

1-1-2011

Barn Adaptation: A Proposal To Protect Rural Architecture

Ashley D. Stewart
Ryerson University

Follow this and additional works at: <http://digitalcommons.ryerson.ca/dissertations>



Part of the [Architecture Commons](#)

Recommended Citation

Stewart, Ashley D., "Barn Adaptation: A Proposal To Protect Rural Architecture" (2011). *Theses and dissertations*. Paper 1757.

This Thesis is brought to you for free and open access by Digital Commons @ Ryerson. It has been accepted for inclusion in Theses and dissertations by an authorized administrator of Digital Commons @ Ryerson. For more information, please contact bcameron@ryerson.ca.

Barn Adaptation

A Proposal To Protect Rural Architecture

by

Ashley Dianne Stewart

BArchSc, Ryerson University, June 2009

a design thesis project

presented to Ryerson University

in partial fulfillment of the

requirements for the degree of

Master of Architecture
in the Program of Architecture

Toronto, Ontario, Canada, 2011

© Ashley Dianne Stewart 2011

author's declaration

I hereby declare that I am the sole author of this Thesis Project.
I authorize Ryerson University to lend this Thesis Project to other institutions or individuals for the purpose of scholarly research.

Ashley D. Stewart

I further authorize Ryerson University to reproduce this Thesis Project by photocopying or by other means, in total or in part, at the request of other institutions or individuals for the purpose of scholarly research.

Ashley D. Stewart

abstract

barn adaptation: a proposal to protect rural architecture
ashley stewart
master of architecture (MArch)
ryerson university
2011

The countryside that surrounds the Greater Toronto Area possesses a significant amount of Canada's prime farmland. However, to accommodate urban growth, this precious resource is being converted to provide urban developments.

The area of interest for this thesis is the rural-urban fringe, a zone of transition between working farms, rural communities and urban residential developments. The developments that are built in this area illustrate a common development approach, the elimination of all obstacles, including farmland and rural architecture.

This thesis introduces the concept of an alternative approach for suburban development, one that presents a compromise between rural and urban needs. At the heart of this concept is the design project, the adaptive reuse of a barn that serves as a tool to communicate the unique qualities of these monumental buildings. It also identifies the need to rethink suburban development approaches to include the preservation of rural architecture and prime farmland.

acknowledgments

I would like to thank my thesis advisor, June Komisar, for her insight, constant encouragement and patience. Her belief in me and this project has helped me grow into a stronger designer and I will forever be grateful.

Thank you to Ted Katsoris, my mentor. Your advice and guidance has truly inspired me.

I owe the success of this project to Joseph Gray. Thank you for taking the time to tell me your story and for introducing me to your family farm. I hope this makes you proud and in some way carries on the legacy of Grayhaven Farms.

To the Sheard family, thank you for welcoming me into your home and taking the time from your busy farming lives to provide your perspective on agriculture and the pressures and issues farmers currently face. Thank you to Mr. Bill Woodill for our interesting conversation about current farm issues and practices, and its contribution to my research.

I am indebted to Denny Duong, without whom I would not have been able to complete this thesis. Your continuous love, support and understanding has meant the world to me.

Finally, I thank my family, especially my parents for their unconditional support throughout the years, especially when it was from the other end of the telephone. Thank you.

dedication

To all the farm families whose farmsteads have been lost as if they had never existed at all.

To myself to recognize that I followed through on a thesis topic that is close to my heart when everything seemed to be against it.

table of contents

01	introduction	
1.1	introduction	1
1.2	problem statement	3
1.3	thesis statement	5
1.4	research questions	7
1.5	literature review	9
1.5.1	the rural-urban fringe	9
1.5.2	urbanization	10
1.5.3	canada land use	10
1.5.4	rural conservation and adaptive reuse	11
1.5.5	precedents	11
1.6	thesis structure	13
02	urban sprawl	
2.1	history of urban sprawl in the greater toronto area	17
2.2	loss of rural architecture	21
03	preservation	
3.1	farmland preservation	25
3.2	perspectives on farmland preservation	29
3.3	benefits of farmland preservation	33
3.4	farmland preservation precedents	37
3.4.1	ontario	37
3.4.2	british columbia	39
3.5	legislation	43
3.5.1	ontario planning act, 1990	43
3.5.2	provincial policy statement, 2005	43
3.5.3	greenbelt act, 2005	45
3.5.4	oak ridges moraine conservation act, 2001	45
3.5.5	niagara escarpment planning and development act, 1973	46
3.5.6	places to grow act, 2006	46
3.5.7	growth plan for the greater golden horseshoe, 2006	46
3.5.8	greater toronto area agricultural action plan	47
3.5.9	ontario farmland trust	47
3.6	significance of rural architecture	49
3.7	why preserve rural architecture	53
3.8	legislation for building preservation	55
04	perspectives	
4.1	introduction	61
4.1.1	the farmer	61
4.1.2	the developer	62
4.1.3	the architect	63

4.1.4	the planner	63
4.1.5	the city	64
4.1.6	the legislation	64
4.1.7	the new resident	75
4.1.8	the rural resident	75
05	precedents	
5.1	urban growth	69
5.1.1	portland, oregon	69
5.1.2	waterloo, ontario	71
5.2	planning design	73
5.2.1	garden city	73
5.2.2	conventional suburban development	75
5.2.3	village centre concept	76
5.2.4	new urbanism	79
5.3	agriculture communities	81
5.3.1	prairie crossing	81
5.3.2	troy gardens	85
5.4	adaptation	87
5.4.1	haley barn	87
5.4.2	slaymaker barn	89
5.4.3	cruser barn	89
5.4.4	moritzburg museum extension	93
5.4.5	piz tschutta	95
5.4.6	selexyz dominican bookstore	97
06	design direction	
6.1	design position and proposal	101
6.2	site selection and analysis	103
07	design project	
7.1	the design	125
7.2	a broader context	1262
08	conclusion	
8.1	summary	172
	appendices	173
	bibliography	269

list of illustrations

XIX	0.0.0	barn boards source: www.cgtextures.com	44	3.5.3	the ontario greenbelt source: Cheng & Lee, 2008, p.8
XXI	1.0.0	barn boards source: www.cgtextures.com	46	3.5.4	growth plan for the greater golden horseshoe source: www.placestogrow.ca
15	2.0.0	barn boards source: www.cgtextures.com	47	3.5.5	ontario farmland trust logo source: www.ontariofarmlandtrust.ca
16	2.1.1	urban sprawl source: www.davidsuzuki.org	48	3.6.1	20th century barn with addition source: pt.wikipedia.org
17	2.1.2	growth of toronto 1843-1953 source: Hodge, 1989, p.53	49	3.6.2	photo of farmstead source: sukanenmuseum.ca
19	2.1.3	zones of suburbs in the gta source: Taylor, 2010, p.22	49	3.6.3	farmhouse with windmill source: jagdanbaproperties.com
20	2.2.1	archdekin farmhouse source: photo by author	49	3.6.4	barn source: postandbeamliving.com
20	2.2.2	abandoned barn source: photo by author	52	3.7.1	remains of a barn source: www3.sympatico.ca
21	2.2.3	run down barn source: photo by author	53	3.7.2	remains of a farmhouse source: www.charlesatric.com
21	2.2.4	decaying barns source: photo by author	56	3.8.1	adaptive reuse of a barn source: free-press-release.com
21	2.2.5	the future of the barn source: Fuller, 1989, p.43	59	4.0.0	barn boards source: www.cgtextures.com
22	3.0.0	barn boards source: www.cgtextures.com	60	4.1.1	the participants source: drawn by author
24	3.1.1	barns among the landscape source: http://www.legacy-by-design.com/weblogs	61	4.1.2	the farmer source: drawn by author
26	3.1.2	common farmland preservation tools source: Greater Toronto Services Board, 2000 in Wilton, 2007, p.19	62	4.1.3	the developer source: drawn by author
28	3.2.1	farmstead source: Howe, 1996, p.9	63	4.1.4	the architect source: drawn by author
32	3.3.1	farm fields source: csva2blogspot.com .	63	4.1.5	the planner source: drawn by author
36	3.4.1	barns in the distance source: www.pucksfarmvisit.com	64	4.1.6	the city source: drawn by author
41	3.4.2	agricultural land reserves in british columbia source: Smith, 2007, p.135	64	4.1.7	the legislation source: drawn by author
41	3.4.3	total CLI agriculturally classified and ALR lands in british columbia (hectares) source: Smith, 2007, p.116	65	4.1.8	the new resident source: drawn by author
42	3.5.1	barn among field of wheat source: Howe, 1996, p.6	65	4.1.9	the rural resident source: drawn by author
43	3.5.2	provincial policy statement (PPS) source: www.yourcodes.blogspot.com	67	5.0.0	barn boards source: www.cgtextures.com
			68	5.1.1	portland, oregon urban growth boundary source: www.oregonmetro.gov
			72	5.2.1	the garden city concept source: www.library.cornell.edu

74	5.2.2	the garden city concept – the ward and centre source: www.library.cornell.edu	81	5.3.3	prairie crossing source: www.prairiecrossing.com
75	5.2.3	aerial views of urban sprawl in brampton source: Google maps, 2011	82	5.3.4	plan of prairie crossing source: www.prairiecrossing.com
75	5.2.4	aerial views of urban sprawl in brampton source: Google maps, 2011	83	5.3.5	byron colby barn source: www.flickr.com/photos/prairiecrossing
76	5.2.5	the rural centre/node concept source: Nelessen, 1994, p.157	83	5.3.6	interior of byron colby barn source: www.flickr.com/photos/prairiecrossing
76	5.2.6	downtown bolton source: photo owned by author	83	5.3.7	byron colby barn at night source: www.flickr.com/photos/prairiecrossing
76	5.2.7	the plan of bolton, 1877 source: Baillie, May, and Schmelzer, 1989, p.8	84	5.3.8	plan of troy gardens source: Komisar, 2010
77	5.2.8	medieval delft source: Komisar, 2010	85	5.3.9	housing in troy gardens source: www.landincommon.blogspot.com
77	5.2.9	medieval thame source: Komisar, 2010	85	5.3.10	housing in troy gardens source: www.landincommon.blogspot.com
78	5.2.10	the theory of new urbanism source: Haas, 2008, p.53	85	5.3.11	housing in troy gardens source: Komisar, 2010
79	5.2.11	the neighbourhood as part of the larger town source: Nelessen, 1994, p.iii	85	5.3.12	watercolour of site plan source: www.troygardens.org
79	5.2.12	the 5 minute walking radius source: Nelessen, 1994, p.154	86	5.4.1	exterior of haley barn source: Endersby, Greenwood and Larkin, 2003, p.130
79	5.2.13	the 10 minute walking radius source: Nelessen, 1994, p.155	86	5.4.2	interior of haley barn source: Endersby, Greenwood and Larkin, 2003, p.131
79	5.2.14	the community source: Nelessen, 1994, p.156	87	5.4.3	setting source: www.flickr.com/photo/russelhopper
80	5.2.15	housing in the cornell development source: http://ecommunitymarkham.files.wordpress.com	87	5.4.4	main entrance source: www.apaptivereuse.net
80	5.2.16	housing and retail space in the cornell development source: http://ecommunitymarkham.files.wordpress.com	88	5.4.5	barn before source: Endersby, Greenwood and Larkin, 2003, p.108
80	5.2.17	the location of the cornell development source: www.lindvest.com	88	5.4.6	barn after source: Endersby, Greenwood and Larkin, 2003, p.109
80	5.2.18	the plan of the cornell development source: www.lindvest.com	88	5.4.7	original structure source: Endersby, Greenwood and Larkin, 2003, p.110
80	5.2.19	street design source: Cornell Development Group, 1996, p.2	88	5.4.8	new structure source: Endersby, Greenwood and Larkin, 2003, p.110
81	5.3.1	prairie crossing source: Komisar, 2010	89	5.4.9	new ceiling structure source: Endersby, Greenwood and Larkin, 2003, p.111
81	5.3.2	prairie crossing source: Komisar, 2010			

90	5.4.10	the new location source: Endersby, Greenwood and Larkin, 2003, p.179	100	6.1.1	design position source: drawn by author
90	5.4.11	more structure source: Endersby, Greenwood and Larkin, 2003, p.180	103	6.2.1	gta to site source: www.builtin.ca, http://www.dmg.utoronto.ca, www.google.ca/maps & drawn by author
90	5.4.12	new sheathing source: Endersby, Greenwood and Larkin, 2003, p.180	104	6.2.2	gray family farmhouse source: Gray, Joseph, 2010
90	5.4.13	nearing completion source: Endersby, Greenwood and Larkin, 2003, p.181	104	6.2.3	grayhaven barns source: Gray, Joseph, 2010
90	5.4.14	a new life source: Endersby, Greenwood and Larkin, 2003, p.181	104	6.2.4	barn raising 1930 source: Gray, Joseph, 2010
91	5.4.15	mr. mccree cruser source: Endersby, Greenwood and Larkin, 2003, p.178	104	6.2.5	filling barn with hay 1950s source: Gray, Joseph, 2010
91	5.4.16	the barn in its original location source: Endersby, Greenwood and Larkin, 2003, p.178	105	6.2.6	grayhaven barns source: photo by author
92	5.4.17	the merging of two facades source: Feireiss, & Klantenm, 2009, p.27	105	6.2.7	hay loft detail source: photo by author
93	5.4.18	the merging of two wall types source: Feireiss, & Klantenm, 2009, p.28-29	105	6.2.8	barns in the winter source: photo by author
93	5.4.19	the original and the intervention source: Feireiss, & Klantenm, 2009, p.28-29	105	6.2.9	grayhaven site source: photo by author
94	5.4.20	preserving the original source: Feireiss, & Klantenm, 2009, p.115	106	6.2.10	timeline of urban sprawl surrounding site source: drawn by author
94	5.4.21	preserving the original source: Feireiss, & Klantenm, 2009, p.115	107	6.2.11	countryside villages secondary plan source: www.brampton.ca
95	5.4.22	vna, Switzerland source: Feireiss, & Klantenm, 2009, p.114	107	6.2.12	concession plan source: www.brampton.ca
95	5.4.23	interior finish source: Feireiss, & Klantenm, 2009, p.115	107	6.2.13	the block plan source: www.brampton.ca
96	5.4.24	the nave source: Feireiss, & Klantenm, 2009, p.155	109	6.2.14	rural nodes source: www.google.ca/maps, & drawn by author
97	5.4.25	a bookstore source: Feireiss, & Klantenm, 2009, p.154	110	6.2.15	site analysis - fabric source: drawn by author
97	5.4.26	a bookstore source: Feireiss, & Klantenm, 2009, p.154	110	6.2.16	site analysis – gross area source: drawn by author
99	6.0.0	barn boards source: www.cgtextures.com	111	6.2.17	site analysis – amenities area source: drawn by author
			110	6.2.18	site analysis – developable area source: drawn by author
			110	6.2.19	site analysis – agricultural area source: drawn by author
			111	6.2.20	site analysis – nodes source: drawn by author
			110	6.2.21	site analysis – residential area source: drawn by author
			110	6.2.22	site analysis – public use area source: drawn by author
			111	6.2.23	site analysis – future fabric source: drawn by author

113	7.0.0	barn boards source: www.cgtextures.com	120	7.1.27	exploded wall axonometric source: drawn by author
114	7.1.1	design parti source: drawn by author	120	7.1.28	barn board icon source: drawn by author
116	7.1.2	barn boards source: photo by author	121	7.1.29	wall section source: drawn by author
116	7.1.3	barn boards source: photo by author	121	7.1.30	wall section detail source: drawn by author
117	7.1.4	barn boards source: photo by author	121	7.1.31	barn board icon source: drawn by author
117	7.1.5	barn boards source: photo by author	123	7.1.32	plan - fourth level source: drawn by author
117	7.1.6	barn boards icon source: photo by author	123	7.1.33	section - north barn looking east source: drawn by author
116	7.1.7	space and structure source: photo by author	122	7.1.34	north barn - east face source: drawn by author
116	7.1.8	space and structure source: photo by author	122	7.1.35	barn board icon source: drawn by author
117	7.1.9	space and structure source: photo by author	124	7.1.36	interior of north barn - fourth level source: drawn by author
117	7.1.10	space and structure source: photo by author	135	7.1.37	barn board icon source: drawn by author
117	7.1.11	space and structure icon source: photo by author	137	7.1.38	plan - second level source: drawn by author
116	7.1.12	interventions source: photo by author	137	7.1.39	sectional perspective - looking east source: drawn by author
116	7.1.13	interventions source: photo by author	126	7.1.40	north barn - south east corner source: drawn by author
117	7.1.14	interventions source: photo by author	126	7.1.41	barn board icon source: drawn by author
117	7.1.15	interventions source: photo by author	128	7.1.42	barn boards - morning source: drawn by author
117	7.1.16	interventions icon source: drawn by author	128	7.1.43	barn boards - afternoon source: drawn by author
116	7.1.17	site source: photo by author	129	7.1.44	barn boards - early evening source: drawn by author
116	7.1.18	site source: photo by author	128	7.1.45	barn board icon source: drawn by author
117	7.1.19	site source: photo by author	131	7.1.46	space and structure source: drawn by author
117	7.1.20	site source: photo by author	131	7.1.47	space, structure and floor plates source: drawn by author
117	7.1.21	site icon source: drawn by author	130	7.1.48	space and structure icon source: drawn by author
116	7.1.22	barn icon source: drawn by author	133	7.1.49	section - north barn looking south source: drawn by author
119	7.1.23	manipulated barn boards source: drawn by author	133	7.1.50	section - south barn looking east source: drawn by author
119	7.1.24	maintaining barn boards source: drawn by author			
118	7.1.25	barn icon source: drawn by author			
120	8.1.26	screen diagram source: drawn by author			

132	7.1.51	plan - fourth level source: drawn by author	142	7.1.76	plan - ground level source: drawn by author
132	7.1.52	plan – third level source: drawn by author	142	7.1.77	section - looking north source: drawn by author
132	7.1.53	plan – second level source: drawn by author	143	7.1.78	multi-purpose rooms source: drawn by author
132	7.1.54	plan – ground level source: drawn by author	142	7.1.79	space and structure icon source: drawn by author
132	7.1.55	plan – lower level source: drawn by author	144	7.1.80	interventions diagram source: drawn by author
132	7.1.56	space and structure icon source: drawn by author	144	7.1.81	interventions icon source: drawn by author
134	7.1.57	north barn - interior east facade source: drawn by author	145	7.1.82	entry to silo source: drawn by author
135	7.1.58	plan - ground level source: drawn by author	147	7.1.83	silo from exterior source: drawn by author
134	7.1.59	atrium - looking up source: drawn by author	146	7.1.84	plan - fourth level source: drawn by author
134	7.1.60	space and structure icon source: drawn by author	146	7.1.85	interventions icon source: drawn by author
136	7.1.61	atrium - looking down source: drawn by author	149	7.1.86	north pop out source: drawn by author
137	7.1.62	lobby source: drawn by author	149	7.1.87	interior of north pop out source: drawn by author
136	7.1.63	sectional perspective - looking south source: drawn by author	148	7.1.88	plan - fourth level source: drawn by author
136	7.1.64	space and structure icon source: drawn by author	148	7.1.89	interventions icon source: drawn by author
139	7.1.65	south barn - looking south source: drawn by author	151	7.1.90	south pop out source: drawn by author
138	7.1.66	plan - third level source: drawn by author	151	7.1.91	interior of south pop out source: drawn by author
138	7.1.67	sectional perspective - looking south source: drawn by author	150	7.1.92	plan - third level source: drawn by author
139	7.1.68	running track source: drawn by author	150	7.1.93	interventions diagram source: drawn by author
138	7.1.69	space and structure icon source: drawn by author	152	7.1.94	site diagram source: drawn by author
141	7.1.70	south barn - looking south source: drawn by author	152	7.1.95	site icon source: drawn by author
140	7.1.71	plan - second level source: drawn by author	155	7.1.96	site plan source: drawn by author
140	7.1.72	sectional perspective - looking south source: drawn by author	154	7.1.97	site section source: drawn by author
141	7.1.73	fitness centre source: drawn by author	154	7.1.98	original site source: Gray, Joseph, 2010
140	7.1.74	space and structure icon source: drawn by author	154	7.1.99	site icon source: drawn by author
143	7.1.75	south barn - looking south source: drawn by author	157	7.1.100	north west exterior axonometric source: drawn by author
			156	7.1.101	south elevation source: drawn by author

- 157 7.1.102 **west elevation**
source: drawn by author
- 157 7.1.103 **north elevation**
source: drawn by author
- 156 7.1.104 **east elevation**
source: drawn by author
- 156 7.1.105 **current north west corner of barns**
source: drawn by author
- 156 7.1.106 **site icon**
source: drawn by author
- 158 7.1.107 **south west exterior axonometric**
source: drawn by author
- 159 7.1.108 **south elevation**
source: drawn by author
- 158 7.1.109 **west elevation**
source: drawn by author
- 158 7.1.110 **north elevation**
source: drawn by author
- 159 7.1.111 **east elevation**
source: drawn by author
- 159 7.1.112 **current south west corner of barns**
source: drawn by author
- 159 7.1.113 **site icon**
source: drawn by author
- 160 7.2.1 **design influence icon**
source: drawn by author
- 163 7.2.2 **site plan**
source: drawn by author
- 162 7.2.3 **original site**
source: Gray, Joseph, 2010
- 162 7.2.4 **design influence icon**
source: drawn by author
- 164 7.2.5 **the village centre**
source: drawn by author
- 164 7.2.6 **design influence icon**
source: drawn by author
- 166 7.2.7 **area**
source: drawn by author
- 166 7.2.8 **site**
source: drawn by author
- 166 7.2.9 **village centre**
source: drawn by author
- 166 7.2.10 **residential**
source: drawn by author
- 167 7.2.11 **transportation hub**
source: drawn by author
- 167 7.2.12 **demonstration farm**
source: drawn by author
- 167 7.2.13 **agricultural lands**
source: drawn by author
- 167 7.2.14 **alternative development approach**
source: drawn by author
- 166 7.2.15 **design influence icon**
source: drawn by author
- 169 8.0.0 **barn boards**
source: www.cgtextures.com
- 173 A.A.0 **barn boards**
source: www.cgtextures.com
- 175 A1.0.0 **barn boards**
source: www.cgtextures.com
- 176 A.1.1 **photo of corn field**
source: http://www.kipnews.org
- 177 A.1.2 **agriculture and agri-industry contribution to GDP**
source: Agriculture and Agri-Food Canada, 2009, p.24
- 177 A.1.3 **agriculture and agri-industry contribution to GDP**
source: Agriculture and Agri-Food Canada, 2009, p.24
- 178 A.1.4 **agriculture and agri-industry contribution to employment**
source: Agriculture and Agri-Food Canada, 2009, p.25
- 178 A.1.5 **agriculture and agri-industry exports**
source: Agriculture and Agri-Food Canada, 2009, p.30
- 178 A.1.6 **agriculture and agri-industry imports**
source: Agriculture and Agri-Food Canada, 2009, p.30
- 179 A.1.7 **agricultural producers**
source: www.mo.nrcs.usda.gov
- 179 A.1.8 **agricultural producers**
source: www.agriculture.sc.gov
- 179 A.1.9 **agricultural producers**
source: www.edmundsremodeling.com
- 181 A.1.10 **agri-industries**
source: www.leslievaleska.com
- 181 A.1.11 **agri-industries**
source: www.russiablog.org
- 181 A.1.12 **agri-industries**
source: www.galles.it.com
- 182 A.2.1 **the canada land inventory (CLI)**
source: Cheng & Lee, 2008, p.28
- 182 A.2.2 **the agroclimatic resource index (ACRI)**
source: Furuseth & Pierce, 1982, p.22

184	A.3.1	canada's prime farmland source: Furuseth & Pierce, 1982, p.23	201	B.2.7	rural-urban fringe in the greater golden horseshoe source: Taylor, 2010, source: Taylor, 2010, p.17
184	A.3.2	amount of dependable agricultural land in canada source: Hofmann, 2001, p.4	200	B.2.8	projection of households and household growth source: Will Dunning, 2006, p.75
186	A.3.3	prime farmland in canada source: Caldwell & Dodds- Weir, 2003, p.8	202	B.3.1	farmland acreage change source: Walton, 2003b, p.10
186	A.4.1	soil class locations in ontario source: Fuller, 1985, p.161	202	B.3.2	farmland acreage change source: Walton, 2003b, p.10
186	A.4.2	agroclimatic resource index for southern ontario source: Ontario Farmland Trust, 2006, p.5	204	B.3.3	ontario class 1 land occupied by urban growth source: Filoso, Hofmann, & Schofield, 2005, p.8
190	A.5.1	soil class location in the greater toronto area source: Walton, 2003, p.17	204	B.3.4	urban use on agricultural land source: Filoso, Hofmann, & Schofield, 2005, p.7
193	B.0.0	barn boards source: www.cgtextures.com	204	B.3.5	lost farmland in southern ontario source: Ontario Farmland Trust, 2005, p.4
194	B.1.1	the rural-urban fringe source: Ontario Farmland Trust, 2006, p.1	205	B.4.1	the cycle of farmland conversion source: Bowers & Daniels, 1997, p.6
195	B.1.2	rural-urban fringe diagram source: Fuller, 1985, p.299	207	B.4.2	scattered vs. clustered model source: Caldwell & Weir, 2002, p.19
195	B.1.3	farming among residential developments source: www.sciencedaily.com	211	B.6.1	available cropland vs. demand for cropland source: Bunce, 1998, p.237
196	B.2.1	toronto's urban sprawl source: www.maxtravelz.com	211	B.6.2	available land and cultivated land source: Filsos, Hofmann, & Schofield, 2005, p.9
197	B.2.2	population growth in the gta source: Demographic Profile of the Greater Toronto Area 1986- 2006, 2009, p.4	213	C.0.0	barn boards source: www.cgtextures.com
198	B.2.3	growth and constraints on development in the greater golden horseshoe source: Taylor, 2010, p.103	214	C.0.1	plan - roof source: drawn by author
199	B.2.4	population density source: Demographic Profile of the Greater Toronto Area 1986- 2006, 2009, p.4	214	C.0.2	plan - fourth level source: drawn by author
199	B.2.5	forecasted gta population source: Flashforward: Projecting Population and Employment to 2031 in a Mature Urban Area, 2006, p.24	214	C.0.3	plan - third level source: drawn by author
199	B.2.6	forecasted population share by municipality source: Flashforward: Projecting Population and Employment to 2031 in a Mature Urban Area, 2006, p.26	215	C.0.4	plan - second level source: drawn by author
			215	C.0.5	plan - ground level source: drawn by author
			215	C.0.6	plan - lower level source: drawn by author
			216	C.0.7	barn boards - june 9 am source: drawn by author

216	C.0.8	barn boards - june 3 pm source: drawn by author	228	C.0.32	site plan source: drawn by author
217	C.0.9	barn boards - june 6 pm source: drawn by author	228	C.0.33	site section source: drawn by author
218	C.0.10	barn boards - morning on fourth level source: drawn by author	229	C.0.34	farmers market and amphitheatre source: drawn by author 219
218	C.0.11	barn boards - afternoon on fourth level source: drawn by author	229	C.0.35	soccer field source: drawn by author
219	C.0.12	barn boards - early evening on fourth level source: drawn by author	231	C.0.36	village centre from from south source: drawn by author
221	C.0.13	barn boards - morning in fourth level pop out source: drawn by author	230	C.0.37	village centre from south west source: drawn by author
220	C.0.14	barn boards - afternoon n fourth level pop out source: drawn by author	233	D.0.0	barn boards source: www.cgtextures.com
221	C.0.15	barn boards - early evening in fourth level pop out source: drawn by author	234	D.0.1	plan - roof source: drawn by author
223	C.0.16	north pop out source: drawn by author	235	D.0.2	plan - fourth level source: drawn by author
222	C.0.17	south pop out source: drawn by author	236	D.0.3	plan - third level source: drawn by author
223	C.0.18	exploded axonometric of silo source: drawn by author	237	D.0.4	plan - second level source: drawn by author
224	C.0.19	ramp entrance to library source: drawn by author	239	D.0.5	plan - ground level source: drawn by author
224	C.0.20	south east axonometric source: drawn by author	238	D.0.6	plan - lower level source: drawn by author
224	C.0.21	south elevation source: drawn by author	240	D.0.7	section - north barn looking east source: drawn by author
224	C.0.22	east elevation source: drawn by author	240	D.0.8	section - south barn looking north source: drawn by author
224	C.0.23	hay loft window source: drawn by author	241	D.0.9	section - south barn looking east source: drawn by author
225	C.0.24	south entrance source: drawn by author	241	D.0.10	section - north barn looking south source: drawn by author
225	C.0.25	north west axonometric source: drawn by author	242	D.0.11	north elevation source: drawn by author
225	C.0.26	north elevation source: drawn by author	243	D.0.12	west elevation source: drawn by author
225	C.0.27	west elevation source: drawn by author	244	D.0.13	east elevation source: drawn by author
226	C.0.28	site plan source: drawn by author	245	D.0.14	south elevation source: drawn by author
226	C.0.29	site section source: drawn by author	246	D.0.15	section - north barn looking east source: drawn by author
227	C.0.30	community garden source: drawn by author	246	D.0.16	wall section source: drawn by author
227	C.0.31	park and skating rink source: drawn by author	247	D.0.17	wall section detail source: drawn by author

247	D.0.18	wall section detail source: drawn by author
248	D.0.19	section - north barn looking south source: drawn by author
248	D.0.20	wall section source: drawn by author
249	D.0.21	wall section detail source: drawn by author
249	D.0.22	wall section detail source: drawn by author
250	D.0.23	section - north barn looking south source: drawn by author
250	D.0.24	plan - study area source: drawn by author
251	D.0.25	wall section - study area source: drawn by author
253	E.0.0	barn boards source: www.cgtextures.com
254	E.0.1	mechanical section - north barn source: drawn by author
256	E.0.2	mechanical section - south barn source: drawn by author
258	E.0.3	mechanical plan - roof source: drawn by author
259	E.0.4	mechanical plan - fourth level source: drawn by author
260	E.0.5	mechanical plan - third level source: drawn by author
261	E.0.6	mechanical plan - second level source: drawn by author
262	E.0.7	mechanical plan - ground level source: drawn by author
263	E.0.8	mechanical plan - lower level source: drawn by author
265	F.0.0	barn boards source: www.cgtextures.com
266	F.0.1	mind map source: drawn by author
269	B.B.1	barn boards source: www.cgtextures.com

list of appendices

A	agriculture	
A.1	agricultural industry in canada	177
	A.1.1 agricultural producers	179
	A.1.2 agri-industries	181
A.2	agricultural potential	183
A.3	agriculture across canada	185
A.4	agriculture in Ontario	187
A.5	agriculture in the gta	189
B	urban sprawl	
B.1	the rural-urban fringe	195
B.2	urban sprawl in the gta	197
B.3	farmland loss	203
	B.3.1 greater toronto area	203
	B.3.2 ontario	204
	B.3.2 canada	204
B.4	overview of impacts	205
B.5	peak soil	209
B.6	supply vs demand	211
C	design development	213
D	final design	233
E	mechanical	253
F	mind map	265

fig. 0.0.0 (opposite)

barn adaptation
a proposal to protect rural architecture



fig. 1.0.0 (opposite)

introduction

chapter 01

*We can not return to agriculture of yesterday
but we can focus on the future and who
will be involved in 10 years and who will be
educating those young people.*

*– quote from a farmer at Odyssey Group
public consultation, Chatham, July 19, 2001
from (Agricultural Adaptation Council, 2002, p.6)*



1.1 introduction

Agriculture is a fundamental component of Canadian history, culture, economy and identity. The majority of agricultural land is found in the area surrounding the largest urban centers across Canada. These current centers reflect a history of settlement in areas of good agricultural production. However, these settlement patterns of the past are now threatening the future availability of prime farmland. As our cities grow, the tendency is to expand outward beyond the old urban boundaries. To accommodate this growth, prime farmland and its rural architecture is being lost as it is converted to urban uses.

This trend is present in southern Ontario. This area is blessed with over 50 percent of Canada's prime farmland, which is within and next to the growing urban boundaries of Greater Toronto. As these boundaries continue to encroach into the countryside, rural non-farm development increases.

The area of specific interest for this thesis within the expanding urban development is the rural-urban fringe. This area, a transition zone between the defined urban edge and countryside, is defined by the juxtaposition of working farms and new urban developments. While there are a number of impacts due to non-agricultural developments within this area, it is the loss of rural architecture specifically barns and the cultural heritage they represent - that is the primary concern of the design portion of this thesis.

These structures, significant to the character of rural culture and an iconic symbol of Canadian agrarian history, are being bulldozed down in order to make way for development. As these barns

continue to become “endangered species” (Arthur & Witney, 1972, p. 7), it provokes a design challenge to find a solution to preserve these structures.

1.2 problem statement

This thesis is addressing the relationship between the urban sprawl of growing urban centres and its elimination of prime agricultural land and rural architecture.

The problem is that the urban fabric within the Greater Toronto Area is surrounded by prime farmland and as this urban area continues to sprawl outward to accommodate new growth, the prime farmland is converted for urban use and the rural architecture is destroyed.

This occurrence is most visible in the rural-urban fringe. The developments that are built within this area showcase the typical approach to suburban growth - the complete destruction of any obstacles that exist including prime farmland and rural architecture. Other than halting new housing and commercial growth altogether, this thesis maintains that through design, another option to reduce the elimination of farmland and rural architecture can be created.

1.3 thesis statement

This thesis envisions an alternative approach for suburban development. In the current scenario where local food security is disregarded and the presence of rural architecture is being bulldozed away, this thesis identifies the need for an intervention that modifies current development methods.

This thesis explores how to reduce the elimination of farmland and rural architecture in an area that will be converted for residential development. This thesis proposes an alternative approach to suburban development which includes the introduction of a village centre, denser housing, and the preservation of the rural architecture. Within this concept is the opportunity for a design response that focuses on one element, the adaptive reuse of a rural barn.

The adaptive reuse of a barn will provide a visible reminder of the agrarian past and a tangible connection to the rural culture. However, the design strategy that will be undertaken for the design portion of this thesis will utilize the barn as a means of communication. At the micro-level, the characteristics that define the barn will allow for an exploration of how to uniquely maintain these qualities in the adaptive reuse. Programming at the meso-level will address the needs of this new community by providing amenities that are not present in most new residential developments. At the macro-level, the preservation will serve to identify the importance of preserving farmland and inspire an alternative approach to suburban development and the benefits of the integration of rural architecture and prime farmland.

1.4 research questions

To understand the effects that surround the problem of the loss of rural architecture, the research for this thesis explored the topics of agriculture, urban sprawl, rural architecture and farmland preservation.

The nature of urban sprawl and how it is related to population growth was examined. It asks what is the forecasted population growth in the Greater Toronto Area? Where will this population be settling? What are the effects of population growth and urban sprawl? What demands will this growth place on urban developments? What is the rural-urban fringe? Where is it? What are its characteristics and conditions? How does it relate to urban sprawl? Investigating urban sprawl highlighted the issue of the loss of farmland. To understand why this is a problem, agriculture in Canada and then in Ontario specifically was reviewed to identify its significance.

The topic of farmland loss reviewed how much farmland, rural architecture and culture is being lost. It asks why this is significant to Canada, Ontario and the Greater Toronto Area. What is agriculture? What is its role in the economy? This research identified the relationship between agricultural land and rural architecture.

The study of rural architecture poses questions to define rural heritage and why it is significant. Farmland preservation emphasized this relationship and contrasted against urban sprawl.

Finally, the collection of precedents assists with the understanding of design responses to agriculture and rural architecture preservation.

1.5 literature review

To understand the factors contributing to the loss of rural architecture and prime farmland and to effectively form an architectural response to this problem, the literature review spanned several disciplines. The assortment of references responds to the categories of the research questions.

1.5.1 the rural-urban fringe

A great deal of research has been published that discusses the concept of the rural-urban fringe. Tom Daniels' *When City and Country Collide* is an excellent starting point. The author provides a concise overview of how the fringe came to exist, using a wide variety of examples ranging from the United States, Europe and Canada. He addresses issues dealt with at both local, provincial and federal government levels. Gerald Walker, author of *An Invaded Countryside: Structures of Life on the Toronto Fringe*, focuses on the pressures being felt by the rural community outside Toronto. Its focus on Toronto provides a local example to understand this concept. Walker observes the issues of understanding the rural survivors, farmers, non-farm residents and urbanites. From his multiple field studies, Walker concludes that the fringe is composed of three components, "agriculture production, commercial/industrial production and residential consumption" (Walker, 1987, p.7). A leader in this field of research is Kenneth Beesley. He has participated in editing and/or writing, *The Rural-Urban Fringe: Canadian Perspectives*, *Rural and Urban Fringe Studies in Canada* and *Perspectives on the Rural-Urban Fringe*. These three references approach problems related to the rural-urban fringe from an urban growth perspective at a macro-scale.

Changing land use is examined in detail and solutions are discussed as to how the agricultural industry can be maintained close to the city. Beesley states that “50% of Canada’s prime farmland is located within a 90 kilometer radius of the 20 largest cities in Canada” (Beesley, 1982, p.7). These three books conclude with the position that urban sprawl should not continue and the focus needs to be placed upon higher density suburban housing and the benefits of city living. These studies of the rural-urban fringe provide a concise understanding of the related concepts, as well as various case studies at the international and local levels.

1.5.2 urbanization

Urbanization is often associated with the study of the rural-urban fringe. This group of references was selected to help understand how quickly the city is growing and the effect this has on the land. *Effects of Urbanization on Agricultural Activities*, a journal article by Davis Berry, explores the “public concerns that have risen due to the expansion of urban, suburban and exurban development into agricultural landscapes” (Berry, 1978, p.1). This article introduces the concepts discussed in both *Agriculture in the City’s Countryside* and *Agricultural Land in an Urban Society*. These books use case studies to examine the relationship between farming and the countryside around major cities. A history of urban development is provided in *Agricultural Land in an Urban Society*. *Contested Countryside: The Rural-Urban Fringe in North America* looks at urbanization from a social, cultural and economic perspective.

1.5.3 canada land use

Land in Canada’s Urban Heartland and *Agricultural Land Use Change in Canada: Process and Consequences* are both collections of data by Environment Canada that demonstrate various aspects of urbanization. Issues explored include the spread of urban areas, population change, development, land consumption, land use and change in land values. The references that discuss urbanization provide a wide range of perspectives ranging from data to social and cultural case studies.

1.5.4 rural conservation and adaptive reuse

Concern for rural conservation and the pressure rural communities are presently experiencing are addressed in this group of references. *Saving America's Countryside: A Guide to Rural Conservation* and *Holding Our Ground: Protecting America's Farms and Farmland* describe the importance of saving farmland. From an American perspective, they explain the role farms play in the lives of Americans. It also looks at the tug of war between growth and protection where Americans "have become increasingly concerned about the many threats to the rural environment we cherish and have been puzzled over how to protect it" (Keller, 1989, p.xix). *Designating Historic Rural Areas: A Survey of Northwestern Ohio Barns* continues this discussion by reviewing case studies. *Preserving the Midwest Barn*, extracted from *Barns of the Midwest*, explores the cultural importance of maintaining rural architecture. Hemalata C. Dandekar and Eric Allen MacDonald emphasize the preservation of barns, for these buildings speak about the past, contribute to the aesthetic quality of the local landscape and act as a way to learn from the past. *The Barn*, by Eric Arthur and Dudley Witney, pick up where the previous two references concluded by examining successful interventions of barn architecture. These references highlight the various issues dealt with when this architectural type is under threat. By preserving or adapting rural architecture, it becomes more than saving agricultural land. It is saving an identity, a culture, a way of life.

1.5.5 precedents

Building Adaptation by James Douglas and *Building Evaluation for Adaptive Reuse and Preservation* investigate the process that is undertaken in adaptive reuse. *Building Adaptation*, in particular, addresses issues that arise when farm buildings are converted to support a new program. *41° to 66° Regional Responses to Sustainable Architecture* by Marco Polo and John McMinn is a collection of case studies of contemporary architecture that have derived their sustainable design from local vernacular architecture. The southern Ontario barn is analyzed to demonstrate how it has influenced design in Ontario. The examination of buildings whole in time is the intent of *How Buildings Learn*. Stewart Brand, the

author, describes buildings as if they can tell stories if they are allowed. This is achieved when their past is embraced rather than concealed. He states, “buildings are shaped and reshaped by changing cultural currents, changing real-estate value and changing usage” (Brand, 1997, p.22). In *Architectural Voices: Listening to Old Buildings*, a series of case studies are presented. Similar to *How Buildings Learn*, the authors suggest that buildings have voices and that they are worth listening to. When the authors interviewed Ken Moth, an architect at architects BDP, he described his assertion that “touching a building brings you into closer contact with the people who once inhabited it” (Lewis, 2007, p. 19-20). This collection of case studies presents a sensitive and personal approach to adaptive reuse. These references are connected by a common theme – the possibility of a higher connection to a building. The idea that a spiritual or mystical connection to architecture is achievable is a concept that is easily applicable to the cultural and personal significance of a rural farmstead.

These references serve to flush out the many issues involved in rural farmstead preservation.

1.6 thesis structure

This thesis presents eight chapters which provide background, research and examples to support a design proposal for the adaptive reuse of a barn.

Chapter 2 provides background information about the history of urban sprawl in the Greater Toronto Area. This research identified the issue of the loss of rural architecture and prime farmland. Chapter 3 examines the idea of farmland preservation. The benefits, precedents and current legislation regarding farmland preservation is reviewed. This chapter concludes with the significance of rural architecture and why it is importance to preserve it. The various perspectives of all those involved in the issue of farmland conversion is addressed in Chapter 4. This provides a realistic overview of the struggles for preservation. An analysis of various precedents is conducted in Chapter 5. Lessons that can be applied to a design are discussed. Chapter 6 outlines the design direction for the design project. It establishes the design hypothesis and states design principles. As well, the site selection is identified. Chapter 7 introduces the design. Final thoughts are provided in Chapter 8. Additional research regarding agriculture and urban sprawl are provided in Appendix A and B respectively. Design Development and additional final design drawings have been included in Appendix C, D, E and F.

fig. 2.0.0 (opposite)

urban sprawl

chapter 02

Cities do not grow – all of them are planned.

*Thomas Adams, 1922
from (Hodge, 1989, p.40)*

*On a clear day, over one-third of Canada's best
agricultural land can be seen from the top of
Toronto's CN Tower.*

*Statistics Canada, 1999
from (Ontario Farmland Trust, 2005, p.5)*





2.1 history of urban sprawl in the greater toronto area

At the beginning of the 20th century, the populations of Canada's major cities were exploding. Toronto was growing into a leading metropolis with its population increasing from 208,000 in 1901 to 522,000 in 1921 (Solomon, 2007).

During the early 20th century, farmers began moving to the cities, giving up their land for access to other employment opportunities and public services. To encourage the farmers and rural residents to stay, the government proposed plans to develop natural resources in rural areas. As well, the rise of unionized urban workers caused the government to discourage people from settling in the cities with the idea that this would prevent strikes by the working class during and after World War Two.

To achieve the goal of rural development while at the same time preventing chaos in the cities, the federal government decided to take advantage of its soldiers returning from Europe. With the knowledge that a demand for housing would be required for this group, the government proposed that land with housing would be provided outside the city (decentralize) and veterans would commute to industrial work in the city and also farm part-time. The farming subdivision lots would be 2 acres for 3 pigs and 3 acres for 1 cow. But even with planning, upon the return of these soldiers, a housing crisis developed in many urban centres, including Toronto. Therefore, plans of part-time farming were scrapped and these lots were divided into half-acres and houses were built (Solomon, 2007). Thus began Toronto's urban sprawl.

opposite

fig. 2.1.1 urban sprawl

The typical landscape surrounding urban centres.

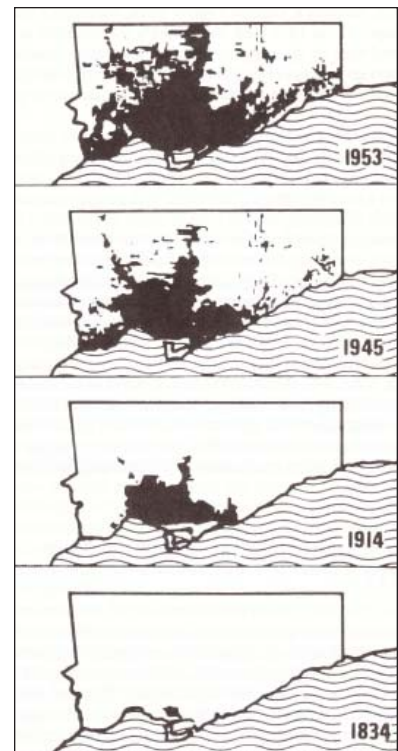


fig. 2.1.2 growth of toronto 1843-1953

Toronto's growth had a strong relationship to modes of transportation. By the 1950s the private automobile contributed to a much more dispersed form for Toronto.

A part of this movement was the Veterans' Land Act of 1942 which required veterans to settle outside the city in order to receive a plot of land. Many returning soldiers wanted to remain in urban centres. Only a small percentage had an agricultural background, therefore, many did not apply for these lots. Nevertheless, 10% did apply for the land subsidies and moved to the suburbs. Yet this 10% was the success that the government needed – "it boosted the outskirts of Toronto by 100,000, an amount equivalent to three times the postwar population of Toronto's largest suburb, North York" (Solomon, 2007, p.56). Provincial and federal programs pushed people into the suburbs, which almost doubled their population between 1945 and 1953, while Toronto's population dropped by 2% (Solomon, 2007).

As the suburbs grew so did the rise of unwanted consequences. The largest issues included a lack of funding for infrastructure including water, sewage, transportation, and education. The government had convinced Canadians to relocate to suburbs to solve urban problems but failed to realize the financial support it would take to keep the population there. "The result was substandard conditions serious enough to threaten future development" (Solomon, 2007, p.56). These issues were dealt with for decades. The basic necessities such as water, sewage and education were resolved. As the growth increased, the dependence on transportation, highways or otherwise, continued. Construction of major highways such as the 401, the Go Transit, a public commuter rail system, the Gardiner Expressway, extensions to the Toronto Transit Commission, (TTC), and highway 407 were all efforts to help make the commute to and from Toronto easier for suburban residents.

The current predicament of Toronto's urban sprawl, and the problems associated with it, did not occur naturally but were the effect of government programs. The current issues of long commutes, farmland conversion and many others can all be traced back to decisions made by the federal and provincial governments.

Had the governments not aborted the dense city that could have been Toronto's destiny, there would have been no rationale for the partial amalgamation that created Metro in the 1950s, or for the regional governments that came in the 1970s, or for the full amalgamation that came in the 1990s, or for the Greater Toronto agencies touted for the 2000s. Aside from the suburbs hugging transportation routes, these areas would have remained Toronto's hinterlands, mostly as agricultural lands, towns and villages attached (Solomon, 2007, p.77-78).

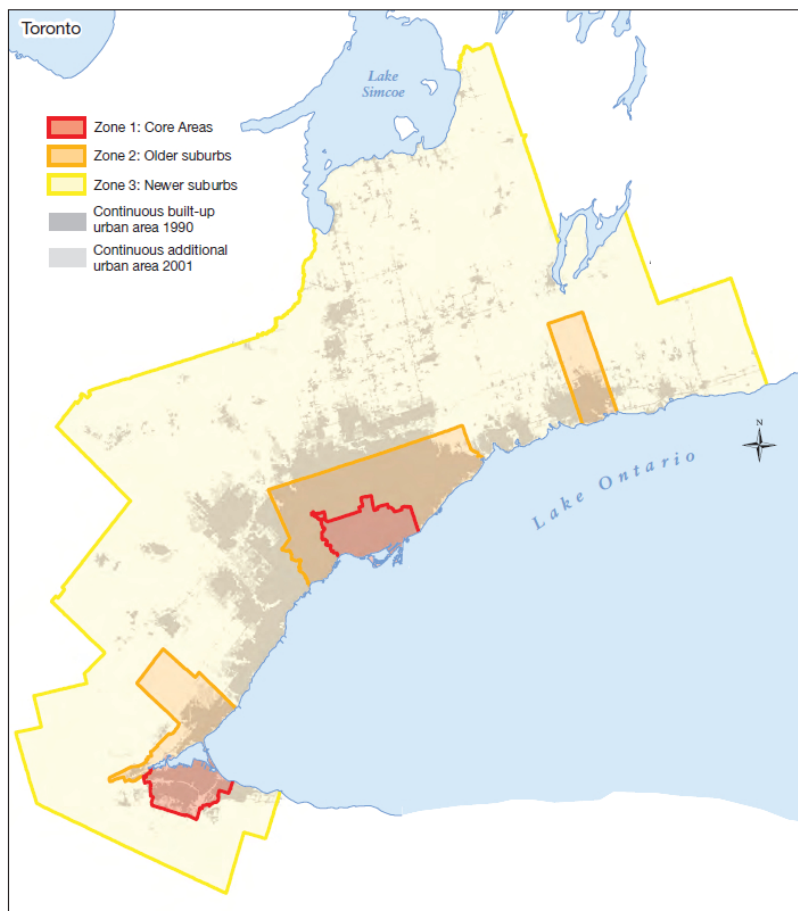


fig. 2.1.3 **zones of suburbs in the gta**

This map summarizes the history of the growth of the GTA's suburbs. It highlights the time periods in which various areas of the suburbs were developed. They can be organized into 3 periods; homes built before 1950 (Zone1: Core Areas), the older suburbs built in the 1950s and 1960s (Zone 2: Older Suburbs), and the newer suburbs built after 1971 (Zone 3: Newer Suburbs).



2.2 loss of rural architecture

As suburbs increase and agricultural land is converted for urban purposes, one impact that is often overlooked is the loss of the rural farmstead. The collection of these buildings is seen merely as obstacles in the way of development.

Most farmsteads have been in a family for generations. These buildings and land are tangible reminders of the hard work of generations before. The flat land that is so attractive to developers is a result of years of the hard work of settlers, clearing the forest by hand and building the farm structures. There is no doubt that an emotional connection exists between the families and their farms, both the buildings and the land, which developed over years of working this land. From the perspective of a developer, this connection does not exist. They do not consider that barns were raised by communities, and decades of toil built a family business from their land - a true testament to a family's legacy.

Instead, a lucrative offer is given, money is exchanged and the farmer leaves his land. He does this reluctantly but knows he does not have power against the developers and urban sprawl. His family takes the money, relocates and waits for their family history to be eliminated.

To the rural resident or farm family, the significance of rural architecture is understood. However, this is rarely considered as farmland is converted for urban uses. This is demonstrated by the continuing trend of the elimination of these buildings which are seen as inconveniences for development and are bulldozed into the ground they were built on.

opposite (top)

fig. 2.2.1 **archdekin farmhouse**

This farmhouse is waiting to be demolished to make way for a new subdivision.

figs. 2.2.2 **abandoned barn opposite (bottom)**

This barn has been abandoned while it waits to be destroyed to make way for a new residential development.



fig. 2.2.3 **run down barn**

This barn requires exterior supports.



figs. 2.2.4 **decaying barn**

This barn is decaying as it waits to be bulldozed into the ground.



fig. 2.2.5 **the future of the barn**

This comic pokes fun at the loss of the farmstead but the reality is this is quite possibly the farmstead's future.

fig. 3.0.0 (opposite)

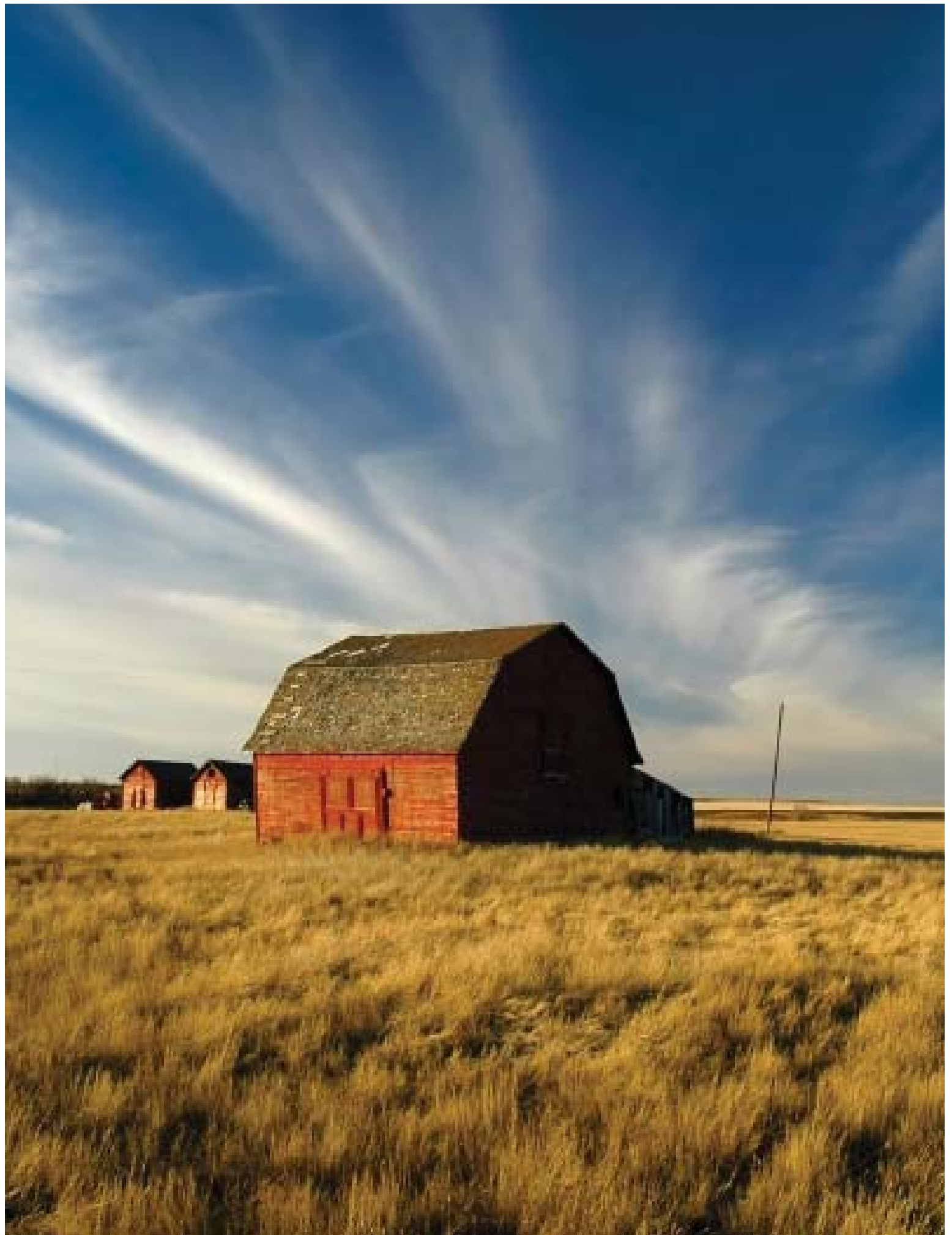
preservation

chapter 03

Land is our most precious heritage.

*Robert West Howard, The Vanishing Land
(from Bowers & Daniels, 1997, p.1)*





3.1 farmland preservation

Farmland preservation is an issue that societies and governments across the world are confronting as the population increases. “With cropland becoming scarce, efforts to protect prime farmland are needed the world over” (L.R Brown, 2003, in Wilton, 2007, p.13).

The impetus of farmland preservation began in the 1960s. The original movement grew with the simultaneously rising environmental movement. The goal of farmland preservation during this time was protecting a natural resource that was under severe strain. Prior to this, the predominant public perception was that there was a limitless supply of farmland. (See Appendix A, p.175). However, as the growing awareness of environmental issues and an overall concern for food security began to build strength, so did the support for farmland preservation. Although concerns of extreme food shortages has yet to occur, largely due to the increased dependency on imported food and food related items, this still did not reduce the importance of this issue.

Today, the continuing decline of prime farmland is of major concern to this issue. (See Appendix B, p.193). A larger understanding of factors and results of this phenomenon has provided new fuel to sustain farmland preservation as a current and significant issue. Additional related issues include “...restricting the urbanization of agricultural lands range from the control of urban sprawl, preservation of countryside amenity, protection of the natural environment, maintenance of rural communities, the farming way of life...” (Wilton, 2007, p.21).

opposite
fig. 3.1.1 barns among wheat
fields

Preservation Tool	Jurisdiction	"Strength" of Tool	Reasons for Implementing	Public Acceptance
Land Use Planning	Primary method of farmland preservation in Canada	Varies, depending on political support	To encourage the 'wise use' of resources for the benefit of society	Widely accepted in Canada; can be viewed as infringement on property rights
Agricultural Land Reserves	B.C., Canada	Very strong, however, is subject to political will	To permanently protect agricultural resources in a specific region (B.C.)	Strong level of public support
Purchase of Development Rights (PDR)	Common tool used in the U.S	Very strong, however, is dependent on high levels of financial support	To protect significant regions or districts for agricultural production	Strong, but only applicable where property right laws allow for the transfer of development rights
Permanent Agricultural Districts	Depends on a combination of planning controls, property tax incentives, and support for farming	Strong, depending on the successful combination of measures implemented	To protect specific targets of land for permanent agricultural use	Would depend on community support for agriculture in the region in question
Easements	Primarily used at the local level	Strong as long as the easement agreement is held in perpetuity and is managed appropriately	To protect specific tracts of land permanent agricultural use	Usually strong, however, this tool is not well understood by the general public, can be seen as an infringement on property rights
Land Trusts	Primarily at the local or regional level but can be province/state wide or national in scope	Strong tool; circumvents the traditional land use planning process	To protect agricultural land; usually has a secondary goal to promote farmland preservation	Not well understood in Canada, strong public support in US and Europe

Within Canada, the need to protect farmland from urban development has been a topic of discussion for over 30 years. During this time, a growing collection of literature and policy has been developed in response to increased public concern over the permanent loss of agricultural land (Wilton, 2007). To thoroughly understand farmland preservation, it is important to define the term. In Ontario legislation defines high capability agricultural lands as:

all lands which have a high capability for the production of specialty crops due to special soils for climate, all soil classes 1-2-3-4 as defined by the Canada Land Inventory, additional areas where farms exhibit characteristics of ongoing viable agriculture and additional areas where local market conditions ensure agricultural viability where it might not exist otherwise (Government of Ontario, 2003 in Wilton, 2007, p.15).

Although the concept of farmland preservation has been recognized as a priority by the Government of Ontario, it has been the implementation and follow through of its policies that have been discouraging. Various tools and policies to address this issue have been developed, however, their procedure, use and successfulness differ among Canadian provinces. Figure 3.1.2 provides an overview of common farmland preservation methods with the accompanying considerations for implementations for provinces in Canada, as well as regions in the United States and the United Kingdom.

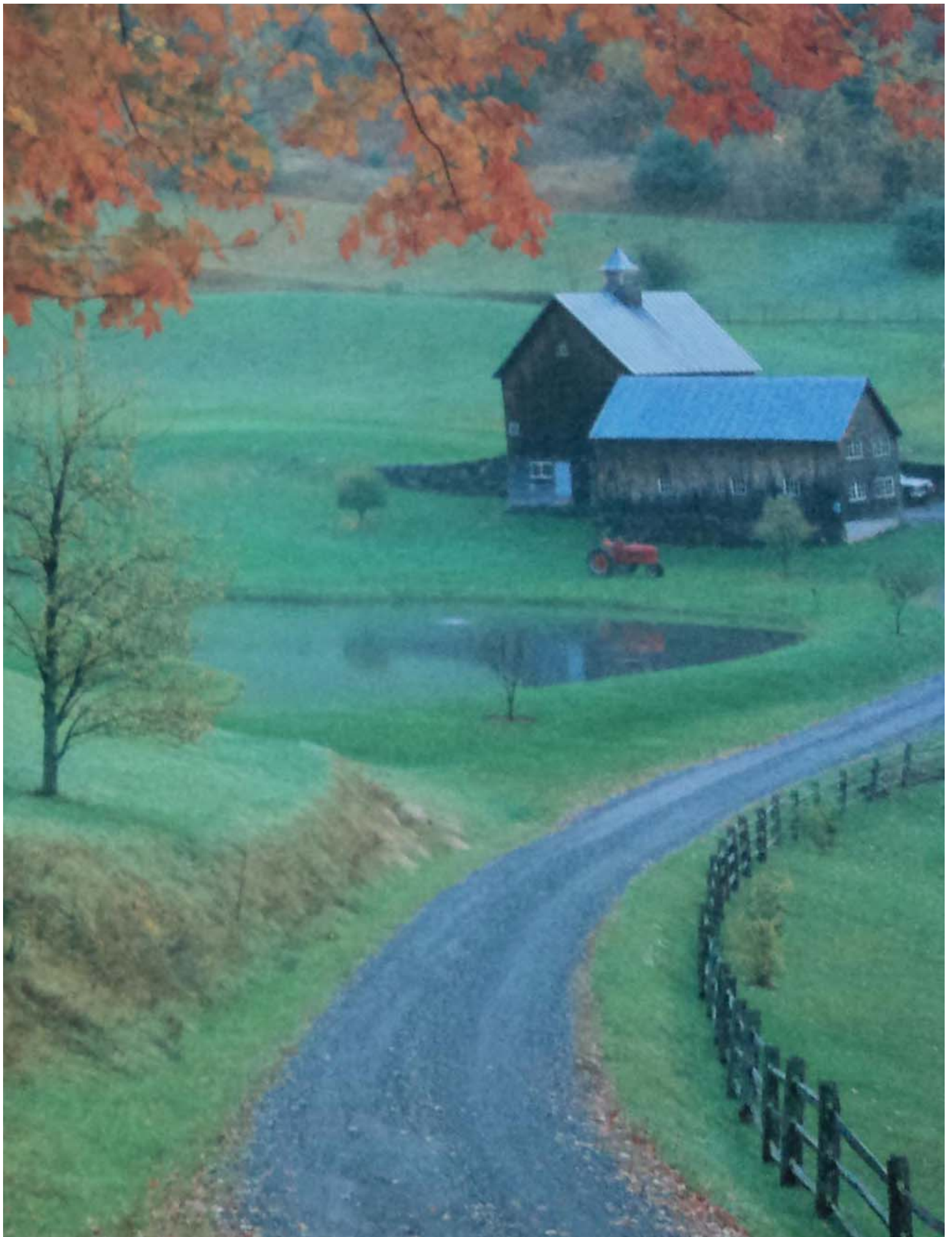
This table illustrates that one approach only cannot be used in farmland preservation. Each case is unique, and as such, needs different considerations and approaches to solve the problem. There are many methods available (fig. 3.1.2) to assist with farmland preservation. Their application must be sensitive to the specific case. Anything less results in failure.

The positive conclusion from this table is that there are tools ready to be used and many of them have been implemented with successful outcomes, proving that farmland preservation is achievable.

opposite

fig. 3.1.2 common farmland preservation tools

Multiple preservation tools, where they have been implemented, their review, why they were needed and how they were received are provided in this chart.



3.2 perspectives on farmland preservation

opposite
fig. 3.2.1 farmstead

In the Canadian context, and Ontario specifically, it is recognized that prime farmland is an invaluable resource. The loss of this land dates back to the 1950s. It was not until the 1970s that any government initiatives were put forth to address this problem. A large factor that has interrupted the process of farmland protection is obtaining a public majority perspective that the loss of prime farmland is a serious problem and that it outweighs the short term economic benefits of urban sprawl.

Groups that are against farmland preservation refer to themselves as productionists. While it seems a straightforward position to argue in favour of farmland preservation, the productionists' arguments have contributed substantially to the derailment of this movement in the past. As previously mentioned, when food security shortages due to a loss of farmland never occurred in the 1960s, this provided a strong argument against farmland preservation for the productionists. The reality of the situation was that "the success of agriculture in producing more crops with less land, labour and water resources undermined both the political and analytical basis of this rational" (E. Feitelson, 1999 in Wilton, 2007, pg.21). Essentially, when land was disappearing and provided the foundations for the argument for land preservation, farmers found their own response in order to survive. This took the form of scientific advancements in increased production. In no way are farmers at fault. It was bad timing for those in favour of farmland preservation and the productionists took advantage of the result.

Today, the productionist argument against preservation is fuelled by the fact that the loss of prime farmland is slowing down. A 1999 article by Jefferson Edgens and Samuel Stanley entitled '*Myth of Farmland Loss*', demonstrates some people's lack of concern over this ongoing occurrence. The central argument to many holding this perspective is that the loss of farmland is a myth because the rate of loss is half of what was in previous decades (Edgens and Stanley, 1999). The productionists' arguments find additional strength in that "low commodity prices, agricultural surpluses, inexpensive food imports and the overall pessimism that exists in certain agricultural land should not be protected" (Caldwell, & Dodds-Weir, 2003, p.15).

On the other hand, individuals who are in favour of farmland preservation see this movement as a priority because of the agricultural sector's role in provincial and national economies, (See Appendix A, p.175), the need for increased food production to support this country's growing population, the unique character of rural communities, and current and future farming families who have worked this land for generations. In addition, now more than ever we see a need and awareness for local food production – and this is considered such a priority that some are calling for high-rise farms (Keehan, 2011).

Currently the focus for farmland preservationists has shifted from the quantity of farmland being converted to the quality (class 1-2-3). (See Appendix A, p.175). As the countryside continues to feel constant pressure from development, this occurrence demonstrates the need for further commitment to the protection of agricultural land.

Society cannot afford to consume the farmland base for other uses in the hope that technology will be able to provide the productivity required to feed growing domestic and global populations in the hope that food importation will be an adequate and affordable alternative to domestic food supplies (Misek-Evens, M., 1992, p.9)

There is great difficulty in implementing effective tools to protect farmland. Achieving the goals the preservationists are seeking might require changing the whole approach to preservation. One individual, Rachelle Alterman, has suggested that societies should

place more emphasis on restricting the size of cities and pay more attention to the vitality and livability of existing urban centres and this in turn would serve to protect the countryside. Focus should not be on saving the farmland but on containing urban growth, (See Appendix B, p.193), the factor that is putting the most pressure on this land, and this approach would prevent the further wasteful pattern of urban sprawl that is seen today (Wilton, 2007). "An Urban Containment Movement will focus on improving urban and suburban land utilization through higher densities, infill, use of underground space, and multiple use, and will explain the importance of good land management for future generations" (Alterman, 1997, p. 238).

The collection of these perspectives demonstrate that there is still a great amount of work to be accomplished to help preserve prime farmland in Ontario.



3.3 benefits of farmland preservation

opposite
fig. 3.3.1 farm fields

Underlying the policies and movements that support farmland preservation is a recognition that it is in the public interest to protect farmland, its farmers and the farming economy. As previously discussed, it is that commitment to follow these policies that at times has wavered. The result is that Ontario possesses an incredible natural resource, prime farmland, and this farmland is disappearing. In the book, *Farmland Preservation, Land for Future Generations*, the editors, Wayne Caldwell, Stew Hilts and Bronwynne Wilton, composed a list of reasons that support treating the protection of farmland as a public interest. These include:

1. Food Production: Food is an essential human need. Life depends on it. At a national level, the ability of a country to feed itself is important, while at a local level, fresh food and choice becomes an important attribute.
2. Food Security: In the past, food security would have been thought of exclusively as the ability of a nation to feed itself, but in a post 9/11 world with threats of related international terrorism, food security takes on a new meaning. In addition, the production of food in Canada occurs under rules and regulations set by Canadians. The use of pesticides, processing and production of food in this country is under careful scrutiny by the public, media and government.
3. Economic contribution of agriculture: Agriculture and related food processing and distribution provide the livelihood for millions of Canadians. While important nationally, it is even more important in many local rural economies, where it is often the economic “backbone” of the community.

4. Stewardship and amenity of the countryside: The countryside is a resource for all Canadians. Many people take pride and enjoyment in driving through a rural landscape with a patchwork of field and crops and attractive farm landscapes. Even more important is the role farmers play in producing quality food, while striving to maintain water quality, clean air and more of Southern Ontario's natural heritage.

5. A resource for future generations: The protection of farmland is for today and tomorrow. Future generations will benefit from wise decisions made today that protect farmland for a growing population.

Specific reasons to limit the impact of non-farm development include; fragment the land base and consume farmland, be a potential source of conflict with agriculture, fundamentally change the rural community, lead to the introduction of restrictions on farmland, have environmental and servicing impacts, and detract from the rural aesthetic (Caldwell, Hilts, & Wilton, 2007, p.93-95).

These reasons are from a Canadian perspective, but this occurrence and search for a solution is happening in the United States as well. In 2003, the American Farmland Trust published an article discussing the benefits of agricultural preservation. Many of the Canadian reasons discussed by Caldwell, Hilts and Wilton were also touched upon in this paper. However, additional issues of environmental quality, heritage and community character were also listed. Environmental benefits include the food and coverage for wildlife living and travelling through fields, the benefits of natural flooding control, the protection of wetlands, water sheds and air quality. As well, natural lands absorb and filters waste water, and provide ground water recharge.

