



Culture and Context Report
National Research Council of Canada:
A Path To Healthy Housing

Bunibonibee Cree Nation

submitted by:

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1.0 EXECUTIVE SUMMARY

PURPOSE

This Report is an assessment of housing in Bunibonibee Cree nation within the local environmental and cultural context. The findings in this report outline the current state of housing and its successful and unsuccessful elements. The findings in this report are intended to inform the design for housing prototypes in Bunibonibee Cree Nation.

Methods

The information for this report was gathered through 2 separate site visits where we held several engagement sessions with community members, youth, builders, and the band councillors. Significant research supporting conclusions, and collaboration with building envelope engineers was also undertaken.

Recommendations and Conclusions

Housing is challenging to undertake in Bunibonibee, and there is an extreme housing deficit with significant overcrowding. A brief summary of these challenges includes:

1.0 Design and Conception: House packages are procured from local wholesale building suppliers. Suppliers decide what is most feasible and provide informal and incomplete designs and specifications to suit their material packages.

1.1 Recommendations: Professionally produced drawings and specifications would support Bunibonibee to procure high-quality materials and achieve technically sound building envelopes.

2.0 Procurement: Economic leakage from construction is typical, retail profits are all off-reserve.

2.1 Recommendations: Long-term goals may include First-Nations specific wholesale with collective purchasing. Tribal councils may be best placed to accomplish this because they serve multiple communities with similar climate, community priorities, logistics, culture and lifestyle.

3.0 Delivery and Storage: Bunibonibee is served by winter roads and air travel; there is no year-round road access. Building materials must be shipped once a year. Maintenance supplies are difficult to fund and to schedule for delivery. There is no warehousing facility in Bunibonibee. Significant waste of materials results from materials exposed to extreme weather and wet soils for extended periods.

3.1 Recommendations: Establish a rhythm of ordering maintenance and new construction materials on a predictable schedule; build and staff a storage warehouse.

4.0 Housing Allocations and Community Land Use: It was not clear from this study what methods are used to allocate homes to members, prioritize housing types, or establish community growth patterns.

4.1 Recommendations: Establish an arms-length housing committee to establish priorities and form long-term strategy independently from political dynamics. Commission a community land use plan based on professional insights in collaboration with intensive community engagement methods.

5.0 Construction Teams: Given the challenges, it is impressive and admirable that Bunibonibee has a functioning construction team of local tradespersons. However, workers report that it is difficult to find journeymen to hone their skills and advance career experience.

5.1 Recommendations: Establish on-reserve accommodations and negotiate with airlines for travel that maximizes time on-reserve for experienced tradespersons. Establish contracts that specify several days in a row are required for each on-site visit.

6.0 Building Envelope: Best practices are not currently followed, due to reasons listed above, especially items 1 and 5.

6.1 Recommendations: Ongoing training of construction workers; example: presentation appended to this report is delivered to all new workers. The home design included in this report incorporates design responses suitable for Bunibonibee climate, materials palette, and construction expertise.

7.0 Soils: Wet and organic muskeg with discontinuous permafrost is typical throughout Bunibonibee. No topographical information is available at a level of detail sufficient for site selection or design. Crawlspace with in-ground footings are typical, together with below-grade inhabited space in split-level homes. Dampproofing is not used on crawlspace walls or floors.

7.1 Recommendations: It is virtually impossible to protect in-ground foundations from water infiltration and differential settlement with this type of soil, even using best practice methods. Multi-point foundations are quick to put together within a limited building season, are much more robust in limiting differential settlement because they function as a space frame, and bring both the inhabited areas of the home and vulnerable materials entirely up and out of the wet soils. Commission geotechnical and topographical analysis prior to establishing new neighbourhood areas, in order to guide site selection and balance member preferences with relevant data.

8.0 Climate: Optimal building conditions are limited to May-September, and materials are subjected to high levels of UV, wind, and and extreme temperature range (-50°C to =35°C).

8.1 Recommendations: Scheduling is extremely critical; see items 3, 4, and 5 above. Materials selection for durability is paramount, see items 1, 2, 6, and 7 above.

Prototype House Design

A prototype design was undertaken tailored to the Bunibonabee context, with significant input from women, construction workers, and housing leadership. The community wished to stress that this home was designed as an interim solution only. It is not an ideal solution, which would require a wider scope of inquiry and account for the dynamics listed in the Recommendations and Conclusions above. The extended family household assumed in this prototype home is an effort to use a similar footprint and scale, materials palette, and construction approach to what construction teams are currently accustomed to. A single housing prototype cannot address community growth patterns, or accommodate a variety of household types. However, this design does address the critical needs of an emergency-level housing deficit in Bunibonabee right now.

Multi-generational dwellings for large families and single one bedroom dwellings for non-married individuals are the most needed housing types for Bunibonabee according to both the community and the 2016 Census. Therefore, Smoke Architecture is proposing a 3 storey, 9-bedroom multi-generational home with an option to add on a tiny home to the front porch area. There is also an option to reduce the size to a 5-bedroom, 2 storey home for a smaller family.

Multi-storey dwellings are the most efficient and cost-effective housing type for large families but require several key considerations in the context of Bunibonabee Cree Nation:

- most builders are not certified and require patient, knowledgeable professionals from outside the community to manage the building process. Pre-fabricated panels and simple construction methods should be used wherever possible. Simple illustrated architectural drawings are helpful.
- all building materials need to be shipped with weatherproof packaging and/or storage tents to protect materials from the elements and reduce overall material waste
- geotechnical surveys are rarely conducted prior to starting construction of any type
- longer/narrower homes and shallow foundations are more susceptible to move with frost
- vandalism is prominent in the community. Very few homes have all windows intact and replacement windows are not readily available. Tenants are typically responsible for home repair so all materials specified should be durable but also easy to repair.
- the water line does not service the entire community so each house should have room for a water set.
- yards around homes should accommodate room for vehicles (including ATVs and snowmobiles), fish/meat smoking structures, firepits, storage sheds, children's play equipment, etc.
- Private neighbourhoods and access to the lake is desirable for most community members for boating and snowmobiling. This is reflected in the community's development pattern which has moved farther and farther south along the shore of Oxford Lake.
- power outages are common, an emergency generator and/or wood stove is preferred in each dwelling unit
- the population in BCN is growing. Extra beds are always in need for friends, family members and/or children.



2.0 SITE CONTEXT

2.1 LOCATION

Bunibonibee Cree Nation is located in the Boreal Shield ecozone, seen in Figure 1 and Figure 2.

- Figure 2 shows the ecoregion of Bunibonibee, 89 Hayes River Upland
- This ecoregion is defined below:

This ecoregion lies northeast of Lake Winnipeg and extends east into northwestern Ontario. It is marked by cool summers and very cold winters. The mean annual temperature is approximately -4°C . The mean summer temperature is 11.5°C and the mean winter temperature is -20°C . The mean annual precipitation ranges from 400 mm in the northwest to 600 mm in the southeast. This ecoregion is classified as having a subhumid high boreal ecoclimate. Black spruce is the climatic climax tree species, but stands consist predominantly of medium to tall, closed stands of black spruce and jack pine with some paper birch. The shrub layer is dominated by ericaceous shrubs, willow, and alder. The ground cover consists of mosses and lichens, low ericaceous shrubs, and some herbs. Depending on drainage, surficial material, and local climate, trembling aspen, white birch, white spruce and to a lesser extent balsam fir, occupy significant areas, especially in the southern section. Bedrock exposures have fewer trees and are covered with lichens. Closed to open stands of stunted black spruce with ericaceous shrubs and a ground cover of sphagnum moss dominate poorly drained peat-filled depressions. Permafrost is found throughout the ecoregion, but is only widespread in organic deposits. Archean granites and gneisses form locally steeply-sloping uplands. Upland surfaces are covered with discontinuous deposits of ridged to hummocky till in the southern section and with calcareous, loamy till in the northern section. Thin clayey lacustrine deposits cover a large part of the till deposits, especially in low-lying areas. These lacustrine deposits are, in turn, often overlain by shallow to deep peat materials. Fluvioglacial moraines and eskers are locally prominent. Gray Luvisols are associated with upland clayey lacustrine and, to some extent, loamy till deposits. However, Eutric Brunisols are dominant on calcareous loamy till and calcareous sandy deposits, whereas Dystric Brunisols are associated with noncalcareous fluviglacial materials. The dominant peatland soils are Mesisols and Organic Cryosols. Many small, rock-bound lakes and medium to large lakes, linked by the primary drainageways of the Nelson, Stupart, Hayes, and Gods rivers are a prominent feature of this ecoregion. Wildlife in the ecoregion includes wolf, lynx, otter, marten, beaver, moose, black bear, woodland caribou, snowshoe hare, red squirrel, short-tailed weasel, red-backed vole, and least chipmunk. Bird species found in the region include spruce grouse which is an important upland game bird, sharp-tailed grouse, willow ptarmigan, common nighthawk, raven, gray jay, bald eagle, hawk owl, and numerous passerine and waterfowl species. Wildlife trapping and hunting, water-oriented recreation and tourism are the dominant uses of the land. Some pulpwood and local sawlog forestry occur in the southern section. The major communities include Thompson, Norway House, Sandy Lake, Gillam, and Gods Lake Narrow. The population of the ecoregion is approximately 33 800. ¹

- Bunibonibee Cree Nation has reserved 13 separate tracts of land, of which Oxford House 24 serves as their main reserve. Figure 3 shows the extent of Oxford House 24.
- The coniferous forest present on the reserve lands has great potential for use as local lumber and we observed several examples of locally-sourced log buildings in Bunibonibee shown in Figure 4.
- Figure 5 identifies Bunibonibee as a cryosolic dominant soil order which lends to cryoturbation - soil movement that arises from frost action, also known as "frost churning". This soil order is characterized by the irregular, broken soil horizon observed in Bunibonibee. ²
- The soil conditions here have also contributed to the poor road conditions and heaving foundations present in the majority of homes in this area.

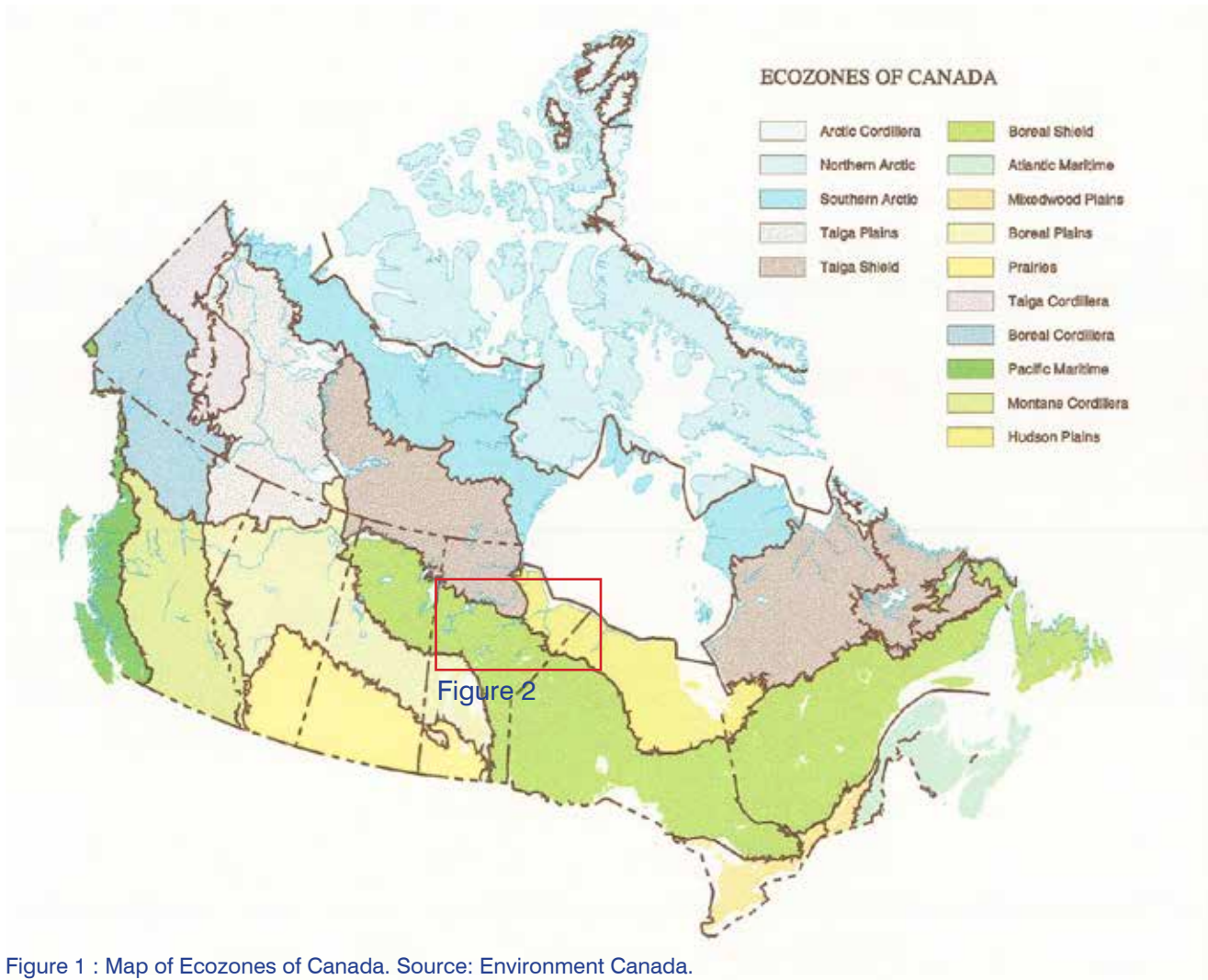


Figure 1 : Map of Ecozones of Canada. Source: Environment Canada.

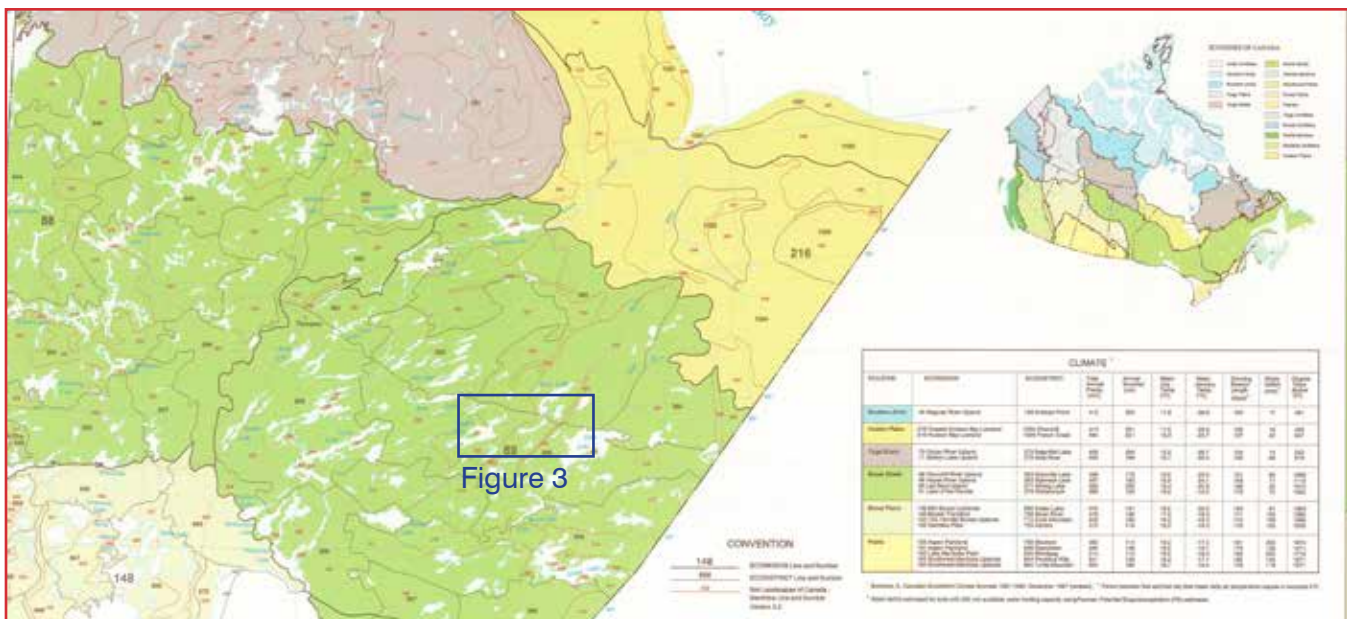


Figure 2 : Map of Terrestrial Ecozones of Northern Manitoba. Source: Environment Canada.



Figure 3 : Map of Area of Study - Bunibonibee Cree Nation IR24. Source: Bunibonibee Lands Department.



Figure 4 : "The Cabin" which serves as a classroom and storage space for the Outdoor Education program



Figure 5 : Map of Soil Orders provided by Agriculture and Agri-Food Canada. Sources: Esri, USGS, NOAA | Agriculture and Agri-Food Canada, Government of Canada | Sources: Esri, Garmin, USGS, NPS

Soil Landscapes of Canada ID (v. 2.2 and 3.1)	46022222
Dominant Soil Order	Cryosolic
Dominant Soil Order %	65
Brunisolic %	35
Chernozemic %	0
Cryosolic %	65
Gleysolic %	0
Luvisolic %	0
Organic %	0
Podzolic %	0
Regosolic %	0
Solonetzic %	0
Vertisolic %	0

2.2 CLIMATE

The climate of Oxford house is cold and temperate. The temperature here averages -2.5 °C and the rainfall in Oxford House is significant. About 503 mm of precipitation falls annually, some of which still occurs during February, the driest month of the year.

TEMPERATURE

With an average of 16.6 °C, July is the warmest month of the year. At -24.2 °C on average, January is the coldest month of the year.

PRECIPITATION

The driest month is February. There is 16 mm of precipitation in February. In July, the precipitation reaches its peak, with an average of 79 mm.

SUNLIGHT

Sunlight is quite variant over the year ranging from 17.25 hours of sunlight on June 21st to only 7 hours of day on December 21st. See Figure 8.

WIND

The coldest winter winds come primarily from the NW while the warmest summer winds come equally from W and ENE. Community members said that weather has become less predictable in recent years and the rise in average global temperature, combined with more extreme storms, has shortened the winter road season.

GROWING SEASON

Island Lake Airport is the nearest major weather station to Oxford House with historical growing season data.

Definitions of the growing season vary throughout the world, but for the purposes of this report, we define it as the longest continuous period of non-freezing temperatures ($\geq 0^{\circ}\text{C}$) in the year (the calendar year in the Northern Hemisphere).

The growing season at Island Lake Airport typically lasts for 4.3 months (130 days), from around May 24 to around October 1, rarely starting before May 8 or after June 9, and rarely ending before September 13 or after October 18.³

CLIMATE ZONE: Zone 8

Heating Degree Days: >7000

Climate Description: Subarctic

Climate Zone 8 Prescriptive Requirements by Manitoba Energy Code 2014

Roofs & Exposed Floors	U=0.142	(R-40)
Walls	U=0.183	(R-31)
Below-Grade Walls	U=0.210	(R-27)
Floors (All)	U=0.379 for full area	(R-15)

	January	February	March	April	May	June	July	August	September	October	November	December
Avg. Temperature (°C)	-24.2	-20.3	-13.1	-2.1	6.6	12.7	16.6	14.9	8	1.4	-9.9	-21.1
Min. Temperature (°C)	-29.4	-26.3	-20.2	-8.5	0.4	6.7	11	9.6	3.8	-2.1	-13.5	-25.5
Max. Temperature (°C)	-18.9	-14.2	-5.9	4.4	12.9	18.8	22.3	20.3	12.3	4.9	-6.2	-16.7
Avg. Temperature (°F)	-11.6	-4.5	8.4	28.2	43.9	54.9	61.9	58.8	46.4	34.5	14.2	-6.0
Min. Temperature (°F)	-20.9	-15.3	-4.4	16.7	32.7	44.1	51.8	49.3	38.8	28.2	7.7	-13.9
Max. Temperature (°F)	-2.0	6.4	21.4	39.9	55.2	65.8	72.1	68.5	54.1	40.8	20.8	1.9
Precipitation / Rainfall (mm)	19	16	22	27	41	63	79	72	60	44	33	27

Figure 6 : Monthly Weather data. Source: <https://en.climate-data.org/north-america/canada/manitoba/oxford-house-12494/>

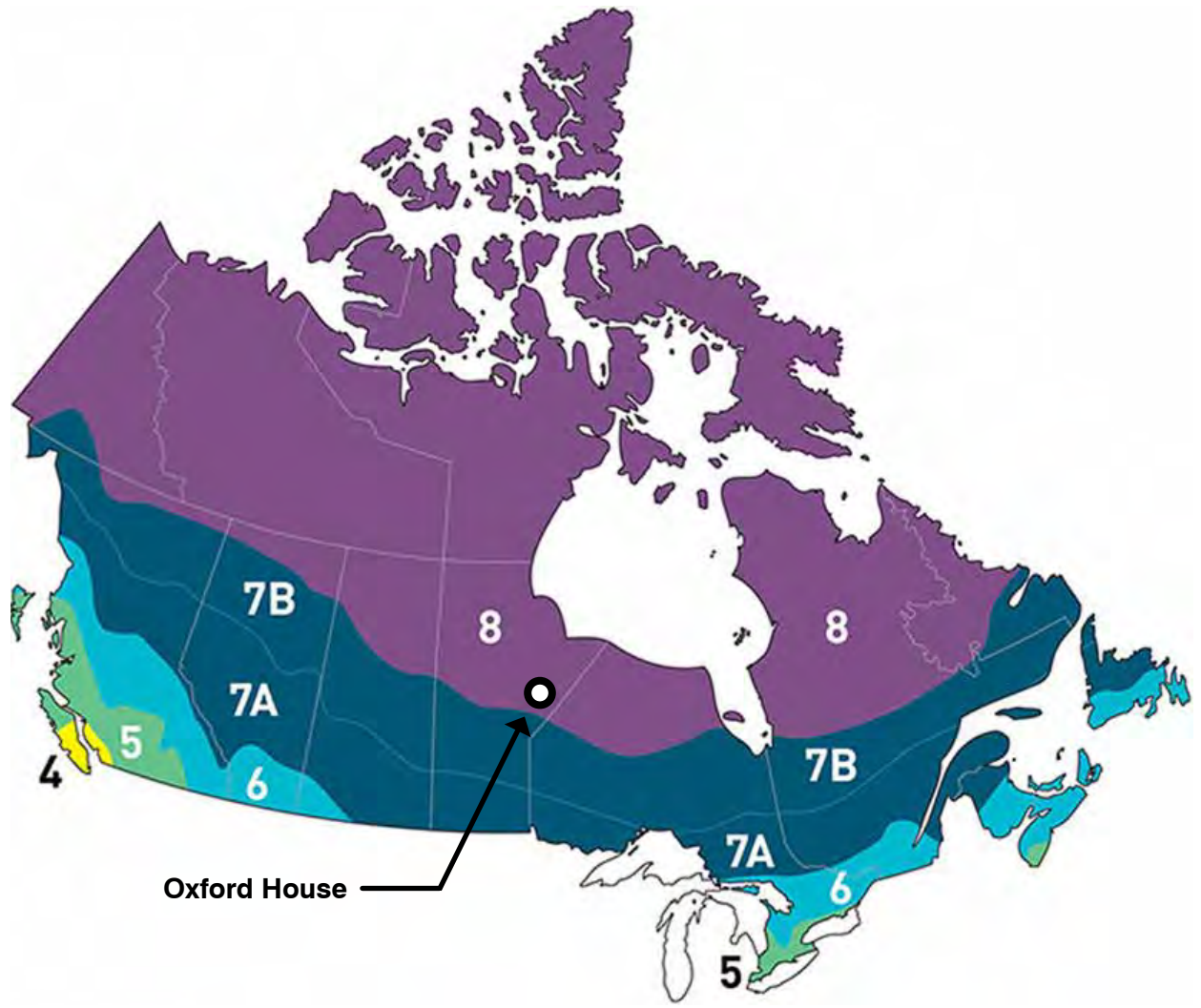


Figure 7 : ASHRAE/NECB/NBC Climate Zone Divisions

CLIMATE CHANGE

“Community members from Bunibonibee Cree Nation (Oxford House) indicated that they have seen a number of changes in weather conditions, winter roads, and other frozen water bodies within and surrounding the community in recent years. Many of these changes observed are thought to have been gradual in nature.”⁴

- Below are some of the most concerning impacts for BCN members:
- unpredictable weather patterns
- shorter and warmer winters with less predictable ice
- higher water and increased water current leading to poor ice conditions and flooded trapping areas
- shorter winter trail/road season
- melting permafrost leading to sinking ground
- changes in animal patterns including migration routes and spawning times
- arrival of new animal species such as raccoon, skunks and pelicans

The winter road is an important link for getting supplies into the community for local operations such as:

- Grocery stores – supplies (e.g. dry goods, furniture, lumber, and fuel)
- Band – housing materials and fuel
- Manitoba Conservation – building project material and fuel
- Manitoba Telephone System – fuel for their towers
- Schools – school supplies
- Manitoba Hydro – wire and supply poles
- Personal Care Home – food and project materials
- Nursing Station – equipment and medical supplies
- Fishing Lodges – fuel supply and building supplies⁵

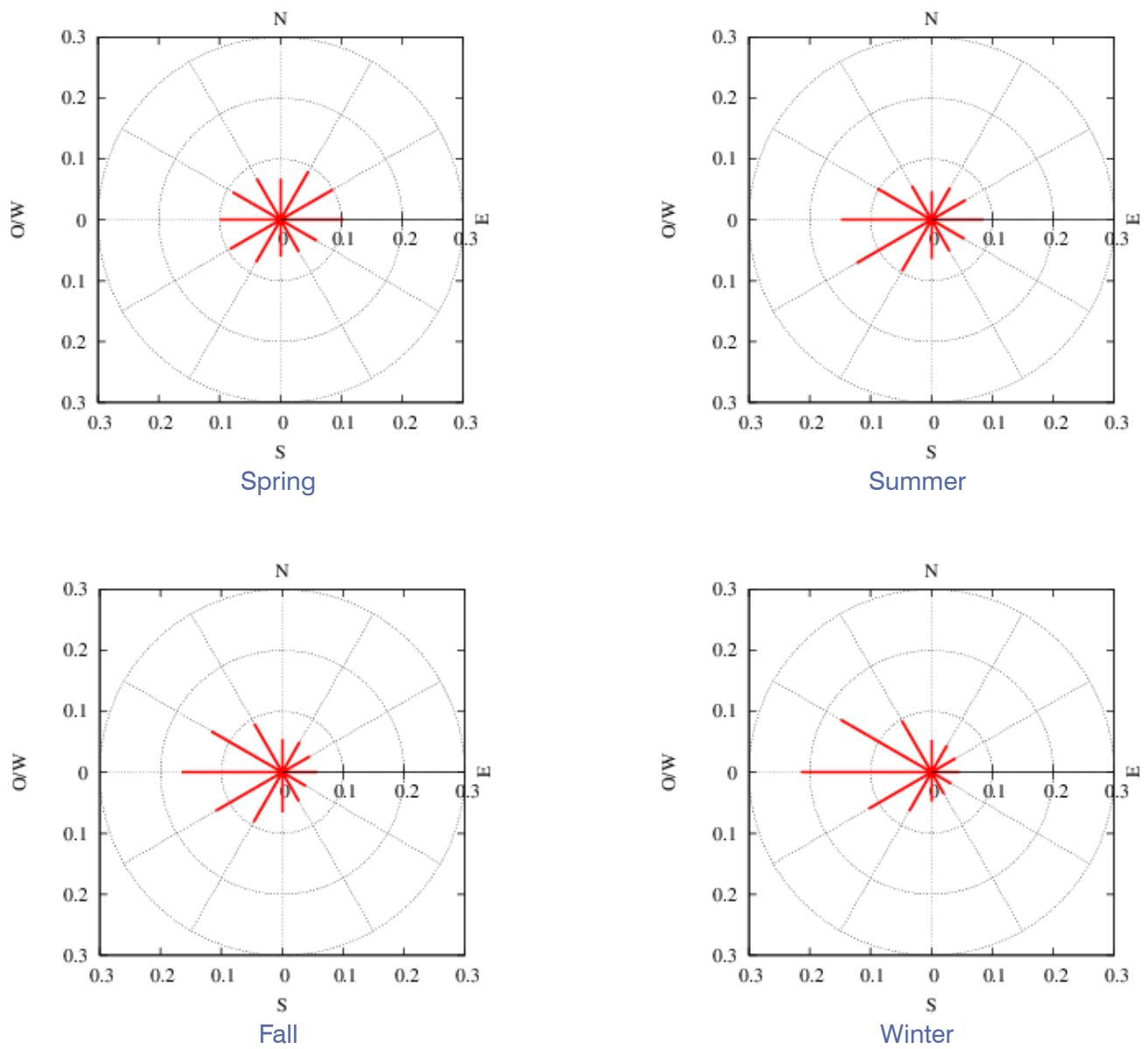


Figure 8 : Wind Roses for Oxford House

Source: <http://www.windatlas.ca/nav-en.php?field=E1&height=50&season=ANU&no=32>

Month of year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
	01	02	03	04	05	06	07	08	09	10	11	12	1-12
Dominant wind direction	W	W	W	SE	N	ESE	W	SW	W	SE	NW	SE	0
Wind probability >= 4 Beaufort (%)	12	13	21	17	16	13	14	13	19	30	26	13	17
Average Wind speed (km/h)	13	13	13	13	13	13	13	13	15	17	17	13	13
Average air temp (°C)	-19	-21	-10	-4	15	18	18	16	11	17	-8	-15	0

