



Radium Hot Springs Community Hall + Library

# Project Summary

The 8,000 sq ft Radium Community Hall and Library is located at the edge of Legends Park at the heart of the Village.

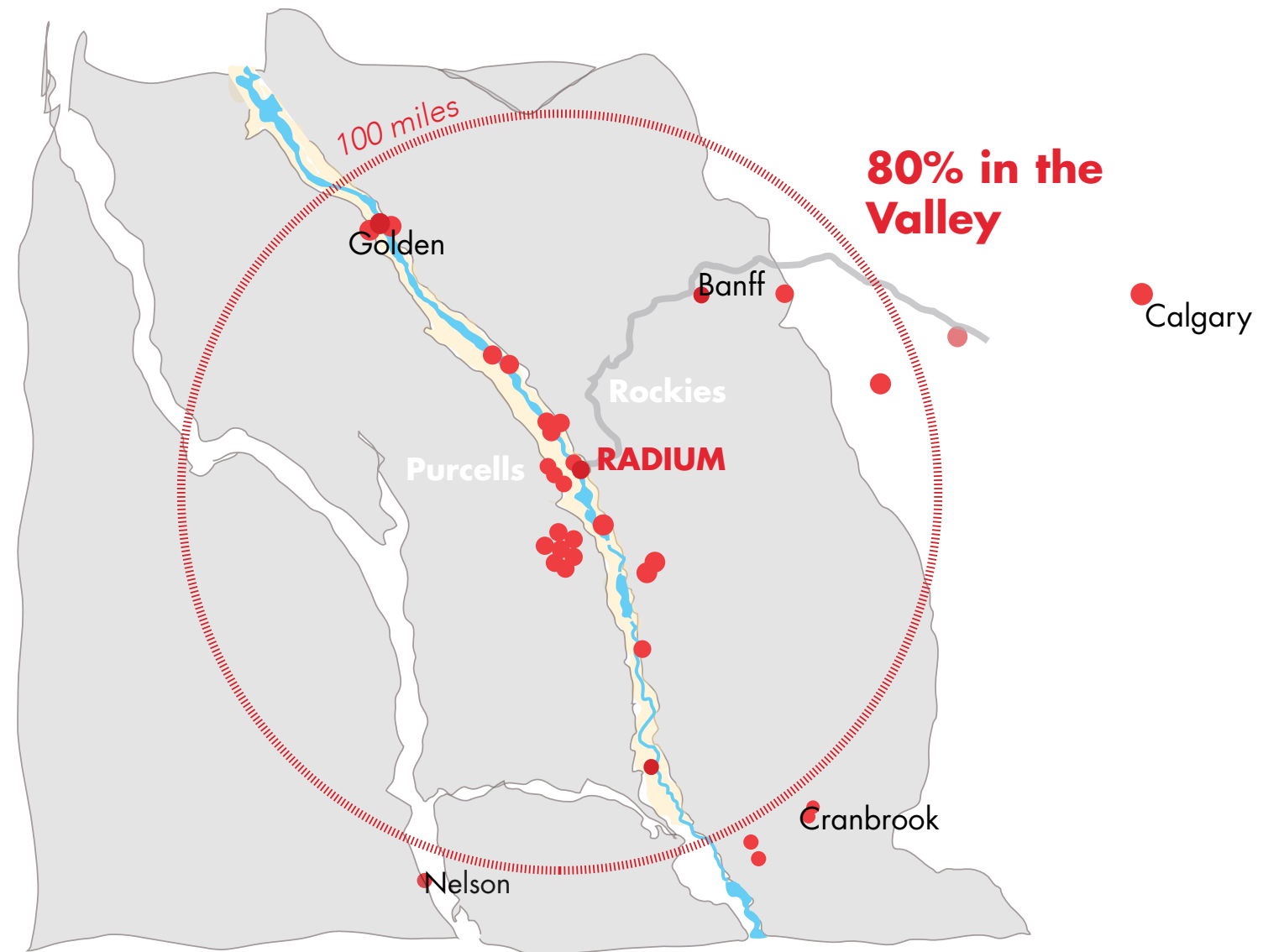
Designed as the “100 mile” building, the project maximizes the use of local materials and trades in the Columbia Valley. The project goals were to:

- Create economic sustainability through a unique project process that commenced with a wood stakeholders workshop to identify local partners, sponsors, champions and trades;
- Demonstrate the use of renewable resources and innovative replicable building systems;
- Create a building that reflects the micro-climate of the site; and
- Design a community home at the centre of the Village that builds synergies through the program components increasing use.