To many, the reasons for saving farmland are local and personal and much of the effort behind this movement is from the residents of these rural agricultural communities. (See Appendix B, p.193). However, some of the most important qualities such as local heritage and community character are the hardest to quantify. The preservation of farmland helps to maintain scenic, cultural and historic landscapes which create and identify the unique community character and quality of rural life. Within rural

communities, agriculture and rural architecture is an integral part of the heritage and identity. Their land is their legacy – from a look back to their past and what they value to the ability to pass this land onto future generations (American Farmland Trust, 2003).

A part of this rural preservation is the relationship between agricultural land and rural architecture. It is the combination of these two that provide the true definition of the character of a rural community. In this sense, it is not the preservation of the land alone that will assist in this preservation of identity, but the addition of rural architecture. Therefore, the preservation of farmland goes hand in hand with the preservation of rural architecture. The preservation of the land assists with the preservation of the rural identity through the protection of rural architecture and vice versa. The significance of rural architecture and why it should be preserved will be reviewed in section 3.6 and 3.7.



3.4 farmland preservation precedents

opposite
fig. 3.4.1 barns in the distance

3.4.1 ontario

Policies to protect and preserve farmland have been in development for 30 years in Ontario. The first was the Foodland Guidelines issued by the government in 1978. It was the first to identify and protect prime agricultural land and limit uses in those areas to agriculture and agricultural-related activities. In 1983, the development of policy statements with respect to land use were defined under the Planning Act of 1983. In 1994, all of these policies were replaced by the Comprehensive Provincial Policy Statement and, in 1997, the former was replaced by the Provincial Policy Statement. In 2005, the Provincial Policy Statement (PPS) was updated and now provides direction on matters of provincial interest in land use planning and is consistent with the 2005 Ontario Planning Act. Finally, the most recent policy was the Greenbelt Protection Act, 2003, in which the goal was to establish a permanent protection of a greenbelt including a combination of agriculture and rural natural environmental lands across the Golden Horseshoe Region (Caldwell, Hilts, & Wilton, 2007).

Today, the Ontario Planning Act, (OPA), provides the framework for farmland preservation policy in Ontario. The Provincial Policy Statement within the OPA, promotes an approach to planning that emphasizes the importance and priority of agriculture within rural areas. The PPS guides the development of local official planning policy and impacts the review of individual developments (Caldwell, Hilts, & Wilton, 2007). Municipalities are only required to be consistent with the PPS and this freedom is often where key aspects related to agriculture in the PPS fall short in being implemented, followed through and reviewed.

The is due to the fact that the PPS is not legislation, therefore, it is not absolute. "Where the PPS has been most successful, it has been accompanied by locally developed and supported municipal policy that was often more holistic, comprehensive and restrictive than provincial policy" (Caldwell, Hilts, & Wilton, 2007, p. 98).

In reality, Ontario does not have any legislation to support and enforce farmland preservation. The most recent legislative initiatives were the Oak Ridges Moraine Act (2001) and the Greenbelt Act (2005) which both address the concept of farmland preservation but lack any enforceability.

The Greenbelt Act has some significant problems. The misconception of the Greenbelt Act is due to the maps that illustrate the protected area. When these areas are examined at a smaller scale only a certain areas are protected and this protection varies depending on their category. The focus of the Greenbelt Act is upon environmentally sensitive areas. The reality of the Greenbelt Act is that because environmentally sensitive areas fall within farmland, this has allowed the claim to the protection of environmentally sensitive areas and farmland preservation. The problem with this occurrence is that it is not protecting farmland but restricting it. Private property (i.e. farmland) receives a designation of a sensitive area. The 'protected' farmland can no longer be used because it has been identified as environmentally sensitive and additional land surrounding the identified area has to conform to strict restrictions, therefore it can no longer be used. In essence, the Greenbelt Act has 'protected' farmland by taking it out of production and has caused numerous problems for farmers on their own private property.

Due to the Greenbelt Act being a relatively new piece of legislation, this results in it not being fully integrated into current official city plans. Whether the Greenbelt Act is eventually to be included in future plans for towns and cities, the fact remains that it lacks any guidance to truly protect Ontario's prime farmland. Therefore, Ontario needs to depart from its previous means of protection through policy and adopt legislation that includes clear goals that protect prime farmland, is accountable, and enforceable. There is opportunity to establish farmland protection tools that work.

3.4.2 british columbia

Canada has examples of provinces where farmland preservation has been addressed and implemented successfully. One of these provinces is British Columbia. The B.C. Agricultural Land Commission Act (1973) is one of most important pieces of land use legislation passed by the British Columbian legislature. This Act provided a program to preserve the province's limited prime agricultural land. By protecting the prime agricultural lands, the Act also played a role in sustaining economic and social benefits at both the local and provincial level for agriculture and assisted with preserving the character of rural and farming communities.

In British Columbia, less than 3% of the province's land has any agricultural capability.

British Columbia, in 2001, only accounted for 3.8% of Canada's land in farm use. But as an indication of the quality of its agricultural land base and intensity of use, B.C. accounted for 6.0% of Canada's total annual gross farm receipts, 8.2% of all farms, 6.7% of all dairy cattle, 14.9% of all chickens and hens, and 18.7% of all land growing fruits, berries and nuts (Statistics Canada, Census of Agriculture, 2001 in Smith, 2007, p.117).

The narrow valleys that give this province its unique landscape are the most agriculturally productive and hold significant wildlife habitats and environmentally sensitive areas. Historically, most settlement occurred here, directly associated with the prime agricultural land, similar to settlement trends in Ontario. The mountain/valley landscape provided a strong visual realization of the realities of the growing urbanization. Concerns for the loss of farmland, food security, emergence of regional planning, student interest in the relationship between planning and resource

management and many others influenced the development of British Columbia's agricultural land preservation program (Smith, 2007, pg118).

The 1972 provincial election was essential to this program's creation and implementation. This election was won by the NDP and they were quick to move on their election promise to protect farmland. On November 29, 1972, just two months after the election, David Stupich, Minister of Agriculture, spoke to a British Columbia Federation of Agriculture (BCFA) convention and stated that, "I would not advise anyone to invest in farmland with any intentions to develop it for industrial or residential purposes" (Vancouver Sun, Feb. 3, 1972 in Smith, 2007, p.122).

British Columbia's farmland preservation formally began in December 1972 when the NDP government enacted Order-in-Council 4483 under the Environmental and Land Use Act. This was done quickly after David Stupich's speech to the BCFA due to a rush of re-zoning and subdivision applications involving farmland (Vancouver Sun, Feb 3, 1973, in Smith, 2007). This order prohibited the further subdivision of land taxed as farmland and lands deemed to be suitable for cultivation of agricultural crops (Order-in-Council 4483, 1972, in Smith, 2007). In January 1973, further clarification was given and declared that non-agricultural development was not permitted on any land of 2 acres or more that was taxed as farmland, zoned as farmland by a municipality or had a CLI agricultural classification Class 1-2-3 or 4 (Order-in-Council, 157, 1973, in Smith, 2007). The combination of these two orders halted both subdivision and non-farm use of agricultural lands in British Columbia. These actions became commonly referred to as the 'farmland freeze'.

The Land Commission Act was enacted on April 18, 1973. "The primary role of the Commission was to preserve agricultural land. The original Act, however, also gave the Commission the additional objectives of establishing green belt, land bank and park land reserves along with Agricultural Land Reserves (ALR)" (Smith, 2007, p.126). The creation of the ALR took input from the Department of Agriculture, their knowledge of farming in the province, the identification of critical lands (with help from the CLI, but not strict compliance), that were not already urbanized

combined with proposed urban expansion (on lower capability and non agricultural land), and consideration of 5 years of future urban growth which would provide a period of transition for local governments to reorganize community plans (Smith, 2007). After many reviews and revisions, the ALR plans were approved and designated on a regional district-by regional district basis. The farmland freeze Orders under the Environment and Land Use Act were lifted and zoning under the Land Commission Act was then applied (Runka, 1977 from Smith, 2007, p.132). Figure 3.4.2 illustrates the identified agricultural land reserves within the province of British Columbia. In total, this Act was able to preserve a large majority of agricultural land in B.C. Figure 3.4.3 summarizes and compares the total area classified and the total area identified in the ALR.

By any measure, British Columbia's program to safeguard the province's scarce farmland resource has met its preservation objective and reduced significantly the conversion of B.C.'s farmland to urban and other non-farm uses. The estimated loss of as much as 6,000 hectares of prime agricultural land annually has been reduced, on average, to about 600 hectares since the establishment of the ALR (Smith, 2007, p.158).

The comparison of the Ontario and B.C. precedents illustrate that farmland preservation is clearly in the hands of legislators. In the case of British Columbia, clear policies were passed that halted traditional sprawl in order to protect the remaining prime farmland but also provided a compromise to allow responsible urban growth. In Ontario, policies are in place that recognize this problem and offer at best conceptual solutions. Ontario policies that address land use are discussed in the next section.

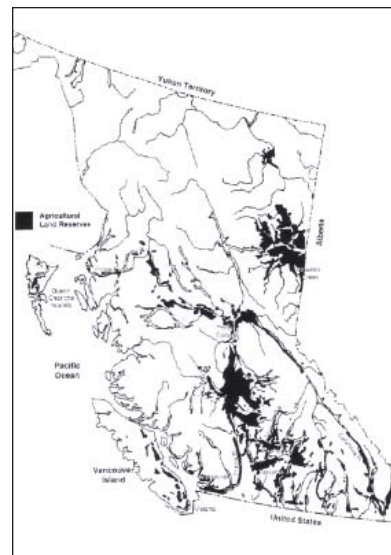


fig. 3.4.2 **agricultural land reserves in british columbia**

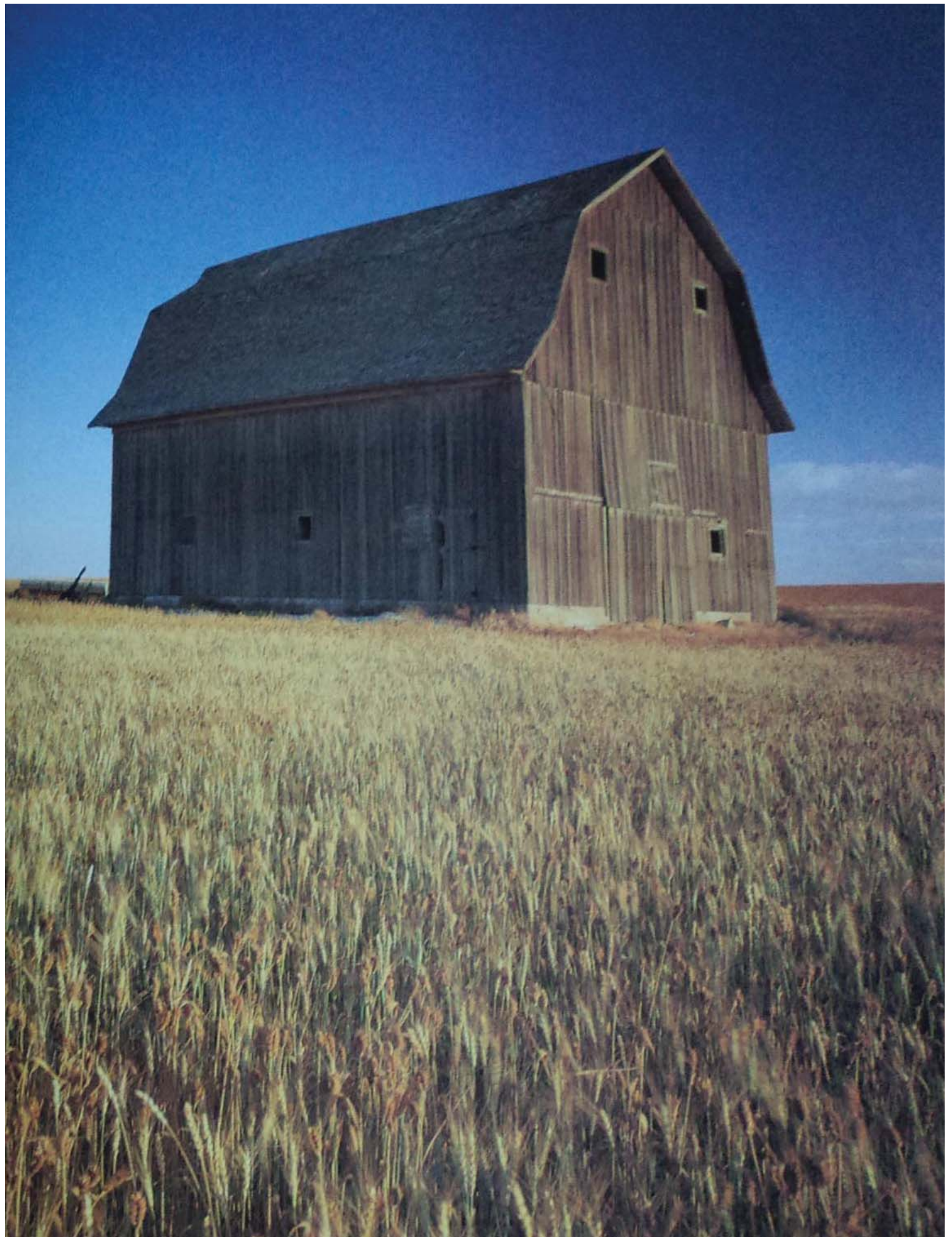
The area of prime farmland that has been saved under the Agricultural Land Reserves within the province of British Columbia.

Total CLI Agriculturally Classified and ALR
Lands in British Columbia (hectares)

CLI Agricultural Classification	Total Area Classified	Land in ALR	ALR as a % of lands Classified
Class 1	69,989	52,920	75.60%
Class 2	397,634	289,079	72.70%
Class 3	999,644	692,090	69.20%
Class 4	2,131,581	1,409,080	66.10%
Class 5	6,137,47	1,468,100	23.90%
Class 6	5,357,781	43,560	8.10%
Class 7	14,898,572	167,540	1.10%
Water		88,890	
Total	29,992,071	4,599,259	

fig. 3.4.3 **total CLI agriculturally classified and ALR Lands in british columbia (hectares)**

This table summarizes that the Commission was able to secure 70% of the province's prime (Class 1-2-3) land within the ALR.



3.5 legislation

A variety of policies have been created in Ontario that include sections that address the issue of farmland preservation. The following is a brief overview of each policy.

3.5.1 ontario planning act, 1990

Municipalities are not autonomous bodies and their power to make local planning decisions is limited to the terms stated in this provincial legislation. The Ontario Planning Act provides the framework for farmland preservation policy in Ontario. It guides municipal land use planning and establishes the basis for provincial policy. Certain authority is assigned to municipalities through the Act, yet the province maintains an overriding role by requiring that consideration is given to the provincial interests as stated in the Provincial Policy Statement. (Caldwell, Hilts, & Wilton, B., 2007) This statement reflects the requirement for a relationship between municipalities and the province.

3.5.2 provincial policy statement (PPS), 2005

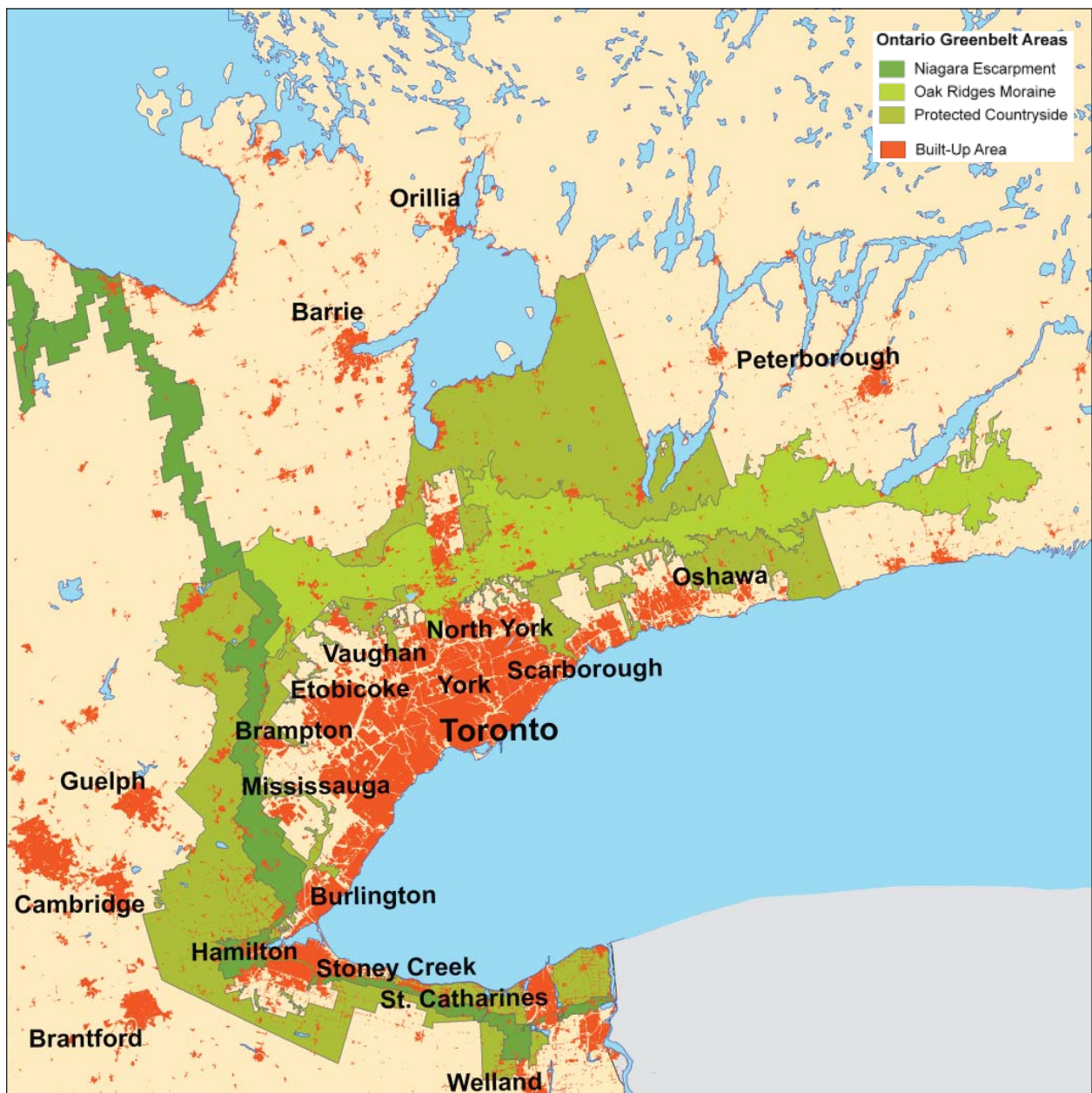
The Provincial Policy Statement (PPS) provides policy direction on matters of provincial interest related to land use planning. The PPS is intended to promote a policy-led system to ensure the long term, wise use and protection of the province's resources. From the provincial viewpoint, the Provincial Policy Statement promotes an approach to planning that emphasizes the importance and priority of agriculture within rural areas. The PPS guides the development of local official planning policy and impacts the review of individual developments (Caldwell, Hilts, & Wilton, 2007).

opposite

fig. 3.5.1 barn among field of wheat



fig. 3.5.2 provincial policy statement (PPS)



Section 2.1 of the PPS covers aspects of planning around agricultural land such as non-agricultural uses, agricultural protection, and minimal distance separation. Under this section, the PPS makes it clear that agricultural protection is an essential matter of public interest. Over the years, the Provincial Policy Statement has evolved into a very concise document. However, what is missing is how these policies are to be implemented, monitored and reviewed. This leaves these policies open to a wide range of interpretation at the municipal level.

3.5.3 greenbelt act, 2005

The Greenbelt Act addresses the growing region of the Golden Horseshoe and identifies where urbanization should or should not occur. The focus of this Act is ecological features and functions occurring within this landscape. The Greenbelt Plan includes a significant amount of land along with the ecological protected areas provided by the Niagara Escarpment Plan (NEP) and the Oak Ridges Moraine Conservation Plan (ORMCP). The additional Protected Countryside lands identified in this Plan link together the Niagara Escarpment and Oak Ridges Moraine (Greenbelt Plan, 2005). Agricultural protection, environmental protection, culture, recreation and tourism, settlement area, infrastructure and natural resources are all matters discussed within this act. In regards to farmland protection specifically, major problems are associated with this Act (discussed previously in 4.3.1).

3.5.4 oak ridges moraine conservation act, 2001

The Oak Ridges Moraine Conservation Act is a plan established by the Ontario Government to provide land use and resource management direction for the 190,000 hectares (1900 sq. km) of land and water within the Moraine. This ecological and hydrologically sensitive area needed an intervention to monitor development, preserving it for future generations. The plan sets out a framework for protecting the area defined in this Act. However, municipalities are responsible for the implementation of the Provincial Policy Framework within local official plans and ultimately have the last approval for decisions of development (residential, commercial, industrial) applications.

opposite

fig. 3.5.3 the ontario greenbelt

The three green-shaded areas represent the three areas of protection within the Ontario Greenbelt.

3.5.5 niagara escarpment planning and development act, 1973

The Niagara Escarpment Planning and Development Act established a planning process to ensure that this vital area would be protected. The Niagara Escarpment Plan emerged from this Act which set out objectives that seek to find a balance between development, preservation and enjoyment of the area. It also includes policies for seven land-use designations including Natural, Protection, Rural, Recreation, Urban, Minor Urban and Mineral Resource Extraction. It also provides development criteria and objectives for parks and protected areas identified in this plan.

3.5.6 places to grow act, 2006

The Places to Grow Act helps the Ontario government plan for growth in a coordinated and strategic way. It gives the authority to designate any geographic region of the province as a growth plan area, and to develop a growth plan in consultation with local officials, stakeholders, public groups, and members of the public. The legislation attempts to ensure that growth plans reflect the needs, strengths and opportunities of the communities involved, and promotes growth that balances the needs of the economy with the environment. (Places to Grow Act, 2006)

3.5.7 growth plan for the greater golden horseshoe, 2006

The Growth Plan for the Greater Golden Horseshoe has been prepared under the Places to Grow Act, 2005. It is a framework for implementing the Government of Ontario's vision for building stronger prosperous communities by better managing growth in this region to 2031 (Growth Plan for the Greater Golden Horseshoe, 2006). This plan sets region-wide standards for growth and development. However, it is up to the local governments to identify and address local circumstances and interpret these standards and apply them to the situation.

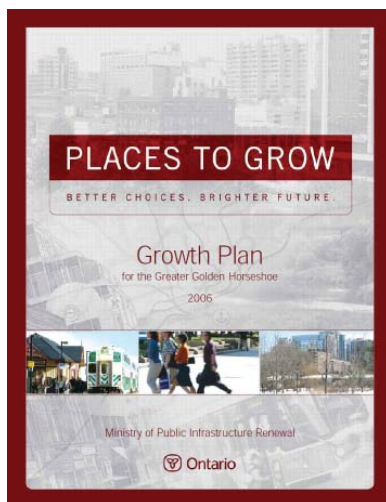


fig. 3.5.4 growth plan for the greater golden horseshoe

3.5.8 greater toronto area agricultural action plan

The Greater Toronto Area (GTA) Federation of Agriculture and GTA Regional Chairs, with assistance from the GTA Regional Planning Commission, came together over the concern for the long term sustainability of agriculture in the GTA. They proceeded to work on an overall GTA Agricultural Action Plan addressing economic development, education/marketing, land use/policy and accountability and responsibility. This plan recognizes the loss of farmland in the GTA, land use and labour pressures faced by farmers and the value of sustaining a viable food production industry near a large urban centre. (Greater Toronto Agricultural Action Plan, 2005).

3.5.9 ontario farmland trust

The Ontario Farmland Trust is a non-government, non-profit, charitable organization that has been established to work with farmers, rural communities and other parties to promote protection of farmland in the province of Ontario. The mission of the Ontario Farmland Trust is to protect and preserve farmland and the associated agricultural, natural and cultural features in the countryside and to research and educate to further the preservation of these lands for the benefit of current and future generations. Their vision is for an Ontario that includes a healthy and vibrant agricultural landscape that provides a safe and local supply of food for all Ontarians now and in the future. (Ontario Farmland Trust, 2011).



fig. 3.5.5 ontario farmland trust logo



3.6 significance of rural architecture

The farmstead is a cultural icon appearing within the rural landscape and represents Canadian agrarian heritage. The various structures that make up the farmstead; the farmhouse, barns, sheds and silos, take on an imprint of their occupants through both functional and aesthetic additions and modifications. This relationship demonstrates the vernacular qualities of this architecture which has been adapted to local needs, preferences and climate.

The farmhouse was crucial to the survival of new settlers coming to Canada. As these new residents cleared the land, worked the fields and eventually started to grow crops, the farmhouse was a “refuge, a safe environment that was grounded in purity, honesty and simple virtues” (Larson, 2006, p.6).

There is no doubt that an emotional connection exists between a farm family and their farmstead which is often passed down from generation to generation. This relationship is inspiring for it can demonstrate to suburban residents the sentiment of rural farmsteads; their simplicity, honesty and beauty.

A great deal of the appeal of rural architecture is the clarity of their forms and the gracefulness of the structures. They are true representations of forms that resulted from strong functional requirements.

When a farmstead is described, the vision is not of a house alone, but instead, a collection of buildings. This collection of carefully placed structures resembles that of a rural community setting (Larson, 2006). Together these buildings become a part of the

opposite

fig. 3.6.1 20th century barn with addition



fig. 3.6.2 a farmstead
1909 farmhouse and classic red barn.



fig. 3.6.3 farmhouse with windmill



fig. 3.6.4 barn with silo

surrounding landscape but each still maintains a logic of the use they provide.

Typical characteristics of the farmhouse are described by Jean Rehkamp Larson. The placement was done with care, considering the best location that would minimize environmental issues such as the midday sun and harsh winter winds. It was usually built of local materials by local craftspeople. As the land was cleared, the fieldstones formed the foundations and walls, and the trees provided lumber for beams, shingles, and flooring. The overall form, as previously mentioned, was generated by program, site and climate - an early example of form follows function. This is evident in the interior layout of spaces and also construction such as right angles, 45 degree sloped roofs, all techniques achieved with simple man powered construction (Larson, 2006).

Similar to the farmhouse, the barn was required to satisfy the storage of crops and animals. In *The Barn, A Vanishing Landmark in North America*, by Eric Ross Arthur and Dudley Witney, the authors discuss the natural inclination of the architect to speak of a barn's purity of line, scale, proportion and to extol their simple materials, simply chosen and artfully joined together. Despite all of these observations, they also suggest that barns are perfectly capable of speaking for themselves. The most spectacular aspect of barns is that they "are all fine buildings, designed by men who didn't know they were designers - but who understood intuitively what kind of structure they needed" (Arthur & Witney, 1972, p. 7).

The barn is a type of architecture indigenous to the southern Ontario region. It is an "early marvel of a low-tech, common sense approach to building performance" (McMinn & Polo, 2005-2006, p. 42). The use of the barn compliments its efficiency. The solid foundations of the barn are an example of thick wall construction which keeps it cool in the summer and warm in the winter. In the winter, livestock are placed in the bottom of the barn, their heat and moisture keeps the foundation stable and hay storage above acts like insulation and keeps the animals below warm. The ventilation through the barn boards helps to dry hay and keep it cool to prevent it catching on fire. In the summer, the top half of the barn is usually empty and the spacing between the barn

boards allows for ventilation which helps to keep the building cool for the livestock.

Today, compliments to farmstead buildings have emerged. The first is in contemporary architecture, where some designers respond to place, materials, styles, structures and proportions in their work using the same strategies as vernacular farmstead architecture. Another trend is the adaptive reuse of farm buildings. Many people and architects have realized their cultural significance and embodied energy. As land use changes, these original farm buildings now serve as homes, public amenities and civic spaces, rather than being abandoned or destroyed. This is in keeping with a trend to recognize both the cultural significance and the value of the embodied energy of existing buildings.

“A man’s barn bespoke his worth as a man. It expressed his earthly aspirations and symbolized the substance of his legacy to his children” (Arthur & Witney, 1972, p.8). Recognizing the relationship between a man and his farmstead is crucial in identifying the importance of this architecture and this land to the identity of agriculture and rural communities. This significance is essential to this thesis and will be explored in the design project.



3.7 why preserve rural architecture

Many reasons exist for preserving rural architecture. They may include a combination of emotional connections, social, cultural, economic and environmental factors. Nevertheless, preservation is a tool that assists with maintaining a tangible reminder of the past.

As much as these rural farmsteads and landscape are importance to Canadian identity and culture, there is a lack of history, interest, and appreciation of this architecture. The location in relation to urban centers and a lack of understanding of the agricultural culture has not benefitted the identification of the significance of these structures. Because these structures cannot be identified with a specific historic significance or provide a program that is of interest to the general public, these structures are viewed as irrelevant to the changing landscape.

The farmstead is truly unique. The buildings do not need to become obsolete structures once their agricultural program has vanished. These pieces of rural architecture are significant to a farm family's culture and history. Their existence is an example of a construction that is few and far between. They are renewable resources that have great potential for a new life when a new program is introduced. Their structure of solid wood dimensional lumber is rare and no longer available.

The rural farmstead resulted from a "well stated function, without frills, built within narrow restrictions of materials and methods" (Arthur & Witney, 1972, p. 7). The significance of this rural architecture is the extraordinary relationship between man, land

opposite

fig. 3.7.1 **remains of a barn**

All that remains of the barn is its structure, some roofing and minimal exterior cladding after years of abandonment.

fig. 3.7.2 **remains of a farmhouse**

The farmhouse still stands after years of being abandoned.



and the built form.

The preservation of rural architecture allows for a physical and visual reminder of our agrarian heritage. Within the rural landscape, these buildings – barns, farmhouses and outbuildings are significant aspects that help support the rural community's cultural identity. From some perspectives, this preservation may seem like a romantic notion, however to rural residents, this architecture speaks of their heritage and contributes to the feeling of a sense of place.

In *What Time is This Place?*, Kevin Lynch argues that there is a need for preservation or adaptive reuse in a changing landscape, “stable symbolic focuses - a church, a rock, an ancient tree - can help to ‘hold’ a shifting scene” (Lynch, 1972, p.110). In the context of this thesis this quote can be applied to the current situation where many pieces of rural architecture literally stand before a changing landscape, one of farmland to urban use, and watch as their destiny - one of destruction - comes toward them.

The design component of this thesis takes the idea of preserving rural architecture and explores how it can be maintained as a focus among its new surroundings. The intent of this type of preservation is to provide the opportunity to maintain an architecture that can teach all Canadians about this country's agrarian heritage, maintain physical precedents for vernacular architecture and serve as a catalyst to influence future land use decisions to protect this country's precious agricultural lands. Through featuring this architecture, the non-rural population can obtain an understanding of the importance of both rural heritage and the productive landscape.

3.8 legislation for building preservation

The Ontario Heritage Act helps municipalities and the provincial government designate historically significant individual properties and districts. Part IV is used to designate a historical property and Part V designates heritage conservation districts.

The general conservation cycle has three stages. The first is to identify the site as a heritage site. Archaeological, architectural and historic research is conducted. Once designation is complete, a property owner must apply to the local municipality for a permit to undertake alterations to any of the identified heritage elements of the property or to demolish any buildings or structures on the property. They must also work in conjunction with the local official city plan.

The second stage is protection and preservation. For properties or districts, they are protected through measures that may include repair, restoration, maintenance and conservation easements. Conservation is a sensitive task to undertake. Various approaches are used depending on the building, site or future use. In Canada, *The Standards and Guidelines for the Conservation of Historic Places in Canada*, is essentially a manual to help direct how to conserve a historic property.

The last stage is interpretation and use. Depending on the type of designation, future use of the building or site play a significant role in its conservation or preservation. One important item to distinguish is the difference between conservation and preservation. Conservation refers to the prolonging of the life and integrity of the original quality of the architectural character. Any changes are done so under strict guidance to ensure they reflect



the time period's materials and construction techniques etc. Preservation on the other hand, seeks to preserve the original architectural character but also embraces the changes of the building over time to allow it to become functional again. Preservation is often associated with restoration or rehabilitation and often results in adaptive reuse.

Therefore, if a building is historically designated under the Ontario Heritage Act, it can be restored but only by following *The Standards and Guidelines for the Conservation of Historic Places in Canada*.

Other buildings that are not designed as historical, but hold significance to a community, family or neighbourhood, still have the option of preserving it, but with more freedom.

This can be completed with adaptive reuse. This method is closely related to the field of preservation. It can be regarded as a compromise between historic preservation and demolition. Adaptive reuse is the process of adapting an old structure for purposes other than what it was initially intended for. This method is also an efficient and environmentally responsible way to redevelop older buildings rather than to build new ones.

Adaptive reuse will be utilized in the design portion of this thesis. After identifying the significance and importance of rural architecture, the strategy of adaptive reuse will be essential in addressing the preservation of a rural farm building.

opposite

fig. 3.8.1 adaptive reuse of a barn

The potential of reuse that the large space of this barn provides. This particular example is a former barn that is now a museum.

fig. 4.0.0 (opposite)

perspectives

chapter 04

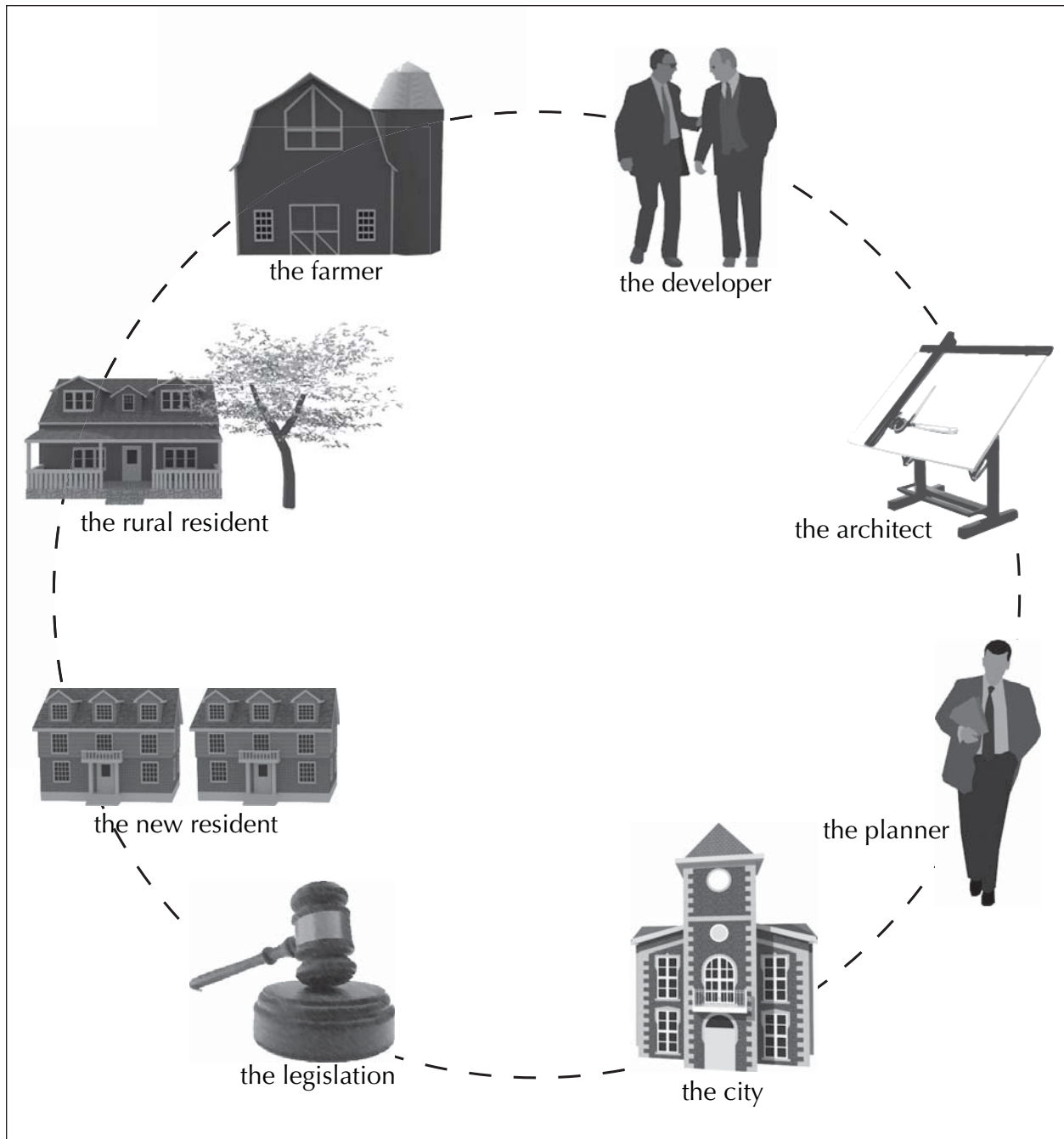
How is it possible that a man who owns 240 acres of prime farmland just outside the city, the envy of developers, should worry about passing it along to his children intact?

*John Hildebrand Mapping the Farm
(from Bowers & Daniels, 1997, p.217)*

It is precisely here, at the edge of development, that sensible and informed farmland and open space preservation policies must be inaugurated.

*Peter Wolf Land in America
(from Bowers & Daniels, 1997, p.133)*





4.1 introduction

This chapter will consider the perspectives of all those involved in the conversion of farmland to urban uses. This collection of perspectives demonstrates the realistic obstacles that the movement of farmland preservation faces. These perspectives include the farmer, the developer, the architect, the planner, the city, the legislation, the new resident and the rural resident.

4.1.1 the farmer

Most farmers are in favour of the concept of farmland preservation. The goal to protect farmland is encouraged among the farming community. It would help with the ability to hand down family farms to the next generation and would also strengthen the agricultural industry locally, provincially and nationally.

Many farmers are concerned with how farmland preservation is implemented. Often the tools that are used such as land trusts or protected areas (i.e. the greenbelt) take away their property ownership or rights. This causes problems because it does not permit the sale of the land in the future or makes farming difficult due to all of the environmental restrictions.

In some areas, such as the Region of Peel, the land value has become inflated due to urban sprawl. In order to continue farming, farmers have to sell portions of their land that are close to the urban boundary. Usually, selling 50 acres provides them with enough capital to buy 200 acres farther north and continue farming for 2 to 5 more years. These farmers are leery of farmland preservation because it would deflate the land value and this would financially ruin many farming families.

opposite

fig. 4.1.1 the participants

All the groups involved in the consideration of farmland preservation.

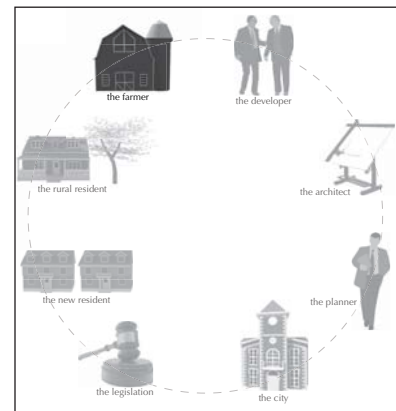


fig. 4.1.2 the farmer

In favour of protecting farmland but not by taking land away from its owner.

The approaching development for some is seen as their future retirement fund, but many would prefer to not have to sell at all. Developers essentially force the situation. The precedent has been set in this community that it is better to eventually sell out than fight against it.

The concept of farmland preservation is perceived as positive, but the concern that arises among the farming community is how it will be implemented. The farming community suggests focus be placed on stopping urban sprawl rather than preserving farmland. Farmland preservation must be sensitive to a number of factors which include location, age of farmer, type of farming and the preservation approach.

4.1.2 the developer

The majority of companies that purchase agricultural land with the intent of converting it into residential, commercial or industrial uses are only concerned with the bottom line – their potential profits. The developments that have been created throughout the Greater Toronto Area speak for themselves - low density, maximized lot creation which results in maximized profits for the developer. The ‘design’ of these developments also indicates their poor response to their context and minimal inclusion of community amenities.

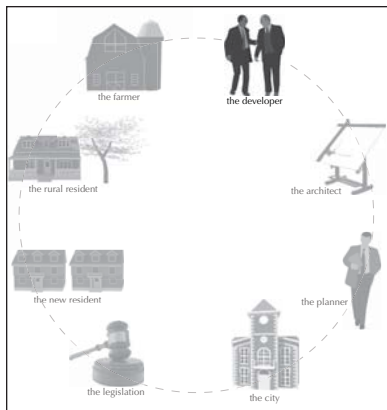


fig. 4.1.3 the developer

Their focus is on the profits. The developers response to any negative impacts due to their developments is that they followed all legal channels so the blame should not be placed on them.

Developers justify their actions by claiming they paid market value, sometimes more, for this land, and if this development should not have occurred it was up to the planning department to have denied their proposal. Therefore, they are not at fault for the consequence of their developments consuming farmland and any opposition to what they are doing should be directed at the local government and planning process/approval department.

There exists a small minority of individuals, many of them professionals, who take upon the role of a developer but with the intent to develop an alternative housing design that incorporates the agricultural land that they build on. One example of this type of project is Troy Gardens which will be further explored in Chapter 5.

4.1.3 the architect

Architects in this situation are often part of a large group of designers within a firm which is hired to complete the design for the developer. Some may feel that what they are doing is not in the best interests of the land, rural community or new residents, but they are not in the position to say otherwise. Most often, firms submit what is expected by their client, the developer, and collect their fees. If a firm takes on this type of project they could propose something alternative, but risk losing the project. Firms that do not take on these types of projects either choose not to because of their understanding of the issues surrounding urban sprawl or are not a firm with the resources to complete this type of project.

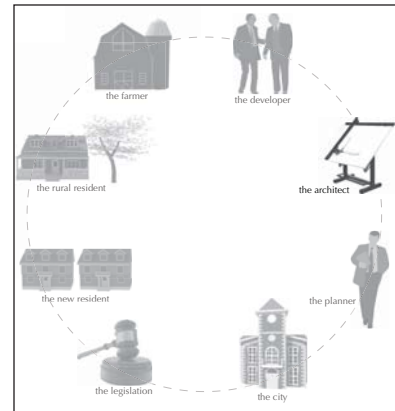


fig. 4.1.4 **the architect**
Business is business, but at what cost?

4.1.4 the planner

The planner works for the planning department of a city and is part of a group that is responsible for developing the official plan for a city. This includes zoning and maintenance of an overview of the concept for the city. These plans are supposed to reflect goals set out in provincial legislation such as the Ontario Planning Act and Provincial Policy Statement. The official plans that emerge from these cities often acknowledge the importance of open spaces for the enjoyment of its residents and sometimes specifies agricultural land. However, often it is not reflected in what is actually approved.

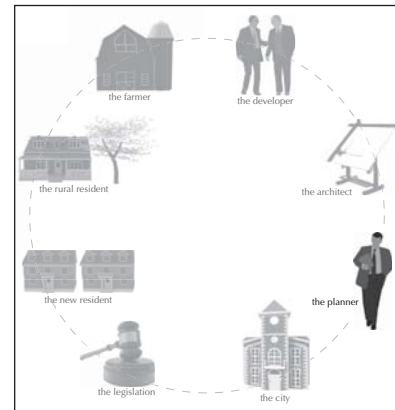


fig. 4.1.5 **the planner**
Development is good for the city.

One can assume that the reason that there is a gap between the provincial legislation and actual construction outcome in cities is that it revolves around the political idea of development. More residents means a larger tax base for the city. Subdivision proposals are common which means less work for public workers due to the routines established from previous projects, and zoning and by-laws conflicts are kept to a minimum.

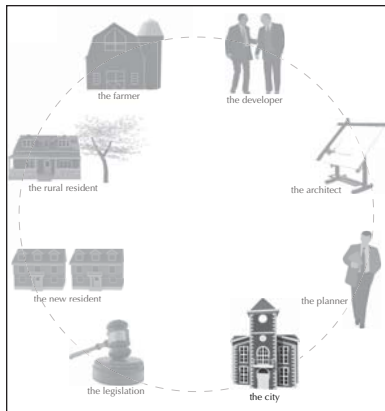


fig. 4.1.6 **the city**
The power to make changes lies in the hands of city officials.

4.1.5 the city

This perspective is unique because officials within this category have a significant amount of power. Official city plans developed by planning departments should address the issues of urban sprawl and farmland conversion and outline goals to solve it. The power exists through legislation to modify these plans until they reflect these goals. Officials holding this power should act more responsibly by denying proposed developments that are low in density, consume farmland, and only provide the minimum of public amenities.

Official city plans reflect the individuals who compose these government documents. As rural residents and farmers become minorities within local government, concerns such as farmland are not a priority. This is reflected in official plans and allows continuous approval of residential developments.

Positive credit can be assigned to the group of local government officials that approve projects such as Troy Gardens. These types of projects would never exist if it had not obtained the approval of its local planning committee. This demonstrates that there is hope for alternative residential design proposals. Also, some official city plans are being redesigned to address this issue. Waterloo for example is currently proposing a development boundary within its new official plan. This will be reviewed in Chapter 5.

4.1.6 the legislation

Multiple pieces of legislation exist that identify the importance of protecting farmland. These include the Ontario Planning Act and Provincial Policy Statements. The weakness in these documents is their interpretation and implementation at the local level. No enforcement exists to ensure that official city plans reflect the goals set out in these provincial documents and there are no consequences if they do not comply. The intent at the provincial level exists but it is lost at the local government level.

This can be attributed to the fact that official city plans developed at the city level have many stages to overcome before they are

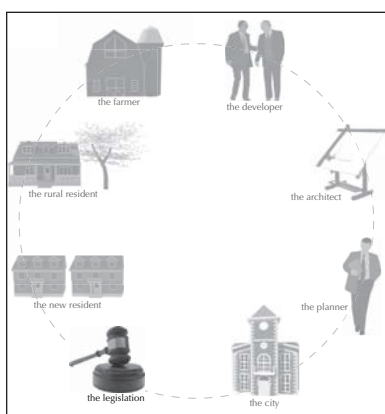


fig. 4.1.7 **the legislation**
Intent is present but the implementation and enforcement needs improvement.

completed. Drafts designed by local governments must be submitted to the provincial government for approval. The largest obstacles to overcome are the appeals by groups, such as the homebuilders association, and multiple public meetings. Therefore, to create an official plan that addresses urban sprawl is a difficult and long process.

Unfortunately, legislation such as The Greenbelt Act was composed with little input from working farmers. This has caused numerous conflicts for farmers whose farmland or portions of their farmland fell within designated areas. Also, the 'greenbelt' gives the impression that this open space is open to the public. It is not. It is still private land adding to frustration for farmers.

4.1.7 the new resident

The issue of urban sprawl and the loss of farmland is usually not obvious to new residents (or suburban residents) of residential developments. People keep moving into the suburbs where houses are cheaper and larger than ones in the city, and have more property. Ignorance is bliss.

4.1.8 the rural resident

Rural residents are often those who grew up in a small town or village and have lived there for generations. Although they might not be farmers, they feel a part of the rural versus urban conflict because they understand the dilemma that urban sprawl causes for agriculture. The lifestyle of living in rural communities is slowly disappearing due to urban sprawl. The peaceful, quiet, star filled night sky, clean air and countryside is disappearing. It is now replaced with pollution (air and light), traffic, noise and endless residential developments. House prices rise as rural houses get closer to the urban boundary. This is beneficial at the time of selling, but this causes taxes and insurance rates to rise. The low cost of living that may have once attracted someone to rural communities and areas initially, or those who have lived there for generations, find the rising costs are too much and are often forced to put their houses up for sale.

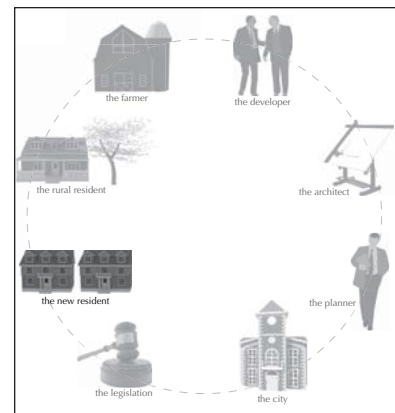


fig. 4.1.8 the new resident
Ignorance is bliss.

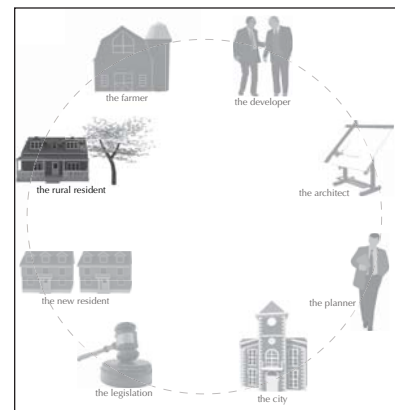


fig. 4.1.9 the rural resident
The rural lifestyle is slowly disappearing.

fig. 5.0.0 (opposite)

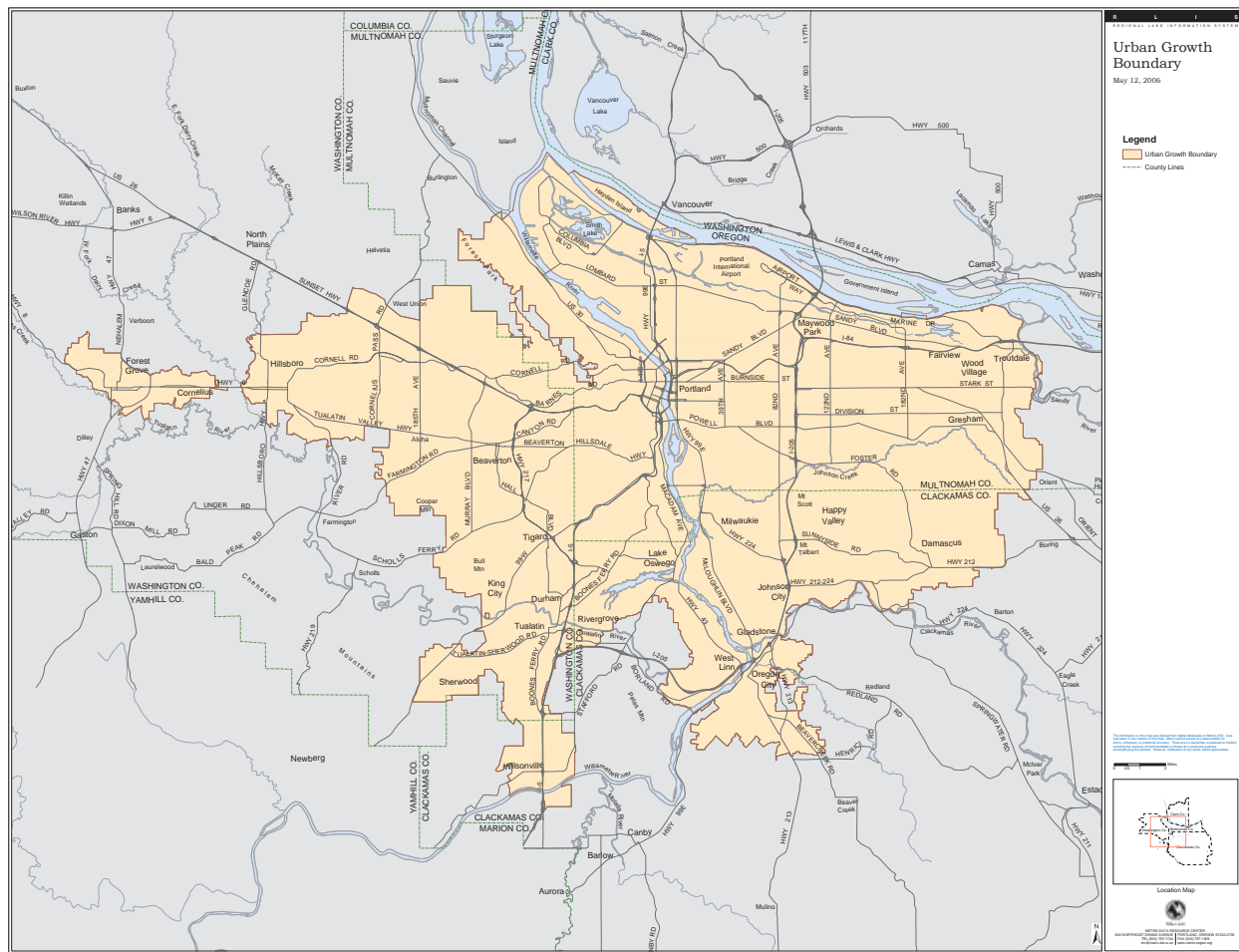
precedents

chapter 05

History teaches us that civilization is measured by the degree to which any society has been able to use its tools; and the perfection of these tools to create a cohesive culture.

*Hancock, 1974
from (Fuller, 1985, p.101)*





5.1 urban growth

The precedents in this section review approaches to urban growth management. The purpose of researching these approaches is to collect strategies that could be integrated into the design proposal.

5.1.1 portland, oregon

Portland, Oregon leads the way in planning and policy that addresses the issue of urban sprawl. Urban growth boundaries were created as a part of a state wide land use planning program in the 1970s. These boundaries separated urban land from rural land which controlled urban expansion into farm and forest land. Governor Tom McCall, along with farmers and environmentalists, headed this movement and were successful in convincing the Oregon legislature in 1973 to adopt state wide land-use planning laws that would prevent the countryside around cities from being lost to urban sprawl. The guidelines under these laws required that every city establish urban growth boundaries, use urban land wisely and protect natural resources (Metro Regional Government, 2011).

The location of the urban growth boundary (fig. 5.1.1) involved more than drawing a line on a map. Numerous plans and growth projections for different counties, cities and special districts had to be accommodated. Today, 1.3 million people live within this urban growth boundary and it encompasses approximately 256,360 acres (1037 sq.km).

The application of this planning tool - an urban boundary - has been successful in protecting farms and forests from urban sprawl.

opposite

fig. 5.1.1 portland, oregon urban growth boundary

A clear boundary was created to halt urban sprawl surrounding Portland, Oregon. The boundaries have been expanded multiple times but only for 20 acres or less.

increased inside the boundary. According to the Metro Regional Government for the Portland Metropolitan area, other benefits of this urban boundary include:

1. Motivation to develop and redevelop land and buildings in the urban core.
2. Assurance for businesses and local governments about where to place infrastructure needed for the future and
3. Efficiency for businesses and local government in terms of how that infrastructure will be built, and money is spent on improving existing roads, transit service and other services more efficient rather than the building of continuous roads (Metro Regional Government, 2011, www.oregonmetro.gov).

It is required by state law that within this urban boundary a 20 year supply of land for future residential developments is available. Every 5 years a review of the land supply is conducted and the boundary is expanded if needed. The original land use laws were passed with an understanding that the boundary would never be static. Since its creation in the mid 1970s, the boundary has been moved 3 dozen times. Most moves were small, 20 acres or less. Approval for larger additions has been given only 3 times.

The method in which Portland has addressed urban sprawl is unprecedented. It demonstrates that all levels of government must be in agreement on the issue and legislation must be clear, quite literally drawing a line to reduce urban sprawl. The strategy Portland has embraced is an excellent example of compromise. It is one that protects its countryside, but also has an understanding that a city must grow and will let it when it is required.

5.1.2 waterloo, ontario

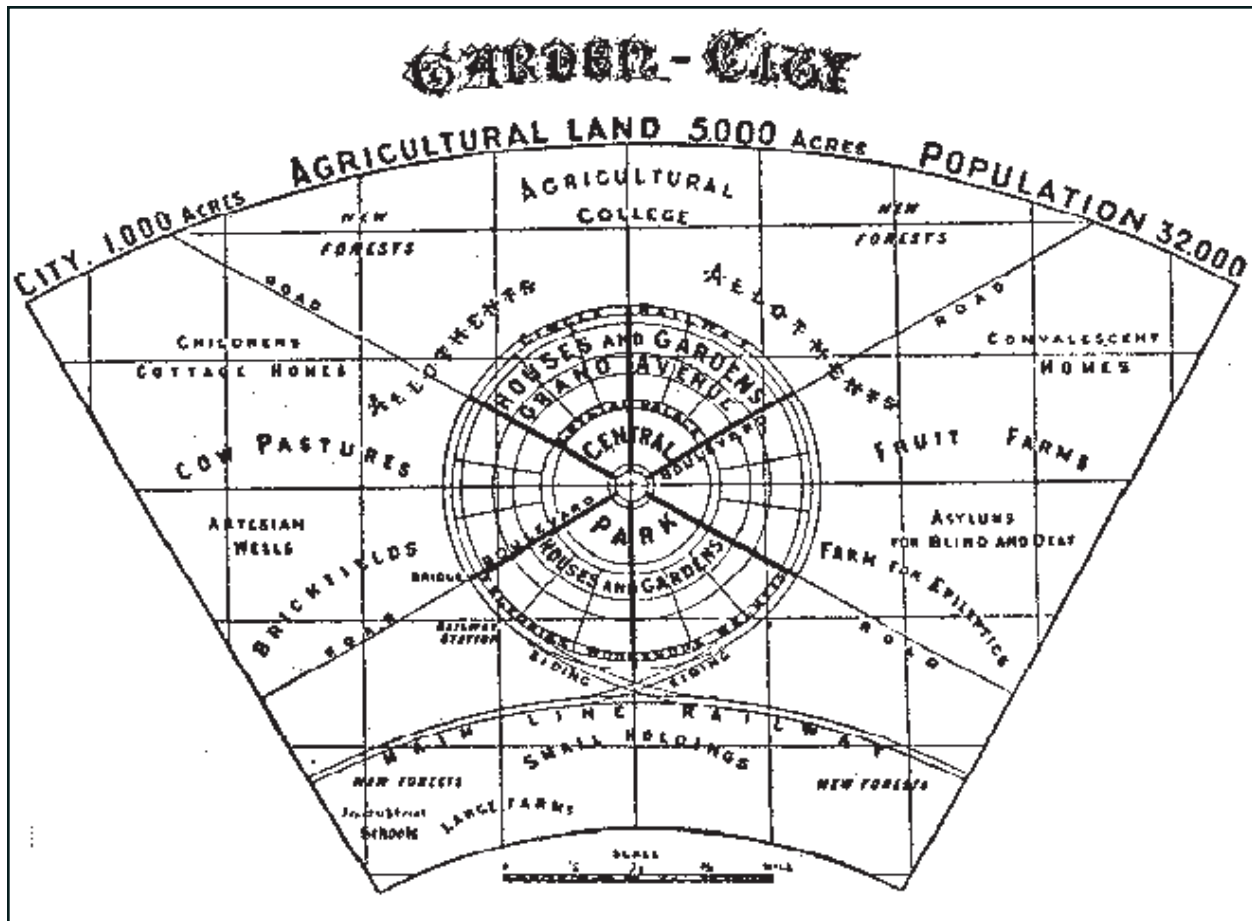
The Waterloo Region in western Ontario is predicted to experience a large growth in population in the next 20 years. Currently, the City of Waterloo is nearing completion of its new Official Plan. In the last stages of review, this legislation will be a test run for reducing and restricting urban sprawl, intensifying existing urban areas and enhancing the public transit system.

The issue of urban sprawl within the Waterloo region is a significant concern. A large portion of Ontario's prime farmland surrounds this growing urban centre. Similar to the occurrence happening in the Greater Toronto Area, as the region of Waterloo grows, prime farmland is converted for urban use.

Therefore, the issue of urban sprawl has been addressed in their Official Plan draft by establishing a countryside boundary beyond which no new subdivisions can be built for the next 20 years. This urban edge would reflect the land use planning scenario that Portland, Oregon has created. If this objective succeeds, Waterloo will serve as a precedent for other Ontario municipalities to establish hard lines to halt urban sprawl.

In recent years, Waterloo has taken on the challenges set out in the *Growth Plan for the Greater Golden Horseshoe* and will lead the province in meeting targets for reducing the construction of new suburbs on old farms and increasing residential construction as infill projects (Pender, 2010).

Waterloo is sitting on the cusp of becoming a leader within Ontario in regards to how to manage urban sprawl.



5.2 planning design

Precedents of theoretical or practiced approaches to master plan scale design have been reviewed. These examples offer concepts and design strategies that would be useful in their application to an alternative suburban development and agricultural preservation.

5.2.1 the garden city concept

Ebenezer Howard was the British designer of the Garden City concept. His vision was to disperse the population and industry of a larger city into smaller concentrations which would create more amenable community living environments (fig. 5.2.1). It was essentially creating a central metropolitan community with local communities in the larger, overall metropolitan region.

One feature, relative to this thesis, was the identification of the importance of farmland. The plan included a greenbelt. All land within it would be owned by a single entity and held in trust for both investors and the residents (Hodge, 1989).

One aspect Howard placed emphasis upon was the idea of a strong town centre. This town centre would include a theatre, library, hospital and similar program. From this town centre, Howard visualized that each house would have its own garden, each neighbourhood its own area for schools, playgrounds and that the whole town be surrounded by garden or agricultural land. The suburban developments outside of Toronto today do not reflect Howard's idea of a town centre and adjacent neighbourhood. Instead, housing sprawls from the city centre and no local nodes exist where basic amenities can be located.

opposite

fig. 5.2.1 the garden city concept
Plan of the Garden City which contains a central node and surrounding farmland.

Howard's concept, though weak in some aspects, is strong in its acknowledgment of the importance of agriculture. In some sense, the clear boundaries defined by the avenues and boulevards illustrate an attempt at halting sprawl. As well, Howard places a great deal of importance on the need for community amenities to be close by.

The strategies that can be useful from the Garden City concept are the idea of a town centre, or community node, its relationship to its residents, and how agricultural land can be a part of the community concept.

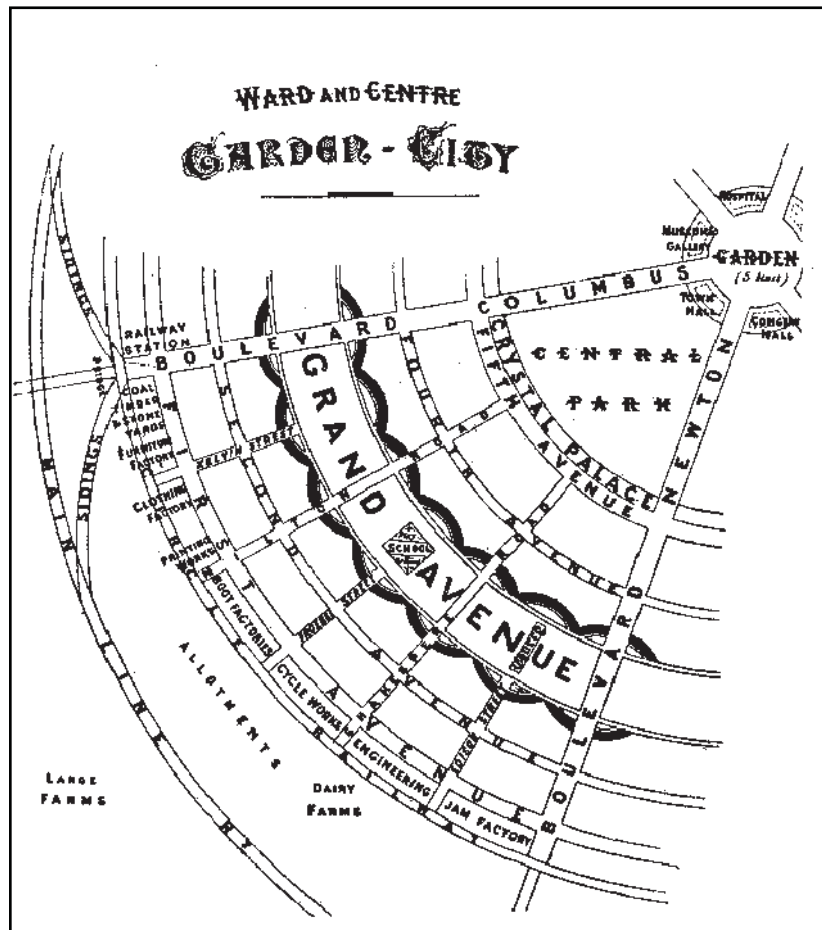


fig. 5.2.2 the garden city concept - the ward and centre

The urban edge is defined by the 'main line' which stops urban uses from entering the agricultural space.

5.2.2 conventional suburban development

Suburban sprawl is a generic approach to residential development. Housing types are limited to the single-detached, semi-detached and townhouse. The density is extremely low and minimal public amenities are included.

This thesis has discussed the effects that residential developments have on prime farmland and rural architecture. Another issue associated with these developments is that they lack any type of a village centre. Basic public amenities, other than schools, are developed together, separate from the residential areas. This clustered design of shops, medical offices etc., increases the dependency on a vehicle to access them.

The absence of a village centre that could provide retail areas, medical services and community space results in residents constantly having to leave their neighbourhood (by vehicle) to access these services.

By reviewing the problems that are currently associated with conventional suburban developments, this provides the basis to identify and develop an alternative approach that would address the issues of a lack of a village centre, basic amenities within walking distance, and the preservation of prime farmland and rural architecture.

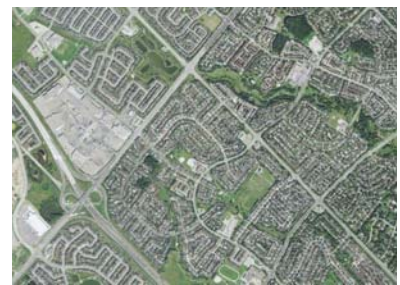


fig. 5.2.3 & 5.2.4 **arial views of urban sprawl in brampton**

Where public ammenities are provided they are clustered together and require a vehicle to access them.

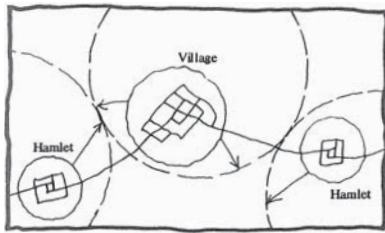


fig. 5.2.5 **the rural centre/node concept**

Small rural nodes were developed throughout the countryside in response to the need to have local amenities close by. These nodes were supported by larger rural towns.



fig. 5.2.6 **downtown bolton**
The original downtown of this rural village in the 1950's.



fig. 5.2.7 **the plan of bolton, 1877**
The rural town of Bolton served the smaller surrounding rural nodes such as Palgrave and Macville.

5.2.3 village centre concept

The village centre concept has emerged from literature, such as Michael Bunce's *Rural Settlement in an Urban World*, the Garden City Concept and the New Urbanism movement (section 5.2.4).

As previously discussed, one of the major critiques of suburban developments is that they lack a village centre. However, what is ironic is that the lands these developments consume provide historical lessons particularly the idea of the rural node.

Rural settlement patterns were the result of the surveying for plots of agricultural land. This resulted in farms being separated by many acres, usually 100. These neighbours recognized the need to have a local node to house basic amenities such as a school house, church and general store. These rural hamlets were typically accessible within a 20 to 30 minute walk or a 10 minute carriage ride (fig. 5.2.5). Beyond these rural nodes was a larger town or village that housed a hardware store, doctor, bank, pharmacy and the non-agricultural population. An example of a town that supported the surrounding rural nodes was the rural town of Bolton (fig. 5.2.6 & fig. 5.2.7). Located northwest of Toronto, the original village served as a hub to its surrounding agricultural neighbours. Today, Bolton is no longer a small town, but the original downtown still exists and provides an idea as to the size of an original rural town.

As affordability of personal transportation grew, the popularity of rural nodes decreased due to the ability to drive into the local village or town. Today, because of the preference to drive into a larger urban centre very few of the rural nodes have survived. The only indication of a rural node is a sign indicating the node's

name and year of settlement.

The rural settlements of Southern Ontario in the 19th century and the creation of nodes and villages and the relationship between the two were influenced by planning in Europe, precedents of farming villages dating back to the medieval period.

The plan of Baroque Delft in 1652 (fig. 5.2.8) illustrates the understanding of the importance of the village centre. The defining boundaries of this city were a response to safety. All could be protected from attacks behind the city walls, but in addition, all public needs could be found in this contained area. As well, all housing within this area increased density which maximized the surrounding farmland.

During this period, various village or town plans show an understanding of the village centre concept. Medieval Thame (fig. 5.2.9) illustrates this understanding. Though this plan is more dispersed, the lot design resulted in positive community aspects. The purpose of the long lots was to provide each lot with access to water from the river which was needed for irrigation. Farmland was maximized by the residents who pushed their buildings to the opposite end of the lot. This pulled all the buildings together creating a community node with a main street.

These three examples have been used to identify the importance of having a community node and the benefits it offers. In areas of urban sprawl, a review of the area's history could identify where these nodes were previously and they could possibly be incorporated into the development's design. There are hints in the land that could greatly assist residential development design, however, it is just a matter of acknowledging and embracing them.



fig. 5.2.8 **medieval delft**

A tight rural node provided security and maximized the amount of available farmland.