Figure 9: Statistics for Island Lake Airport, MB

Source: <https://www.windfinder.com/windstatistics/island-lake-airport>

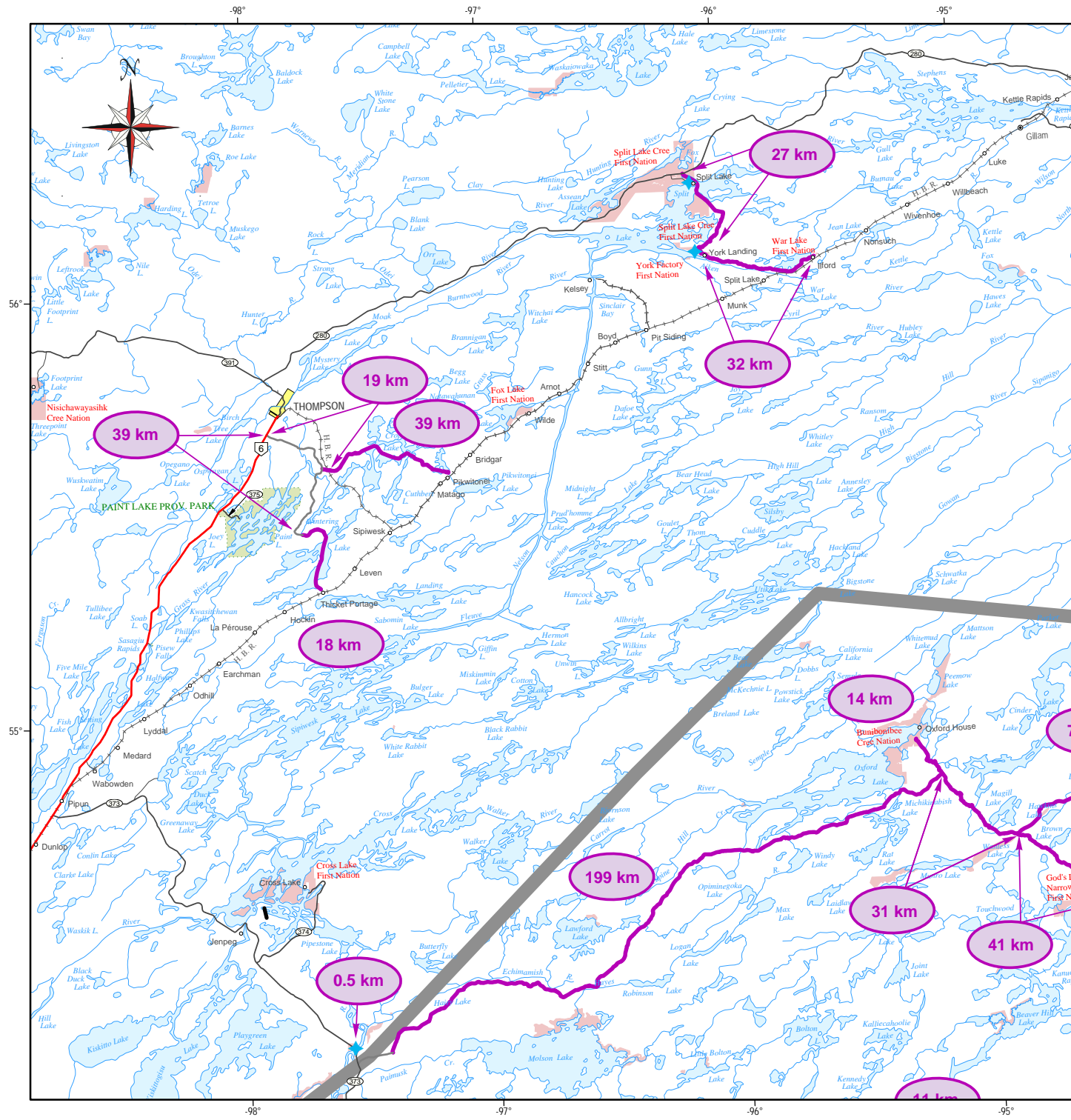
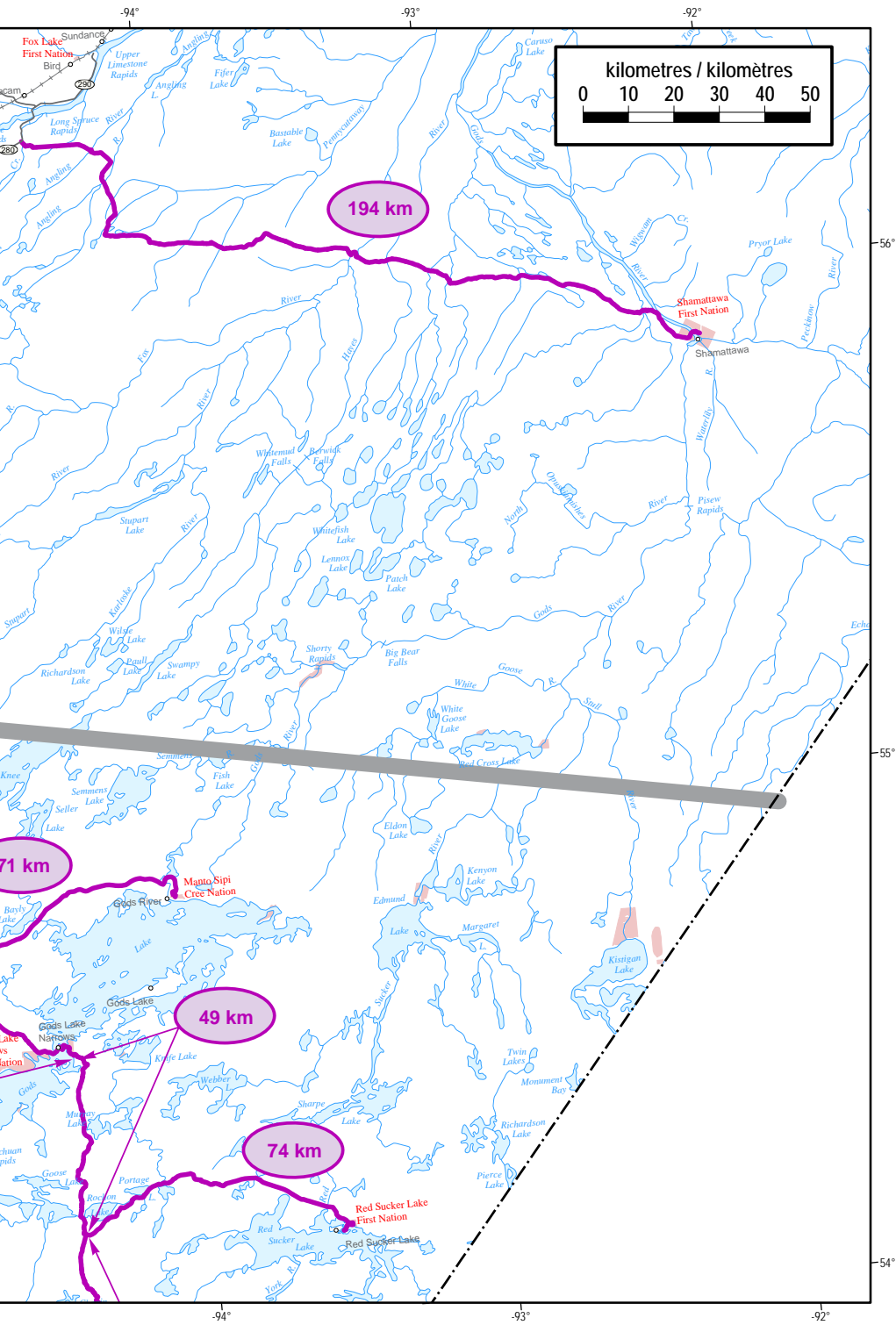


Figure 10 : 2018-2019 Winter Roads - East Central Map
 Source: <https://www.gov.mb.ca/mit/winter/maps.html>



MANITOBA

WINTER ROADS CHEMINS D'HIVER

2018 / 2019

**DISTANCES SHOWN FOR LENGTH OF
WINTER ROADS ARE APPROXIMATE**
**LES DISTANCES INDICUÉES SONT
APPROXIMATIVES POUR
LES CHEMINS D'HIVER.**

LEGEND / LÉGENDE

**PROVINCIAL TRUNK HIGHWAYS
ROUTES PROVINCIALES À GRANDE CIRCULATION**

Provincial Trunk Highway / Route provinciale à grande circulation ————

**PROVINCIAL ROADS
ROUTES PROVINCIALES SECONDAIRES**

Provincial Road / Route provinciale secondaire ————

Other Roads / Autres routes ————

Winter Roads (winter access only)
Chemin d'hiver (accès en hiver seulement) ————

(In unfamiliar areas, enquire locally before using gravel roads.
Renseignez-vous auprès des autorités locales avant d'emprunter
les routes en gravier que vous ne connaissez pas.)

Trans Canada Highway / Transcanadienne Typical speed signs on the winter road system / La vitesse typique connecte le système de route d'hiver

Provincial Trunk Highway / Route provinciale principale à grande circulation

Provincial Road / Routes provinciales secondaires

SYMBOLS / SYMBOLES

First Nations / Premières nations ————

Contact Boundary / Limite de la région ————

kilometres / kilomètres
0 10 20 30 40 50 60 70 80 90 100

**HIGHWAY CONDITION INFORMATION
RENSEIGNEMENTS SUR L'ÉTAT DES ROUTES**

Winter highway conditions and highway conditions on construction projects or other special conditions, phone **Manitoba Infrastructure**

Within Manitoba call 511 / Outside Manitoba call toll-free 1-877-627-6237
www.mb511.ca
Twitter: @MBGovRoads

Pour tout renseignement sur l'état des routes en hiver, sur les projets de construction ou sur d'autres conditions particulières, communiquez avec **Infrastructure Manitoba**

Du Manitoba, composez le 511 / De l'extérieur du Manitoba, composez le 1 877 627-6237 (sans frais)
www.gov.mb.ca/mi/roadsinfo/index.fr.html
Twitter : @MBGovRoads

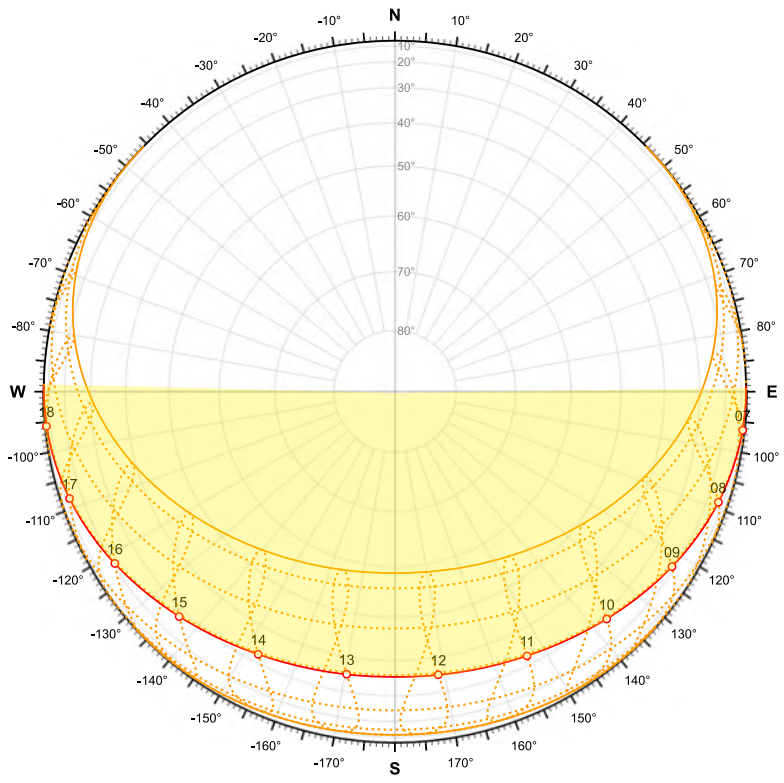
Overweight / Oversize permits
Winnipeg: 204 945-3961
Or toll-free 1 877 812-0009

Permis pour véhicules non conformes aux normes de poids et de dimensions
À Winnipeg: 204 945-3961
Sans frais: 1 877 812-0009

Northern ferry schedules, phone the Marine Division
Winnipeg 204-945-3424
or see www.gov.mb.ca/mi/namo/schedule.html

Pour l'horaire des traversiers dans le nord de la province, adressez-vous à la Direction des travaux maritimes.
À Winnipeg: 204 945-3424
ou visitez www.gov.mb.ca/mi/namo/schedule.fr.html

Produced by: Manitoba Infrastructure Highway Planning & Design Branch Geographic Section Préparé par: Infrastructure Manitoba Division de la planification et de la conception des routes Section de dessin



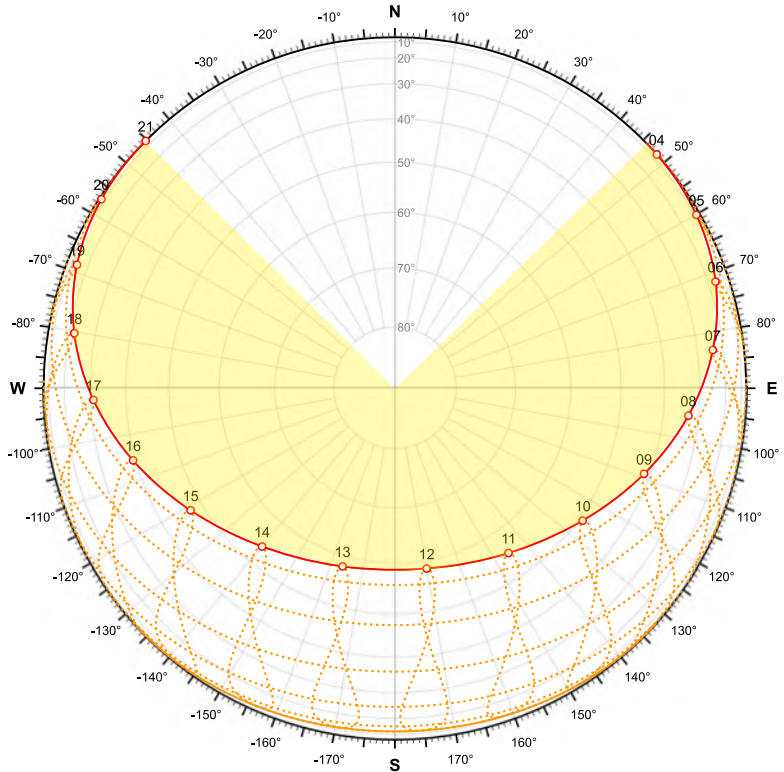
SPRING EQUINOX

SOLAR INFORMATION

Solar Time: 11:32
 Azi / Alt: 171.29° / 35.33°
 Hour Angle: 7.10°
 Declination: 0.21°
 Rise / Set: 06:21 / 18:35
 Daylight: 12:14 Hrs

TWILIGHT TIMES

Civil: 05:46 / 19:11
 Nautical: 05:03 / 19:54
 Astronomical: 04:18 / 20:39



SUMMER SOLSTICE

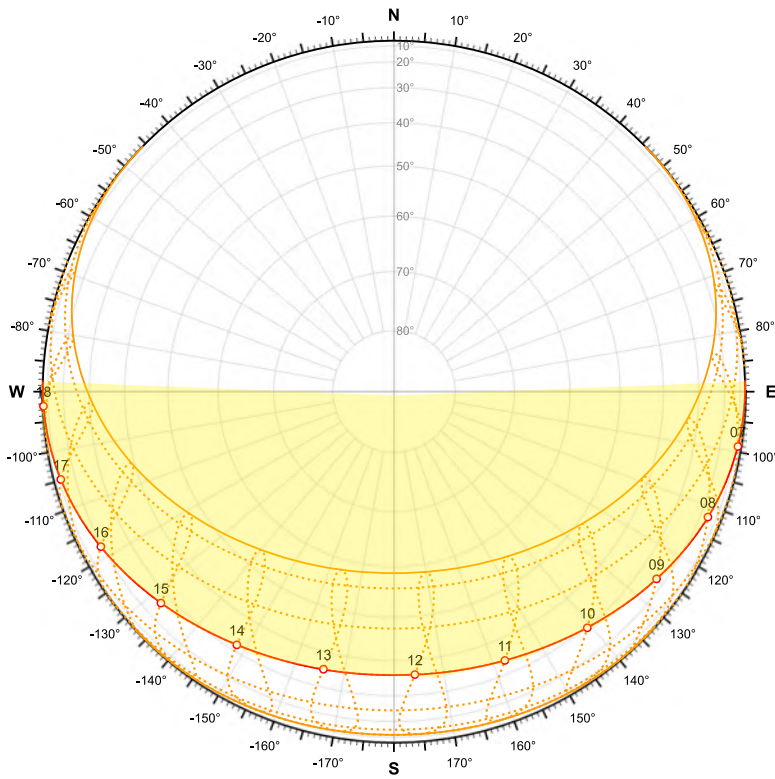
SOLAR INFORMATION

Solar Time: 11:37
 Azi / Alt: 170.03° / 58.56°
 Hour Angle: 5.65°
 Declination: 23.44°
 Rise / Set: 03:44 / 21:01
 Daylight: 17:17 Hrs

TWILIGHT TIMES

Civil: 02:48 / 21:58
 Nautical: 00:00 / 24:00
 Astronomical: 00:00 / 24:00

Figure 11 : Sun Path Diagrams with overlay. Source: <http://andrewmarsh.com/apps/releases/sunpath2d.html>



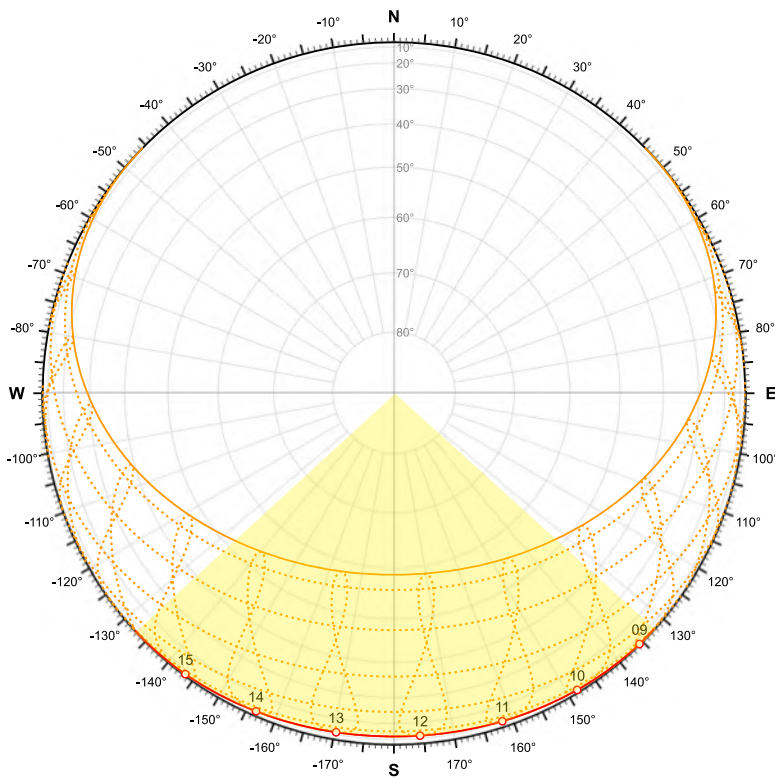
FALL EQUINOX

SOLAR INFORMATION

Solar Time: 11:46
 Azi / Alt: 175.77° / 36.07°
 Hour Angle: 3.42°
 Declination: 0.72°
 Rise / Set: 06:04 / 18:24
 Daylight: 12:20 Hrs

TWILIGHT TIMES

Civil: 05:28 / 18:59
 Nautical: 04:45 / 19:42
 Astronomical: 04:00 / 20:28



WINTER SOLSTICE

SOLAR INFORMATION

Solar Time: 11:41
 Azi / Alt: 175.63° / 11.94°
 Hour Angle: 4.66°
 Declination: -23.43°
 Rise / Set: 08:41 / 15:56
 Daylight: 07:15 Hrs

TWILIGHT TIMES

Civil: 07:56 / 16:41
 Nautical: 07:09 / 17:28
 Astronomical: 06:25 / 18:12

2.3 COMMUNITY RESEARCH

Geographic Zone

Zone 4 : First Nation has no year-round road access to a service centre and, as a result, experiences a higher cost of transportation.

Sub-zone

Sub-zone 6 : Distance, measured directly, to the nearest service centre is greater than 480 Km.

Environmental Index: C - Geographic location between 50 and 55 degrees latitude.

City: Thompson

Service Center: Winnipeg ⁶

Demographics

According to Indigenous and Northern Affairs Canada, the First Nation has a total registered population of 3,207 people. Of these, 2,547 registered members live on their own reserve, while 593 members live off reserve. The remaining number live on other reserves or their own crown land (INAC, October 2019).

Age Characteristics based on 2016 Census:

Total	1950
Age 0-14	700 (35.9%)
Age 15-64	1130 (57.9%)
Age 65 and over	115 (5.9%)
Age 85 and over	15 (0.8%)

Median Income based on 2016 Census (Age 15+): 14,921

Labour Force Indicators based on 2016 Census:

Participation Rate	45.1%
Employment Rate	30.3%
Unemployment Rate	31.8%

Marital status based on 2016 Census (Age 15+):

Total	1250
Married or living common law	505
Not married, not common law	745

335 households are occupied by 420 census-families. 185 are one-census-family households, 110 of are multiple-census-family households and 40 are non-census-family households.



Figure 12: Aerial photograph of Bunibonibee Airport, MB provided by Bunibonibee Lands Department.



Figure 13: Indians at Oxford House, Manitoba, 1910.
Source: Geological Survey of Canada / Library and Archives Canada / PA-039932

Historical Background

Oxford House was established in 1798 by William Sinclair, under the instructions of Joseph Colen, chief at York Factory. The post was located on Oxford Inlet on the northeast end of Oxford Lake, known then as Holey Lake. Oxford House was established as part of a wider plan by the HBC to speed up transport along the Hayes River by using a system of boat and canoe relays, transferring at depots along the rivers. York boats travelling from the Saskatchewan River stopped at Oxford House to transfer their goods to canoe, which then travelled to Rock Depot and on to York Factory. Oxford House also operated outposts at Island Lake (1825-1833), Cross Lake and Jack River (1801-1812).

In 1810, Oxford House became an inland factory and took charge of all posts in the Lake Winnipeg drainage basin. The area was known as the Winnipeg Factory District. The next year, the district was split into West and East Winnipeg districts with Oxford House in charge of the west district. This area encompassed the posts located southwest of Lake Winnipeg including Cumberland House, Swan River, Pembina and Brandon House. In 1814, the headquarters of the West Winnipeg District was transferred to Jack River.

Norway House, constructed in 1817, superceded Oxford House in the management of western transportation. After this, Oxford House functioned mainly as a depot for provisioning parties going to and from the Red River Settlement. From 1828 to 1837 and again from 1874-1892, Oxford House operated as the headquarters of the Island Lake District. In 1828, Oxford House also became the headquarters for the construction and maintenance of a winter road connecting York Factory and the Red River Settlement. The road was in operation until 1833.

Oxford House continued operation as a fur trade post and provision depot, as well as saleshop, into the twentieth century. In 1959, the administration of the the post and saleshop was transferred to the newly-formed Northern Stores Department. Oxford House operated as a Northern Store until 1987, when the stores were sold to the Hudson's Bay Northern Stores (later called North West Company).⁷

Historically, families that became a part of the Cree Nation lived in smaller family-based settlement areas throughout the traditional territory. Historical land use by BCN members was documented to have taken place over a large area: from the Norway House area in the southwest, Beaver Hill Lake in the southeast, High Hill Lake to the northwest, and the Hayes River north of Manto Sipi.

The present-day location of the Bunibonibee (Oxford House) reserve IR24 was created in 1948. It is located approximately 950 kilometres northeast of Winnipeg or 160 kilometers southeast of Thompson (by air). Bunibonibee has “no year-round road access to a service centre, and, as a result, experiences a higher cost of transportation” (AANDC, 2014). Most of the year, the community is only accessible by boat or plane. Land transportation currently takes place over a winter road, which provides access west to Highway 373 (Norway House) and east to God's Lake and Manto Sipi. The proposed all-season road, once all projects are completed, would provide year-round land access to these communities and highways connecting to the rest of the province.⁸



Figure 14 : Day school children at Oxford House, 1920s.
Source: Archives of Manitoba



Figure 15 : Members of the Oxford House Band, 1910.
Source: Archives of Manitoba

Legacy of Residential Schools 1890-1925

Despite its location, the remote community of Oxford House did not escape the Euro-Canadian attempts to culturally assimilate and “educate” Indians across the country through the residential school system. A study of 4 Methodist Indian Day Schools in Northern Manitoba conducted by the University of Manitoba states that, “Poor school buildings were typical of all reserves studied with the exception of Oxford House, which had none. Indians there began appealing to the government for a school in 1910. By 1912, when Department of Indian Affairs records for this reserve end, there was still no school building at Oxford House.”⁹

Prior to their own school, and even afterwards, many of the children of Oxford House would have attended the Norway House Residential School, a several day trip by canoe or yorkeboat. There is no mention of exactly how many students attended this school from Oxford House but those that did would have been subject to issues of overcrowding, malnourishment, abuse and overall neglect that are described in more detail by the Residential School Archive Project “The Children Remembered”.¹⁰

For the Methodist Indian Day School that eventually arrived in the community,

Oxford House records are the most brief and unrevealing of those of the four day schools studied. Very little attention seems to have been paid to this community, members of which were largely left on their own to sink or swim in their desperate struggle against poverty. Significantly, attendance problems do not seem to have occurred because parents were away on hunting and fishing trips. [36] Rather, the high rate of absenteeism seems to have existed “[because of] the great distance which they [the children] live from the Methodist mission.” [37] By 1911, however, the school at Oxford House seems to have gained a greater foothold in the community. The Indian Agent’s report made mention of the good attendance and marked progress being made at the day school. [38]

A fairly clear picture of what the school probably represented to many Indians in Berens River can be gleaned from these sentences. Situated far away from homes, difficult to travel to, and in terrible shape, the school and its motives were foreign to the lives of the Indians. This was undoubtedly the case at Cross Lake and Nelson House and, to a large extent, at Oxford House. While parents probably wished their children to acquire those skills that would enable them to cope with the Euro-Canadian world, they had no intention of allowing the assimilation of their children into that world. The adults in these communities seem to have placed little stock in staying home in order to send their children to schools that would teach skills different from those inherent in their own background and culture. The day schools posed a practical problem as well. Children could not stay home alone to study while parents left for several weeks of hunting and fishing. Even the communities of Berens River and Cross Lake—who faced some gruelling winters, meagre hunts and poor prices for their furs, and who were at least keeping peace by going through the motions of agriculture and cattle raising—made a choice between the school and their traditional livelihood. The school did not come out the winner. Despite differences in the characters and situations of the four reserves, it is probable that the parents in all these communities thought alike on these issues.

Between 1915 and 1925, when we have the greatest amount of data concerning Oxford House and Nelson House, it seems the Nelson House school endured the same neglect that the Oxford House school experienced. The scarcity of all records pertaining to these reserves supports this conclusion. The government and Methodists did not strenuously involve themselves with the Indians and they in turn seemed unconcerned with the school.¹¹



Figure 16 : Children from Oxford House, circa 1916. The reverend with children from Oxford House who attend Norway House Indian Residential School. Source: United Church of Canada Archives, 93.049P/1267



Figure 17 : Norway House, circa 1920. Setting sail for Oxford House, carrying the missionary and his wife and child. Norway House, Manitoba. Source: United Church of Canada Archives, 93.049P/1298.

2.4 INFRASTRUCTURE

BCN has a high school, elementary school, a pre-school (Head Start), an arena, a Northern Store with a Tim Hortons, a nursing station, a Royal Canadian Mounted Police detachment, the University College of the North Centre, an airport, a hotel (within the band office), a water treatment plant, a band office, a care home, medivac operation/emergency, a fire hall, Super B's convenience store, a radio station, North Star Resort (at Knee Lake) and several churches.

Bunibonibee relies primarily on their local gravel road network to maintain all infrastructural elements including water, sewage and electricity.

ROADS

- Bunibonibee has no year-round road access to a service centre and, as a result, experiences a higher cost of transportation. Manitoba Infrastructure has plans to make an all-season road to Norway House and, later on, another road linking Manto Sipi Cree Nation, Bunibonibee Cree Nation and God's Lake First Nation. (Project 6– All-Season Road linking Manto Sipi Cree Nation, Bunibonibee Cree Nation and God's Lake First Nation)
- Though the community is looking forward to reduced transportation costs, some members are worried about the ease of trafficking alcohol and drugs into their current “dry community”.

Ice Roads:

- The ice roads are in operation for 3 months of the year and they serve as the primary method for transporting building materials.
- The current ice roads provide access west to Highway 373 Norway House and east to God's Lake and Manto Sipi.
- Community members voiced concerns over climate change and the negative impacts it has been having on the ice roads over the past few years.

Gravel Roads:

- Bunibonibee relies primarily on their local gravel road network to maintain all infrastructural elements including water, sewage and electricity.
- Roads are made from local gravel but its low quality mixed with dirt lends to significant heaving over the numerous freeze-thaw cycles throughout the year. The dust kicked up by vehicles contributes to low visibility and causes concern for respiratory health.

AIR TRANSPORTATION

- Air travel by plane is the secondary means of transportation of goods and people in and out of the community.

ELECTRICITY

- As part of the North Central Project, Oxford House was linked up to the provincial power system as of July 1997. The electrification project that supplies the 200-amp service has replaced the 15-amps service previously supplied by a diesel generator. Manitoba Hydro manages the project.
- The Kelsey to Oxford House 138 kilovolt (kV) transmission line, which originates outside of the area, provides power to Bunibonibee Cree Nation.
- There is no backup to the power generation and there are discussions about having more backup generators in the community due to the many power outages experienced throughout the year. Of primary concern are outages that occur in the winter months when most new homes rely on electric heat.
- We recommend a wood stove in every home for more reliable emergency heating



Figure 18 : Map showing proposed all-season roads P2 and P6 linking Bunibonibee Cree Nation to other communities.
 Source: https://www.gov.mb.ca/mit/hpd/environment/pdf/project6/baseline/wildlife_existing_maps.pdf

WATER

- The water treatment plant was built in 2004 with a design year of 2021 and a projected population of 3265 on the piped system.
- 1/3 of the community has running water (see Context map B for approximate location), the other 2/3 relies on water delivery to individual homes via truck. Currently the community has only 3 of these delivery trucks.

SEWAGE

- The community relies on a mechanical SBR (Sequence Batch Reactor) wastewater treatment plant for sewage treatment.
- the plant was built in 2004 with a design year 2021 and a projected population of 3265 on the piped system.
- not all residents are connected to the existing sewer system.

POLICING & FIREFIGHTING

- Policing is done locally from an RCMP detachment located in the community. The Band also employs five full-time constables and two casual constables.
- Local volunteers provide fire-fighting services. Natural Resources provide forest fire watch and forest fire fighting, if necessary.

2.5 TRANSPORTATION LOGISTICS

Bunibonibee relies primarily on the ice roads for transporting building materials to the community.

