no	no	no	no		
23	129	short	517789.5	136732.6	43.7306026	-72.7391917	NORWICH	191	49-3N	steel culvert	3	19	CGMP	1971	334	6	40	0.86	99.2	12.26	no	no	no	no	no	no	no		
24	141	short	526833.2	155274	43.8972097	-72.1660116	FAIRLEE	191	55-2	steel culvert	3	19	MULTI PLATE PIPE	1971	290	7	30	8.39	496	33.40	unknown	no	no	no	no	no	no		
25	142	short	527045.1	155415.6	43.8984765	-72.1639771	FAIRLEE	191	55-3	steel culvert	3	19	CGMP	1971	288	7	30	8.39	496	33.40	unknown	no	no	no	no	no	no		
26	145	short	520105.7	174956.1	44.008884	-72.1245177	BRADFORD	191	61-2	steel culvert	3	19	CGMP	1972	510	7	40	0.99	145	13.04	unknown	no	no	no	no	no	no		
27	165	short	538512.2	21028.8	44.3966678	-72.0165857	WATERFORD	191	80-2D	steel culvert	3	19	CGMP	1982	170	7	20	1.19	184	14.14	no	no	no	no	no	no	no		
28	167	short	537914.9	217887.8	44.4402258	-72.0235667	ST. JOHNSBURY	191	90-1N	steel culvert	3	19	CGMP	1975	212	7	28	0.77	104	11.68	unknown	no	no	no	no	no	no		
29	169	short	536636	230186.4	44.570969	-72.0992167	LINDON	191	96-3N	steel culvert	3	19	CGMP	1973	366	8	70	2.75	316	20.44	unknown	no	no	no	no	no	no		
30	170	short	536997.1	230060.8	44.5698194	-72.091811	LINDON	191	96-5	steel culvert	3	19	CGMP	1973	308	8	55	2.75	316	20.44	unknown	no	no	no	no	no	no		
31	176	short	529291.1	218050.3	44.6420714	-72.1307851	SHEFFIELD	191	1004	steel culvert	3	19	CGMP	1973	672	7	55	1.35	264	14.95	unknown	no	no	no	no	no	no		
32	184	short	522416.6	23395.1	44.7852623	-72.2151614	BARTON	191	1051N	steel culvert	3	19	A.C.C.G.M.P.	1972	182	6	25	0.71	113	11.27	unknown	no	no	no	no	no	no		
33	185	short	524715.3	23399.61	44.7851652	-72.2160499	BARTON	191	1055S	steel culvert	3	19	A.C.C.G.M.P.	1972	200	6	25	0.70	112	10.90	unknown	no	no	no	no	no	no		
34	194	short	525458.1	24820.5	44.8136081	-72.1778428	DERBY	191	1088S	steel culvert	3	19	MULTIPLATE PIPE ARCH	1979	<N/A>	120	15	10	1.24	195	14.40	unknown	yes	no	no	no	no		
35	196	short	530074.9	275871.6	44.9815607	-72.1148989	DERBY	191	112-2	steel culvert	3	19	MULTIPLATE PIPE	1962	1970	284	8	19	1.39	167	15.14	unknown	no	no	no	no	no		
36	206	short	542006.6	213954.5	44.4245328	-71.9574788	WATERFORD	193	6-3	concrete culvert	1	19	R C BOX	1982	224	7	14	6.98	538	50.80	unknown	no	no	no	no	no	no		
37	227	short	452741.2	214609.9	44.4049683	-73.0007996	WILLISTON	US2	38	steel culvert	3	19	C.G.M.P.P.A.	1917	1969	74	7	3	1.64	222	16.29	yes	no	no	no	no	no		
38	220	short	462275.6	211264	44.4006265	-72.973558	RICHMOND	US2	31	concrete culvert	1	19	R C BOX	1929	1974	78	6	8	0.82	123	12.00	no	no	no	no	no	no		
39	234	short	515281.6	206939.6	44.3625289	-72.3082929	CABOT	US2	84	timber culvert	7	19	TIMBER PENSTOCK	1923	999	6	9	NG			no	no	no	no	no	no	unknown		
40	248	short	546745.8	215856.9	44.4412527	-71.9127895	CONCORD	US2	113	concrete culvert	1	19	R C BOX	1933	100	8	12	2.34	290	19.04	unknown	no	no	no	no	no	no		
41	252	short	542542.6	218390.6	44.6230791	-71.8919327	LUNenburg	US2	120	BRIDGE	8	11	STONE ARCH	1917	19	12	2	10.50	904	36.86	unknown	no	no	no	no	no	no		
42	255	short	436868.1	122692.4	43.6017691	-73.2819333	FAIR HAVEN	US4	04-1	steel culvert	3	19	C.G.M.P.P.	1969	350	8	40	8.07	465	32.83	yes	no	no	no	no	no	no		
43	256	short	437114.1	123076.8	43.6025201	-73.2789334	FAIR HAVEN	US4	04-2	steel culvert	3	19	C.G.M.P.P.	1969	420	8	35	7.67	442	32.11	yes	no	no	no	no	no	no		
44	257	short	437116.3	122927.6	43.6024268	-73.2789334	FAIR HAVEN	US4	04-2E	steel culvert	3	19	C.G.M.P.P.	1969	424	8	25	7.69	443	32.14	yes	no	no	no	no	no	no		
45	258	short	437118.3	123244.8	43.6026762	-73.2789334	FAIR HAVEN	US4	04-2E	steel culvert	3	19	C.G.M.P.P.	1969	428	8	20	NG			no	no	no	no	no	no	<N/A>		
46	259	short	446512	124285	43.6168573	-73.1263555	CASTLETON	US4	12-1	concrete culvert	1	19	R.C. BOX	1968	205	15	15	13.60	1370	41.31	yes	no	no	no	no	no	no		
47	261	short	451339.5	123668.8	43.6134425	-73.1028133	IRA	US4	12-7E	steel culvert	3	19	A.C.C.G.M.P.	1968	108	6	9	0.63	128	10.69	no	no	no	no	no	no	no		