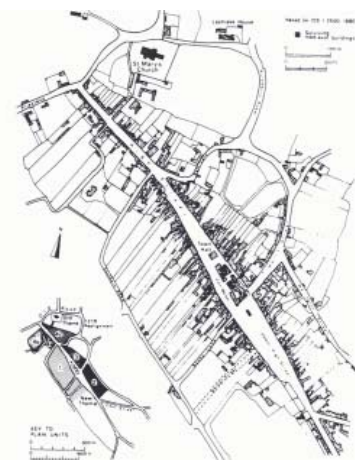


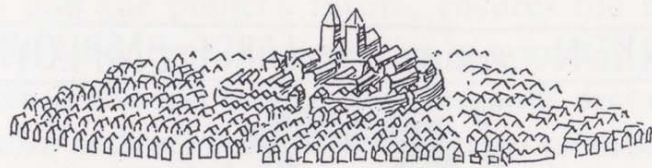
fig. 5.2.9 **medieval thame**

To allow each lot to have access to the river, long lots were created. This also maximized farmland and created a rural node.

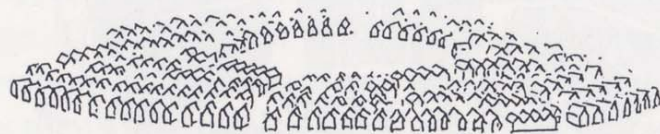
CITY & PARASITE



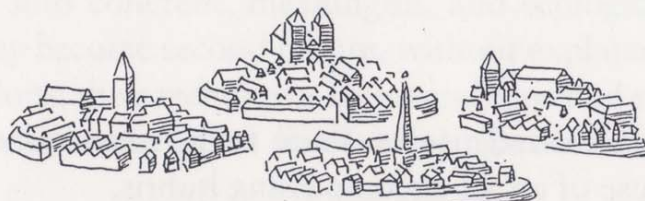
CITY WITHOUT SUBURB



CITY WITH SUBURB



SUBURB WITHOUT CITY



CITIES WITHIN THE CITY

fig. 5.2.10 **the theory of new urbanism**

The goal of New Urbanism is to create cities within cities.

6.2.4 new urbanism

New Urbanism is a planning movement that is a reaction to the present planning strategies of the city and the suburb. This movement seeks to present design solutions to address the

“growing concern over congestion and air pollution resulting from our increased dependence on automobiles, the loss of open space, the need for costly improvement to roads and public services, the inequitable distribution of economic resources, and the loss of a sense of a community” (Fulton, 1996, p.3).

The New Urbanism by Peter Katz is one of the best sources to define the principles of the New Urbanism movement. The principles are organized into 3 categories:

1. The Region
2. The Neighbourhood
3. The Street, Block and Building

This movement provides a new strategy that has great potential to be used in residential developments. Figure 5.2.10 illustrates the theory of New Urbanism, moving away from the concept of the city and its suburbs to cities within cities. This theory strongly reflects the concept of the village centre. Defined neighbourhoods are created that can meet their own basic needs locally but are supported by the large town it is a part of (fig. 5.2.11). This is very similar to the precedent of the rural node and rural town and their interaction.

For the purpose of this thesis, the New Urbanism principle that focused on the idea of designing a community based upon various walking distances was used. *In Visions for a New American Dream*, Anton Nelessen describes this principle. Instead of large

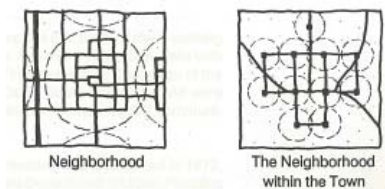
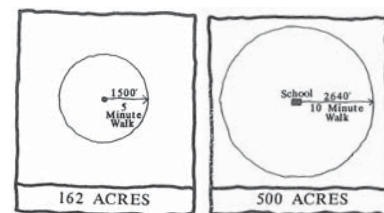


fig. 5.2.11 the neighbourhood as a part of the larger town



figs. 5.2.12 & 5.2.13 the 5 minute and 10 minute walking radius

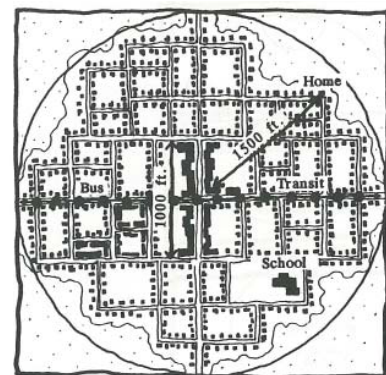


fig. 5.2.14 the community



fig. 5.2.15 housing in the cornell development



fig. 5.2.16 housing and retail space in the cornell development



fig. 5.2.17 the location of the cornell development



fig. 5.2.18 the plan of the cornell development

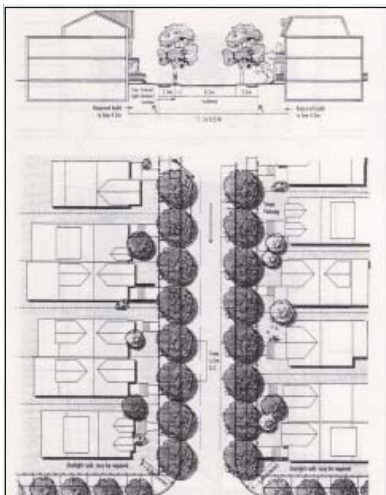


fig. 5.2.19 street design

sprawl from a city core, as is the trend with suburban developments, a village centre should be placed as determined by the 5 and 10 minute walking radii. The 5 minute walk, (fig. 5.2.12) defines a neighbourhood from the core to the periphery.

All amenities, shops, medical offices or public spaces are within a 5 minute walk from home. The 10 minute walking radius (fig. 5.2.13) identifies the maximum distance that should be between the home and the neighbourhood school. When these two principles come together, they create a community that is illustrated in figure 5.2.14. The application of these radii is the creation of a well served neighbourhood within a larger residential development. Depending on the size of the developable area, these radii are repeated as often as required.

An example of a residential development that used this and other New Urbanism principles, is the Cornell Development (figs. 5.2.5, & 5.2.16) located in Markham, Ontario. It is a 2404 acre (9.7 sq. km) site bounded by Little Rouge Creek and Highway 407 (fig. 5.2.17) and is home to 27,000 people. Approximately 30% of the site is open space (fig. 5.2.18) consisting of Rouge Park, community parks, woodlands, trails and storm water management facilities. The New Urbanism principle that was highly utilized in this community was the creation of village nodes which provide shopping services and workplaces within a 5 minute walk from home. Other aspects of this development include a higher density than that of conventional suburban developments, a diverse range of housing, buildings close to the tree lined streets, (fig. 5.2.19) which illuminate life on the street and long term parking is only accessible from back lanes. The street grid also has more options, not like conventional developments where getting lost is highly probable.

This development lacks any awareness of the agricultural land it consumed and failed to include any preservation of prime farmland in its master plan. It also missed the opportunity to introduce urban agriculture into the community. However, it is the implementation of the 5 minute walking radius of this project that is important. It demonstrates the benefits of including multiple village centres within a large residential development. It is an example of an alternative approach to suburban development.

5.3 agricultural communities

Precedents of alternative development approaches that included an agriculture component in its master plan were reviewed. The focus was placed upon how the agricultural land and residential lots interacted with one another, and analysis of communities including, housing type and their relationship to the surrounding context.

5.3.1 prairie crossing

Prairie Crossing is a master-planned green community located north of Chicago in the town of Grayslake, Illinois. It is a 668 (2.7 sq. km) acre farming subdivision (figs. 5.3.1 & 5.3.2 & 5.3.4) that resulted when a group of neighbours purchased the land to prevent the conventional subdivision from being built, and then created an alternative method to development. The community consists of 360 Midwest vernacular single family homes (fig. 5.3.3) and 36 condominiums. The original development proposal included 1600 single family homes.

The community maintained 60% of the site as open space. At the community's centre is a mixed-used commercial area, community and fitness centre, train station, 3 on-site schools: a nursery, charter elementary and Montessori adolescent programs. One of the special features of Prairie Crossing is its 100 acre working organic farm. The Prairie Crossing Organic Farm was one of the first parts of the community to be established. It is here that the original farmstead is located along with several barns, outbuildings, including horse stables and pastures, a farm business incubator, a learning farm and weekly farmers market (Kirley, Ranney & Sands, 2010).



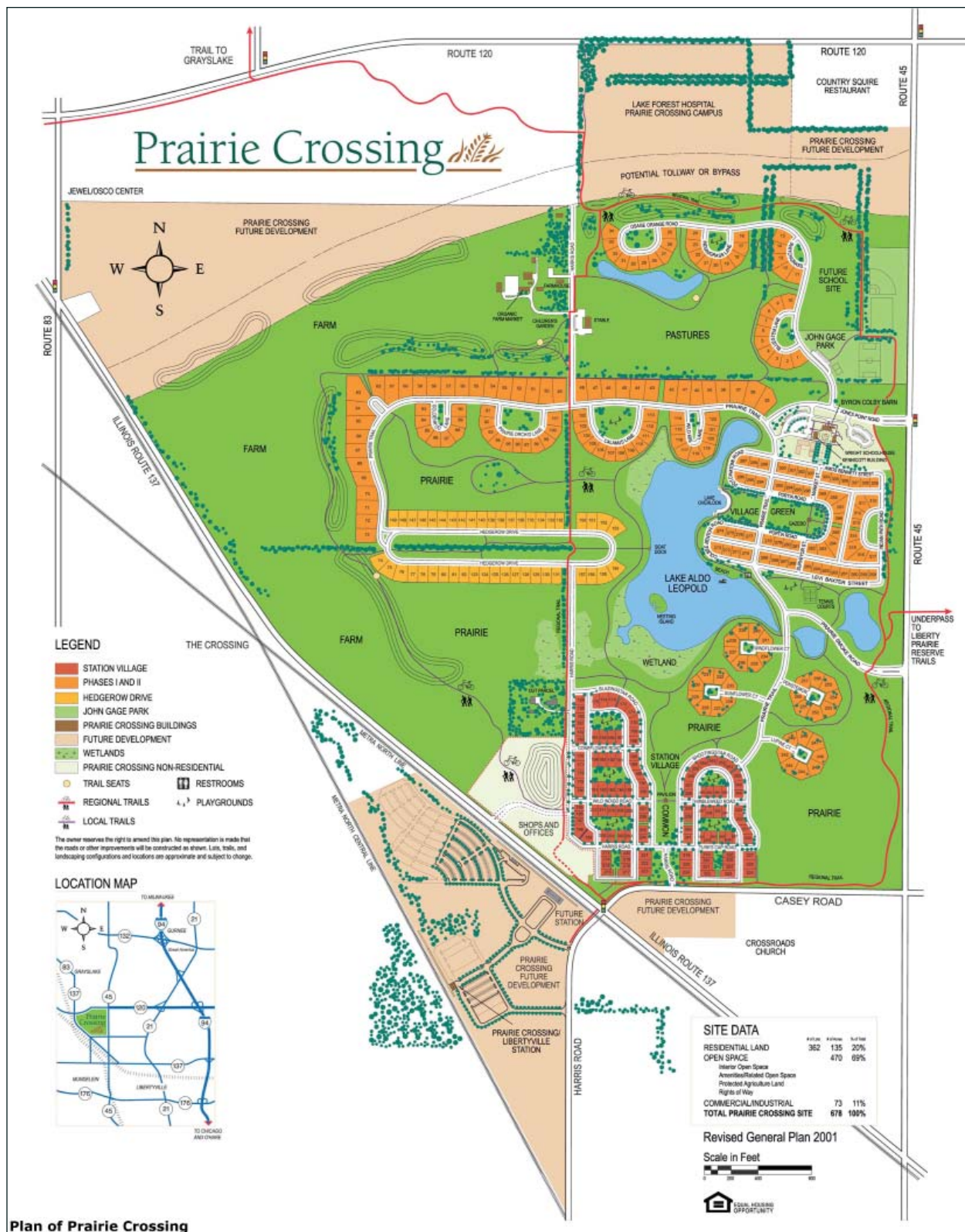
fig. 5.3.1 **prairie crossing**
The central areas of Prairie Crossing beyond the farm.



fig. 5.3.2 **prairie crossing**
The organic farm at Prairie Crossing.



fig. 5.3.3 **prairie crossing**
An example of the vernacular midwest house at Prairie Crossing.



One of these barns, the Byron Colby barn, was a former dairy barn that was built in 1885 and restored in 1996. It was dismantled at its original sight and relocated to Prairie Crossing to serve as a community centre to Prairie Crossing and the surrounding community (figs. 5.3.5, 5.3.6 & 5.3.7).

The town centre was placed in the middle of the community, allowing all of the amenities to be within a short walking distance or bike ride from homes. Bike paths and walking trails have been created throughout the site. Local trails connect residential units to the town centre, train station and are a means of travel throughout the site. It also includes regional trails which connect Prairie Crossing to the residential developments that surround it.

One critique of this development is that the single family homes resemble estate sized lots and portions of the street grid resemble conventional suburban developments. Density could have been increased by replacing the number of single family homes with townhouses or more condo buildings. The surrounding context is a fabric of farmland and conventional suburban development. Interaction between this community and surrounding developments seems to be minimal. Determined from Google Maps, street view, a berm has been built along the majority of the site and restricts any view into the site. Even at a congested corner with a gas station and McDonalds, the only presence that the Prairie Crossing development has is a glimpse of one of its condo buildings and open space behind the berm. However, the farmers market and learning farm must attract residents from the surrounding area.

Strategies that can be derived from Prairie Crossing include the integration of residential lots into agricultural land, a village centre, access to public transportation, bike paths, the presence and reuse of the original farmstead and the adaptive reuse of a barn for their community centre.

opposite

fig. 5.3.4 **plan of prairie crossing**
In this development, agricultural land and residential lots coexist.



fig. 5.3.5 **byron colby barn**
The adaptive reuse of this barn serves as a community centre for this community.



fig. 5.3.6 **interior of byron colby barn**
This community centres hosts many events including dinners, meetings and weddings.



fig. 5.3.7 **byron colby barn at night**
The space the barn provides is great for the community to gather.

fig. 5.3.8 **plan of troy gardens**

By increasing density and using the clustered design approach, it allowed for a large portion of the agricultural land to be preserved.



5.3.2 troy gardens

Troy Gardens is located in Madison, Wisconsin. This 31 acre (0.13 sq. km) property consists of mixed income families, green-built housing, community gardens, an organic farm and restored prairie woodlands. This parcel of land is surrounded by typical suburban subdivisions. In contrast, this parcel clearly demonstrates alternative possibilities for residential design that succeeds in maintaining both open space and productive land.

The community character of this development is strengthened with a co-housing living style and current development of a community centre. Troy Gardens includes two planting areas. The first is the community gardens which are small plots that allow children and adults to plant and maintain their own garden. The second is the farm, an area of 5 acres, which grows vegetables, herbs and flowers. The fresh produce is used for the Community Supported Agriculture (CSA) and baskets are sold from June to late October.

This community is an excellent example of the possibilities of challenging typical suburban development. The site plan (fig. 5.3.8) illustrates the benefits of increasing density, larger open spaces that are closer to home, locally grown produce and strong community character. The contrast between Troy Gardens and its neighbours clearly points out the issues with the conventional suburban development approach (i.e. density, open space, community amenities). It also provides the opportunity for the residents of the conventional suburban houses an opportunity to learn about and participate in productive agriculture. The strongest aspect of this project is that it acts as an example to see, experience and witness the positive aspects of its approach to residential design, agricultural preservation and general land use.



figs. 5.3.9, 5.3.10, & 5.3.11
housing in troy gardens

All homes in Troy Gardens are green-built and privately owned in this co-housing community.



figs. 5.3.12 **watercolour of site plan**



fig. 5.4.1 **exterior of haley barn**
The insertion of windows has been done gently.

fig. 5.4.2 **interior of haley barn**
The intergration of sky lights allows additional light into the space.



5.4 adaptation

Projects that have given a new life to existing buildings, spaces and structures have been analyzed in this section. A variety of projects have been selected to study the various approaches that can be taken in adaptive reuse. A collection of barn adaptations will be reviewed first, followed by a collection of other unique adaptive reuse projects.

5.4.1 haley barn

The reuse of this Pennsylvania style barn in Clinton, Tennessee, demonstrates the possibilities of new life for these existing structures. This was once a working barn of a 157 acre farm owned by author Alex Haley. It was sold to the Children's Defense Fund and now serves as a library. The entire property, which now operates as a retreat, hired architect Maya Lin to transform this structure. The strongest aspect of this adaptive reuse project is that even though major changes have been made to the interior, and some obvious interventions to the exterior, the design maintained the essence of the barn. This has been achieved with references to its original use. For example, the pen spaces on the lower floor serve as a bookstore and stairwell, and the repetition of the windows and book shelves remind one of the repeating bays and structure within a barn. The challenge of fenestration and preserving the exterior form has been done elegantly. Windows have been introduced to one end of the barn and multiple skylights provide additional lighting for the upper floor. The front entrance face remains solid to present a barn wall when entering the library. This is a very successful reuse of a barn. It demonstrates that this rural architecture can adapt, provide new and interesting spaces, and introduce methods to insulate walls and provide fenestration.



fig. 5.4.3 **setting**

This photo illustrates the serene surroundings and view from this adaptive reuse project.



fig. 5.4.4 **main entrance**

The design has utilized the original ground level entrance to this now functional library.



fig. 5.4.5 **barn before**
The Slaymaker barn before conversion.

fig. 5.4.6 **barn after**
The Slaymaker barn after conversion.



fig. 5.4.7 **original structure**
Interior of the barn before construction. The floor joists have been removed and the main beams temporarily shored.

fig. 5.4.8 **new structure**
Steel columns and bar joists, metal decking, and a concrete floor slab have been installed.



5.4.2 slaymaker barn

This barn was built in 1816 in Lancaster County, USA, and was later converted into a business facility. The conversion strategy for this project was to maintain as many original features as possible such as the windows at the cellar level which provided lighting for milking and the louvers at haymow allowed for ventilation to dry and cure hay (Endersby, Greenwood, & Larken, 2003).

Material to repair the stone walls was collected from the site. The gable wall was cleaned and repainted. All doors and windows were updated to current standards but remain true to the colour and proportions of the original structure. Overall, this adaptive re-use was successful as it remained true to its original character and the minor alterations responded to the conversion strategy to preserve as much as possible of the original quality of the barn (Endersby, Greenwood, & Larken, 2003).

One negative aspect of this project was the elimination of winnowing doors in favour of a blank wall. This could have been an opportunity to introduce glazing hidden behind the doors or to make them operable for ventilation or additional lighting. The most appealing aspect of this project is the gentle integration of the new structure. As a public use building, the existing structure would not have met codes without testing. This ultimately would have required that these solid wood beams and columns be destroyed to prove their structural integrity. Therefore, the new structure was introduced to accommodate this requirement. Steel joists were used to reinforce the existing structure without taking away from its original character.



fig. 5.4.9 **new ceiling structure**
View up through the stairwell opening during construction.

fig. 5.4.10 **the new location**
The frame of the Cruiser Barn goes up on the slope of a meadow.



fig. 5.4.11 **more structure**
The reassembly of the structure is complete.



fig. 5.4.12 **new sheathing**
The barn was fully sheathed within days after reerection.



fig. 5.4.13 **nearing completion**
After the insulation panels were covered with tar paper and lath, a final outer layer of rough-sawn siding was nailed in place.



fig. 5.4.14 **a new life**
The completed house, enlarged with a lean-to garage and embellished only with siding doors, gooseneck lights, and lightning rods, needs no landscaping to fit comfortably into its adopted meadow.



5.4.3 cruser barn

In 1845, this barn was raised in Plainboro, New Jersey by J. McCree Cruser. In the mid 20th century, the site was transformed into the headquarters of a research firm and this barn became an early example of adaptive reuse. In the mid 1990s, the area was rezoned for commercial space and the barn was going to be demolished. A New Jersey timber-framing firm saved the barn and removed it from the site. 150 years after it had been raised, it was measured, tagged and disassembled. It was moved to Hopewell, New Jersey and reassembled. (Endersby, Greenwood, & Larken, 2003).

Now a house, the adaptive reuse maintained the internal structure but major alterations were done to its external construction. This project was an example of a barn re-raising and how the issues of the original structure, material, external siding and insertion of insulated exterior walls were dealt with. The relationship between new and old was particularly important.

In figures 5.4.10 to 5.4.14 it illustrates how some of the barn's character was lost with the introduction of new exterior cladding. In the early stages of the barn re-raising, the character of the barn was maintained through the reuse of the original structure. However, once the external cladding was applied, the barn lost a great amount of its character from the exterior. The original structure is only visible from within. Though this barn was saved, the character that this structure provided is now an aesthetic condition applied within rather than truly embraced.



fig. 5.4.15 **mr. mccree cruser**
Mr. McCree Cruser's name stenciled on a board used as a dutchman.



fig. 5.4.16 **the barn in its original location**
Old surface coverings are revealed during dismantling.



5.4.4 moritzburg museum extension

All that remains of this 15th century castle in Halle, Germany is its fortress walls, central court and three of four original corner towers. A German expressionist art museum moved into the structure in 1904 but without any renovations. The newest introduction by Neito Sobejano, S.L.P Fuensanta Nieto and Enrique Sobejano creates a dramatic contrast between old and new (Feireiss & Klanten, 2009).

This project was studied to investigate its delicate interventions. The first was the new facades of glass and steel that were built behind the ruins of the original fortress walls of Moritzburg Castle. This elegant insertion is achieved with the attention to the original quality of scale, colour and proportions and translated into the new exterior walls. The quality of the exterior is carried into the interior interventions. With careful material choices, the design of the new spaces embraced the presence of the ruins. This created a clear contrast between the sleek and elegant nature of the new materials against the rustic and authentic quality of the old. The new interventions are subtle, but are able to highlight the original interior qualities while still acknowledging themselves.

This project is an excellent example of how the presence of the original facades were embraced and utilized rather than seen as an obstacle. This approach created dynamic facades for this building which also reflect the approach and quality of the interior interventions.

opposite

fig. 5.4.17 the merging of two facades

The facades of this new museum were introduced behind the ruins of this former castle.



figs. 5.4.18, & 5.4.19 the original and the intervention

The crumbling historical walls were conspicuously retained and buttressed with precise new elements like stairs, walls and floors that create sightlines to, and frames around, the old architecture.



figs. 5.4.20 & 5.4.21 **preserving the original**

New blonde wood panels or partitions and smooth lines of concrete are paired with traditional alpine wood shutters and stonework.



5.4.5 piz tschutta

The original buildings of this project were a stone residential section and reconstruction stable that had served as a small restaurant in the community of Vna, Switzerland. These buildings were important to the community. After they had been sitting vacant for a period of time, a group of local residents came together with help from architects, Rolf Furrer and Christof Rosch, to find a new role for these buildings. Together they came up with a decentralized hotel concept that allowed local house owners to offer private accommodations to visitors, essentially turning the whole village into a hotel (Feireiss & Klanten, 2009).

The adaptive reuse of Piz Tschutta is at the heart of this movement. The guiding design philosophy of conversion was to preserve as much as possible of the original building. “The final design provided a building of harmonious coexistence between old and new without attempting to hide the interventions behind a veneer of traditions” (Feireiss & Klanten, 2009, p.114).

The preservation of this building responded to its context. The importance of this building to the community was reflected in the minimal exterior interventions, which acknowledged the contribution of this building to the aesthetic character of the entire village. The most interesting aspect of this design, specifically in the context of this thesis, is that the original exterior sheathing was preserved in its original nature. The character of the barn is defined by the light that spills through the barn boards. The interventions have maintained this quality but also made the space occupiable. The interior qualities are highlighted by the contrast between the original structure and new wall finish.



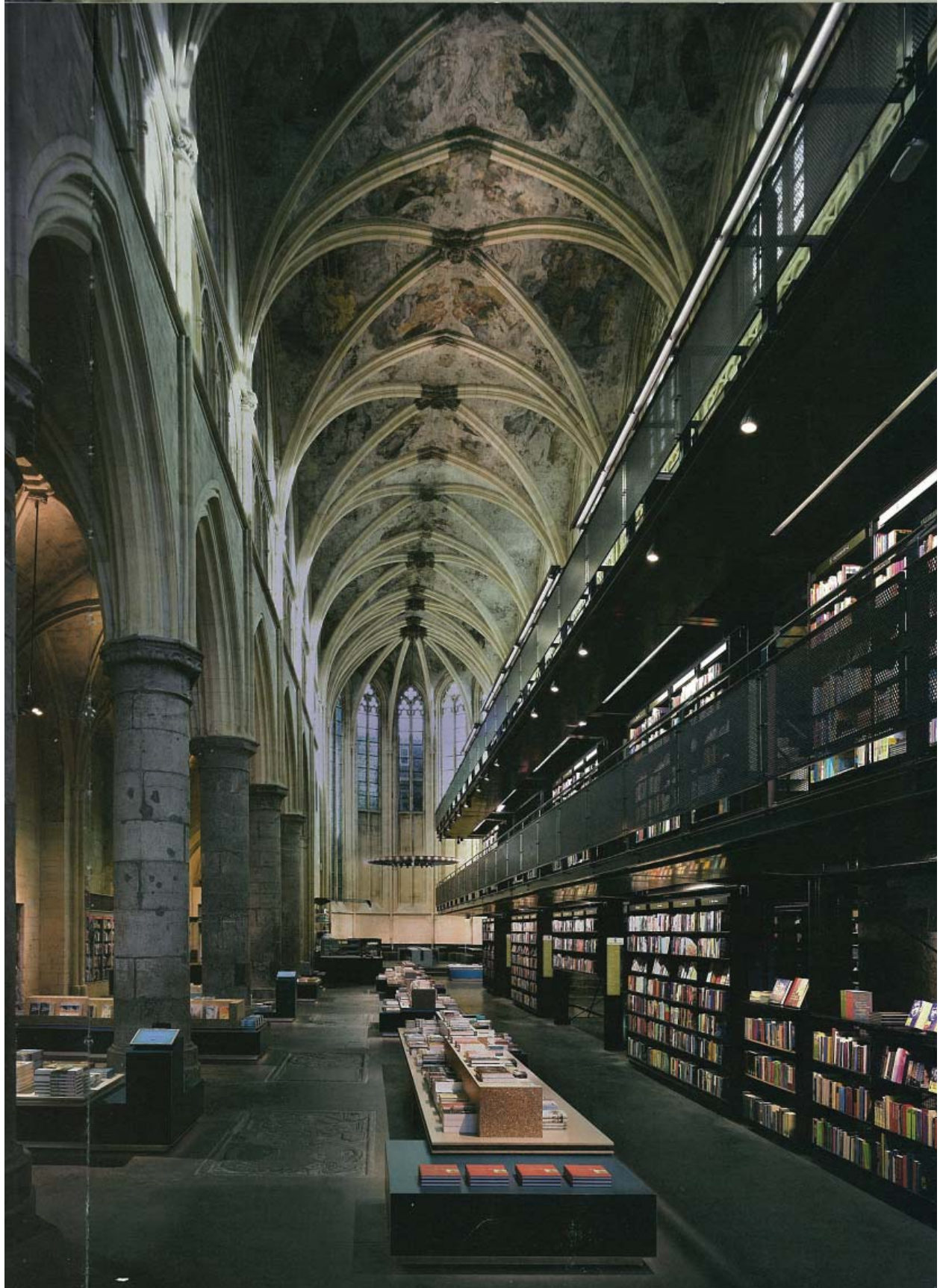
figs. 5.4.22 **vna, switzerland**

The focus of the village was this hotel at the centre of the community.

figs. 5.4.23 **interior finish**

The exposure of old beams layered with inventive additions like a skylight.





5.4.6 selexyz dominican bookstore

This former Dominican Church in Maastricht, Netherlands, was studied to investigate the incredible insertion of a bookstore into the open space of the church's nave.

Merkx and Girod Architects were able to insert 1200 sq. meters of retail space into the 750 sq. meter floor space of this church with the delicate insertion of a black multi-level steel structure (Feireiss & Klanten, 2009). The height of the nave allowed for this design solution. This shear frame rises three storeys without obscuring the extraordinary structure. By utilizing this height, the structure provides plenty of retail spaces. At the same time, it creates moments within the church to experience its 13th century architecture such as long, uninterrupted views and the ability to get up close to the historic murals.

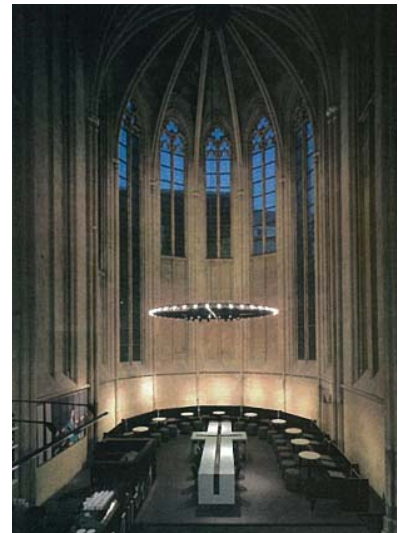
It is the union, yet juxtaposition, of these two styles, spaces, materials that make this design so extraordinary.

This design is successful because it identified the significance of the interior quality of this church as it currently exists. However, its adaptive reuse introduced a new program that required additional space and organization. Therefore the design approach is brilliant because through adaptive reuse this structure has a new use but the original character and quality that truly defined it were embraced, preserved and celebrated.

opposite

figs. 5.4.24 the nave

Climbing the stairs exposes a customer to the wide variety of books but also provides much closer views of the historical friezes.



figs. 5.4.25 & 5.4.26 a bookstore

In places, it is difficult to tell that this former Dominican church is now a book store.

fig. 6.0.0 (opposite)

design direction

chapter 06

Ultimately, what determines the future of agriculture is the collective decisions of individual landowners.

*Bob Berner, director Marin Agricultural Land Trust
from (Bowers & Daniels, 1997, p.59)*



design position

ruralruralrural | urbanurbanurban

Stop urban sprawl, no alternative design, hard edge.

OR

ruralurbanurbanurbanurbanurban

Don't stop sprawl, urban consumes rural.

OR

ruralruralruralurbanurbanurban

concept design
project

Stop sprawl, alternative design that softens the rural-urban fringe.

6.1 design position and proposal

The purpose behind the research collected for this thesis is to illustrate the delicate relationship between agriculture and urban sprawl. The area of the rural-urban fringe provides the ideal context to examine this phenomenon. Many impacts were identified. Aside from the most visible - the loss of farmland - this thesis also addresses the impact urban sprawl has on rural architecture. The background research identified the significance of rural architecture and why it should be preserved. The review of farmland and building preservation assisted with creating the design position for this thesis.

An approach to development that is an alternative to suburban sprawl is essential in addressing the issues of the loss of rural architecture and prime farmland. This thesis envisions an alternative approach to suburban development in the rural-urban fringe where the presence of rural architecture is embraced, a portion of the farmland is preserved, and a more gentle transition occurs between urban and rural. The reality is that the solution to farmland preservation lies in the hands of legislators, but farmstead architectural preservation is something that can be addressed by architects and preservationists.

Within the concept of the alternative approach, the design portion of this thesis focuses on the adaptive reuse of a barn which addresses the issue of the loss of rural architecture. A holistic approach to its preservation will be taken, allowing for flexibility to preserve the essence of this structure. Maintaining this structure through adaptive reuse will provide a visible reminder of the agrarian past and a tangible connection to the rural culture. While the large volume and usable area that a barn encloses offers

opposite

fig. 6.1.1 design position

This word diagram illustrates the design position this thesis is taking.

excellent shelter for a number of new uses, the goal of this design is to maintain the spirit of the barn while introducing non-agricultural program. Any new interventions seek to enhance this spirit. The design intends to make sure that what is new is obvious, and what is original is evident and featured. In addition, the reuse of this barn will be enhanced with the vision for its surrounding context. The outdoor space will be an extension of the barn and provide an open public area for the new community, including community gardens and the preservation of productive farmland.

The adaptive reuse of a barn is the design focus of this thesis. However, as previously mentioned, its preservation seeks to inspire an alternative approach to suburban development. In tandem with legislation, compromise and the conceptual solution, this thesis offers a better buffer within the rural-urban fringe that serves the rural and urban communities with services such as a farmers market, town centre, the adaptive reuse of rural architecture and a transportation hub.

Based on the surrounding context of the site selected for this project, the barn would greatly serve at this point in time as a community centre which would include a library, fitness centre and multi-purpose spaces. However, as the surrounding context changes this may require the program to change, and the design approach of adaptive reuse allows this flexibility. Therefore, no matter the program that is introduced, the main design intent, that of preserving the barn's essence, will remain.

6.2 site selection and analysis

The area being studied for this design project is located within the rural-urban fringe of the Greater Toronto Area. After much exploration within Peel Region, which is experiencing a great deal of development, an area was identified between the municipalities of Caledon and Brampton (fig. 6.2.1). The specific area is an interface between new suburban developments and agricultural land. This location lends the opportunity to explore the concept of an alternative approach to suburban development, while also utilizing the rural architecture it contains through the method of adaptive reuse. The specific site, Grayhaven Farms, has been selected to test this design proposal. Currently, residential developments frame its southern property line and it is only a matter of time before this farm is eliminated to allow for the next phase of residential development to occur.

Grayhaven Farms had been in the Gray family for 5 generations until it was sold in 2004 to developers. The family acquired the original 100 acres upon their arrival in Canada in the early 1800s. In the late 1800s, they were able to purchase an additional 150 acres where the barns that are being used in this design project currently sit. The north barn was built in 1906 and the south in 1930. South of the site was land that the Gray family farmed and it was still in production up until 3 years ago when development started. The aerial images in figure 6.2.1 illustrates that the last portion of that residential development is nearly complete. The elimination of Grayhaven Farms to the north is in the near future.

With images and diagrams, the purpose of this section is to identify the location of the site, its history, the urban growth that surrounds it, and a land use analysis of the area.

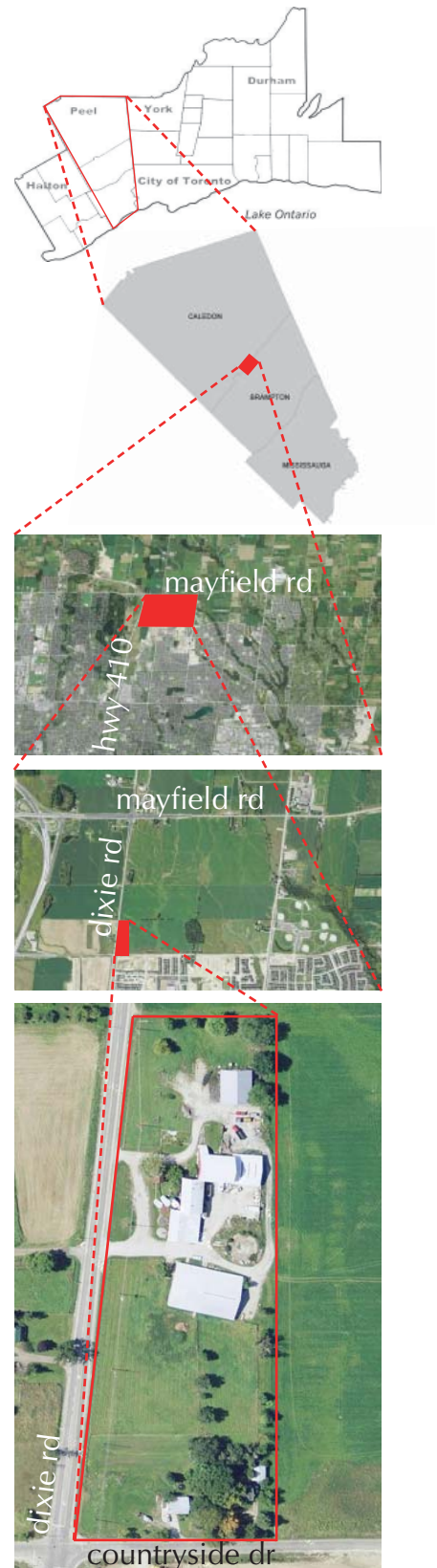


fig. 6.2.1 gta to site

This diagram illustrates the location and condition of the site for this thesis.



1900



1950

top left

fig. 6.2.2 **gray family farmhouse**
The original farmhouse for the Gray family established in 1823.

top right

fig. 6.2.3 **grayhaven barns**
These barns were a distinct landmark for the small rural node of Mayfield.

above right

fig. 6.2.4 **barn raising 1930**
It took the collaboration of many to raise a barn.

right

fig. 6.2.5 **filling barn with hay 1950s**
Filling the barn with hay for the winter season.





2000



top

fig. 6.2.6 grayhaven barns

The condition of the south face of the north barn and east face of the south barn in May 2011.

above left

fig. 6.2.7 hay loft detail

These doors slide open, a chain is dropped and bales of hay are lifted into the upper barn.

above right

fig. 6.2.8 barns in the winter

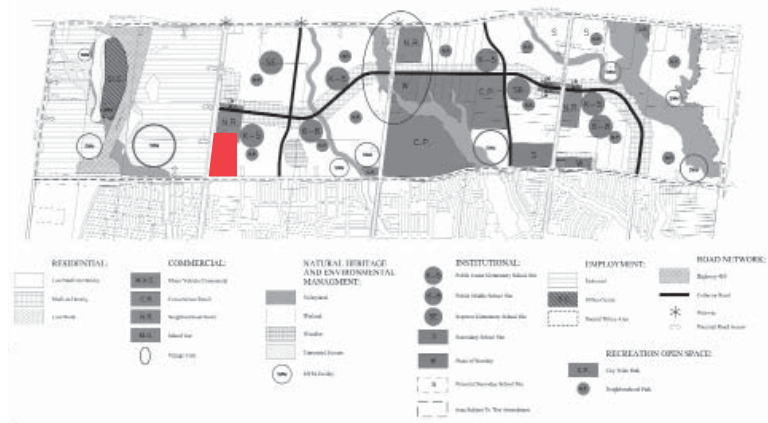
The north and west faces of the north barn and north face of the south barn in December 2010.

left

fig. 6.2.9 grayhaven site

This aerial photograph shows this farm during its prime in the 1990s.





opposite

fig. 6.2.10 timeline of urban sprawl surrounding site

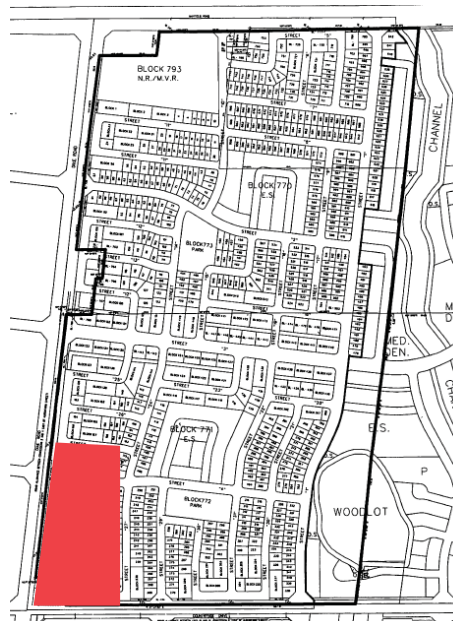
Sprawl has been quick to consume the last remaining parcels of agricultural land in Brampton. Only one concession to the north remains before the urban edge is at the northern border of Brampton and will start its way into Caledon. The red box indicates the project site.



top right

fig. 6.2.11 countryside villages secondary plan

The draft of the development proposal is converting 1600 acres of prime farmland into a residential development. The secondary plan discusses including new urbanism concepts, however, the detailed plans contradict this intent. The red box indicates the location of Grayhaven Farms in the context of this development proposal.



middle right

fig. 6.2.12 concession plan

The proposal for this concession will provide 1387 dwellings; 572 single-detached, 192 semi-detached and 623 townhouses. No farmland will be preserved. A hard urban edge will be created along Mayfield Road, the north boundary of Brampton. The red box indicates the location of Grayhaven Farms in the context of this development proposal.

bottom right

fig. 6.2.13 the block plan

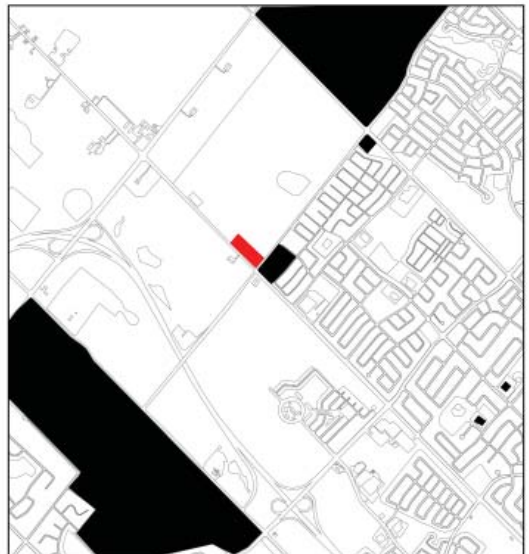
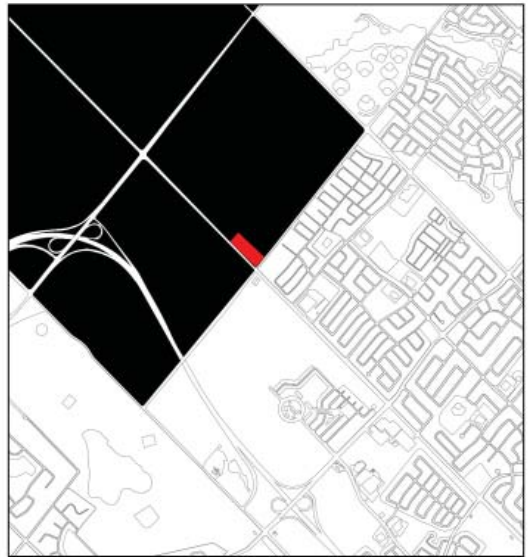
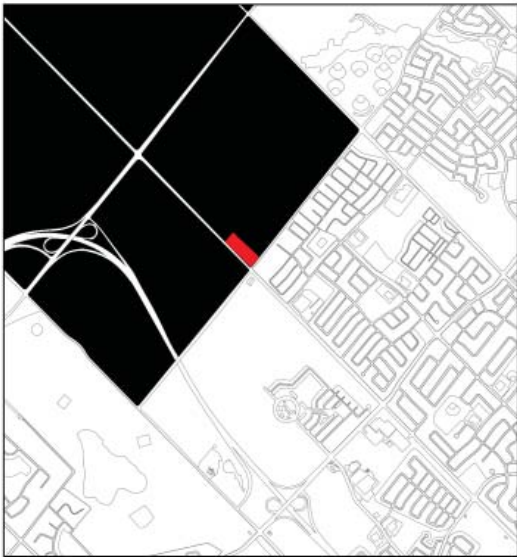
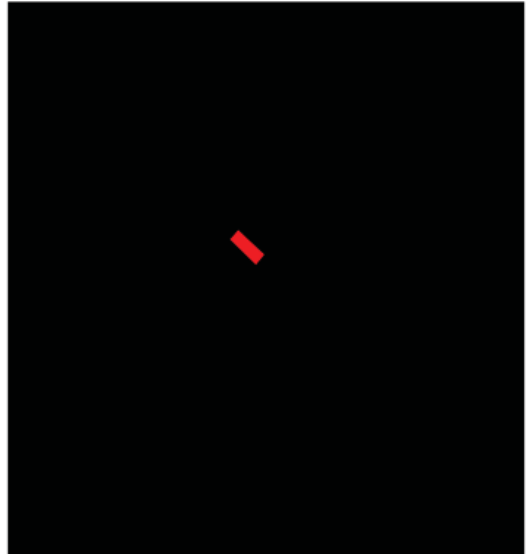
This figure illustrates the residential plan that will consume the west half of this rural concession. The current location of Grayhaven Farms is indicated in red.

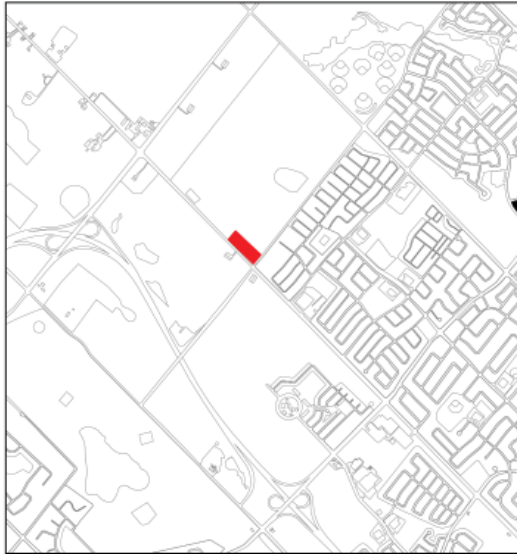
fig. 6.2.14 **rural nodes**

This diagram identifies the location of current and past rural nodes against the current urban edge. Nodes south of the urban edge existed at one time but were eliminated by urban sprawl. These are important to acknowledge because they can act as guides to suggest where a town centre could be incorporated into the development. The red box indicates the current location of Grayhaven Farms.









top left

fig. 6.2.15 site analysis - current fabric

top middle

fig. 6.2.16 site analysis - gross area

top right

fig. 6.2.17 site analysis - public amenities area

middle left

fig. 6.2.18 site analysis - developable area

middle middle

fig. 6.2.19 site analysis - agricultural area

middle right

fig. 6.2.20 site analysis - nodes

bottom left

fig. 6.2.21 site analysis - residential area

bottom middle

fig. 6.2.22 site analysis - public use area

bottom right

fig. 6.2.23 site analysis - future fabric

The collection of these diagrams describes the various land base definitions. The red box represents the current location of Grayhaven Farms. Developable land and agricultural land are identical images because future development will occur on this land. The last diagram illustrates the future fabric of this area, completely consumed by residential developments unless an alternative approach is taken such as the design proposal of this thesis.

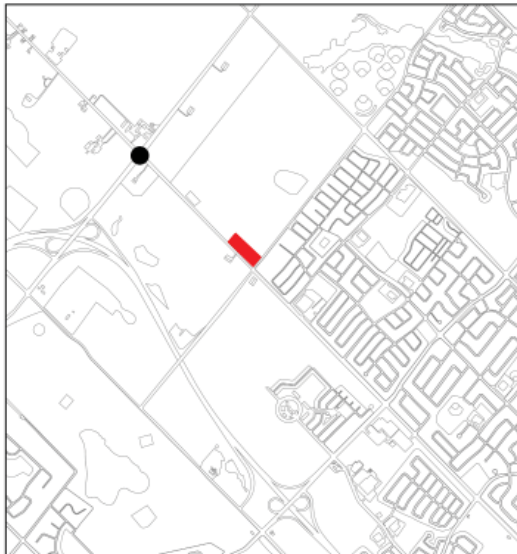


fig. 7.0.0 (opposite)

design project

chapter 07

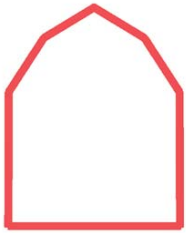
"...they say that they are going to preserve farmland, but you can't build on the Niagara escarpment, you can't build on hazard lands, you can't build on environmentally sensitive areas- what's left?

*Halton Region Farmer
from (Fuller, 1985, p.297)*

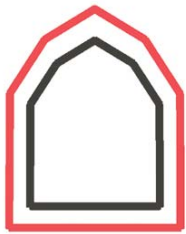
A man's barn bespoke his worth as a man. It expressed his earthly aspirations and symbolized the substance of his legacy to his children.

*- Bill N. Lacy AIA, Director,
Architecture and Arts Environmental
Studies, National Endowment for
the Arts Washington, D.C.
from (Arthur & Witney, 1972, p.8)*





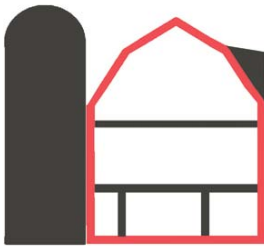
1



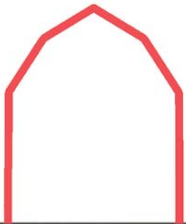
2



3



4



5



6

7.1 the design

This section presents the design proposal that was outlined in Chapter 6, the adaptive reuse of a barn. The following pages illustrate the development of this project starting with identifying the characteristics that defined the barn, the site, and how these were translated and carried through the design. Various diagrams and renderings communicate the potential this barn has to serve a new program and its relationship and influence upon its surrounding area.

The design process began with exploring the characteristics of the barn that created its essence. After numerous visits to the site, four elements were identified. These included the barn boards, space, interventions and the site. They are illustrated in the following pages.

opposite

fig. 7.1.1 parti

This diagram describes the evolution of the parti for this design. In 1, the original barn and its essence guides the design. In 2, light and wind through the barn boards gives the barn spirit. It is a part of the experience of the barn, thus the reasoning behind the introduction of the screen. In 3, the interior space is given life by filling the void. In 4, contemporary interventions are introduced. In 5, the relationship between the barn and site is heightened. In 6, all elements come together to breathe new life into this rural architecture.

barn characteristics

row one

figs. 7.1.2, 7.1.3, 7.1.4, 7.1.5, 7.1.6 **barn boards**

The current quality of the barn boards shows the history of the barn. Light slipping through the barn board gaps and the gentle breeze enlightens the interior of the barn. This characteristic is the first to be identified and will be maintained throughout the design.

1



row two

figs. 7.1.7, 7.1.8, 7.1.9, 7.1.10, 7.1.11 **space and structure**

The quality of the space is defined by its large voids literally supported by the natural structure of wood beams and columns. This spatial quality will guide internal planning.

2



row three

figs. 7.1.12, 7.1.13, 7.1.14, 7.1.15, 7.1.16 **interventions**

Choices for interventions were guided by listening to the barns, hearing where it would be appropriate to introduce contemporary additions.

3



row four

figs. 7.1.17, 7.1.18, 7.1.19, 7.1.20, 7.1.21 **site**

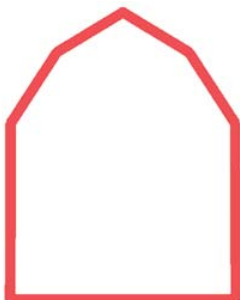
An approach that picked up on the former exterior layout of the site guided the introduction of program into this area including the use of farm outbuildings.

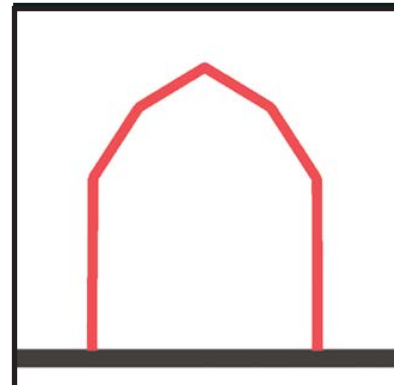
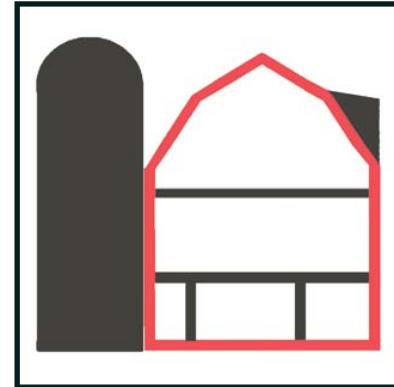
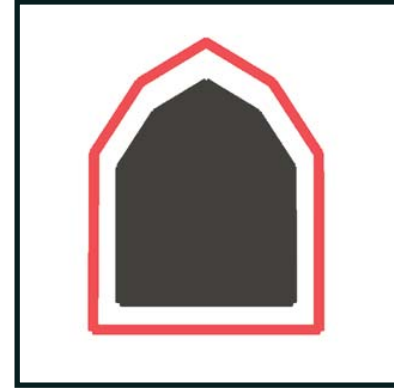
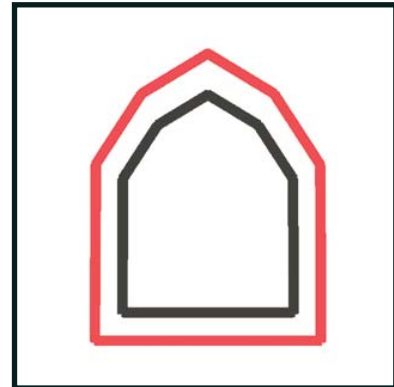
4



barn icon

fig. 7.1.22





the barn board screen

opposite (top)

fig. 7.1.23 manipulated barn boards

Most often when a barn is adapted for a new program, the barn is disassembled and rebuilt in order to create solid walls and allow the interior space to be occupied. This diagram demonstrates the quality of the space once this has been completed.

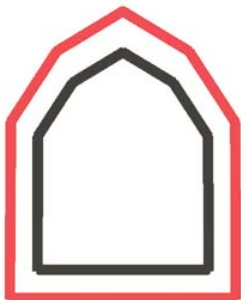
opposite (bottom)

fig. 7.1.24 maintaining barn boards

This diagram illustrates the unique quality that light (and wind, not shown) create in the interior space of a barn. This guides the design to examine how this quality, caused by the gaps between barn boards, can be embraced.

barn boards icon

fig. 7.1.25



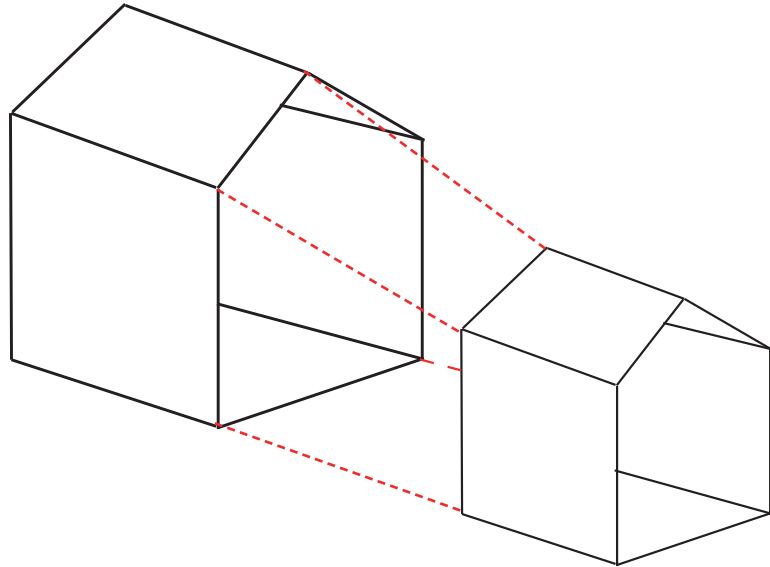


the barn board screen

top

fig. 7.1.26 **screen diagram**

The concept of inserting a new shell within the barns would provide a strategy to preserve the essence of the character created by the barn boards.

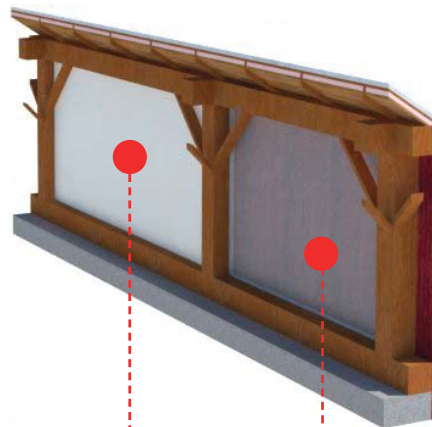


bottom

fig. 7.1.27 **exploded wall**

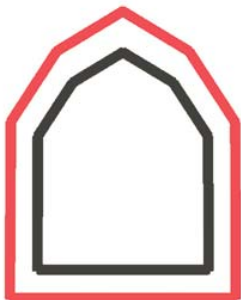
axonometric

The response to this barn characteristic is to preserve the barn boards in all their essence - gaps, rough wood, holes, peeling paint, light and wind. In order to achieve this the barn boards have essentially become an exterior screen and the 'new building' is inserted. The diagram adjacent illustrates this idea where the exterior is left as it is and components are inserted from within to make the space occupiable. This exploded wall axonometric illustrates the way this could be achieved. To maintain the barn board experience, sections of triple pane glass units would be inserted into the existing structure. In other places where this effect is not desired, insulated wall sandwiches would create a white interior finish, provide insulation and exterior cladding behind the barn boards.



barn board icon

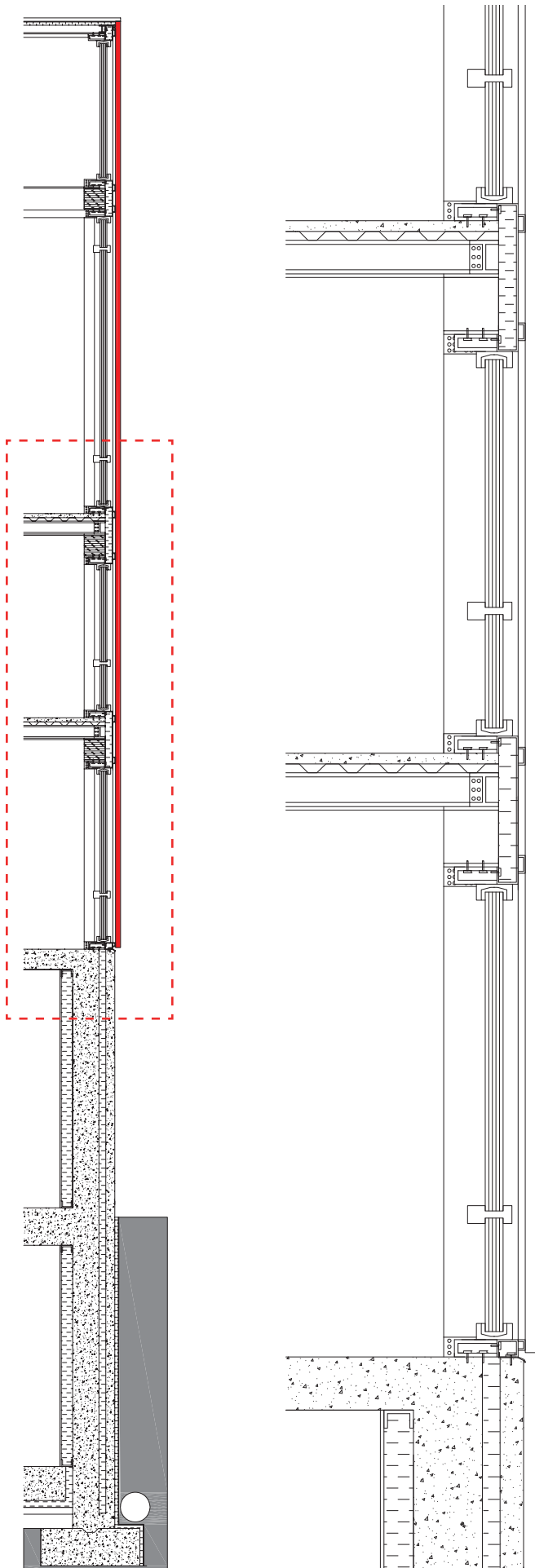
fig. 7.1.28



insulated unit
(barn boards hidden)

glass unit assembly
(barn boards remain visible)

original barn boards
(the screen)



the barn board screen

left

fig. 7.1.29 **wall section**

This wall section illustrates how the east face of the north barn would introduce new structure but maintain the barn boards as a screen.

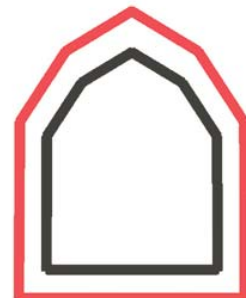
right

fig. 7.1.30 **wall section detail**

Essentially a curtain wall has been introduced behind the barn boards. This would allow light to filter through and maintain dynamic space as it always was. New structural support has been added to the original wood structure along with concrete and steel I beam floor plates. (See Appendix D, p.238 for more detail).

barn board icon

fig. 7.1.31



the barn board screen

opposite (top)

fig. 7.1.32 plan - fourth level

The first area that this effect was investigated was the top level of this new community centre. The open concept of this library provides the ideal conditions to witness the light coming through the barn boards.

opposite (bottom)

fig. 7.1.33 section - north barn looking east

This section illustrates the large space that the fourth level of the library offers.

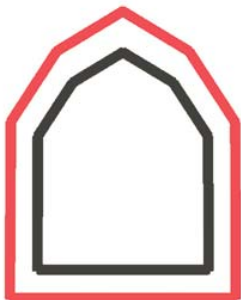
below

fig. 7.1.34 north barn - east face

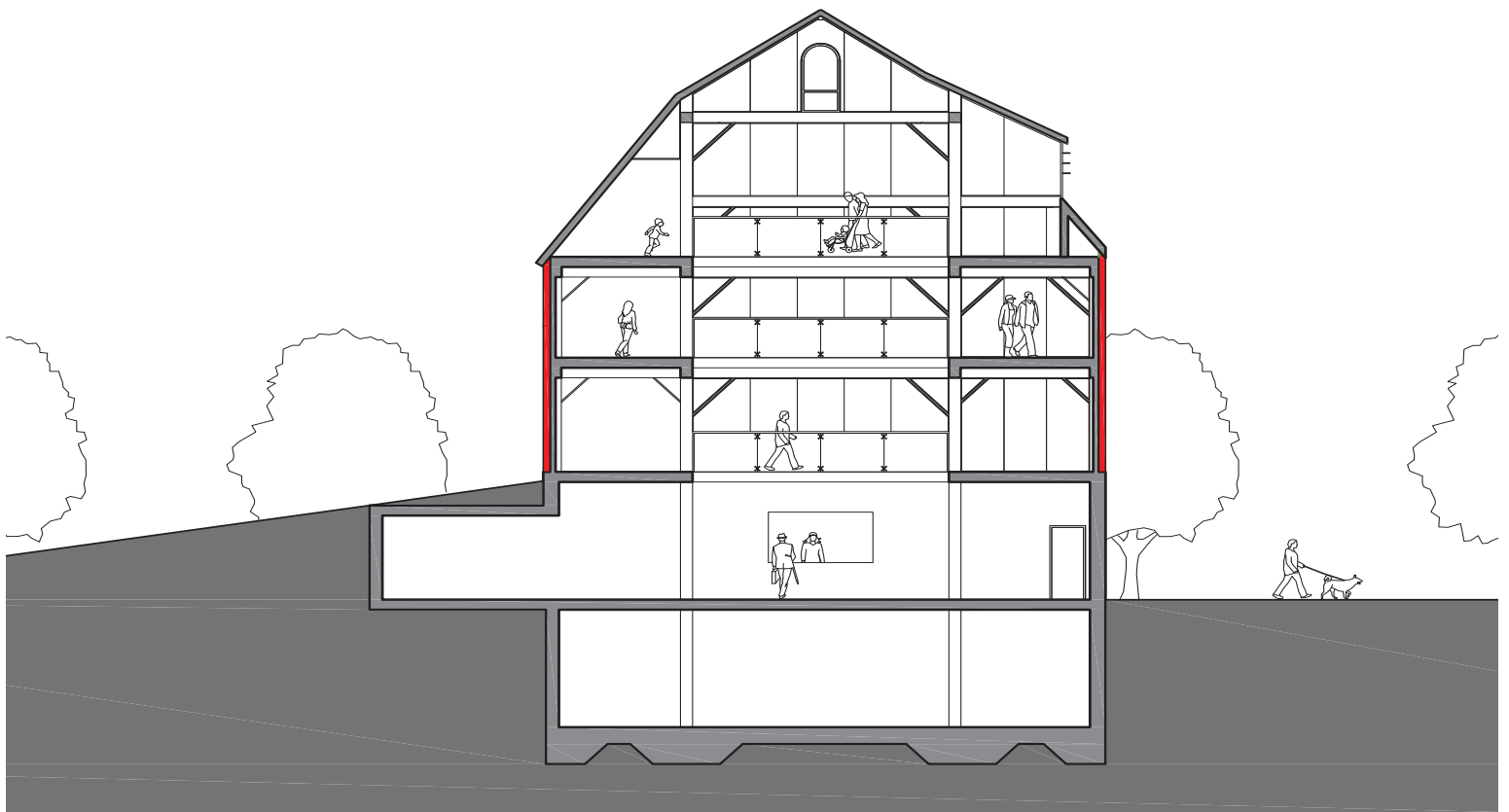
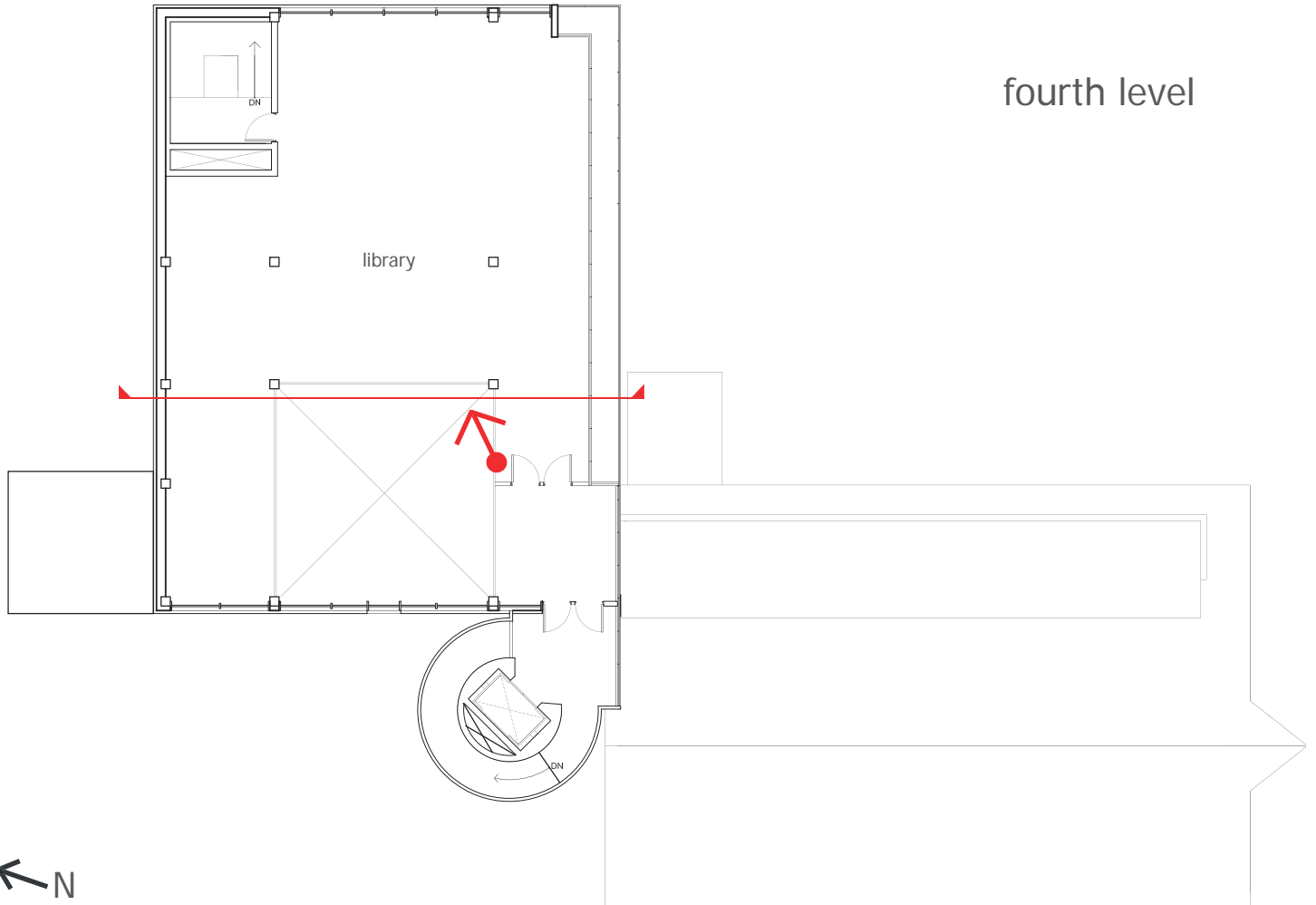
This is the current condition of the space that the fourth level of the library was introduced into.

