

VT Center for Geographic Information

VT Building Footprints Geospatial Data Standard

Version 1.0

Updates

Date	Notes
April 28, 2020	Version 0.1, first draft
September 8, 2020	Version 0.2, second draft
December 7, 2020	Version 0.3, release for public comment
January 26, 2021	Version 0.4, edit based on public feedback
January 29, 2021	Version 0.5, edits based on input from Committee and Data Steward
DDMMYYYY	Version 1.0, final approved by Vermont’s Enterprise GIS Consortium (EGC)

Acknowledgements

The Vermont Center for Geographic Information (VCGI) would like to thank the EGC’s “Building Footprints Workgroup” for their efforts drafting this standard, with special thanks to Tyler Hermanson (E911), Jeff Nugent (WRC), Ivan Brown (VCGI), and Steve Sharp (VCGI).

Statutory Authority and Standard Review/Approval

The Vermont Center for Geographic Information (VCGI) has the statutory authority¹ to craft and adopt VT GIS standards and guidelines. Over the past two decades, VCGI has worked with the VT GIS community to carefully craft these standards and guidelines, helping to make sure that Vermont GIS data “is compatible with, useful to” others in the VT GIS community.

The State’s Enterprise GIS Consortium (EGC) has been established as the organization responsible for reviewing and approving Vermont GIS standards crafted by VCGI (in collaboration with the Vermont GIS Community).

¹ <http://legislature.vermont.gov/statutes/fullchapter/10/008>

Applicability

This standard applies to Vermont’s master building footprints geospatial dataset as managed by the defined Data Steward.

Objectives

- Define a data standard that supports use of data which models building footprints in multiple contexts; contexts include emergency management, planning, and analysis. *NOTE: This standard and the associated statewide building footprints dataset is NOT intended for uses such as property assessment and site engineering.*
- Define a data standard that supports a workflow which merges best-available building-footprint data from multiple sources into a single dataset stewarded by VT Enhanced 911 Board; sources include local governments, RPCs (regional planning commissions), lidar, aerial imagery, and the public domain.
- Define a data standard that supports availability of high-quality building footprint data—in terms of shape integrity and attribute integrity.

Terminology

- **Building footprints²** means data features that model extents and shapes of buildings as 2D top-down representations.
- **STRUCTURES_POLY** references the name of the feature class containing the building footprint polygons.

Data Steward

The Vermont Enhanced 911 Board (E911) is the designated steward of Vermont’s statewide building footprints geospatial data.

Specifications

Spatial Reference

The **building footprints** dataset will be managed in Vermont’s Coordinate System³.

Shape Integrity

Ideally, unless a building has a non-rectilinear perimeter or a non-orthogonal exterior corner, it is modeled with orthogonal polygons—all angles are 90-degrees. Some source-data features—depending on the method by which they are produced, might not have such shape integrity; in such cases, a determination must be made on whether to use the feature as-is (better to have a building footprint represented than not represented), to modify the feature, or use a different data-source. Building footprints will be represented as 2D polygons.

Floors and Units

As a rule, separate polygons will NOT be created to represent different units and/or floors within a building structure. However, the Data Steward (E911) has the option to do so on an as-needed basis.

Primary Key Management

² Building “footprints” in most cases actually represent “roofprints” since there is no reliable way of determining the actual foundation footprint of a building from an aerial image (the primary data source).

³ <https://vcgi.vermont.gov/document/map-coordinate-system>

Definition: The POLY_ID field is the primary key field for the STRUCTURE_POLY feature class. It is a stable and unique sequential statewide identifier (integer) assigned and maintained by the Data Steward (E911). The Data Steward will make every attempt to maintain this as a stable ID for others to use when joining data (see *Lookup Tables* section below).

When to change the POLY_ID? a structure polygon and its corresponding POLY_ID must be archived and replaced when it meets one of two conditions defined below:

1. **Change in footprint area \geq 50%:** When visual assessment of an existing structure polygon vs. the orthophoto for the year of update review indicates a change in footprint/footprint area of the structure greater than or equal to 50%. This is true whether the change is the result of a teardown/rebuild or the existing structure has undergone a significant addition or subtraction.
 - **ACTION:** Archive existing structure polygon, replace with new, and assign a new POLY_ID.