HOT List Current Status



**247 Culverts on the HOT List
(Culverts rated 5 or less in the BIS)**

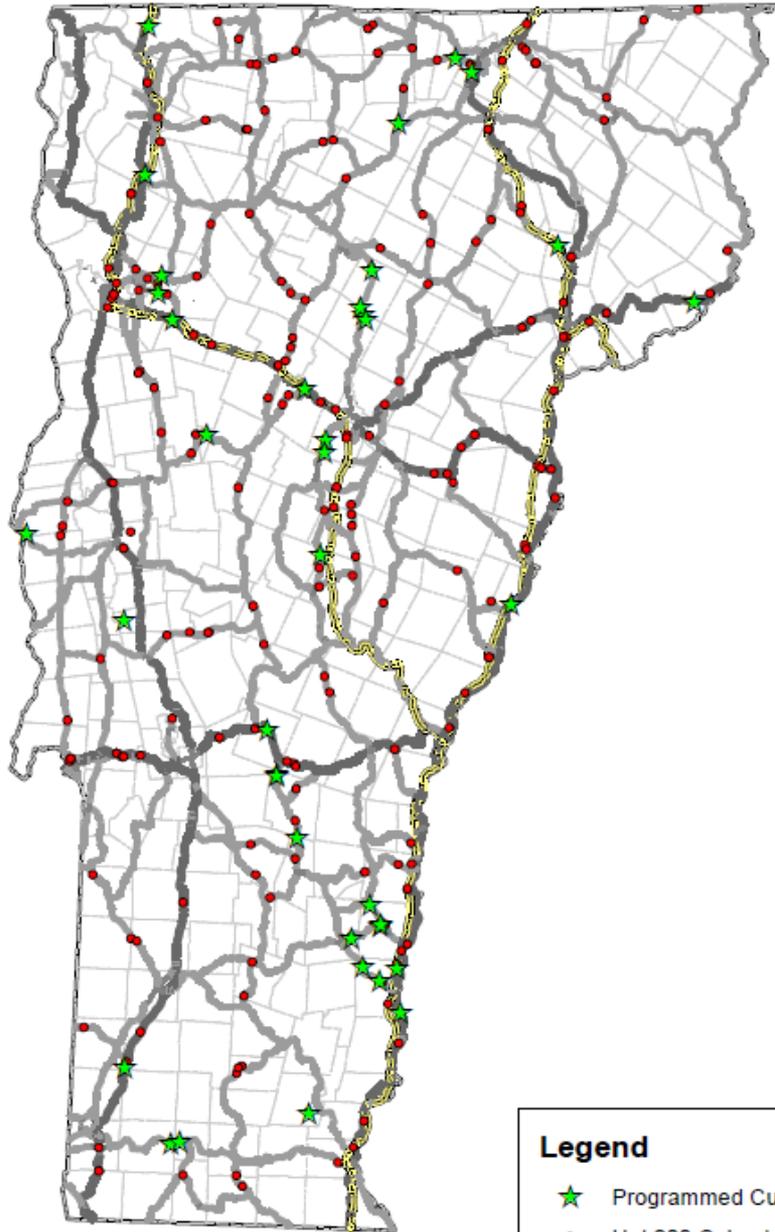
- 232 Shorts (6' to 20' span)
- 15 Longs (Greater than 20' span)