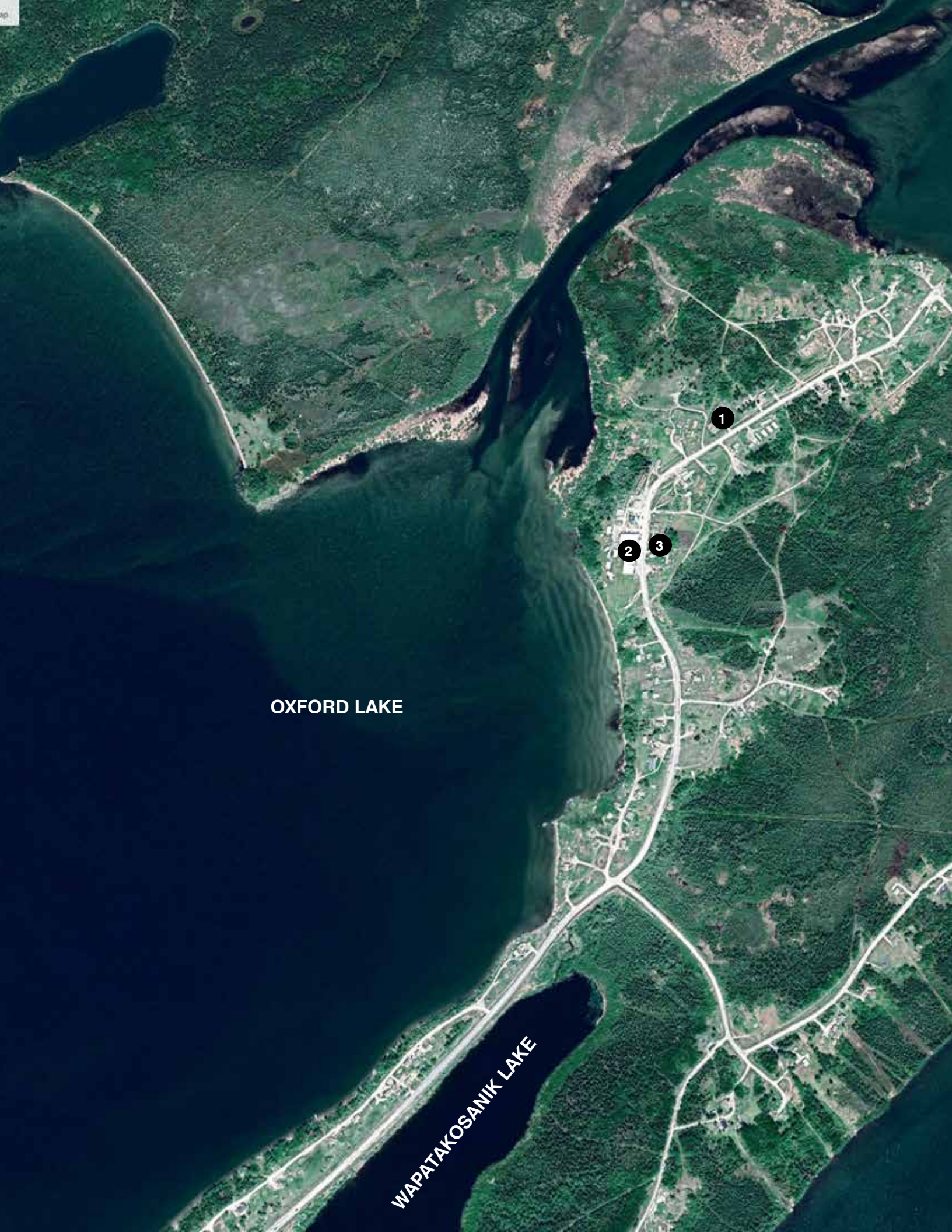
- The closest building supply store is located in Thompson, MB - only accessible via ice road or airplane
- The window within which goods can be transported on ice road runs from the end of January till the end of March, however, community members say it has become far less predictable in the last few years. Sometimes the community only has 2-2.5 months of reliable ice roads which makes the need for a local co-op or at least an ordering system even greater.
- Currently, building materials are ordered on a project-by-project basis, either for new or retrofit projects. There is no place for homeowners to go to purchase new supplies or replacement products such as windows, HRV units, door locks, and plumbing pipes. Home repairs are practically non-existent with the exception of the retrofit projects.
- Food products with the exception of wildmeat/berries are transported via airplane for most of the year, however, higher and stronger winds are becoming more common. Several flight cancellations in a row causes a backup of products and luggage which we experienced firsthand during our visits.

CONTEXT MAP A



CONTEXT MAP B





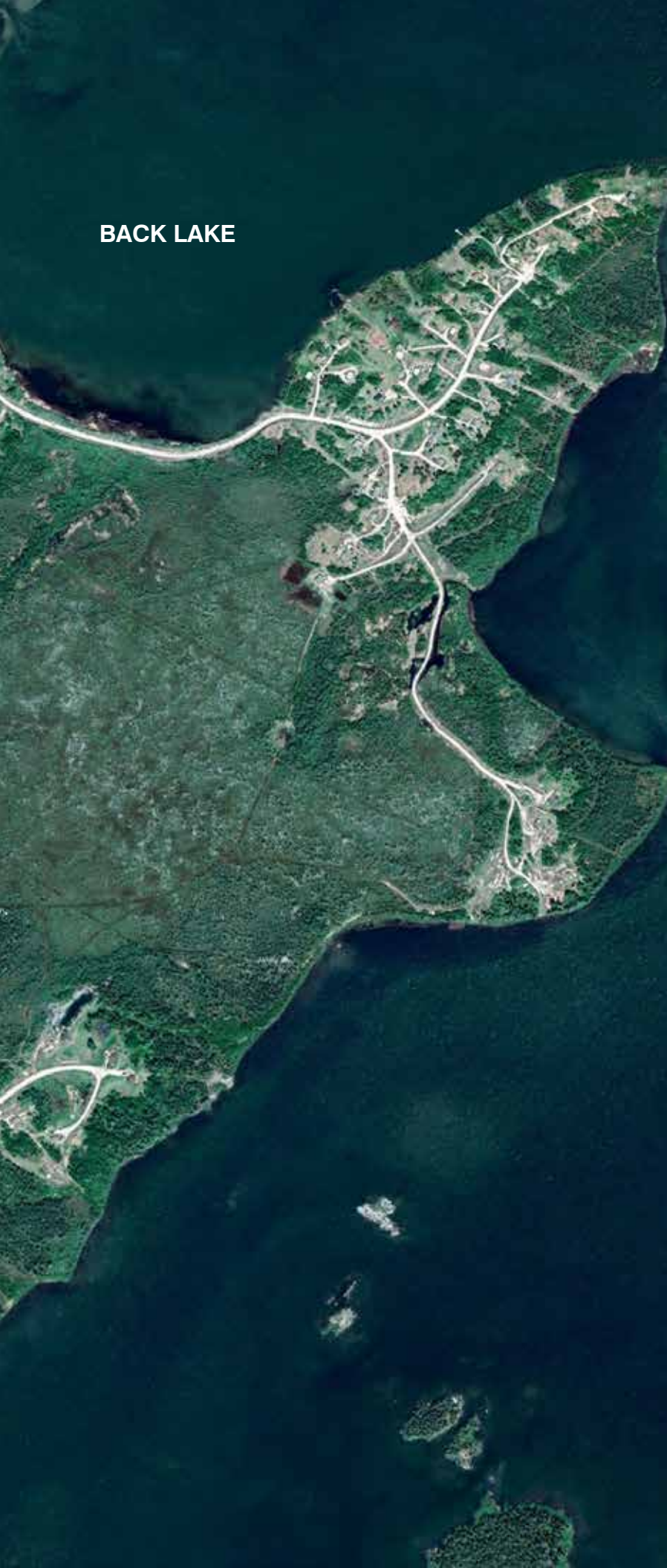
OXFORD LAKE

WAPATAKOSANIK LAKE

1

2

3



BACK LAKE

CONTEXT MAP A

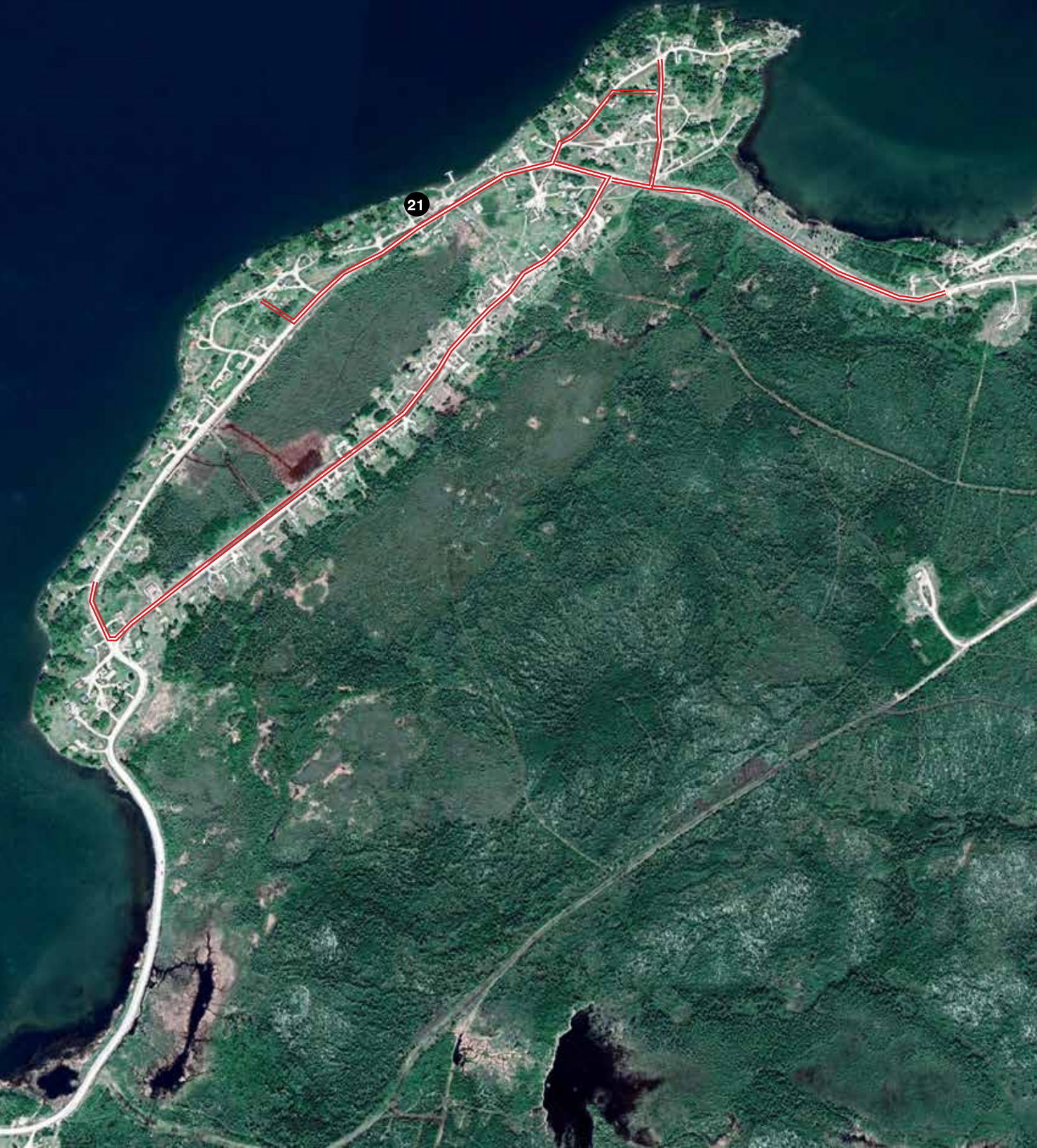
- 1 Royal Canadian Mounted Police detachment
- 2 Northern Store w/ Gas Station and Tim Hortons
- 3 Manitoba Conservation Office

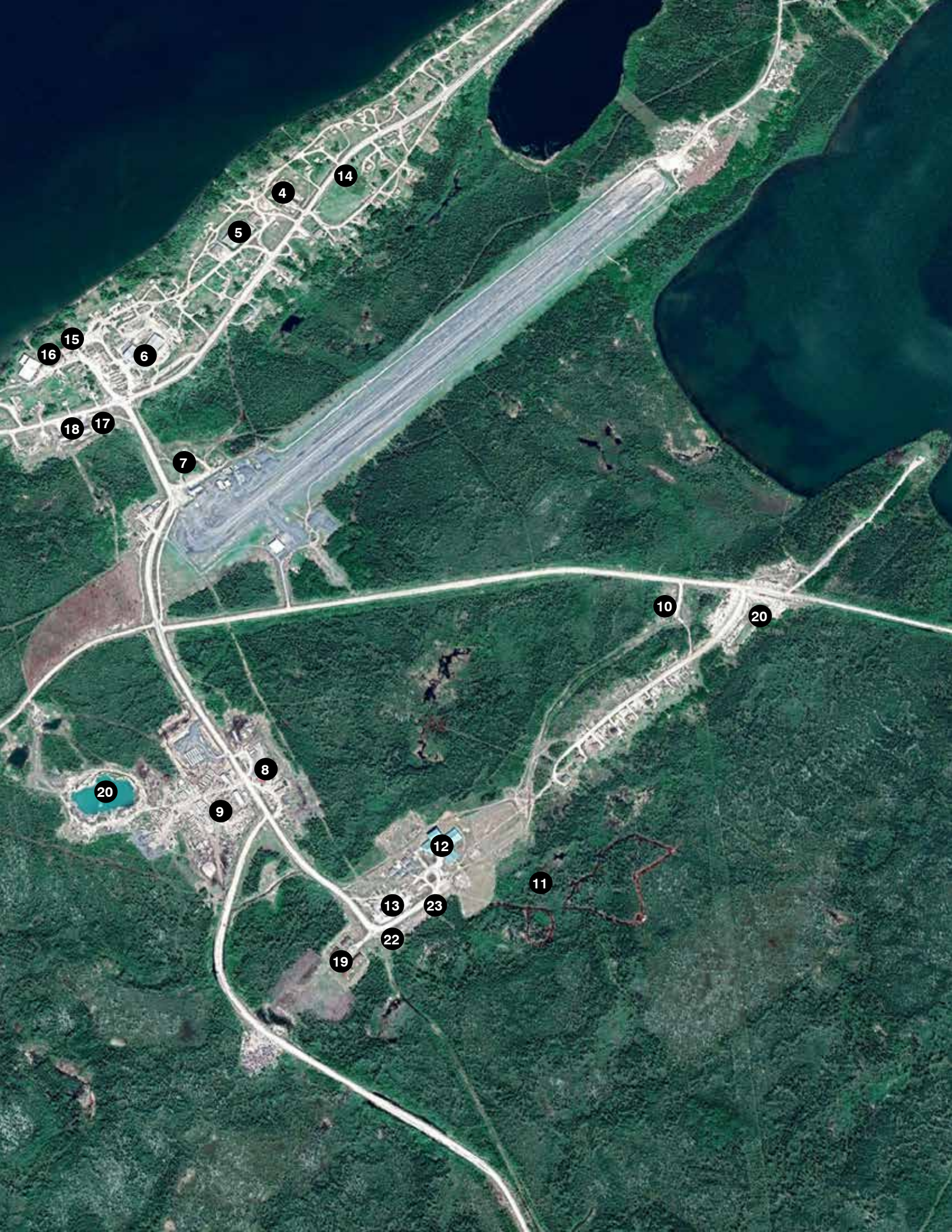
CONTEXT MAP B

- 4 care home
 - 5 arena
 - 6 Oxford House Elementary School
 - 7 airport building
 - 8 Super B's convenience
 - 9 public works yard
 - 10 sewage treatment plant
 - 11 new elementary school (under construction)
 - 12 1972 Memorial High School
 - 13 the University College of the North Centre
 - 14 radio station
 - 15 band office
 - 16 George Colon Memorial Home
 - 17 fire hall
 - 18 water truck dispatch
 - 19 teacherages
 - 20 quarries
 - 21 water treatment plant
 - 22 pre-school (Head Start)
 - 23 "The Cabin"
- ==== known water line

BACK LAKE

OXFORD LAKE





4

14

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Figure 19 : Gas and convenience store next to the Northern Store.



Figure 20 : The Northern store.



Figure 21 : Dusty road conditions along main road (Oxford House Rd).



Figure 22 : The Band Office which also houses the Bunibonibee Cree Nation Hotel.



Figure 23 : Oxford House Elementary School.





Figure 24 : Manitoba Conservation Office.



Figure 25 : Pentacostal Church.



Figure 26 : Oxford House elementary school.



Figure 27 : Public works fuel storage area.



Figure 28 : University College of the north with portable classrooms and 1972 Memorial High in background.



Figure 29 : Nursing Station.



Figure 30 : Airport terminal.



Figure 31 : Water Treatment Plant.



Figure 32 : George Colon Memorial Home.



Figure 33 : Head Start.



Figure 34 : Fire hall and municipal sheds for water trucks.



Figure 35 : Super 'B's Convenience.



Figure 36 : 1972 Memorial High.



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3.0 CULTURAL CONTEXT

3.1 CULTURAL CUSTOMS AND TRADITIONS

SEASONAL ACTIVITIES + EVENTS

Spring Activities: spring festival, fishing derbies

Summer Activities: Hunting, fishing, camping, canoeing, floor hockey, volleyball, baseball, summer carnival, boating, bingo, Terry Fox Run, Indian Days, Treaty Days, yorkboat racing, triathlon

Fall: Thanksgiving Feast, Halloween Bash.

Winter Activities: Hunting, trapping, fishing, snowshoeing, hockey, bingo, Winter Carnival

LANGUAGE

Despite the many hardships faced by this community an impressive 68.6% of members can speak their mother tongue, namely Cree-Montagnais. (Census 2016)

RELIGION

The community of Oxford House has four Churches: The Northern Evangelical, The Roman Catholic, The United, and The Full Gospel. Both Traditional beliefs and Christian beliefs and/or practices are observed within the community, as well as other neighboring communities.



Figure 37 : The Cabin



Figure 38 : students plucking ducks and geese

3.2 TRADITIONAL LAND USE

Trapping

- Many BCN members actively trap along the traplines in the area
- marten, otter and mink are the most commonly trapped species, but beaver, muskrat, fisher, wolverine, fox, lynx and wolf are also trapped
- Trapping in BCN has changed over the years. Whereas travel used to be limited to foot, dogsled or canoe, the introduction of snowmobiles in the 1970's has allowed members to travel faster and farther than ever before. This has also drastically reduced the number of days trappers will spend overnight camping. Some would spend the entire winter away from one but nowadays the trips are limited to a few days at a time
- Trapping is in decline partially due to reduced fur prices.¹²

Hunting

- Moose were identified as an important part of the traditional diet of BCN members and fall moose hunting remains a popular activity in the area.
- Most hunters move along the shorelines of Oxford Lake by boat while others fly to surrounding lakes. In winter, some hunt along Knee Lake Road or the winter roads but moose sightings on these routes have been rare in the past few years.¹³
- Community members usually butcher the animals at home which requires ample table space and freezer storage.

Fishing

- Fish are part of a regular diet in Bunibonibee. Though people eat less fish than in the past, many BCN members still practice for both food and fun. Youth are more inclined to practice catch and release.
- People fish in all major water bodies around BCN including Oxford Lake, Back Lake, Laidlaw Creek, Rat Lake, Windy Lake, Knee Lake and the Hayes River. They fish as far north as Atik Lake and as far south as Colen Lakes.
- Fishing occurs year round both with gillnets and fishing rods. Walleye, whitefish and jackfish (northern pike) are fished in the spring, summer and fall. Trout are fished in the summer and fall. Ice fishing takes place in winter at places like Knee Lake. Community members set gill nets along shoals in the winter.¹⁴
- Although very rare, sturgeon are occasionally caught as by-catch
- During our visit we saw several fish smoking structures next to peoples' homes. Space for this should be accommodated in the site design.

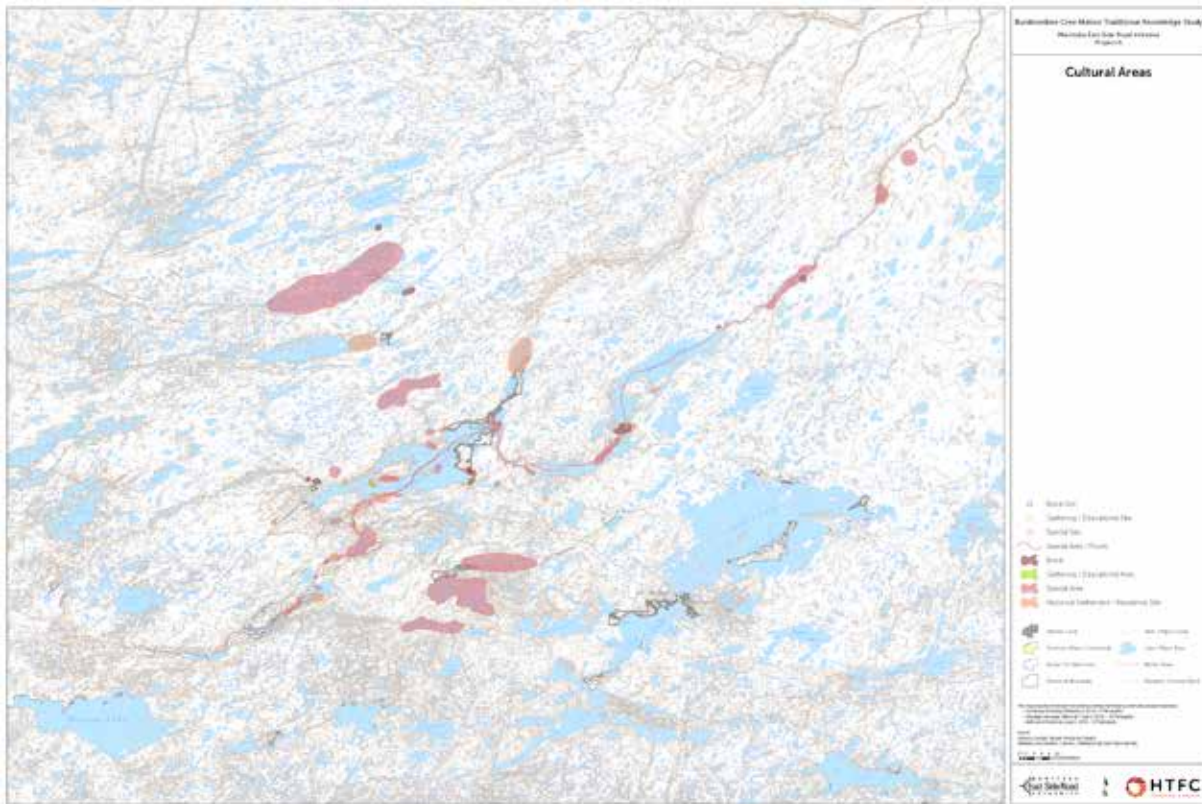


Figure 39 : Cultural Areas Map. Source: Bunibonibee Lands Department.

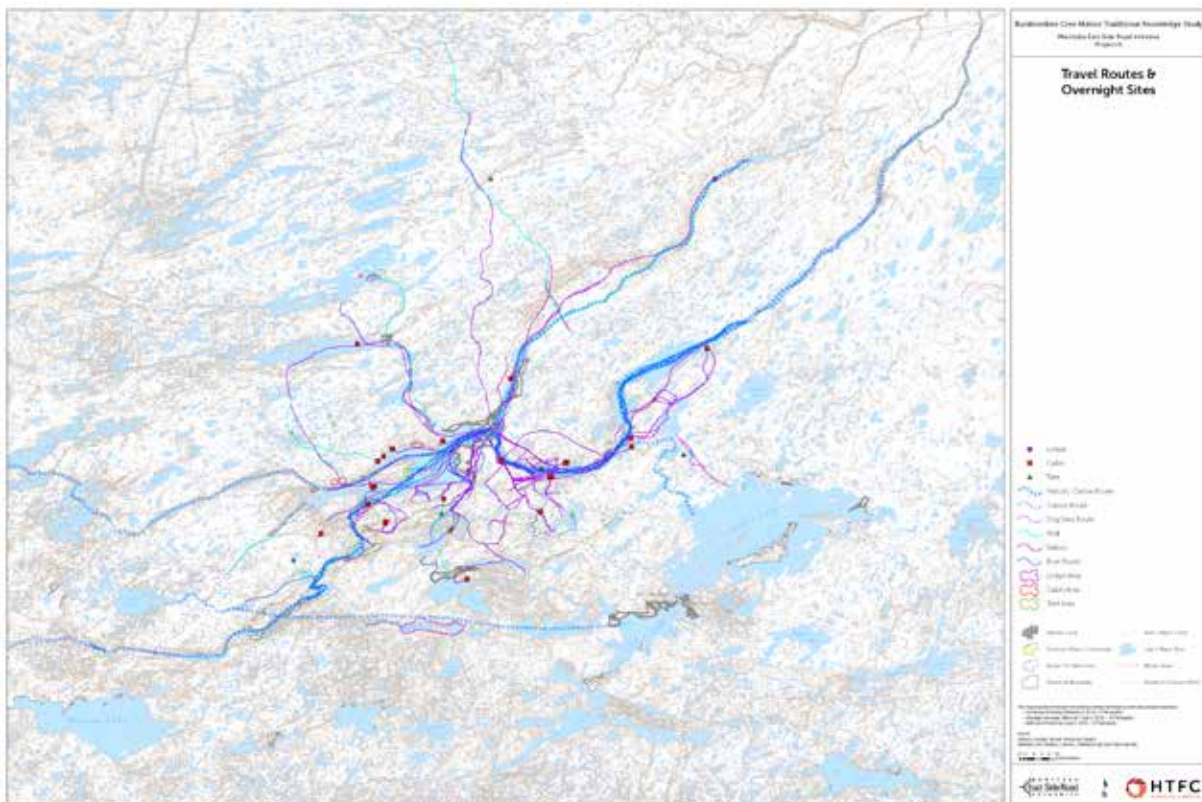


Figure 40 : Travel Routes and Overnight Sites Map. Source: Bunibonibee Lands Department.

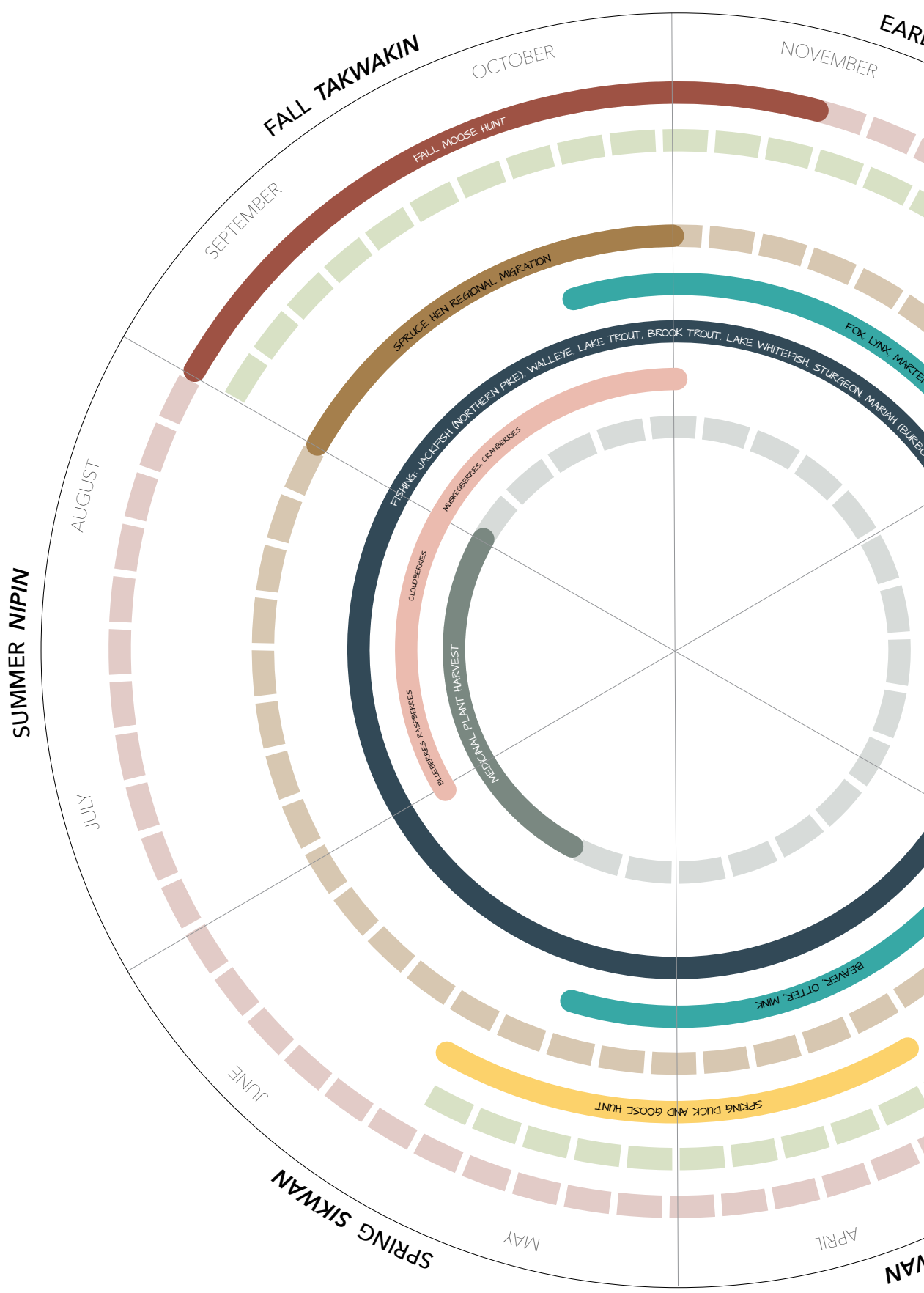
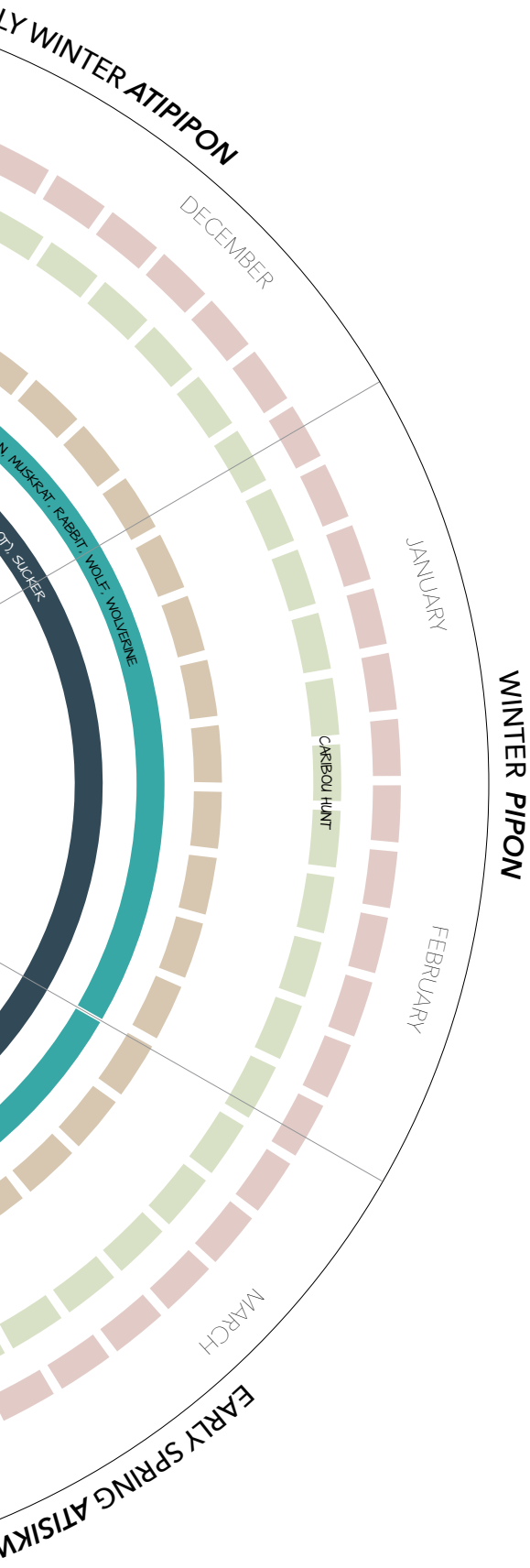
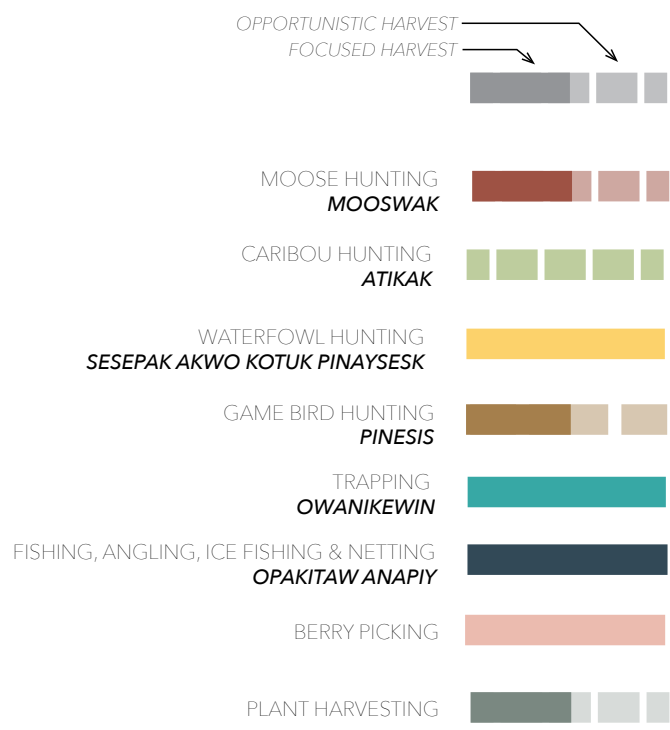


Figure 41 : Bunibonibee Harvest Calendar. Source: "Bunibonibee Cree Nation: Traditional Knowledge Study." East Side Road Project 6. HTFC Planning and Design, 2017.