2. **Significant change in building shape:** When visual assessment of an existing structure polygon vs. the orthophoto for the year of update review indicates a change in footprint/footprint whereby the configuration is significantly different, regardless of area differences. This is most typical of a teardown/rebuild scenario and often is associated with larger structures. (eg: a new school built in the same location as an old one and the total areas are similar, but the new one has a courtyard that results in a doughnut polygon. Or an old rectangular warehouse torn down and replaced by a residential complex in a “plus-sign” configuration of wings with total similar floor area that would not trigger the 50% difference threshold.)
 - **ACTION:** Archive existing structure polygon, replace with new, and assign a new POLY_ID.

If a teardown/rebuild results in a replacement structure that has a footprint/roofprint not appreciably different than the original structure per the criteria listed above, the structure polygon is not edited and its POLY_ID remains intact. This can happen if a single-floor single family house adds a second floor within the outline extent of the first floor. Also disregard differences of observed building lean where the angle of observation in the orthophoto can change between orthophoto vintages, but the building itself is unchanged.

Lookup Tables

Users of the statewide building footprints (structures) dataset can create lookup tables with additional attributes of interest to them and their organizations. For example, a lookup table could include anything of value such as year constructed, historical survey number, etc. All lookup tables should contain at a minimum the POLY_ID field to enable a proper link to the STRUCTURE_POLY feature class.

Data Schema

STRUCTURES_POLY Feature Class

Field Name	Description	Field Type	Allowed Values
GlobalID	Esri software (auto generated). <i>NOT FOR USE AS A PRIMARY KEY FOR LOOKUP TABLES</i>	GUID	Globally unique values automatically generated by Esri software.
POLY_ID (<i>primary key</i>)	A stable statewide unique identifier assigned by Data Steward (E911).	Long Integer	Sequential unique identifier See the “Primary Key Management” section of this standard for details. See the “Lookup Tables” section for details on how to link/join data.
POLY_TYPE	What the polygon represents.	Text, 10	Domain [<i>ROOFPRINT</i> , <i>FOOTPRINT</i>] ROOFPRINT = Outline of building “roof” as seen from the air. FOOTPRINT = Outline of building where exterior walls meet the ground and/or top of foundation/piers.
SITETYPE	Building site classification	Text, 60	Same domain set as E911’s ESITE “SITETYPE” field. See Appendix A
BLDG_NOTES	Free text field for miscellaneous notes about the building.	Text, 150	Used for keeping miscellaneous notes about the building that may be of value to E911 call takers and others. <i>See UPDATENOTES for notes regarding polygon feature edits.</i>
NAME_LBL	String to use when wanting to place a “name” label on the map/display for this polygon.	Text, 150	Examples: “University Mall” “State Capital”
ADDR_LBL	String to use when wanting to place a “address range or list” label on the map/display for this polygon.	Text, 100	Examples: Single – “133” List - “389&393&422” Range – “5-12”

PRIMARYADD	Primary address of the building footprint.	Text, 50	Full address of the building footprint.
SRC_ORIG	Original source of polygon; for long-term lineage tracking. <i>ONCE POPULATED, THE VALUES IN THIS FIELD NEVER CHANGE EVEN WHEN EDITS ARE MADE (unless the feature is “archived” per the Primary Key Management guidelines)</i>	Text, 25	Domain [2016HIGHRESLC, E911, BING, RPC, MUNI, UNKNOWN]
SRC_DATE	Date (YYYYMMDD) of source data used to initially create <u>OR</u> update the structure polygon.	Long integer	The eight-digit format is to allow for more accurately recording the date as local datasets and as newer imagery are used to update the statewide data. Should change whenever polygon is edited/modified based on difference source information. Examples: "20110000" if only year is known, “20110900” if year and month are known, “20110902” if year-month-day are known.
SRC_DATA	Source imagery/data used to derive polygon (if known)	Text, 50	Domain [VTORTHO<YEAR>, NAIP<YEAR>, OTHERORTHO<YEAR> SITEPLAN, UNKNOWN] Examples: VTORTHO2014, NAIP2016, OTHERORTHO2021
SRC_NOTES	Used to store additional details about the source data used to create or modify the polygon.	Text, 100	
TOWNGEOID	Town (Minor Civil Division) code – VT	Long Integer	See VT Geographic Area Codes Standard