## Key sustainable design strategies:

- Create social sustainability through extensive community involvement throughout the design process;
- Support the local economy through the “100 mile” build local strategy;
- Minimize GHG through the use of wood and reduction in transportation costs of materials;
- Create an aurally calm environment for the aging population; and
- Minimize energy consumption through passive design strategies including building orientation, minimizing disturbance of the land, maximizing daylighting, robust envelope design, well considered openings, and photo-voltaic energy assist.

## 100 Mile Building- Build local strategy



Key plan of the Valley indicating location of resources, trades and materials utilized in the construction of the facility.



# Strategic Decisions

## The "100 Mile" Building - Maximizing Building Life Cycle Considerations

Critical to the success of the Radium Community Hall + Library was an integrative design process that identified local materials, resources and labour, thereby dramatically reducing the life cycle embodied energy and overall carbon footprint of the development.

The design process resulted in a building that maximized the use of local wood fibres, utilizing approximately 288 cubic meters of wood products harvested from valley woodlots within 50km of the site and processed at the local Canfor mill 1km from site. Much of the material fabrication was also carried out locally. The panels were subsequently prefabricated off-site in Golden, 60 km north of Radium, and transported to the site in a choreographed sequence to maximize efficiency. The cladding was milled by a local millworks and charred in Brisco, 8km from site.

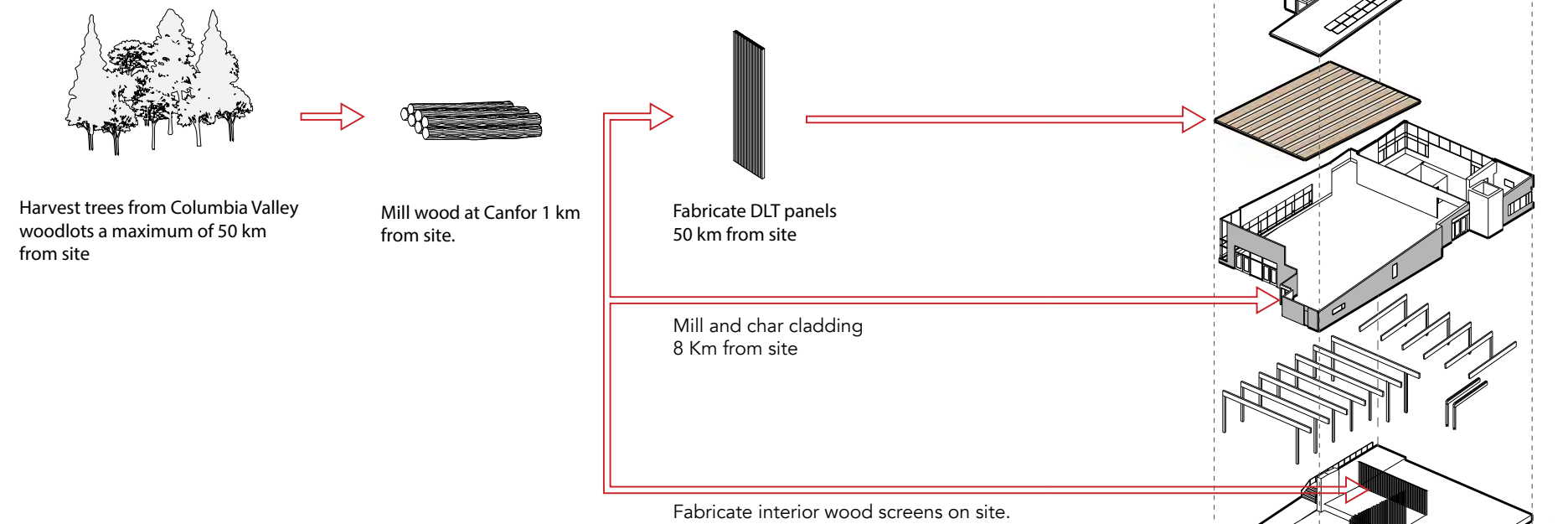
DLT is a mass timber structural panel constructed of standard dimensional lumber, friction-fit together with hardwood dowels, not requiring the use of nails, screws, or adhesive. DLT panels combined with a glulam posts + beams also results in a structural system with high potential for demountability and adaptability for future reuse to other functions.