Bunibonibee Harvest Calendar



Legend



This Harvest Calendar presents information interpreted from interviews with 18 Bunibonibee Cree Nation members conducted between March 29th and April 3, 2016, and community workshops held in Bunibonibee on February 3, 2016 and June 8, 2016..

Note: Exact harvest seasons vary year to year based on weather.



3.3 TRADITIONAL HOUSING

Bunibonibee Cree Nation falls under the Rocky Cree subgroup of Woodland Cree. Cree homes were different depending on the land. The Plains Cree lived in tipis while the Woodlands and Swampy Cree lived in wigwams (or wetus) made out of birch bark. Where birch trees were stunted, coverings of animal hide or spruce boughs were often used. ¹⁵

The dominant precolonial shelter typology of the Northeastern region of Manitoba is likely a hide or bark covered conical wigwam. In BCN, large birchbark trees are rare and the forest consists mostly of small-scale conifer trees and shrubs.

Historical photographs from 1880 reveal bark-covered conical wigwams, birchbark canoes and Hudson Bay Company “York Boats”. Other photos from 1889 and 1890 reveal an Indian Camp with many more birchbark canoes along the shoreline and bark or hid covered wigwams. Photographs from 1910 reveal another Indian Camp consisting of canvas tipis, some attached to small white fabric tents. There is also a small lineup of trapper tents next to a small settlement - the area in which the Hudson’s Bay trading post established.

The oldest known house in Bunibonibee is e Game and Fish Branch building, Oxford House, 1949.

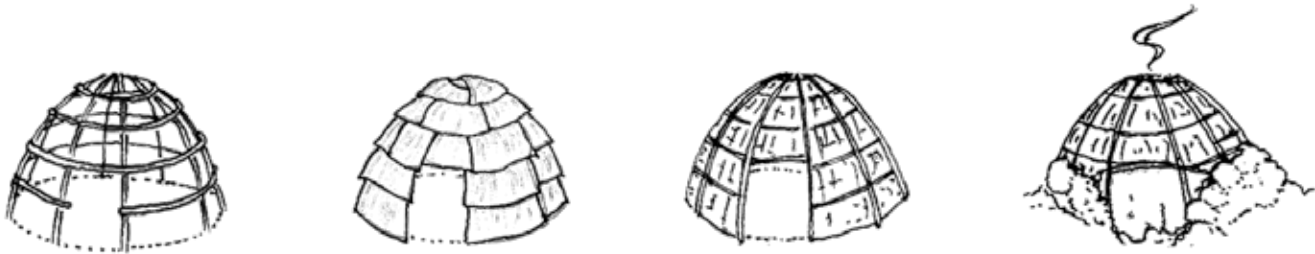


Figure 42 : Hand sketch of the wigwam evolution throughout seasons. From left to right, mid-summer to mid-winter.



Figure 43 : Indian Camp, Oxford House, Manitoba (1880) . Source: Geological Survey of Canada / Library and Archives Canada / PA-PA-039933



Figure 44 : "Oxford House from the N[orth] W[est] 1/10/89" James McDougall album 1, 1889-1890. Source: Archives of Manitoba



Figure 45 : Indian Camp, Oxford House, Manitoba (1890) .
Source: Geological Survey of Canada / Library and Archives Canada / PA-050926





Figure 46 : Indian Camp, Oxford House, (1910) . Source: Geological Survey of Canada / Library and Archives Canada / PA-045262.



Figure 47 : His Excellency Earl Grey and Major Trotter, Oxford House, (1910). Source: Geological Survey of Canada / Library and Archives Canada / PA-045262.



Figure 48 : Photograph of the Game and Fish Branch building, Oxford House, 1949. Source: Archives of Manitoba



Figure 49 : The oldest known house in BCN.

3.4 VERNACULAR HOUSING

Among the many government houses we saw during our visit, some of the most intriguing were houses, sheds or add-on structures that were constructed of local logs. Most notably, “The Cabin” and a residence next to Super B’s Convenience used local logs for the walls. Parts of an old sawmill still remain near Super B’s Convenience.

Despite the stunted forests we observed during our two visits, we were told by many BCN members that taller/straighter trees that are good for building can be found in small pockets throughout the area, often farther inland from the lakes.

Aside from these few examples, all other housing in Bunibonibee seems very typical of 1950s and 1960s government reserve housing (see examples in Figure 51 and 52).



Figure 50 : examples of small-scale timber buildings.

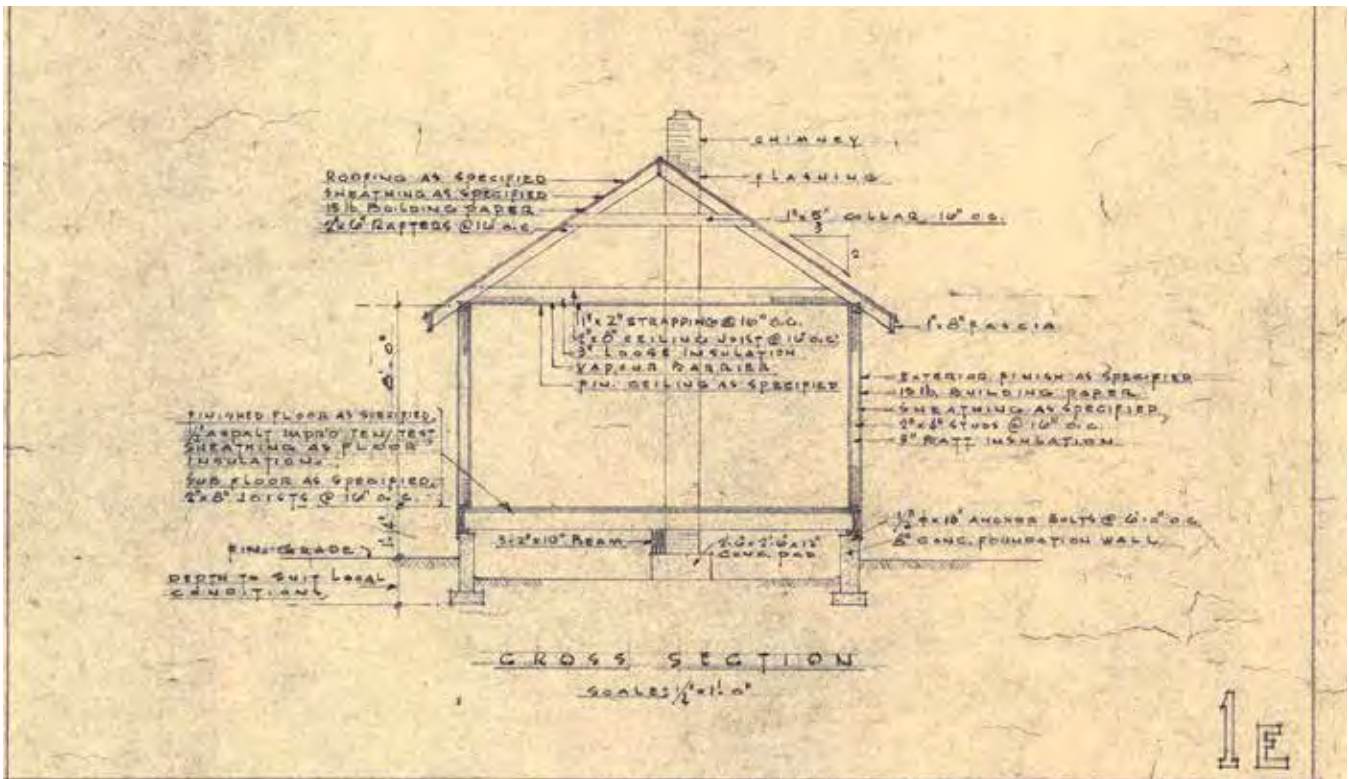


Figure 51 : Government blueprints - Cross Section of 'Indian House type 1' from the 1960s — one of the designs used for reserve housing. Source: Library and Archives Canada.



Figure 52 : Government blueprints for 'Indian House type 5' from the 1960s — one of the designs used for reserve housing. Source: Library and Archives Canada.



4.0 GOVERNANCE

4.1 GOVERNANCE

Bunibonibee's governing band council is elected under the First Nations Elections Act, consisting of a Chief and six Councillors for a two-year term. The current administration, whose term expires December 2, 2019, is Chief Timothy Muskego, and Councillors Tommy Weenusk, Paul Hart, Luke Muskego, Catherine (Tessa) Weenusk, Forbes (James) Weenusk and Paul Weenusk.

- Bunibonibee Cree Nation is a member of :
- Keewatin Tribal Council (KTC), the regional technical/political council
- Manitoba Keewatinowi Okimakanak (MKO), the northern regional political council
- Assembly of Manitoba Chiefs (AMC), the provincial political council
- Assembly of First Nations (AFN), the federal political council.

4.2 HOUSING GOVERNANCE AND FUNDING

During our first visit, we discovered that there is effort being made to make a detailed housing inventory but there is still no clear method for housing allocation. Therefore, we would highly recommend the community take advantage of the ISC program to develop a housing development committee and/or introduce a grading system to determine how houses are distributed to members. For example, members in overcrowded households would be at the top of the waiting list to be re-located.



5.0 HOUSING

5.1 HOUSING TYPES

In our visit we saw many different housing types from multi-unit single storey residential to 6 bedroom two storey homes. The most desirable housing types based on community input were the newer 6 bedroom split-level homes but it seemed that many people were happier with anything larger than bungalow.

Topic	Characteristics	Total	Male	Female
		Counts (unless otherwise specified)		
Population and dwellings	Population; 2016	1950		
	Population; 2011	1864		
	Population percentage change; 2011 to 2016	4.6		
	Total private dwellings	377		
	Private dwellings occupied by usual residents	334		
	Population density per square kilometre	38.2		
	Land area in square kilometres	51.01		
Age characteristics	Total - Age groups and average age of the population - 100% data	1950	1000	950
	0 to 14 years	700	370	330
	0 to 4 years	270	150	125
	5 to 9 years	225	115	110
	10 to 14 years	200	105	95
	15 to 64 years	1130	580	555
	15 to 19 years	205	100	110
	20 to 24 years	175	90	80
	25 to 29 years	145	75	75
	30 to 34 years	125	55	70
	35 to 39 years	105	50	55
	40 to 44 years	105	60	40
	45 to 49 years	85	45	35
	50 to 54 years	70	35	35
	55 to 59 years	60	30	35
	60 to 64 years	55	35	20
	65 years and over	115	50	65
	65 to 69 years	35	20	15
	70 to 74 years	30	15	15
	75 to 79 years	15	5	10
	80 to 84 years	15	5	15
	85 years and over	15	0	10
	85 to 89 years	10	0	5
	90 to 94 years	5	0	5
	95 to 99 years	0	0	0
	100 years and over	5	0	0
	Total - Distribution (%) of the population by broad age groups - 100% data	100	100	100
	0 to 14 years	35.9	37	34.7
	15 to 64 years	57.9	58	58.4
	65 years and over	5.9	5	6.8
	85 years and over	0.8	0	1.1
	Average age of the population	26.8	26.2	27.4
Median age of the population	21.9	21.7	22.2	
Household and dwelling characteristics	Total - Occupied private dwellings by structural type of dwelling - 100% data	335		
	Single-detached house	295		
	Apartment in a building that has five or more storeys	0		
	Other attached dwelling	35		
	Semi-detached house	15		
	Row house	20		
	Apartment or flat in a duplex	0		
	Apartment in a building that has fewer than five storeys	5		
	Other single-attached house	0		
	Movable dwelling	0		
	Total - Private households by household size - 100% data	335		
	1 person	30		
	2 persons	30		
	3 persons	20		
	4 persons	40		
	5 or more persons	215		
	Number of persons in private households	1920		
	Average household size	5.7		

Figure 53 : 2016 Census Profile data. Source: Statistics Canada (www12.statcan.gc.ca).

DETAILS

TYPE:

SINGLE DETACHED

TOTAL AREA:

800-1000 sqft

FOUNDATION:

Shallow concrete footings

BEDROOMS:

3-4

WASHROOMS:

1

STORIES:

1 STOREY

CRAWLSPACE:

YES

HEATING:

electric furnace or baseboard
(occasional wood stove)

VENTILATION:

NONE



Figure 54 : split-level with broken windows and add-on water tank room

3-4 bedroom bungalow

This is the most common housing type in BCN - a 1 storey, 3-4 bedroom home with a crawlspace. Typically the home is an open plan with connected living-room and kitchen. There is only 1 washroom. The roof is a low-slope, asphalt-shingled gable roof with insulated attic and “popcorn” gypsum board ceiling finish.

If not on the water supply line, the house will have an exterior potable water tank room approximately 10’ x 10’. Some people have added an exterior porch and/or extra room to the exterior.

Most septic systems consisted of a tank buried behind the home next to a septic field. Most houses also have either electric furnace heating or electric baseboard heating with only a few people still using wood stoves.

Housing Issues Observed by Community members

- smashed/broken windows are common
- wood panel wall finishes and vinyl flooring need replacing in older homes
- crawlspace is not vented, homeowners need to purchase a crawlspace humidex or else deal with poor air quality and odour.
- foundations are cracked and/or heaving, poor site drainage overall. Weeping tile is not used and granular fill is used sparingly if at all.
- no emergency heat in case of power outage
- water lines between the home and water tank room often freeze
- not enough washrooms



Figure 55 : abandoned concrete footings in southern neighbourhood of BCN



Figure 56 : bungalow with separate water tank shed, the structure should share a wall with the house to prevent freezing pipes.



Figure 57 : bungalow with covered porch and small out-building using local logs



Figure 58 : bungalows with add-on water tank rooms



Figure 59 : bungalow with add-on front vestibule using local logs



Figure 60 : bungalow with add-on water tank room

Construction Assemblies

E0 - Crawlspace Wall
8" concrete wall

F0 - Crawlspace Floor
undisturbed soil

F1- Main Floor
vinyl flooring
1/2" asphalt impregnated ten/test sheathing as floor insulation
plywood or OSB subfloor
2x8" joists @16" o/c

E1 - Exterior Wall
vinyl siding
15lb building paper
plywood or OSB sheathing
2x4" studs @16" o/c
3" batt insulation
vapour barrier
wood panelling

R1- Roof
Asphalt shingles
plywood or OSB roof sheathing
15lb building paper
Pre-engineered wood trusses
blown insulation
vapour barrier
1x2" ceiling strapping @ 16" o/c
popcorn ceiling
* Roof vents at gable ends
* Solid soffits



Figure 61 : tour of local elder's home

DETAILS

TYPE:

SINGLE DETACHED

TOTAL AREA:

1600-2000 sqft

FOUNDATION:

Shallow concrete footings

BEDROOMS:

4-6

WASHROOMS:

2

STORIES:

2 STOREY

CRAWLSPACE:

NO

HEATING:

electric furnace or baseboard

VENTILATION:

NONE



Figure 62 : split-level with broken windows and add-on water tank room

4-6 bedroom split-level

This is the second most common housing type in BCN - a split-level, 4-6 bedroom home. Typically the home is an open plan with connected living-room and kitchen. There are normally 2 washrooms. The roof is a low-slope, asphalt-shingled gable roof with insulated attic.

If not on the water supply line, the house will have an exterior potable water tank room approximately 10' x 10' or, as in some of the newer homes, the water set will be in the lower level. Some people have added a porch and/or extra room to the exterior.

New houses have either electric furnace heating or electric baseboard heatings with only a few people still using wood stoves.

Housing Issues Observed by Community members

- smashed/broken windows
- wood panel wall finishes and linoleum flooring need replacing in older homes
- crawlspace is not vented, homeowners need to purchase a crawlspace humidex or else deal with poor air quality and odour.
- foundations are cracked and/or heaving, poor site drainage overall. Weeping tile is not used and granular fill is used sparingly if at all.
- no emergency heat in case of power outage
- water lines between the home and water tank room often freeze
- not enough washrooms



Figure 63 : split-level with add-on water tank room



Figure 64 : split-level with broken windows and add-on water tank room

Construction Assemblies

F0 - Basement Floor

1/2" pressure-treated plywood
pressure treated wood floor joists resting on edge of footings
Vapour barrier?
granular fill
24" drain-through concrete footing o/c of foundation wall

E0 - Basement Wall

1/2" pressure-treated plywood extended below grade
1 1/2" XPS rigid insulation R7.5
1/2" pressure-treated plywood
2x6" pressure treated stud wall
6" batt insulation
Vapour barrier
strapping @ 16" o/c?
1/2" GWB, paint finish

F1- Main Floor

finish flooring,
plywood subfloor
open web wood floor joists
1/2" GWB, paint finish

E1 - Exterior Wall

7/16" composite wood panel Siding
1 1/2" XPS rigid insulation R7.5
1/2" pressure-treated? plywood
2x6" pressure treated? stud wall
6" batt insulation
Vapour barrier
strapping @ 16" o/c?
1/2" GWB, paint finish

R1- Roof

Asphalt shingles
c/w ice & water shield underlayment 48"?
3/4" (19 mm) T&G plywood or OSB roof sheathing
Pre-engineered wood trusses
blown insulation
vapour retarder?
3/4" (19 mm) ceiling strapping @ 16" o/c
1/2" GWB, paint finish
Roof vents at gable ends
Solid soffits



Figure 65 : tour of bi-level home under construction



Figure 66 : single-level row house with 3 units

OTHER

Amongst some of the bungalow and split-level homes we observed several other housing types that do not fit in these categories. Most of which are not replicated anywhere else in the community. This includes several mobile homes, 2-level duplexes, single-level row houses of 3-4 units, and custom small-scale timber structures.



Figure 67 : mobile home



Figure 68 : 2-level triplex



Figure 69 : 2-level duplex



Figure 70 : single-level row house with 3 units



Figure 71 : small-scale timber bungalow



Figure 72 : mobile homes



Figure 73 : mobile homes



Figure 74 : one bedroom bungalow with add-ons

5.2 BUILDING SYSTEMS

5.2.1 foundations

Foundations types in Bunibonibee

Crawlspace or basement walls on concrete strip footings

- We found almost all foundations in Bunibonibee to be pressure-treated framed walls or concrete block walls on top of concrete strip footings. Typically the older homes use concrete block walls while newer homes use pressure-treated 2x6s - according to testimonies by community members, this is due to the high cost of shipping concrete.
- Pressure-treated stud walls were typically clad in pressure-treated plywood while concrete block walls were parged. The newer split-level homes are built on gravel pads.
- There was no evidence of weeping tiles being installed in the newer homes and community members confirmed that weeping tiles have never been used in any of the foundations.

Wood crib

- Wooden crib foundations are a very inexpensive foundation type that can be adjusted as the ground moves.
- We found only a few examples of this. One was supporting a mobile home, the others supporting add-on vestibules or standalone sheds.

Recommendations

Any of the foundations shown in Figure # would be deemed suitable for this area, however, we would recommend a more in-depth cost estimate, geotechnical surveys and on-site testing be done to more accurately determine the best foundation for this area.

Based on our research and the two site visits to the community, we would recommend a **multipoint/space frame foundation** above all others for several reasons:

- not reliant on soil conditions. Geotechnical surveys are rarely conducted so the community has been operating on a trial and error basis.
- require minimal maintenance. Most homeowners do not have access to the tools needed to maintain foundations.
- lightweight. The high cost of shipping has already caused the community to switch from concrete to pressure-treated walls in foundations.
- Simple assembly. There is no need for heavy equipment or extensive leveling.

If a multipoint foundation system proves too costly for the community, the next best solution would be a **helical pile foundation** for the below reasons:

- suitable for undisturbed soils
- require minimal maintenance.
- lightweight.
- simple assembly. Helical piles can be screwed into the soil by hand if need be.
- very inexpensive compared to most other foundation types.



Figure 75 : new split-level home under construction



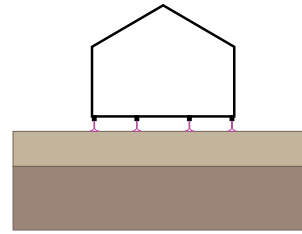
Figure 76 : older bungalow on concrete block foundation



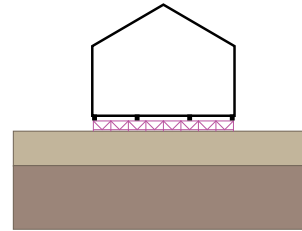
Figure 77 : abandoned concrete block foundation



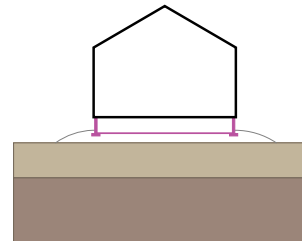
Figure 78 : abandoned concrete strip footings



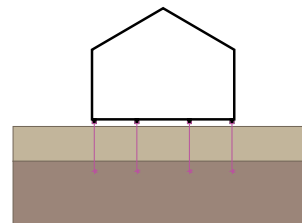
F1 - Screwjack



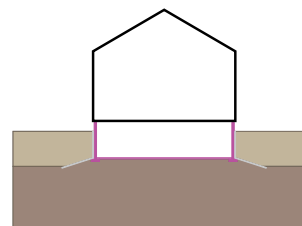
F2 - Multipoint / Spaceframe



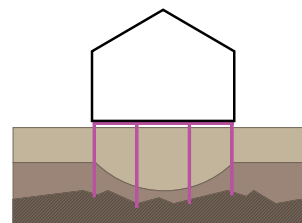
F3 - Crawlspace on Granular Fill



F4 - Helical Pile / Groundhog



F5 - Full Basement insulated below frost level



F6 - Bedrock foundation

Figure 79 : Foundation Types presented at Second Session

5.2.2 Structure

Structures in Bunibonibee

Wall Types

Typical Stick Frame Construction

- Most common construction type, newer homes using 2 x 6, 16" o.c studs and some older homes using 2 x 4 studs with unknown stud spacing.

Log Construction

- 10 -12" logs are an alternative used by the local Manitoba Conservation Office.
- 4-5" small-scale timber logs are another alternative used by community members. It is the only structural system that does not rely on sources outside the community with the exception of the fasteners.

Roof Types

- 2 x 4 Truss Roof 24" o.c. Insulated Attic

Floor Types

- Main Floor - 2 x 12 Joists or Open Web Floor Trusses @16" o.c. Main Floor
- Basement Floor - pressure-treated joists of unknown size
- Crawlspace Floor - none, dirt floor

Recommendations

Heaving foundations are the primary cause of structural issues, not the roof, floor or wall types. Recommendations for a more effective building envelope are covered in 5.2.3. and 5.4.10.

5.2.3 Building Envelope

5.2.3.1. Walls

- A "Mooney Wall" approach was selected after reviewing multiple types of exterior wall systems. This system uses methods and materials familiar to local crews. As described throughout this report, homes are overcrowded and subject to extreme vapour pressure causing high vulnerability to mould. Continuous vapour barrier is the most significant determinant of success in an airtight cavity wall system. Therefore, it is highly advisable to place this critical element away from threats to its continuity, including electrical penetrations and the drywall installation process.

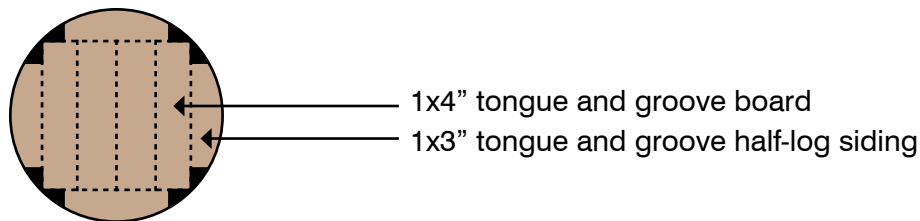


Figure 80 : 5" small-scale timber section showing cut lines for making exterior and/or interior siding boards.



Figure 81 : new split-level home crawlspace walls



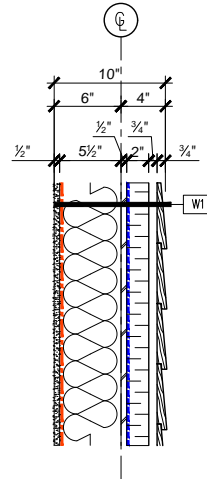
Figure 82 : new split-level home main floor trusses



Figure 83 : 10-12" log home, Maintoba Conservation Office

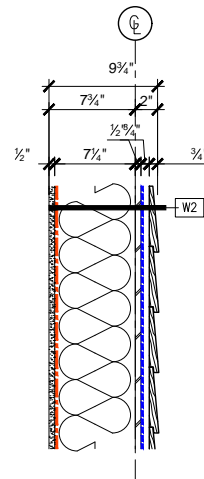


Figure 84 : locally-sourced small-scale timber structure



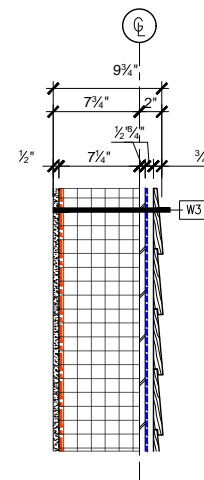
W1 - 2x6 Wood Stud Walls + Rigid Insulation

- 1/2" impact-resistant GWB (abuseboard), paint finish
- Smart vapour retarder (MemBrain or approved equal)
- 2x6" Stud framing @ 16" o.c. or 24" o.c. as per structural filled with R-22 batt insulation
- 1/2" OSB sheathing
- Spun bonded polyolefin (house wrap)
- 2" rigid insulation: extruded polystyrene
- Air barrier
- 3/4" strapping
- Pre-finished engineered wood siding



W2 - 2x8 Wood Stud Walls

- 1/2" impact-resistant GWB (abuseboard), paint finish
- Smart vapour retarder (MemBrain or approved equal)
- 2x8" Stud framing @ 16" o.c. or 24" o.c. as per structural filled with R-22 batt insulation
- 1/2" OSB sheathing
- Spun bonded polyolefin (house wrap)
- 3/4" strapping
- Pre-finished engineered wood siding



W3 - Prefab Structurally Insulated Panels (SIP)

- 1/2" impact-resistant GWB (abuseboard), paint finish
- structural insulated panel (SIP)
- foil radiant vapour retarder
- foamed-in-place 2x8" stud framing @ 16" o.c. or 24" o.c. as per structural filled with closed cell polyurethane foam
- 1/2" OSB sheathing
- Spun bonded polyolefin (house wrap)
- 3/4" strapping
- Pre-finished engineered wood siding

Figure 85 : Wall Types presented at Second Session

- Continuous insulation principles reduce thermal bridging and enhance energy efficiency. Conventional wall systems typically use rigid insulation installed outside the structural studs and sheathing. However, this leads to construction complexity and siding fastening difficulties. Also, some types of rigid insulation may not be vapour permeable enough to release moisture that inevitably makes its way into the wall assembly. The Mooney Wall system places wood framing inside and perpendicular to the structural wall as a service plenum. This allows for an additional maximum 1/3 insulation value on the warm side of the vapour barrier. It is critical that no more than 1/3 of the insulation is inside the vapour barrier, otherwise the dew point is moved too far inside the wall and could result in moisture condensation within this interior insulation layer. Thermal bridging is limited to the single points of contact between the service plenum and the structural studs
- These are other considerations used in the selection of wall construction types:
 - Durable exterior materials such as cement board siding or engineered wood siding are critical. Standard wood siding is very vulnerable and vinyl is easy to damage.
 - An alternative solution would be locally-sourced small scale timber siding. Although it is less durable, the surrounding forest is a reliable source for replacement pieces. All other siding products must be sourced from outside the community.
 - 3/4" strapping should ALWAYS be installed before the siding. This air space allow for proper drainage and ventilation of the wall system (also called "rainscreen" system.
 - Any of the walls types in Figure 85 are acceptable for this area but we would highly recommend Prefab SIP walls as they require the least amount of skill and time to install
 - Community members prefer drywall (gypsum wall board — GWB) over all other types of interior finishes. Moisture-Resistant GWB is currently used on all walls in new homes. In addition, it is recommended to use fiberglass-backed GWB in wet areas such as behind plumbing and in washrooms and the water set room. This variety has no paper backing, and presents no food source for mould.