	Geographic Area Codes Standard		
MCODE	Municipal Code of “E911 town/jurisdiction” in which the building footprint is located.	Short Integer	E911’s Municipal coding schema [see Appendix B]
E911TOWN	Name of “E911 town/jurisdiction” in which the building footprint is located.	Text, 50	E911’s Municipal naming schema [see Appendix B]
COUNTY	County in which building footprint is located.	Text, 20	See VT Geographic Area Codes Standard
STATE	State or Province in which building footprint is located.	Text, 2	
HEIGHTFT	Height of the roof’s highest point (FEET)	Long Integer	Rounded to the nearest foot.
UPDATEDATE	Last edit/update date.	Date	
UPDATESOURCE	Who made last edit/update(s)	String, 25	
UPDATENOTES	Edit/update notes	String, 100	

Appendix A – SITETYPE Domain Values

SITETYPE
ABANDONED
ACCESS POINT
ACCESSORY BARN
ACCESSORY BUILDING
AIR SUPPORT / MAINTENANCE FACILITY
AIRPORT TERMINAL
AMBULANCE SERVICE
AUDITORIUM / CONCERT HALL / THEATER / OPERA HOUSE
BANK
BOAT RAMP / DOCK
BORDER CROSSING
BORDER PATROL
BREWERY
BUS STATION / DISPATCH FACILITY
CAMP
CAMPGROUND
CEMETERY
CITY / TOWN HALL
COAST GUARD
COLLEGE / UNIVERSITY
COMMERCIAL
COMMERCIAL CONSTRUCTION SERVICE
COMMERCIAL FARM
COMMERCIAL GARAGE
COMMERCIAL W/RESIDENCE
COMMUNICATION BOX
COMMUNICATION TOWER
COMMUNITY / RECREATION FACILITY
CONDOMINIUM

SITETYPE
COURT HOUSE
CULTURAL
DAY CARE FACILITY
DEVELOPMENT SITE
EBS TOWER
EDUCATIONAL
EMERGENCY PHONE / CALLBOX
FAIR / EXHIBITION/ RODEO GROUNDS
FIRE STATION
FISH FARM / HATCHERY
FITNESS FACILITY
FOOD DISTRIBUTION CENTER
GAS STATION
GATED W/BUILDING
GATED W/O BUILDING
GOLF COURSE
GOVERNMENT
GRAVEL PIT / QUARRY / MINE
GREENHOUSE / NURSERY
GROCERY STORE
HARBOR / MARINA
HAZARDOUS MATERIALS FACILITY
HAZARDOUS STORAGE FACILITY
HEALTH CLINIC
HELIPAD / HELIPORT / HELISPOT
HISTORIC SITE / POINT OF INTEREST
HOSPITAL / MEDICAL CENTER
HOUSE OF WORSHIP
HYDROELECTRIC FACILITY
ICE ARENA
INDUSTRIAL

SITETYPE
INSTITUTIONAL RESIDENCE / DORM / BARRACKS
LANDFILL
LAW ENFORCEMENT
LIBRARY
LODGING B&B / HOTEL / MOTEL / INN
LOOKOUT TOWER
LUMBER MILL / SAW MILL
MANUFACTURING FACILITY
MOBILE HOME
MORGUE
MULTI-FAMILY DWELLING
MUSEUM
NATIONAL GUARD / ARMORY
NURSING HOME / LONG TERM CARE
OFFICE BUILDING
OIL / GAS FACILITY
OTHER
OTHER COMMERCIAL
OTHER RESIDENTIAL
OUTPATIENT CLINIC
PARK AND RIDE / COMMUTER LOT
PHARMACY
PICNIC AREA
POST OFFICE
PRISON / CORRECTIONAL FACILITY
PRIVATE AND EXPRESS SHIPPING FACILITY
PSAP
PUBLIC BEACH
PUBLIC GATHERING
PUBLIC TELEPHONE
PUBLIC WATER SUPPLY INTAKE