This unique local-centric process resulted in the following outcomes:

- 80% materials and labour obtained within 100 miles of the site supporting local economy;
- Significant contributions in kind (lumber) from the local Canfor mill;
- Inclusion of an innovative pre-fabricated dowel laminated panels system;
- Local production of charred wood siding;
- Significant sponsorship of the building from local residents;
- Significant funding from the Columbia Valley Trust due to their appreciation of the inclusive design process;
- A vibrant new community home that is much loved by all, and within weeks of opening is almost booked out for 2019 summer wedding season!

## Build Local/ Economic Sustainability

**Local materials + trades support the valley economy + reduce GHG transportation emissions.**

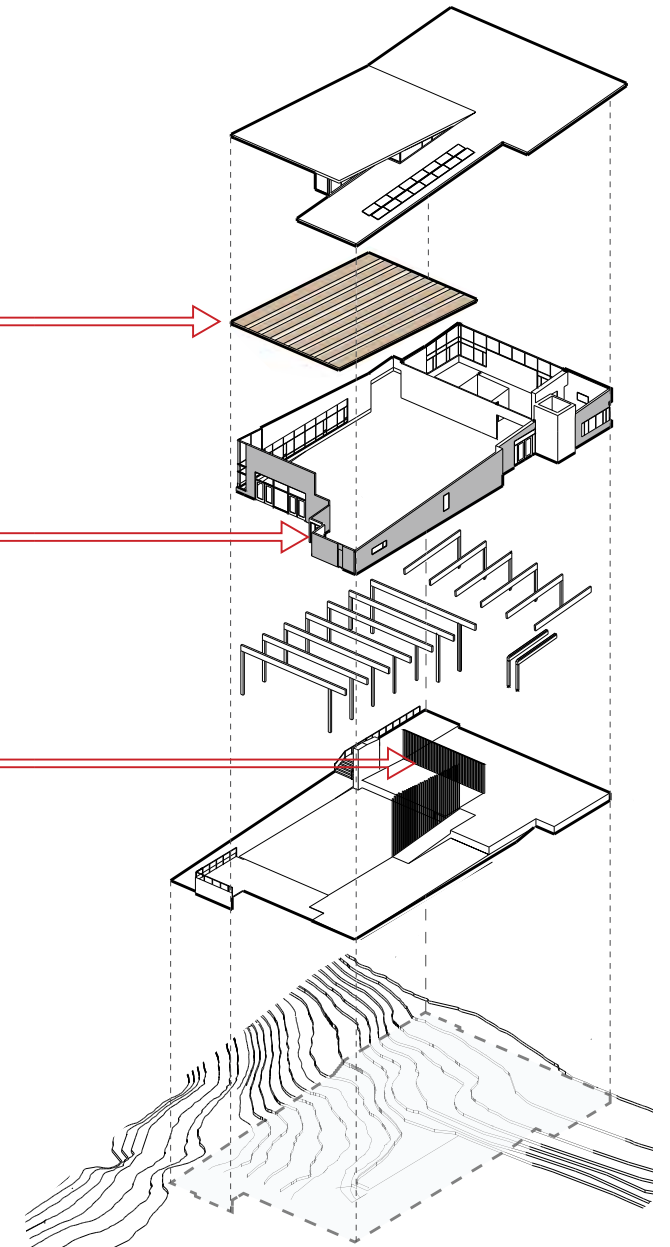


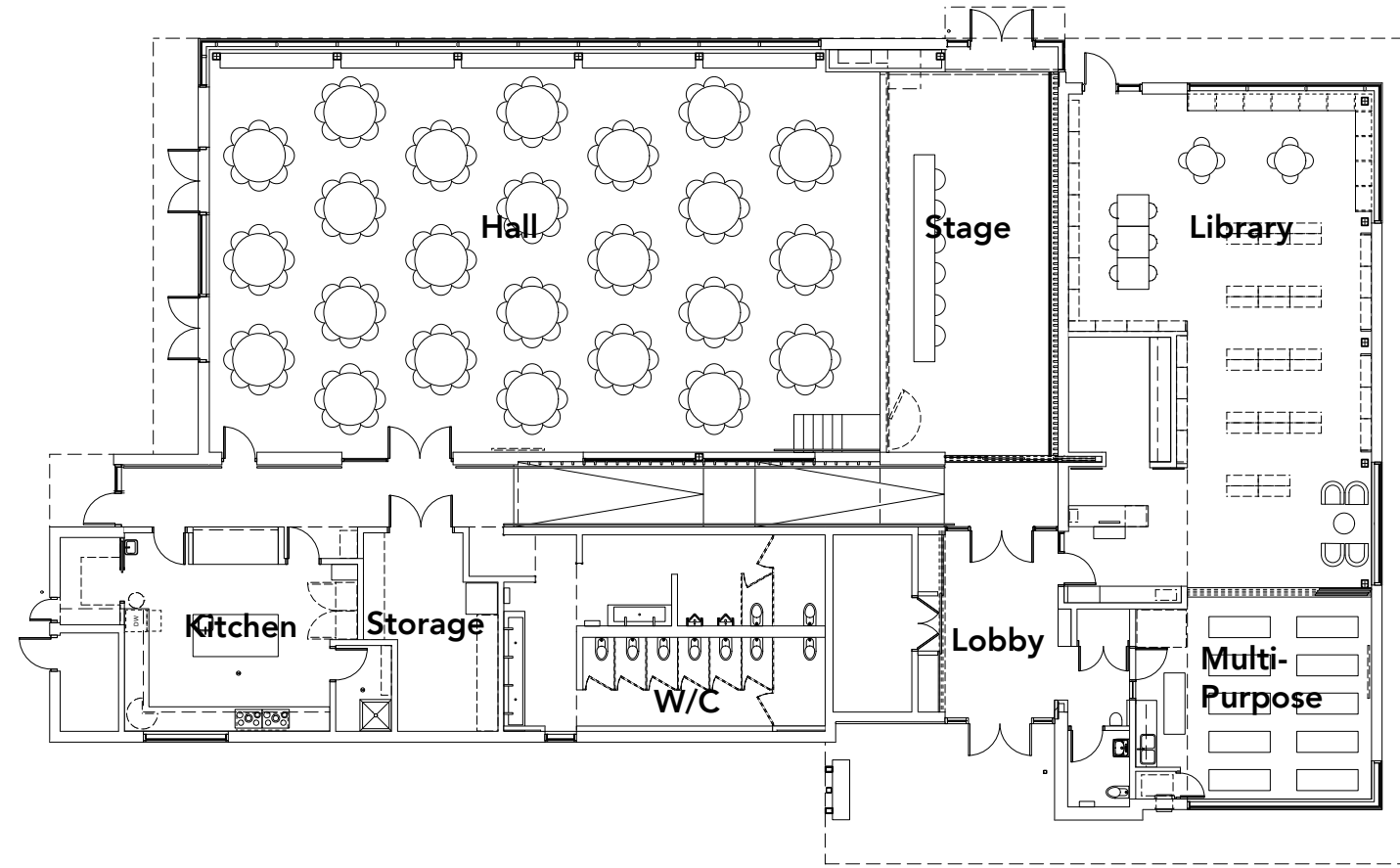
### Environmental Impact

- V** Volume of wood products used: 288 cubic meters
- T** U.S. and Canadian forests grow this much wood in: 1 minute
- C** Carbon stored in the wood: 245 metric tons of CO<sub>2</sub>
- G** Avoided greenhouse gas emissions: 522 metric tons of CO<sub>2</sub>
- ✓** Total potential carbon benefit: 767 metric tons of CO<sub>2</sub>