5.2.3.2 Windows

Materials

- We highly recommend triple-pane fiberglass windows (double - or single- hung instead of casement if possible). An even more durable option would be to use sliding door frames in place of window frames, which would be more robust and more able to support the added weight of laminated and tempered glass recommended below.
- Wooden window frames are preferred by community members for repairability but are much more vulnerable to UV and moisture damage, expensive, and not recommended. Vinyl is typical in residential applications, but is also vulnerable to UV damage, less easily repaired, and has a significantly different thermal expansion/contraction behaviour compared to supporting wood framing. Fibreglass has excellent thermal performance and nearly identical thermal expansion/contraction to wood. It is more expensive, however.
- Triple pane is recommended for the Northern Manitoba climate. Casement windows tend to become inoperable much faster than double- or single-hung windows due to fragile hardware.
- Nearly all homes in Bunibonibee had broken windows. UV-stable polycarbonate (Lexan) would be one option, but has significantly different thermal expansion/contraction behaviour compared to glass, and wouldn't be appropriate for use in a sealed unit. Rather, it could be used as a storm window on the outside surface. However, it is very expensive, has a lower light transmittance, yellows over time, and doesn't resist scratching as well as glass. UV and scratch-resistive layers may delaminate with time.
- Another option is laminated glass, two layers of glass heated with a polyvinyl butyl (PVB) core. This glass stays in the frame even if it is broken, beneficial because ad-hoc repairs like OSB, plywood, or other salvaged materials may fill the hole but significantly compromise the building envelope. It is less expensive than Lexan.
- Tempered glass is less expensive than laminated glass, is impact-resistant, and breaks into safer



Figure 86 : drywall damage below an improperly installed window



Figure 87 : recently abandoned home.

cube-like pieces.

- Annealed glass is the least expensive option, but clearly isn't durable enough for Bunibonibee.
- Therefore, our recommendation is one layer laminated glass on the outside face of the window, annealed glass (plate glass) at the middle lite, and tempered glass on the inside face to reduce the likelihood of breakage.

Sizing

- Windows should minimize frame length to glazing ratio to minimize air leakage at the frames connection to the wall.
- We recommend the community establish a standard window size and window hardware so that the community can order replacement panes/frames/hardware in a more efficient manner. We have shown 4'-0" x 4'-0" double-hung windows and 4'-0" x 2'-0" sliders windows in the prototypical house design.

Views & Placement

- Windows should be placed to the east to capture the low morning sun and to the south to maximize solar gain.

Installation

- In terms of installation, all openings in the building envelope should have lapped membranes and proper flashing. Shim spaces should be filled with low-expanding foam, topped with a backer rod and sealed with caulk at the edge
- adding heaters or an intake air vent below the window help re-circulate the air dropping off the cold windows

Doors

- Doors in Bunibonibee tend to jam when foundations heave or settle. Cross bracing around all exterior doors is recommended to maintain rigidity in these areas.
- Similar to windows, we would recommend that the community establish a standard door size as well as standard door hardware such as locks. Replacement locks are highly sought after in Bunibonibee due to the high level of break-ins.

5.2.3.3. Roof

Materials

- One option for roof finishes is asphalt shingles (fibreglass backing). This uses methods familiar to local crews, is widely available, and is a less expensive option.
- Standing seam w/ concealed fasteners is another option, but is significantly more expensive and uses methods not familiar to local crews. Accumulated snow has the potential to spontaneously release from this roof, and snow fencing is required at slopes that end over pathways.
- Stone-clad metal (ex. Decra) w/ non-slip underlay is highly durable, more expensive than asphalt shingles and less expensive than conventional standing seam, and would be possible for local crews to install. Snow does not spontaneously release in large amounts; snow behaviour is similar to asphalt shingles.
- Standing seam pre-finished panels with concealed fasteners is a good option for this home. These are steel shingles that snap together; they are more expensive than asphalt shingles, but easy to install and not as expensive as stone-clad steel shingles or conventional standing seam roofs. Accumulated snow has the potential to spontaneously release from this roof, and snow fencing is required at slopes that end over pathways. In the prototype design, pathways are not located under slope terminations.
- We DO NOT recommend corrugated / flat metal as the exposed fasteners don't last
- Lighter colour = longer life

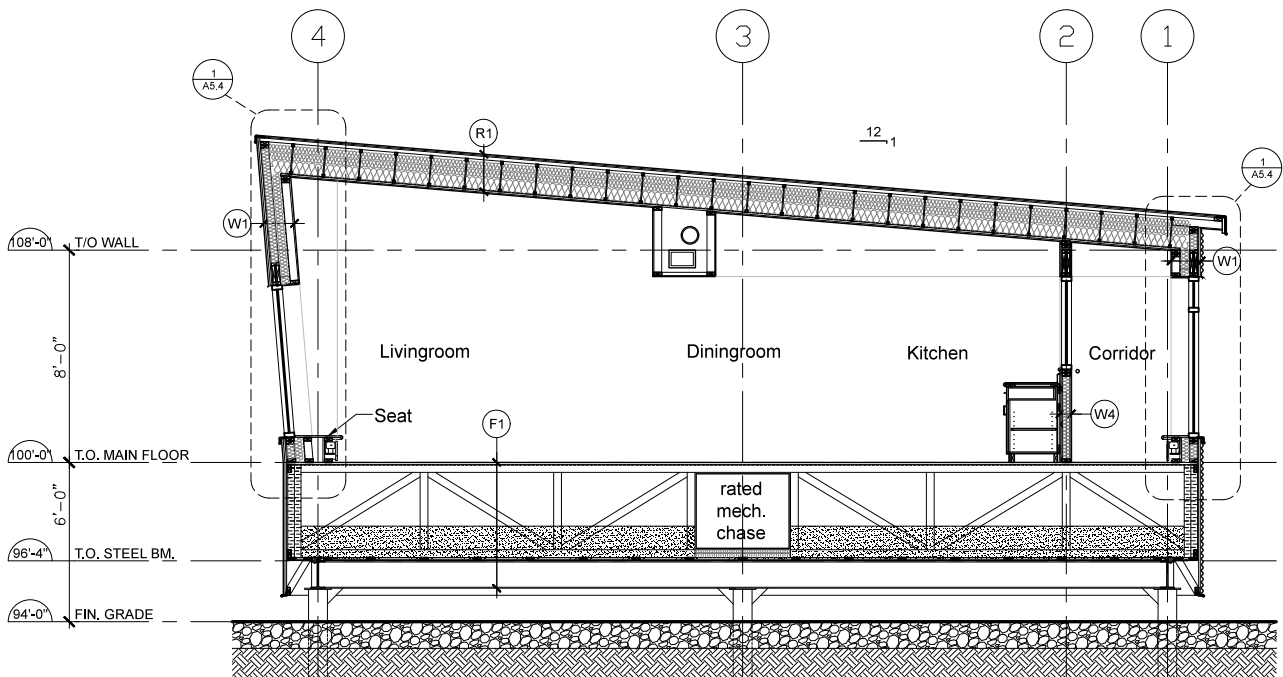


Figure 88 : building section showing above-ground deep floor trusses and rated mechanical chase
 Source: GUY Architects, Yellowknife, NWT



Figure 89 : water tank room add-on examples

Structure

- We highly recommend 20" heel trusses to allow for a cold roof system which will prevent ice damming at the eaves. (16" insulation + 4" airspace).
- Scissor trusses are recommended to increase the usable square footage of the house at a comparable cost to standard roof trusses
- For ease of installation, a ridge beam located at the peak is recommended to keep individual trusses small so a crane is not required.

Ventilation and Protection

- Ridge vents, gable vents and other surface mounted roof vents are recommended for extra ventilation. To achieve positive roof venting:
 - maintain airspace of minimum 4" / 100 mm between top of insulation and roof deck; this requires a high heel truss 20" / 500 mm
 - locate venting at outer extent of eaves, apex of roof, and gables
 - protect gable vents from snow inflow with louvres, and locate under roof overhangs.
 - protect apex roof vents from snow inflow by selecting either ridge vents or "whirlybirds" — upstands with wind turbines, height exceeding the roof peak.
- Don't forget bug screens! Small critters love to make their home in roof attics and bug screens are a simple and inexpensive way to prevent them from getting in.
- 4' ice and water shield recommended at the eaves to protect from ice damage
- Eavestroughs, and flashing at the eaves are recommended to protect the house siding
- Significant snow accumulation is anticipated on the leeward side of each home. Detailed snow pattern does not fall in the scope of this study, however snow removal and on-site storage will be a concern. Recommendations include:
 - steep roof slope to minimize accumulation, which can otherwise compromise eaves, roofing, and eavestroughs
 - eavestroughs to protect from shingle uplift during freeze/thaw cycles
 - limit the length of pedestrian and vehicular approaches
 - site homes with the primary entrance wall and driveway in parallel with prevailing winds (for Bunibonibee, winter winds are primarily west/northwest, therefore ideally main door faces east or southeast with driveway parallel).
 - shelter primary entrances under canopy or roof overhang

5.2.3.4 Floor

Materials

- For floor finishes we recommend marmoleum (linoleum), hardwood, ceramic tile or carpet tile. Low VOC is preferred for better indoor air quality. DO NOT use laminate or vinyl tiles if possible. Laminate degrades quickly while vinyl contributes to poor indoor air quality and cannot be recycled at the end of its life.

Main floor on Above-ground foundation

- For above-ground foundations we recommend deep floor trusses w/ a rated plumbing chase to prevent pipes from freezing. Above-ground foundations should also be clad in pressure-treated plywood or any other siding material rated for grade contact. This recommendation comes from many community member testimonials about snowmobile accidents and stray dogs making homes within the space between the grade and the floor.

Main floor above unheated crawlspace

- Main floors above an unheated crawlspace can use open web floor trusses or floor joists but they will require either batt insulation or loose fill insulation between the floor joists. In either case, the insulation must be held from falling into the crawlspace using an air barrier and a layer of



Figure 90 : drywall damage below an improperly installed window



Figure 91 : wood pellet delivery using flatbed truck and forklift. Source: www.woodpellets.com

fibreboard sheathing fastened to the underside of the joists,

- Crawlspace should never have bare soil floors. We recommend using a layer of sand, a layer of concrete slurry sloped to the sump pit drain and polyolefin (15 mil fibre reinforced)

Main floor above basement

- Main floors above a basement can simply use open web floor trusses or floor joists at the main floor as the basement is presumably heated and well-insulated
- Basement floors are recommended to be a 4" poured concrete slab on polyethylene on a 6" compact granular fill layer OR a treated subfloor on treated floor joists on treated wood sleepers on polyethylene on 6" compact granular fill layer.

5.2.4 Septic and Water

- approximately 1/3 of the community is connected to the water treatment plant and the sewage system.
- the rest of the community relies on primarily on water delivery and septic field system. Most water tanks hold around 1000 gallons and it is common for most households to have a water room added to the outside of the existing structure.
- Septic tanks are often buried along the rear wall of the house

Recommendations

Septic

- Septic tanks should be heat traced and located outside the home, as close to the bathroom as possible.
- Ideally, septic tanks are buried with robust ground anchors, insulated, with sufficient heat tracing that is connected to the emergency generator.
- The sewage connection is a vulnerable point in the home, subject to freezing and disconnection due to differential movement between the home and the tank.
- Recommend heat tracing and insulation of the sewage connection. If a telescoping connection is available, this would be ideal.
- The sewage waste strategy would benefit from further research.

Water

- Water tanks should be located in a separate room on the main floor to prevent freezing and pipe breakage associated with having 2 separate foundations. It would be best to keep this room closer to the road for water truck access and to finish the interior with waterproof finishes (ie. vinyl sheet flooring).
- the floor of the water tank room should have a floor drain leading to the sump pit in the event of spillage during refill/cleaning operations.
- Water tanks should also be outfitted with a water level sensor that indicates to water delivery service when the tank is empty.

5.2.5 Heating and Ventilation

Heating

- Most new homes in Bunibonibee rely on forced air electric furnaces which is concerning for homeowners in an area that experiences frequent power outages.

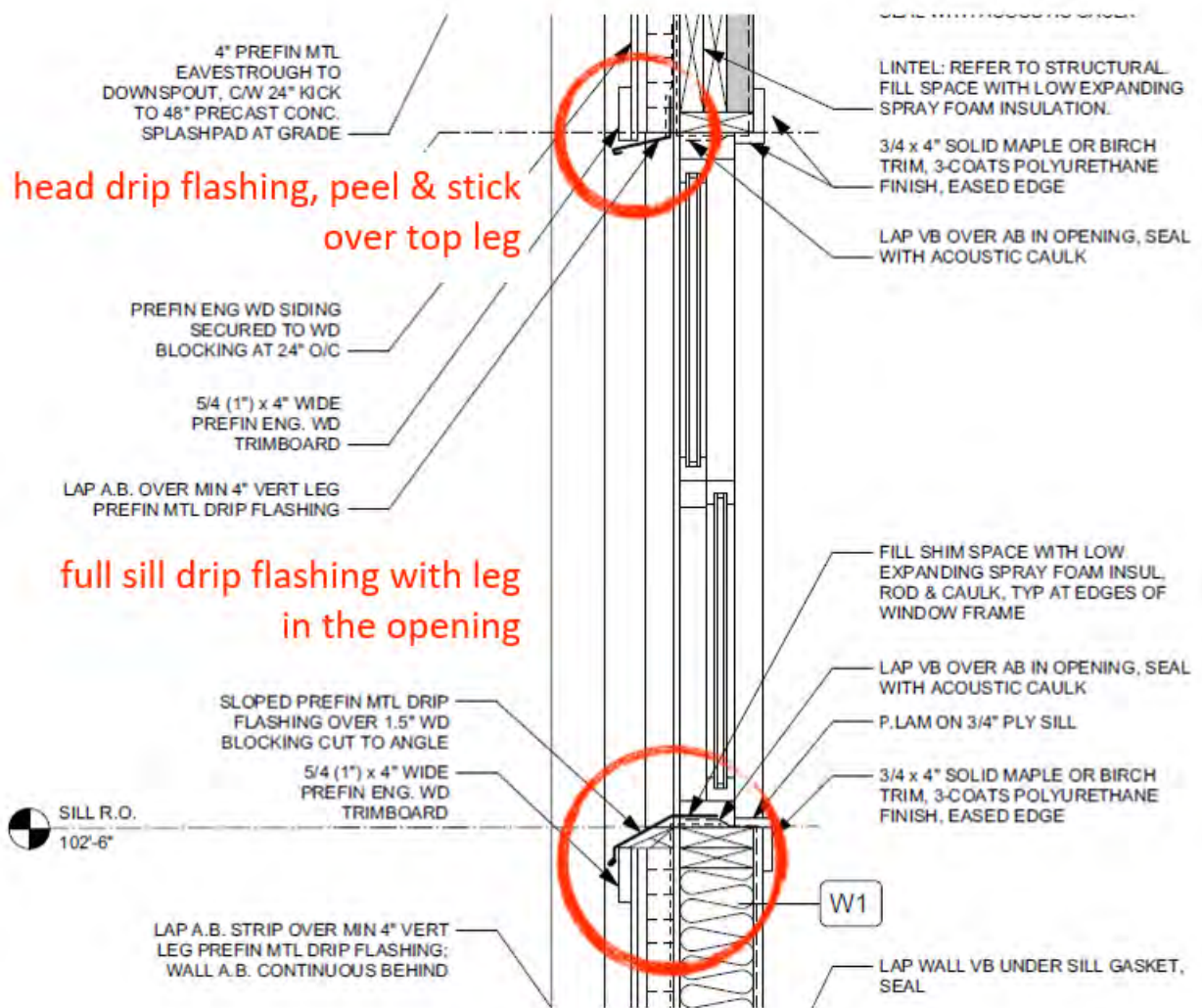


Figure 92 : illustration presented at Second Session

- Testimonies from community members revealed that nearly everyone would prefer a wood stove in the home. The wood used for fuel can be collected at minimal cost and they would no longer rely entirely on the power grid for heat.

Ventilation

- Based on observation and testimonials, ventilation is very poor in most houses in Bunibonibee
- Most homes with crawlspaces require a humidex to remove humidity, which helps to eliminate mould and odours. Unfortunately, replacement parts and repair services are scarce.
- Many homes rely completely upon windows for ventilation, several members mentioned that they often blocked floor vents to prevent odours coming up from the crawlspace.
- Furnaces?
- HRVs (Heat Recovery Ventilator) are often unplugged and left unused. Replacement parts and servicing personnel are simply unavailable.

Recommendations

- all homes should be equipped with a wood stove for emergency heating
- an alternative heating source that relies on local materials is a wood pellet stove. There are several advantages to using wood pellet stoves instead of regular wood stoves:
 - easy to operate, often only need to be loaded once a day
 - Pellets create considerably less ash than firewood, giving off less creosote, a flammable byproduct of combustion that can build up and cause chimney fires.
 - Wood pellets are heavily compressed, which reduces their moisture content and overall weight. Dryer fuel creates more heat, causing the pellets to burn hotter and cleaner than their wood counterparts.
 - no wood splitting!
 - takes advantage of wood waste byproducts such as sawdust.
 - Locally produced. Wood pellet mills provide jobs, support local economies and can lead to energy independence.
 - Easy to store. A ton of pellets consists of fifty 40-lb bags and stacks neatly on a 4' x 4' wood pallet.
- Two story homes must be ventilated to pull heat from the upstairs and move it to the main floor.
- Further action needs to be taken to properly ventilate roof areas. See 5.2.3.3. Roof.
- Coordinate a day for HRV/Humidex servicing by an experienced technician. Either bi-annually or annually.

5.2.6 Vestibule

Vestibules in Bunibonibee:

- either non-existent or owner-added
- owner-added vestibules are often subject to differential setting as they are on a different foundation. Very similar to add-on water tank rooms.
- typically a 90 degree turn between vestibule and the main home
- storage for outdoor equipment is often shared between the vestibule, entryway in the main home, crawlspaces and outdoor sheds

Recommendations

- all new homes should be designed to accommodate a mudroom/vestibule to act both as storage space and as an airlock for transitioning between the main living spaces and the outdoors. Many community members also expressed the need for a room to process animals.
- a porch will help to avoid snow build-up and precipitation at the entrance. Walls may also be added instead of railings to create a windbreak from the steady western wind during winter.

5.3 OWNER ALTERATIONS & REPAIRS

Home alterations and repairs include:

- Mudroom, often clad in siding or plywood.
- Water tank room
- Wood burning stove to supplement electric baseboard heating
- Plywood over broken windows
- Tarps over damaged roofing

Yard structures and objects include:

- Fish smoking structures, made of stripped local timber poles
- Greenhouses, made of stud framing and clear polyethylene film
- Sheds used for workspaces, processing animals and storage, made of studs and plywood or small-scale timber
- Vehicles including boats, boat trailers, RVs, ATVs, snowmobiles, trucks
- fire barrels, homemade firepits,

5.4 DEFICIENCIES & RECURRING ISSUES

Speaking with local tradespersons and residents, several common issues were identified throughout the neighbourhood planning process, housing conceptualization, delivery, execution, operation, and maintenance lifecycle. For a more user-friendly and accessible set of recommendations, refer to the Second Session Presentation in Appendix D. This presentation was given at the first annual Keewatin Tribal Council housing conference in Thompson, MB, where Bunibonibee housing committee representatives attended, and again to trades at the second site visit to Bunibonibee. The following sections are a condensed summary.

5.4.1 NEIGHBOURHOOD AND COMMUNITY PLANNING — OBSERVATIONS

- There is no community plan in place for Bunibonibee. Homes are widely spaced along an extensive pattern of long roads, leading to a “string of pearls” development pattern. There is insufficient funding for road maintenance, therefore this sprawling pattern of development exacerbates long-term infrastructure deficits.
- Neighbourhoods are not walkable, almost all travel is by personal vehicle, and the community has very little identifiable or cohesive neighbourhood structure. Extremely poor road conditions were observed throughout, and residents reported high vehicle maintenance and replacement costs. Vehicle repair is not readily available in Bunibonibee.
- There is no topographical or geotechnical information available at the neighbourhood scale for Bunibonibee. Homes are located ad hoc based on trial and error investigation of soil conditions; for instance, abandoned concrete footings were seen in two locations where a near-surface water table was later observed. Organic wet soils (muskeg) are typical in the community, and discontinuous permafrost was reported by residents.
- Drawings for Bunibonibee are not readily available to consultants undertaking work in the building industry. The lands office has an array of drawings, mostly at a low level of resolution or at larger scales, but they are not fully organized or digitized, making it difficult to locate what’s required. For instance, drawings showing the extent of the existing municipal water supply were unavailable and consultants had to rely on first-hand accounts from when infrastructure had been originally installed.

5.4.2 NEIGHBOURHOOD AND COMMUNITY PLANNING — RECOMMENDATIONS

- Commission a 10-year community plan and update it each decade. A community plan assists leaders in making long-term planning decisions on a firm basis of research and data. It also mitigates the uncertainty inherent in the 2-year chief & council election cycle by reducing the political nature of planning decisions. When the engagement process is done well and guides the preparation of the final report, the document is a living voice of the community as a whole. A comprehensive community plan should accomplish the following:
- undertake significant Elder-led community engagement to guide the preparation of the document; chief and council may be involved, but voices from all four generations and all genders must be specifically invited to participate, using tools that are accessible to all persons regardless of language barriers, gender, or age.
- identify priorities for future development
- lay out future neighbourhoods following a denser pattern of homes and buildings to reduce infrastructure costs, ongoing road maintenance, and increase the feasibility of municipal sewage and water supply to future homes.
- provide walkable residential areas with identifiable boundaries, developed around shared amenity spaces such as a corner store, playground, or sport field / green space to encourage positive interaction between residents, and result in identifiable neighbourhood clusters.
- analyze demographic information to plan for a mix of future residence types that will accommodate mixed neighbourhoods that include housing suitable for adult singles, extended families, and Elders.
- prioritize future capital expenditures for public amenities
- locate suitable land for expanding or filling in vacant land in the community
- commission a topographic study of Bunibonibee at a 0.25 m increment in tandem with the community planning process, include as part of the final report.
- commission a geotechnical investigation to identify future development zones, especially for future residential neighbourhoods and commercial buildings. Undertake individual test holes and/or drill on a grid pattern, in tandem with the community planning process. Include findings as part of the final report.
- When drawings and reports are produced by consultants, include in the procurement process a requirement to supply as-built digitized (CAD & PDF) drawings.
- Hire an archivist to work with Lands personnel to fully digitize existing plans for the community, public buildings, and residences, and organize into a coherent folder structure using cloud-based storage that can be easily accessed and shared with consultants doing work for the community. Continually update as new drawings are produced by consultants.

5.4.3 HOUSING DESIGN AND PROCUREMENT — OBSERVATIONS

- Professionals (architect, engineers) were not employed to design or specify homes.
- Generally, materials for homes are purchased in bulk packages from Winnipeg-based suppliers. There is little if any community member input regarding home designs or specifications.
- Exact procurement methods were unclear, though a method was reported using a competitive bidding process where the supplier with the highest quote would be approached to provide an extra home using the same amount. Likely this was an effort to address the extreme housing deficit present in the community.
- An arms-length housing committee is not present in Bunibonibee; housing decisions are made by the councillor assigned to this portfolio, who may or may not have formal training or familiarity with the building industry. As with all councillors, this position is subject to the political concerns and unpredictability of the 2-year election cycle in Bunibonibee.



Figure 93 : drywall waste at construction site of new bi-level house.

- It was unclear if technical drawings are used for the construction of homes; drawing sets and specifications were not observed on site or available on request.
- Responsibility for housing procurement and delivery were exclusively male, while responsibility for the day-to-day long-term operation of the home was primarily female, leading to a disconnect between the home as designed and its responsiveness to everyday household life.
- Accommodation for culturally-specific activities was not observed in homes as built in the existing community. Some ad hoc outbuildings were observed to accommodate sweat lodge activities, wild food processing, and other culturally-relevant activities. Elements having to do with Mushkegowuk spirituality were kept very subtle as there is an observed reluctance to share these activities openly; residents reported a stigma associated with activities such as this, stemming from the colonial process and multiple generations of residential school.

5.4.4 HOUSING DESIGN AND PROCUREMENT — RECOMMENDATIONS

- Request from suppliers and keep a full-size print of technical drawings and specifications at each active job site.
- A long-term goal may be to develop a regionally suitable, climate-appropriate specification for materials and building methods used in homes, perhaps at the level of the tribal council. Use this document when procuring materials.
- Another long-term goal suitable for the level of the tribal council may be to develop a regional materials distribution centre. This has the potential for multiple economic benefits and is better able to tailor the supply of homes to the regional needs and patterns of northern communities.
- Establish an arms-length housing and capital projects committee with independent authority to make decisions related to housing and development. This leadership structure may be more effective in accomplishing the type of long-term planning Bunibonibee needs, because such an entity would:
 - insulate chief & council from political backlash related to individual or niche interests that are not shared by the larger community (as recorded in the Community Plan);
 - remove the community planning and housing procurement process from the unpredictability and unavoidably short-term nature of the 2-year election cycle;
 - members assigned to this committee could undertake training in building industry patterns and methods, developing long-term capacity and expertise in the community.
- Actively engage and recruit women into positions of responsibility in the decision-making process for housing procurement and design, and into the building trades.
- Recruit Elders and Mushkegowuk knowledge carriers to guide the process of thinking through a long-term strategy for house design and community planning. Include an Elders' honorarium for each major meeting concerning housing and community planning. Follow Mushkegowuk spiritual protocols when undertaking new developments and planning activities. Over time, this may help to reduce the stigma associated with following pre-contact cultural protocols, and lead to housing that responds better to on-the-ground household patterns of everyday life.

5.4.5 MATERIAL STORAGE - OBSERVATIONS

- Organization of tools and materials storage is not optimal — dedicated staff and infrastructure for woodlot inventory and storage are required.
- Site equipment is in some instances insufficient; for instance scaffolding is in short supply and reaching the end of its service life.
- When we visited an active construction site to see progress on the new bi-level homes we witnessed large piles of damaged drywall on the site. We were told by builders that over half of the drywall they use is thrown away because it is too damaged and often moldy from being stored outside.



Figure 94 : Construction materials stored outside without protection.

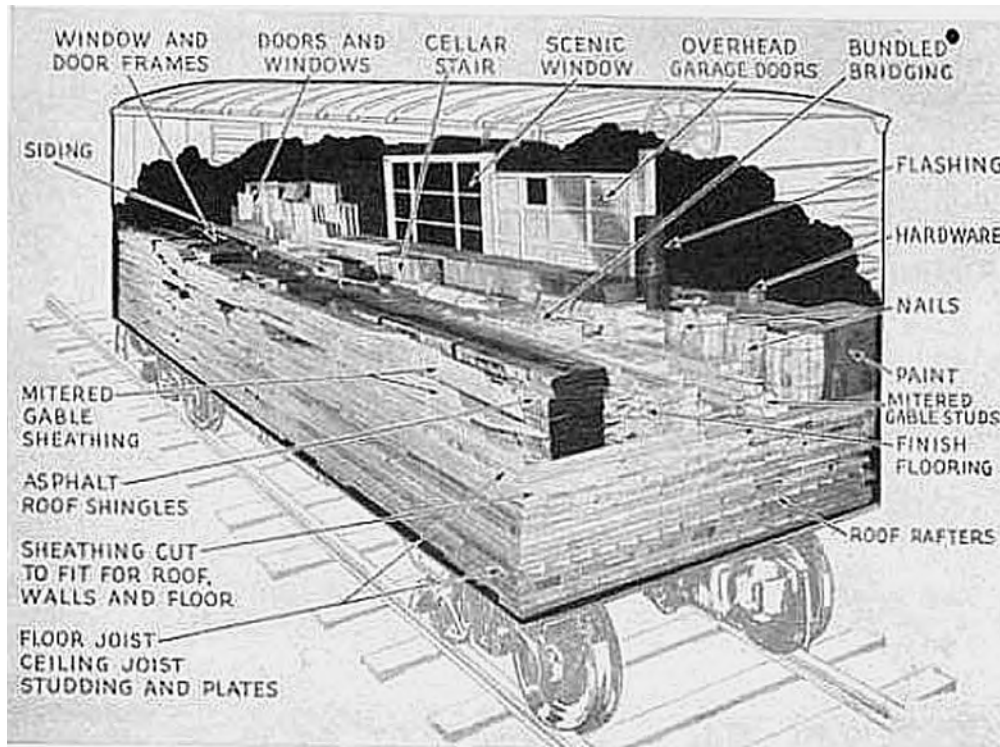


Figure 95: Aladdin Kit Homes Illustration. Source: <https://archive.org/details/AlladinReadi-cutHomesnotPrefabricate>

5.4.6 MATERIAL STORAGE - RECOMMENDATIONS

- Option 1: Build a warehousing facility; options may include a steel prefabricated shelter with multi-point foundation. Arrange for dedicated personnel who operate it similarly to a small lumber yard.
- Option 2: A long-term goal may be to undertake a regional distribution centre with delivery patterns tailored for communities in the region; this could happen at the level of the tribal council.
- Option 3: Request from suppliers that materials for each new house are delivered in individual shipping containers with materials sequenced for construction. For example, the foundation materials are packed last for transportation and unpacked first on site. This would leave builders with a secure, dry, temporary storage solution that could save significant amounts of material waste.

5.4.7 FORMAL TRAINING/CERTIFICATION OF TRADESPEOPLE — OBSERVATIONS

- Trades mentioned that it was very difficult to get journeyman presence to advance in their careers as certified builders. Journeymen frequently came for only short amounts of time, and not on a predictable schedule.
- While many local workers had expertise in the building industry, basic familiarity with building envelope best practice was not always present among all workers.

5.4.8 FORMAL TRAINING / CERTIFICATION OF TRADESPEOPLE — RECOMMENDATIONS

- Establish a predictable schedule for journeyman visits of minimum of one week duration. These could be keyed to building milestones such as foundations; rough framing; services rough-in; building close-up; finishing work. Undertaking homes in sequence (several homes at the same sequenced level of completion) may help mitigate the costs of these regular, longer visits.
- Perform annual training sessions for tradespersons on the principles of best practice in residential building envelopes. Each new employee should run through this training session when first hired. See example presentation developed by Smoke Architecture.

5.4.9 BUILDING ENVELOPE — OBSERVATIONS

- Windows are frequently broken, with ad hoc repairs typical (for further discussion see section on CPTED).
- Attic venting is insufficient; trades reported that attic insulation has been repeatedly been added to some homes in past years without maintaining a vented space between top of insulation and underside of roof deck (compromising the cold-roof principle), causing ice damming, roof failure, and moisture/mold issues.
- Roof and wall penetrations are frequently inadequately sealed, causing condensation within building envelopes and ice accumulation leading to moisture and mold issues.
- Water set and associated plumbing connections are not located within the building envelope, and do not share foundations with the home, leading to repeated movement due to frost heave, penetration gaps, frozen pipes, leaks, and associated building envelope problems.
- In new construction observed, crawlspace damproofing was not used. Materials used in the lower levels of the home were not suitable for use below grade; fiberglass batts and non-pressure treated wood is not acceptable for use below the level of native soils. Sill gaskets were not commonly used below wall plates. Existing homes observed had frequent issues with lower level mold growth and

mold forming at the lower extent of walls, in in the lower level. In particular the split-level homes (currently built with non-pressure-treated lower level wood framed floors with fibreglass batts in the framing space, and 5-mil poly as the only form of moisture control) must have adequate waterproofing (10-mil fibre-reinforced poly taped at seams “pool liner”, and mastic applied or peel-and-stick dampproofing at crawlspace walls), along with moisture-proof rigid insulation at the lower levels, all the way around below-grade walls up to the level of the adjacent soil.