**42 Programmed Projects:
Resulting in the HOT 205**

Legend

- Hot 200 Culverts

Programmed Culverts



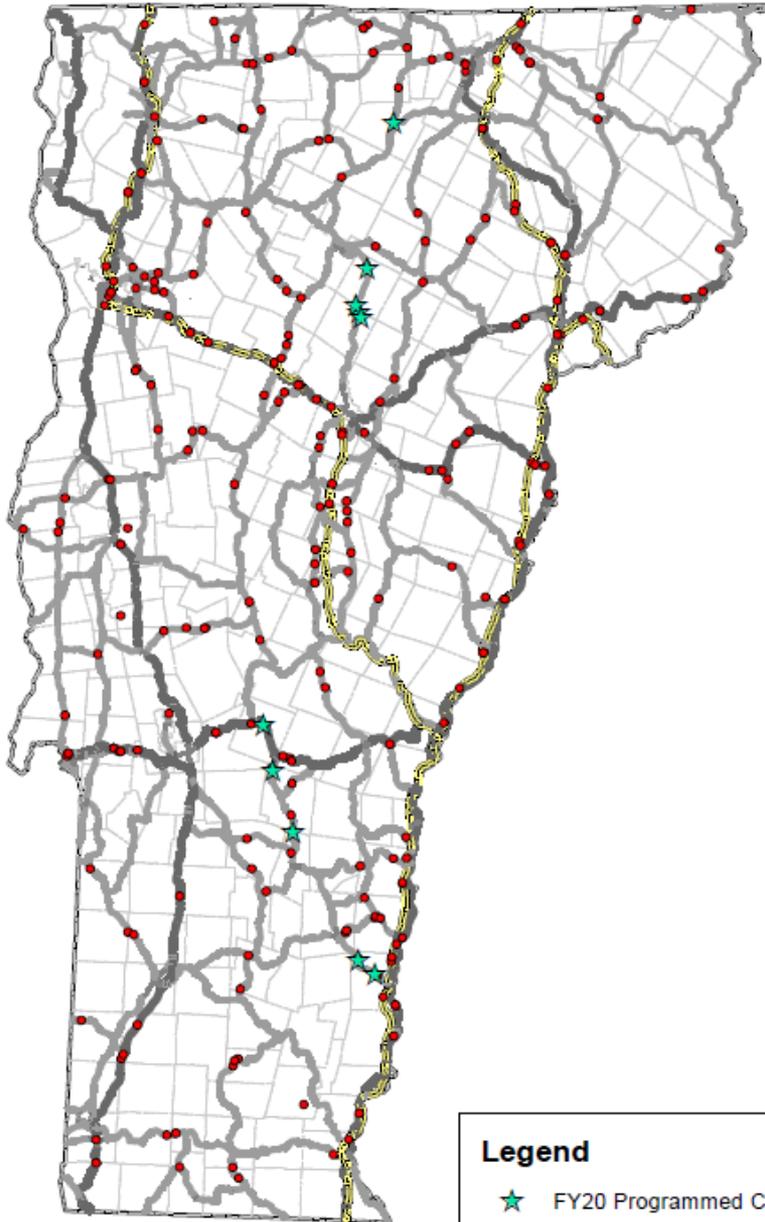
42 Culverts Programmed

- 24 Culvert from original HOT200 list
- 18 additional culverts identified with needs since development of HOT 200