SITETYPE
PUBLIC WATER SUPPLY WELL
PUMP STATION
RACE TRACK / DRAGSTRIP
RAILROAD STATION
RESIDENTIAL FARM
REST STOP / ROADSIDE PARK
RESTAURANT
RETAIL FACILITY
RV HOOKUP
SCHOOL K / 12
SEASONAL HOME
SHOOTING RANGE
SINGLE FAMILY DWELLING
SKI AREA / ALPINE RESORT
SOLAR FACILITY
SPORTS ARENA / STADIUM
STATE CAPITOL
STATE GARAGE
STATE GOVERNMENT FACILITY
STATE PARK
STORAGE UNITS
SUBSTATION
SUGARHOUSE
TEMPORARY STRUCTURE
TOWN GARAGE
TOWN OFFICE
TRAILHEAD
TRANSFER STATION
UNKNOWN
US FOREST FACILITY
US GOVERNMENT FACILITY

SITETYPE
UTILITY
UTILITY POLE W/PHONE
VETERINARY HOSPITAL / CLINIC
VISITOR / INFORMATION CENTER
WAREHOUSE
WASTE / BIOMASS FACILITY
WASTEWATER TREATMENT PLANT
WATER TANK
WATER TOWER
WIND FACILITY / WIND TOWER
YOUTH CAMP

Appendix B – MCODE and E911 TOWNNAME Domain

MCODE	TOWNNAME	COUNTY
500	ADDISON	ADDISON
501	ALBANY	ORLEANS
502	ALBURGH	GRAND ISLE
503	ANDOVER	WINDSOR
504	ARLINGTON	BENNINGTON
505	ATHENS	WINDHAM
506	BAKERSFIELD	FRANKLIN
507	BALTIMORE	WINDSOR
508	BARNARD	WINDSOR
509	BARNET	CALEDONIA
510	BARRE CITY	WASHINGTON
511	BARRE TOWN	WASHINGTON
512	BARTON	ORLEANS
513	BELVIDERE	LAMOILLE
514	BENNINGTON	BENNINGTON
515	BENSON	RUTLAND
516	BERKSHIRE	FRANKLIN
517	BERLIN	WASHINGTON
518	BETHEL	WINDSOR
519	BLOOMFIELD	ESSEX
520	BOLTON	CHITTENDEN
521	BRADFORD	ORANGE
522	BRAINTREE	ORANGE
523	BRANDON	RUTLAND
524	BRATTLEBORO	WINDHAM
525	BRIDGEWATER	WINDSOR
526	BRIDPORT	ADDISON
527	BRIGHTON	ESSEX

MCODE	TOWNNAME	COUNTY
528	BRISTOL	ADDISON
529	BROOKFIELD	ORANGE
530	BROOKLINE	WINDHAM
531	BROWNINGTON	ORLEANS
532	BRUNSWICK	ESSEX
533	BUELS GORE	CHITTENDEN
534	BURKE	CALEDONIA
535	BURLINGTON	CHITTENDEN
536	CABOT	WASHINGTON
537	CALAIS	WASHINGTON
538	CAMBRIDGE	LAMOILLE
539	CANAAN	ESSEX
540	CASTLETON	RUTLAND
541	CAVENDISH	WINDSOR
542	CHARLESTON	ORLEANS
543	CHARLOTTE	CHITTENDEN
544	CHELSEA	ORANGE
545	CHESTER	WINDSOR
546	CHITTENDEN	RUTLAND
547	CLARENDON	RUTLAND
548	COLCHESTER	CHITTENDEN
549	CONCORD	ESSEX
550	CORINTH	ORANGE
551	CORNWALL	ADDISON
552	COVENTRY	ORLEANS
553	CRAFTSBURY	ORLEANS
554	DANBY	RUTLAND
555	DANVILLE	CALEDONIA
556	DERBY	ORLEANS
557	DORSET	BENNINGTON