- Weeping tile was not in use at exterior perimeter; this is considered standard for any build, and essential for the muskeg soils common in Bunibonibee.
- Flashings at openings were not generally to recommendations; see presentation in Appendix D for more detail.
- Eavestroughs and downspouts are not commonly used; uncontrolled water tends to cause infiltration into foundations, damage to the lower surface of the exterior cladding, and eaves are more vulnerable to shingle uplift.

5.4.10 BUILDING ENVELOPE — RECOMMENDATIONS

- See further discussion regarding windows in section on CPTED. Recommend triple-pane windows; exterior pane: UV stable polycarbonate; middle pane: plate glass; interior pane: tempered glass.
- Attic venting: use minimum 20” / 500 mm heel truss at eave to maintain 4” / 100 mm clear airspace above 16” / 400 mm attic insulation. Check annually that soffits and vents are clear.
- Perform annual checks of roof and wall penetrations; fill gaps with spray foam where required. Adequately detail penetrations during design and construction. No penetrations should be made to connect building elements that do not share the same foundation. Use best practice window & door, roof and wall penetration details, have detailed drawings readily available on every active job site.
- Construct new water sets to share a continuous foundation with the home.
- Recommend all new builds use multi-point foundations; even the best detailed and constructed crawlspace or conventional footing foundation will be vulnerable to failure in muskeg and discontinuous permafrost. Occupied levels of the home should all be above grade. Remediate existing homes with below-grade walls to include exterior perimeter weeping tile drained to daylight (into a ditch or swale), and apply exterior damp-proofing over new cement board at below-grade walls. Remove batt insulation below grade and replace with exterior SM-type extruded polystyrene rigid insulation.
- Use sill gaskets at all interior main level walls.
- Use best-practice details to construct new homes and retrofit existing homes with perforated soffits, clear attic vent space above insulation, roof venting strategy (ridge vent at roof peak; roof vents with upstands and rotating louvres (whirlybirds); and/or louvered gable vents), ice and water shield and drip flashings at eaves, and eavestroughs complete with downspouts to 48” kicks onto precast concrete splash pads or pea gravel. Check annually.

5.5 COMMUNITY ENGAGEMENT AND INPUT

5.5.1 First Visit

Community input was gathered both formally through engagement sessions at the high school and informally through conversations with community members throughout the duration of our stay. Our formal engagement sessions that took place in the highschool gymnasium typically consisted of presentations followed by discussion and questionnaires. Aerial maps and visuals (see Appendix B for boards) were provided alongside our presentation table for 3 days to help spur conversation and allow individuals to comment or draw on them when we were not present.

Formal sessions at 1972 Memorial High gymnasium

April 29, 2019

- 9am
 - short presentation by Smoke Architecture followed by Q + A discussion
 - standard presentation layout, presenters in front of several rows of seating
 - small turnout but lots of great conversation surrounding the boards and maps.
 - teacher, grade 7 students, a few local community members and council members
- 1:30pm
 - presentation by Smoke Architecture
 - presentation by Tommy Weenusk (councillor) on community draft plan followed by Smoke Architecture Q + A discussion
 - standard presentation layout, presenters in front of several rows of seating
 - majority of BCN's carpenters and a few local community members

April 30, 2019

- 9am
 - pancake breakfast
 - great turnout but no one stays for small table groups following breakfast
- 1:00pm
 - presentations by Smoke Architecture, Tommy Weenusk, CMHC + INAC following discussions about funding opportunities and organizing a housing committee
 - group layout, presenters in front of several table groups.
- 4:30pm
 - Smoke Architecture Q + A discussion with table groups
 - several community members and a few elders

May 1, 2019

- 9am
 - presentation by Tommy Weenusk and science fair students John and Shelby
 - group layout, presenters in front of several table groups.
- 10am
 - Smoke Architecture Q + A discussion with table groups
 - carpenters, local community members, grade 11/12 students

Informal Input Gathering

During our 3 day trip to BCN, we saw most of the community by truck with a few major exceptions. With the help of our liason Rex, and newly appointed chauffeur Howard, we were able to see construction in-progress of the new bi-level homes in the northern neighbourhood and have a tour of an elder's home in the southern neighbourhood. We also visited the radio station, Northern Store, Super B's convenience, and the Conservation outpost.

Of notable importance was our trip to The Cabin with students and the highschool's Outdoor Education Coordinator. Here we were given an overview of the curriculum and we witnessed traditional knowledge teachings in action when we later found the students in the forest behind The Cabin plucking ducks and geese for an upcoming community feast.



Figure 96 : April 29th, 1:30pm presentation to BCN's carpenters



Figure 97 : First Visit - informal conversations surrounding aerial maps and visuals

Informal conversations during these activities were extremely valuable as they allowed us to gain insight from many demographics that did not attend the engagement sessions. Although we did not have many chances to speak with either women or children, it is our hope that the next session will be easier for a wide audience to respond to.

Findings

- Conversations informed us that some community members are living in very crowded housing conditions. One example was a family of 17 living in a 4 bedroom bungalow.
- Ventilation is a major issue in current homes as the crawlspaces are typically not ventilated and weeping tile was not used in foundations
- Many community members responded positively to the ideas of including a screened-in porch, a mudroom, large central tables for cleaning animals and/or crafts such as beading, no-maintenance materials, drywall (opposed to paneling in most homes currently), foundations that resist heaving, and a wood stove for emergency heat
- Everyone in the community eats plenty of wild meat (mostly moose and geese) and animals are commonly processed in or around the household. This should be accommodated in the design.
- There is need for a long-term community plan, a housing committee and an unbiased method of house selection
- There is need for a much larger facility for storing construction materials. Hoping they can have an official supply yard in the future.
- There are plenty of local tradespeople in the community but they are not certified since certification requires people to leave the community. They have a hard time getting contractors from outside the community to stay for the entire duration of a building project.
- it is good to keep the water sets on the same foundation as the house
- the local radio is the best method for advertising sessions
- raffles and free meals are great incentive for bringing community members to the high school
- Of each of the engagement sessions we held, the most effective strategy for gathering input was to host small table groups with questionnaires.



Figure 98 : First Visit - informal conversations with youth surrounding visuals.



Figure 99 : First Visit - Councillor Tommy Weenusk presents to the public.

5.5.2 Second Visit

The second engagement sessions were catered to 3 specific demographics: Construction workers, Women and Leadership/Public. Our sessions were similar to that of the first visit where presentations were followed by discussion and questionnaires. Aerial maps and visuals (see Appendix C for boards) were provided via projector and workbooks were provided to table groups in the women's session.

Formal sessions at CFS building

October 16, 2019

- | | |
|---------|---|
| 10:30am | Construction Workers |
| | - short presentation by Smoke Architecture followed by Q + A discussion |
| | - large square table layout, presenters in front, construction workers on other 3 sides. |
| | - great turnout, lots of great conversation on building methods and storage deficiencies. |
| | - 12 construction workers |
| 1:30pm | Women |
| | - short presentation by Smoke Architecture followed by Q + A discussion |
| | - large square table layout, presenters in front, women on other 3 sides. |
| | - good turnout, lots of great conversation came from workbooks. |
| | - 7 women |
| 3:30pm | Leadership + general public |
| | - no turnout |

Informal Input Gathering

Though very brief, we were able to gather some information from informal conversations before and after the above sessions. Namely, the issues surrounding the operation of the public works yard.

Findings

- In general, everyone responded positively to the idea of a regional distribution centre
- Everyone agreed that the neighbourhood plan would need to be adjusted as the central portion of the site is actually very swampy
- The women's group was okay with denser community planning as long as fences were maintained between lots.
- Everyone preferred a lot at least two times the size of the lots presented
- The women's group responded positively to the 2.5 storey household plans.
- Some of the attendees, including Councillor Tommy Weenusk, suggested that a back door and a stairway to a 2nd level entrance would be better for multiple families.



Figure 100 : Second Visit - presentation to construction workers



Figure 101 : Second Visit - presentation to women

5.6 HOUSING NEEDS

BCN is currently facing issues of overcrowding and poor living conditions due to lack of available housing, continued lack of maintenance of older homes, increasing population, and an unclear selection process for band housing. 91% of all housing on-reserve is band housing.

More than half of the houses on Oxford House 24 reserve are deemed “not suitable” under the National Occupancy Standard (NOS); that is, whether the dwelling has enough bedrooms for the size and composition of the household.

“Housing suitability and the National Occupancy Standard (NOS) on which it is based were developed by Canada Mortgage and Housing Corporation (CMHC) through consultations with provincial housing agencies.” (Statistics Canada, 2016)

2016 census data shows us that the average household size is 5.7 persons. However, there are only 335 private dwellings with 120 of them being occupied by families of 4 or less. That leaves 215 homes for the remaining 1610 people, an average of 7.5 persons per house. Based on community input, it is not unusual to see families of 12 or more persons in a single dwelling.

Based on our conversations with community members during the engagement and a close analysis of the census data, we determined that the most needed housing types in the community are:

- **multi-unit residences for extended families**
- **one bedroom residences for bachelors**

Bunibonibee has many families on their waiting list for housing, many of which are currently living in an overcrowded situation. Despite the housing shortage, there are several homes in the community that are abandoned, many of which are in a state of disrepair such to a point where they are economically unfeasible to repair. Figure # shows an abandoned house that the neighbourhood children continuously broke into and damaged until the homeowner abandoned it.

5.7 Crime Prevention Through Environmental Design (CPTED) principles

At the design review meeting, women in particular mentioned that fences around the yards would be very beneficial because with children playing and neighbours sometimes dealing with addictions issues, they’d feel safer having defined household perimeter. This provides a cue for passersby between public and private areas. Willow is indigenous to the boreal region in Bunibonibee, and establishes readily from sapling cuttings set in soil in early spring. Over time, the family can even weave designs into the new shoots each year, or leave it to form a thick hedge. This would be cheaper and more durable than a conventional wood or chain link fence, almost maintenance-free, and provides habitat for smaller animals and birds around the house.

Clear delineation of entrance is recommended, with a gateway at the driveway consisting either of a sliding panel mounted on an overhead track; even a simple post on either side will further cue passersby to the change from public to private realm.

Windows in all facades are also recommended to achieve a perception of oversight surrounding the home. This enhances the perception of safety for residents inside, who can then see out on all sides, and creates a perception of ownership and monitoring for passersby.

It is recommended that windows are protected physically and standardized. The vast majority of homes observed in Bunibonibee had broken and damaged windows. Replacement is extremely expensive due to shipping costs and difficulty of securing maintenance funds. On-site fixes compromised building envelope; poly film, OSB, plywood, and corrugated cardboard were some materials residents used to fill in the opening. One option would be to apply permanent outdoor louvres to protect the window but allow in daylight and views; this would somewhat obstruct views, might obstruct cleaning, and would not protect the interior surface. Another option is to provide a third pane of polycarbonate on the outside; this has the benefit of achieving an effective triple-pane window, but can cloud over time, and also does not protect the interior surface. The best option might be to have a polycarbonate outside pane, a plate glass middle pane, and a tempered glass interior pane. While this will raise the cost of windows, the energy costs of an on-site fix for a broken window is much more, not to mention the negative appearance of multiple broken windows in the neighbourhood.



Figure 102 : Living Willow Fence. Source: <https://modmissy.com>

5.8 SITE SELECTION

Site selection is based on:

- proximity to the existing water line
- proximity to amenities such as the schools, nursing station and grocery store.
- least swampy areas as identified during the 2 engagement sessions

5.9 BUILDING FORM & MASSING

The building form and massing is based on energy efficiency, durability, repairability, overall comfort, and the ability to house multiple generations in one place. These were achieved through the following characteristics:

- square building footprint to minimize foundation heaving
- cube-like massing to minimize exposed exterior surface area that leads to energy loss
- steep roof pitch to shed snow and create occupiable attic space
- polycarbonate sheets instead of tempered glass to prevent window breakage
- large front porch to ease transition into the home. The area also provides additional gathering, storage and animal processing space.
- extended eaves to shelter secondary entrance
- secondary entrance to prevent disturbance to the lower level. This entrance would also allow homeowners the option to convert the building into private “suites” in the future.
- exterior walls and siding dimensions are made to be a multiple of 4'-0" to save on cutting and material waste



Figure 103 : Map of selected areas deemed suitable for new development.

ENDNOTES

***Please note that much of the information used for this report was received through engagement and word of mouth. Few formal reports were made available to us and we did not find any evidence of a community plan, topographical maps or infrastructure maps.**

1 "HAYES RIVER UPLAND." Ecoregion: HAYES RIVER UPLAND. Accessed January 15, 2020. <http://ecozones.ca/english/region/89.html>.

2 "Cryosolic." Cryosolic - Soils of Canada. University of Saskatchewan. Accessed January 15, 2020. <https://soilsofcanada.ca/orders/cryosolic-soils.php>.

3 "WeatherSpark.com." Average Weather at Island Lake Airport, Canada, Year Round - Weather Spark. Accessed January 15, 2020. <https://weatherspark.com/y/146167/Average-Weather-at-Island-Lake-Airport-Canada-Year-Round#Sections-Growing-Season>.

4 "Community Visit Summary: Bunibonibee Cree Nation (Oxford House)." Climate Change Impacts on Winter Roads and Lake and River Ice Conditions in Manitoba First Nations, 2006. Accessed January 15, 2020. http://www.yourcier.org/uploads/2/5/6/1/25611440/bunibonibee_summary_document2_3.pdf.

5 Ibid.

6 Indigenous and Northern Affairs Canada. "Bunibonibee Cree Nation 301." First Nation Profiles, July 11, 2016. https://fnppn.aadnc-aandc.gc.ca/fnp/Main/Search/FNMain.aspx?BAND_NUMBER=301&lang=eng.

7 "Archives of Manitoba." Archives of Manitoba | Keystone Archives Descriptive Database. Accessed January 15, 2020. http://pam.minisisinc.com/scripts/mwimain.dll/144/PAM_AUTHORITY/AUTH_DESC_DET_REP/SISN_1307?sessionsearch.

8 "Project 6 - All-Season Road Linking Manto Sipi Cree Nation, Bunibonibee Cree Nation and God's Lake First Nation." Manitoba Infrastructure, 2017. <https://www.ceaa-acee.gc.ca/050/documents/p80138/119253E.pdf>.

9 Gray, Susan Elaine. "Manitoba History: Methodist Indian Day Schools and Indian Communities in Northern Manitoba, 1890-1925." Manitoba Historical Society. Accessed January 15, 2020. http://www.mhs.mb.ca/docs/mb_history/30/methodistdayschools.shtml.

10 "Norway House Indian Residential School." The Children Remembered. Accessed January 15, 2020. <https://thechildrenremembered.ca/school-locations/norway-house/>.

11 Gray, Susan Elaine. "Manitoba History: Methodist Indian Day Schools and Indian Communities in Northern Manitoba, 1890-1925." Manitoba Historical Society. Accessed January 15, 2020. http://www.mhs.mb.ca/docs/mb_history/30/methodistdayschools.shtml.

12 "Bunibonibee Cree Nation: Traditional Knowledge Study." East Side Road Project 6. HTFC Planning and Design, 2017.

13 Ibid.

14 Ibid.

15 Jenness, Diamond. *The Indians of Canada*. Ottawa: National Museum of Canada, 1963.



**APPENDIX A:
ARCHITECTURAL DRAWING SET**

National Research Council of Canada: A Path To Healthy Housing

Bunibonibee Cree Nation, Oxford House 24, Manitoba

ARCHITECTURAL DRAWING INDEX

A0-00	Cover Sheet + Architectural Drawing Index
A0-01	Architectural Symbols + Abbreviations
A0-02	Specifications
A1-00	Site Plan
A2-00	Structural Grid Drawing
A2-01	Main Floor Plan
A2-02	Reflected Ceiling Plan Main Floor
A2-03	Second Floor Plan
A2-04	Reflected Ceiling Plan Second Floor
A2-05	UPPER Floor Plan
A2-06	Reflected Ceiling Plan Second Floor
A2-07	Roof Plan
A2-08	Main Floor Finishes Plan
A2-09	Second Floor Finishes Plan
A2-10	UPPER Floor Finishes Plan
A2-11	Door Types and Details
A2-12	Door Schedule
A2-13	Window Types and Details
A2-14	Window Schedule
A2-15	Room Finishes Schedule
A3-00	Exterior Elevations South and East
A3-01	Exterior Elevations North and West
A4-00	Building Sections
A5-00	Building Section Details
A6-00	Stair Plans and Details
A6-01	Plan and Wall Details
A6-02	Interior Elevations and Millwork
A6-03	Optional 'Tiny Home' Plans

4	2020 APR 14	ISSUED FOR FINAL REPORT
3	2020 MAR 31	RE-ISSUED FOR 99% REVIEW
2	2020 JAN 16	ISSUED FOR 99% REVIEW
1	2019 DEC 15	ISSUED FOR DRAFT REVIEW

NO.	DATE	ISSUE NOTES
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PROFESSIONAL SEAL

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NOT FOR
CONSTRUCTION**

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PROJECT TITLE
National Research Council of Canada:
A Path To Healthy Housing

LOCATION
Bunibonibee Cree Nation, Oxford House 24, Manitoba

CLIENT
David T Fortin Architect INC.

DRAWING TITLE
TITLE SHEET
DRAWING INDEX

DRAWN LR	APPROVED ES	DRAWING NO.
SCALE AS NOTED	DATE ISSUED APRIL 14, 2020	A0-00
PROJECT NUMBER 1905	REVISION NO. R-0	

CONSTRUCTION ASSEMBLIES

FLOORS

F0 - Foundation
Steel and aluminum triodetic multipoint frame as per Manufacturer.
Minimum 6" compacted granular fill to 2" above finished grade
Undisturbed native soil; remove vegetation and first layer of organic soils
Refer also to foundation manufacturer's site preparation specifications.

F1 - Main Floor
Flooring as scheduled
Underlay if required, per manufacturer's recommendations
3/4" T+G OSB or plywood subfloor, glued and screwed to sleepers
2x4" sleepers @16" O/C laid horizontally on edge, screwed perpendicular to joists (run plumbing in this space)
Air/vapour barrier type E
1/2" OSB or plywood sheathing, glued and screwed to joists
16" framing at 16" o/c spans between and flush frames with floor beams – open web floor trusses; OR ALTERNATIVELY, TJI engineered wood floor joists
2-layers 8" stone wool insulation in joist space for a total of R-64 (ASTM C518)
6x20" integrated engineered wood beams as per Manufacturer
1/2" pressure-treated plywood (protects insulation above)

F2 - Exterior Porch / Patio
2x6 pressure-treated wood decking
2x8 pressure-treated wood joists @ 16" o/c flush framed with floor beams
Integrated engineered wood beams as per Manufacturer, suitable for outdoor use

F3 - Floors 2 & 3
Flooring as scheduled
Underlay if required, per manufacturer's recommendations
3/4" T+G OSB or plywood subfloor, glued and screwed to joists
12" TJI engineered wood floor joists at 16" o/c
3 1/2" acoustical batt insulation in joist space
[resilient channels @ 16" o/c; 5/8" moisture-resistant GWB] optional, best practice for acoustics, fire resistance
Ceiling finish as specified

ROOFS

R1 - Typical Truss Roofs
Roofing as specified c/w underlayment type A
Ice & water shield underlayment 48" from centreline of all eaves and valleys
3/4" (19 mm) plywood or OSB roof sheathing
Pre-engineered wood trusses with minimum 20" (510 mm) depth at heel and tapers
2-layers 8" (203 mm) rock wool insulation in truss space for a total of R-64 (ASTM C518)
Vapour barrier type F
3/4" (19 mm) ceiling strapping @ 16" o/c
Ceiling finish as specified

R2 - Typical Non-Insulated Eaves
Roofing as specified c/w underlayment type A
Ice & water shield underlayment 48" from centreline of all eaves and valleys
3/4" (19 mm) T&G plywood or OSB roof sheathing
Wood outriggers as per Structural
Wood blocking (see eave details)
Prefinished perforated aluminium / steel soffit

WALLS

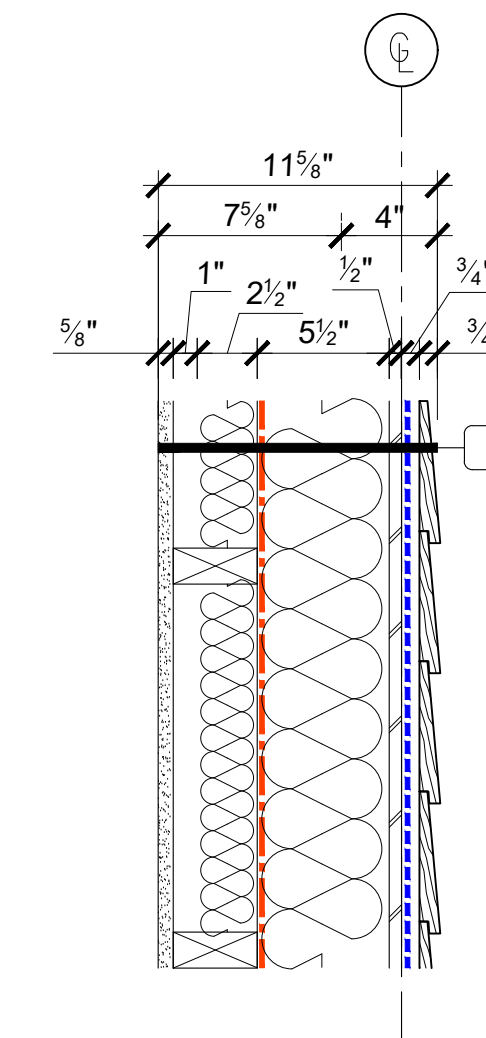
E0 - Foundation Wall
Install from 12" above finished grade: pre-engineered wood siding
Install between 12" above finished grade to 2" below finished grade: 1/2" cement board, paint finish
2x4" pressure-treated wood framing @16" o/c on Triodetic fasteners as per Manufacturer
Steel and aluminum Triodetic multipoint frame as per Manufacturer

E1 - Exterior Walls
5/8" moisture-resistant GWB
2x4 stud framing @ 16" o.c. installed parallel to floor (run plumbing/electrical in this space)

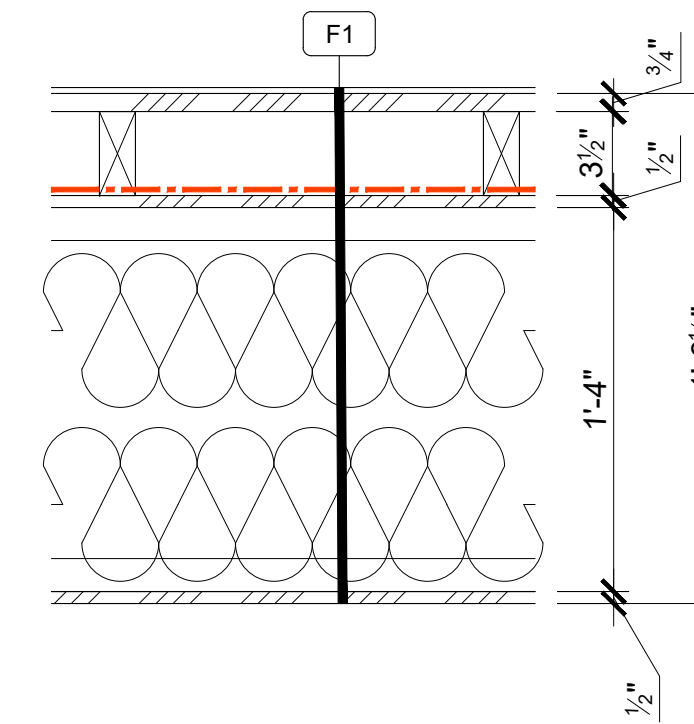
2-1/2" stone wool batt insulation in cavity, total R-10 (install behind any plumbing); OR ALTERNATIVELY, 1-3/4" batts total R-7 (3-1/2" batts split in half) vapour barrier type F
2x6 stud framing @ 16" o.c.
5-1/2" stone wool batt insulation in stud space, total R-24
1/2" OSB or plywood sheathing
air barrier type G
1x4 vertical strapping @ 24" o.c.
Pre-finished engineered wood siding
P1 - 2x4" Interior Wall, unrated
5/8" moisture-resistant GWB
2x4" stud framing at 24" o/c
3 1/2" acoustical batt insulation in stud space
5/8" moisture-resistant GWB

P2 - 2x4" Interior Wall for wet areas, unrated
5/8" fibreglass-mat GWB (installed on wet side)
[at water set room only: vapour barrier type F, lap and seal to ceiling VB]
2x4" stud framing at 24" o/c
3 1/2" acoustical batt insulation in stud space
5/8" moisture-resistant GWB

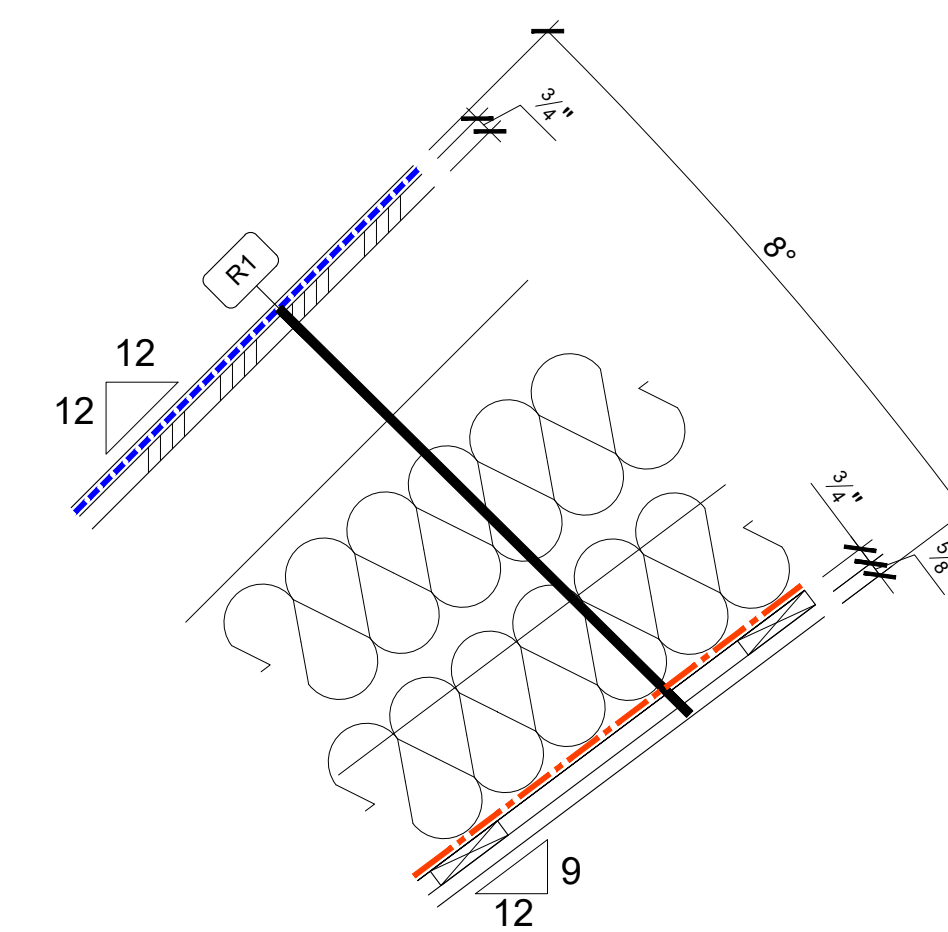
P3 - 2x6" Interior Plumbing Wall, unrated
5/8" fibreglass-mat GWB (installed on wet side)
2x6" stud framing at 24" o/c
5 1/2" acoustical batt insulation in stud space
5/8" moisture-resistant GWB



- E1 - Exterior Wall**
- 5/8" moisture-resistant GWB
 - 2x4 stud framing @ 16" o.c. installed parallel to floor (run plumbing/electrical in this space)
 - 2-1/2" stone wool batt insulation in cavity, total R-10 (install behind any plumbing); OR ALTERNATIVELY, 1-3/4" batts total R-7 (3-1/2" batts split in half)
 - vapour barrier type F
 - 2x6 stud framing @ 16" o.c.
 - 5-1/2" stone wool batt insulation in stud space, total R-24
 - 1/2" OSB or plywood sheathing
 - air barrier type G
 - 1x4 vertical strapping @ 24" o.c.
 - Pre-finished engineered wood siding



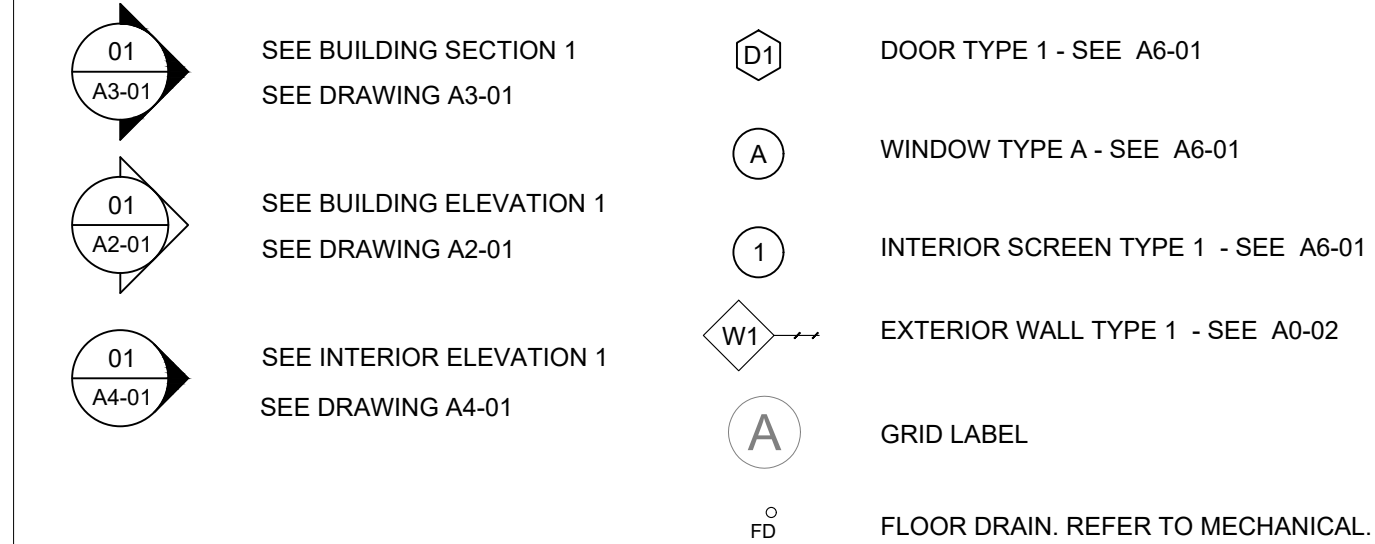
- F1 - Main Floor**
- Flooring as scheduled
 - Underlay if required, per manufacturer's recommendations
 - 3/4" T+G OSB or plywood subfloor, glued and screwed to sleepers
 - 2x4" sleepers @16" O/C laid horizontally on edge, screwed perpendicular to joists (run plumbing in this space)
 - air/vapour barrier type E
 - 1/2" OSB or plywood sheathing, glued and screwed to joists
 - 16" framing at 16" o/c spans between and flush frames with floor beams — open web floor trusses; OR ALTERNATIVELY, TJI engineered wood floor joists
 - 2-layers 8" stone wool insulation in joist space for a total of R-64 (ASTM C518)
 - 6x20" integrated engineered wood beams as per Manufacturer
 - 1/2" pressure-treated plywood (protects insulation above)



- R1 - Typical Truss Roof**
- Roofing as specified c/w underlayment type A
 - Ice & water shield underlayment 48" from centreline of all eaves and valleys
 - 3/4" (19 mm) plywood or OSB roof sheathing
 - Pre-engineered wood trusses with minimum 20" (510 mm) depth at heel and tapers
 - 2-layers 8" (203 mm) rock wool insulation in truss space for a total of R-64 (ASTM C518)
 - Vapour barrier type F
 - 3/4" (19 mm) ceiling strapping @ 16" o/c
 - Ceiling finish as specified

ARCHITECTURAL LEGEND

1. Refer to Reflected Ceiling Plans A2-01, A2-02, A2-03 for reflected ceiling notes and legend.
2. Refer to Floor Pattern Plans A2-04, A2-05 for floor pattern notes and legend.