Programmed Projects

- 7 culverts have been completed (not updated in BIS yet)
- 19 culverts in design
- 9 culverts in scoping
- 7 culverts in Pre-Construction

FY 2020 Programmed Culverts



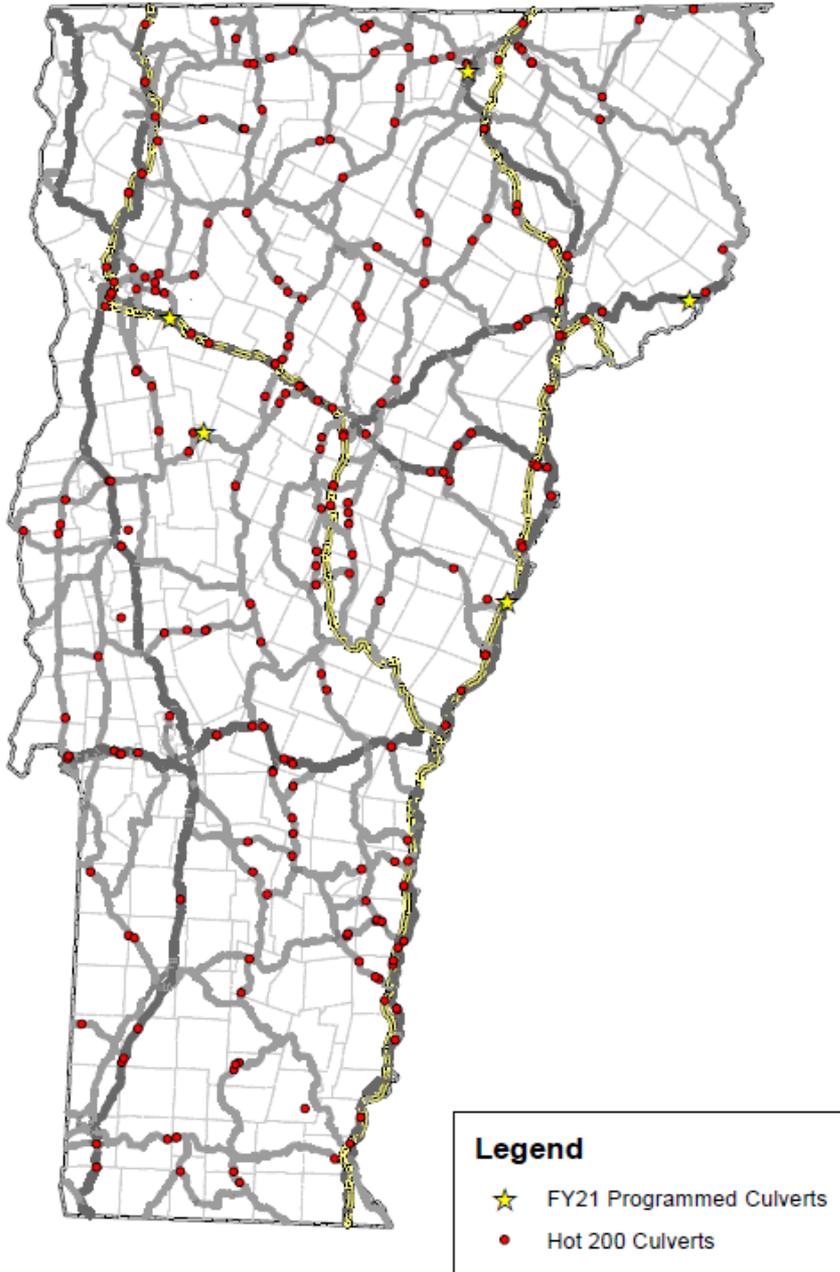
Legend

- ★ FY20 Programmed Culverts
- Hot 200 Culverts

10 Culverts Programmed in FY2020

- Out of 29 structures programmed in FY2020
 - 34% culverts
- Programmed based on condition and proximity to each other
 - All 10 culverts were identified on the "Hot 200" list