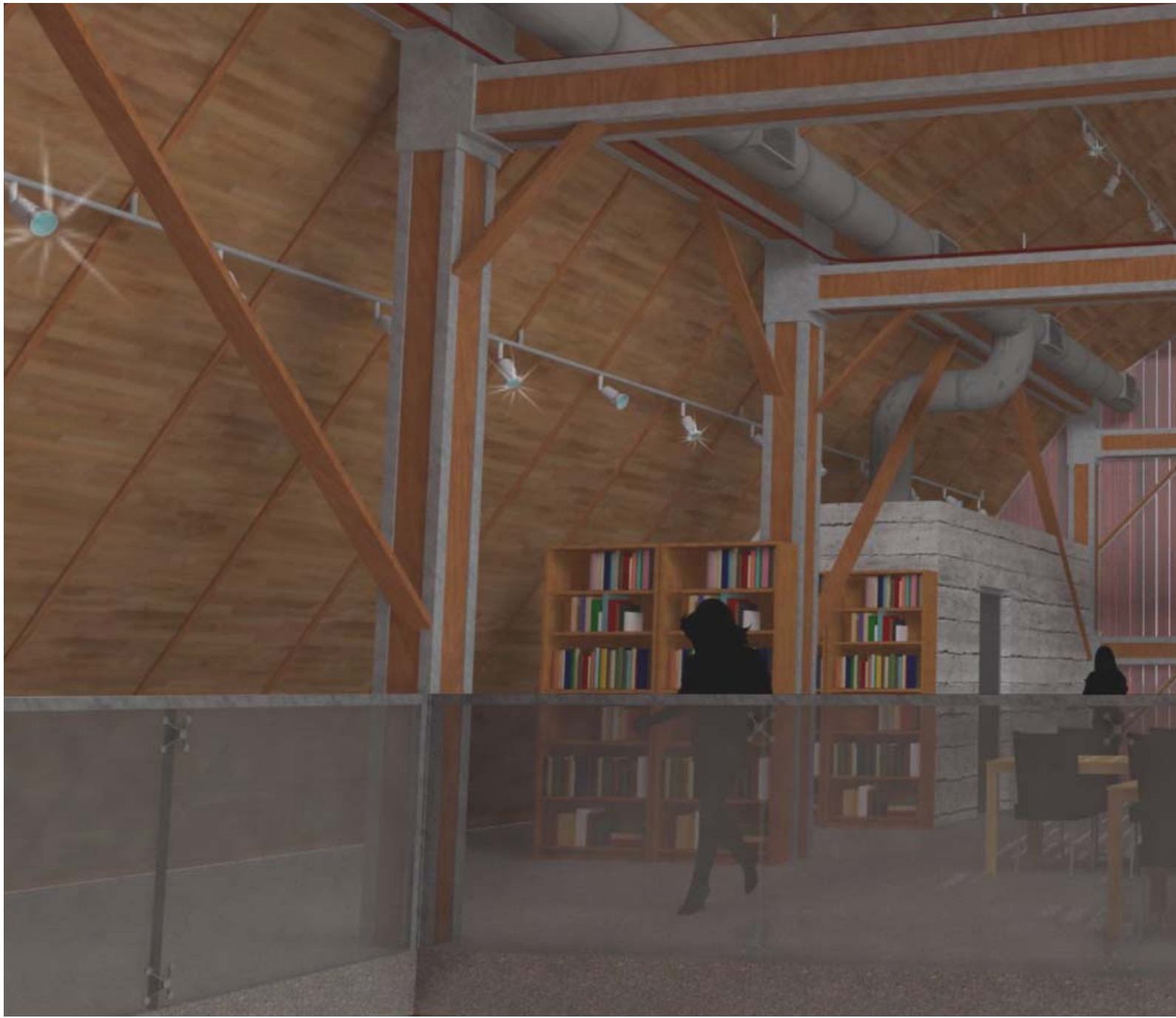
barn board icon

fig. 7.1.35



fourth level





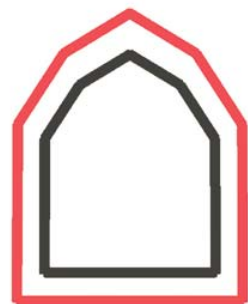
the barn board screen

fig. 7.1.36 **interior of north barn
- fourth level**

This rendering highlights the quality of the space of the library on the fourth level. Light slips through the barn boards casting shadows on the floor. New steel structure has been added to the existing wood structure and the inclusion of mechanical systems provides a feeling of the space.



barn board icon
fig. 7.1.37



the barn board screen

opposite (top)

fig. 7.1.38 **plan - second level**

The second space that investigated the use of light through the barn boards was on the second level of the library.

opposite (bottom)

fig. 7.1.39 **sectional perspective - looking east**

This sectional perspective illustrates the location and size of space in relation to other spaces within the north barn.

below

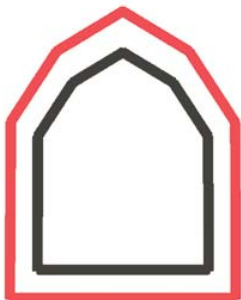
fig. 7.1.40 **north barn - south east corner**

This is the current condition of the space that the second level of the library was introduced into.

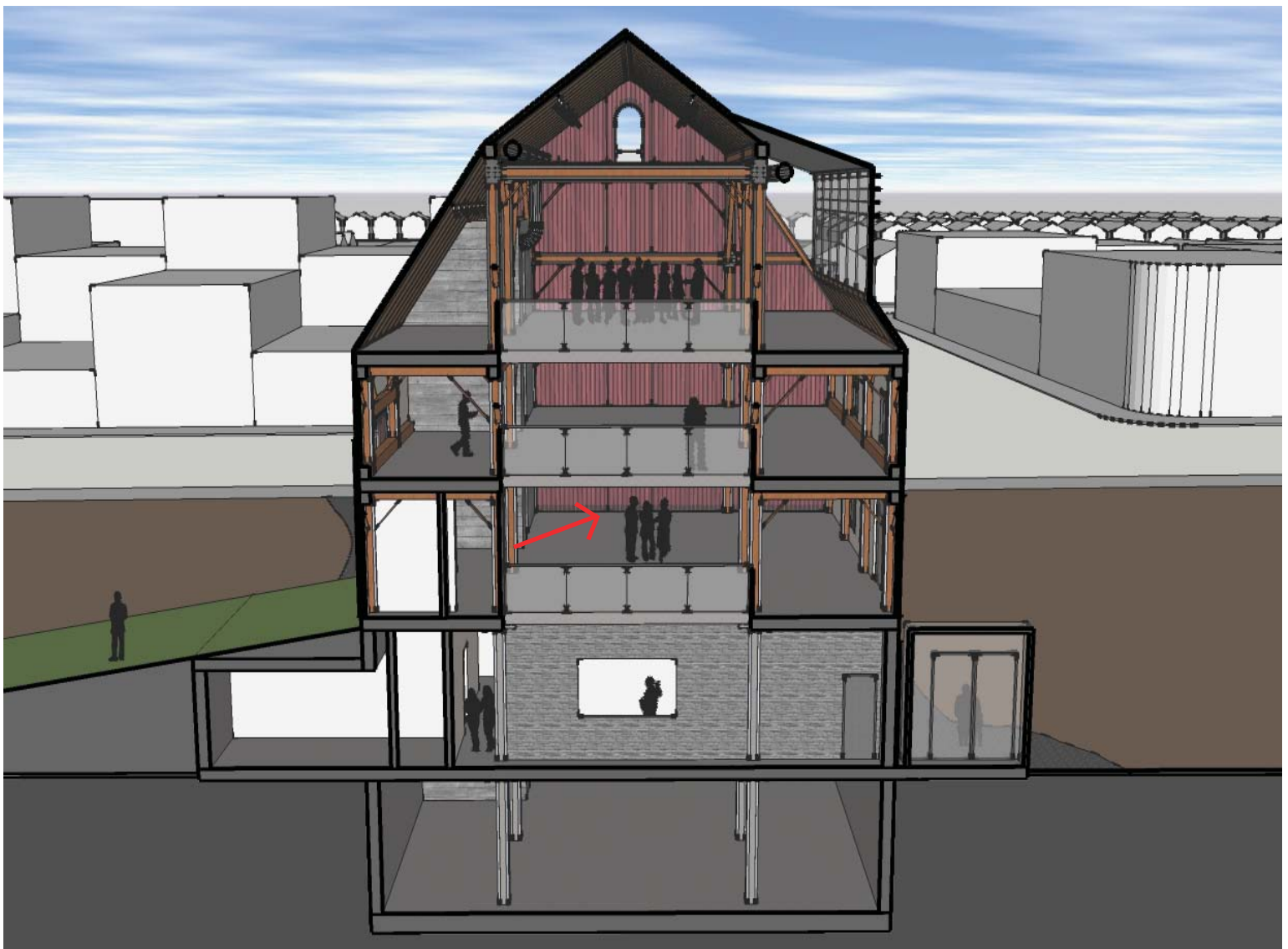
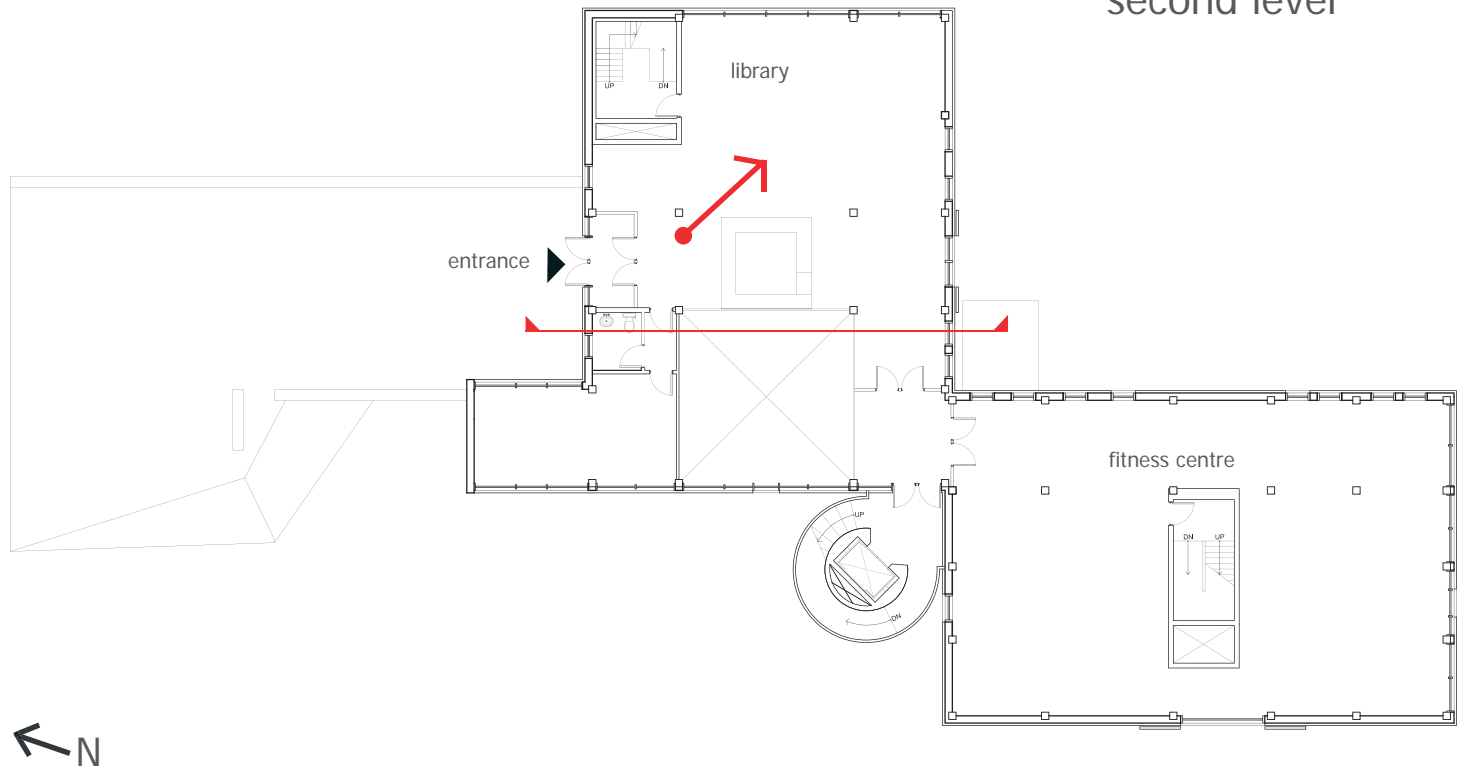


barn board icon

fig. 7.1.41



second level



the barn board screen

top

fig. 7.1.42 barn boards - morning
bottom (left)

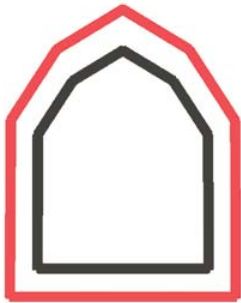
fig. 7.1.43 barn boards - afternoon
bottom (right)

fig. 7.1.44 barn boards - early
evening

These renderings illustrate the effect this design approach creates inside the barn. By introducing glazing instead of solid walls, the exterior maintains in its original quality and this space is created within. This series of renderings show how the light interacts with the space throughout the day.

barn board icon

fig. 7.1.45





the interior space

opposite (top)

fig. 7.1.46 **space and structure**

This diagram explores the open space and structure that defines the interior of the barn. This large space was once ideal for agricultural use but the question now becomes how can this massive space still be experienced while becoming functional for non-agricultural program.

opposite (bottom)

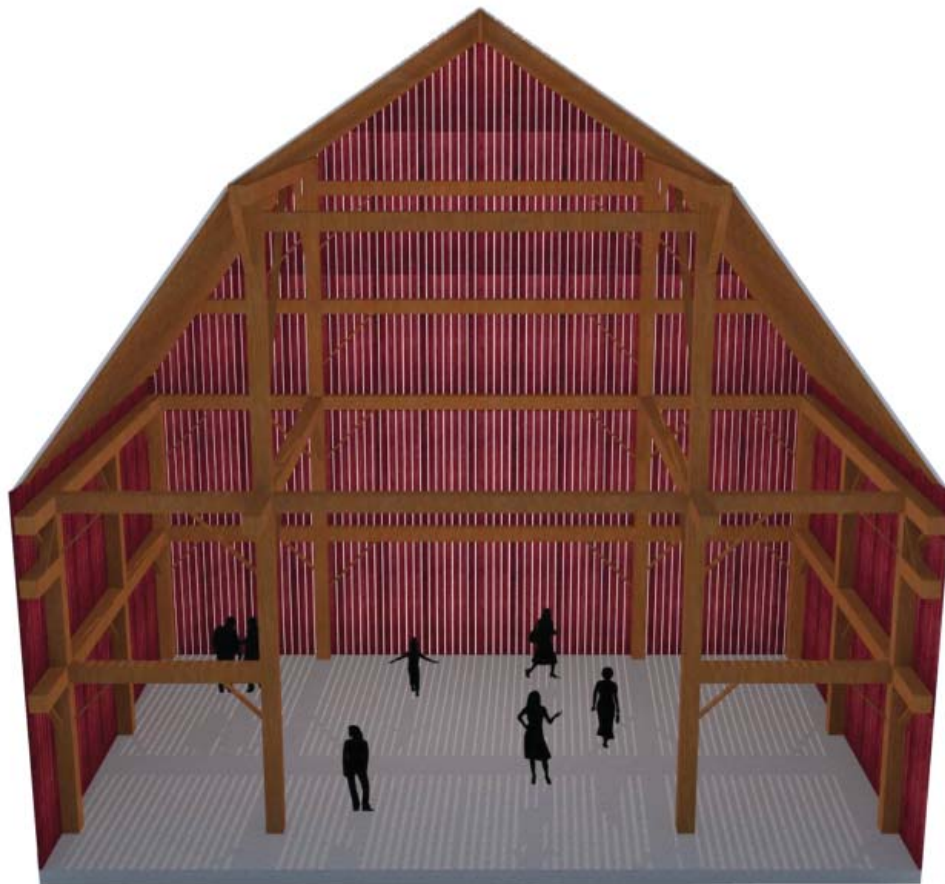
fig. 7.1.47 **space, structure and floor plates**

This diagram illustrates how inserting floor plates takes advantage of the large space within the barn. However, complete floor plates lose the experience of the spaciousness of being in the barn. A way to introduce multiple levels but maintain the sense of the space is essential. The design investigation to achieve both was conducted.

space and structure icon

fig. 7.1.48





the interior space

opposite (top)

fig. 7.1.49 section - north barn
looking south

opposite (bottom)

fig. 7.1.50 section - south barn
looking east

The generous heights of 18 meters in the north barn and 14 meters in the south barn provided an excellent opportunity to design in section. The height of the north barn allowed for an atrium to be introduced which is illustrated in the following pages.

fig. 7.1.51 plan - fourth level

fig. 7.1.52 plan - third level

fig. 7.1.53 plan - second level

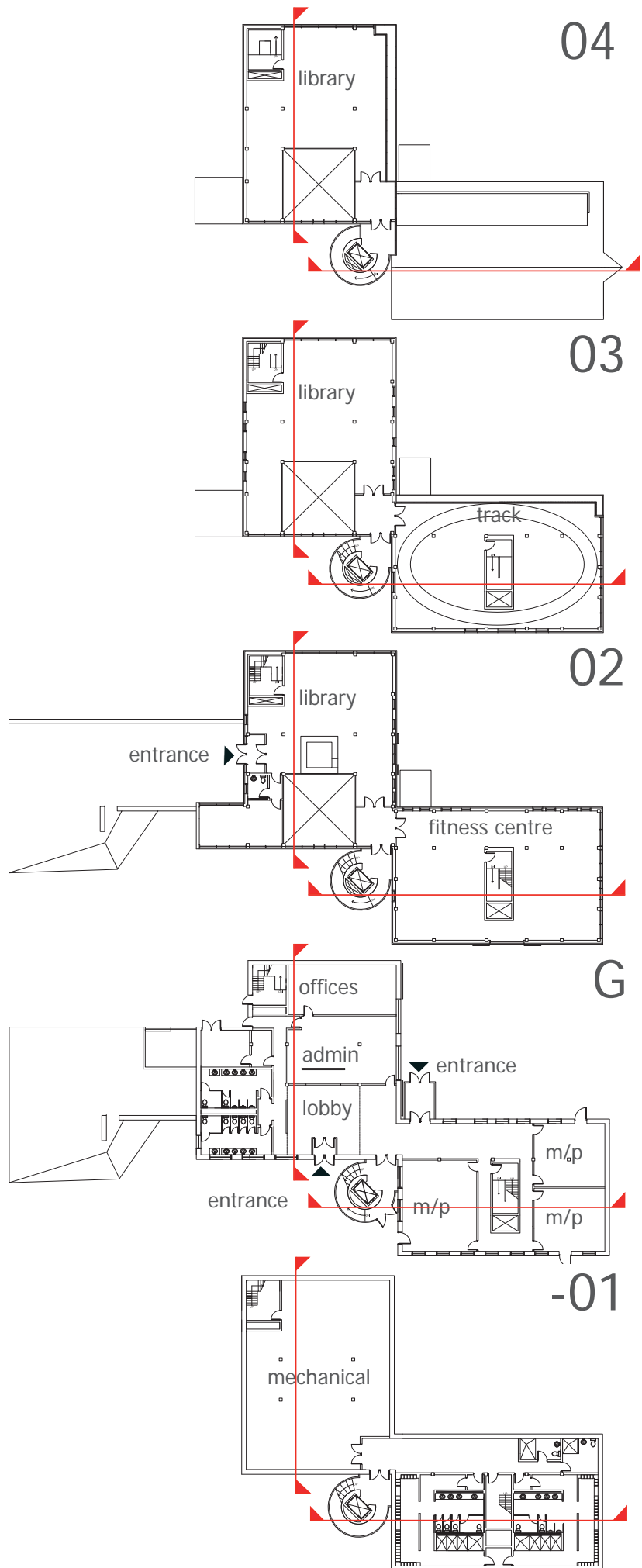
fig. 7.1.54 plan - ground level

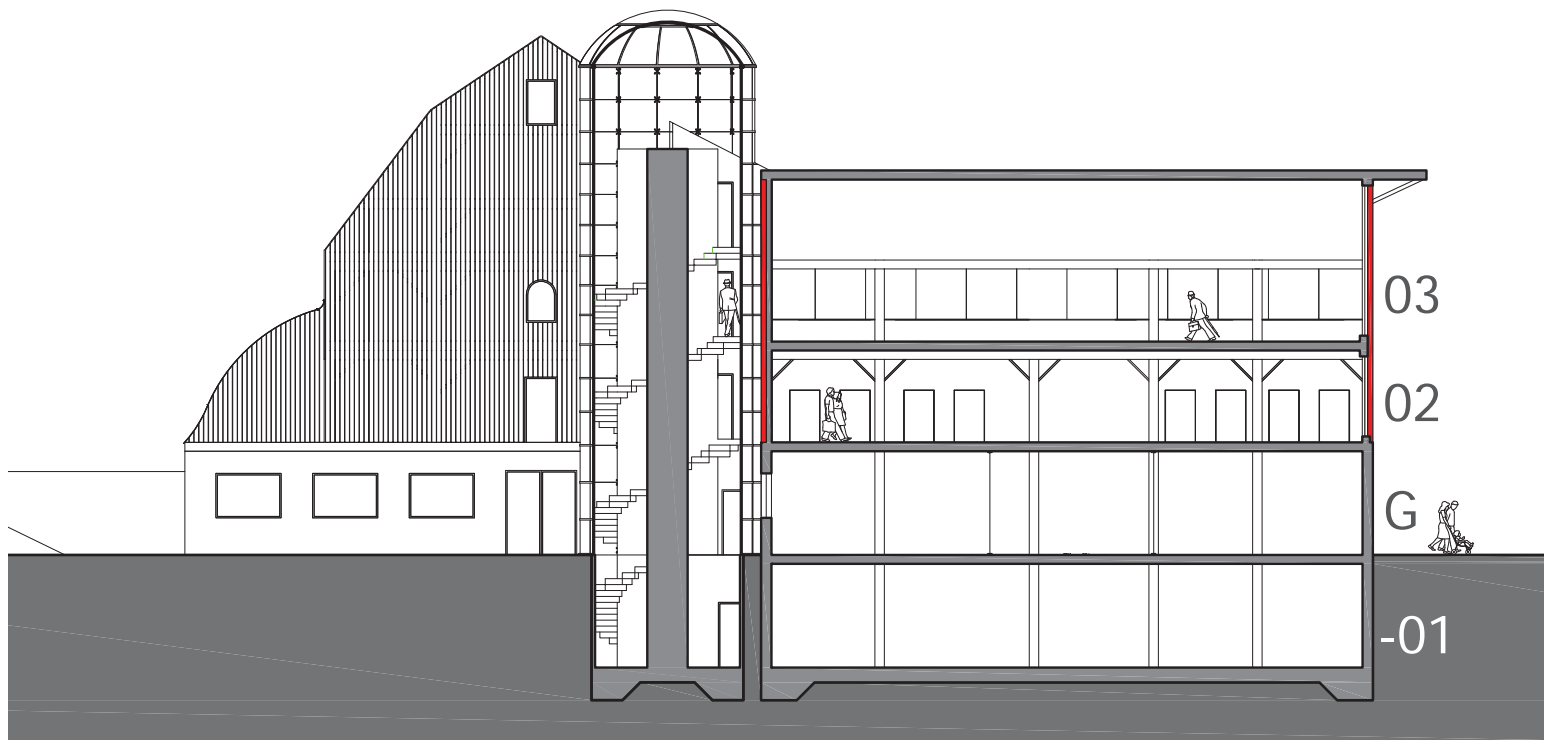
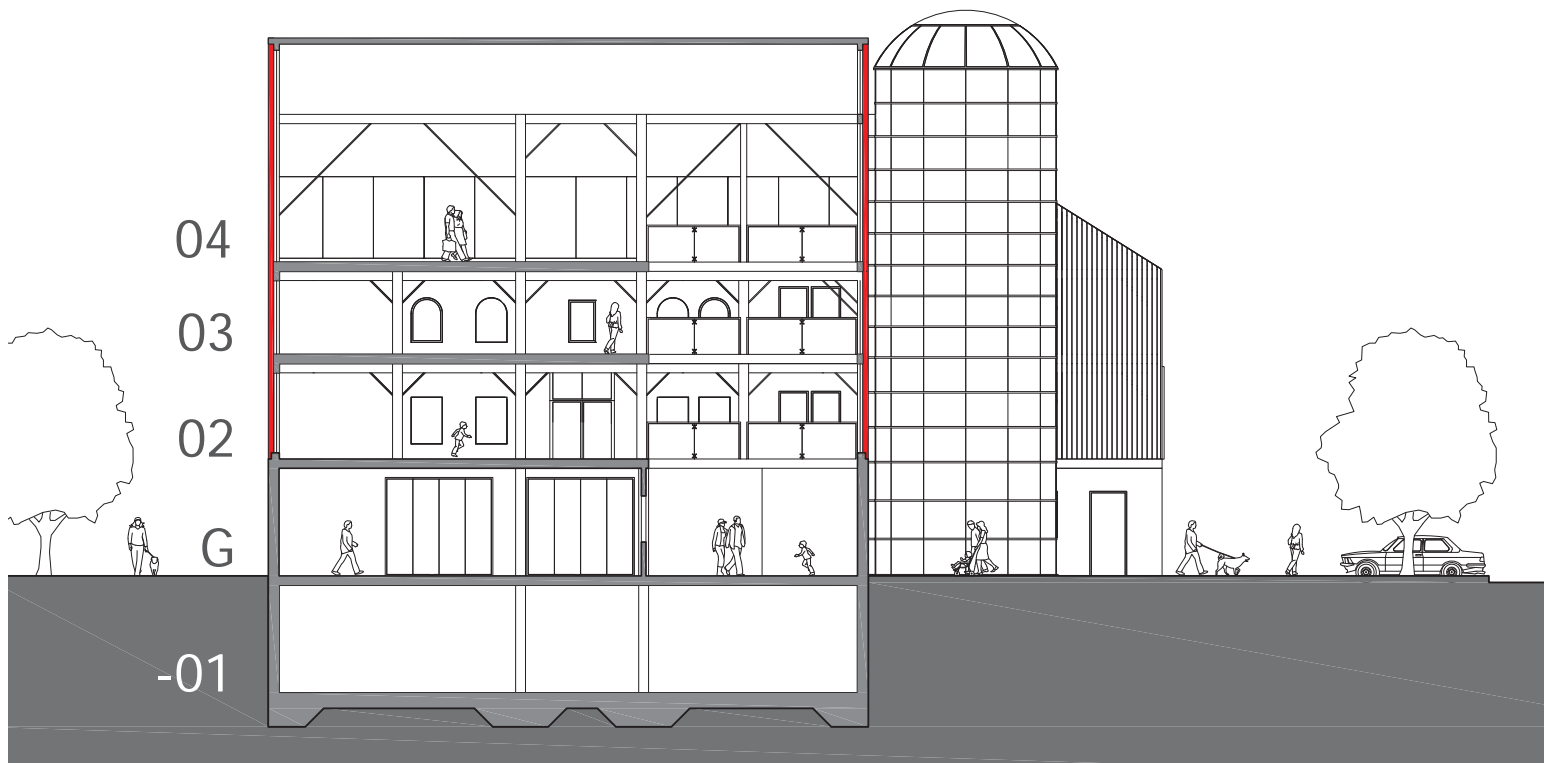
fig. 7.1.55 plan - lower level

In addition to a lower level for each barn, the current heights of the barns provided the space to introduce 4 levels in the north barn and 3 levels in the south barn.

space and structure icon

fig. 7.1.56





the interior space

right

fig. 7.1.57 north barn - interior east facade

This is the current condition of the west half of the north barn.

opposite (top)

fig. 7.1.58 plan - ground level

bottom

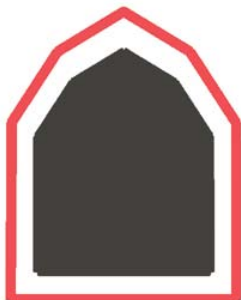
fig. 7.1.59 atrium - looking up

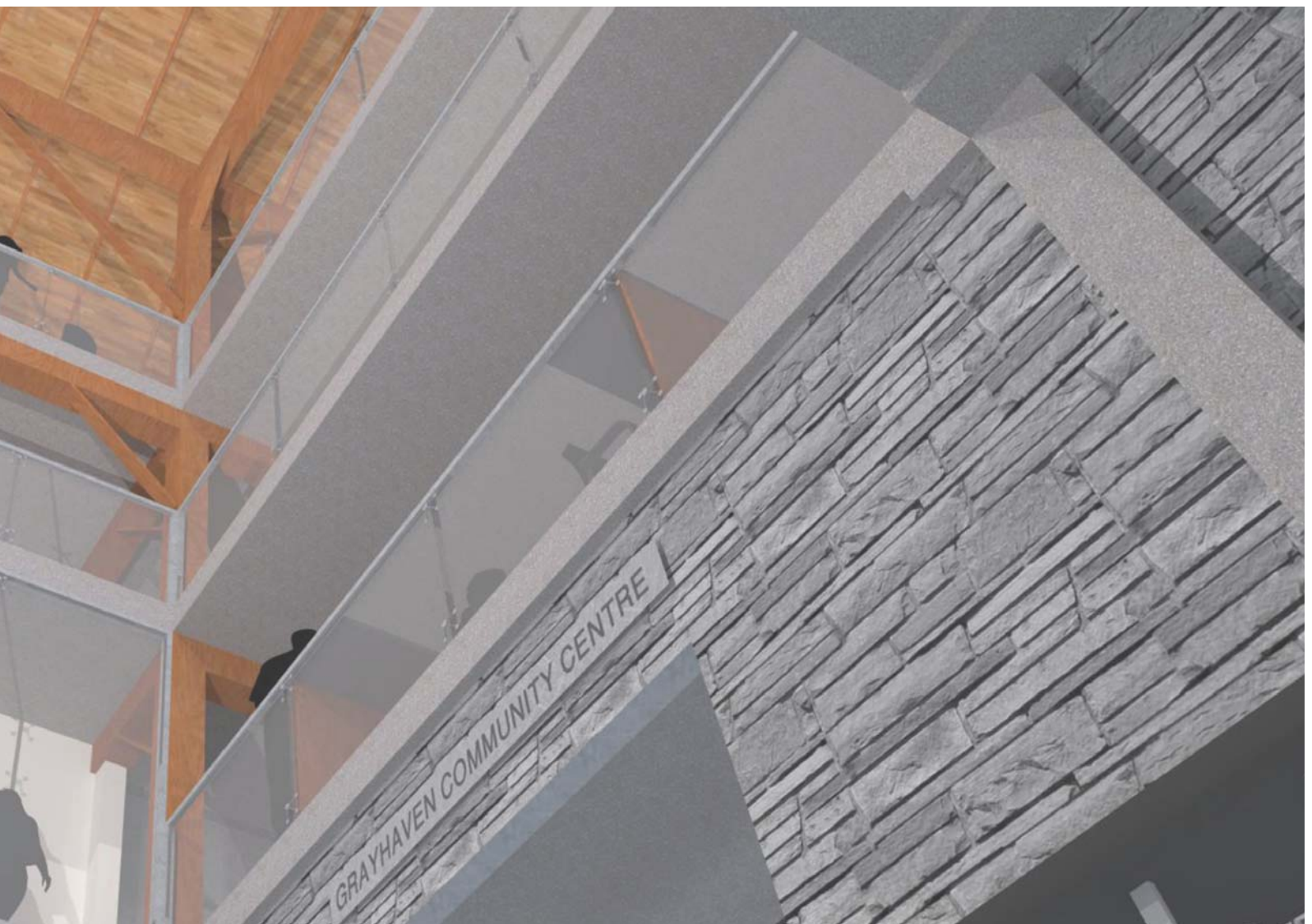
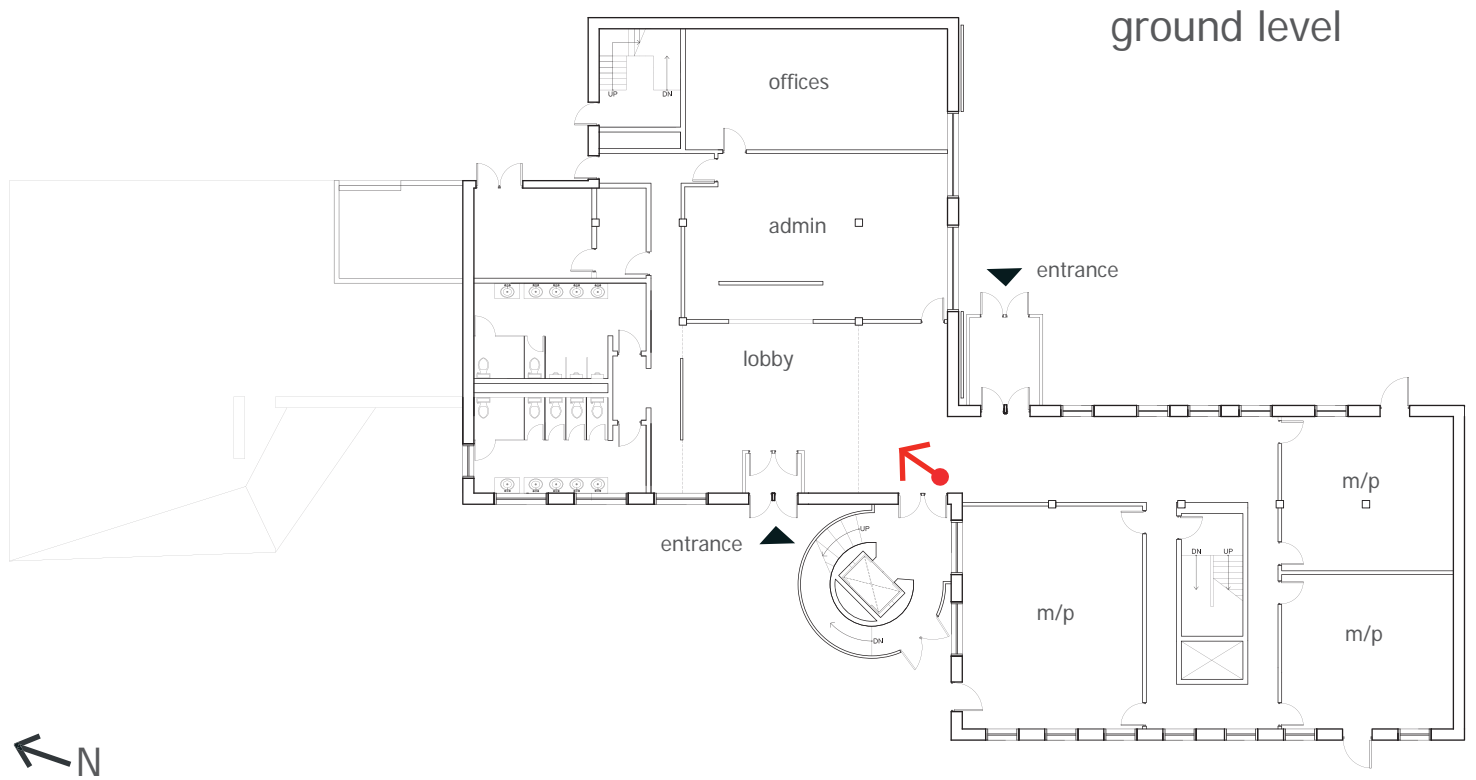
The atrium was introduced in the west half of the north barn. This space provided the height to introduce this architectural feature and also maintained the feeling of the large space that this barn offers immediately as one enters from the main entrance on the ground level.



space and structure icon

fig. 7.1.60





the interior space

right

fig. 7.1.61 atrium - looking down

The introduction of this atrium space also connects all levels in both the north and south barns. No matter what floor is being occupied, the spaces are connected and a physical and visual experience of the size of the barn has been achieved. This rendering illustrates this sense of the space looking down from the fourth floor.

opposite (bottom)

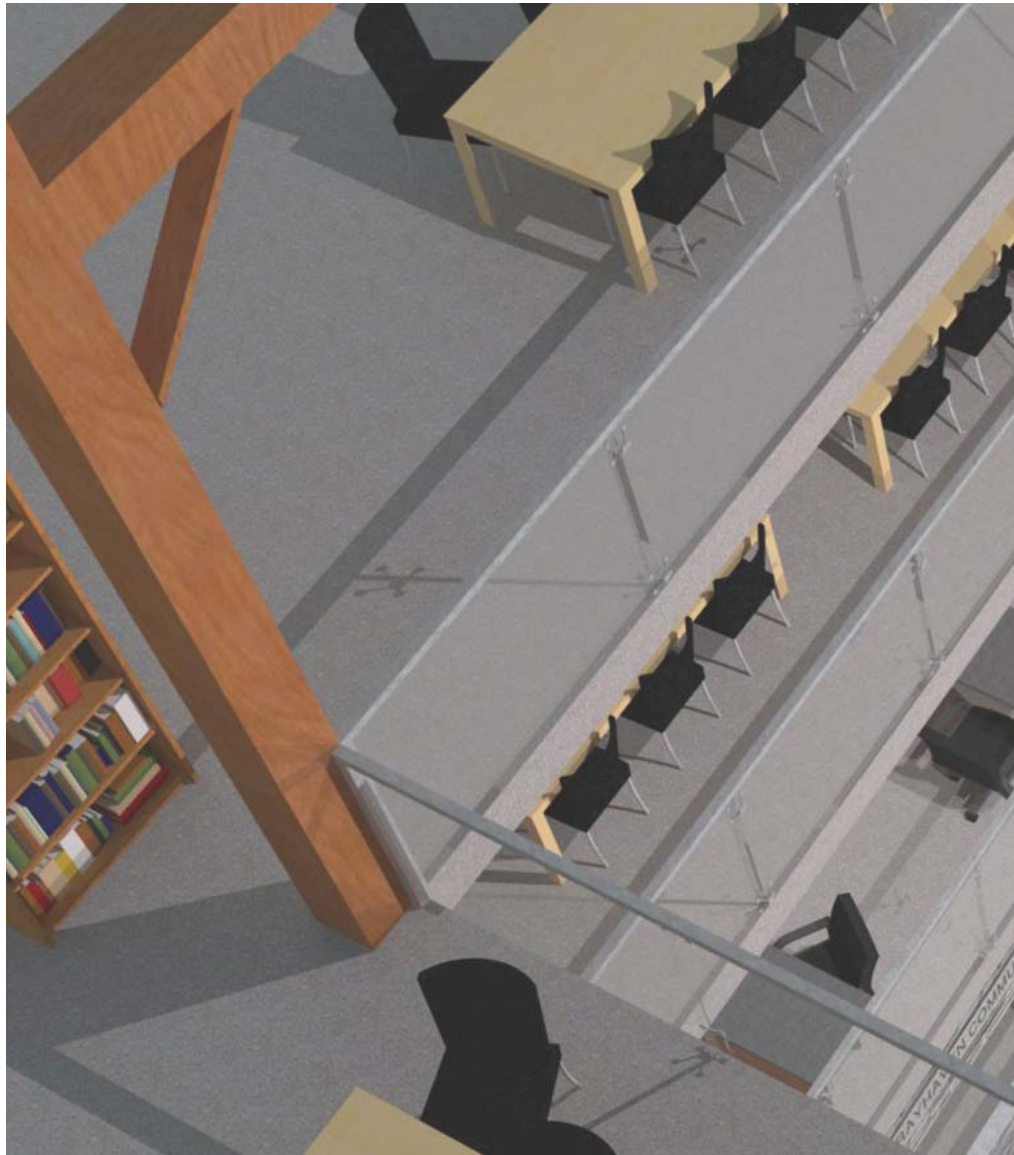
fig. 7.1.62 lobby

Upon entering the library, you come into the larger atrium at the ground level. This provides a visitor with the immediate experience of the height that this barn offers.

bottom

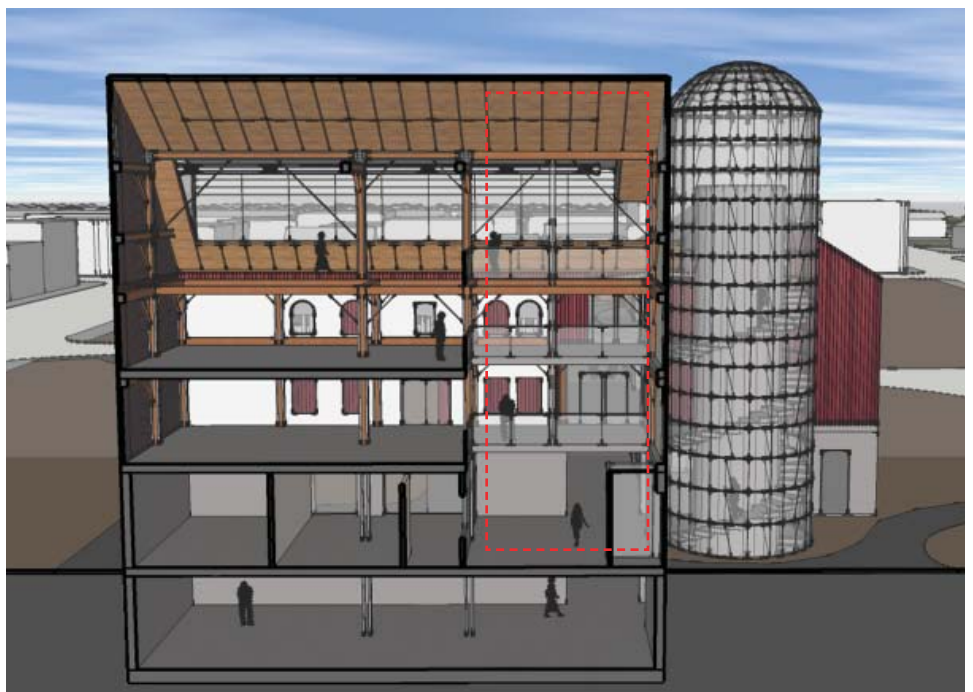
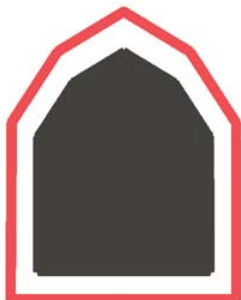
fig. 7.1.63 sectional perspective - looking south

This section illustrates the quality and connectivity of the space that the atrium within the north barn creates.



space and structure icon

fig. 7.1.64



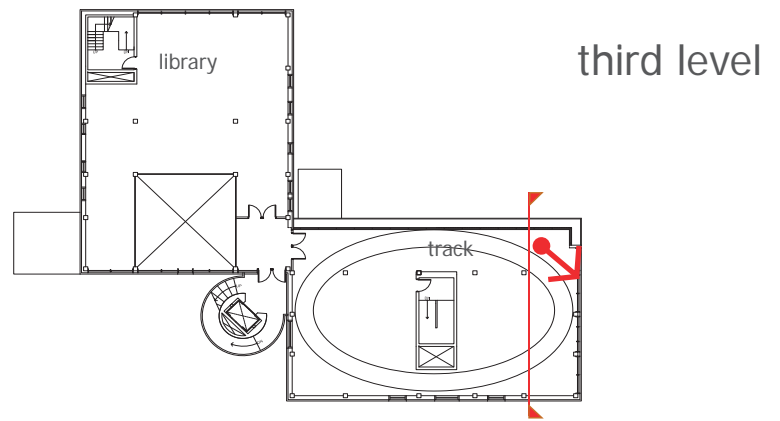


the interior space

opposite (top)

fig. 7.1.65 south barn - looking south

This is the current condition of the south barn.



top

fig. 7.1.66 plan - third level

middle

fig. 7.1.67 sectional perspective - looking south

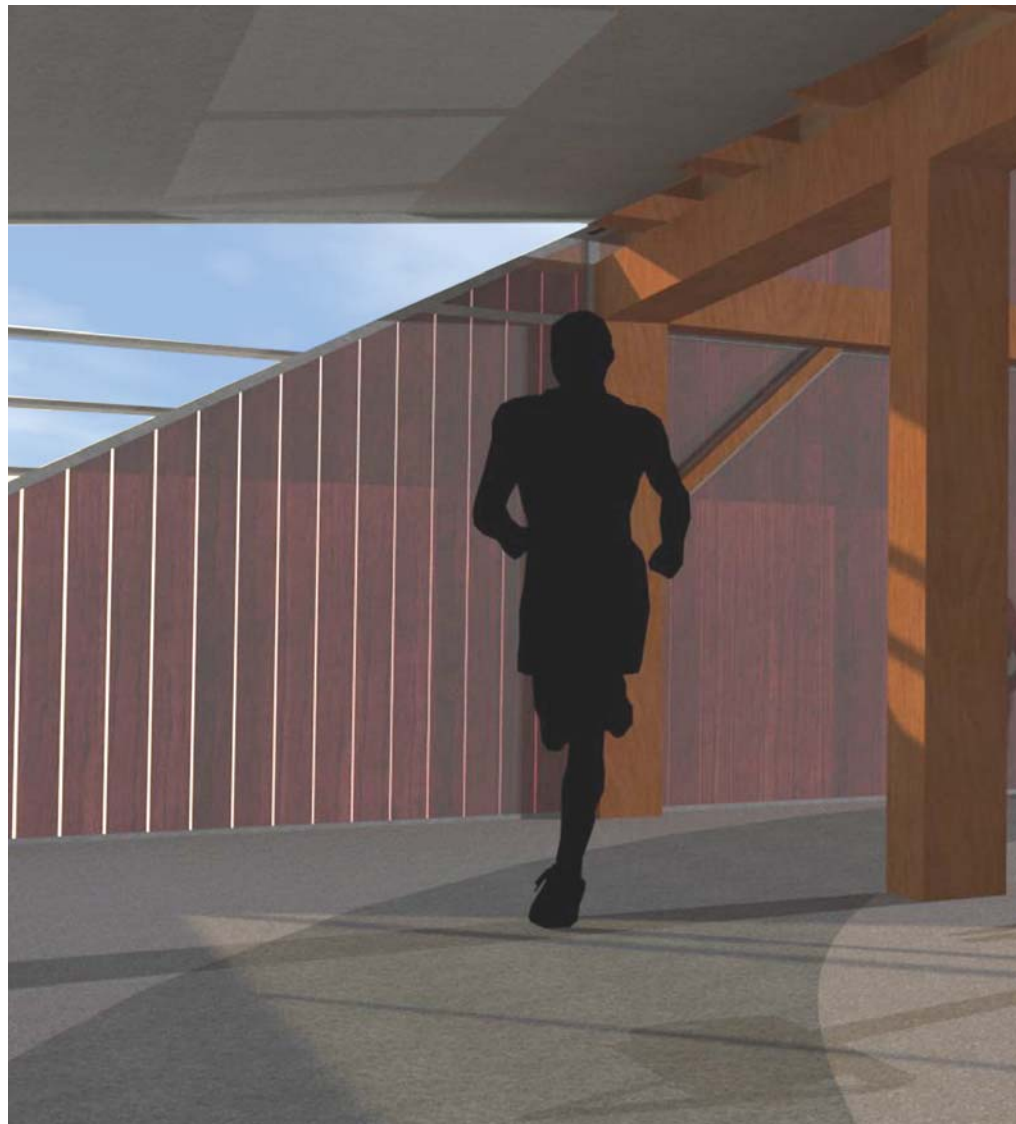
Though slightly smaller than the north barn, the area provided within the south barn allowed for 3 floor plates to be introduced.



bottom

fig. 7.1.68 running track

On the third level, with assistance from the introduction of a contemporary pop out, the space provided enough room to introduce a running track. The quality of this space can be seen in the rendering below. The original structure creates an interesting interaction with the space. In addition, the idea of playing with the light through the barn boards has also been included in this space.



space and structure icon

fig. 7.1.69





the interior space

opposite (top)

fig. 7.1.70 south barn - looking south

top

fig. 7.1.71 plan - second level

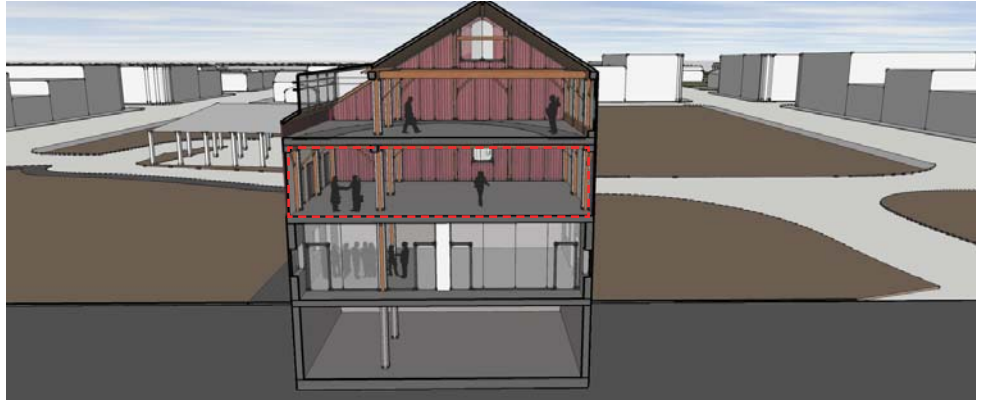
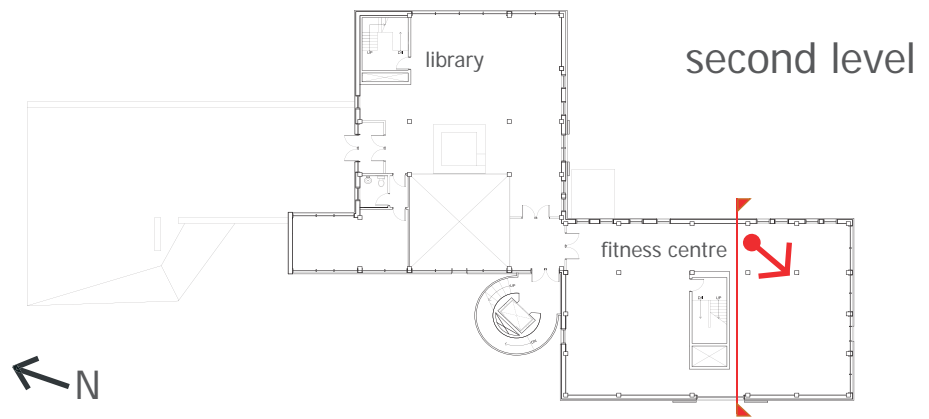
middle

fig. 7.1.72 sectional perspective - looking south

bottom

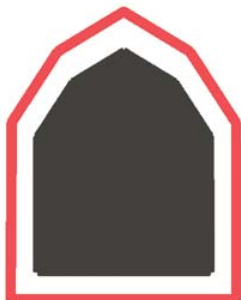
fig. 7.1.73 fitness centre

The south barn was able to accommodate 3 floor plates. On the second level, the open concept allows for the space to adapt to multiple programs. However, in the context of this design, a fitness centre was introduced. Again, as illustrated in this rendering, the original structure was maintained and the use of light through the barn boards was included on the south face.



space and structure icon

fig. 7.1.74





the interior space

opposite (top)

fig. 7.1.75 south barn - looking south

This is the current condition of the existing ground level of the south barn.

top

fig. 7.1.76 plan - ground level

middle

fig. 7.1.77 section - looking north

By exploring in both plan and section, it was identified that this space could accommodate large rooms by picking up on the original agricultural program layout. The industrial layout of cow stalls provided the perfect grid to create multi-purpose rooms on this level.

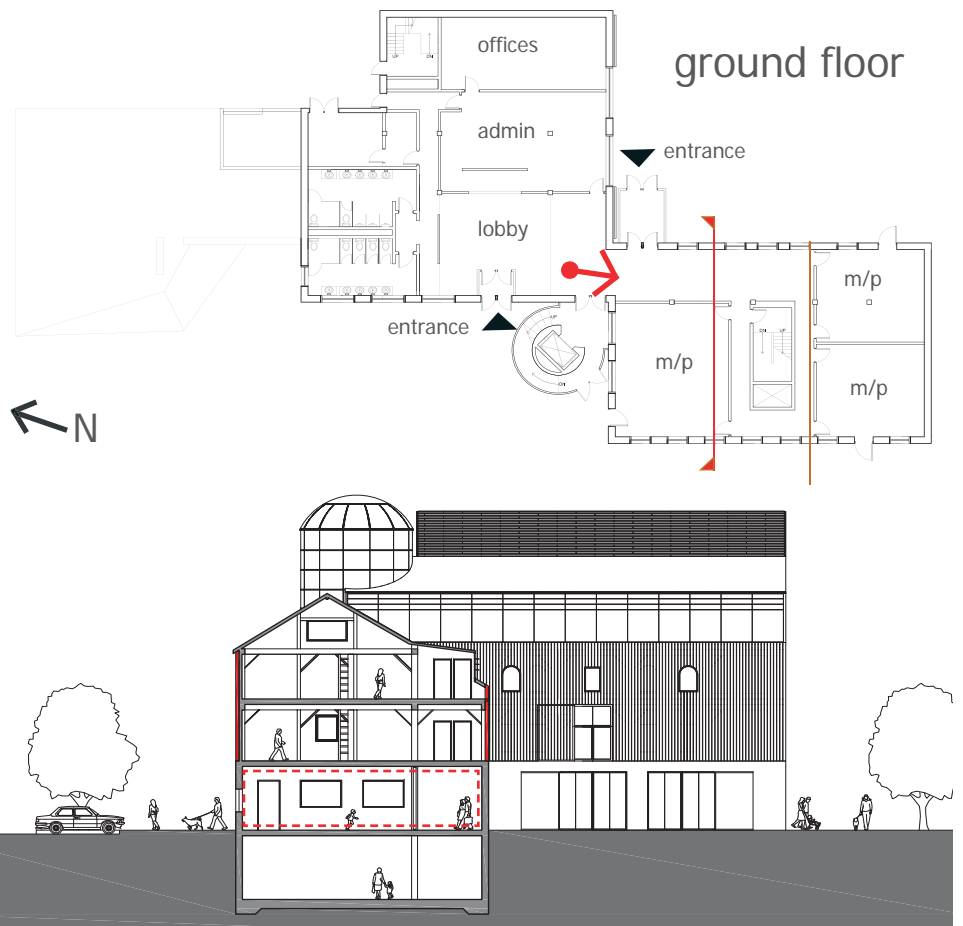
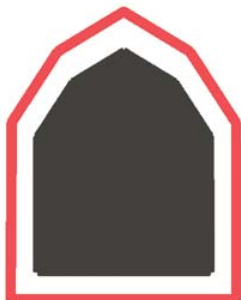
bottom

fig. 7.1.78 multi-purpose rooms

This rendering showcases the interior intervention within this space. The original 'hall' was maintained and the multi-purpose rooms used the division of cattle stalls to determine the location of partition walls.

space and structure icon

fig. 7.1.79

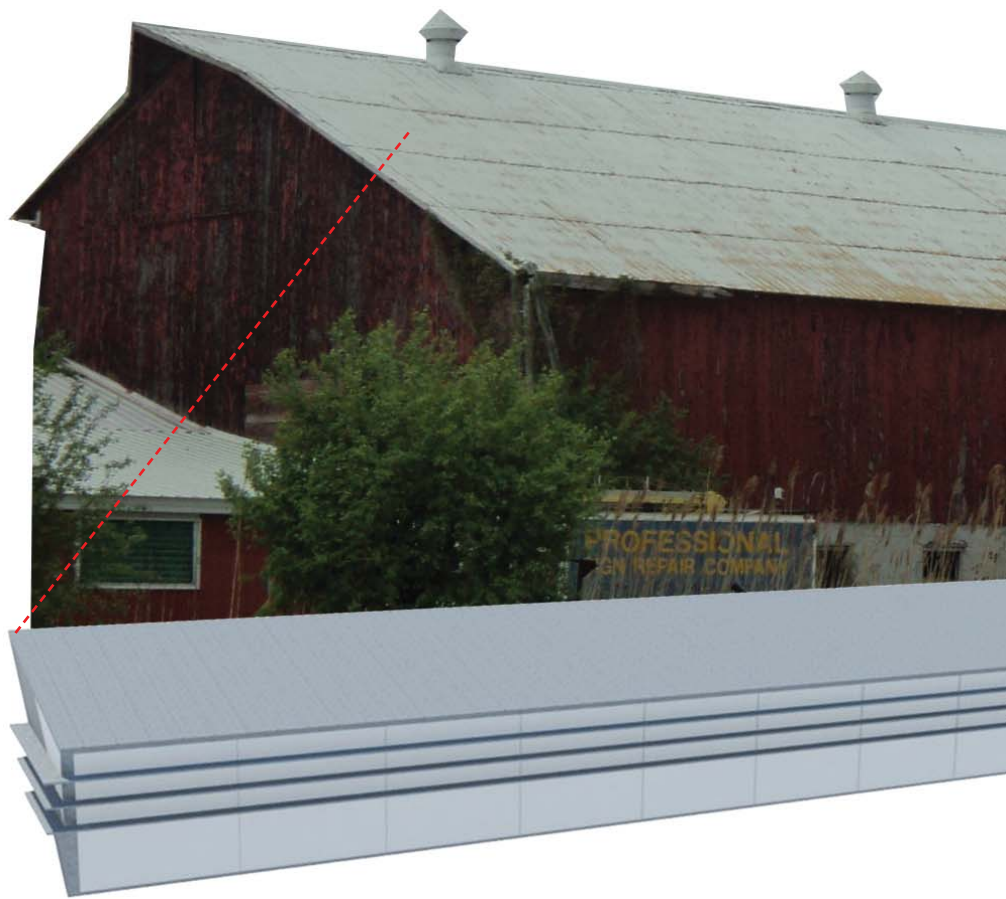




interventions

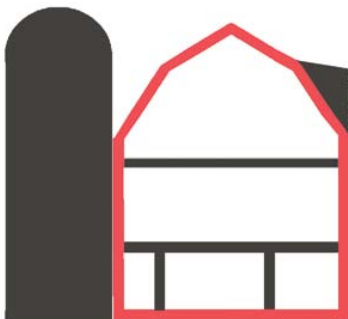
fig. 7.1.80 interventions diagram

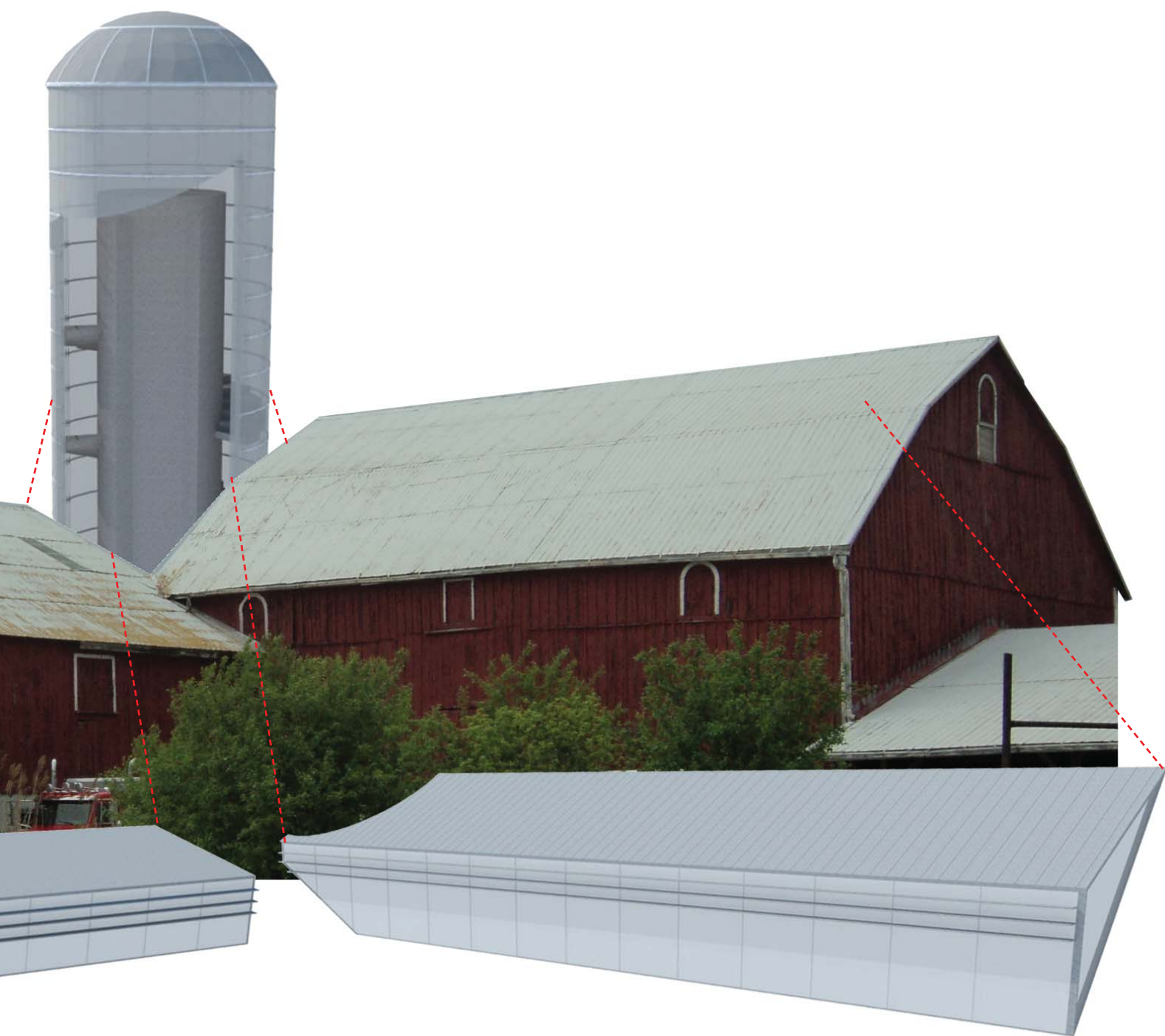
After numerous site visits and gaining an understanding of the barn, intervention locations were identified. The goal of these interventions is to enhance the spirit of the barn but clearly identify themselves as new components.



interventions icon

fig. 7.1.81





interventions

top

fig. 7.1.82 entry to silo

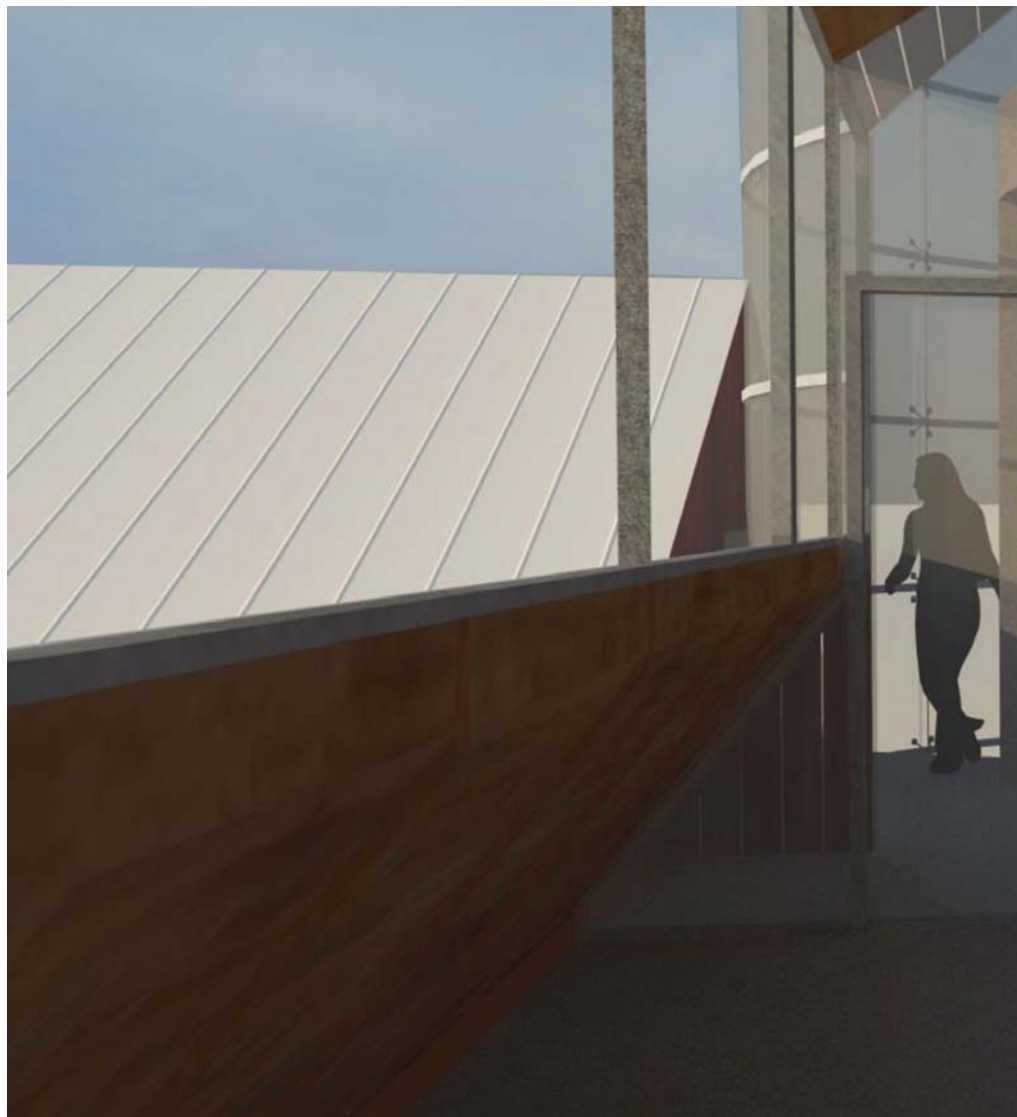
opposite (bottom)

fig. 7.1.83 silo from exterior

bottom

fig. 7.1.84 plan - fourth level

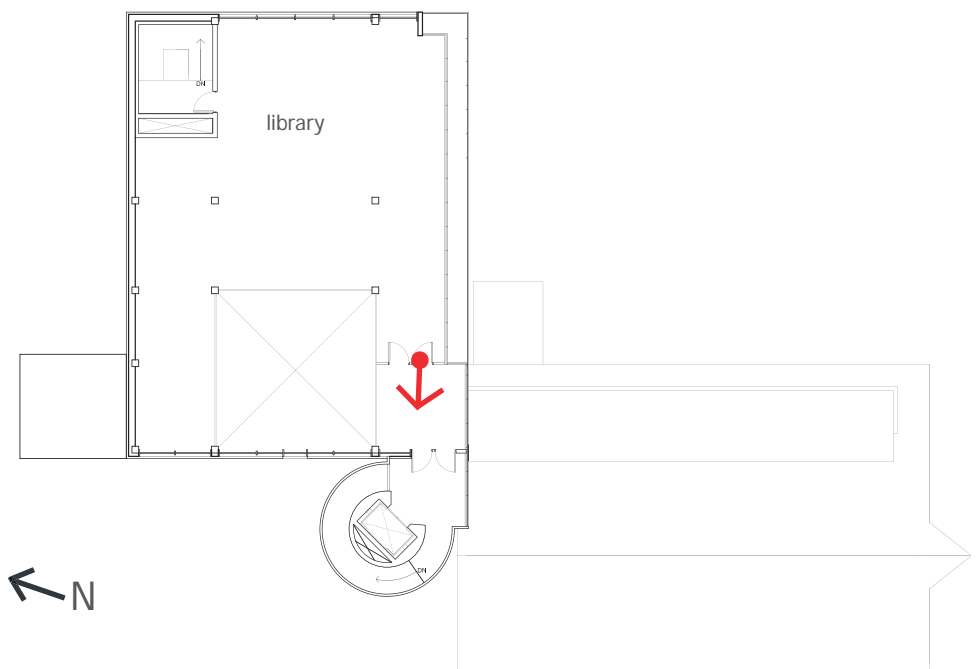
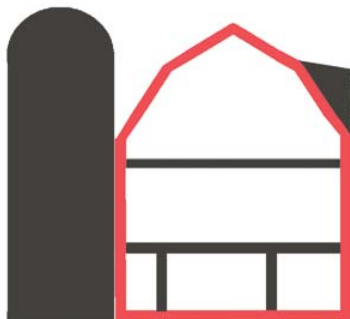
The first intervention is the glass silo. It is envisioned to be constructed of steel rods, and spider joint connections which attach to the concrete plates and core of the stairs and elevator. This silo is the main circulation core. The intent of this glass silo was to create an interesting contemporary space that complimented and assisted with experiencing the barns vertically. The silo took its proportions, colour and configuration from surrounding silos in the area. The glass, a tinted shade of gray assists with heat gain.



fourth level

interventions icon

fig. 7.1.85





interventions

top

fig. 7.1.86 north pop out

The introduction of a pop out space in the north barn provided the ability to maximize space of the fourth level. It provides additional natural light which filters through the fourth level and into the atrium space. As well, its presence clearly identifies itself as a contemporary intervention. The glass facade and placement in relation to the original roof configuration and slope makes it appear as if it is literally popping out of the south face of the north barn's roof.

opposite (bottom)

fig. 7.1.87 interior of north pop out

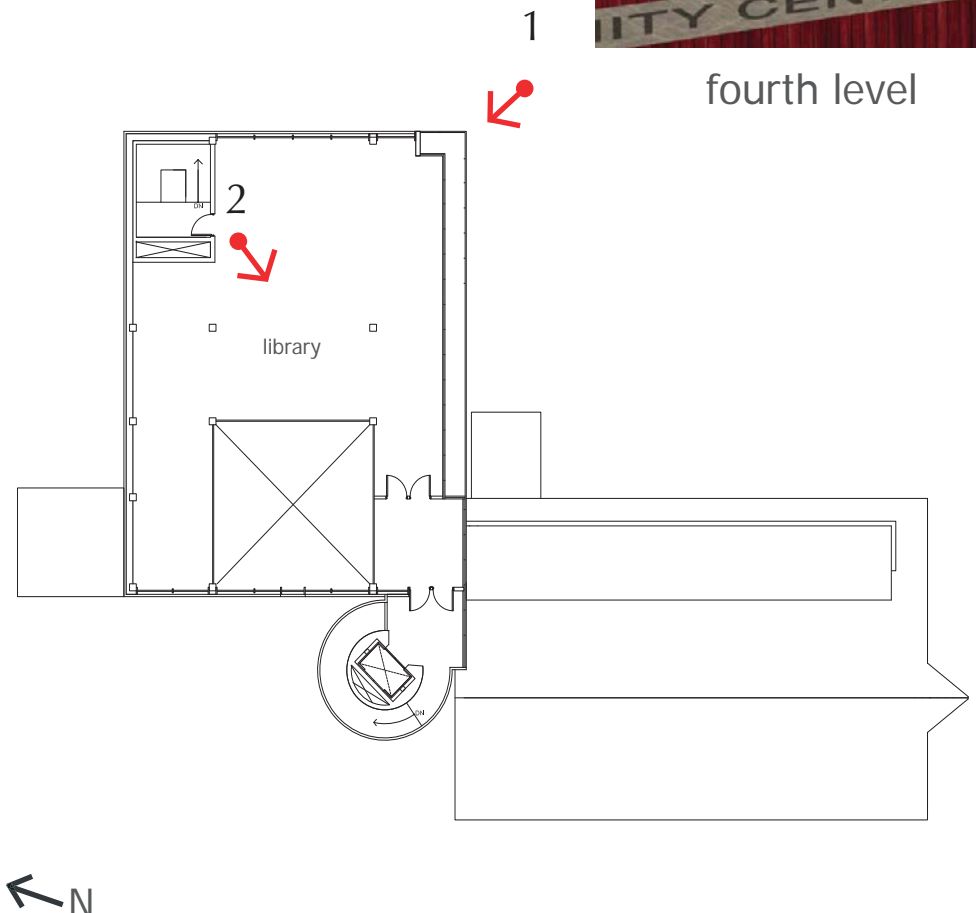
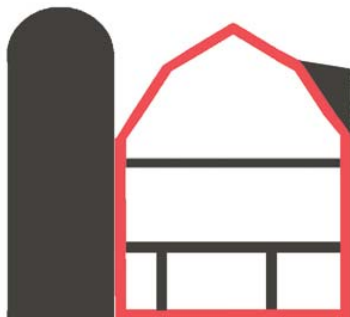
This rendering illustrates the quality of the space that is created with the addition of this pop out. Even from within, material choices identify this space as a contemporary intervention.

bottom

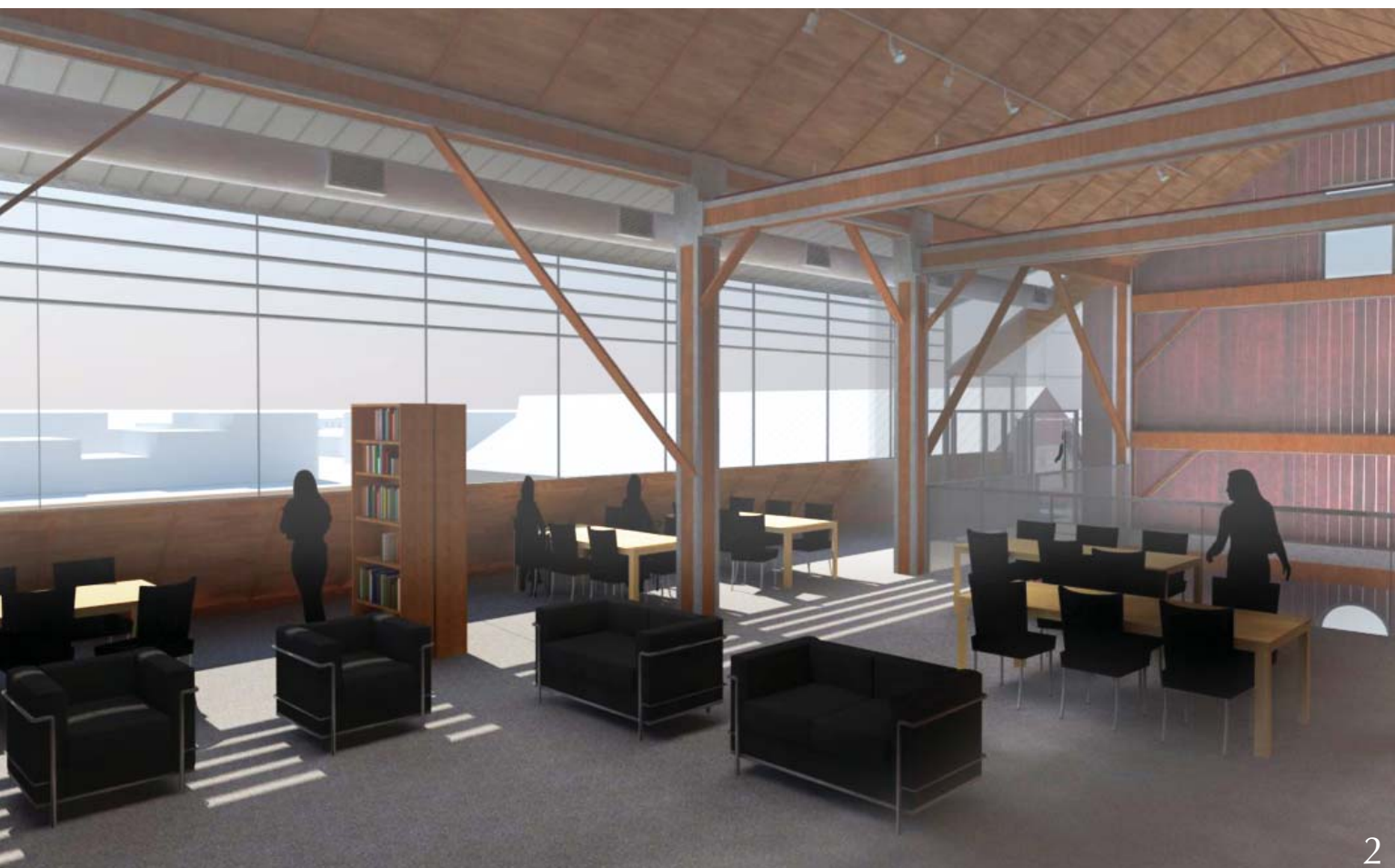
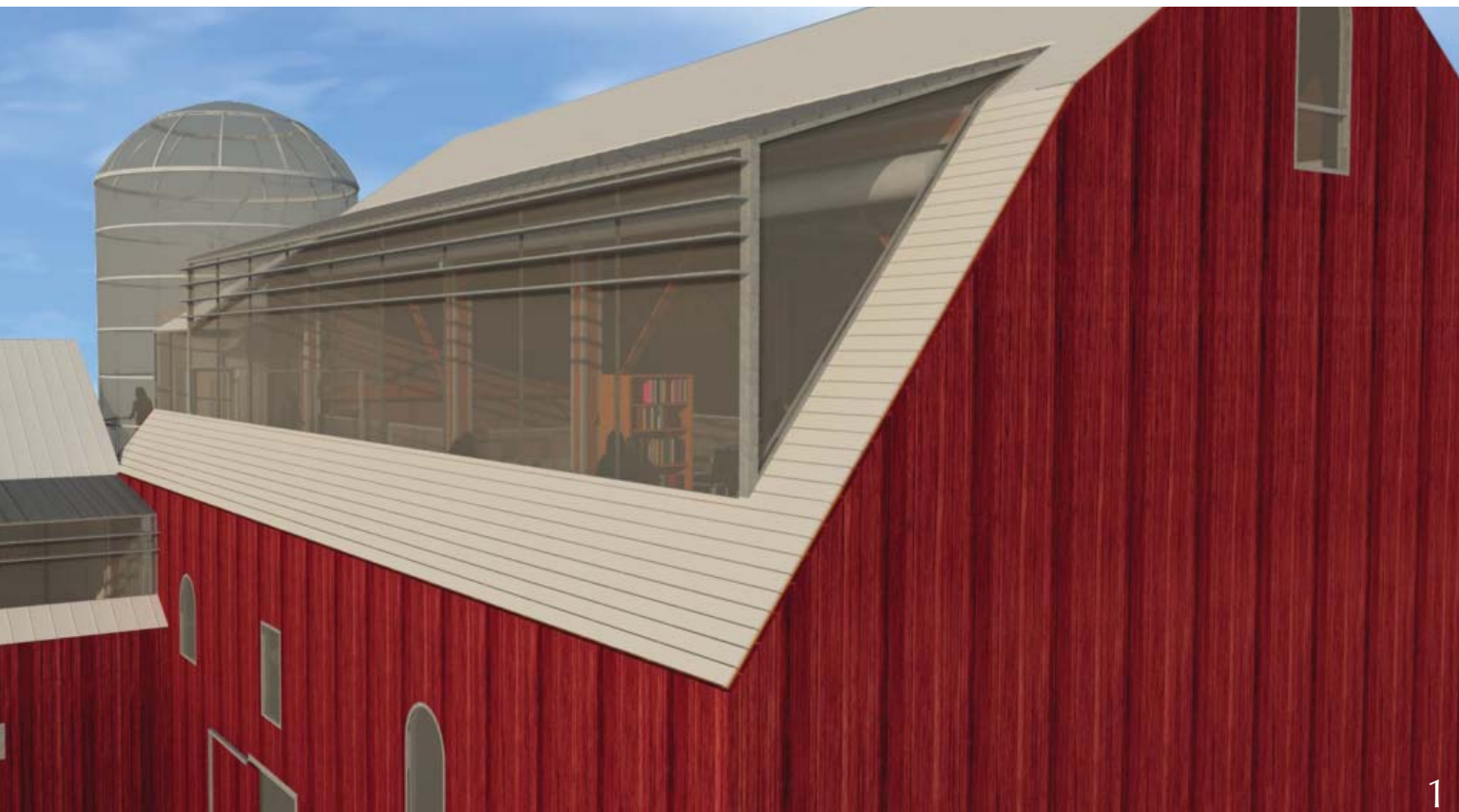
fig. 7.1.88 plan - fourth level

interventions icon

fig. 7.1.89



fourth level



interventions

top

fig. 7.1.90 **south pop out**

Similar to the pop out on the north barn, the introduction of a pop out space on the east face of the south barn maximized the space of the third level and provided natural light into the space. The goal of these interventions was to clearly identify themselves as contemporary. Similar to the north barn pop out, this placement of the pop out offset itself from the roof edge to create the effect that it was literally popping out of the roof.

opposite (bottom)

fig. 7.1.91 **interior of south pop out**

This rendering illustrates the quality of the space of the third level within the south barn. Even from within, the pop out identifies itself as an intervention.