ABBREVIATIONS

ACTILE 1	acoustic tile ceiling type	GB	grab bar type	Qty	quantity
adj.	adjustable	GWB	gypsum wall board	RB	rubber base
A.F.F.	above finished floor	GL	grid line	RB	rubber hook
AL	aluminum	HM	hollow metal	R.O.	rough opening
AL THRES.	aluminum threshold	HPL	high-pressure laminate	RRF	resilient rubber flooring
ANOD.	anodized	HSS	hollow structural steel	RNL	rain water leader
B/H	bulkhead	JAL	insulated aluminum	SCDD	surface mounted combination paper
CJ	control joint	INSUL. 1	insulation type	SD	soap dispenser and disposal
CL	centreline	LAV	lavatory	SD	soap dispenser
col	column	M/A	match adjacent	SH	shelf
CONC	concrete	MAX	maximum	SIM	similar
CONC.B	concrete block	MCP	metalline composite panel	SP	speaker
CPT TILE	carpet tile	MIN.	minimum	TB	backboard
CT1	ceramic tile type	MIRR	mirror type	TELE	telephone
clw	complete with	MW	microwave	THMR	tiled mirror
DD	door operator	ND	napkin disposal	TTD	toilet tissue dispenser
divs.	divisions	N.B.C.	National Building Code	t/o	top of
ECB	emergency call button	N.I.C.	not in contract	TYP.	typical
EP	electrical panel	No.	number	ups	underside of
EQ.	equal	n.s.	not to scale	Varies	height varies
EXPOSED	exposed structure	o/c	on center	VCT	vinyl composite tile
STRUCTURE	structure	PB	particle board	WDS-LAT	wood slat ceiling system
FAK	first aid kit	PLAM	plastic laminate	WH	wall hydrant
FAP	fire access panel	POR	porcelain tile	WC	water closet
FB	fire blanket	PREFIN	prefinished	W	with
FGGB	fiberglass mat gypsum board	PSF	pressed steel frame	±	plus/minus (site verify)
FP	filter panel	PT	paint		
		PTD	paper towel dispenser		
		PVC	polyvinyl chloride		

NO.	DATE	ISSUE NOTES
4	2020 APR 14	ISSUED FOR FINAL REPORT
3	2020 MAR 31	RE-ISSUED FOR 99% REVIEW
2	2020 JAN 16	ISSUED FOR 99% REVIEW
1	2019 DEC 15	ISSUED FOR DRAFT REVIEW

NO.	DATE	ISSUE NOTES
PROFESSIONAL SEAL		

PRELIMINARY
NOT FOR
CONSTRUCTION

THIS DRAWING MUST NOT BE SCALED.
DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE NOTED.
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SMOKE
ARCHITECTURE

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907-533-0496 | smokearchitecture@gmail.com

PROJECT TITLE
**National Research Council of Canada:
A Path To Healthy Housing**

LOCATION
Bunibornbee Cree Nation, Oxford House 24, Manitoba

CLIENT
David T Fortin Architect INC.

DRAWING TITLE
ARCHITECTURAL SYMBOLS + ABBREVIATIONS

DRAWN LR	APPROVED ES	DRAWING NO. A0-01
SCALE AS NOTED	DATE ISSUED APRIL 14, 2020	
PROJECT NUMBER 1905	REVISION NO. R-0	

GENERAL NOTES

WORK IS TO PROCEED USING THE PROTOCOLS AND INDUSTRY STANDARDS LAID OUT IN THE CCDC-2 STANDARD FORM OF CONTRACT, MOST RECENT VERSION ISSUED. ALL MARKUPS ON CONTRACT CHANGES TO TOTAL 10% ON CONTRACTOR'S OWN WORK, OR 10% ON CONTRACTOR'S OWN WORK AND 10% ON SUBCONTRACTOR'S WORK, INCLUDING OVERHEAD AND PROFIT.

- 1. THE FOLLOWING SPECIFIC CONDITIONS SHALL GOVERN ALL TRADES UNDER THESE SPECIFICATIONS, IN ADDITION TO THOSE PROVIDED. THE LEAD CONTRACTOR SHALL COOPERATE AND COORDINATE WITH OTHER TRADES AS REQUIRED TO THE SATISFACTORY AND EXPEDITIOUS COMPLETION OF THE WORK.
2. THE OWNER MAY INVESTIGATE THE QUALIFICATIONS OF ANY TRADESPERSON. PARTIES TENDERING MUST KEEP THE SITE AND OBTAIN FOR THEMSELVES ALL INFORMATION NECESSARY TO CARRY THE WORK TO COMPLETION, AS NO CLAIM FOR EXTRA COMPENSATION WILL BE ALLOWED THROUGH LACK OF SUCH INFORMATION ON THE PART OF THE SUB-TRADE.
3. CARE SHALL BE TAKEN THAT NO DAMAGE IS DONE TO THE EXISTING ROADS, GROUNDS, LANDSCAPING, BUILDINGS, SERVICES, AND OTHER FACILITIES TO REMAIN IN PLACE. IF DAMAGED UNDER THIS CONTRACT, THEY SHALL BE RESTORED TO THEIR ORIGINAL CONDITION UPON COMPLETION OF THE CONTRACT, OR SOONER AS DIRECTED BY THE OWNER.
4. THE CONTRACTOR AND SUB-CONTRACTORS SHALL PROVIDE INSURANCE WHICH AGREES WITH THE TERMS SET OUT BY THE OWNER. INSURANCE POLICIES TO BE COPIED BY EACH PARTY AND TO EACH PARTY.
5. CONTRACTORS SHALL FULFILL AND COMPLY WITH FEDERAL, PROVINCIAL AND MUNICIPAL REGULATIONS THAT APPLY TO THEIR TRADE.
6. CONTRACTOR SHALL OBTAIN AND PAY FOR ALL PERMITS REQUIRED BY REGULATORY AND MUNICIPAL AUTHORITIES HAVING JURISDICTION.
7. THE OWNER RESERVES THE RIGHT TO MAKE CHANGES OR VARIATIONS TO THE DRAWINGS AND SPECIFICATIONS BEFORE WORK STARTS OR DURING THE PROGRESS OF THE WORK. THE VALUE OF SUCH CHANGES AS DETERMINED BY THE CONTRACTOR, AND APPROVED BY THE OWNER, SHALL BE ADDED TO OR DEDUCTED FROM THE CONTRACT AMOUNT, THUS ADJUSTING THE CONTRACT.
8. THE CONTRACTOR SHALL GUARANTEE THE WORK FOR A PERIOD OF ONE YEAR FOLLOWING THE DATE OF SUBSTANTIAL PERFORMANCE UNLESS STATED OTHERWISE. THE CONTRACTOR SHALL KEEP A PERMANENT WRITTEN RECORD ON THE SITE OF THE PROGRESS OF THE WORK, WHICH SHALL BE OPEN TO INSPECTION BY THE OWNER. A COPY SHALL BE FURNISHED TO THE OWNER UPON REQUEST.
9. THE CONTRACTOR SHALL ISSUE ALL DIRECTIVES TO SUBCONTRACTORS WHICH CHANGE THE SCOPE OF THE WORK, CONTRACT PRICE, OR CONTRACT TIME.
10. PROJECT MUST COMPLY WITH THE LATEST EDITIONS OF THE FOLLOWING CODES, STANDARDS AND CLAUSES IN THIS DOCUMENT, INCLUDING ALL AMENDMENTS AND ADDITIONS.
1. NATIONAL BUILDING CODE OF CANADA
2. HYDRO ELECTRICAL SAFETY CODE
3. ALL STANDARDS REFERENCED IN NBC 2.7 AND ALL MUNICIPAL ZONING AND SITE REQUIREMENTS.
11. NOTIFY PROJECT CO-ORDINATOR PRIOR TO STARTING WORK THAT INVOLVES BREAKING INTO OR CONNECTING TO EXISTING SERVICES. CARRY OUT WORK AT TIMES DIRECTED BY OWNER OR AUTHORITIES HAVING JURISDICTION, WITH MINIMUM OF DISTURBANCE TO PEDESTRIAN AND VEHICULAR TRAFFIC, OR USERS OF BUILDING WHERE REQUIRED FOR INTERIOR WORK.
12. RECORD LOCATIONS OF MAINTAINED, REROUTED AND ABANDONED SERVICE LINES.
13. SUBCONTRACTORS TO SUBMIT SHOP DRAWINGS, PRODUCT DATA.
14. SAMPLES OR MOCKUPS, RELATING TO THEIR TRADE FOR APPROVAL PRIOR TO ORDERING OF MATERIALS, AND PROVIDE TWO SETS OF MAINTENANCE AND OPERATION MANUALS AT TIME OF SUBSTANTIAL PERFORMANCE.
15. OBSERVE CONSTRUCTION SAFETY MEASURES OF THE QUEBEC CONSTRUCTION CODE AND THE NATIONAL BUILDING CODE, PART 8, PROVINCIAL GOVERNMENT, WORKERS/WORKMENS COMPENSATION BOARD, STANDARDS OF THE FIRE COMMISSIONER OF CANADA, STANDARD FOR CONSTRUCTION OPERATIONS FCC NO. 301 AND MUNICIPAL AUTHORITY PROVIDING THAT IN ANY CASE CONFLICT OR DISCREPANCY MORE STRINGENT REQUIREMENT SHALL APPLY.
16. CONTRACTOR SHALL SECURE ALL OPEN AND ACCESSIBLE WORK AREAS TO PREVENT BOTH INJURY TO OTHER PERSONS AND ACCESS TO THE FACILITY. ANY DAMAGE TO THE FACILITY AS A RESULT OF A LACK OF DUE DILIGENCE WILL MAKE THE CONTRACTOR RESPONSIBLE FOR THE REPAIR AND/OR REPLACEMENT OF ITEMS TO THEIR ORIGINAL CONDITION.
17. THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING MINIMUM LOCAL LABOUR CONTENT AS SPECIFIED IN THE ATTACHED BID FORM. THE CONTRACTOR MAY EXCEED THIS REQUIRED CONTENT BUT MAY NOT UTILIZE LESS THAN THE REQUIRED AMOUNT. COORDINATE WITH OWNER ACCESS TO ALL AREAS FOR AUXILIARY WORK PRIOR TO COMMENCEMENT OF WORK.
18. ALL SURPLUS MATERIAL SHALL BE HANDED OVER TO OWNER (ARCHITECTURAL, MECHANICAL, ELECTRICAL) UNLESS AUTHORIZED BY OWNER TO REMOVE FROM SITE.
19. PATCH AND MAKE GOOD ALL WALL, FLOOR AND CEILING SURFACES TO MATCH NEAR UNLESS NOTED OTHERWISE.
20. PROVIDE ALL NECESSARY BLOCKING FOR WALL AND CEILING MOUNTED ITEMS (ARCHITECTURAL, MECHANICAL, ELECTRICAL).

OWNER/CONTRACTOR GENERAL:

- 1. RELEVANT CSA STANDARDS, MUNICIPAL REGULATIONS, PROVINCIAL AND FEDERAL BUILDING CODES SHALL APPLY TO THIS PROJECT.
2. DIMENSIONS AND ELEVATIONS NOTED ON THE DRAWINGS SHALL BE VERIFIED BY THE CONTRACTOR PRIOR TO STARTING CONSTRUCTION. PROMPTLY ADVISE ARCHITECT UPON FINDING DIMENSIONAL DISCREPANCIES.
3. ARCHITECTURE ACCEPTS NO RESPONSIBILITY FOR FAILURE OF CONTRACTOR TO COMPLY TO THE LATEST BUILDING CODES AND FINALIZED DRAWINGS.
4. TURNOVER SURPLUS MATERIALS TO THE OWNER (ARCHITECTURAL, MECHANICAL, ELECTRICAL) UNLESS AUTHORIZED BY OWNER TO REMOVE FROM SITE.
5. PATCH AND MAKE GOOD ANY FINISHES DAMAGED DURING CONSTRUCTION CAUSED BY THE CONTRACTORS/SUBCONTRACTORS FORCES.

ROUGH CARPENTRY:

- 1. LUMBER TO CSA 0141-05 & NLGA-2004 STANDARD GRADING RULES FOR CANADIAN LUMBER.
2. NAILS, SPIKES & STAPLES TO CSA B111-74.
3. HOT DIP GALVANIZING TO CAN/CSA-G164-92.
4. SOFTWOOD PLYWOOD TO CSA 151-04.

ARCHITECTURAL WOODWORK:

- 1. CABINETWORK: ALL CABINETWORK INCLUDING CASEBODIES, DOORS, DRAWER FRONTS, GABLES, CABINET BACKS, SHELVES, DRAWER BODIES, DRAWER CONTRA TRIMS, AND FILLER STRIPS TO BE HIGH PRESSURE LAMINATE (HPL), UNLESS OTHERWISE NOTED.
1. STANDARD HIGH PRESSURE LAMINATE BY PANOLAM, NEVAMAR Pattern 54025 'HONEY PLANTAIN' FOR KITCHEN ROOM #23 UNLESS OTHERWISE NOTED, PIONITE Pattern SW811 'WHITE' FOR ALL OTHER CABINETWORK.
2. UNLESS OTHERWISE INDICATED, PROVIDE THE FOLLOWING THICKNESSES FOR CABINETWORK:
1. DOORS: 3/4"
2. DRAWER FRONTS: 3/4"
3. GABLES: 3/4" OR 1 1/2"
4. CABINET BACKS: 5/8"
5. SHELVES: 3/4" OR 1 1/2"
6. DRAWER BODIES: 3/4"
2. SOLID SURFACE COUNTERTOPS: SOLID SURFACE ON ONE (1) LAYER 3/4" PARTICLEBOARD, SIZE TO SUIT DRAWINGS C/W CUSTOM CUTOUTS TO SUIT SINK BOWLS. FORMICA SOLID SURFACING OR APPROVED ALTERNATE, TWO COLOURS.
3. BUTCHER BLOCK COUNTERTOPS: 1 1/2" MAPLE OR ASH BUTCHERBLOCK. FINISH WITH A NATURAL OIL, LOW VOC BUTCHER BLOCK CONDITIONER. 'RUBIO MONOCOAT OIL PLUS 2C' OR APPROVED ALTERNATE.
4. SOLID PINE SURFACE: 3/4" THICK, SOLID PINE ON ONE (1) LAYER 3/4" PARTICLEBOARD, APPLY THREE (3) COATS CLEAR WATER-BASED POLYURETHANE, SAND LIGHTLY BETWEEN COATS.
5. BACKSPLASH:
1. TILE BACKER BOARD 5/8" THICK 'DENSHEILD TILE BACKER' BY GEORGIA PACIFIC CERAMIC TILE. COLOUR AND DIMENSION SERIES 3" X 6" TILE BY OLYMPIA TILE OR APPROVED ALTERNATE, TWO COLOURS.
6. KICK PLATE: 3/4" MEDIUM DENSITY FIBREBOARD (MDF) OR DOUGLAS FIR PLYWOOD (DFP) TO ACCEPT 4" RUBBER BASE. JOHNSONITE OR APPROVED ALTERNATE. FOUR COLOURS.
7. HINGES: 'BLUM MODUL HINGE 100"' BY RICHELIEU C/W DOOR HINGE PLATE AND DOOR DAMPENNER.
DRAWER AND DOOR PULLS: 'CONTEMPORARY METAL HANDLE PULL - 8160' BY RICHELIEU, BRUSHED NICKEL FINISH, 6 3/8" LONG. REFER TO DRAWING FOR INSTALLATION DIRECTION.
DRAWER SLIDES: 'ACCURIDE 3832-2G FULL EXTENSION SLIDE' BY RICHELIEU, ZINC FINISH, LENGTH TO SUIT DRAWER FOR FULL EXTENSION.
10. RECESSED METAL PILASTER: 'NO 25510' BY RICHELIEU, 5/8" WIDE X TOTAL LENGTH, ZINC

FINISH:

- 11. PILASTER SHELF CLIP: 'NO. CP2362G' BY RICHELIEU, HEAVY-DUTY, ZINC FINISH.
12. BUTCHER BLOCK SHELF: 1 1/2" MAPLE OR ASH BUTCHERBLOCK, FINISH WITH A NATURAL OIL, LOW VOC BUTCHER BLOCK CONDITIONER. 'RUBIO MONOCOAT OIL PLUS 2C' OR APPROVED ALTERNATE.
13. CONCEALED SHELF SUPPORT: 'NO. 1622410 TRIADE RAIL' BY RICHELIEU, POLISHED ALUMINIUM FINISH, AND '1621512S TRIADE CONCEALED MOUNTING BRACKET' BY RICHELIEU, NICKEL FINISH.
14. DRAWER KNOBS: 'TRADITIONAL METAL KNOB - 878A' BY RICHELIEU, MATTE BLACK
15. COAT HOOKS: 'CONTEMPORARY ALUMINIUM HOOK - 1320' BY RICHELIEU, ALUMINIUM
16. DOOR AND DRAWER BUMPERS: 'NO. MP30311' BY RICHELIEU, CLEAR NYLON, 1/8" HEIGHT X 3/8" DIAMETER. PEEL AND STICK BUMPERS.
17. DRAWER AND DOOR LOCKS: 'BP140101140 'CAM LOCK FOR PANEL THICKNESS UP TO 23 MM' BY CELIEU, CHROME FINISH, KEYPED ALIKE #1
18. CORNER PULL-OUT SHELVING SYSTEM: '6922140100' (RIGHT) 'LE MANS SYSTEM' BY RICHELIEU, HEIGHT-ADJUSTABLE TRAYS, GRAY MELAMINE SURFACE, CHROME RAILINGS, DOOR WIDTH 19 11/16" MIN. INTERIOR WIDTH 37 7/8" X MIN. INTERIOR DEPTH 19 11/16".
19. WASTEBASKET HANGING CENTER: 'NO. 4WC8M2430M2 BOTTOM-MOUNTING PULL-OUT WASTE CONTAINER' BY RICHELIEU.
20. TRAY FOR CLEANING SUPPLIES: 'NO. SBD72730A1 NEW CABINET DRIP TRAY' BY RICHELIEU, INTERIOR WIDTH 28 1/2", INTERIOR DEPTH 23 1/4", 'ORION GRAY' COLOUR.
21. SHELF BRACKETS: 'NO. 494W16B 'HEAVY-DUTY SHELF BRACKET' BY RICHELIEU

STEEL DOORS, FRAMES, AND ACCESSORIES:

- 1. CANADIAN STEEL DOOR & FRAME MANUFACTURERS ASSOCIATION (CSDFMA)-90.
2. NATIONAL FIRE PROTECTION ASSOCIATION (NFPA), NFPA 80-92, NFPA 253-96.
3. UNDERWRITERS LABORATORIES OF CANADA (ULC), CAN 4-S104M-M80, CAN4-S015M-M85.
4. AMERICAN SOCIETY FOR TESTING AND MATERIALS, ASTM A-525M-91b, ASTM 526-90, ASTM 527M-90, ASTM 29-92, ASTM B 749-85(91), ASTM E 152-81a.
5. CANADIAN GENERAL STANDARDS BOARD (CGSB), CAN/CGSB-1481-92, CGSB 41-GP-19Ma-84, CAN/CGSB-51-20-87, CGSB 51-GP-21M-78.
6. CANADIAN STANDARDS ASSOCIATION CSA A101-83, CAN/CSA-G40-21-92, CSA W59-89.
7. CONTRACTOR TO SUBMIT DOOR AND FRAME SCHEDULE/LIST FOR OWNER REVIEW.
8. FRAMES, WELDED, HOT DIPPED GALVANIZED TO ASTM 653M, ZF75, ULC RATED & LABELED AS INDICATED.
9. REINFORCEMENT CHANNELS TO CAN/CSA-G40 21 TYPE 44W 16 GAUGE DOORS AND FRAMES C/W SILENCERS, TOP AND BOTTOM CAPS, GLAZING STOPS, FIRE LABELS WHERE REQUIRED, METALLIC PASTE FILLER, AND ACCESSORIES.
10. GLAZING - TEMPERED OR LAMINATED SAFETY GLASS GLASS WHERE INDICATED.

INTERIOR WOOD DOORS:

- 1. COMMERCIAL GRADE, MEDIUM-DUTY SOLID CORE WOOD DOORS, ULC RATED & LABELED WHERE INDICATED. ACCEPTABLE MANUFACTURERS: BAILLARGEON, ALLMAR, ASSA ABLOY.
2. STANDARD DOORS: SOLID PARTICLE CORE, SIZES & TYPES INDICATED.
3. FIRE RATED DOORS: SOLID MINERAL CORE, SIZES & TYPES INDICATED.
4. FACE MATERIAL: BIRCH OR MAPLE VENEER.
5. SAMPLES: SUBMIT TWO (2) 8" X 8" VENEER SAMPLES FOR ACCEPTANCE.
6. FINISH: MINIMUM THREE (3) COATS WATER-BASED CLEAR POLYURETHANE, LIGHTLY SAND BETWEEN COATS.
7. PROTECTION: PROTECT INSTALLED PRODUCTS UNTIL PROJECT COMPLETION.
8. TOUCH UP, REPAIR OR REPLACE DAMAGED PRODUCTS BEFORE SUBSTANTIAL COMPLETION.

DOOR HARDWARE:

- 1. STANDARD HARDWARE LOCATIONS & DIMENSIONS IN ACCORDANCE WITH CANADIAN METRIC GUIDE FOR STEEL DOORS AND FRAMES PREPARED BY CANADIAN STEEL DOOR AND FRAME MANUFACTURER ASSOCIATION, ULC RATED & LABELED WHERE INDICATED.
2. SUBMIT HARDWARE LIST/SCHEDULE FOR REVIEW BY CONSULTANT & OWNER.
3. HINGES: CARD READERS TYPICAL, REFER TO ARCHITECTURAL PLANS & ELECTRICAL, BORED & PRE-ASSEMBLED LOCKS & LATCHES TO CAN/CGSB-89.17-M86, COMMERCIAL GRADE.
5. BUTTS & HINGES TO CAN/CGSB-89.18-M90/ANSI/BHMA A156.1-81 BY STANLEY OR HAGAR, C/W BALL BEARINGS.
6. DOOR CLOSERS TO CAN/CGSB -69.20-M90/ANSI/BHMA A156.4-86 LCN4110 SERIES, BARRIER FREE.
7. KICK PLATES: S.S. 1.27 THICK
8. DOOR STOPS: FLOOR TYPE ZINC DIE CAST TO CBH 110.
9. DOOR SWEEP, FIRE RATED, W-13S BY KNC.
10. SMOKE SEALS, W-21 BY KNC.
11. EXISTING HARDWARE TO REMAIN AS INDICATED.
12. REFER TO ELECTRICAL FOR POWER & SECURITY ITEMS.
13. ACCEPTABLE HARDWARE MANUFACTURERS: COMMERCIAL GRADE SCHLAGE, WEISER OR RICHELIEU.

WINDOWS

- 1. WINDOWS TO AAMA/WDMA/CSA 1011.5.2/A440-08 NORTH AMERICAN FENESTRATION STANDARD/SPECIFICATION FOR WINDOWS, DOORS AND SKYLIGHTS, INCLUDING A440S1-09 CANADIAN SUPPLEMENT; CSA A440-2:09 FENESTRATION ENERGY PERFORMANCE; AND NFRC 100-2010 PROCEDURE FOR DETERMINING FENESTRATION PRODUCT U-FACTORS
2. TRIPLE GLAZED WINDOWS SHALL HAVE A RATED U VALUE OF 1.40 W/M2K OR LESS. DOUBLE GLAZED WINDOWS SHALL HAVE A RATED U VALUE OF 1.70 W/M2K OR LESS.
3. FRAME AND SASH PROFILES PULTRUDED FIBREGLASS, WITH A MINIMUM OF WALL THICKNESS OF 0.090" (2.3 MM), MINIMUM GLASS CONTENT OF 60%.
4. FASTENERS: NON MAGNETIC, STAIN AND CORROSION RESISTANT STAINLESS STEEL TO ASTM E-149.
5. INSULATION: FRAME PERIMETER AND MULLION CAVITIES TO BE FILLED WITH EPS INSULATION, TYPE 1, OR OTHER AS APPROVED.
6. GLAZING METHOD: LAID-IN GLAZING USING EPDM, NON-SHRINK RUBBERIZED GLASS STOP LOCKED-IN FROM THE INTERIOR, PROVIDE A SECURE AND POSITIVE SEAL.
7. PROVIDE INSECT SCREENS AT ALL OPERABLE WINDOWS TO CGSB 79-GP-1M AND CAN3-A440-M84 HEAVY DUTY CLASSIFICATION. ROLL-FORMED ALUMINIUM FRAME WITH FRICTION FIT CORNER KEYS. FRAME COLOUR TO MATCH WINDOW FRAMES. SCREEN MESH BLACK, NON-GLARE FIBERGLASS FLOTT, MESH COUNT 18 X 14, HELD IN PLACE BY SPLINE BUT REMOVABLE.
8. INSTALLATION BY EXPERIENCED INSTALLERS IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS AND CSA A-440.4.

SUSPENDED ACOUSTIC CEILING:

- 1. ACOUSTIC PANELS TO CAN2-92.1-M77.
2. CEILING TILE CLASS A, 610 x 610 x 16 LAY-IN REGULAR-EDGE TILE.
1. 'ARMSTRONG #296 OASIS 24" X 24" OR APPROVED ALTERNATE.
2. SUBMIT SAMPLE(S) FOR REVIEW & ACCEPTANCE.
3. SUSPENSION SYSTEM: FABRICATE TO ASTM C635-76, 610x610 GRID, COLOUR WHITE.

LINOLEUM COMPOSITE TILE (MCT)

- 1. MCT IS TO BE 3MM, 13x13" OR 20x20" OR 105" X 79" LINOLEUM COMPOSITION TILE, ACCEPTABLE MATERIAL, MARMOLEUM STRIATO ORIGINAL, SERIES BY FORBO, ALLOW FOR (4) FOUR COLOURS FROM FULL PRODUCT LINE.
2. REFER TO MANUFACTURER'S RECOMMENDATIONS AND FOLLOW COMPLETE INSTALLATION GUIDELINES. AVAILABLE FOR DOWNLOAD AT WWW.FORBOFLORINGNA.COM. FOR A HARD COPY OR FOR ADDITIONAL INFORMATION, CONTACT FORBO TECHNICAL SERVICES AT 1-800-942-7839.
3. INSURE AREAS TO RECEIVE FLOORING ARE CLEAN, FULLY ENCLOSED AND WEATHERTIGHT. SET BUILDING HVAC TO MINIMUM OF 68° F (20° C) FOR MINIMUM SEVEN (7) DAYS PRIOR TO, DURING, AND SEVEN (7) DAYS AFTER INSTALLATION. CONDITION MATERIAL AND ADHESIVE AT INDOOR INSTALLATION CONDITIONS FOR MINIMUM 48 HOURS PRIOR TO INSTALLATION.
4. STORE TILES IN STACKED CARTONS; LAY FLAT.
5. CONDUCT MOISTURE TESTS PRIOR TO INSTALLATION. REFER TO MANUFACTURER'S INSTRUCTIONS FOR TESTING METHODS, AND ACCEPTABLE LEVELS FOR SLAB MOISTURE, PH, AND HUMIDITY.
6. CONDUCT ADHESIVE MAT BOND TESTS BEFORE INSTALLATION.
7. USE MATERIAL FROM THE SAME BATCH/DYE LOT. MIX TILES FROM SEVERAL BOXES. DO NOT REMOVE MORE TILE FROM THE BOX THAN CAN BE INSTALLED IN APPROXIMATELY 1 HOUR. INSTALL CARTONS IN CONSECUTIVE ORDER.
8. INSTALL TILES WITH PATTERN GRAIN PARALLEL TO THE LONG DIMENSION OF THE ROOM / CORRIDOR, AND MATCH GRAIN DIRECTION THROUGHOUT CONTIGUOUS AREAS (I.E. CORRIDOR 02 IS CONTIGUOUS WITH CORRIDOR 13, PATTERN GRAIN RUNS EAST - WEST).

- 9. INSTALL TILES INTO WET ADHESIVE AND ROLL WITH A 100 POUND ROLLER BEFORE THE ADHESIVE HAS DRIED. ALWAYS CHECK FOR PROPER ADHESIVE TRANSFER. IN ORDER TO ACHIEVE A SECURE BOND, THERE MUST BE A COMPLETE WET TRANSFER OF ADHESIVE TO THE TILE SURFACE.
11. REMOVE FRESH ADHESIVE RESIDUE IMMEDIATELY WITH A CLEAN WHITE DAMP CLOTH. DRIED ADHESIVE RESIDUE CAN BE REMOVED WITH A CLEAN
12. PROTECT INSTALLED FLOORING FROM CONSTRUCTION TRAFFIC UNTIL SUBSTANTIAL COMPLETION AND FORMAL HANDOVER TO OWNER.