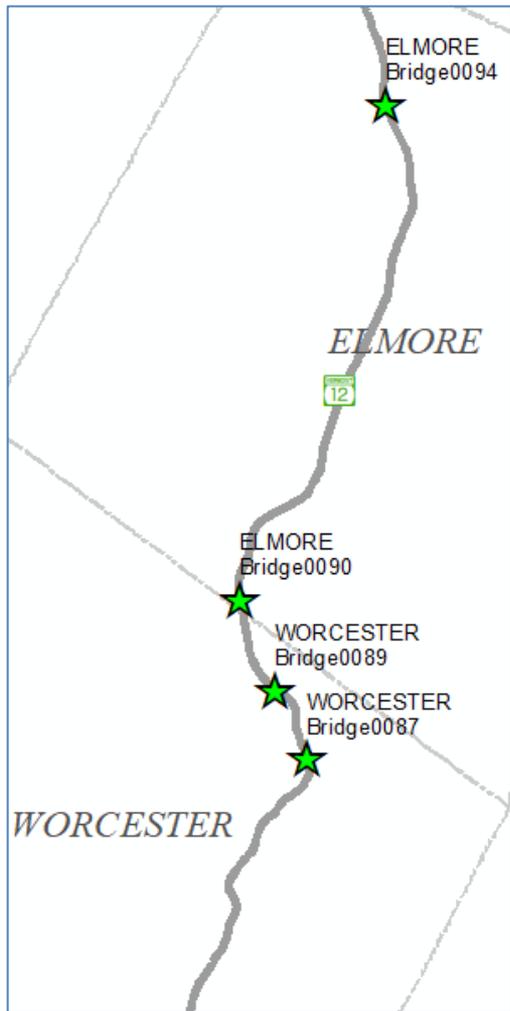
FY 2021 Programmed Culverts



5 Culverts Programmed in FY2021

- Out of 13 structures programmed in FY2021
 - 38% culverts
- Programmed based on condition
 - All 5 culverts were identified on the “Hot 200” list

Worcester-Elmore Bundle



WORCESTER BF 0241(56)

- Scope: Full Bridge Replacement with a 19-foot x 7-foot precast box
- Traffic Control: Temporary Bridge

WORCESTER BF 0241(57)

- Scope: Full Bridge Replacement with a Frame or Bridge
- Traffic Control: Temporary Bridge

ELMORE STP CULV(64)

- Scope: Full Bridge Replacement with a Bridge
- Traffic Control: Temporary Bridge

ELMORE BF 0241(55)

- Scope: Full Bridge Replacement with a 11-foot x 6-foot precast box
- Traffic Control: Temporary Bridge

PIN	Town	Project Number	Route	Bridge No	Features Intersected	Culvert Rating
19B213	WORCESTER	BF 0241(56)	VT-12	87	HARDWOOD BROOK	5
19B214	WORCESTER	BF 0241(57)	VT-12	89	NORTH BROOK	5
18B003	ELMORE	STP CULV(64)	VT-12	90	BROOK	3
19B212	ELMORE	BF 0241(55)	VT-12	94	BROOK	5

WORCESTER BF 0241(56) – VT Route 12 Bridge #87



Corrugated Galvanized Metal Plate Pipe Arch (CGMPPA)

- Culvert Span: 14 feet
- Culvert Length: 96 feet
- Fill Over Culvert: 6 feet
- Year Built: 1961

WORCESTER BF 0241(57) – VT Route 12 Bridge #89



Corrugated Galvanized Metal Plate Pipe (CGMPP)

- Culvert Span: 15 feet
- Culvert Length: 172 feet
- Fill Over Culvert: 3 feet
- Year Built: 1964

ELMORE STP CULV(64) – VT Route 12 Bridge #90



Corrugated Galvanized Metal Plate Pipe (CGMPP)

- Culvert Span: 6 feet
- Culvert Length: 208 feet
- Fill Over Culvert: 18 feet
- Year Built: 1964

ELMORE BF 0241(55) – VT Route 12 Bridge #94



Aluminum Coated Corrugated Galvanized Metal Plate Pipe (ACCGMPP)

- Culvert Span: 6 feet
- Culvert Length: 74 feet
- Fill Over Culvert: 10 feet
- Year Built: 1959

Completed Projects



I-89 in Georgia

Completed Projects



I-89 SB Off Ramp in Georgia

Summary

- 50% of structures greater than 6-feet on the State and Interstate system are culverts
 - These structures are often not priorities on a regional level due to lack of knowledge of their existence
- There are 205 culvert needs based on condition
 - There are additional needs based on substandard hydraulics and ANR requirements

Questions?