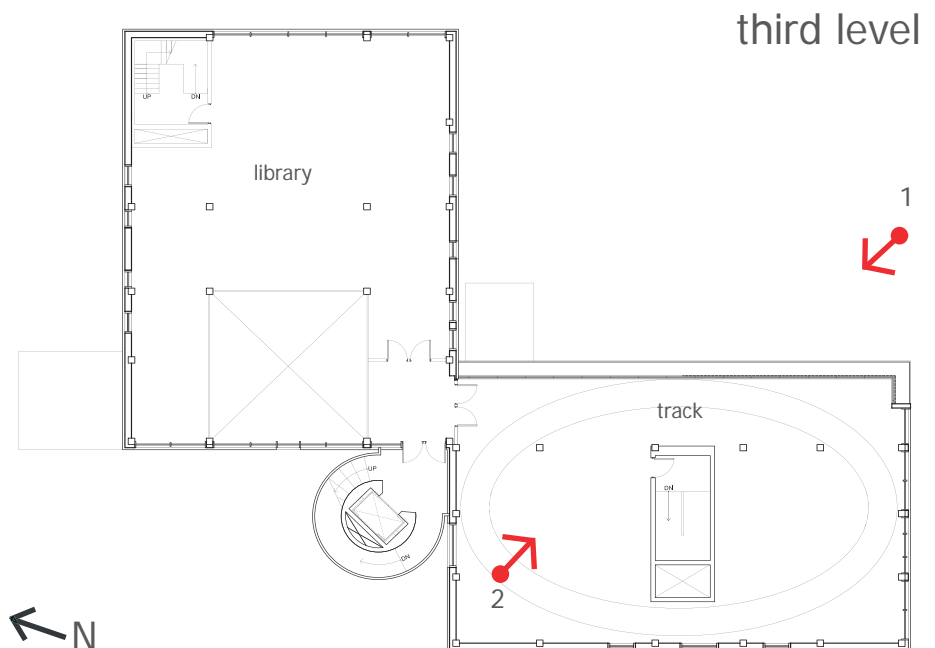
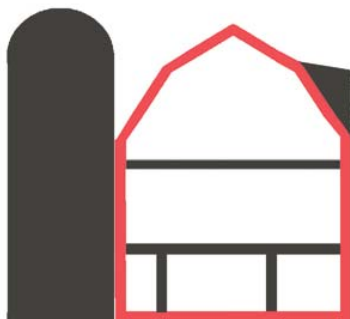
bottom

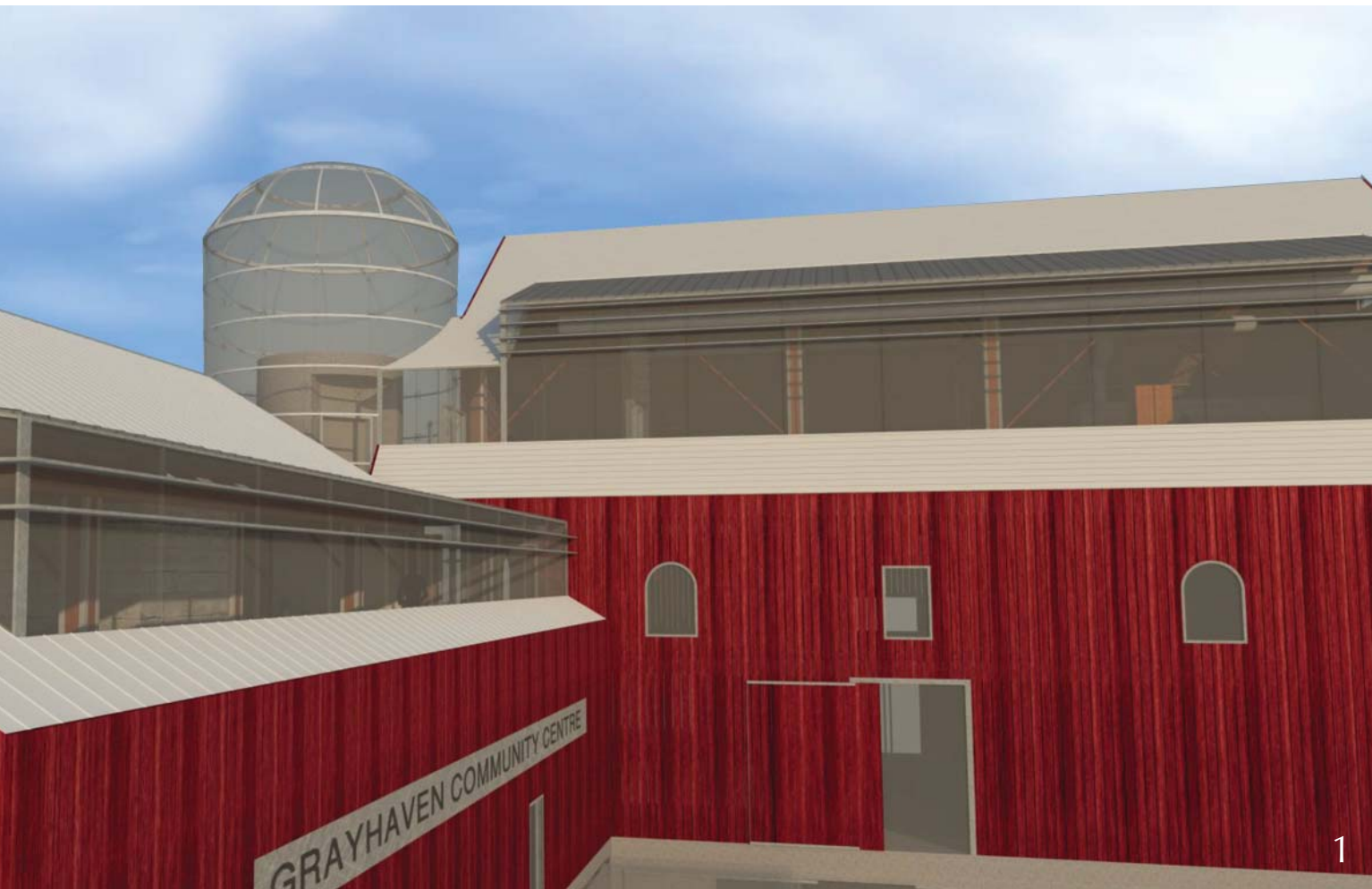
fig. 7.1.92 **plan - third level**



interventions icon

fig. 7.1.93

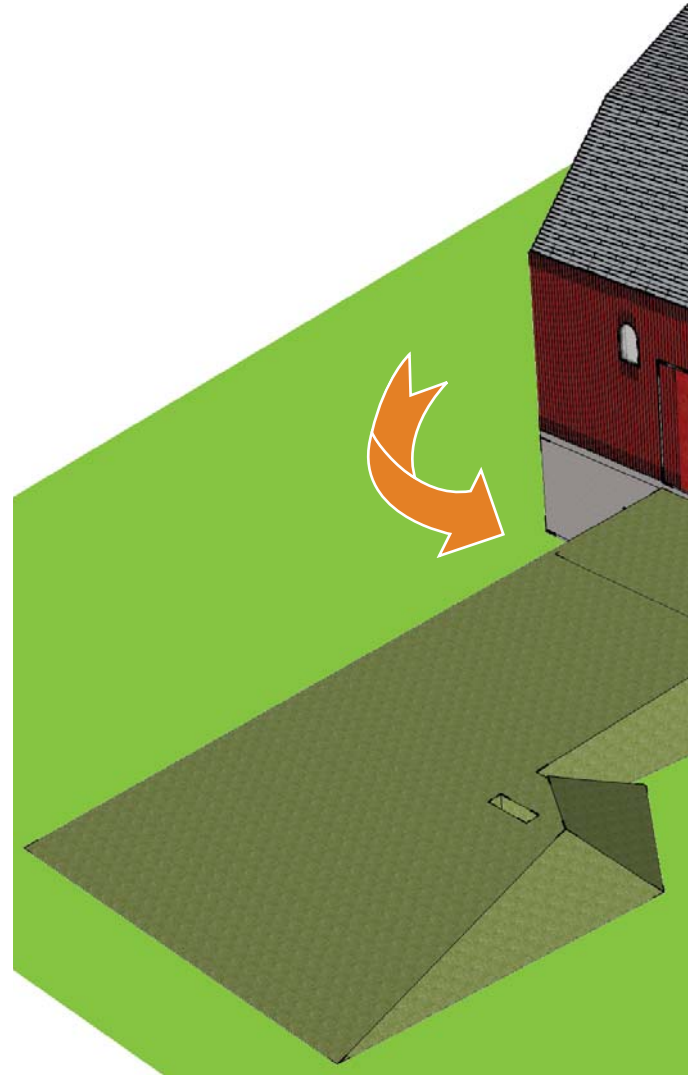




site

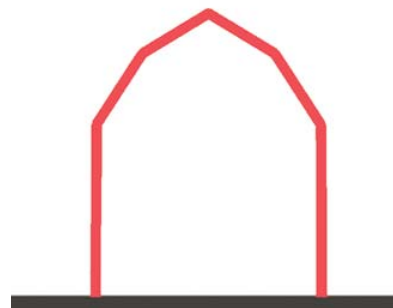
fig. 7.1.94 **site diagram**

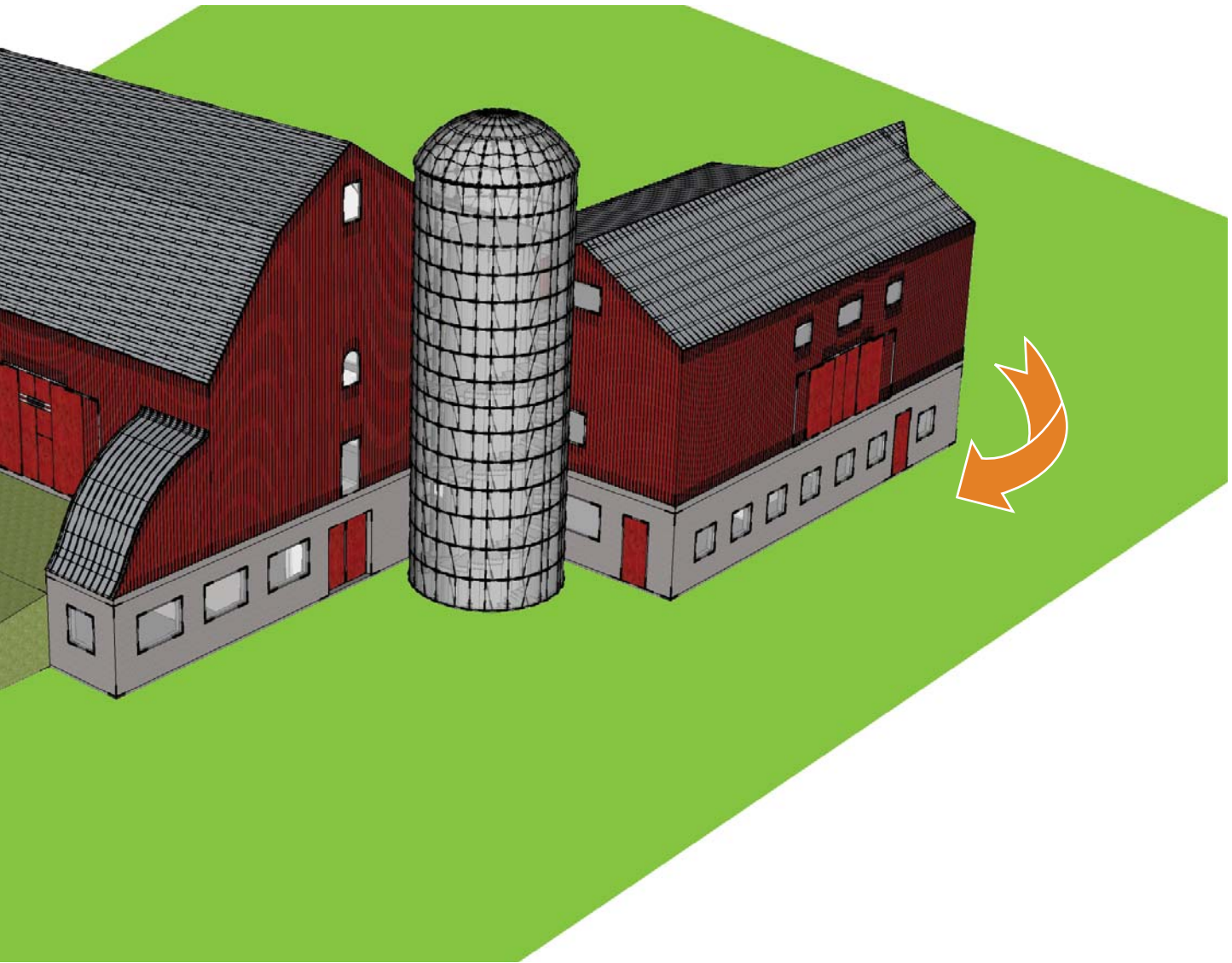
A barn and the land it occupies have a unique relationship. Therefore, the adaptive reuse of the barn was not limited to the space contained within. In the context of this thesis, the exterior space or site was investigated to determine how public space could be provided to the new community within this alternative suburban development and address the issue of lost prime agricultural land.



site icon

fig. 7.1.95





site

opposite

fig. 7.1.96 **site plan**

bottom

fig. 7.1.97 **site section**

The immediate area surrounding these barns provides the ideal conditions to introduce public space but also maintain some of the agricultural land. The meso level of the concept of this thesis identified the need to preserve prime agricultural land. As this site plan illustrates, the area surrounding the barns provides community gardens and utilizes this prime farmland by having working fields within the centre of this community.



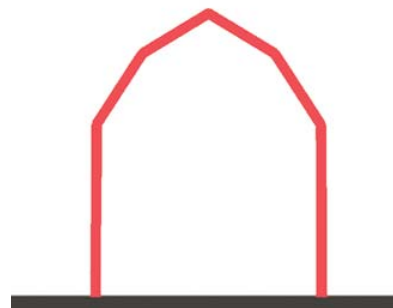
top

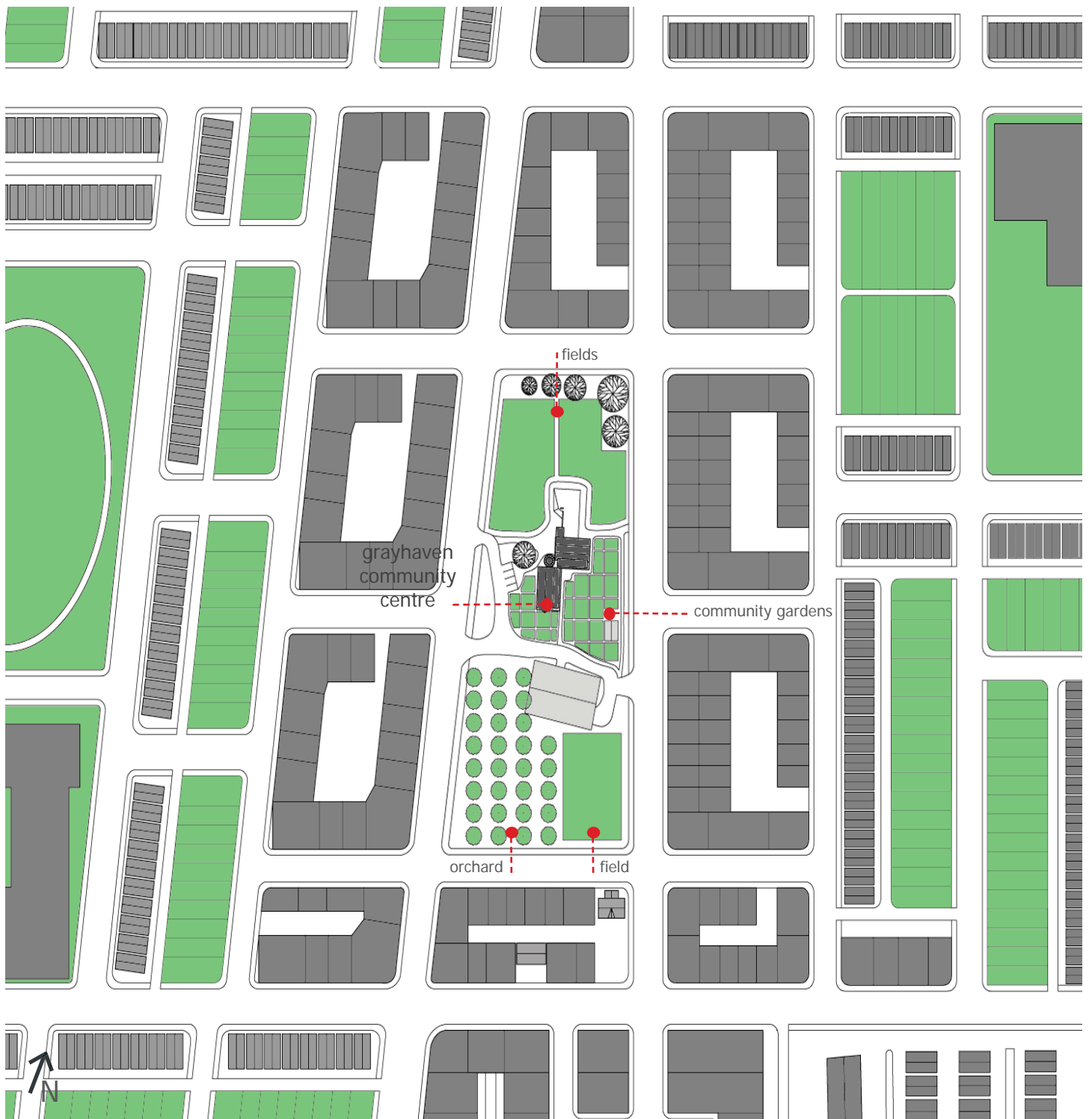
fig. 7.1.98 **original site**

This photograph illustrates the condition of the original site prior to the exterior interventions.

site icon

fig. 7.1.99





site

top

fig. 7.1.100 **north west exterior axonometric**

This rendering illustrates the concept for the site surround the barns. To maintain surrounding prime farmland, working fields have been introduced adjacent to each face of the barn. Specifically in this image the orchard can be seen in the distance, the community gardens behind the barns and corn and soya beans grow to the north.

bottom (left to right)

fig. 7.1.101 **south elevation**

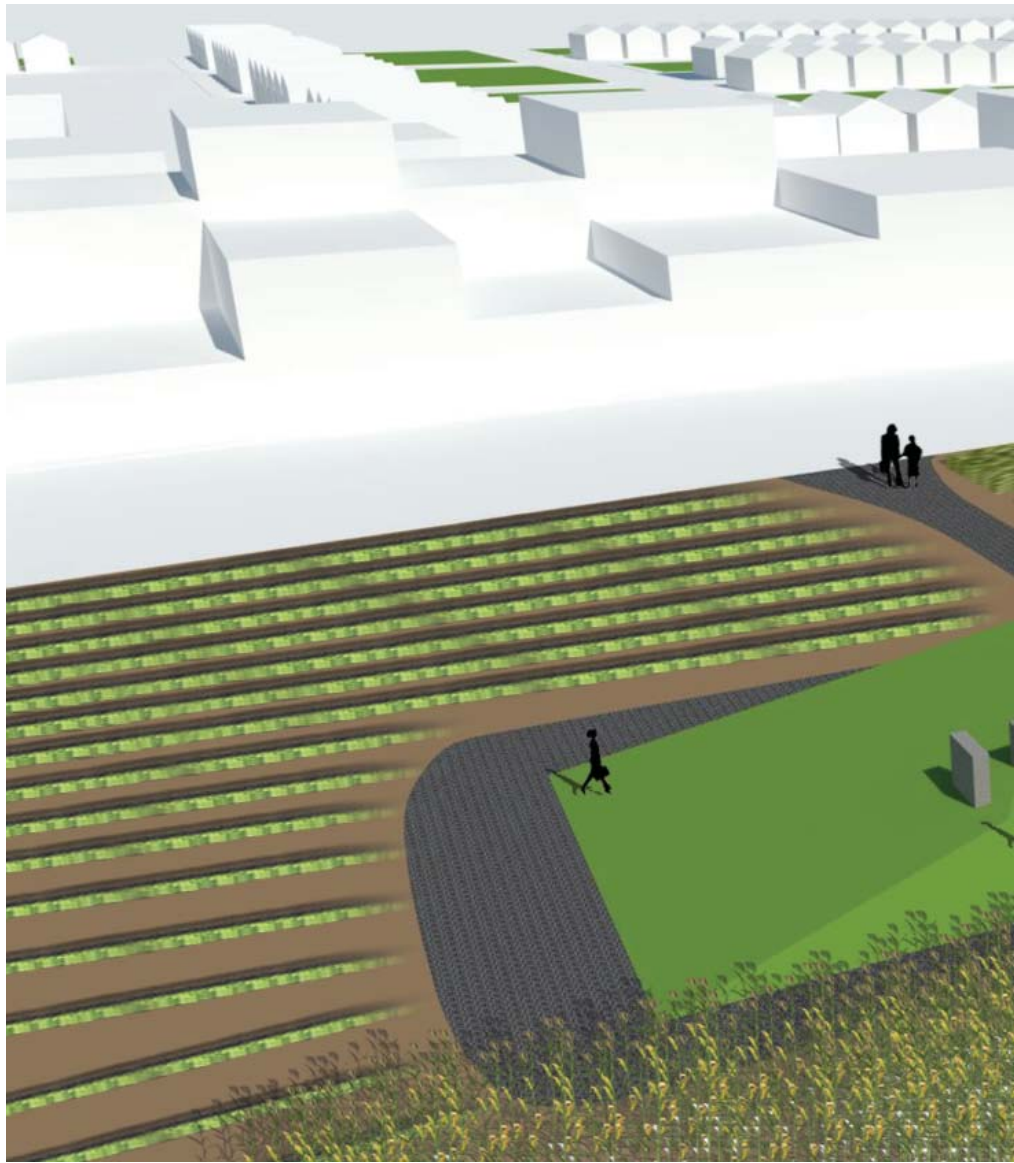
fig. 7.1.102 **west elevation**

fig. 7.1.103 **north elevation**

fig. 7.1.104 **east elevation**

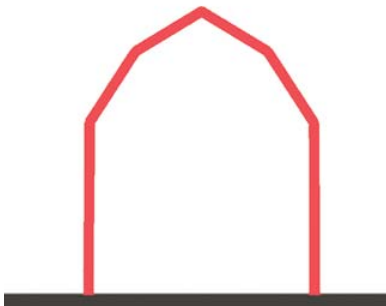


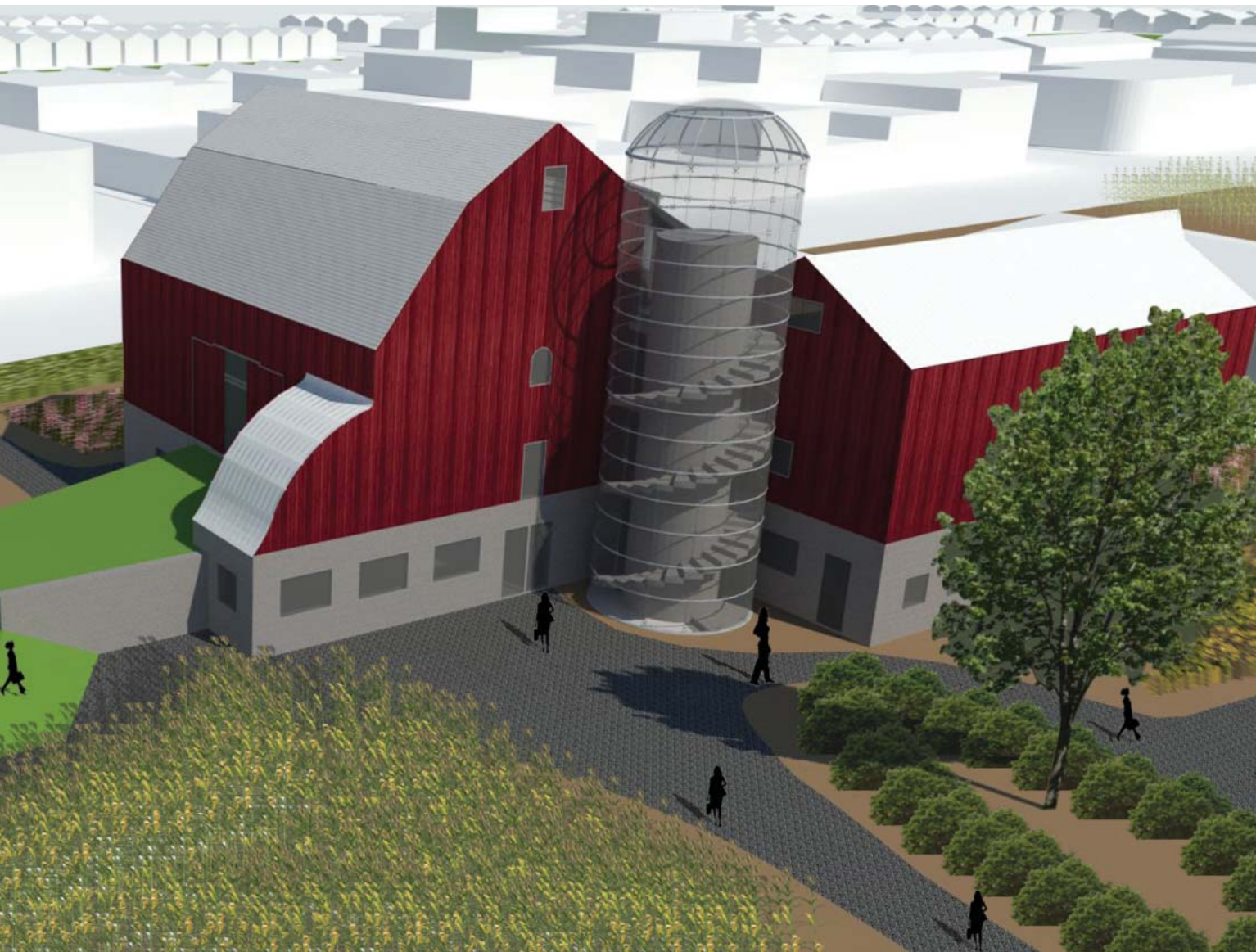
fig. 7.1.105 **current north west corner of barns**

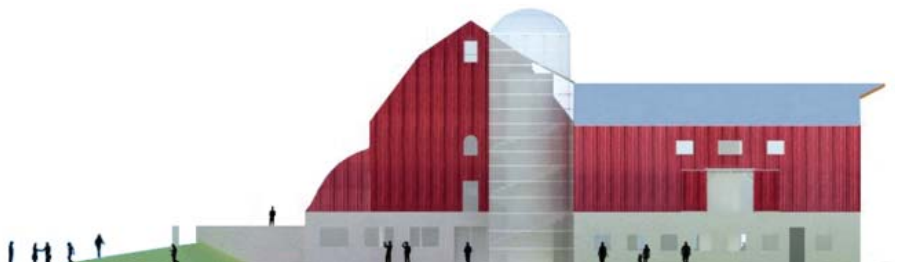


site icon

fig. 7.1.106









site

top

fig. 7.1.107 **south west exterior axonometric**

This rendering illustrates the concept previously presented but from the south-east. Here the community gardens are highlighted as well as the crop fields to the north of the barns.

bottom (left to right)

fig. 7.1.108 **south elevation**

fig. 7.1.109 **west elevation**

fig. 7.1.110 **north elevation**

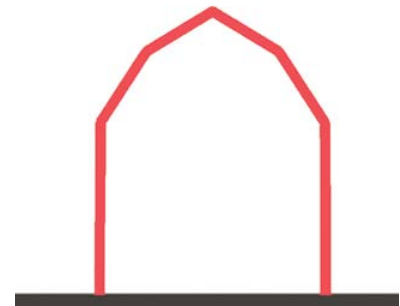
fig. 7.1.111 **east elevation**



fig. 7.1.112 **current south west corner of barns**

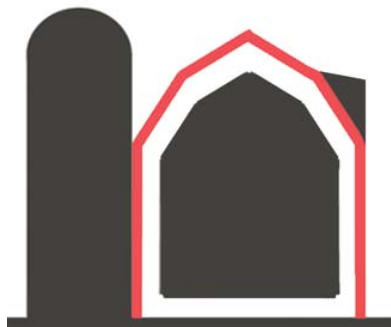
site icon

fig. 7.1.113



design influence icon

fig. 7.2.1



7.2 a broader context

This section explores, in concept, an alternative approach to suburban development. The larger implications of the adaptive reuse of Grayhaven Farms is tested by examining the relationship of the barns and its site in the context of the village centre and the surrounding area, including how productive land and a transportation hub fit into this larger concept.

site

opposite

fig. 7.2.2 **site plan**

One component of this alternative approach is the village centre. The community centre would establish itself at the centre of this future development. Based on the 5 minute walking radius concept from the new urbanism movement, the village centre would provide a public space for residents but also preserve some of the prime agricultural land. The previous renderings illustrated the adjacent interventions surrounding the barns which included community gardens and productive fields. This site plan illustrates the macro level where the barn and the surrounding site have become the village centre and surrounding it is dense development. The approach to the housing is including higher density but also long lots that provide the option for spin farming or self cultivation. The residents then have the option to rent the agricultural portion of their land or keep it and use it themselves for agricultural use.



above

fig. 7.2.3 **original site**

This photograph illustrates the condition of the original site prior to the exterior interventions.

design influence icon

fig. 7.2.4

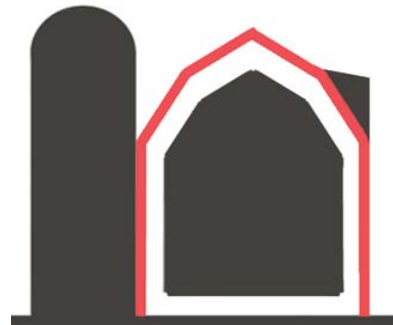




fig. 7.2.5 **the village centre**

This rendering illustrates the potential of this alternative approach to suburban development. As this image shows, prime farmland has been preserved surrounding the barns which are located at the core of the village centre. Higher density allows for multiple programs to be introduced within the areas surrounding the barns. Denser housing and lot configuration has preserved a portion of the prime farmland with the introduction of long lots for spin farming or self cultivation. This image summarizes an alternative approach to suburban development that embraces the existence of rural architecture and prime farmland.



design influence icon

fig. 7.2.6

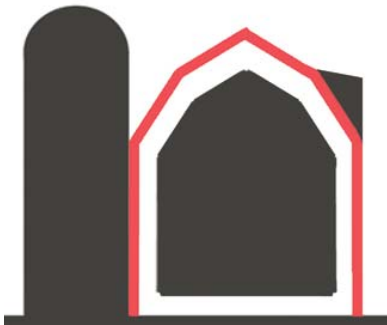






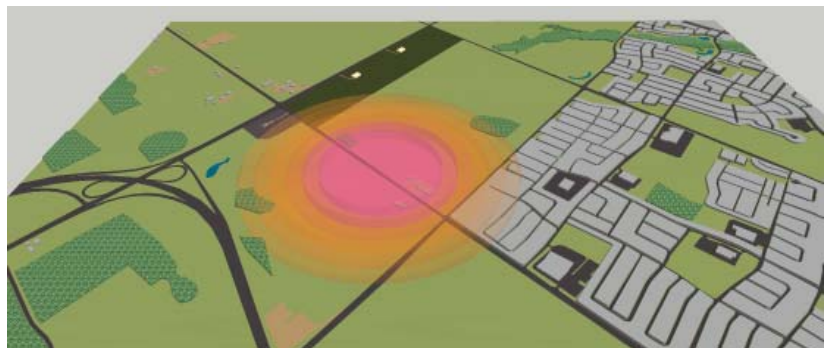
fig. 7.2.7 **area**

fig. 7.2.8 **site**

fig. 7.2.9 **village centre**

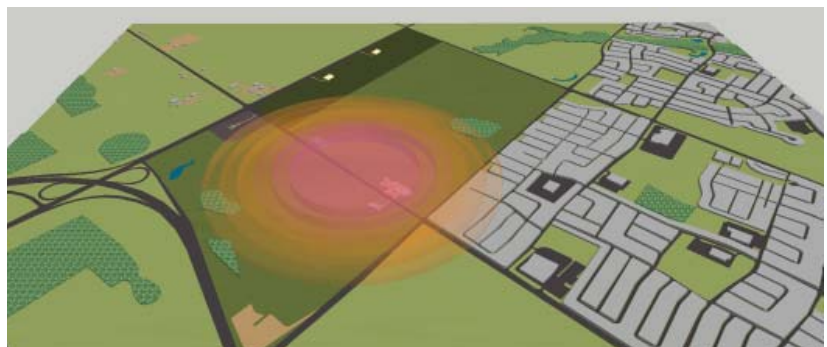
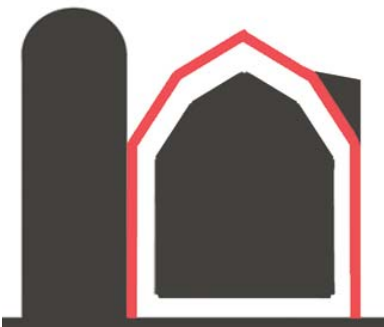
fig. 7.2.10 **residential**

These images demonstrate the macro scale of the conceptual proposal for an alternative method for residential development that was explored in this thesis. At the core is the village centre which provides public services and amenities in a high density format to the community. This was illustrated in more detail in the previous pages, which included the adaptive reuse of rural architecture. Surrounding that higher density is housing which is only a 5 minute walk from the village centre.



design influence icon

fig. 7.2.15



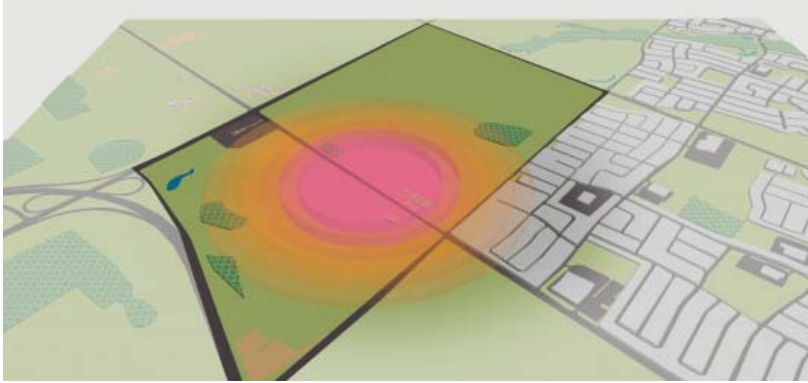


fig. 7.2.11 **transportation hub**
 fig. 7.2.12 **demonstration farm**
 fig. 7.2.13 **agricultural lands**
 fig. 7.2.14 **alternative development approach**

A transportation hub located to the top left of the site, adjacent to the 410, provides quick access to downtown for northern Brampton and Caledon residents. A demonstration farm at the top right of the site assists with resolving some of the conflicts between the rural and suburban communities. Finally, agricultural land is preserved due to the higher density of housing. This approach not only preserves farmland and rural architecture, but provides a gentler transition between rural and urban landscapes.

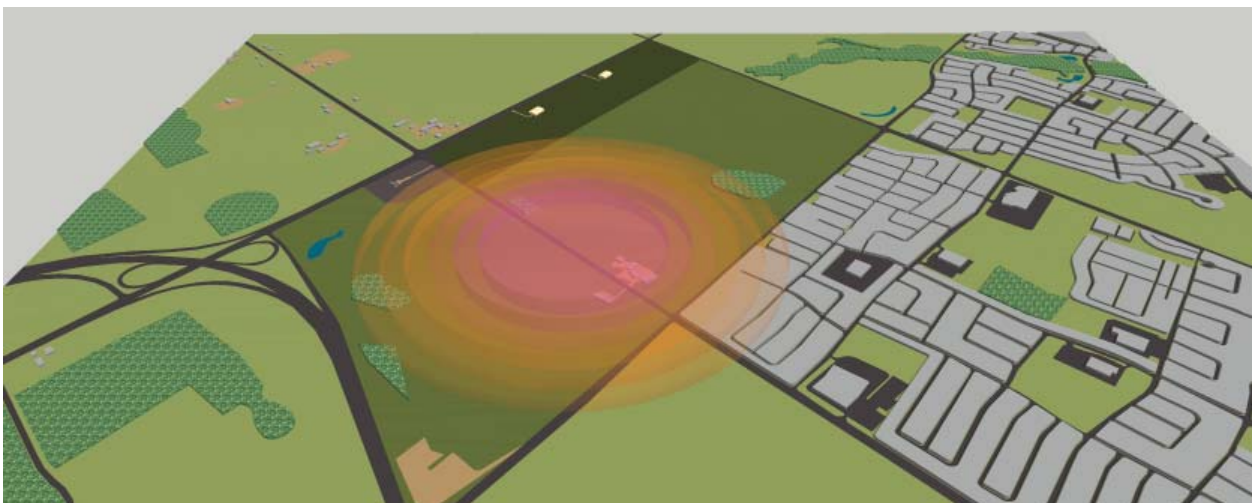
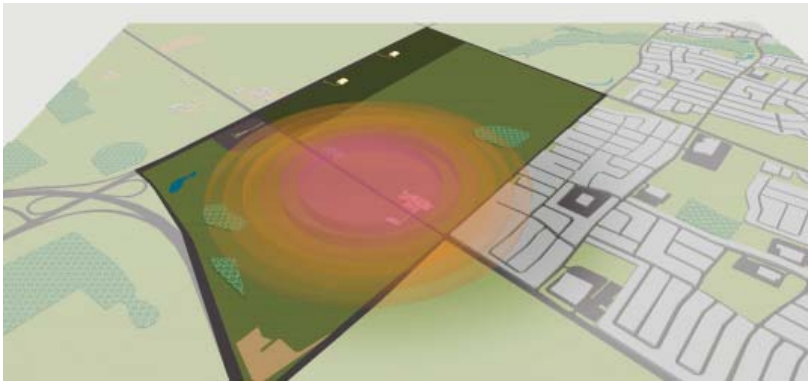
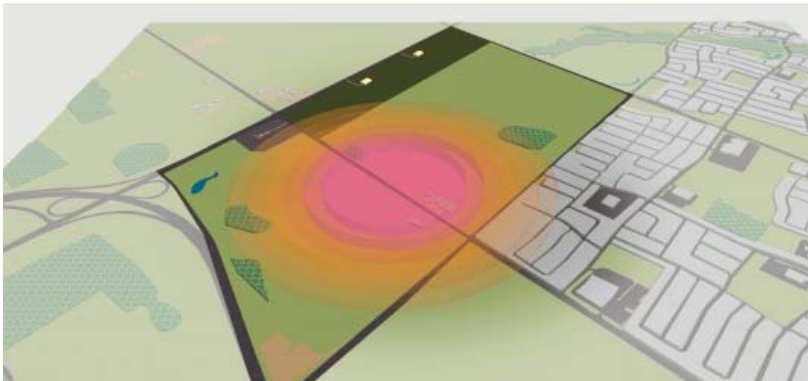


fig. 8.0.0 (opposite)

conclusion

chapter 08

Each generation has its own rendezvous with the land, for despite our fee titles and claims of ownership, we are all brief tenants on this planet. By choice, or by default, we will carve out a land legacy for our heirs. We can misuse the land and diminish the usefulness of resources, or we can create a world in which physical affluence and affluence of the spirit go hand in hand.

*S.L. Udall, 1963
from (Fuller, 1985, p.151)*



8.1 summary

This thesis explored the adaptive reuse of barns to address the issue of the loss of rural architecture due to urban sprawl. The design choices maintained the essence of the barn while also embracing the new interventions. This design demonstrated an alternative to the elimination of these buildings in residential development.

The design of the surrounding site illustrates that the preservation of these types of structures has significant potential in creating village centres within residential developments and farming communities. By embracing this type of approach, it can greatly improve the quality of life in these developments, as well as the surrounding rural residents and the agricultural community.

Explored in concept, the larger implications of this alternative development approach suggests how farmland preservation could be addressed. The reality is, that in order for this alternative approach to occur, action must be taken at the local level. Cities such as Waterloo will set a precedent in regards to addressing urban sprawl but it is up to architects and preservationists to assist with saving rural architecture by intervening with unique ideas to save these buildings within the countryside.

fig. A.A.0 (opposite)

appendices



fig. A.0.0 (opposite)

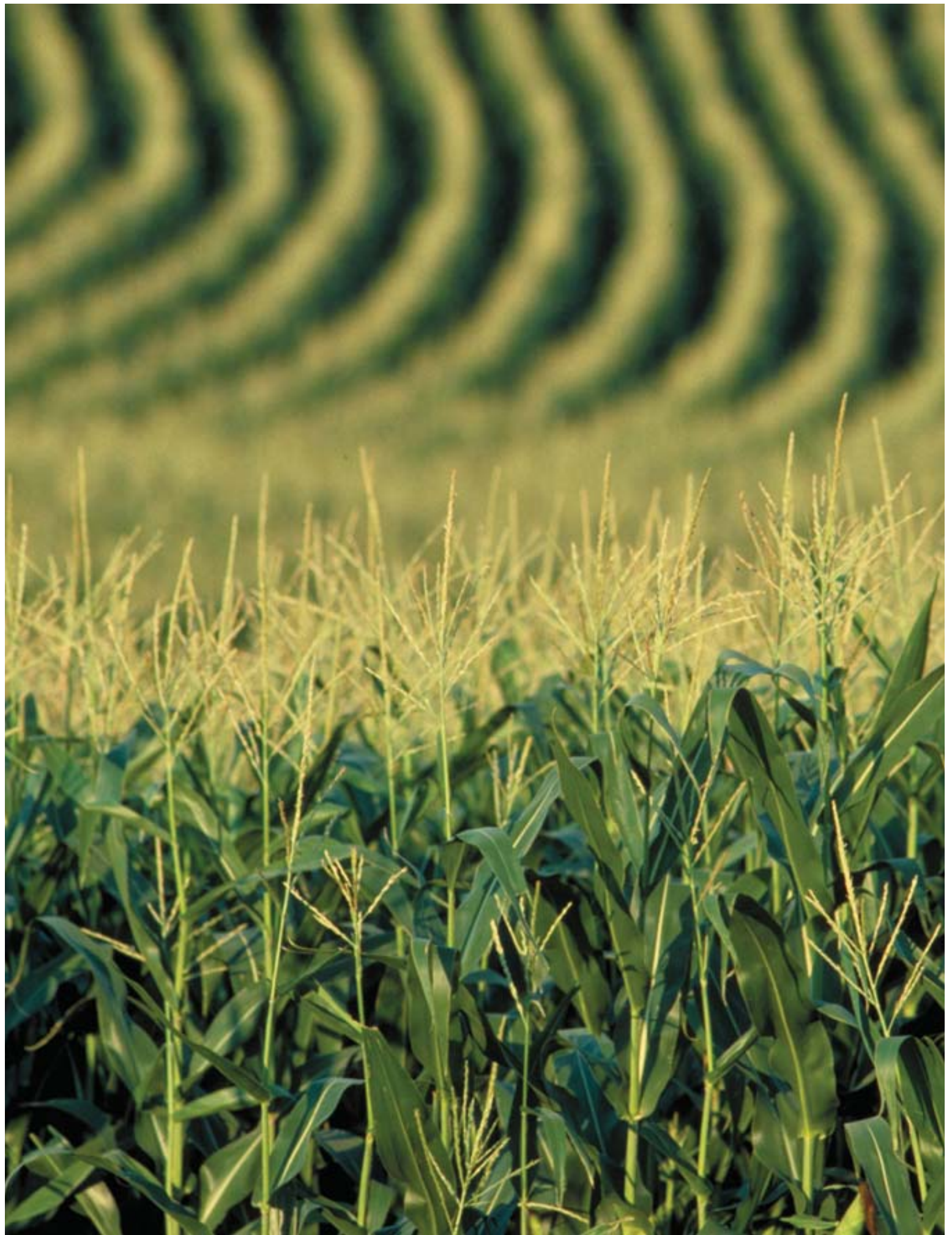
agriculture

appendix a

*The well-being of a people is like a tree.
Agriculture is its root,
Manufacture and Commerce are its branches
and its leaves.
If the root is injured,
the leaves fall, the branches break away,
and the tree dies.*

Chinese Proverb





A.1 agricultural industry in canada

Agriculture is an essential part of Canadian heritage. Its development within Canada was a defining moment for this country's history, one that dramatically changed social structures, defined cultural values and provided a wide range of economic opportunities. Throughout Canada's growth and development, agriculture has remained an integral part of its culture and economy.

The growth and continuous complexity of the agricultural industry required that the Canadian Government create different categories to organize this sector. Today, it is composed of two; the producers and agri-industries. The agricultural producers are the foundation of the agricultural sector. They are responsible for primary and secondary animal products (i.e. beef and milk) and crops. The agri-industry handles crops and animal products and their use once they leave the farm.

The agriculture and agri-industries sectors play an important role in the federal and provincial economies. They make a significant contribution to Gross Domestic Product (GDP) and employment. In 2008, this sector accounted for 8.1% (\$99 billion) of the GDP, (fig. A.1.2), a growth of 0.1% since 2007. Growth for this sector has been continuous since 1997 (fig. A.1.3) with food retail/wholesale experiencing the most growth and primary agriculture remaining steady with a small average increase of 1.9% annually. In 2008, 1 in 8 jobs were directly provided by agriculture and agri-industries representing 2.2 million people (fig. A.1.4). Though growth of employment is slightly lower than the national average, most employment is available in the food service sector (Agriculture and Agri-Food Canada, 2009).

opposite

fig. A.1.1 photo of corn field

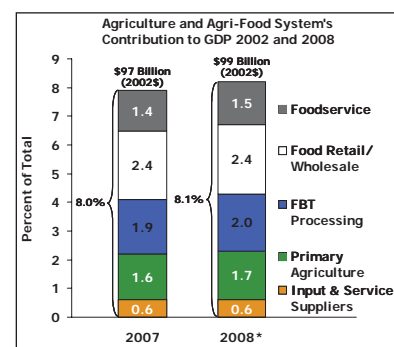


fig. A.1.2 agriculture and agri-industry contribution to GDP

The food retail/wholesale industry was the largest contributor to the agriculture and agri-food system's GDP. Primary agriculture accounted for 1.7% of national GDP in 2008, up slightly from 2007.

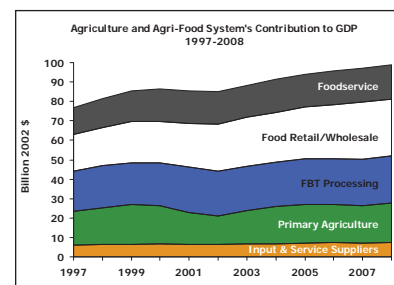


fig. A.1.3 agriculture and agri-industry contribution to GDP

The overall agriculture and agri-food system has been growing at an average annual rate of 2.4%. Food retail/wholesale is the fastest growing component. Primary agriculture grew by 1.9% from 2007.

fig. A.1.4 **agriculture and agri-industry contribution to employment**

The Canadian agriculture and agri-food system provided one in eight jobs in 2008, employing nearly 2.2 million people.

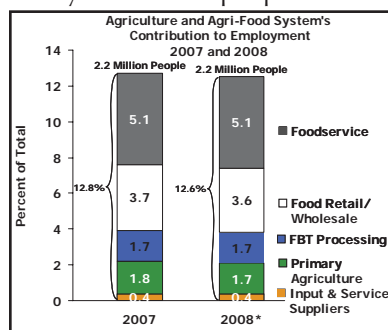


fig. A.1.5 **agriculture and agri-industry exports**

Canada exported \$38.8 billion of agricultural and agri-food products in 2008, and is the world's fourth-largest agricultural and agri-food exporter.

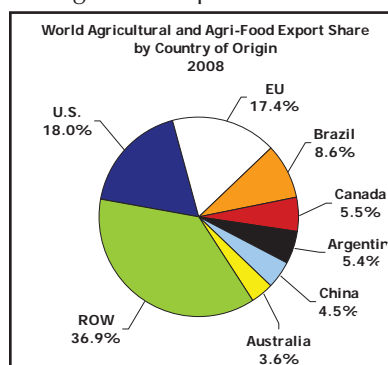
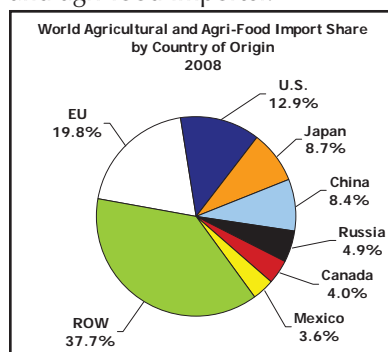


fig. A.1.6 **agriculture and agri-industry imports**

Canada imported \$24.9 billion of agricultural and agri-food products in 2008, and is the world's sixth-largest agricultural and agri-food importer.



These statistics indicate that primary agriculture accounts for a small share of the food system's contribution to the economy. However, this sector is essential. It is the heart of the agriculture and agri-industry system. All other areas are dependent upon it.

Export opportunities are crucial for the continuous growth of this sector. In 2008, Canada exported \$38.8 billion (fig. A.1.5), the fourth largest exporter, yet imported \$24.9 billion (fig. A.1.6), the sixth largest importer of agriculture and agri-products. Strong exports respond to Canada's trade agreements and contribution to global economic growth. However, imports are needed to sustain requests for off season products, international requests and a growing overall food demand (Agriculture and Agri-Food Canada, 2009).

In conclusion, the agriculture and agri-industry sector is essential to Canada's economy at all levels and makes a significant contribution to growth and employment opportunities.

A.1.1 agricultural producers

Agricultural production is “highly competitive and is worth 130 billion dollars per year” (Agriculture and Agri-Food Canada, 2010, www.agr.gc.ca). It is composed of three different production groups: 1. Animal Production, 2. Crop Production, and 3. Organic Production.

Animal Production (fig. A.1.7) provides the traditional varieties of red meat, poultry, eggs and dairy. Livestock farms within this production group provide the largest share of Canada’s agricultural production. Crop production (fig. A.1.8) represents Canadian farms that produce a diverse range of crops for domestic and international markets. These include fruit, vegetables, cereals, oil seeds, greenhouse, ornamentals, specialty crops and nursery stocks. These crops are organized into three categories. The first, Grains and Oilseeds, include Canada’s main grain crops such as barley, corn, oats, rye and wheat and oilseed production (i.e. canola, soybean). Horticulture, the second category, includes field and greenhouse fruit and vegetables, varieties of flowers and plants, and maple and honey products. Pulses and Special Crops, includes peas, beans, chickpeas and lentils and others that do not fall under a specific category such as buckwheat, essential oils, ginseng, herbs and spices, and medicinal plants. The last group, Organic Production (fig. A.1.9) is a dynamic and rapidly growing sector of the global food industry (Agriculture and Agri-Food Canada, 2010).



figs. A.1.7, A.1.8, A.1.9
agricultural producers
Beef, crops and organic production - examples of the different production groups within the agricultural producers.

A.1.2 agri-industries

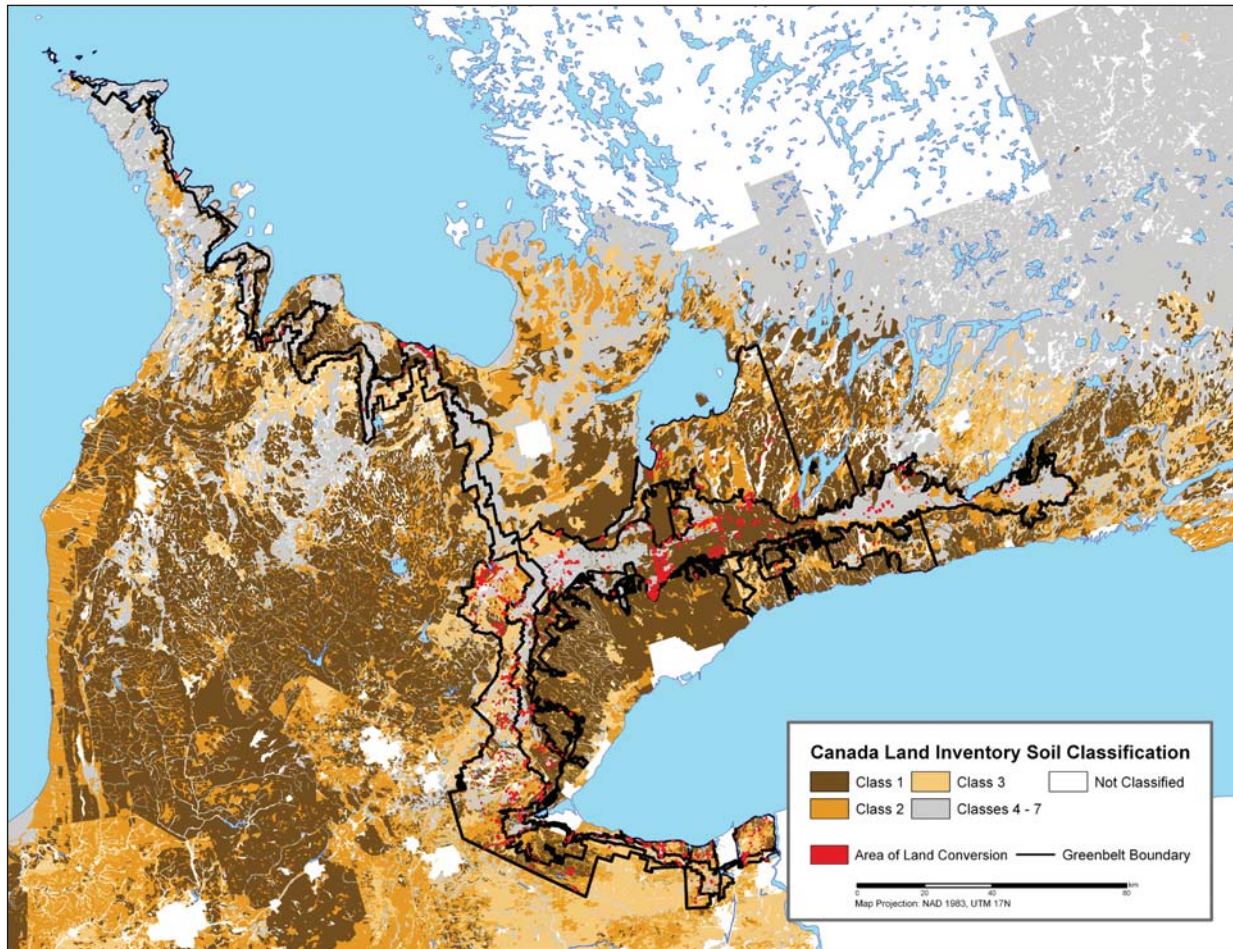
The agri-industry is defined by the use of products from the agricultural producers. The federal government has organized it into six sectors. 1. Processed Food and Beverages is the second largest manufacturing industry in Canada. Essentially, it is the processing of products in some manner (i.e. freezing, cooking, or preserving) to create new products. 2. Food Regulations is the primary legislation governing the safety and nutritional quality of food sold in Canada. This refers to such issues as food labeling, food additives and food standards. 3. Food Distribution is the final link in the food supply chain between food producers and processors to consumers. This large sector includes supermarkets, grocery stores, restaurants and the whole-sellers, distributors and brokers that supply them. 4. Canadian Consumers, help to answer questions regarding food and beverage consumption. Through analysis, studies and reports, specific and general overviews on issues related to the food system are provided. 5. Biomass is a relatively new area that is receiving growing interest in the last five years. This area will continue to grow as we search for renewable resources that can substitute for petroleum based fuels. 6. Biofuels is also an area of growing interest. This renewable fuel strategy is generating environmental benefits and supporting farmers by creating demand and new opportunities for agricultural resources (Agriculture and Agri-Food Canada, 2010).



figs. A.1.10, A.1.11, A.1.12

agri-industries

Frozen vegetables, grocery store and a restaurant, all examples of sectors within the agri-industries.



A.2 agricultural potential

In Canada, there are two systems that provide information to assist with identifying the growing quality and potential of land. These systems are the Canada Land Inventory (CLI), and The Agroclimatic Resource Index (ACRI).

The Canada Land Inventory was created in 1963 under the Agricultural and Rural Development Act (ARDA). This program lead to the most comprehensive inventory of agriculture, forestry, recreation and wildlife mapping in Canada. The data collected for each subject was categorized into seven classes. For the agriculture inventory, soil quality was the primary focus and it was determined by the consideration of slope, topography, stoniness and overall soil quality. This set of criteria lead to the identification of various classes of soil which indicates the agricultural growing potential. Class 1 through 3 represent the best conditions for agriculture, which is often referred to as prime farmland (fig. A.2.1). Classes 4 through 7 identify soil conditions of mild to severe limitations to agriculture.

The Agroclimatic Resource Index, ACRI (fig. A.2.2), evaluates the impact of climatic restriction on agricultural potential. The criteria for this index considers growing season length, temperature, moisture, and weather conditions. The combination of these factors results in index values ranging from 0.0 to 3.5. ACRI values greater than 2.0 represent the land with the best potential for agricultural use because of their ideal environmental conditions (Ontario Farmland Trust, 2005).

Together, the Canada Land Inventory and Agroclimatic Resource Index provide the ability to identify the location and amount of prime agricultural land that is available in Canada.

opposite (top)

fig. A.2.1 the canada land inventory (CLI)

The CLI soil classes indicate potential of the land for agriculture, where Class 1 is the most suitable. This is an example of the CLI mapping of Southern Ontario. The class descriptions include, Class 1: No significant limitations to agriculture. Class 2: Moderate limitations to agriculture. Class 3: Moderately severe limitations to agriculture. Classes 4 to 7: Severe limitations to agriculture.

opposite (bottom)

fig. A.2.2 the agroclimatic resource index (ACRI)

The basic parameter of the ACRI is the length of the frost free growing season, as modified by moisture limitations and summer heat or degree-day data. The resulting index produces values ranging from less than 1.0 in the north to 3.0 in portions of southern Ontario.



Amount of Dependable Agricultural Land, Canada and Provinces

Province / Territory	Class 1	Class 2	Class 3	Dependable land (Class 1-2-3)	Total land area	Dependable agricultural land	
						- as percent of total land within each province	- as percent of Canada's total agricultural land
	*** square kilometres ***						
Newfoundland	-	-	19	19	405,720	-	-
Prince Edward Island	-	2,616	1,415	4,031	5,660	71.2	0.9
Nova Scotia	-	1,663	9,829	11,492	55,490	20.7	2.5
New Brunswick	-	1,605	11,511	13,116	73,440	17.9	2.9
Quebec	196	9,071	12,772	22,039	1,540,680	1.4	4.8
Ontario	21,568	22,177	29,088	72,833	1,068,580	6.8	16.0
Manitoba	1,625	25,306	24,407	51,338	649,950	7.9	11.3
Saskatchewan	9,997	58,745	94,247	162,989	652,330	25.0	35.9
Alberta	7,865	38,371	61,053	107,289	661,190	16.2	23.6
British Columbia	211	2,355	6,920	9,486	947,800	1.0	2.1
Yukon	..	..	..	..	483,450	..	..
Northwest Territories	..	..	..	..	3,426,320	..	..
Canada	41,461	161,908	251,261	454,630	9,997,610	4.5	100.0

A.3 agriculture across canada

Canada boasts a landmass of 9,093,507 square kilometers. Of this area, “approximately 673,000 square kilometers is presently being used for agriculture. Although this area seems large, it only represents 7% (fig. A.3.1) of Canada’s total landmass. This comparison demonstrates that despite Canada’s size, dependable agricultural land within the country is a scarce resource” (Caldwell & Dodds-Weir, 2003, p.8).