GYPSUM BOARD:

- 1. INSTALL IN ACCORDANCE WITH CSA A82.31-M1980.
2. STANDARD BOARD, WATER-RESISTANT BACKING, 5/8" THICK, OR AS INDICATED.
3. CEILING BOARD, 1/2" THICK.
4. TYPE X, SIZES AS NOTED, RASTING AS NOTED, C/W ACCESSORIES & TRIM, FIRE RATED BOARD AS INDICATED.
5. FIBERGLASS-BACKED WATER RESISTANT BOARD: 5/8" THICK. PROVIDE THROUGHOUT BATHROOMS, WATER SET ROOM, BEHIND PLUMBED MILLWORK, AND WHERE OTHERWISE INDICATED.
6. ACCESS DOORS, STEEL TYPE, C/W OPERABLE LATCH AND HINGES, GALVANIZED, PAINT READY, ULC RATED, LOCATE WHERE REQUIRED FOR MECHANICAL AND ELECTRICAL ACCESS AND AS INDICATED OR DIRECTED BY CONSULTANT.
7. ACCESSORIES: NAILS TO ASTM C514, SCREWS TO ASTM C 1002, ADHESIVE TO CAN/CGSB-71.25 ASTM C557, LAMINATING COMPOUND, ASBESTOS FREE, CASING BEADS, CORNER BEADS, CONTROL JOINTS, EDGE TRIM TO ASTM C 1047, ZINC COATED SEALANTS LATEX TYPE, ACOUSTIC SEALANT DOW CORNING, INSULATING STRIPS 3mm THICK, NEOPRENE WIDTHS AS REQUIRED, JOINT COMPOUND TO ASTM C 475 ASBESTOS FREE.
8. PREPARE SURFACES FOR PAINTING. REMOVE CRACKS, HOLES, RIDGES AND OTHER BLEMISHES.

PAINTING:

- 1. ONLY PAINT MATERIALS LISTED ON THE CGSB-1-GP-C SERIES QUALIFIED PRODUCTS LIST ARE ACCEPTABLE FOR USE ON THIS PROJECT. COLOURS TO BE CHOSEN BY OWNER.
2. ALL COATING MATERIALS TO BE LOW VOC.
3. COLOURS ALLOW FOR A TOTAL OF TWO (2) FIELD COLOURS AND THREE (3) ACCENT COLOURS. ASSUME A FIELD CEILING COLOUR, A FIELD WALL COLOUR, AND AN ACCENT WALL COLOUR IN EACH ROOM.
4. NEW GYPSUM BOARD: ONE (1) COAT LATEX PRIMER SEALER, TWO (2) COATS HIGH PERF. LATEX, SATIN G4 FINISH.
5. GALV METAL DOOR & WINDOW FRAMES: ONE (1) COAT PRIMER, TWO (2) COATS ACRYLIC ENAMEL, SEMI-GLOSS G5 FINISH.
7. NEW WOOD DOORS & INTERIOR SCREEN WOOD FRAMES: THREE (3) COATS CLEAR WATER-BASED POLYURETHANE, SAND LIGHTLY BETWEEN COATS.

CAULKING & SEALANTS

- 1. CAULKING, GENERAL: CAULKED JOINTS ARE NOT NECESSARILY INDICATED ON THE PROJECT DRAWINGS, HOWEVER, ENSURE THAT JOINTS THAT REQUIRE CAULKING ARE SEALED PRIOR TO PAINTING. WHEN CAULKING IS PERFORMED AFTER PAINTING, CAULKING COLOUR TO MATCH COLOUR OF ADJACENT FINISH FROM MANUFACTURER'S STANDARD COLOUR RANGE.
2. ONLY SEALANTS LISTED ON CGSB QUALIFIED PRODUCTS LIST ARE ACCEPTABLE.
3. BACK-UP MATERIALS TO BE COMPATIBLE WITH SEALANT.
4. VERTICAL AND HORIZONTAL NON-TRAFFIC BEARING JOINTS, TO TABLE 1, CGSB 19-GP-23. APPLICATION: DUST AND OTHER FOREIGN MATTER TO BE REMOVED AND JOINTS DRIED. APPLY TO MANUFACTURER'S INSTRUCTIONS BY FILLING VOIDS AND JOINTS WITH SUPERFICIAL PAINTING WITH SKIN BEAD IS NOT ACCEPTABLE. SURFACE OF CAULKING MUST BE FORMED SMOOTH, FREE FROM RIDGES, WRINKLES, SAGS, AIR POCKETS, EMBEDDED IMPURITIES, NEATLY TOOL SURFACE TO A SLIGHT CONCAVE JOINT. ADJACENT SURFACES MUST BE CLEANED IMMEDIATELY AND WORK LEFT NEAT AND CLEAN. EXCESS CAULKING AND DROPPINGS MUST BE REMOVED USING RECOMMENDED CLEANERS AS WORK PROGRESSES. MASKING TAPE MUST BE REMOVED BEFORE CAULKING HAS SET.

FIRE STOPPING AND SMOKE SEALS

- 1. TO CAN4-S115-M85 1991, EXCEPT WHERE SPECIFIED OTHERWISE.
2. PRODUCTS MUST BE CERTIFIED BY ULC-UNDERWRITERS LABORATORY OF CANADA.
3. CONTRACTOR TO SUBMIT DATA SHEETS TO CITY OF THUNDER BAY FOR REVIEW.

WASHROOM ACCESSORIES:

- A. TOILET TISSUE DISPENSER: DOUBLE ROLL TYPE, SURFACE MOUNTED, CHROME PLATED, STEEL FRAME, ROLL UNDER SPRING TENSION FOR CONTROLLED DELIVERY. ACCEPTABLE MATERIAL: FROST 150.
B. MIRRORS: VANDAL RESISTANT WALL MOUNTED, 18" x 30" FRAMED MIRROR, 1/4" TO CAN/CGSB-12.5, STAINLESS STEEL FRAME, ACCEPTABLE MATERIAL: FROST 941-1830 SERIES.
C. GRAB BARS: L-SHAPED MIRROR PLATED STAINLESS STEEL, KNURL BAR AT AREA OF HAND GRIPS. GRAB BAR MATERIAL AND ANCHORAGE TO WITH STAND DOWNWARD PULL OF 2.2 KN. ACCEPTABLE MATERIAL: FROST 1003-30-30.
D. GRAB BARS: WALL TUBING OF CHROME PLATED STAINLESS STEEL, KNURL BAR AT AREA OF HAND GRIPS. GRAB BAR MATERIAL AND ANCHORAGE TO WITH STAND DOWNWARD PULL OF 2.2 KN. ACCEPTABLE MATERIAL: FROST 1001-24.
E. COAT HOOKS: STAINLESS STEEL WITH MAXIMUM 2" PROJECTION. ACCEPTABLE MATERIAL: BOBBICK 86707.
F. JANITORIAL SHELF: ACCEPTABLE MATERIAL: FROST 1115.

ENGINEERED WOOD SIDING

- 1. BORATE-IMPREGNATED WOOD FIBRE SUBSTRATE WITH RESIN BINDING: LP CANEXEL ULTRAPLANK, KWP NATURETECH, OR APPROVED EQUAL. PREFINISHED FACTORY BAKED-ON FINISH. REFER TO ELEVATIONS FOR COLOUR DETAILS. INCLUDE TOUCH-UP PAINT FROM THE MANUFACTURER TO MATCH COLOURS SELECTED.
2. PREFINISHED WHITE TRIM BOARDS: AT ALL CORNERS, AROUND LOUVERS, PENETRATIONS, AND AS A MOUNTING SURFACE FOR EXTERIOR ITEMS SUCH AS LIGHT FIXTURES, OUTLETS, RAILINGS, ETC., AND AS INDICATED ON THE DRAWINGS. ENGINEERED WOOD TRIM BOARDS 50 (1", 5/4") THICKNESS, SUPPLIED FROM THE SAME SIDING MANUFACTURER. AT LOUVRES & PENETRATIONS: 2" WIDTH. ALL OTHER LOCATIONS: 4" WIDTH.
3. UNDERLAYMENT: SHEATHING TO CAN/CGSB51.32 AS SPECIFIED AND AS DETAILED. INCLUDE WOOD FURRING/BLOCKING AS REQUIRED TO SUPPORT SIDING DETAILS SHOWN ON DRAWINGS.
4. EXPOSED FASTENERS FOR PANELS: STAINLESS STEEL HEX SCREWS, 6MM (1/4") DIAMETER X LENGTH TO PENETRATE FULLY THROUGH SHEATHING TO CSA-835.4. REFER TO MANUFACTURER'S RECOMMENDATIONS FOR SPACING AND INCLUDE A STAINLESS STEEL WASHER/GROMMET FOR EACH SCREW.
5. CONCEALED FASTENERS FOR LAP SIDING: HOT DIPPED GALVANIZED NAILS (BLIND NAIL) AS PER MANUFACTURER'S RECOMMENDATIONS AND TO PENETRATE FULLY THROUGH SHEATHING TO CSA-835.4.
6. PATCHING COMPOUND: CEMENTITIOUS PATCHING COMPOUND ACCEPTABLE TO THE SIDING MATERIAL MANUFACTURER.
7. INCLUDE PREFINISHED METAL DRIP FLASHINGS AT HORIZONTAL TRANSITION POINTS BETWEEN ONE SIDING TYPE AND THE NEXT.

VAPOUR BARRIER, AIR BARRIER, DAMPROOFING, ROOF UNDERLAYMENT

- 1. ADHERE TO REQUIREMENTS FOR MATERIALS AND INSTALLATION IN THE SEALANT AND WATERPROOFERS INSTALLATION, SEALANT AND CAULKING GUIDE SPECIFICATION, NATIONAL AIR BARRIER ASSOCIATION PROFESSIONAL CONTRACTOR QUALITY ASSURANCE PROGRAM; CANADIAN URETHANE FOAM CONTRACTOR'S ASSOCIATION PROFESSIONAL CONTRACTOR QUALITY ASSURANCE PROGRAM; SEALANT AND WATERPROOFERS' INSTITUTE - SEALANT AND CAULKING GUIDE SPECIFICATION OR LATEST; CANADIAN CONSTRUCTION MATERIALS CENTRE (CCMC), TECHNICAL GUIDE FOR AIR BARRIER SYSTEMS FOR EXTERIOR WALLS OF LOW-RISE BUILDINGS.
2. PREPARE AND INSTALL ACCORDING TO MANUFACTURER'S INSTRUCTIONS; ADHERE TO INSTRUCTIONS REGARDING SUBSTRATE SURFACE PREPARATION AND SEALANT MATERIAL TEMPERATURE RANGES.
3. SUPPLY AND INSTALLATION OF AIR/VAPOUR BARRIER MATERIALS AND ASSEMBLIES TO RESULT IN A CONTINUOUS BUILDING ENVELOPE AND A CONTINUOUS SEAL AT ALL BUILDING PENETRATIONS.

AIR- AND VAPOUR BARRIER AND ROOF UNDERLAYMENT:

Table with 3 columns: Type, Application, Accepted Material (or approved equal). Rows include Roof underlayment, Roof eave and valley protection, NOT USED, Peel and stick air/vapour barrier, Crawlspace floor, Interior face of exterior walls and ceilings, Exterior face of wall air barrier, Roof under asphalt shingles.

ROOFING

- 1. METAL SHINGLES: 26-GAUGE HOT-DIP GALVANIZED STEEL PANELS, FACTORY BAKED-ON FINISH, INSTALLED USING CONCEALED FASTENERS AND SNAP-LOCK STANDING SEAMS. MINIMUM 40-YEAR MANUFACTURER'S WARRANTY.
2. PROVIDE CONTINUOUS RIDGE VENT AT ROOF PEAK WITH RIDGE CAP BY SAME MANUFACTURER.
3. CONTINUOUS RIDGE VENT: 19MM (3/4") THICK X 267MM (10.5") WIDE, HIGH DENSITY FIBER ROLLED MATERIAL WITH A MINIMUM NET FREE VENTILATION AREA OF 15.2 SQUARE INCHES PER LINEAL FOOT, BLACK OR GRAY COLOUR. ACCEPTABLE MATERIAL: RIDGEMASTER PLUS, BLOCKSOM & CO. ROOF SAVER, MENZIES SHINGLE OVER RIDGE TOP VENT, OR APPROVED EQUAL.
4. MODIFIED OR RUBBERIZED ROOFING MASTIC TO CAN/CGSB 19-13-M87. LAP CEMENT: TO CAN/CGSB-37.4.

INSULATION & MEMBRANES:

- 1. TO CAN4-S115-M95, PRODUCTS MUST BE ULC CERTIFIED.
2. EXTERIOR WALLS AND ROOF BATT INSULATION TO CANULC S702, R-4.4 PER INCH AT WALLS, R-4 AT ROOF. ACCEPTABLE MATERIAL: ROXUL COMFORTBATT OR APPROVED EQUAL.
3. ACOUSTICAL SOUND AND FIRE ATTENUATION BATT AND BLANKET AT INTERIOR PARTITIONS: TO ASTM C 665, ULC DESIGN. ACCEPTABLE MANUFACTURER: ROXUL, OWENS CORNING OR OTTAWA FIBRE.
4. ACCESSORIES - INSULATION CLIPS, TAPE, AND TYPES AS RECOMMENDED BY MANUFACTURER. STAPLES, NAILS, GALVANIZED.
5. SPRAYFOAM INSULATION: TO MEET CAN/CGSB 19-13-M87, LOW EXPANSION FOAM.

SHEET METAL FLASHING AND TRIM

- 1. WORK TO INDUSTRY STANDARDS ACCEPTED BY THE LOCAL CONSTRUCTION AND TRADE ASSOCIATIONS.
2. FLASHINGS, FASCIAS, AND BENT CLOSURES: 24 GAUGE (0.6MM)
3. FINISHES: GALVALUME OR 8000 SERIES FROM STANDARD COLOURS; ALLOW FOR FOUR COLOURS AS SELECTED BY CONSULTANT.
4. CONTINUOUS SOFFIT VENT (UNLESS SPECIFIED OTHERWISE): 6MM (2 3/8") WIDE STRIP VENT WITH 44MM (1 3/4") PERFORATED WIDTH OR FULL WIDTH PERFORATED SOFFIT PANELS TO SUIT. PREFINISHED METAL IN A WHITE OR MILL FINISH. INCLUDE ALL RELATED ACCESSORIES NECESSARY. ACCEPTABLE MATERIAL: MENZIES METAL PRODUCTS CONTINUOUS SOFFIT VENT, OR APPROVED EQUAL.
5. PREFINISHED SOFFIT: VENTED, FACTORY BAKED-ON PRIMER AND OUTSIDE COATING TO BE DURABLE AND FADE RESISTANT. COLOUR TO BE SELECTED BY CONSULTANT FROM FULL STANDARD RANGE. KAYCAN OR APPROVED EQUAL.
6. EAVESTROUGHS AND DOWNSPOUTS: 24 GAUGE CORE MATERIAL, PRECOATED STEEL, ALLOW FOR TWO COLOURS AS SELECTED BY CONSULTANT FROM STANDARD RANGE. EAVESTROUGH TO BE 150MM (6") MINIMUM WIDTH X 100MM (4") MINIMUM DEPTH WITH STANDARD PROFILE, AS INDICATED ON THE DRAWINGS. UNLESS NOTED OTHERWISE ON DRAWINGS, DOWNSPOUTS TO BE 200MM (8") WIDE X 150MM (6") DEEP WITH OPEN FRONT FACE. ALL DOWNSPOUTS INSTALLED COMPLETE WITH 1200MM (48") KICKS TO PRECAST CONCRETE SPLASHPADS.
7. PRE-CAST CONCRETE SPLASH PADS: MIN. 18"W x 30"L x 3"H.
8. FASTENER: PREFINISHED STEEL WITH FIBERGLASS REINFORCED NYLON HEAD AND SOFT NEOPRENE WASHER, AT EXPOSED LOCATIONS. EXPOSED FASTENERS TO MATCH SAME COLOUR AS FLASHING AND FASCIA.
9. SEALANT: CLEAR SILICONE AS PER SECTION 07 92 00.

RUBBER BASE

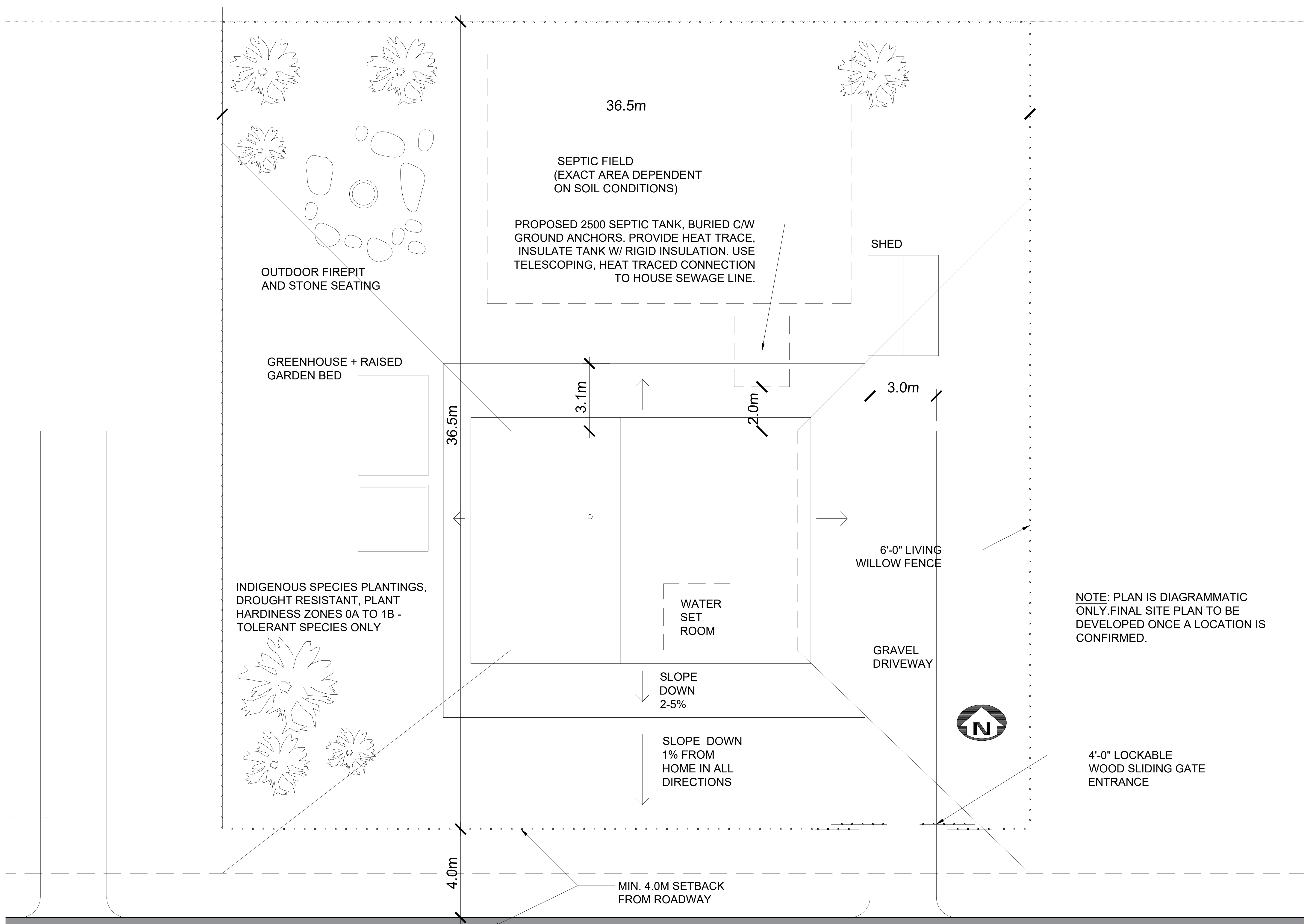
- 1. RESILIENT RUBBER WALL BASE TO CAN/CSA A 126.5-87, 4" (100MM) HIGH.
2. ACCEPTABLE MATERIAL: JOHNSONITE 4" TRADITIONAL WALL BASE 'DC-XXX-4' OR APPROVED EQUAL. COLOURS TO BE SELECTED BY CONSULTANT.
3. ACCESSORIES, ADHESIVES, ETC. AS PER MANUFACTURER'S SPECIFICATIONS
4. INSTALL AS PER MANUFACTURER'S SPECIFICATIONS.

VINYL SHEET FLOORING

- 1. HOMOGENEOUS SHEET VINYL TO CA01350 / ASTM F1913-04, JOHNSONITE IQ OPTIMA OR APPROVED EQUAL. PROVIDE ALL ADHESIVE AND ACCESSORIES REQUIRED FOR INSTALLATION, MAINTENANCE AND REPAIR, CERTIFIED BY MANUFACTURER.
2. ENSURE FLOOR SUBSTRATES ARE CLEAN, SOUND AND FREE OF DEFECTS PRIOR TO FLOORING INSTALLATIONS. SEAL CONCRETE FLOOR TO MANUFACTURERS RECOMMENDATIONS.
3. USE A FLOOR LEVELING COMPOUND TO ACHIEVE SLOPE TO FLOOR DRAINS. ACCEPTABLE FLOOR LEVELING COMPOUND MANUFACTURERS: RUTLAND, DAP, HENRY.
4. COVE BASE, RUBBER WITH RADIUS TOP, COLOUR AS SELECTED BY CONSULTANT.
5. INSTALL FLOORING UNDER MILLWORK AND OTHER PERMANENTLY MOUNTED FITTINGS.
6. SEALER AND WAX: TYPE RECOMMENDED BY VSF FLOORING MANUFACTURER FOR MATERIAL TYPE AND LOCATION.
7. TRANSITION STRIPS: AS RECOMMENDED BY MANUFACTURER.
8. INSTALLATION, STORAGE AND HANDLING AS PER MANUFACTURER'S SPECIFICATIONS.
9. VENTILATE SPACE DURING GLUING OPERATIONS.
10. PROHIBIT TRAFFIC ON FLOOR 48 HRS AFTER INSTALLATION.

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NO.	DATE	ISSUE NOTES
4	2020 APR 14	ISSUED FOR FINAL REPORT
3	2020 MAR 31	RE-ISSUED FOR 99% REVIEW
2	2020 JAN 16	ISSUED FOR 99% REVIEW
1	2019 DEC 15	ISSUED FOR DRAFT REVIEW

PROFESSIONAL SEAL

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SMOKE
ARCHITECTURE

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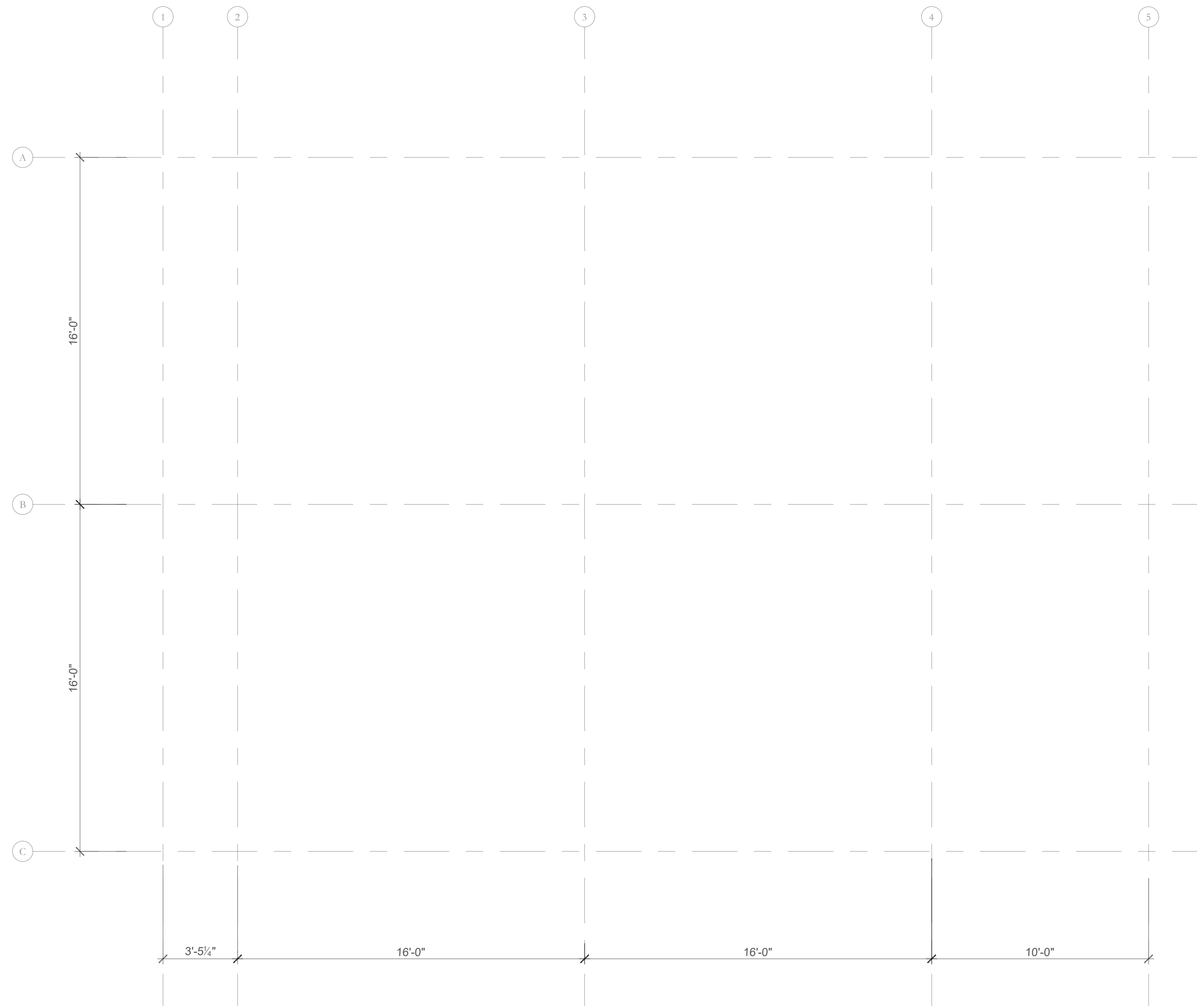
PROJECT TITLE
**National Research Council of Canada:
A Path To Healthy Housing**

LOCATION
Bunibonibee Cree Nation, Oxford House 24, Manitoba

CLIENT
David T Fortin Architect INC.

DRAWING TITLE
SITE PLAN

DRAWN LR	APPROVED ES	DRAWING NO.
SCALE AS NOTED	DATE ISSUED APRIL 14, 2020	A1-00
PROJECT NUMBER 1905	REVISION NO. R-0	



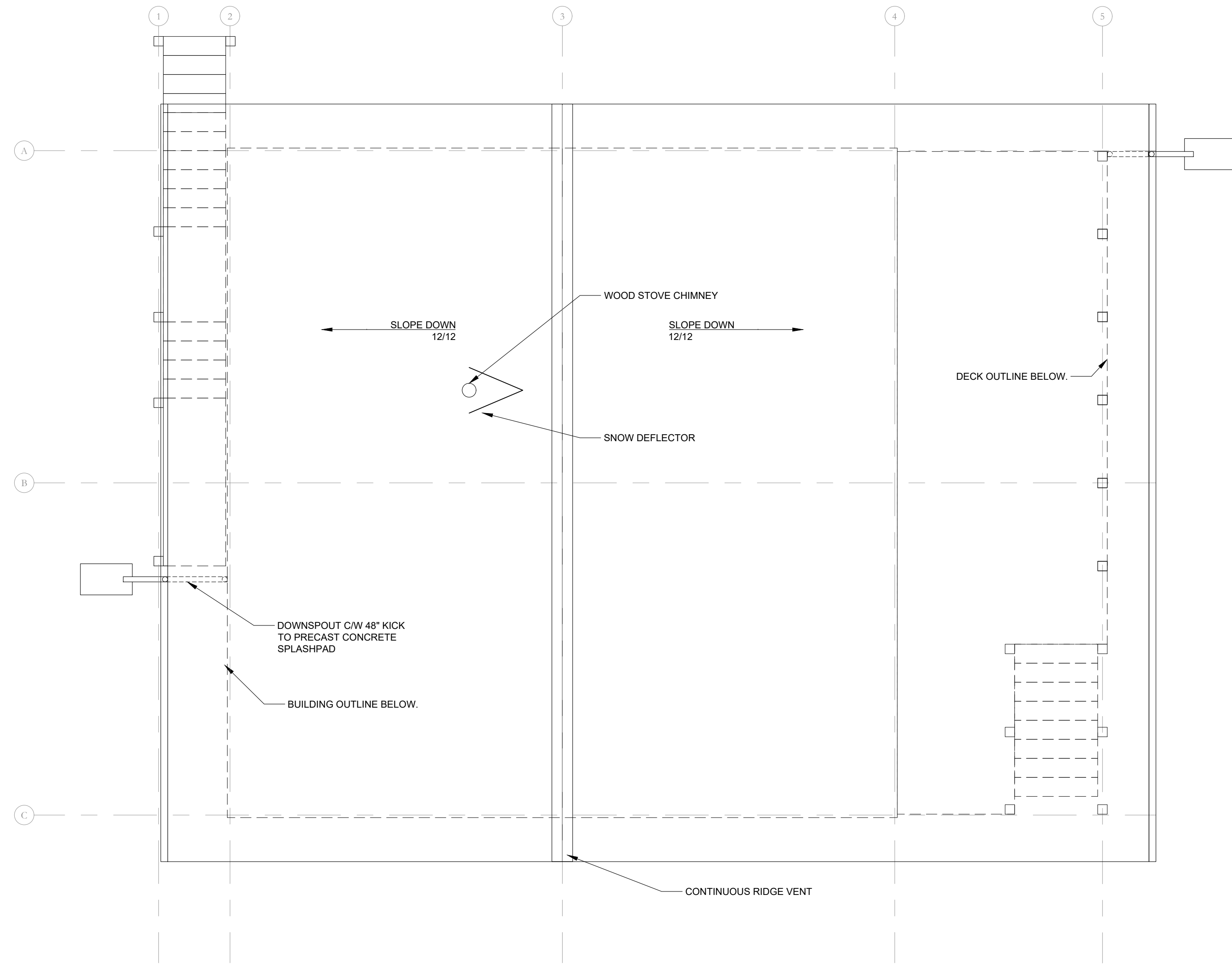
01 STRUCTURAL GRID PLAN
 A2-00 SCALE: 1/4" = 1'-0"

MAIN FLOOR NOTES

NOTE 1
 Galvalume kick within a 6" W x 6" D trough in sidewalk, c/w inset grate flush with sidewalk surface; refer also to Civil drawings.

NOTE 2
 Galvalume downspout wraps around inside face of column, 48" kick to precast concrete splashpad set in raised planter bed.

NOTE 3
 Wood post supporting porch canopy above, refer to structural.



02 ROOF PLAN
 A2-00 SCALE: 1/4" = 1'-0"



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SMOKE ARCHITECTURE

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PROJECT TITLE
 National Research Council of Canada:
 A Path To Healthy Housing

LOCATION
 Bunibonibee Cree Nation, Oxford House 24, Manitoba

CLIENT
 David T Fortin Architect INC.

DRAWING TITLE
 STRUCTURAL GRID PLAN + ROOF PLAN

DRAWN LR	APPROVED ES	DRAWING NO. A2-00
SCALE AS NOTED	DATE ISSUED APRIL 14, 2020	
PROJECT NUMBER 1905	REVISION NO. R-0	