MCODE	TOWNNAME	COUNTY
558	DOVER	WINDHAM
559	DUMMERSTON	WINDHAM
560	DUXBURY	WASHINGTON
561	EAST HAVEN	ESSEX
562	EAST MONTPELIER	WASHINGTON
563	EDEN	LAMOILLE
564	ELMORE	LAMOILLE
565	ENOSBURGH	FRANKLIN
566	ESSEX TOWN	CHITTENDEN
567	FAIR HAVEN	RUTLAND
568	FAIRFAX	FRANKLIN
569	FAIRFIELD	FRANKLIN
570	FAIRLEE	ORANGE
571	FAYSTON	WASHINGTON
572	FERRISBURGH	ADDISON
573	FLETCHER	FRANKLIN
574	FRANKLIN	FRANKLIN
575	GEORGIA	FRANKLIN
576	GLASTENBURY	BENNINGTON
577	GLOVER	ORLEANS
578	GOSHEN	ADDISON
579	AVERILL	ESSEX
580	GRAFTON	WINDHAM
581	GRANBY	ESSEX
582	GRAND ISLE	GRAND ISLE
583	GRANVILLE	ADDISON
584	GREENSBORO	ORLEANS
585	GROTON	CALEDONIA
586	GUILDHALL	ESSEX
587	GUILFORD	WINDHAM

MCODE	TOWNNAME	COUNTY
588	HALIFAX	WINDHAM
589	HANCOCK	ADDISON
590	HARDWICK	CALEDONIA
591	HARTFORD	WINDSOR
592	HARTLAND	WINDSOR
593	HIGHGATE	FRANKLIN
594	HINESBURG	CHITTENDEN
595	HOLLAND	ORLEANS
596	HUBBARDTON	RUTLAND
597	HUNTINGTON	CHITTENDEN
598	HYDE PARK	LAMOILLE
599	IRA	RUTLAND
600	IRASBURG	ORLEANS
601	ISLE LA MOTTE	GRAND ISLE
602	JAMAICA	WINDHAM
603	JAY	ORLEANS
604	JERICO	CHITTENDEN
605	JOHNSON	LAMOILLE
606	KIRBY	CALEDONIA
607	LANDGROVE	BENNINGTON
608	LEICESTER	ADDISON
609	LEMINGTON	ESSEX
610	LINCOLN	ADDISON
611	LONDONDERRY	WINDHAM
612	LOWELL	ORLEANS
613	LUDLOW	WINDSOR
614	LUNENBURG	ESSEX
615	LYNDON	CALEDONIA
616	MAIDSTONE	ESSEX
617	MANCHESTER	BENNINGTON

MCODE	TOWNNAME	COUNTY
618	MARLBORO	WINDHAM
619	MARSHFIELD	WASHINGTON
620	MENDON	RUTLAND
621	MIDDLEBURY	ADDISON
622	MIDDLESEX	WASHINGTON
623	MIDDLETOWN SPRINGS	RUTLAND
624	MILTON	CHITTENDEN
625	MONKTON	ADDISON
626	MONTGOMERY	FRANKLIN
627	MONTPELIER	WASHINGTON
628	MORETOWN	WASHINGTON
629	MORGAN	ORLEANS
630	MORRISTOWN	LAMOILLE
631	MOUNT HOLLY	RUTLAND
632	MOUNT TABOR	RUTLAND
633	NEW HAVEN	ADDISON
634	NEWARK	CALEDONIA
635	NEWBURY	ORANGE
636	NEWFANE	WINDHAM
637	NEWPORT CITY	ORLEANS
638	NEWPORT TOWN	ORLEANS
639	NORTH HERO	GRAND ISLE
640	NORTHFIELD	WASHINGTON
641	NORTON	ESSEX
642	NORWICH	WINDSOR
643	ORANGE	ORANGE
644	ORWELL	ADDISON
645	PANTON	ADDISON
646	PAWLET	RUTLAND
647	PEACHAM	CALEDONIA

MCODE	TOWNNAME	COUNTY
648	PERU	BENNINGTON
649	PITTSFIELD	RUTLAND
650	PITTSFORD	RUTLAND
651	PLAINFIELD	WASHINGTON
652	PLYMOUTH	WINDSOR
653	POMFRET	WINDSOR
654	POULTNEY	RUTLAND
655	POWNAI	BENNINGTON
656	PROCTOR	RUTLAND
657	PUTNEY	WINDHAM
658	RANDOLPH	ORANGE
659	READING	WINDSOR
660	READSBORO	BENNINGTON
661	RICHFORD	FRANKLIN
662	RICHMOND	CHITTENDEN
663	RIPTON	ADDISON
664	ROCHESTER	WINDSOR
665	ROCKINGHAM	WINDHAM
666	ROXBURY	WASHINGTON
667	ROYALTON	WINDSOR
668	RUPERT	BENNINGTON
669	RUTLAND CITY	RUTLAND
670	RUTLAND TOWN	RUTLAND
671	RYEGATE	CALEDONIA
672	SALISBURY	ADDISON
673	SANDGATE	BENNINGTON
674	SEARSBURG	BENNINGTON
675	SHAFTSBURY	BENNINGTON
676	SHARON	WINDSOR
677	SHEFFIELD	CALEDONIA