Despite the small amount of land in comparison to Canada as a whole, prime farmland is located throughout the provinces. Figure A.3.2 lists the amount of Class 1-2-3 soil in all provinces in square kilometers. The largest portions of prime agricultural land are located in central and western Canada, and over 75% is concentrated in Ontario, Saskatchewan and Alberta. Ontario does not contain the most prime farmland but it does contain over 20,000 square kilometers of Class 1 land, just over 50% of the amount available within the entire country.

The Canada Land Inventory (CLI) rating system recognizes production limitations of agricultural lands. Figure A.3.3 is derived from the CLI and identifies the amount of Class 1-2-3 agricultural land within Canada. It is important to note that only 5% of Canada’s land is considered prime farmland and of that 5%, only 0.45% is class 1. This indicates that only a small portion of Canada’s land is free from severe limitations and provides the highest productivity for a wide range of crops.

opposite (top)

fig. A.3.1 canada’s prime farmland

This map illustrates the amount of prime farmland that is available in Canada. The shaded areas represent prime farmland. Note the minimal area of prime farmland in comparison to Canada’s landmass and the majority’s location close to the Canada-US border.

opposite (bottom)

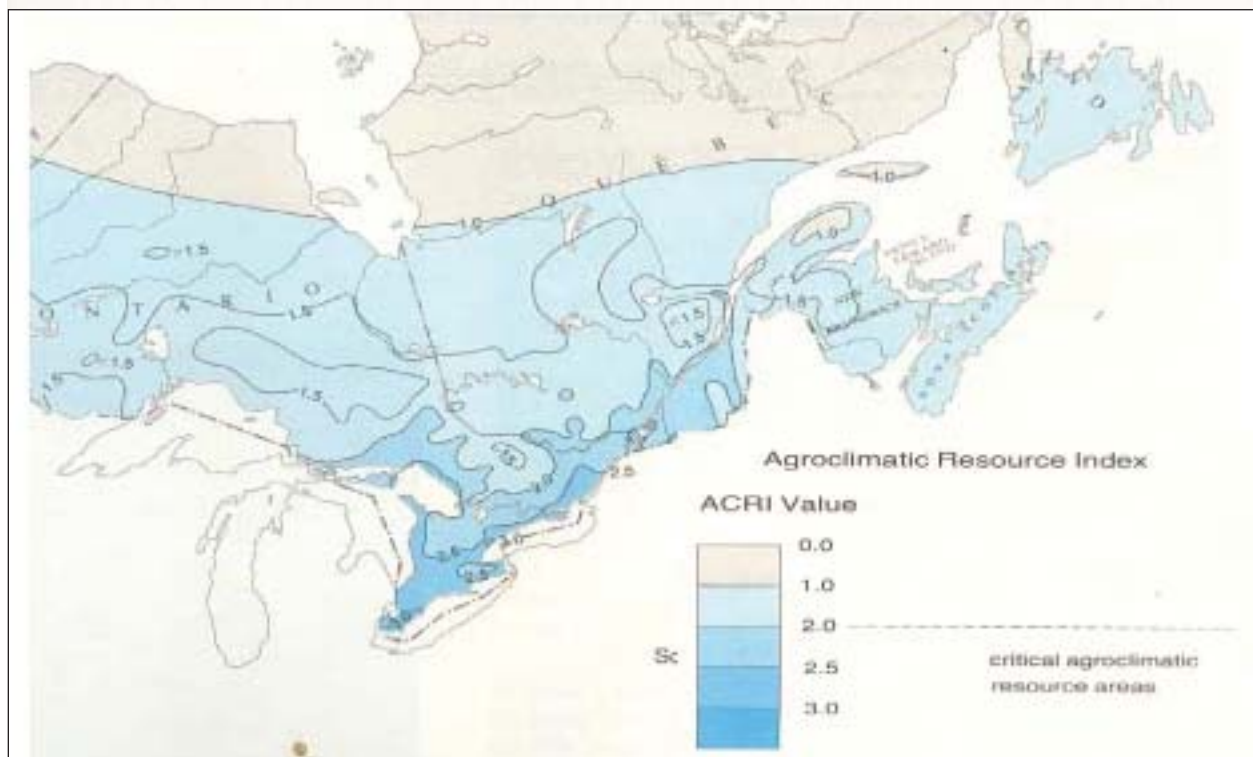
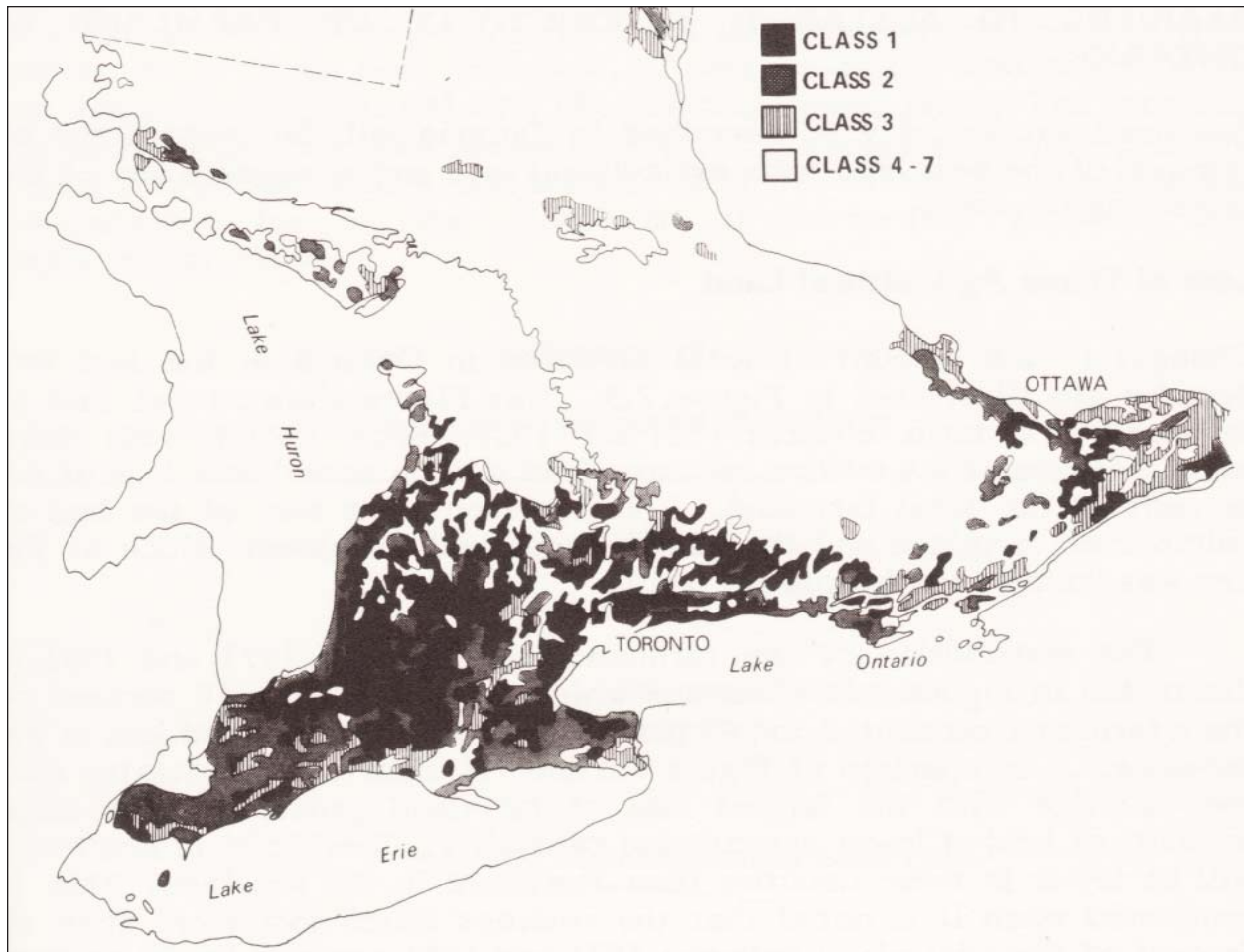
fig. A.3.2 amount of dependable agricultural land in canada

The majority of prime farmland is available in Ontario, Saskatchewan and Alberta.

National Agricultural Land Supply by Capability Rating		
Canada Land Inventory Class	Description	% Of Canada's Land Area
1	EXCELLENT TO VERY GOOD	0.45
2	GOOD	1.80%
3	FAIRLY GOOD	2.80%
		5.05%

fig. A.3.3 prime farmland in canada

Only 5% of Canada’s land area is identified as prime farmland (Class 1-2-3), and of that 5%, only 0.45% is Class 1.



A.4 agriculture in ontario

Ontario is not only home to some of the best agricultural lands in Canada but also to climatic zones that allow for a diverse crop production which are not feasible anywhere else in the country. This is due to the fact that as a percent of Canada's total agricultural land, Ontario possesses 16% all of dependable agricultural land (fig. A.4.1) which represents approximately 17.1 million acres (69.2 sq. km). Of that area, "due to the rich soils and favourable climate, Ontario possess over half (52%) of all Canada's class 1 farmland" (Agricultural Adaptation Council, 2002, p.73).

Similar to the Canadian landmass versus viable farmland comparison made earlier, the same type of situation can be found in Ontario. Though the province encompasses a vast amount of land, in reality only 6.8% is suitable for agriculture. (Caldwell, Hilts, & Wilton, 2007). Ontario also contains all of Canada's class A climate potential and almost all class B, determined by the Agroclimatic Index, ACRI (fig. A.4.2). This means that Ontario is the only province that contains ACRI values of 3.0 or greater, 95% of ACRI values of 2.5-2.9, and 42% of ACRI values 2.0-2.4.

opposite (top)

fig A.4.1 soil class locations in ontario

The majority of Class 1-2-3 soils are located in southern Ontario, particularly surrounding Toronto and Waterloo.

opposite (bottom)

fig. A.4.2 agroclimatic resource index for southern ontario

The Agroclimatic Resource Index (ACRI) evaluates the impact of three climatic restrictions on agricultural potential including the length of the frost free period, degree-day information and the degree of moisture limitation. Farmlands with ACRI values of 2.0 or greater are considered critical lands.

These statistics explain the value of farmland in Southern Ontario. Preconceived notions associate the prairie provinces as the agricultural hub of the country. While this remains true for its ability to grow wheat, corn and similar crops in large quantities, it is the Ontario growing region that is truly unique for its minimal constraints on agriculture (Ontario Farmland Trust, 2005).

The contribution of the agriculture and agri-industry sector to the Canadian economy has already been discussed. However, it is also important to identify this sector's crucial contribution to the provincial economy.

Ontario agriculture has become an economic powerhouse within the national agriculture industry, with its farm cash receipts contributing \$9.65 billion to the economy, and leading all provinces with approximately 24% of the national total (OMAFRA, 2009).

Once again, due to the ideal conditions, the agricultural industry in Ontario is diverse which allows it to provide a wide range of commodities. These range from fruit and vegetables, livestock and dairy. In 2008, the strength of Ontario agriculture provided 700,000 jobs within the agri-industry (OMAFRA, 2009) and has continued to experience growth at an average of 2.4% each year since 1991 (AAFC, 2008).

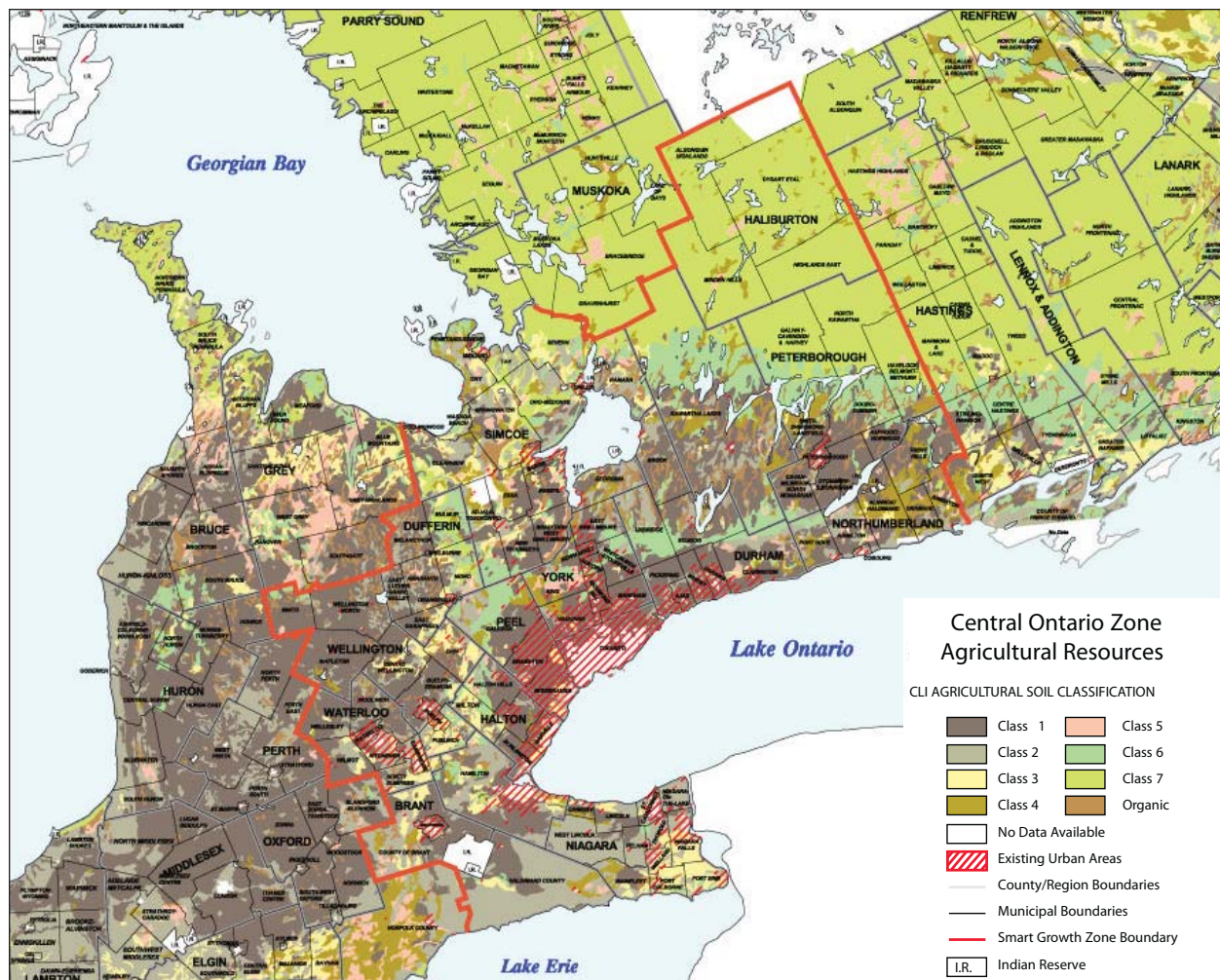
The importance of agricultural land within the province is crucial to the national economy as well as the Ontario farming community.

A.5 agriculture in the gta

The Greater Toronto Area (GTA), is located within a high concentration of Class 1 farmland. This explains why the agricultural industry in this area is so successful, and why this area provides the greatest potential for a diverse range and quantity of agricultural products. Figure A.5.1 illustrates the location of the GTA and its proximity to Class 1-2-3 farmland.

The collective area of the GTA, which includes the City of Toronto, and the Regions of Durham, York, Peel, and Halton provide 709,422 acres (2871 sq. km) of productive farmland as of 2001. Of the farmland that is available, GTA farmers are able to produce more revenue (higher yields) on fewer acres in comparison to northern Ontario and other provincial farmers. The gross farm receipts for 2001 totaled \$671 million, an increase of \$86 million (14.7%) since 1996. Employment due to agriculture in the GTA has experienced an increase of 10,605 jobs (45%) between 1996 and 2001 (Walton, 2003).

Farm sizes within the GTA are significantly smaller than that of average Ontario farms. According to Margaret Walton, the average GTA farm size is 183 acres (0.75 sq. km) which is significantly less than the Ontario average of 226 acres (0.91 sq. km) (Walton, 2003b).



This overview of agriculture in the GTA demonstrates the importance of agriculture in this area. Although most assume that this is a booming metropolis, agriculture still exists and plays an important role in the economy of the area, and the local and regional character. As the urban edge of the GTA continues to expand, it places pressure on the remaining agricultural land. The relationship between agriculture and urban sprawl is essential to this thesis.

opposite

fig. A.5.1 soil class location in the greater toronto area

A significant amount of prime farmland is located within the boundaries of the Greater Toronto Area. The urban pressure on this farmland has been indicated with the use of red cross hatching.

fig. B.0.0 (opposite)

urban sprawl

appendix b

Concern should focus not only on the quantity of land undergoing change but also, and most importantly, the quality of farmland being lost or gained.

*Environment Canada, 1982
from (Ontario Farmland Trust, 2005, p.1)*





B.1 the rural-urban fringe

The concept for the rural-urban fringe (fig. B.1.2) was developed to describe an area of land surrounding the suburbs of urban centres but could not be described as strictly rural. In *When City and Country Collide*, Tom Daniels describes this area as a “hybrid region no longer remote and yet with a lower density of population and development than a city or suburb” (Daniels, 1999, p. 9). Daniels continues to describe the rural-urban fringe as an area of transition where “strips of urban and suburban fabric have extended into the countryside creating ragged settlement patterns of subdivisions, shopping centres, estates and retail shops all separated by farm, forest and open spaces” (Daniels, 1999, p. 9). Simply, it is the area between well recognized urban land use and land devoted to agriculture.

It should be clarified that this fringe does not become a suburb, but as new development starts and others are completed, the fringe’s edge shifts, pushing itself further into the countryside. The description of an area of transition for the rural-urban fringe is a conservative way of describing it. As development pushes towards established rural communities, it causes friction between the long term rural residents and suburban residents.

The rural-urban fringe is important to define for the purpose of this thesis. Much of this rural-urban fringe has already been purchased by developers but construction has not started. It provides the opportunity to imagine how an alternative approach to residential development could be applied to a site that would address the farmland it would consume and any existing rural architecture. It is within this area that a site was selected and used in the design portion of this project.

opposite

fig. B.1.1 the rural-urban fringe

The mixing of residential developments within farmland has created numerous conflicts between the farming community and new urbanites.

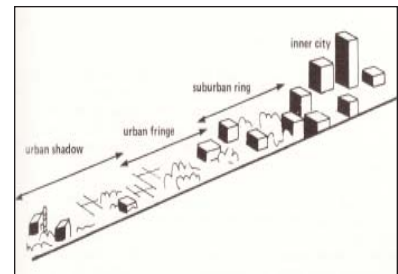


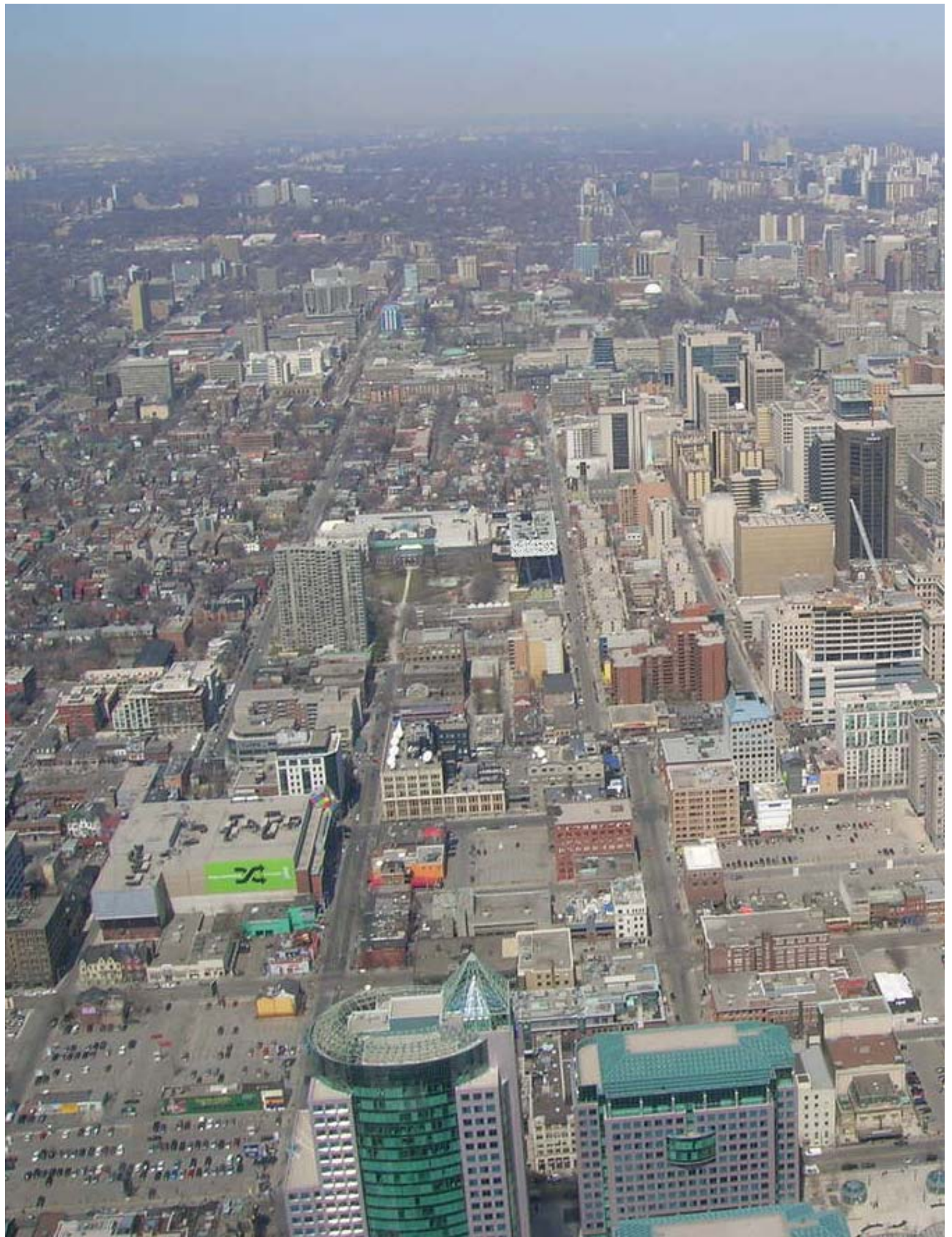
fig. B.1.2 rural-urban fringe diagram

The rural-urban fringe is a zone up to 15 km wide surrounding the suburbs where rural land is being turned into housing and industrial subdivisions.



fig. B.1.3 farming among residential developments

Farming continues often with farm fields being immediately adjacent to residential developments.



B.2 urban sprawl in the gta

The Greater Toronto Area (GTA) is one of the fastest growing regions in North America. This area attracts many new residents and businesses due to the high quality of life and the economic opportunities. During the next decade communities throughout the GTA will experience large growth that includes

diversified community services, arts, culture and recreation facilities. However, without properly managing growth, communities will continue to experience the negative aspects associated with rapid growth, such as increased traffic congestion, deteriorating air and water quality, and the disappearance of agricultural lands and natural resources” (Growth Plan for the Greater Golden Horseshoe, 2006, p.6).

Since the 1970s, the GTA refers to the combination of the areas of Toronto and the Regions of Peel, York, Halton and Durham which cover an area of approximately 7125 sq. km (1.8 million acres). Since becoming a part of the GTA, these regions have significantly increased in population. In 1986, the GTA was home to 3.7 million people. By 2006, this figure had nearly doubled (46%) to 5.5 million. Figure B.2.2 illustrates the total population growth for the GTA and also identifies individual population increases for all the regions. Although Toronto contributed a fair amount to this population growth, it was the Regions of Peel and York that had the greatest increases with over 500,000 people and Durham and Halton not far behind with 235,000 and 168,000 respectively (Demographic Profile for the Greater Toronto Area 1986-2006, 2009, p.4)

opposite

fig. B.2.1 **toronto's urban sprawl**
Looking north from the CN Tower.

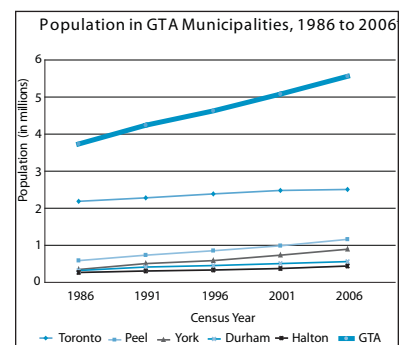
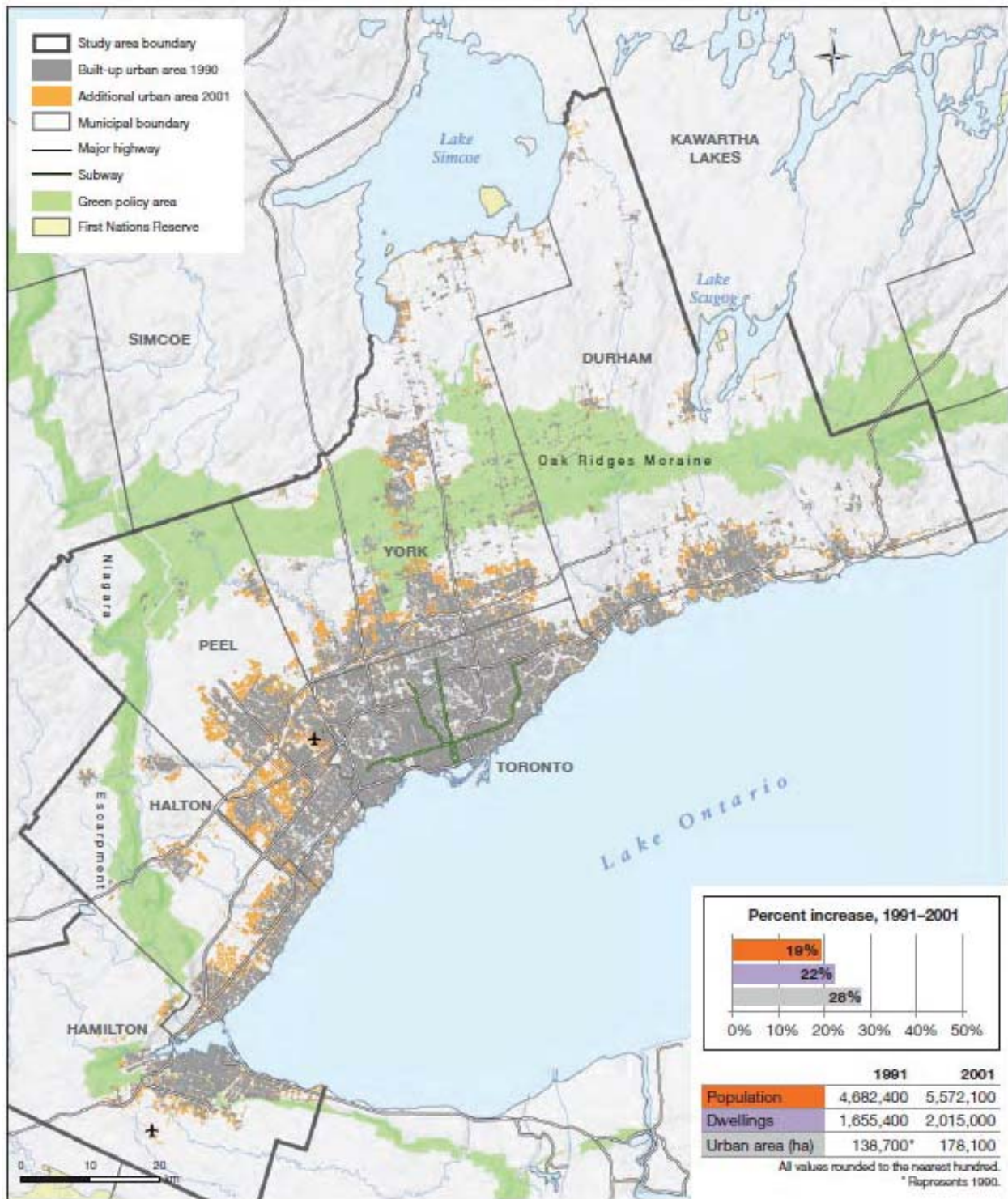


fig. B.2.2 **population growth in the gta**

The population of the GTA has been growing steadily since 1986.



One of the most visual realities of this growth, especially in the regions surrounding the City of Toronto, was the increase in population density. Figure B.2.4 lists the increase in density between 1986 and 2006 for the GTA. The City of Toronto maintained its high density but significant increases occurred in the Regions of Peel, York, Durham and Halton. This growth resulted in a demand for housing. The built up urban area of the GTA (also including Halton and Hamilton) in 1991 is compared to the built up urban area of 2001 in figure B.2.3. The result of this growth was a demand for 360,000 houses by a 19% population increase and a consumption of 40,000 hectares (400 sq. km) of land. The 2001 urban boundary was once the 1991 rural-urban fringe edge and as a result, a new edge for the rural-urban fringe was created further into the countryside.

These population trends for the GTA lead to question what the future will hold for the GTA and the location of the rural-urban fringe. The data from 1996 to 2006 suggests that the general GTA population will continue to increase but the majority of the increase will occur in the regions of Peel, York, Durham and Halton. Since 1992, the City of Toronto has been required to include the Regions of Peel, York, Durham and Halton in all of its planning. Therefore *Flashforward: Projecting Population and Employment to 2031 in a Mature Urban Area* is key in understanding the GTA population in the coming decades. This report suggests that the GTA is still growing. Figure B.2.5 illustrates that the population of the GTA is projected to grow by 2.6 million to 7.45 million by 2031. This means that a population equivalent to that of today's City of Toronto is expected to be added to the GTA between 1996 and 2031.

The regions surrounding the City of Toronto are anticipated to grow very quickly. Figure B.2.6 demonstrates that by 2031 the regions will account for 60% of the total GTA population. *Economic Influences on Population Growth and Housing Demand in the Greater Golden Horseshoe*, a report released by the Neptis Foundation, provides projections for GTA total households and household growth (fig. B.2.8). Demands for housing in the City of Toronto will actually decrease as most of the population will settle in the surrounding regions.

opposite

fig. B.2.3 growth and constraints on development in the greater golden horseshoe

The population growth and housing demand between 1991 and 2001 resulted in a conversion of 400 sq. km of land.

	Toronto	Peel	York	Durham	Halton	GTA
Area in sq.km	630.18	1,242.40	1,761.84	2,523.15	967.17	7,124.74
1986 People/sq.km	3,479.52	476.63	199.00	129.27	280.60	523.96
1991 People/sq.km	3,611.30	589.82	286.62	162.13	323.77	594.51
1996 People/sq.km	3,785.30	679.84	336.26	181.76	351.41	648.63
2001 People/sq.km	3,937.75	788.63	413.92	200.90	387.97	712.10
2006 People/sq.km	3,972.33	924.56	506.69	222.44	454.17	778.54

fig. B.2.4 population density

Densities among the regions surrounding Toronto significantly increased between 1996 and 2006. In Toronto, it only increased slightly.

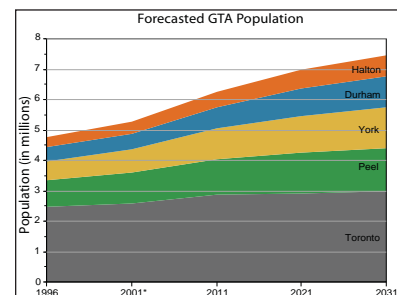


fig. B.2.5 forecasted gta population

Flashforward: Projecting Population and Employment to 2031 in a Mature Urban Area predicts a large population growth for the GTA.

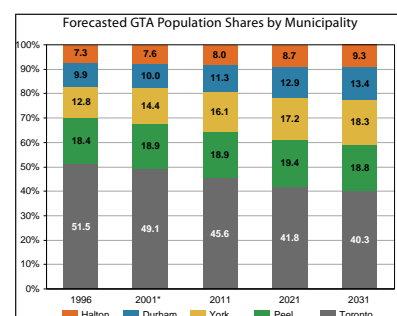


fig. B.2.6 forecasted population share by municipality

The majority of population growth will be occurring in the Regions of Peel, Halton, York and Durham.

opposite

fig. B.2.7 the rural-urban fringe in the greater golden horseshoe

The prediction of the growth of the urban boundary in the greater golden horseshoe up to 2031.

The demand for housing in the Regions of Peel, York, Durham and Halton will result in the current rural-urban fringe being converted into urban uses, once again pushing the rural-urban fringe boundary further into the countryside. Figure B.2.7 illustrates the concept of the rural-urban fringe and the consequences of continuous urban sprawl. Grey 1 km bands have been placed around the existing 2001 urban boundary. These grey bands represent the current rural-urban fringe. Once population and housing meets its 2031 projections, the new urban boundary will be located 1 to 4 kilometers beyond the 2001 urban edge.

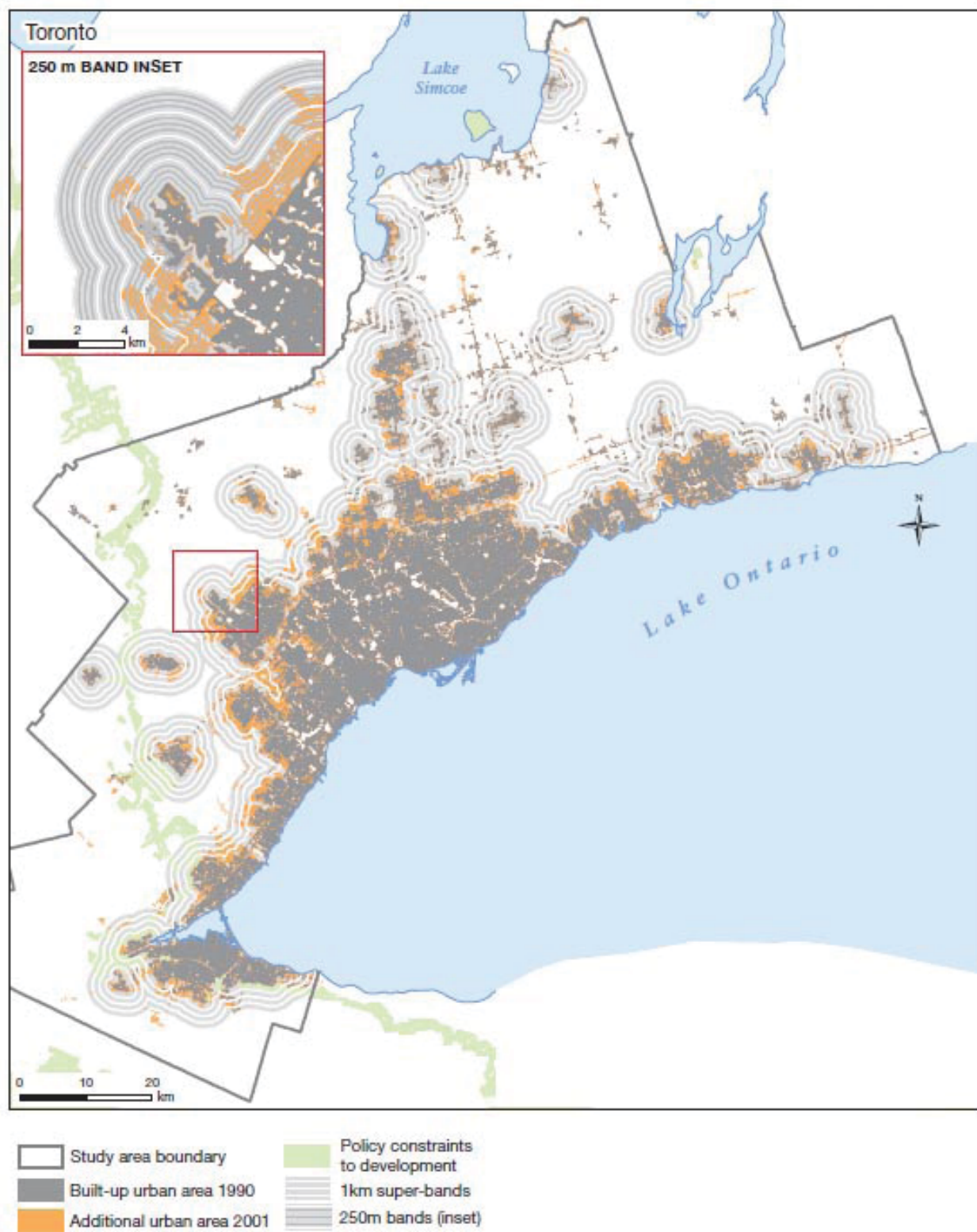
Urban sprawl is a serious issue for the GTA. Population growth and housing demand is the GTA's future. In order to avoid the loss of more of the GTA's surrounding countryside a new approach must be considered to stop this urban sprawl before its boundaries consume the entire GTA. A number of strategies need to be implemented to prevent this from occurring.

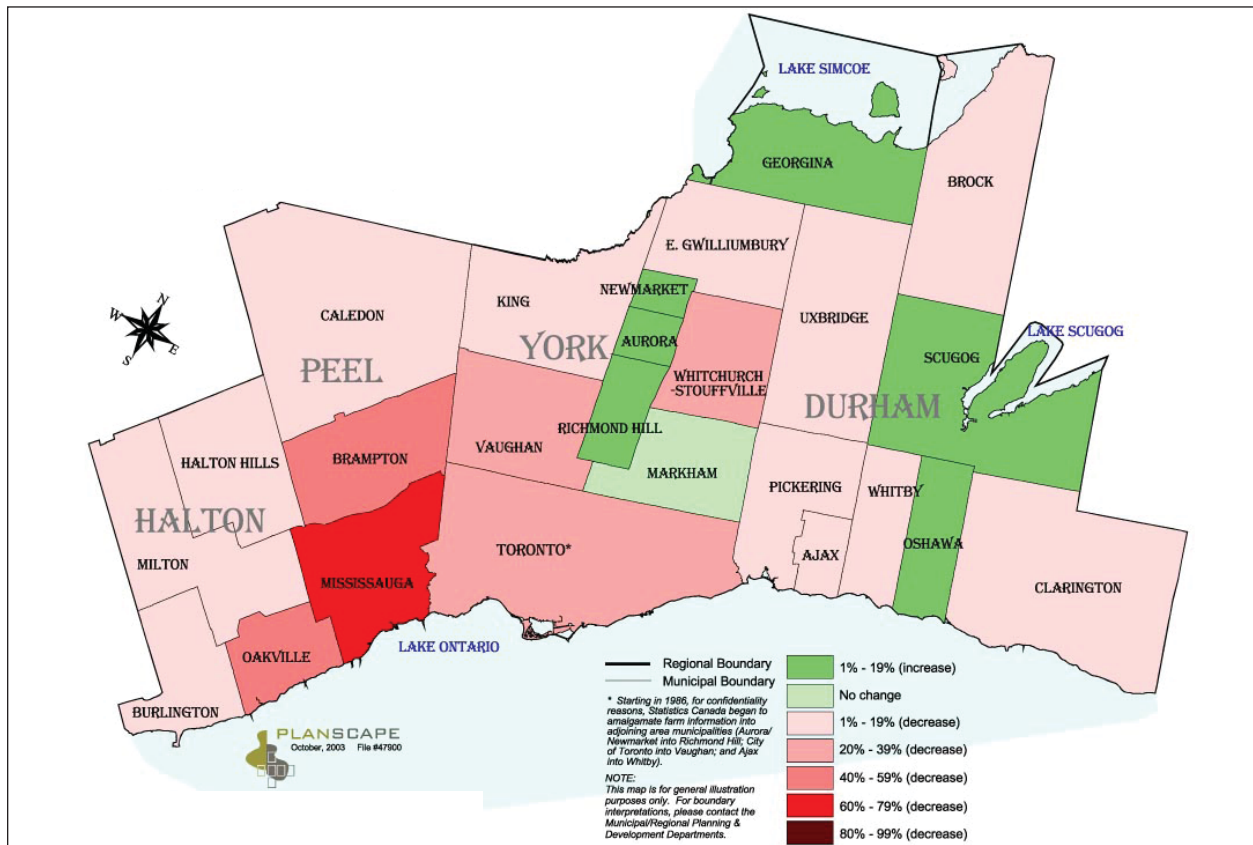
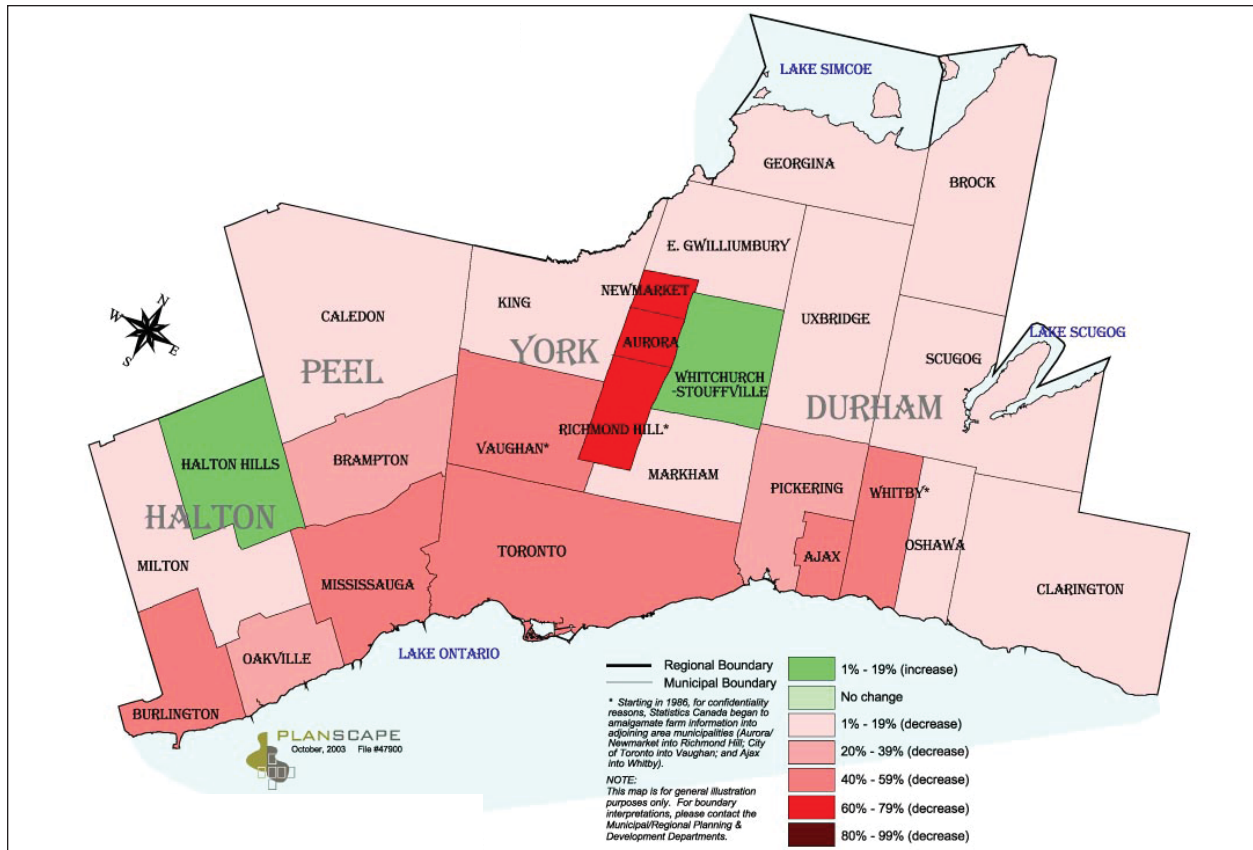
There are a number of consequences that result from the conversion of land to accommodate urban sprawl. These will be reviewed in the following sections.

fig. B.2.8 projection of household and household growth

This table lists the projection of housing for the Regions of Peel, Halton, York and Durham and the City of Toronto.

Projections of Households and Household Growth by Census Division in the Inner Ring					
	Durham	Halton	Peel	Toronto	York
<i>Total Households</i>					
2001-2011	178,034	138,319	324,919	979,173	231,374
2011-2021	229,848	170,098	447,974	1,006,486	337,828
2021-2031	282,014	199,309	569,717	981,253	435,348
Total	325,172	221,227	680,068	912,317	510,304
<i>Total Household Growth</i>					
2001-2011	51,814	31,779	123,055	27,312	106,454
2011-2021	52,166	29,211	121,743	-25,233	97,520
2021-2031	43,159	21,918	110,351	-68,936	74,956
Total	147,139	82,908	355,149	-66,857	278,930
<i>Average Annual Household Growth</i>					
2001-2011	5,181	3,178	12,306	2,731	10,645
2011-2021	5,217	2,921	12,174	-2,523	9,752
2021-2031	4,316	2,192	11,035	-6,894	7,496
Total	4,905	2,764	11,838	-2,229	9,298
<i>Average Number of People Per Household</i>					
2001-2011	2.96	2.82	3.25	2.65	3.28
2011-2021	2.75	2.66	3.05	2.57	3.05
2021-2031	2.61	2.55	2.93	2.5	2.91
Total	2.55	2.48	2.87	2.45	2.84





B.3 farmland loss

One of the consequences of land use change in the rural-urban fringe is the loss of prime farmland. This section will review the loss of farmland in the Greater Toronto Area, Ontario and Canada.

B.3.1 greater toronto area

During the period of 1976 to 1996 the GTA lost over 150,000 acres (610 sq. km) of farmland. From 1996 to 2001 another 50,314 acres (205 sq. km) of prime farmland was converted for urban uses. (Walton, M., 2003, pg. 5). A total of 200,314 acres (810 sq. km) of farmland went out of production in the GTA in 25 years. Figure B.3.1 provides the percentage of change of farmland acreage for GTA municipalities from 1976 to 1996. Figure B.3.2 provides the same data from 1996 to 2001. These two figures show that farmland loss has continued and municipalities adjacent to the city of Toronto have all experienced the highest levels of farmland loss.

The loss of prime farmland in the GTA is a serious issue. Ontario possesses the largest portion of class 1 farmland and this is where land use change is occurring dramatically. Addressing this problem immediately must be made a priority.

opposite (top)

fig. B.3.1 farmland acreage change

A significant amount of farmland has been lost surrounding the City of Toronto during the time period of 1976 to 1996.

opposite (bottom)

fig. B.3.2 farmland acreage change

Adjacent to the City of Toronto, the Region of Peel has lost between 60 to 79% of its farmland between 1996 and 2001.

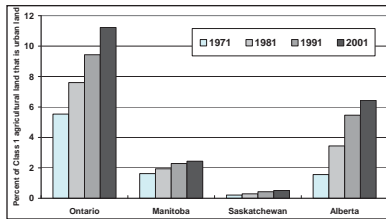


fig. B.3.3 **ontario class 1 land occupied by urban growth**

In 2001, 11% of Ontario's Class 1 agricultural land was occupied by urban land uses.

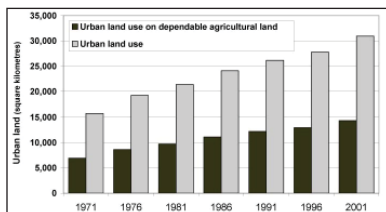


fig. B.3.4 **urban use on agricultural land**

Urban uses cover 14,000 sq. km of dependable agricultural land in Canada.

B.3.2 ontario

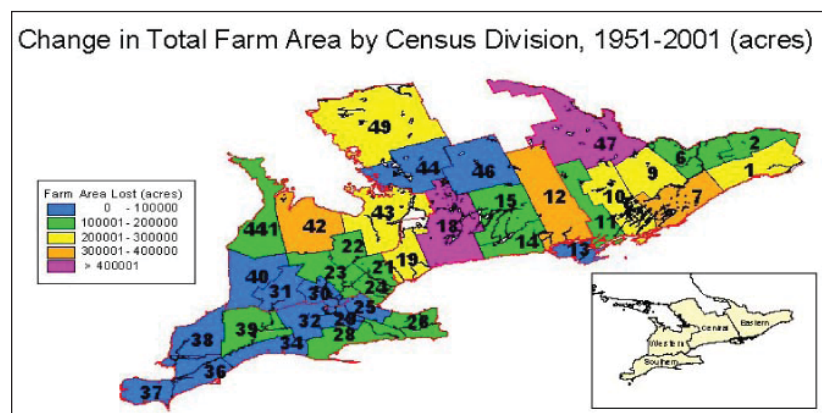
Within Ontario, 18 percent of class 1 land has already been urbanized (Hofmann, N., 2001). Figure B.3.3 shows that as of 2001, over 11 percent of the province's best agricultural land (class 1-2-3) was occupied by urban land uses. Central Ontario alone has lost 1,897,000 acres (7677 sq. km) of farmland since the second half of the 20th century. This trend will continue to occur as urban sprawl absorbs and converts more farmland (Ontario Farmland Trust, 2005). The map of southern Ontario (fig. B.3.5) illustrates the acres of farmland lost between 1951-2001. This conversion has not been limited to the Greater Toronto Area but all farmland below the Canadian Shield.

B.3.3 canada

As of 2001 in Canada, there were "14, 300 square kilometers of urban uses occupying dependable agricultural land" (Filoso, G., Hofmann, N., & Schofield, M., 2005, p.6). Figure B.3.4 illustrates that between 1971 and 2001, urban land use on dependable agricultural land has doubled. Based on the trend derived from this 1971 to 2001 data, it can be predicted that the amount of urban land use on agriculture land today has increased and will continue to do so in the future. The loss of any of Canada's prime agricultural land is a concern given the fact that there is a limited amount within the country and the majority of it is under pressure from urban centres.

fig. B.3.5 **lost farmland in southern ontario**

The acres of lost prime farmland between 1951 and 2001 by census divisions for Southern Ontario.



B.4 overview of impacts

As previously discussed, urban sprawl occurs at the outer boundaries of the city in an area of land that is not urban but no longer strictly rural – the rural-urban fringe. This particular area is constantly dealing with impacts of the impending urban land conversion and this has caused numerous conflicts between long term rural residents, farmers, and new suburban residents.

The countryside is painted as having picturesque vistas with natural landscapes and open spaces, ideal for starting and raising a family. This rural character attracts new residents. However, to accommodate these new residents, developers purchase and convert the farmland in the rural-urban fringe and in the case of Toronto, prime farmland, and fill it with residential units. Figure B.4.1 describes the cycle and sequence of farmland conversion.

In addition, development greatly alters the land itself. The layer of top soil is stripped and hauled away for separate profit, and the natural drainage that was so crucial to the success of crops is altered by foundations, paving and piping.

The loss of prime farmland is not the only consequence of this process. Instead, the conversion of the land has altered the character of the rural countryside. With population increase due to new residents, the rural identity is forced to change. As rural residents become outnumbered, this is reflected in local government. The majority of individuals who run for or hold public office are new residents and rural and agricultural concerns are not their priority. By-laws and new legislation then reflect the needs of the new population.

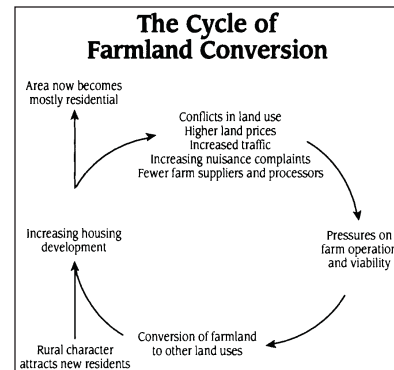


fig. B.4.1 the cycle of farmland conversion

As the density increases in a previously predominately agricultural area, the impact upon agricultural operations can exponentially increase. The greatest impact of increasing residential development is not just the potential loss of farmland, but the impact on existing farm operations. An increase in the number of non-farm residences in rural areas can often place greater pressures upon farm operations, making it more difficult for them to continue to expand.

Farmers who do participate in local government find it extremely difficult because they do not have the population base to pass any by-laws that address concerns in the agricultural community and protect their investments.

Rural residents are now paying more for their land because their once remote rural residences are becoming part of the city. Public services, such as water and sewage that once accommodated small rural towns, are no longer sufficient. To modify or build new facilities, taxes are raised to obtain the required funds.

Additional pressure on the farming community is caused by the loss of farmland located near the rural boundary. It is highly desired by developers who offer outrageous prices to purchase the land. This inflation makes it extremely expensive to farm in these areas and acquiring more land to expand a farm is nearly impossible.

Growing populations in these new residential developments increase traffic congestion. Not only are rural roads busier, traffic increases the amount of vehicular accidents, interfere with the ability to walk or bike on the sideroads, and has increased insurance rates for both rural residents and farmers. Road sharing conflicts (i.e. driving a tractor or farm implement transporting a load of hay on a major road) between farmers and suburban residents result in road rage and accidents from a lack of understanding and patience. These increases in traffic congestion interfere with normal farm operations, making the movement of farm equipment difficult and sometimes unsafe. The closer the urban boundary gets, the higher the conflict between farmers and suburban residents becomes.

Complaints about normal farm practices such as spreading manure, late night seeding, harvesting, animal noise and dust upset these suburban residents. Littering, dumping, trespassing, and destruction to farm property and animals are often a result of suburban residents who believe farmland is a public park for them to use (Ontario Farmland Trust, 2005).

In addition, increases in road use creates a need for paving rural roads, which increases the speed at which drivers can travel as well as contributing to increased taxes.

Another issue that has developed due to the presence of non-agricultural land use is by-laws outlining a minimal distance between farm land and residential development. This restricts the amount of their own land farmers can use and results in cropland boundaries having to be moved or animals relocated to other parts of the property.

There are typically two models for residential developments; the scattered model and the clustered model. Figure B.4.2 illustrates these two models. The scattered model is the most common.

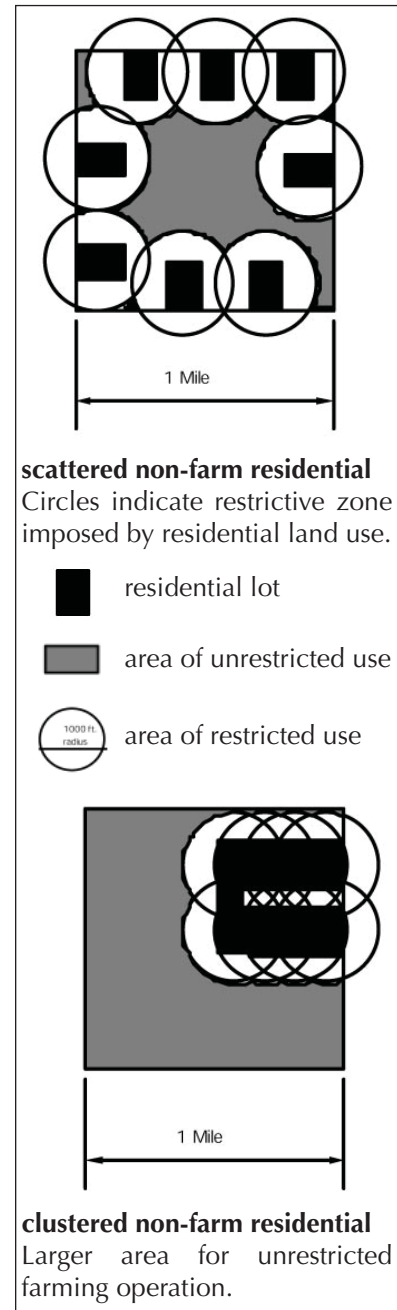
This approach uses a large amount of land for relatively few people. These lots are typically an attempt at creating estates with lots of land and vegetation. Essentially, they are trying to create the rural countryside in a subdivision. However, the difficulty with this approach is that it poses the greatest amount of restriction upon farmers. Because of the distance between the residential lots, each one has its own area of restricted use and as a result, very little of the 1 square mile block is available for agriculture.

The clustered model approach identifies a more sensitive acknowledgement of the surrounding farmland. By pulling together the residential lots, the area of restriction overlaps. This leaves a greater amount of space open so it can remain in use for agriculture.

Although agriculture can take place within a scattered model approach, it is difficult, time consuming and more expensive for the farmer. The clustered model not only provides more space for agriculture but is easier and less expensive to farm because of the L-Shape plot of land. Farming within the rural-urban fringe is not without its difficulties, and conflicts only increase as the urban boundary grows closer to a farmer's property.

fig. B.4.2 **scattered vs. clustered model**

The clustered model reduces the restriction placed on surrounding agricultural land.



The conversion of farmland also has resulted in an impact on the environment quality of this land. Fields and forested areas are bulldozed to provide flat landscapes for housing – destroying not only natural vegetation, often centuries old, but also homes to a variety of wildlife. Air quality and light pollution are now growing concerns among rural residents. Housing construction has also altered the natural underground water system. In many areas, farmer's adjacent to developments see their crops suffer as a result of the destruction of the natural drainage systems. Rural wells, which function using ground water, are experiencing increased levels of contaminants due to pollution or dried wells because this natural water system has been damaged by development.

As farmland continues to experience pressure from development, farming in general is becoming difficult to conduct.

B.5 peak soil

As prime farmland disappears, it is lost forever. The soil in Ontario was developed under forest vegetation, and from till and glacial deposits. Unlike natural vegetation – which will eventually grow back and take over - the combination of minerals, climate, trees, shade dampness, and rotting ground cover over thousands of years are the reason for this soil quality. There is no way to recreate this soil once it is gone. This is why it is so important to acknowledge this precious resource in Ontario and start addressing the issues that threaten it.

B.6 supply vs. demand

This demand and supply concept represents a growing concern for this country. As the demand for crop land continues to rise and eventually reaches its capacity, we will be forced to rely more on foreign imports. This dependency is risky- a developed country, any country, should not be reliant on other countries for food to feed its own population. By relying on other countries we are at their mercy regarding value, quality and quantity. Therefore to have continued food security in Canada, we need to start protecting our prime farmland.

In *Thirty Years of Farmland Preservation in North America: Discourses and Ideologies of a Movement*, Michael Bunce discusses the issue of available crop land and current demand. Figure B.6.1 shows that even during the 1980s this was an issue of concern throughout North America. Though this bar graph represents American data, it was being predicted by the 2000s that demand would outgrow the farmland available. However, in Canada, cultivated farmland has increased (fig. B.6.2). This means that farmers are now having to use lower quality farmland because the demand for prime farmland is larger than what is available.

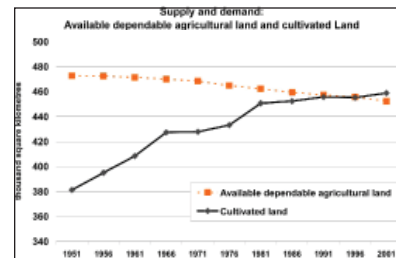


fig. B.6.1 **available land and cultivated land**

Between 1951 and 2001, the amount of cultivated land in Canada increased by 20% while the supply of available dependable agricultural land actually declined by 4% as a result of urbanization and other non-agricultural land uses.

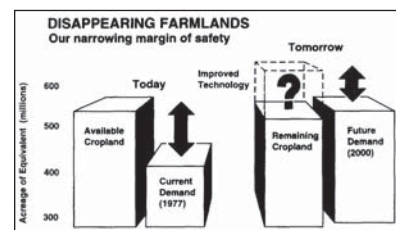


fig. B.6.2 **available cropland vs. demand for cropland**

This conceptual diagram illustrates that in the 1980s it was being predicted that by 2000 the demand for farmland would be higher than was available.

fig. C.0.0 (opposite)

design development

appendix c



top (left)

fig. C.0.1 **plan - roof**

middle (left)

fig. C.0.2 **plan - fourth level**

bottom (left)

fig. C.0.3 **plan - third level**

top (opposite)

fig. C.0.4 **plan - second level**

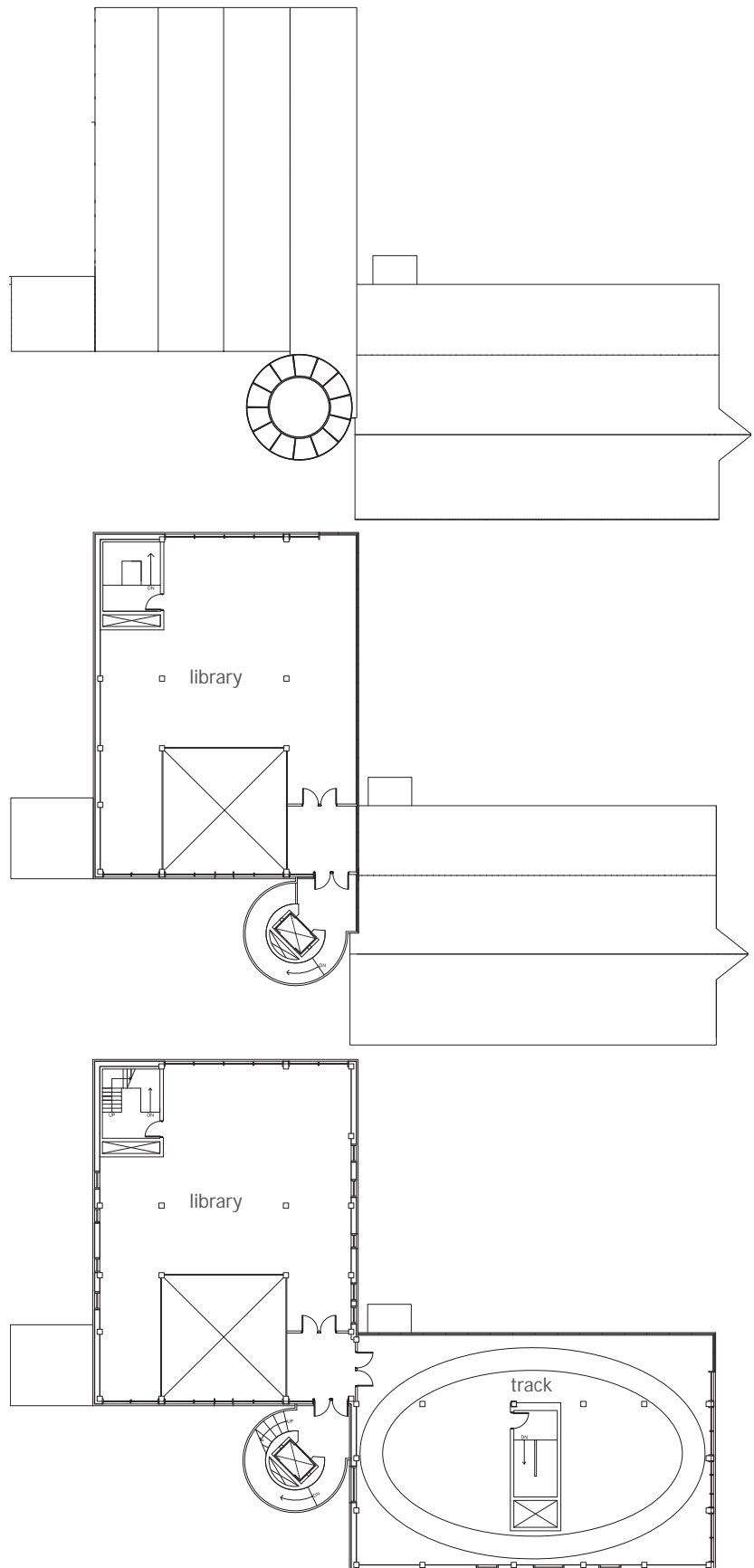
middle (opposite)

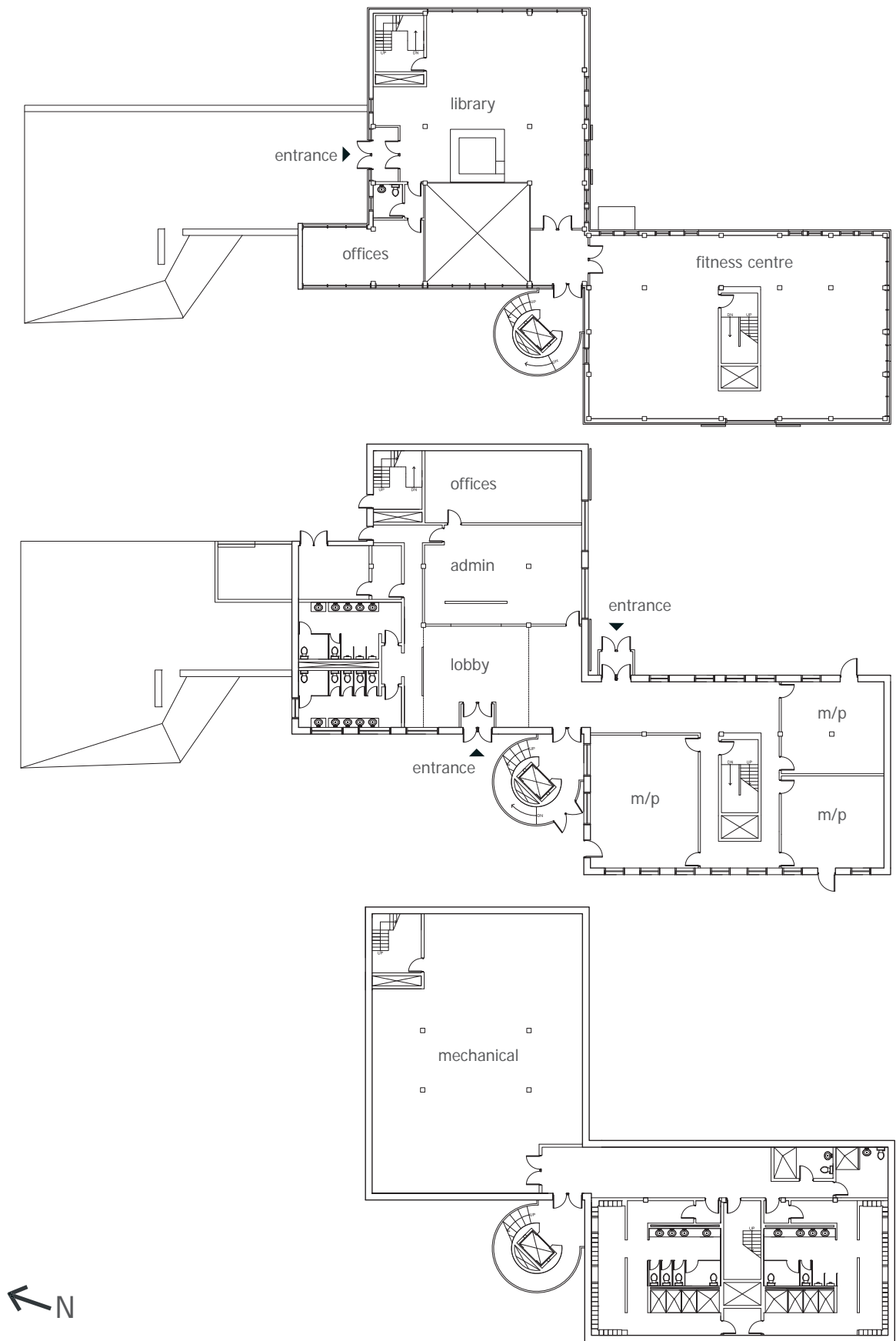
fig. C.0.5 **plan - ground level**

bottom (opposite)

fig. C.0.6 **plan - lower level**

These plans were presented during the substantial performance review in August 2011. They illustrate the floor levels prior to the minor changes to the pop outs and vestibule.





bottom

fig. C.0.7 **barn boards** - june 9am

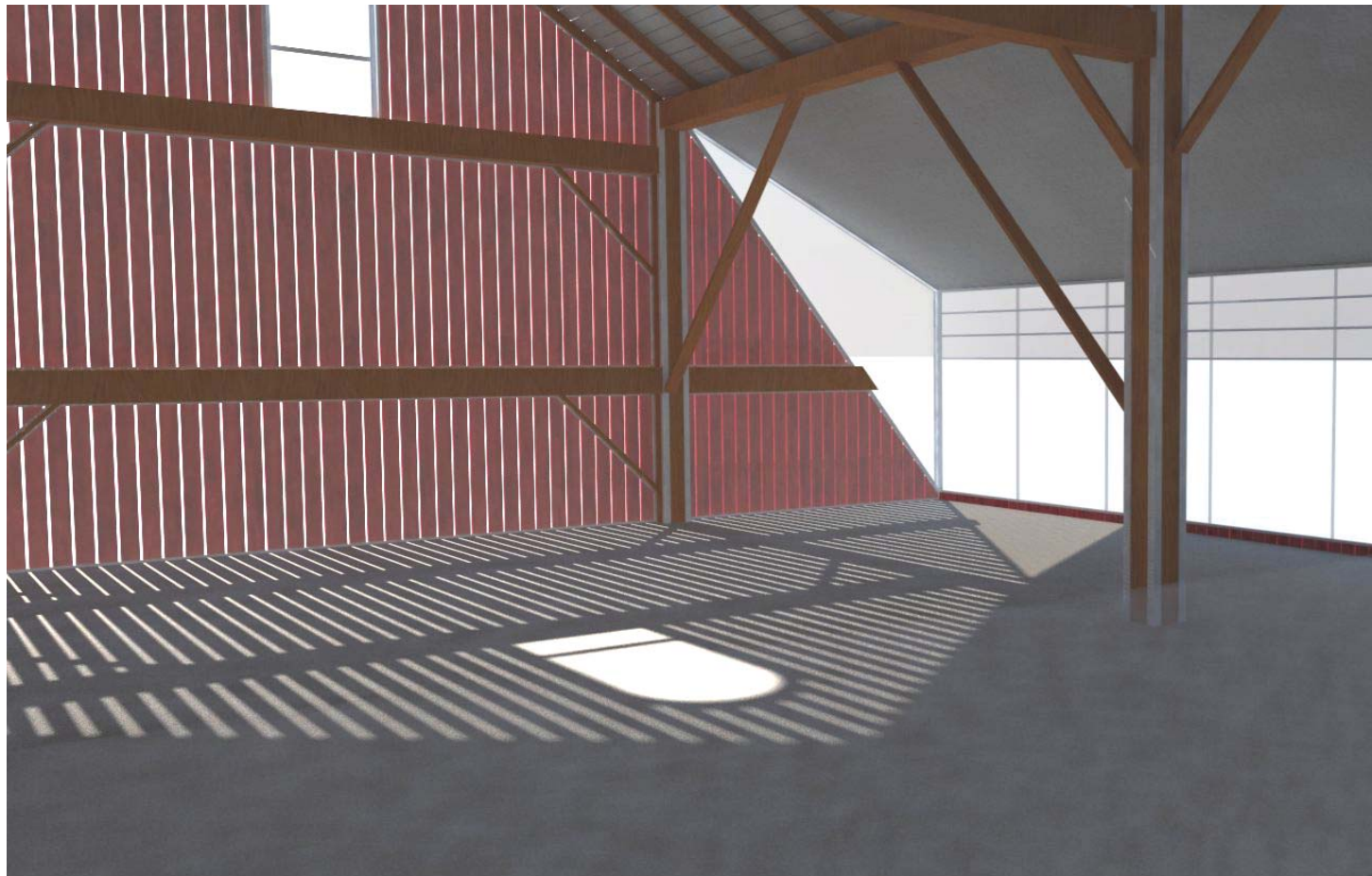
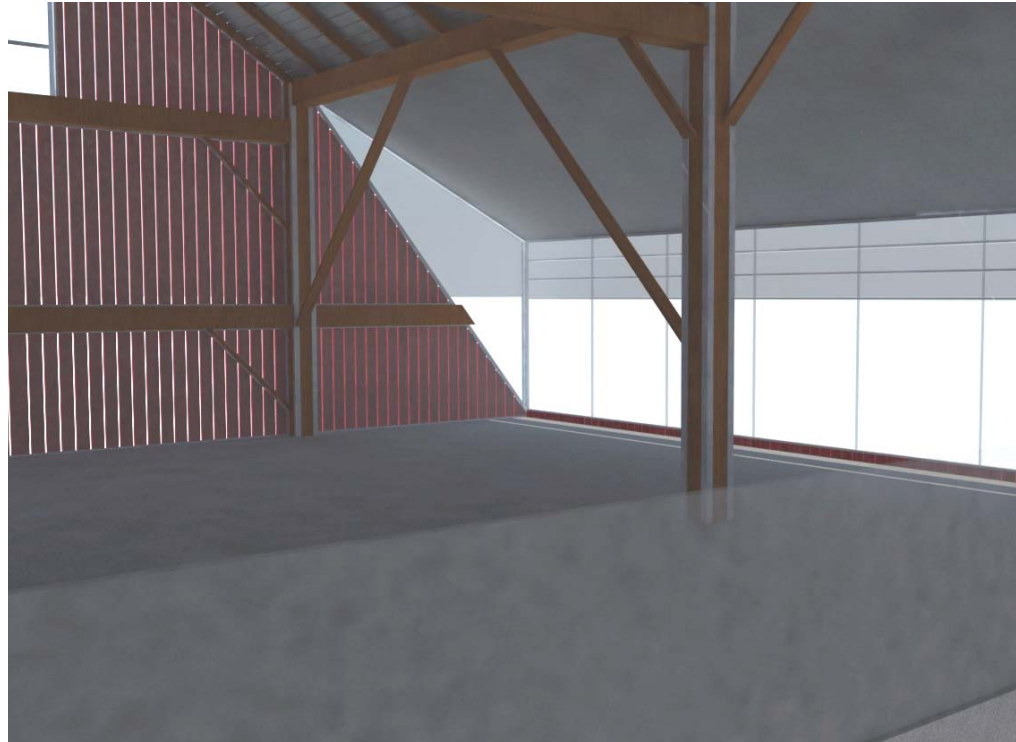
top (left)

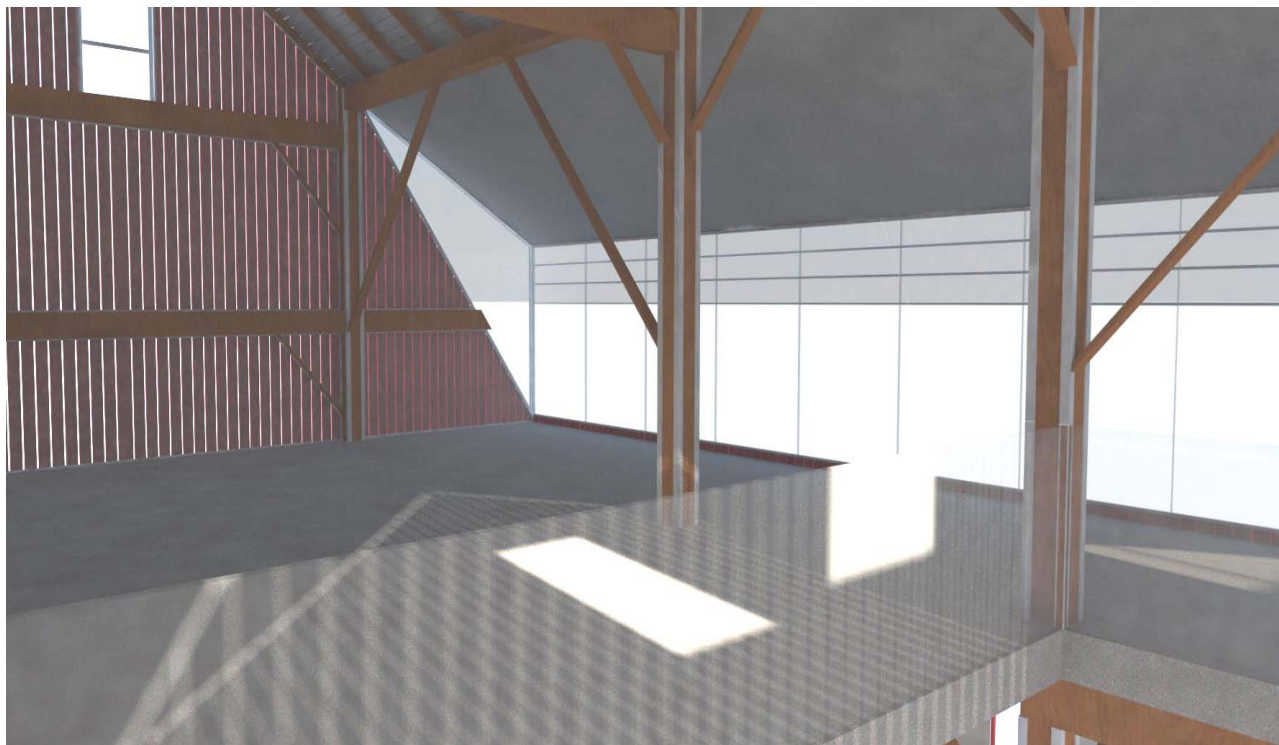
fig. C.0.8 **barn boards** - june 3pm

top (right)

fig. C.0.9 **barn boards** - june 6 pm

These renderings illustrate the development of the barn board screen. The time lapse investigated how the light interacted with the space throughout the day.





bottom

**fig. C.0.10 barn boards - morning
on fourth level**

top (left)

**fig. C.0.11 barn boards -
afternoon on fourth level**

top (right)

**fig. C.0.12 barn boards - early
evening on fourth level**

These renderings illustrate the
further refinement of the effect of
the light and barn boards.





bottom

**fig. C.0.13 barn boards - morning
in fourth level pop out**

top (left)

**fig. C.0.14 barn boards -
afternoon in fourth level pop out**

top (right)

**fig. C.0.15 barn boards - early
evening in fourth level pop out**

This space on the fourth floor of the north barn explored how light would enter the south facing pop out throughout the day.





top

fig. C.0.16 north pop out

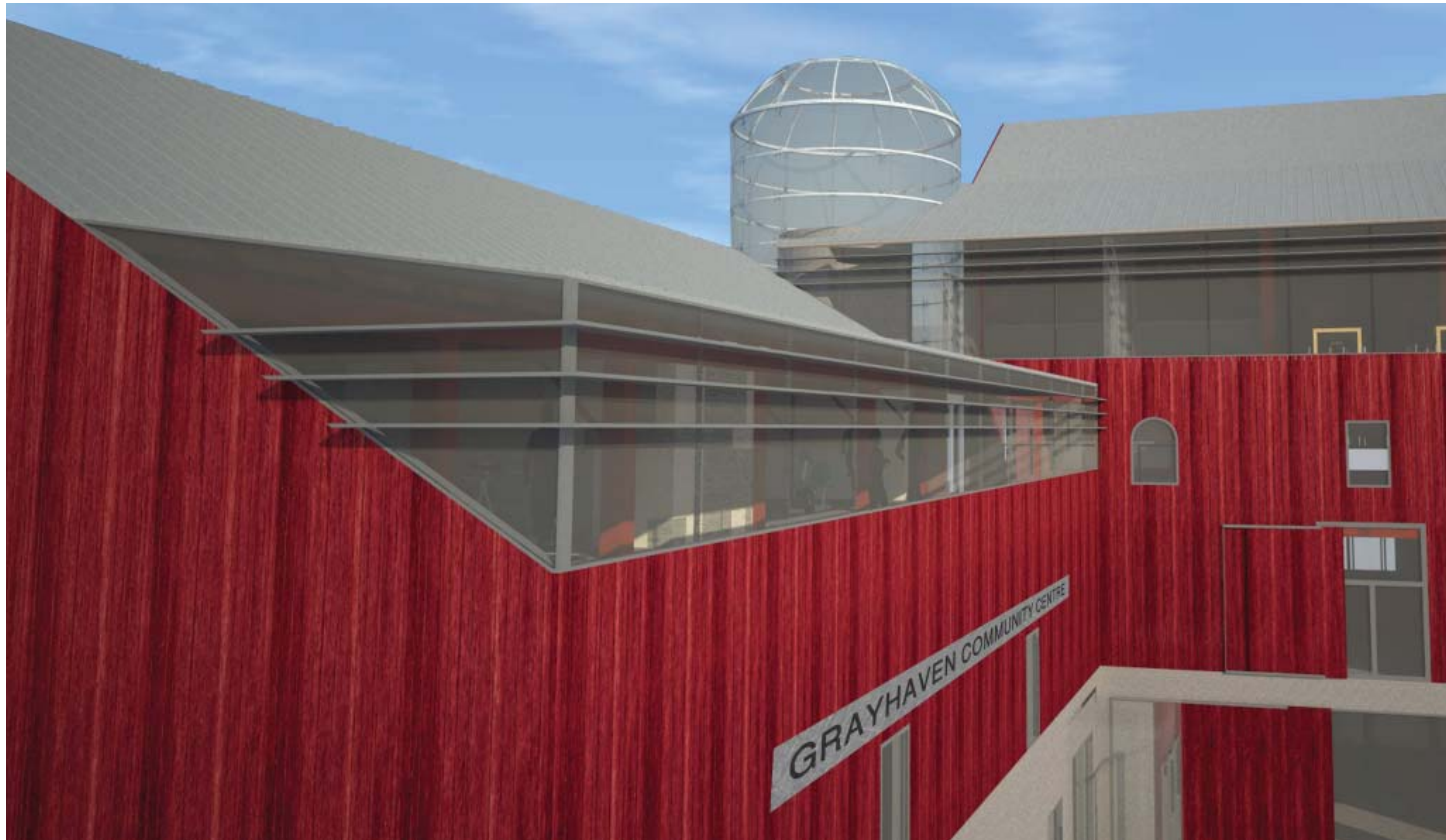
bottom (left)

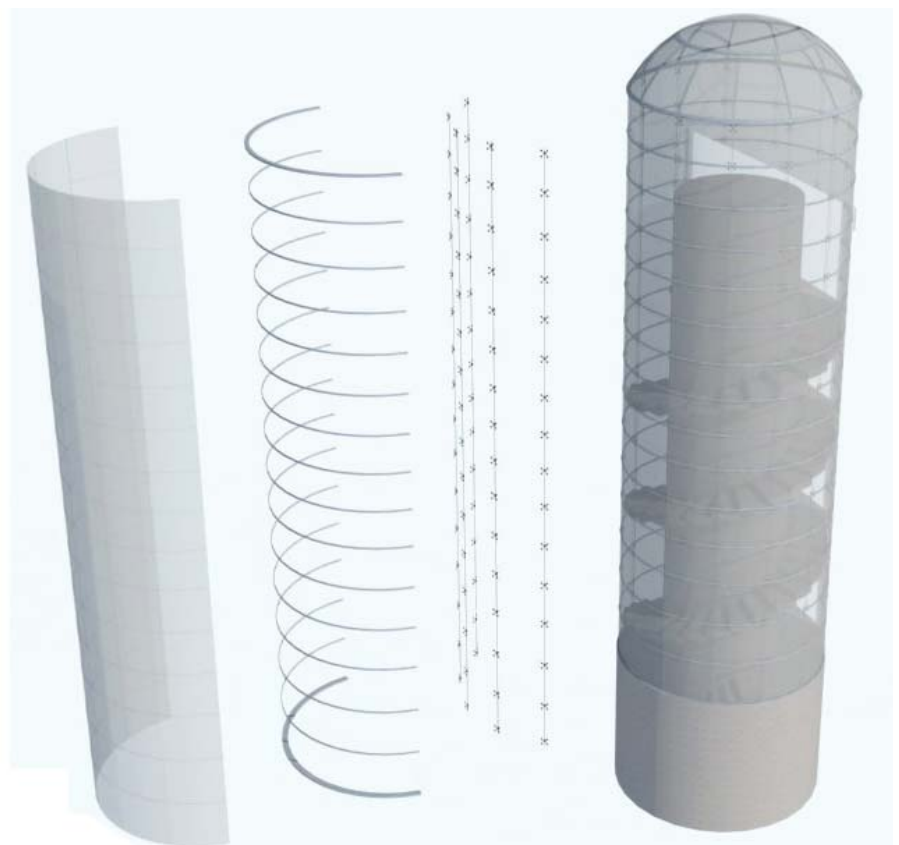
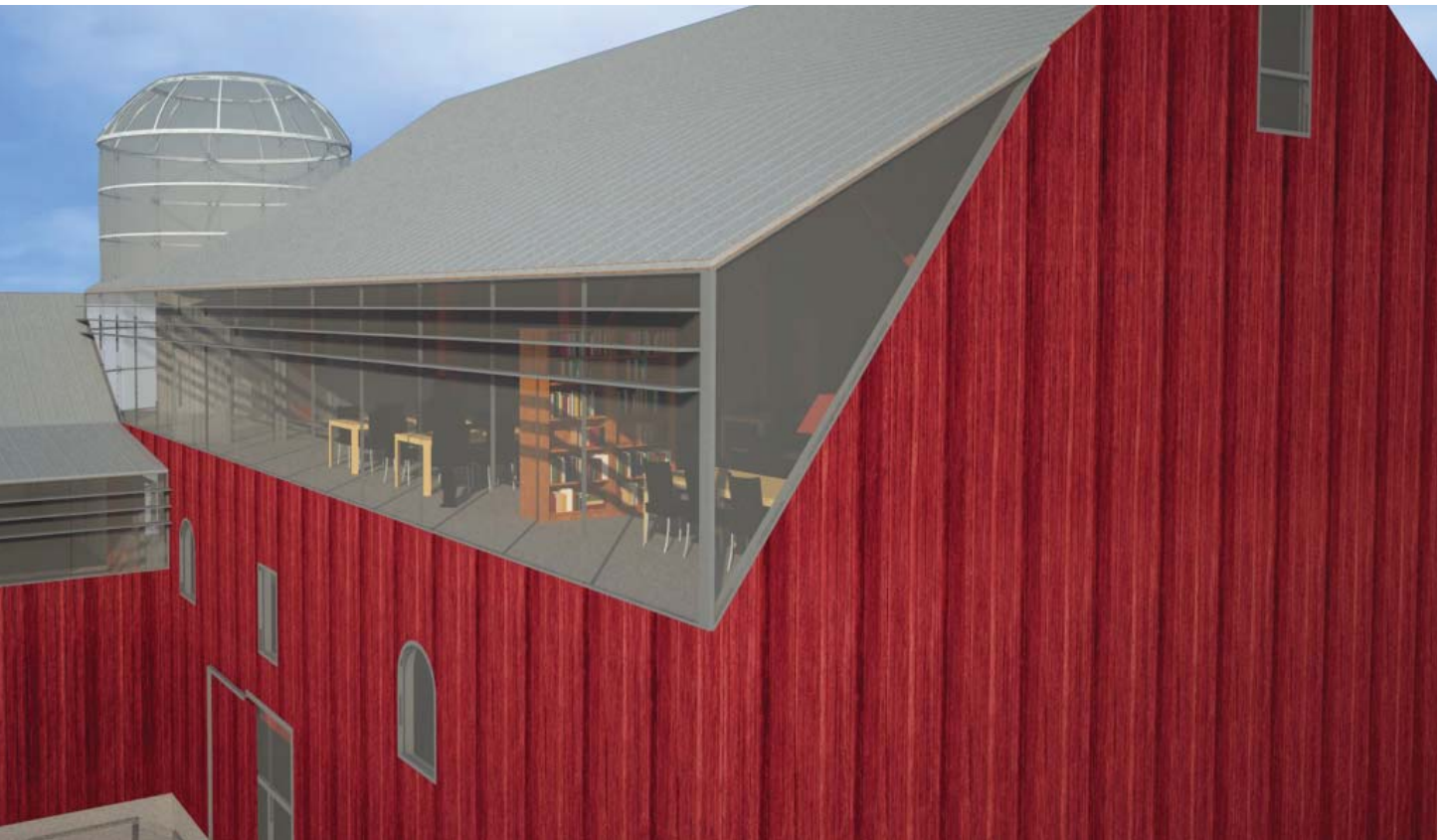
fig. C.0.17 south pop out

bottom (right)

fig. C.0.18 exploded axonometric
of silo

These renderings of the pop outs were presented during the substantial performance review in August 2011. They illustrate their relationship to the barns prior to minor changes after the presentation. The exploded axonometric illustrates the construction of the silo which included a system of steel rods and spider joints.





top (left)
fig. C.0.19 ramp entrance to
library

middle (left)
fig. C.0.20 south east
axonometric

bottom (left)
fig. C.0.21 south elevation

bottom (right)
fig. C.0.22 east elevation
These exterior renderings were
presented during the substantial
performance review in August
2011.





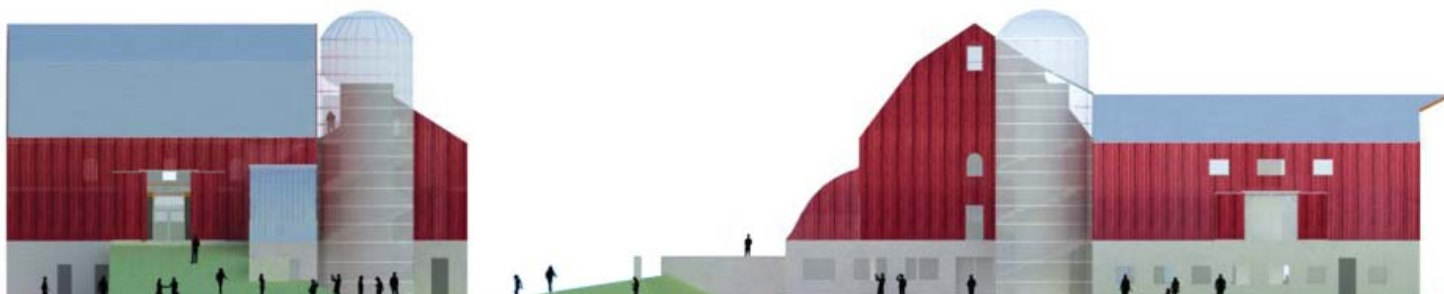
top (left)
fig. C.0.23 hay loft window

top (right)
fig. C.0.24 south entrance

middle (right)
fig. C.0.25 north west
axonometric

bottom (left)
fig. C.0.26 north elevation

bottom (right)
fig. C.0.27 west elevation

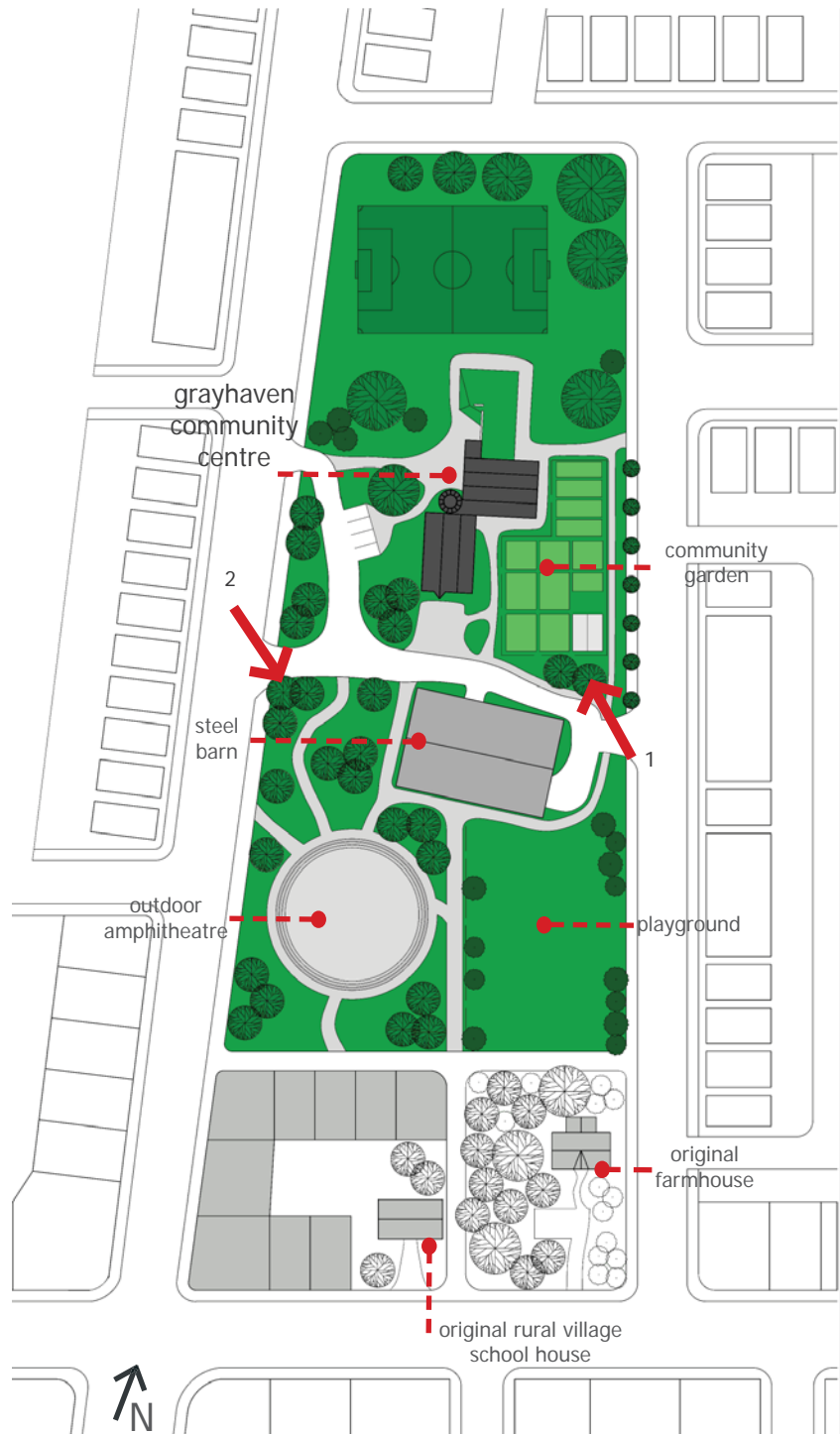


top
fig. C.0.27 **site plan**

bottom
fig. C.0.29 **site section**

top (opposite)
fig. C.0.30 **community garden**

bottom (opposite)
fig. C.0.31 **park and skating rink**
Within the development of the larger site plan, many original structures, features and patterns were maintained such as the driveway and walking paths, fence and lot lines and open spaces and other rural architecture including the original farmhouse and school house. Where manure was once stored, is the location of the community garden. A town amphitheatre provides a space to skate during the winter and the newer steel barn built in 1973 provides a perfect open structure for parking.





1. community garden



2. parking and skating rink



top
fig. C.0.32 **site plan**

bottom
fig. C.0.33 **site section**

top (opposite)
fig. C.0.34 **farmers market and amphitheatre**

bottom (opposite)
fig. C.0.35 **soccer field**
This 8 acre site offered multiple opportunities for exterior activities and utilizing other farm out buildings. For example, the former steel barn built in 1973 doubles as a covered open outdoor space for a farmers market during the summer. The ample space to the north of the site provided a space for a soccer field.





1. farmers market and amphitheatre



2. soccer field



top

fig. C.0.36 **village centre from
from south**

bottom

fig. C.0.37

village centre from south west

The original development of the village centre that was presented during the substantial performance review in August 2011, envisioned the community centre establishing itself at the north east corner of this future village centre. Based on the analysis of rural villages and the 5 minute walking radius concept from the new urbanism movement, the village centre would serve the surrounding rural and suburban residents with services such as a farmers market, retail, community centre and public space provided by the adaptive reuse of this rural architecture.

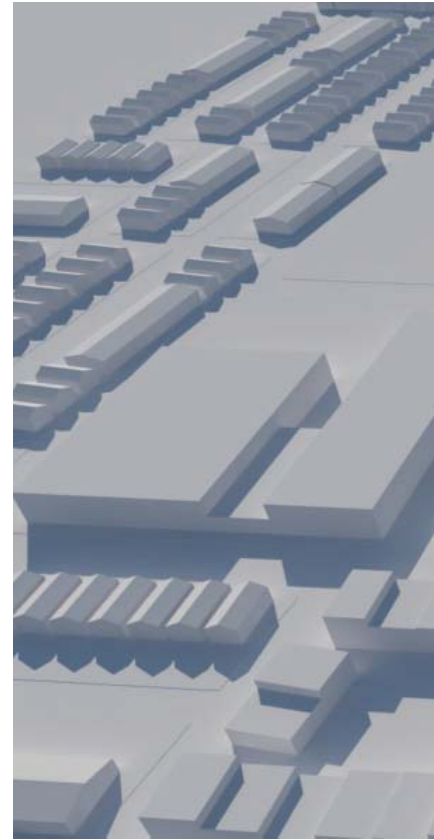




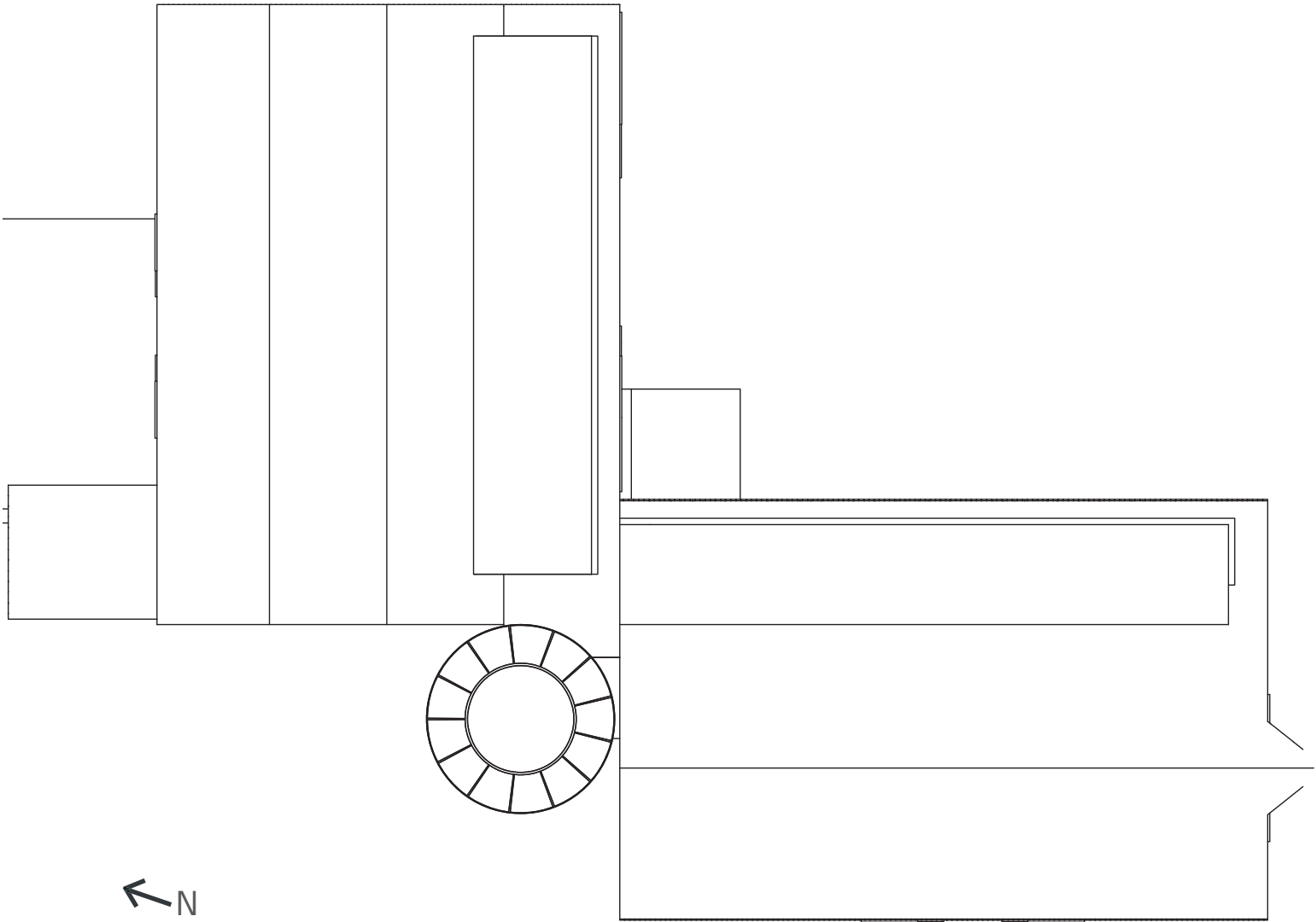
fig. D.0.0 (opposite)

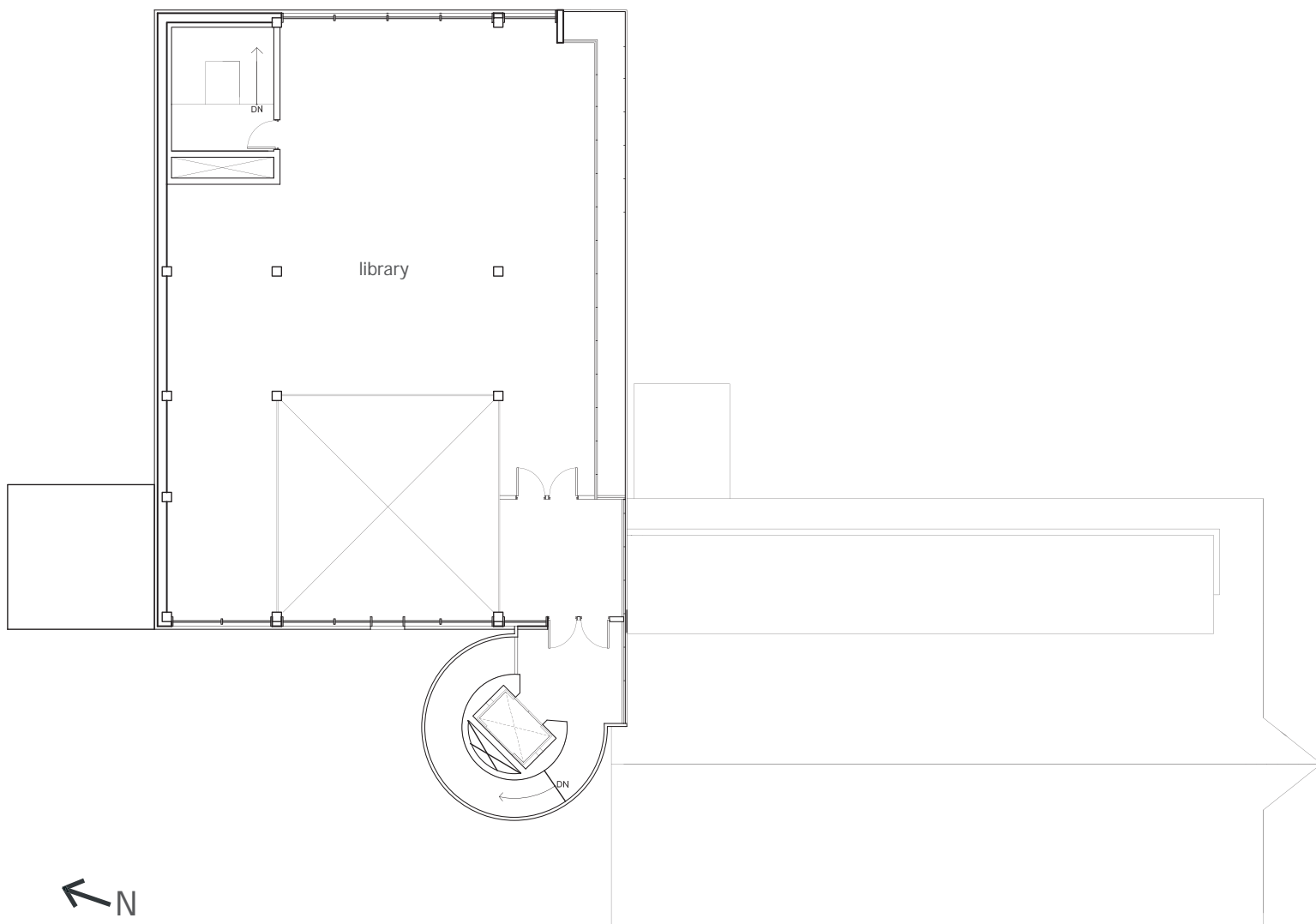
final design
appendix d



bottom (left)
fig. D.0.1 **plan - roof**

bottom (right)
fig. D.0.2 **plan - fourth level**



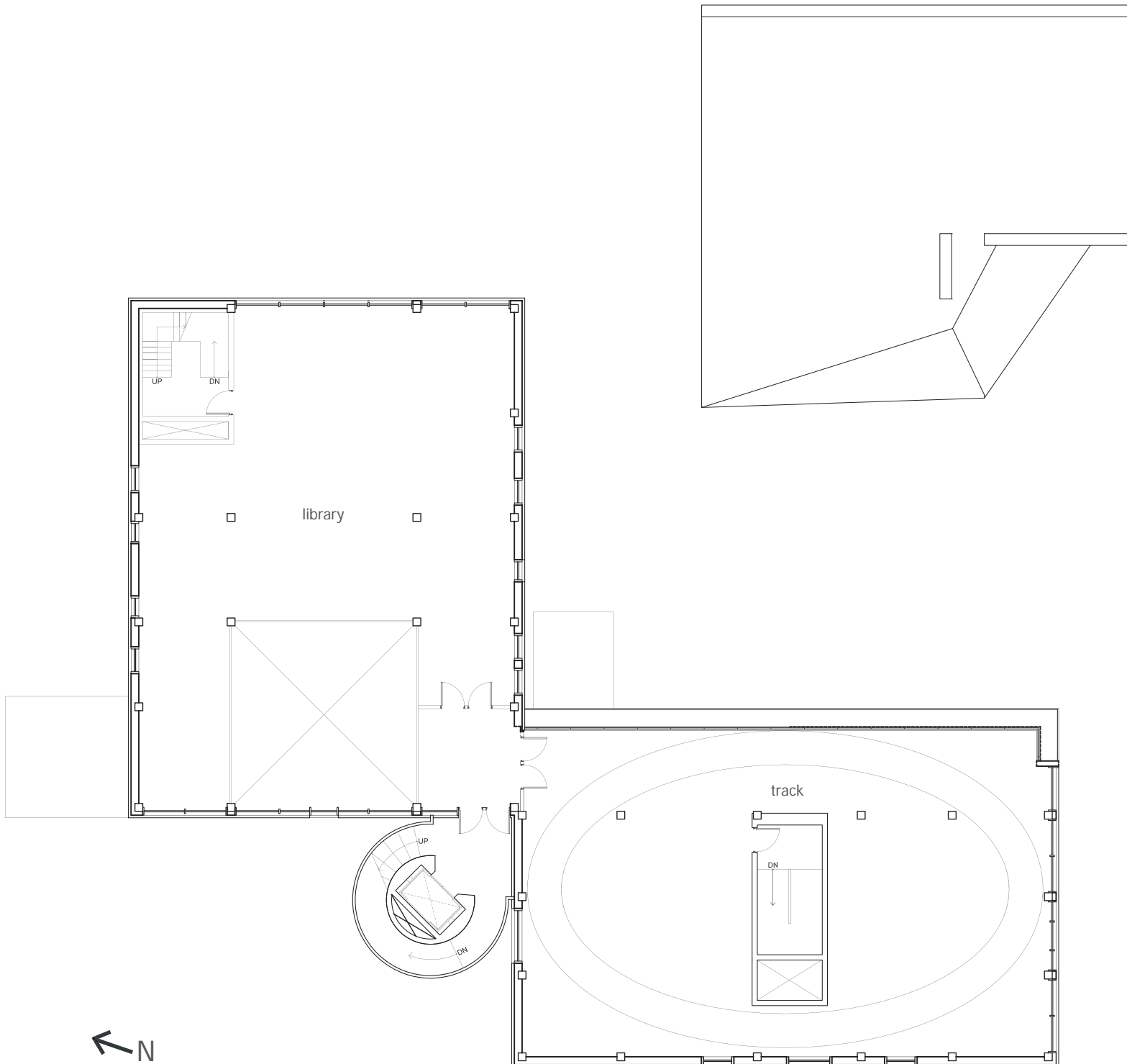


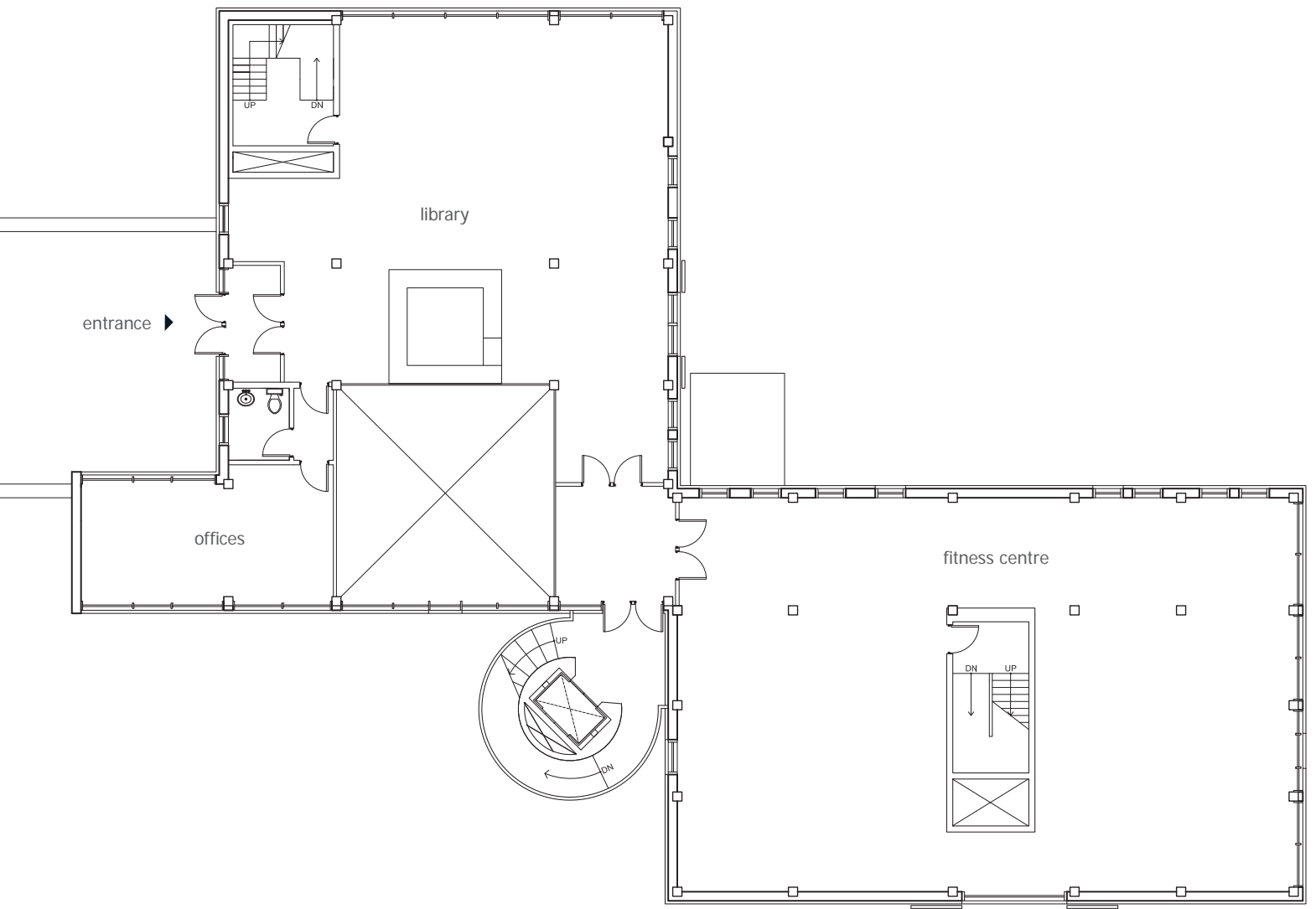
bottom (left)

fig. D.0.3 **plan - third level**

top (right)

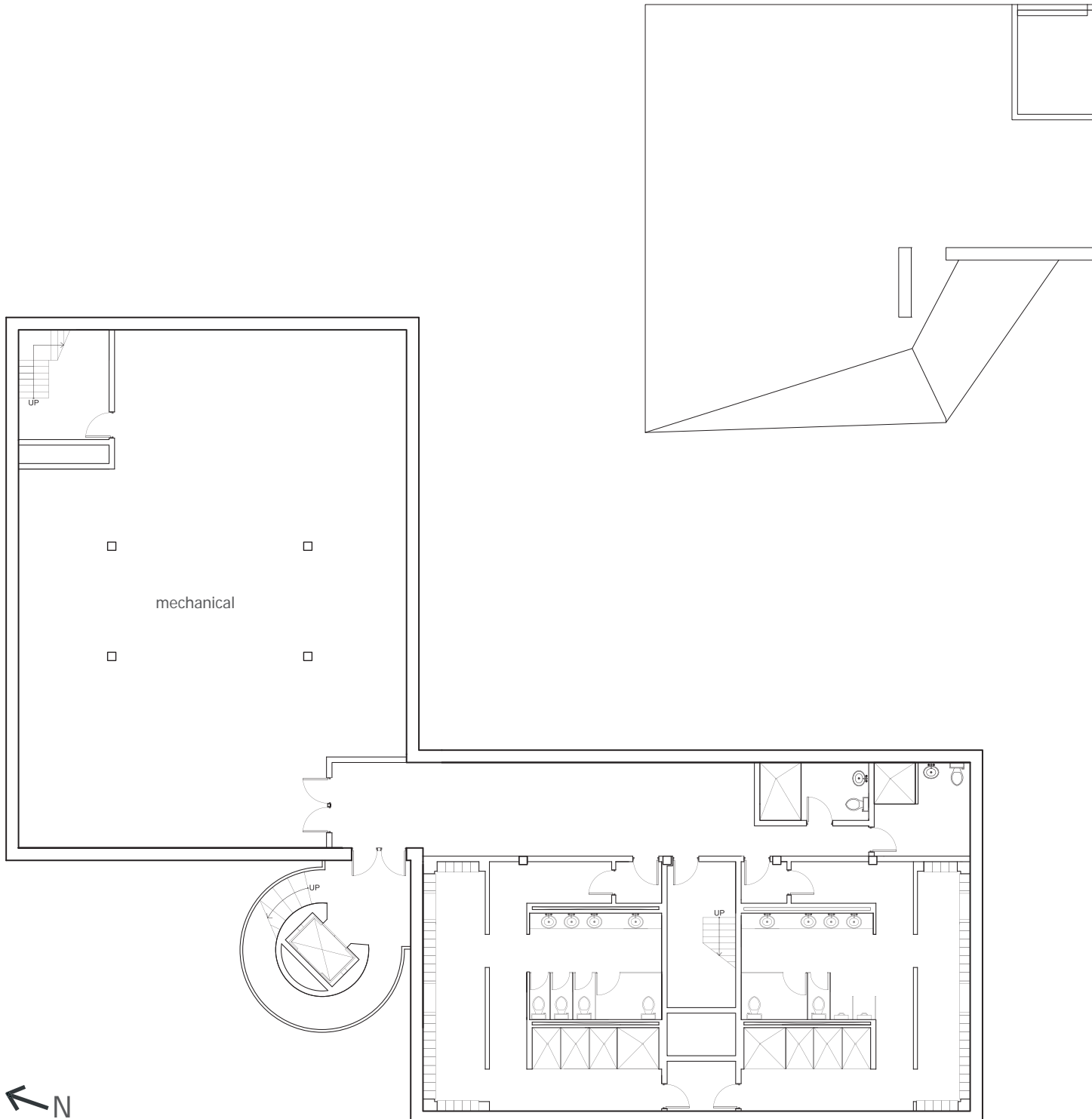
fig. D.0.4 **plan - second level**

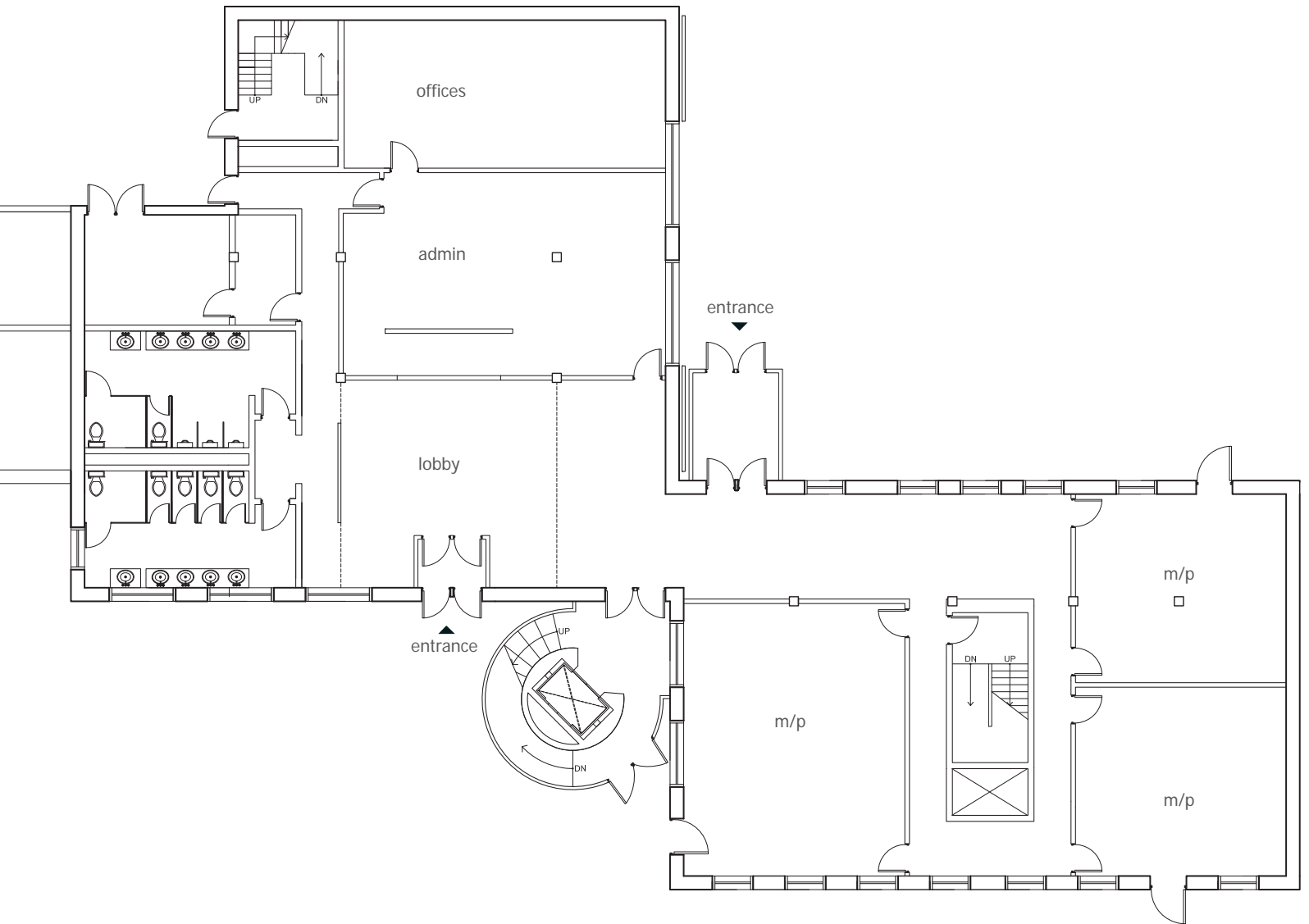




top (right)
fig. D.0.5 **plan - ground level**

bottom (left)
fig. D.0.6 **plan - lower level**



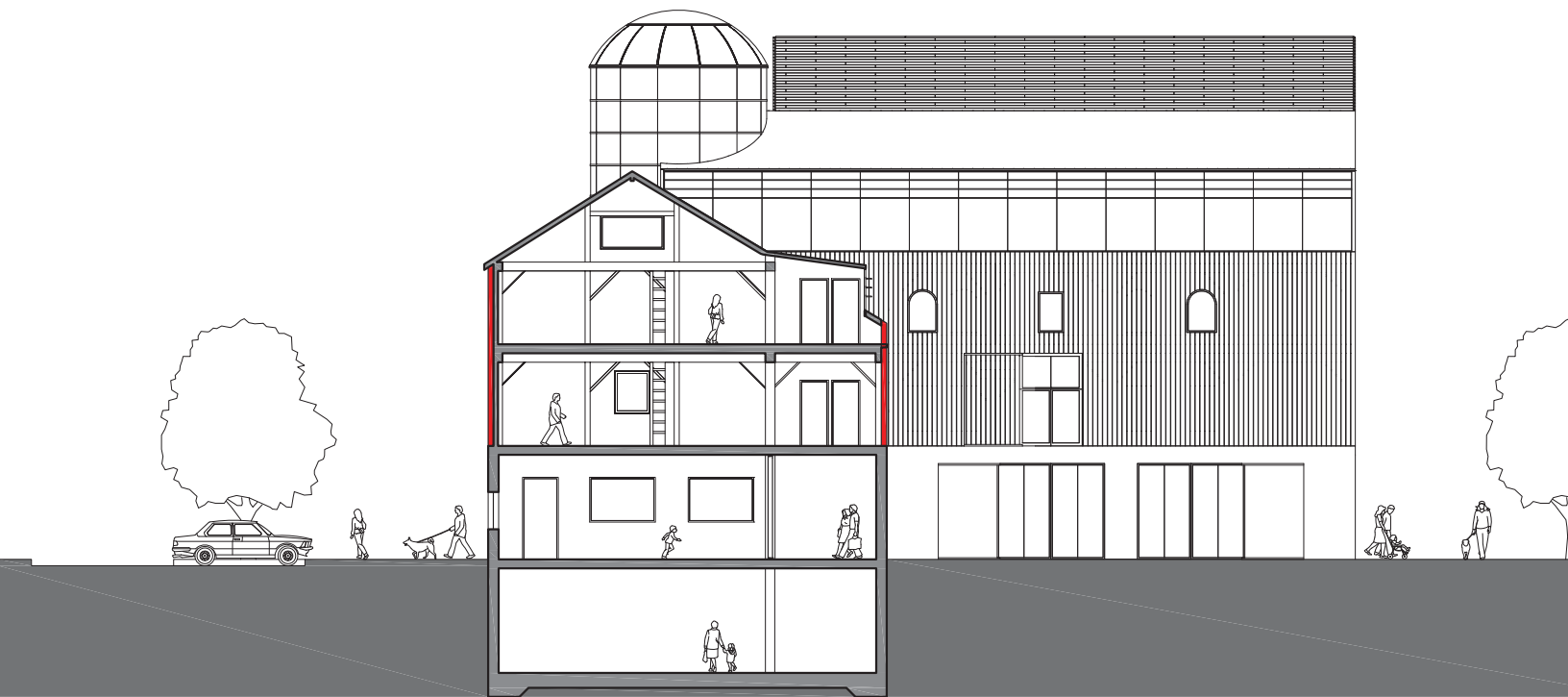
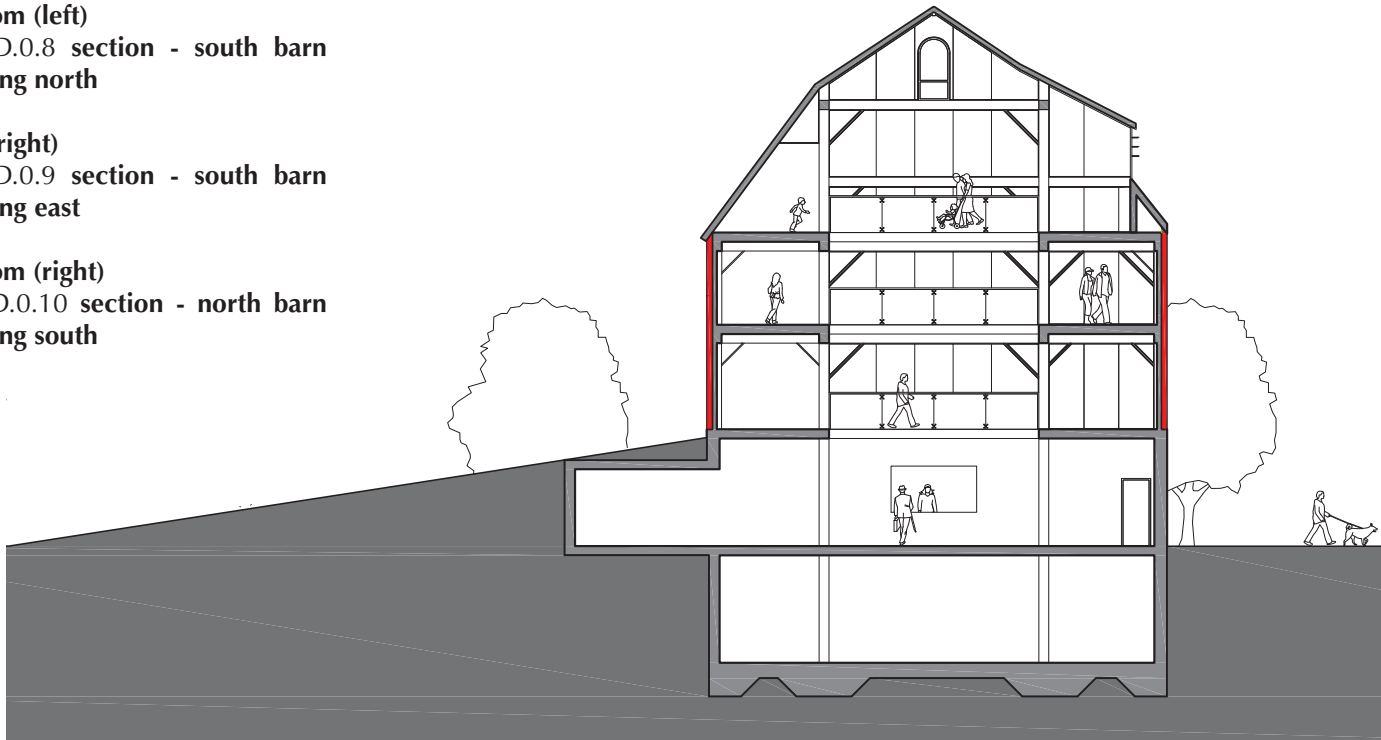


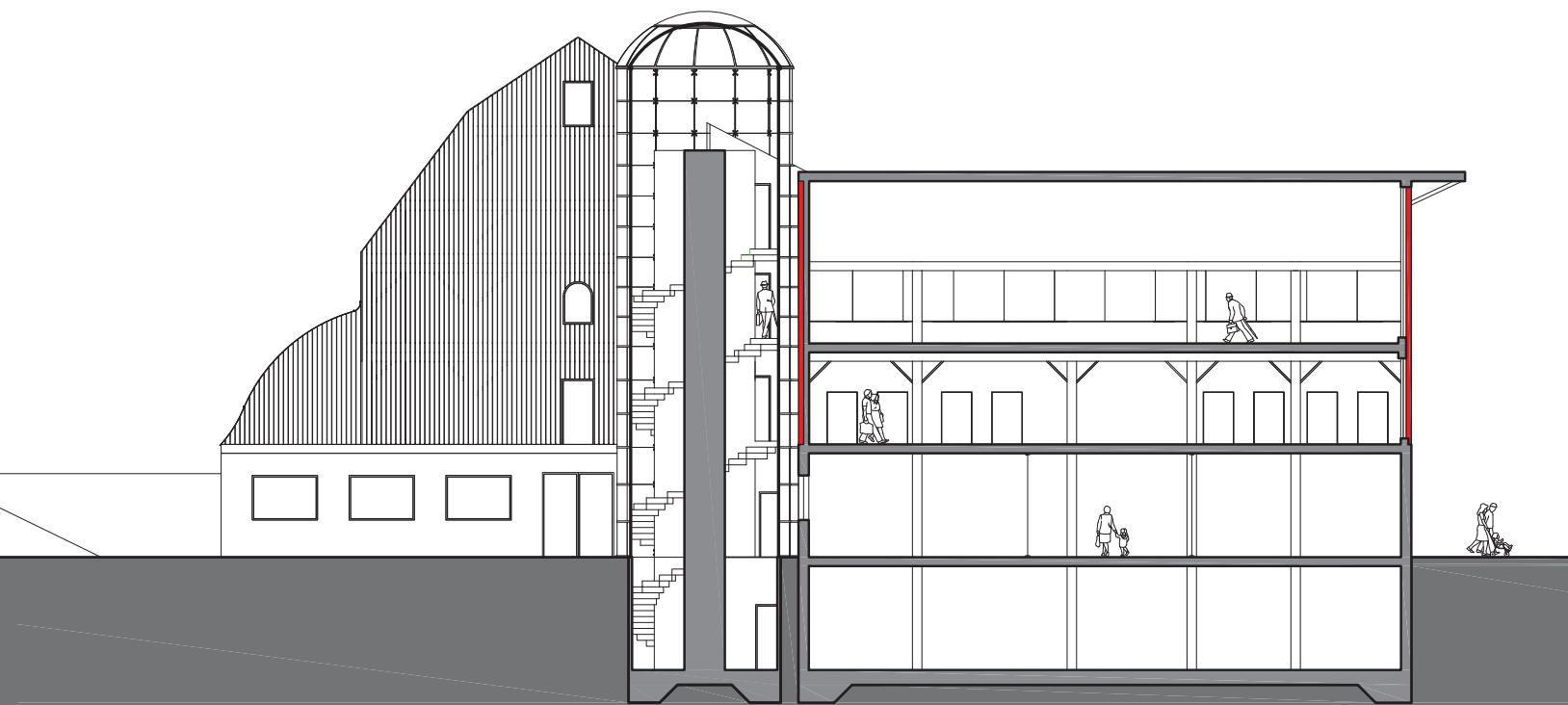
top (left)
fig. D.0.7 section - north barn
looking east

bottom (left)
fig. D.0.8 section - south barn
looking north

top (right)
fig. D.0.9 section - south barn
looking east

bottom (right)
fig. D.0.10 section - north barn
looking south





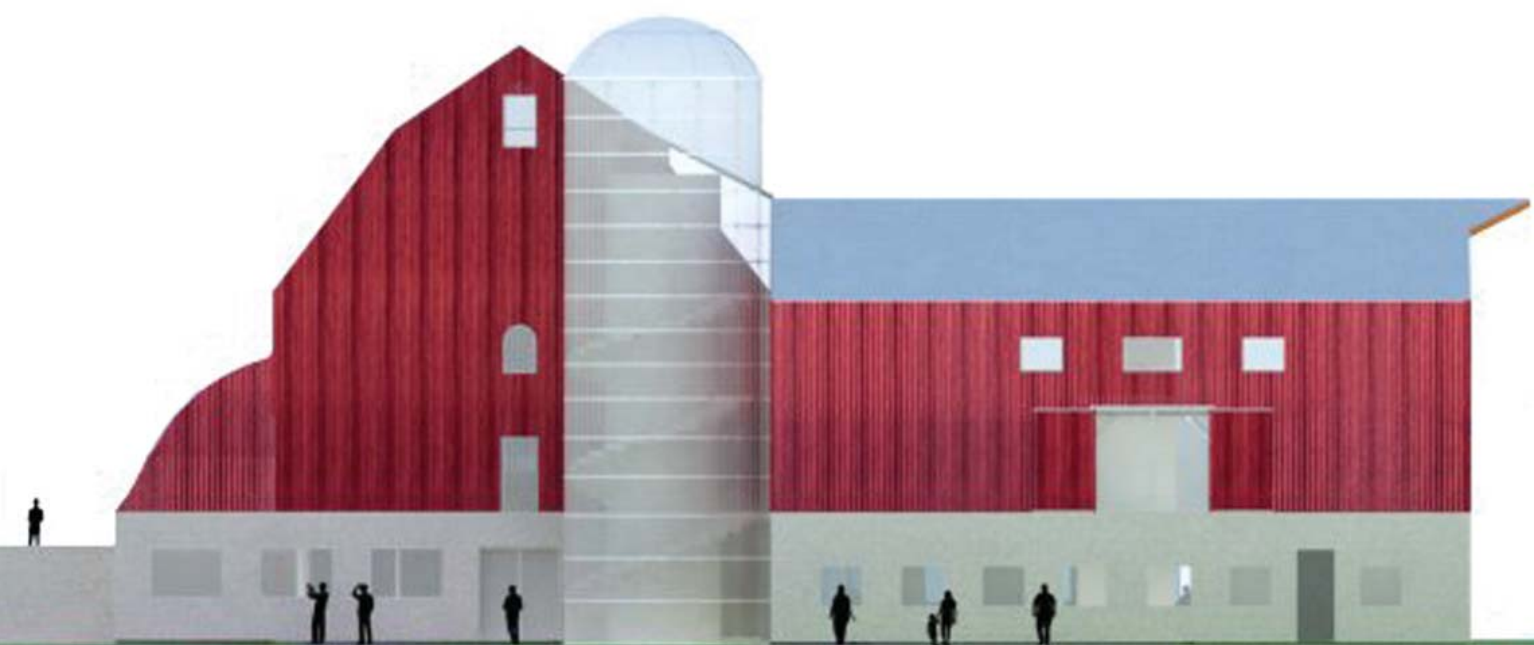
bottom (left)

fig. D.0.11 **north elevation**

bottom (right)

fig. D.0.12 **west elevation**





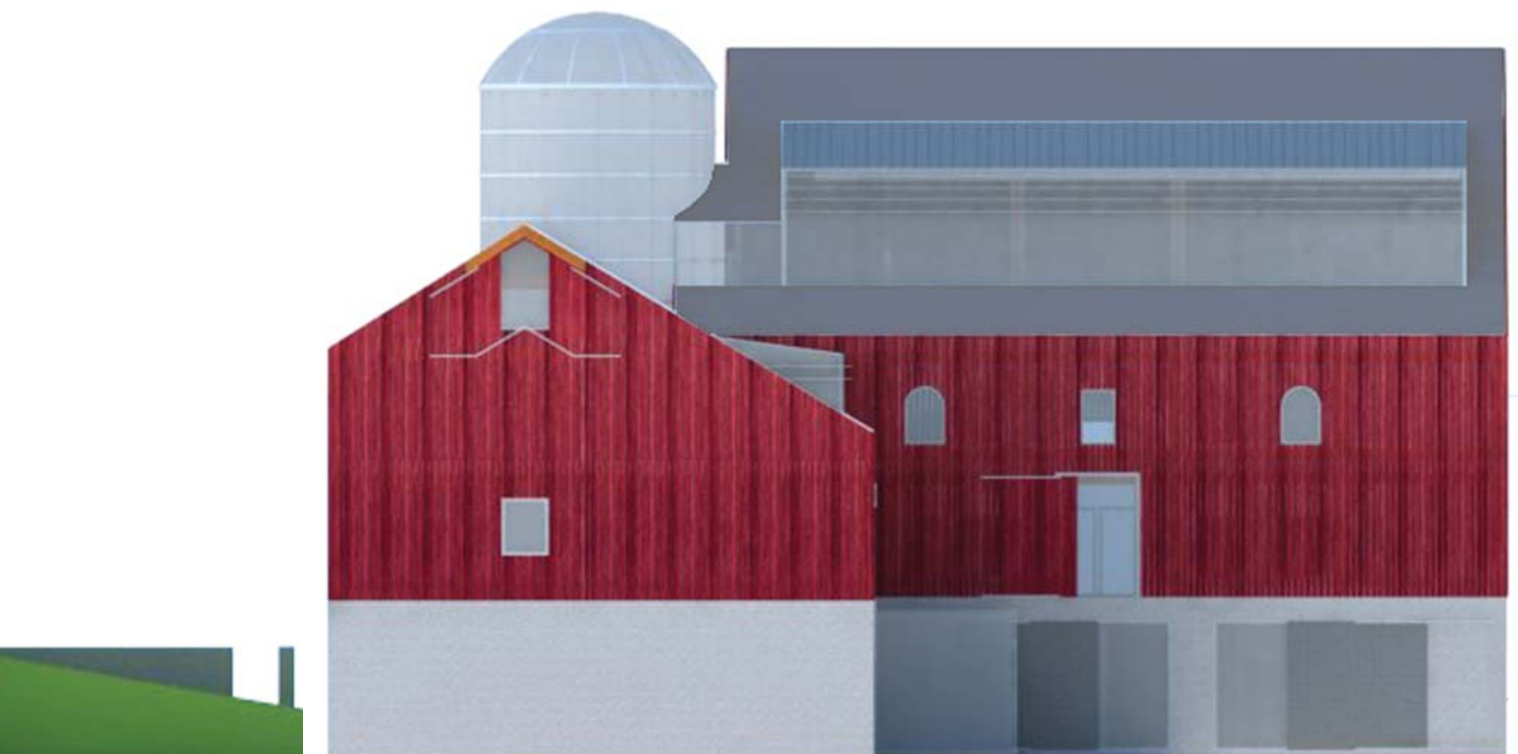
bottom (left)

fig. D.0.13 **east elevation**

bottom (right)

fig. D.0.14 **south elevation**



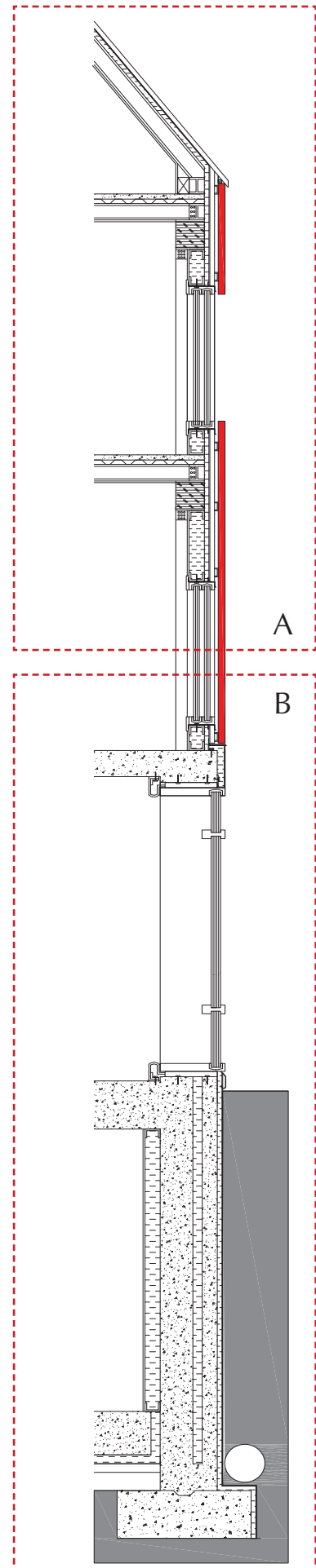
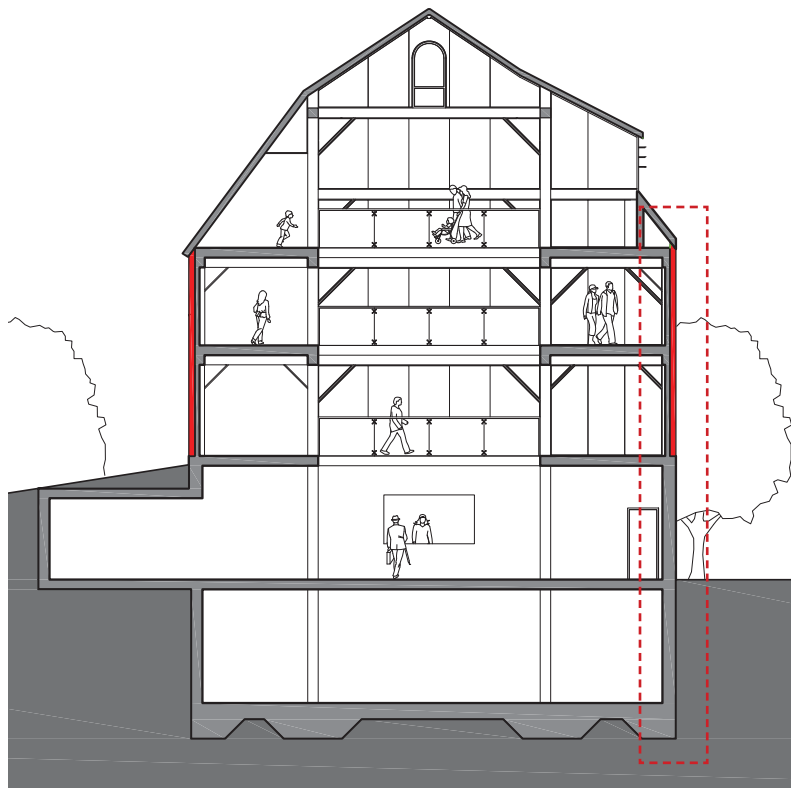


bottom (left)
fig. D.0.15 section - north barn
looking east

right
fig. D.0.16 wall section

opposite (left)
fig. D.0.17 wall section detail

opposite (right)
fig. D.0.18 wall section detail



A

Roof

Wood Finish	20mm
Vapour Barrier	
Steel Rafters	200mm
Rigid Insulation	100mm
Sheathing	20 mm
Building Paper	
Steel Roofing	20mm