MCODE	TOWNNAME	COUNTY
678	SHELBURNE	CHITTENDEN
679	SHELDON	FRANKLIN
680	KILLINGTON	RUTLAND
681	SHOREHAM	ADDISON
682	SHREWSBURY	RUTLAND
683	SOMERSET	WINDHAM
684	SOUTH BURLINGTON	CHITTENDEN
685	SOUTH HERO	GRAND ISLE
686	SPRINGFIELD	WINDSOR
687	SAINT ALBANS CITY	FRANKLIN
688	SAINT ALBANS TOWN	FRANKLIN
689	SAINT GEORGE	CHITTENDEN
690	SAINT JOHNSBURY	CALEDONIA
691	STAMFORD	BENNINGTON
692	STANNARD	CALEDONIA
693	STARKSBORO	ADDISON
694	STOCKBRIDGE	WINDSOR
695	STOWE	LAMOILLE
696	STRAFFORD	ORANGE
697	STRATTON	WINDHAM
698	SUDBURY	RUTLAND
699	SUNDERLAND	BENNINGTON
700	SUTTON	CALEDONIA
701	SWANTON	FRANKLIN
702	THETFORD	ORANGE
703	TINMOUTH	RUTLAND
704	TOPSHAM	ORANGE
705	TOWNSHEND	WINDHAM
706	TROY	ORLEANS
707	TUNBRIDGE	ORANGE

MCODE	TOWNNAME	COUNTY
708	UNDERHILL	CHITTENDEN
709	VERGENNES	ADDISON
710	VERNON	WINDHAM
711	VERSHIRE	ORANGE
712	VICTORY	ESSEX
713	WAITSFIELD	WASHINGTON
714	WALDEN	CALEDONIA
715	WALLINGFORD	RUTLAND
716	WALTHAM	ADDISON
717	WARDSBORO	WINDHAM
718	WARREN	WASHINGTON
719	WASHINGTON	ORANGE
720	WATERBURY	WASHINGTON
721	WATERFORD	CALEDONIA
722	WATERVILLE	LAMOILLE
723	WEATHERSFIELD	WINDSOR
724	WELLS	RUTLAND
725	WEST FAIRLEE	ORANGE
726	WEST HAVEN	RUTLAND
727	WEST RUTLAND	RUTLAND
728	WEST WINDSOR	WINDSOR
729	WESTFIELD	ORLEANS
730	WESTFORD	CHITTENDEN
731	WESTMINSTER	WINDHAM
732	WESTMORE	ORLEANS
733	WESTON	WINDSOR
734	WEYBRIDGE	ADDISON
735	WHEELOCK	CALEDONIA
736	WHITING	ADDISON
737	WHITINGHAM	WINDHAM

MCODE	TOWNNAME	COUNTY
738	WILLIAMSTOWN	ORANGE
739	WILLISTON	CHITTENDEN
740	WILMINGTON	WINDHAM
741	WINDHAM	WINDHAM
742	WINDSOR	WINDSOR
743	WINHALL	BENNINGTON
744	WINOOSKI	CHITTENDEN
745	WOLCOTT	LAMOILLE
746	WOODBURY	WASHINGTON
747	WOODFORD	BENNINGTON
748	WOODSTOCK	WINDSOR
749	WORCESTER	WASHINGTON
750	NORTH BENNINGTON	BENNINGTON
751	AVERYS GORE	ESSEX
752	FERDINAND	ESSEX
753	LEWIS	ESSEX
754	WARNERS GRANT	ESSEX
755	WARRENS GORE	ESSEX
756	ORLEANS	ORLEANS
757	WEST PAWLET	RUTLAND
758	SAXTONS RIVER	WINDHAM
759	BELLOWS FALLS	WINDHAM
760	ESSEX JUNCTION VILLAGE	CHITTENDEN