Floor

Concrete	100mm
Metal Decking	50mm
Steel I Beams	200mm
Wood Beams with	310mm
Steel Boots and	
Steel Edging	150mm
Ceiling Finish	20mm

Operable Window to Exterior**Wall**

Interior Finish	20mm
Vapour Barrier	
Steel Studs with	165mm
Rigid Insulation	
Sheathing	20mm
Air Cavity	20mm
Exterior Metal	50mm
Cladding	
Brackets and Air	50mm
Cavity	
Barn Board Screen	75mm
(Shutters on Hinges)	

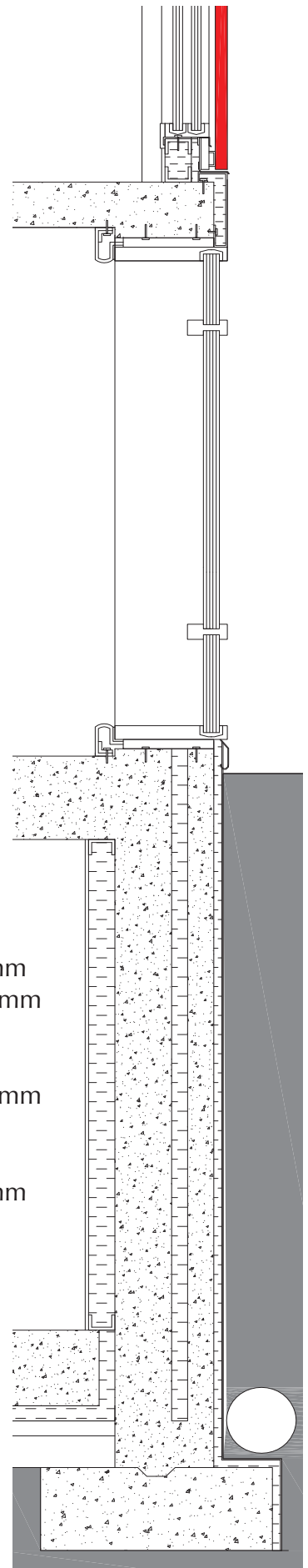
Operable Window to Screen**Foundation Wall**

Interior Finish	20mm
Steel Studs with	165mm
Rigid Insulation	
Vapour Barrier	
Concrete Wall	620mm
with Centred	
Rigid Insulation	
Rigid Insulation	50mm
Membrane	
Backfill	

Foundation Floor

Concrete Slab	500mm
Membrane	
Insulation	100mm
Sand	100mm
Gravel	200mm
Backfill	

B

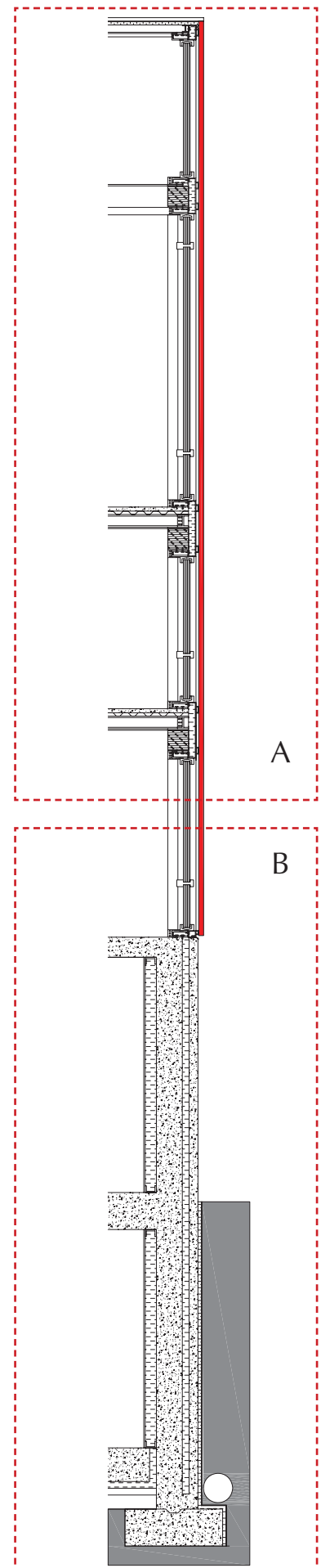


bottom (left)
fig. D.0.19 section - north barn
looking south

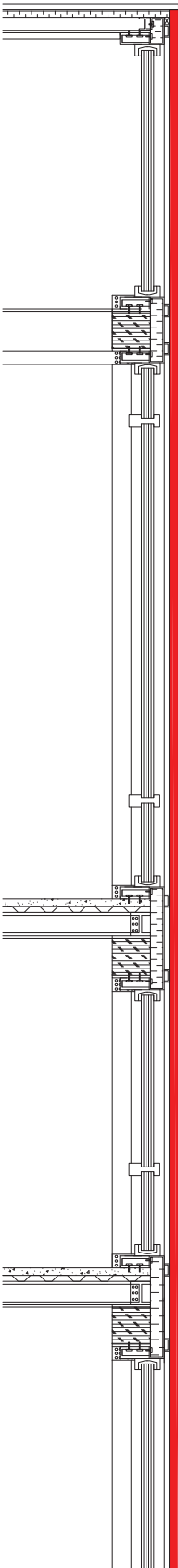
right
fig. D.0.20 wall section

opposite (left)
fig. D.0.21 wall section detail

opposite (right)
fig. D.0.22 wall section detail



A



Roof

Wood Finish	20mm
Vapour Barrier	
Steel Rafters	200mm
Rigid Insulation	100mm
Sheathing	20 mm
Building Paper	
Steel Roofing	20mm

Floor

Concrete	100mm
Metal Decking	50mm
Steel I Beams	200mm
Wood Beams with	310mm
Steel Boots and	
Steel Edging	150mm
Ceiling Finish	20mm

Window to Screen

Triple Pane Glass Units

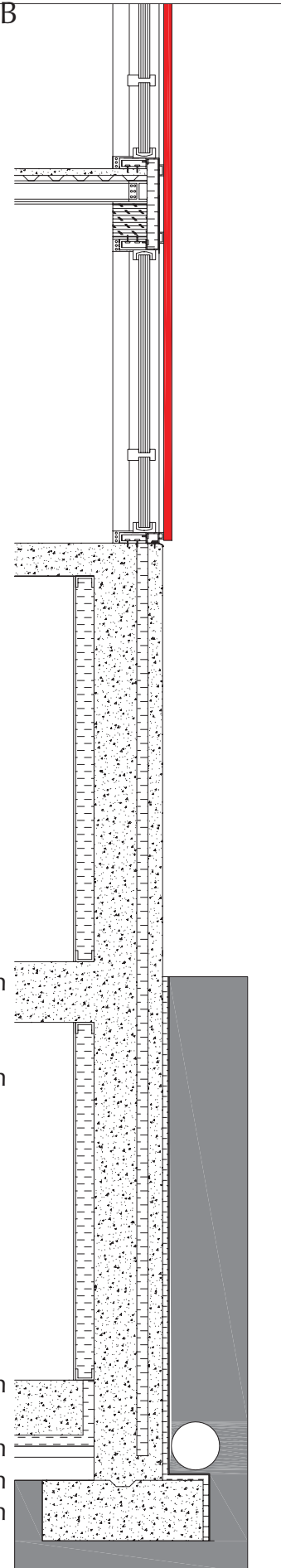
Foundation Wall

Interior Finish	20mm
Steel Studs with	165mm
Rigid Insulation	
Vapour Barrier	
Concrete Wall	620mm
with Centred	
Rigid Insulation	
Rigid Insulation	50mm
Membrane	
Backfill	

Foundation Floor

Concrete Slab	500mm
Membrane	
Insulation	100mm
Sand	100mm
Gravel	200mm
Backfill	

B



top

fig. D.0.23 **section - north barn
looking south**

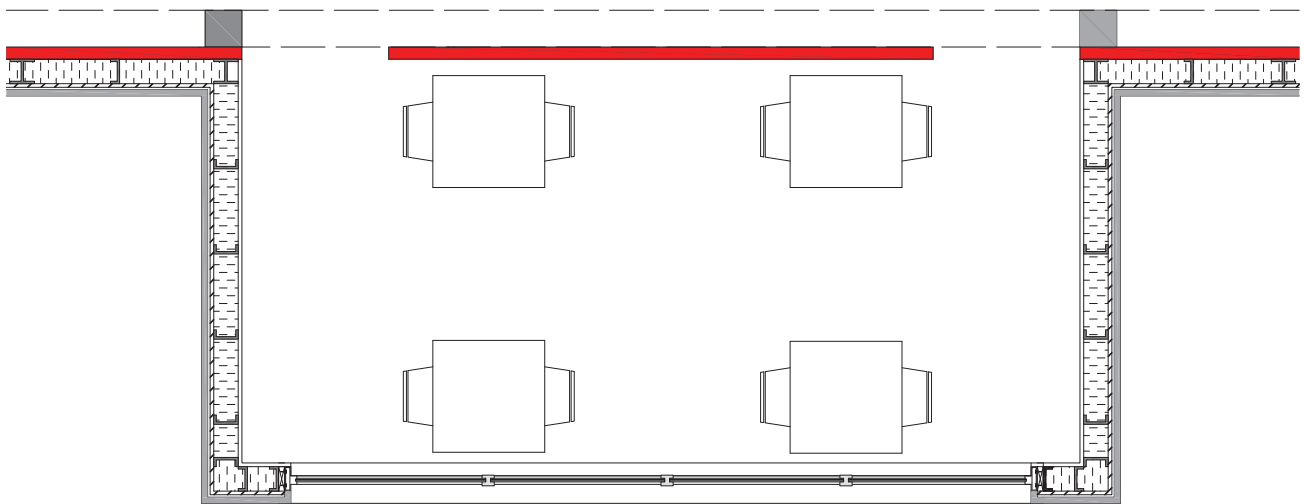
bottom

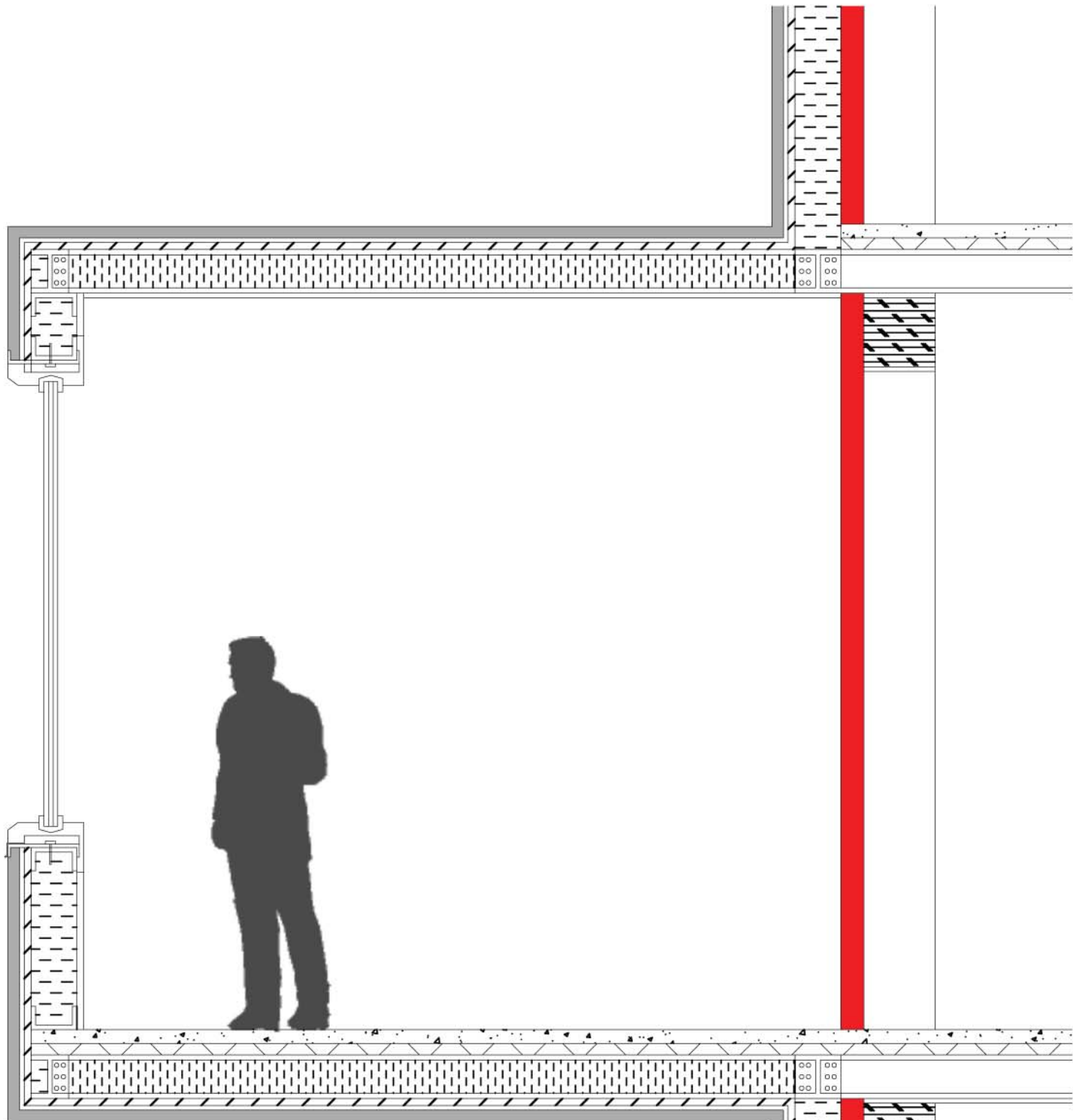
fig. D.0.24 **plan - study area**

opposite

fig. D.0.25 **wall section - study
area**

The plan and section investigated an alternative approach to the barn board screen. In this investigation the barn boards became the interior finish. The experience of the barn boards was enhanced with their use as a screen in this contemporary pop out.





Floor

Concrete	100mm
Metal Decking	50mm
Vapour Barrier	
Steel I Beams with	
Rigid Insulation	200mm
Sheathing	30mm
Building Paper	
Air Cavity	20mm
Metal Cladding	50mm

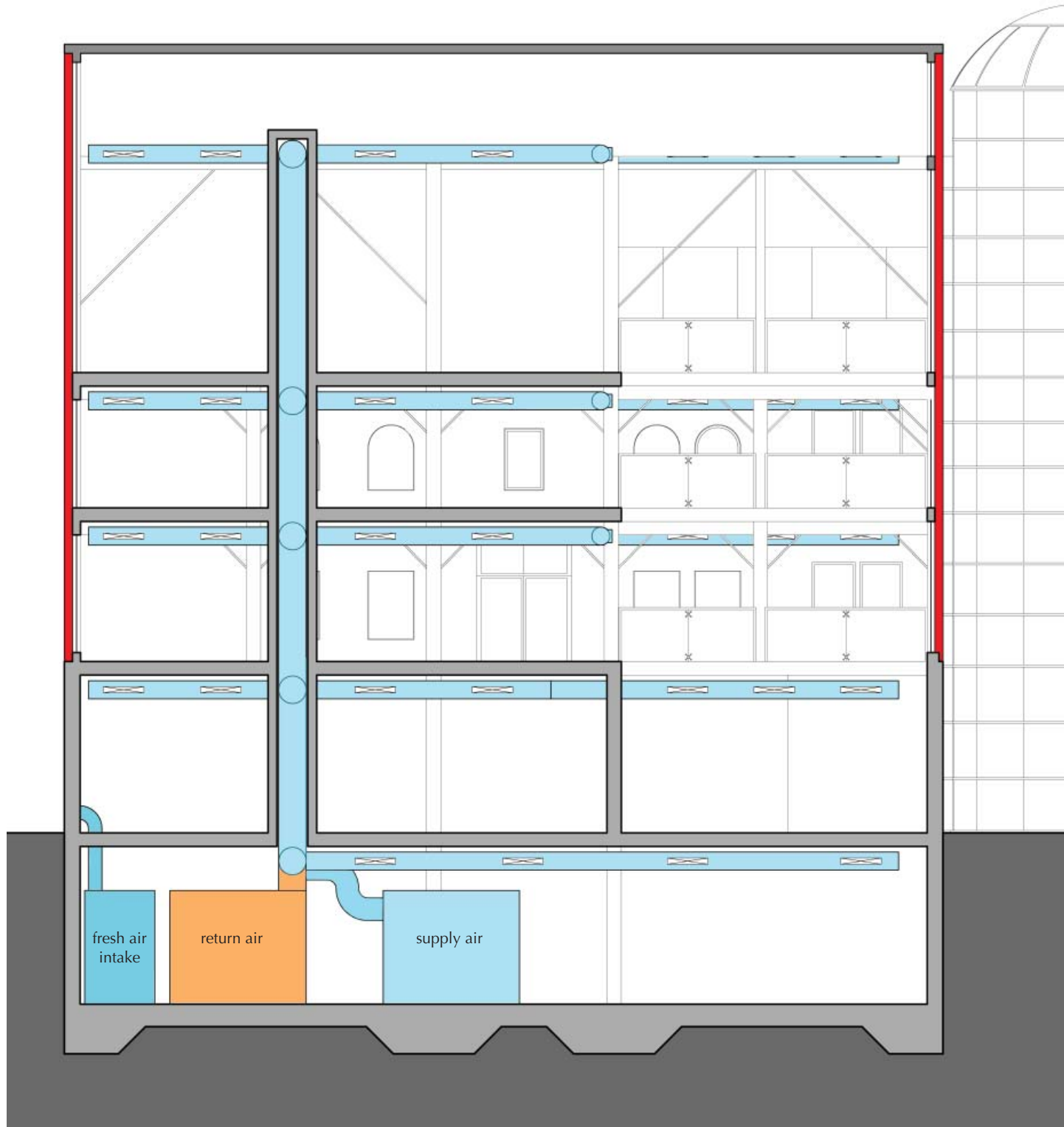
Exterior Wall

Metal Cladding	50mm
Air Cavity	20mm
Building Paper	
Sheathing	30mm
Steel I Beams with Rigid	200mm
Insulation	
Vapour Barrier	
Interior Finish	100mm
Barn Boards	
Aesthetic Structure	310mm
Wood Columns and Beams	

fig. E.0.0 (opposite)

mechanical
appendix e





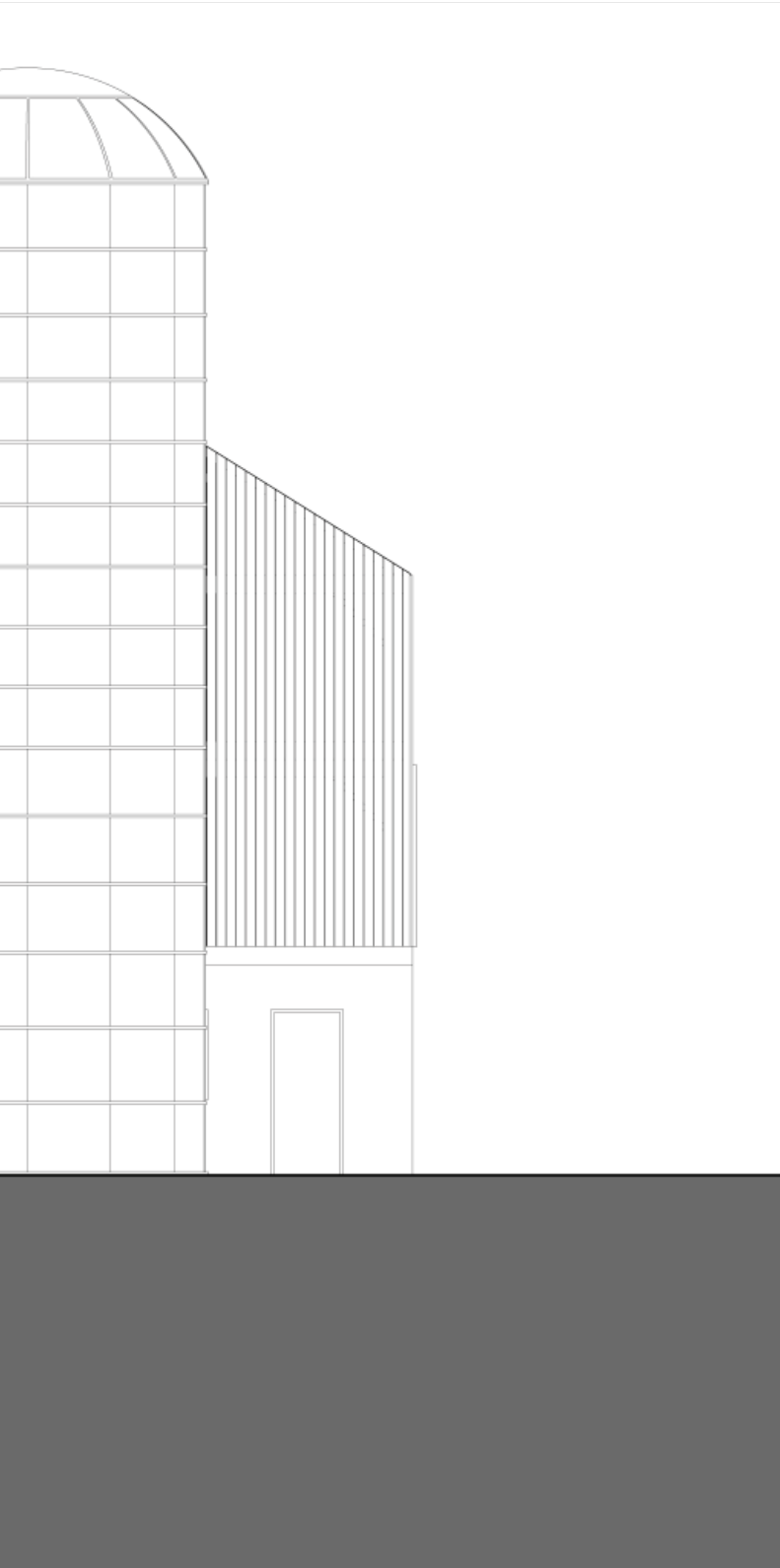
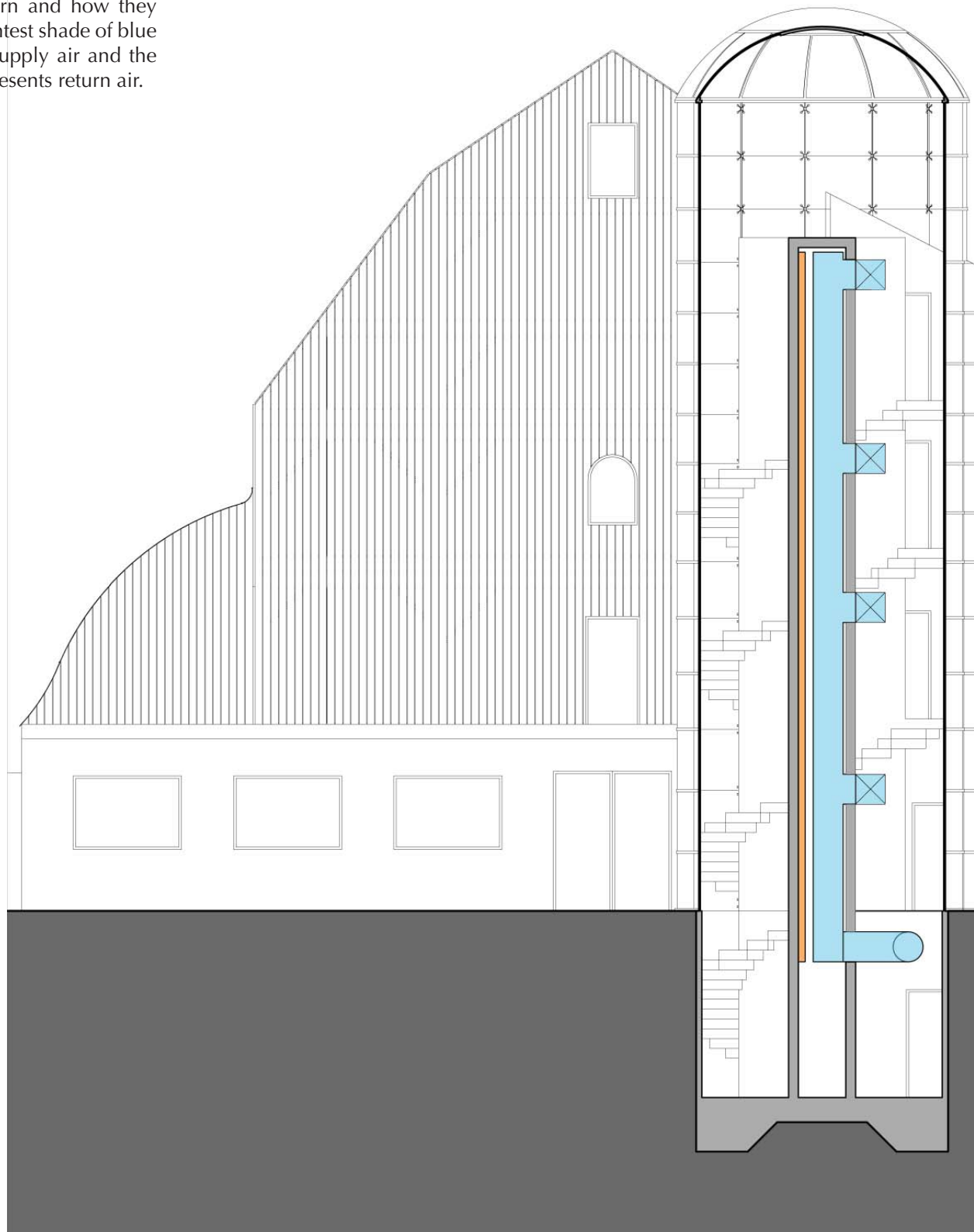


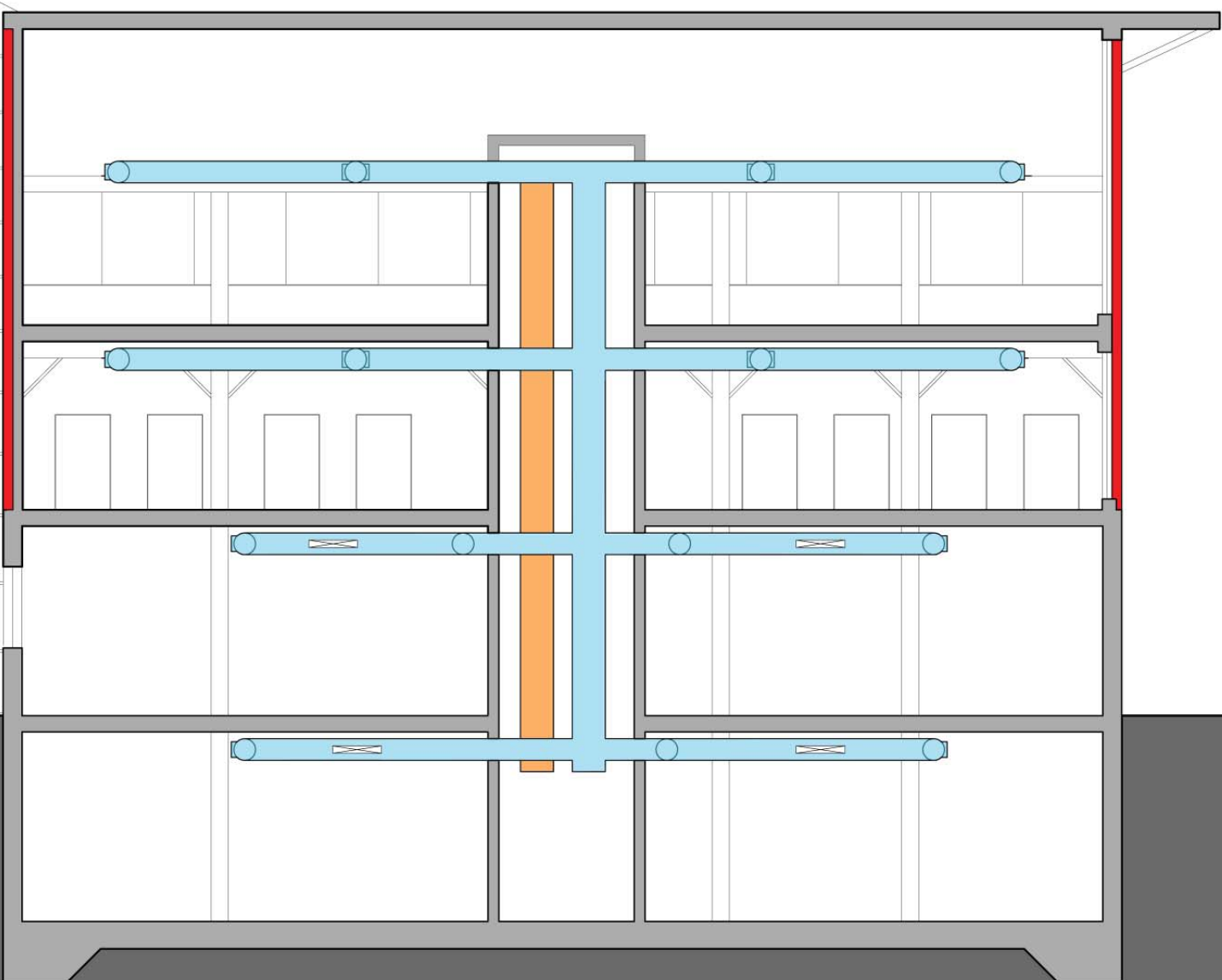
fig. E.0.1 **mechanical section - north barn**

This section illustrates the location of mechanical systems in the north barn and how they interact. The lightest shade of blue represents the supply air, the orange, return air and the darkest shade of blue, the fresh air intake.

fig. E.0.2 **mechanical section - south barn**

This section illustrates the location of mechanical systems in the south barn and how they interact. The lightest shade of blue represents the supply air and the orange, represents return air.





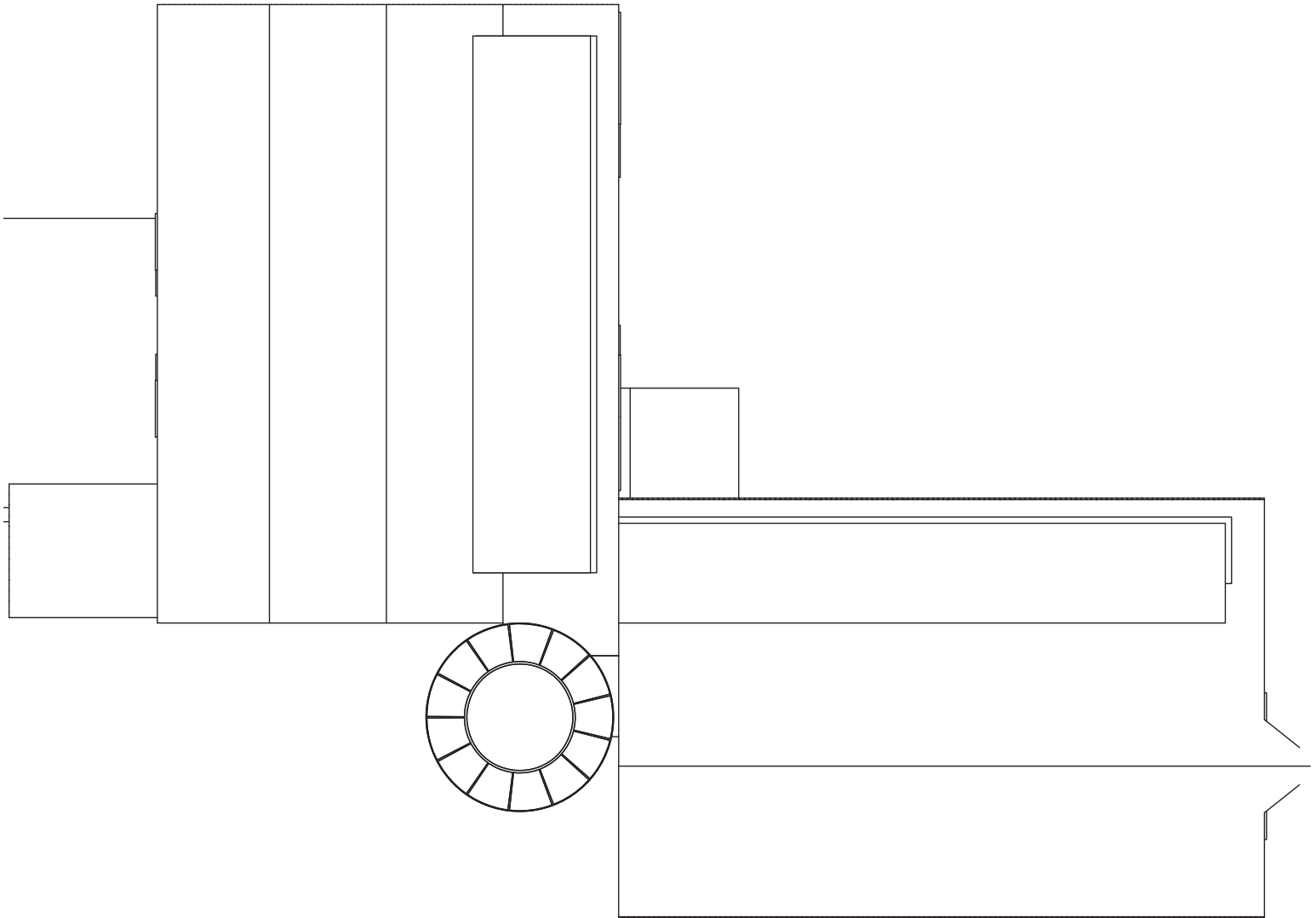
bottom (left)

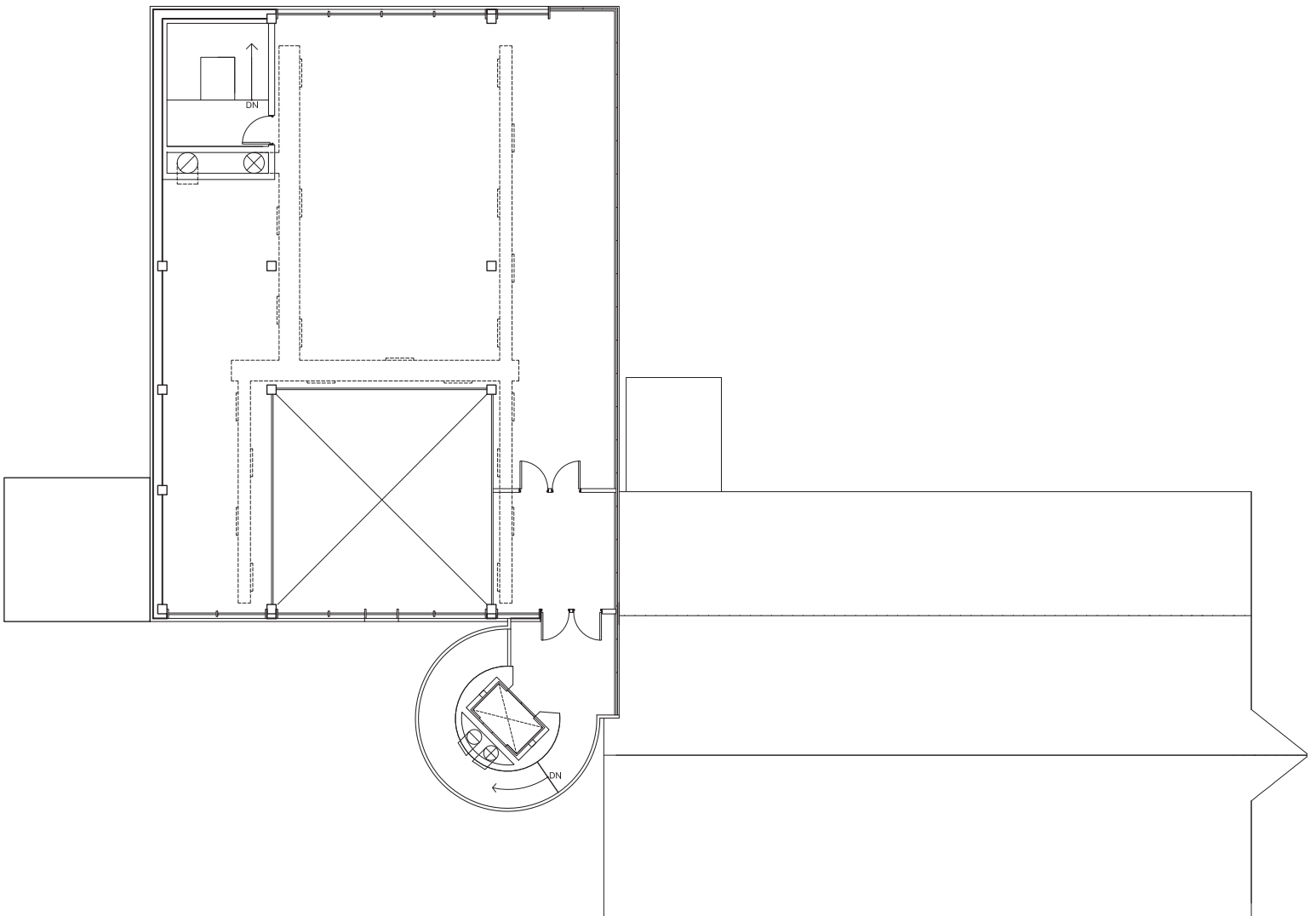
fig. E.0.3 **mechanical plan - roof**

bottom (right)

fig. E.0.4 **mechanical plan - fourth level**

These plans illustrate the location of ducts on each level. The dotted lines represent the ducts above.





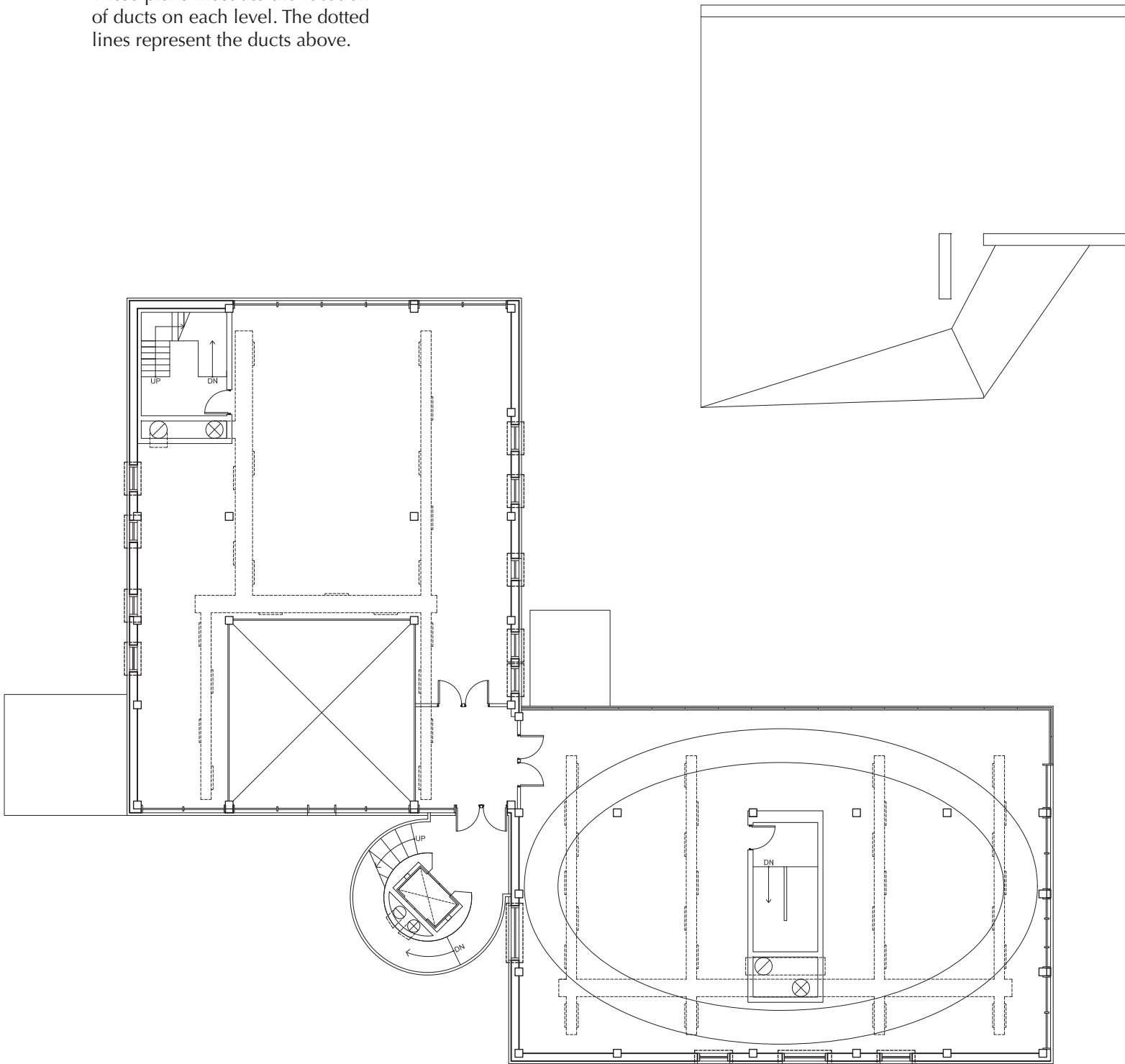
bottom (left)

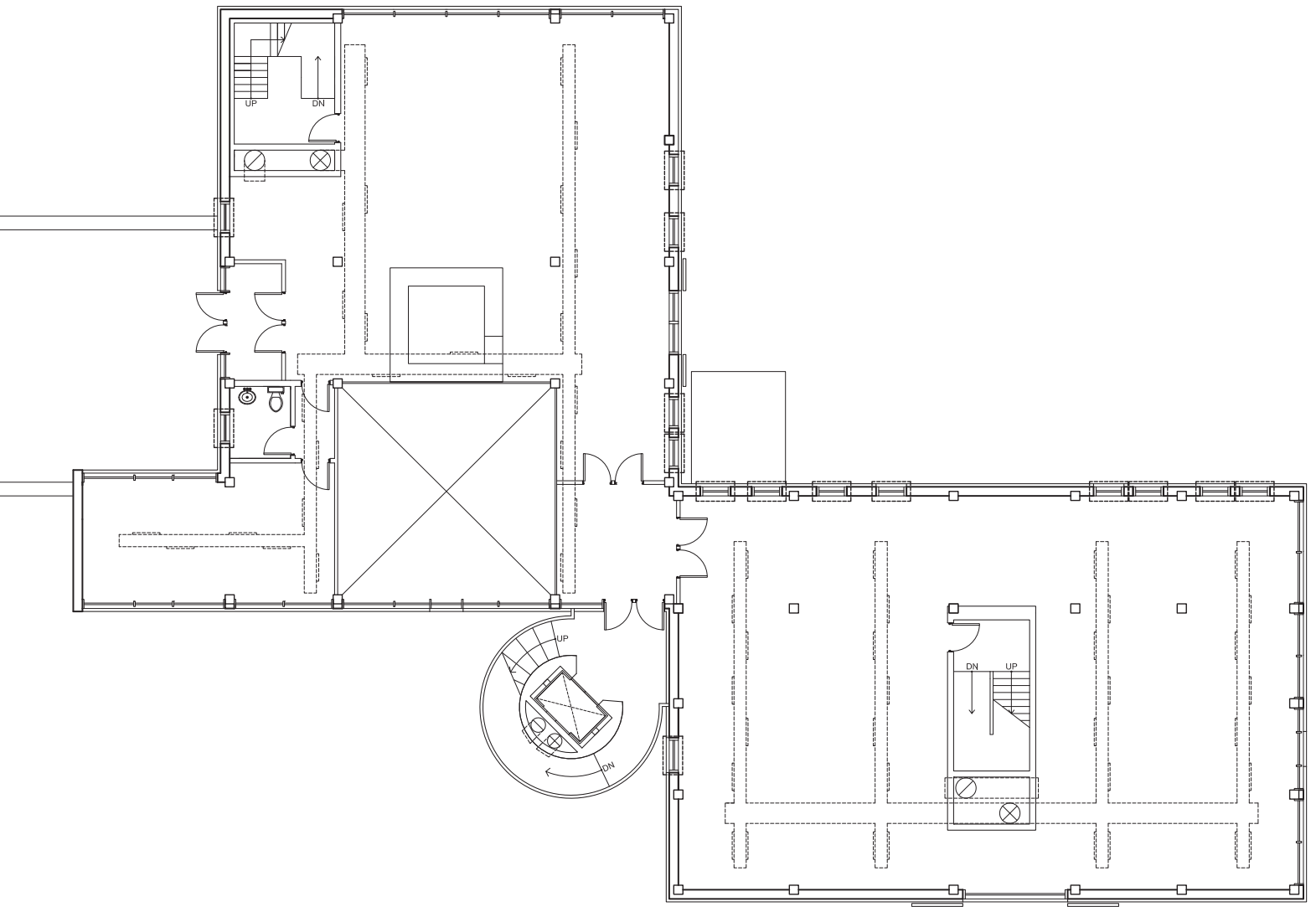
fig. E.0.5 mechanical plan - third level

top (right)

fig. E.0.6 mechanical plan - second level

These plans illustrate the location of ducts on each level. The dotted lines represent the ducts above.





top (right)
fig. E.0.7 **mechanical plan -**
ground level

bottom (left)

These plans illustrate the location of ducts on each level. The dotted lines represent the ducts above.



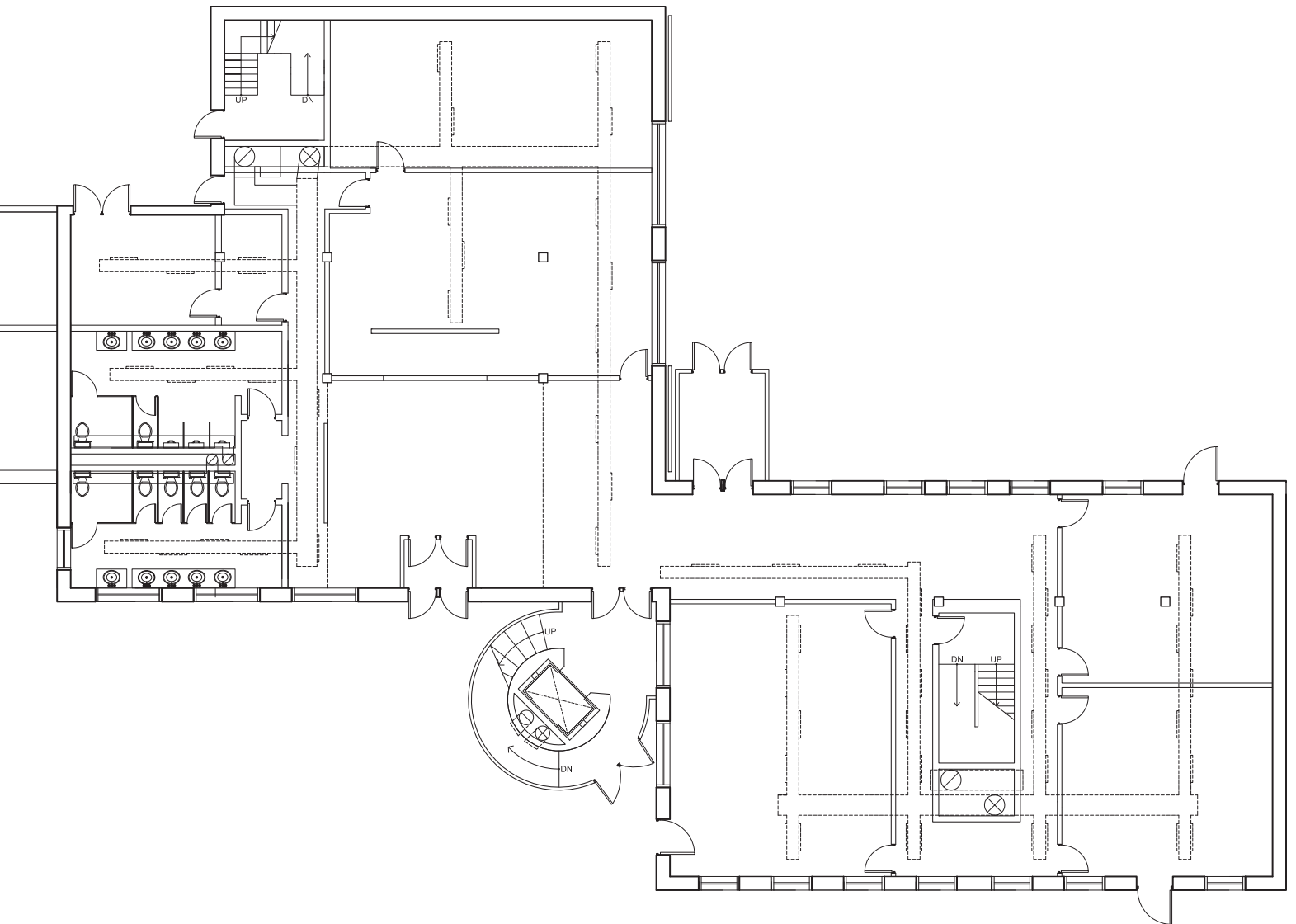


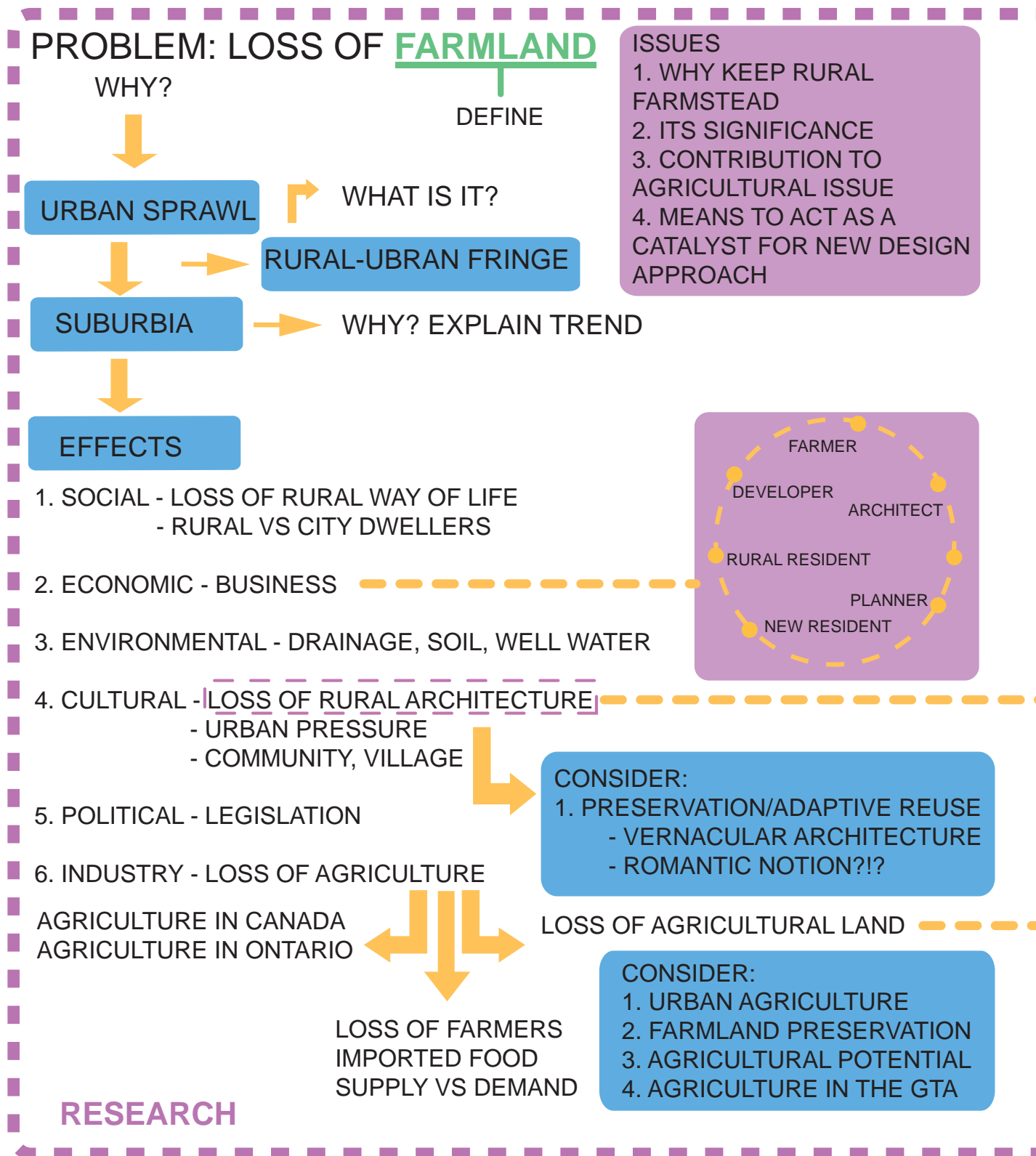
fig. F.0.0 (opposite)

mind map

appendix f



fig. F.0.1 mind map



CASE STUDIES:

1. PORTLAND, OREGON
2. WATERLOO, ONTARIO
3. GARDEN CITY
4. SUBURBAN DEVELOPMENT
5. VILLAGE CENTRE CONCEPT
6. NEW URBANSIM
7. PRAIRIE CROSSING
8. TROY GARDENS
9. HALEY BARN
10. SLAYMAKER BARN
11. CRUSER BARN
12. MORITZBURG MUSEUM
13. PIZ TSCHUTTA
14. SELEXYZ DOMINICAN STORE
15. CLUSTERED VERSUS
SCATTERED DESIGN

CONSIDER:

1. RURAL ARCHITECTURE: THE FARMHOUSE, THE BARN

DESIGN
ADDRESSES

1. LOSS OF RURAL ARCHITECTURE
2. MAINTAINING RURAL HERITAGE
3. COMMUNITY/VILLAGE NODE
4. FARMLAND PRESERVATION
5. CONVENTIONAL DEVELOPMENT
6. URBAN GROWTH
7. TRANSITION BETWEEN RURAL
AND URBAN

DESIGN RESPONSE:

FOCUS: RURAL ARCHITECTURE

ADAPTIVE REUSE OF BARN,
SITE DEVELOPMENT WILL
ADDRESS #1 AND #2

DESIGN RESPONSE IN
CONCEPT:

#3, #4, #5, #6 AND #7 WILL BE
EXPLORED IN CONCEPT

WHY IS THIS A THESIS?

SIGNIFICANT AND CURRENT
ISSUE AND DEMONSTRATING
ARCHITECTURAL ROLE WITHIN
IT BUT TAKING A REALISTIC
APPROACH

fig. B.B.1 (opposite)

bibliography



bibliography

- AAFC. (2008). *An Overview of the Canadian Agricultural and Agri-Food System*. Retrieved Nov. 1, 2010 from www4.agr.gc.ca/AAFC_AAc/display_afficjer.do?id=1228246364385&lang=eng.
- Agricultural Adaptation Council. (2002). *The Odyssey Report: An Industry Quest for Solution*. Ontario: Ministry of Agriculture and Food.
- Agriculture and Agri-food Canada. (2009). *An Overview of the Canadian Agriculture and Agri-food System*. Ottawa: Government of Canada.
- Agriculture and Agri-food Canada. (2010). Retrieved Oct 24, 2010 from www.agr.gc.ca.
- Alterman, R. (1997). *The Challenge of Farmland Preservation - Lessons from a Six-Nation Comparison*. Journal of the American Planning Association. 63(2), 221-237
- American Farmland Trust. (2003). *Why Save Farmland? Farmland Information Centre*. Retrieved Oct. 14, 2010 from www.farmlandinfo.org.
- Arthur E. & Witney, D. (1972). *The Barn: A Vanishing Landmark in North America*. Toronto, Ontario: McClelland and Stewart.
- Baillie, S., May, A., & Schmelzer, I. (1989). *Bolton*. Erin, Ontario: The Boston Mills Press.
- Beesley, K.B. (Ed.). (1991). *Rural and Urban Fringe Studies in Canada*. North York, Ontario: Department of Geography, Atkinson College, York University.
- Beesley, K.B. & Cocklin C. (1982). *Perspectives on the Rural-Urban Fringe*. Ontario: University of Guelph.
- Beesley, K.B. & Russwurm, L.H. (Ed.). (1981). *The Rural-Urban Fringe: Canadian Perspectives*. Toronto, Ontario: York University, Atkinson College.
- Berry, D. (1978). *Effects of Urbanization on Agriculture Activities*. Growth and Change, 9(3), 2-8.
- Bowers, D. & Daniels, T. (1997). *Holding Our Ground: Protecting America's Farms and Farmland*. Washington, D.C.: Island Press.
- Brand, S. (1997). *How Buildings Learn: What Happens After They're Built*. London, UK: Phoenix Illustrated.
- Bryant, C.R. (1992). *Agriculture in the City's Countryside*. Toronto, Ontario: University of Toronto Press.
- Bunce, M. (1982). *Rural Settlement in an Urban World*. London: Croom Helm, Ltd.
- Bunce, M. (1998). *Thirty Years of Farmland Preservation in North America: Discourses and Ideologies of a Movement*. Journal of Rural Studies. 14(2) p.223-247.

- Caldwell, W.J., & Dodds-Weir, C. (2003). *Farmland Preservation: An Assessment of the Impact of Rural Non-Farm Development on the Viability of Ontario's Agricultural Industry - Literature Review*. Guelph: School of Rural Planning and Development.
- Caldwell, W., Hilts, S. & Wilton, B. (2007). Chapter 4: Farmland Preservation in Ontario. In W. Caldwell, S. Hilts, & B. Wilton (Eds.). *Farmland Preservation: Land for Future Generations* (p. 87-113). Kitchener, Ontario: Volumes Publishing
- Caldwell, W.J. & Weir, C. (2002). *Ontario's Countryside: A Resource to Preserve or an Urban Area in Waiting?*. Guelph: University of Guelph, School of Rural Planning and Development
- Carlson, A.W. (1978). *Designating Historic Rural Areas: A Survey of Northwestern Ohio Barns*. *Landscape*, 22(3), 29-33.
- Cheng, R., & Lee, P. (2008). *Urban Sprawl and Other Major Land Use Conversion in Ontario's Greenbelt from 1996 to 2007: A Change Analysis Project Using Satellite Imagery*. Report to the David Suzuki Foundation and the Greenbelt Foundation. Edmonton, Alberta: Global Forest Watch Canada.
- Dandekar, H.C. & MacDonald, E.A. (1995). Preserving the Midwestern Barn. In A.G. Noble & H.G. Willhelm (Eds.), *Barns of the Midwest*. (p. 259-275). Athens, Ohio: Ohio University Press.
- Daniels, T.L. (1999). *When City and Country Collide: Managing Growth in the Metropolitan Fringe*. Washington, D.C.: Island Press.
- Demographic Profile of the Greater Toronto Area 1986-2006*. (2009). Canada: Statistics Canada.
- Douglas, J. (2006). *Building Adaptation*. Oxford, UK: Butterworth-Heinemann.
- Edgens, J. & Stanley, S. (1999). *The Myth of Farmland Loss*. *Forum for Applied Research and Public Policy*. 14(3), 29-54.
- Endersby, E., Greenwood, A., & Larkin, D. (2003). *Barn: Preservation and Adaptation: the Evolution of a Vernacular Icon*. New York: Rizzoli International Publications, Inc.
- Flashforward: Projecting Population and Employment to 2031 in a Mature Urban Area*. (2006). Toronto Official City Plan. Toronto: Urban Development Services.
- Feireiss, L. & Klanten, R. (Eds.) (2009). *Build-On Converted Architecture and Transformed Buildings*. Berlin: Gestalten.
- Haas, T. (Eds.). (2008). *New Urbanism and Beyond: Designing Cities for the Future*. New York: Rizzoli International Publications, Inc.
- Hodge, G. (1989). *Planning Canadian Communities*. Scarborough, Ontario: Nelson Canada.
- Hofmann, N. (2001). *Urban Consumption of Agricultural Land*. *Rural and Small Town Canada Analysis Bulletin*. 3(2), 1-13.

- Howard, R. W. (1985). *The Vanishing Land*. New York: Ballantine Books.
- Howe, N.S. (1996). *Barns*. New York: Metro Books.
- Fulton, W. (1996). *The New Urbanism, Challenges of Conventional Planning*. *Landlines*. 8(5).
- Filoso, G., Hofman, N., & Schofield, M. (2005). *The Loss of Dependable Agricultural Land in Canada*. *Rural and Small Town Canada Analysis Bulletin*. 6(1), 1-16.
- Fuller, T. (1985). *Farming and the Rural Community in Ontario: An Introduction*. Toronto, Ontario: Foundation for Rural Living.
- Furuseth, O.J. & Lapping, M.B. (Eds.). (1999). *Contested Countryside: The RuralUrban Fringe in North America*. Brookfield, VT: Ashgate.
- Furuseth, O.J. & Pierce. (1982). *Agricultural Land in an Urban Society*. Washington, D.C.: A.A.G.
- Greater Toronto Agricultural Action Plan*. (2005). Greater Toronto Area Agricultural Action Committee. Retrieved October 26 from www.gttaa.ca.
- Greenbelt Plan*, (2005). Government of Ontario: Ministry of Municipal Affairs and Housing. Order-in-Council No. 208/2005.
- Growth Plan for the Greater Golden Horseshoe*. (2006). Government of Ontario: Ministry of Infrastructure. Retrieved July 8, 2011 from www.placestogrow.ca.
- Katz, P. (1994). *The New Urbanism: Towards an Architecture of Community*. New York: McGraw Hill, Inc.
- Keehan, E. (2011). *Building Up Instead of Out: The Rise of the Vertical Farm*. Retrieved June 22, 2011 from www.thegridto.com.
- Keller, G.P. & Keller, J.T. & Stokes, S.N. & Watson, A.E. (1989). *Saving America's Countryside: A Guide to Rural Conservation*. Baltimore: The John Hopkins University Press.
- Kelso, R. & Rabun, J.S. (2009). *Building Evaluation for Adaptive Reuse and Preservation*. Hoboken, New Jersey: John Wiley & Sons, Inc.
- Kirley, K. Ranney, V. & Sands, M. (2010). *Buliding Communities with Farms*. Grayslake, Illinois: The Liberty Prairie Foundation.
- Larson, J.R. (2006). *The Farmhouse: New Inspiration for the Classic American Home*. Newtown, CT: The Taunton Press.
- Lewis, S. & Littlefield, D. (2007). *Architectural Voices, Listening to Old Buildings*. Great Britain: Wiley-Academy.
- Lynch, K. (1972). *What Time Is This Place?*. Cambridge, Massachusetts: The MIT Press.
- McCuaig, J.D. & Manning, E.W. (1982). *Agricultural Land-Use Change in Canada: Process and Consequences*. Ottawa: Environment Canada.
- McMinn, J. & Polo, M. (2005-2006). *41° to 66° Regional Responses to Sustainable Architecture in Canada*. Cambridge, Ontario: Design at Riverside.

- Metro Regional Government. (2010). *Urban Growth Boundary*. Retrieved July 16, 2011 from www.oregon.com.
- Miset-Evens, M. (1992). *Balancing Growth with Agriculture: Approaches to Managing Non-Farm Rural Residential Development*. Oxford: Department of Planning and Development.
- Nelessen, A.C. (1994). *Visions for a New American Dream: Process, Principles, and an Ordinance to Plan and Design Small Communities*. Chicago, Illinois: APA Planners Press.
- OMAFRA. (2009). *Food Industry Overview*. Retrieved Nov. 1, 2010 from www.omafr.gov.on.ca/english/food/industry/overview.htm.
- Ontario Farmland Trust. (2005). *Farmland in Ontario - Are We Losing a Valuable Resource?*. Guelph: Ontario Trillium Foundation.
- Ontario Farmland Trust. (2006). *Planning Regional Food Systems: A Guide for Municipal Planning and Development in the Greater Golden Horseshoe*. Ontario: Ontario Farmland Trust.
- Ontario Farmland Trust. (2001). *Mission Statement*. Ontario Farmland Trust. Retrieved July 14 from www.ontariofarmlandtrsu.ca.
- Pender, T. (2010). *Waterloo Region on the Front Line in Province's Battle Against Urban Sprawl*. Retrieved July 16, 2011 from www.therecord.com.
- Places to Grow Act*. (2005). Government of Ontario: Ministry of Infrastructure. Retrieved July 12, 2011 from www.placestogrow.ca/index.
- Solomon, L. (2007). *Toronto Sprawls: A History*. Toronto: University of Toronto Press Incorporated.
- Smith, B. (2007). Chapter 5: A Work in Progress - The British Columbia Farmland Preservation Program. In W. Caldwell, S. Hilts, & B. Wilton (Eds.). *Farmland Preservation: Land for Future Generations* (p. 115-162). Kitchener, Ontario: Volumes Publishing.
- Taylor, Z.T. (2010). *Growing Cities: Comparing Urban Growth Patterns and Regional Growth Policies in Calgary, Toronto and Vancouver*. Canada Library and Archives Canada Cataloguing.
- Walker, G. (1987). *An Invaded Countryside: Structures of Life on the Toronto Fringe*. Toronto, Ontario: York University, Atkinson College.
- Walton, M. (2003). *Agriculture in the Central Ontario Zone*. Toronto: Neptis Foundation.
- Walton, M. (2003)b. *Greater Toronto Area Agricultural Profile: An Update of the GTA Agricultural Economic Impact Study*. Bracebridge, Ontario: Planscape.

- Will Dunning Inc. (2006). *Economic Influences on Population Growth and Housing Demand in the Greater Golden Horseshoe*. Toronto: Neptis Foundation.
- Wilton, B. (2007). Chapter 1: Farmland Preservation Perspectives. In W. Caldwell, S. Hilts, & B. Wilton (Eds.). *Farmland Preservation: Land for Future Generations* (p. 13-32). Kitchener, Ontario: Volumes Publishing.
- Yeates, M. (1985). *Land in Canada's Urban Heartland*. Ottawa: Environment Canada.