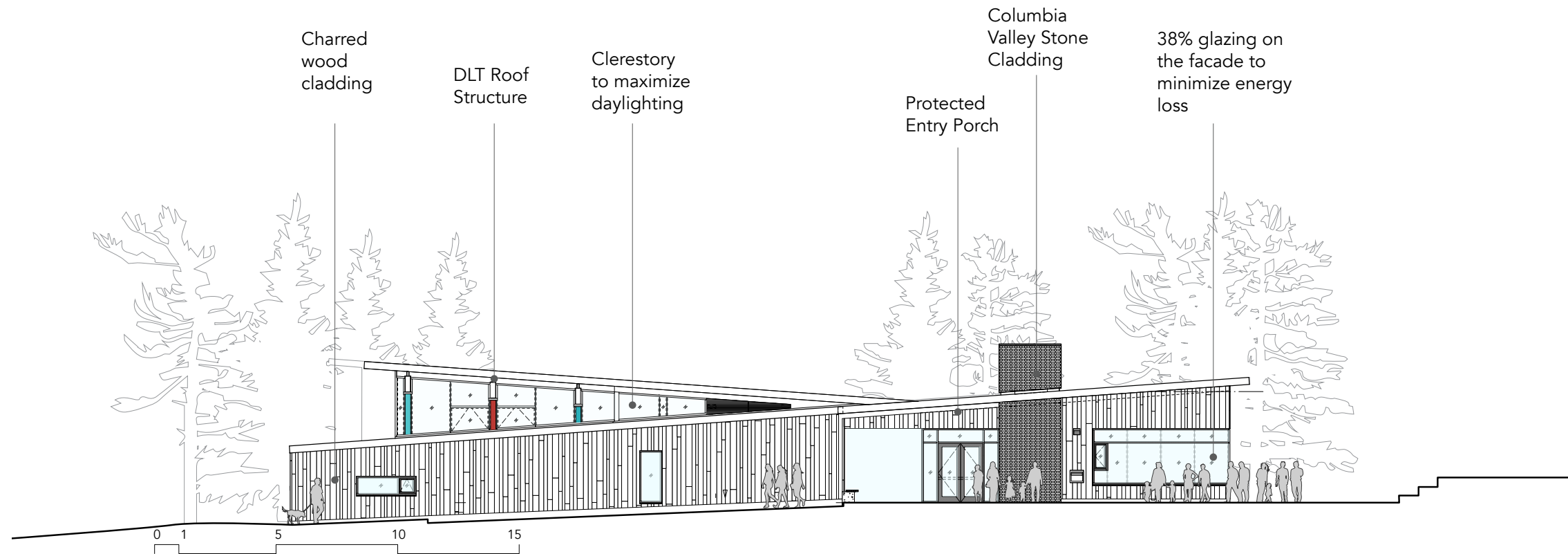
GHG Emissions are Equivalent to:

- Car** 162 cars off the road for a year
- House** Energy to operate 81 homes for a year





Floor Plan 



South Elevation

# Community

*“Our use of wood helps the interior beauty of this unique building really stand out. The project re-vitalized our community meeting space and turned this community hall and library into a centrepiece project for the municipality. We’ve had tremendous buy-in from the residents of Radium as well as from our wood suppliers who came together on this.”*

-Arne Dohlen, Director of Planning and Development Services, Village of Radium Hot Springs

From the outset of the design process, the community participated as active project partners instilling ownership and creating social connections. This resulted in a community hall and library that reflects mountain culture and is a vibrant gathering place at the heart of the village.

Located at a prime downtown corner, the Community Hall and Library **enhance the public realm** by providing outdoor gathering spaces that promote indoor-outdoor connectivity to the town and the park. Overlooking the Legends Park kettle hole, the building is sited to increase accessibility to the park in all seasons.

The Community Hall and Library **encourages community interaction** by:

- Being the community living room for residents and tourists;
- Providing a venue for the aging population to meet;
- Promoting connectivity and wellness through co-locating public spaces; and
- Supporting wellness through mitigating loneliness by providing an accessible home for all.

The Community Hall and Library **supports resiliency** by:

- Creating a culture of participation through an intensive engagement process;
- Facilitating economic growth through the inclusion of many local citizens in the contracts for the project;
- Nurturing connectivity by co-locating the Hall, Library and community kitchen;
- Providing an accessible, welcoming place for celebrations and mourning, and
- Including a community kitchen to enhance health and wellness and contribute to food security.



Located at the centre of Radium, within a 15 minute walking radius of the 80% of the residents, the location reduces the reliance on car travel.



A parking analysis indicated that there was sufficient available parking within 5 minute walk from the proposed Hall, including up to 50 cars surrounding the park. 6 accessible stalls and 6 regular stalls only are provided near the entry to support the aging community.



*The Paint Pot plaza supports markets, festivals and celebrations in all seasons, and was inspired by the unique Paint Pot formation in Kootenay National Park.*

# Site Ecology

Radium Hot Springs is a resort municipality, known for the natural hot springs, the Columbia Valley wetlands, and the Rocky Mountain culture. Perched on the edge of the natural kettle hole and lined with pine trees, the site is a microcosm of the Valley.

As part of the process, a master plan for the park was created. The intent was to limit the development footprint, preserving the natural environment. As such, the Hall, plaza and parking areas are located on a previously developed site.

The building is nestled into the edge of the slope overlooking the park below. The building was sited to preserve the existing groves of pine trees that line the slopes of the kettle hole. The shade from the trees is utilized to shield the building from the late western sun.

The low sloped form follows the natural topography of the site to minimize excavation, reduce massing and highlight the silhouette of the pine trees. Inspired by the simple agrarian sheds in the Columbia Valley, the building form is calibrated to suit the spatial requirements of the programmatic uses.



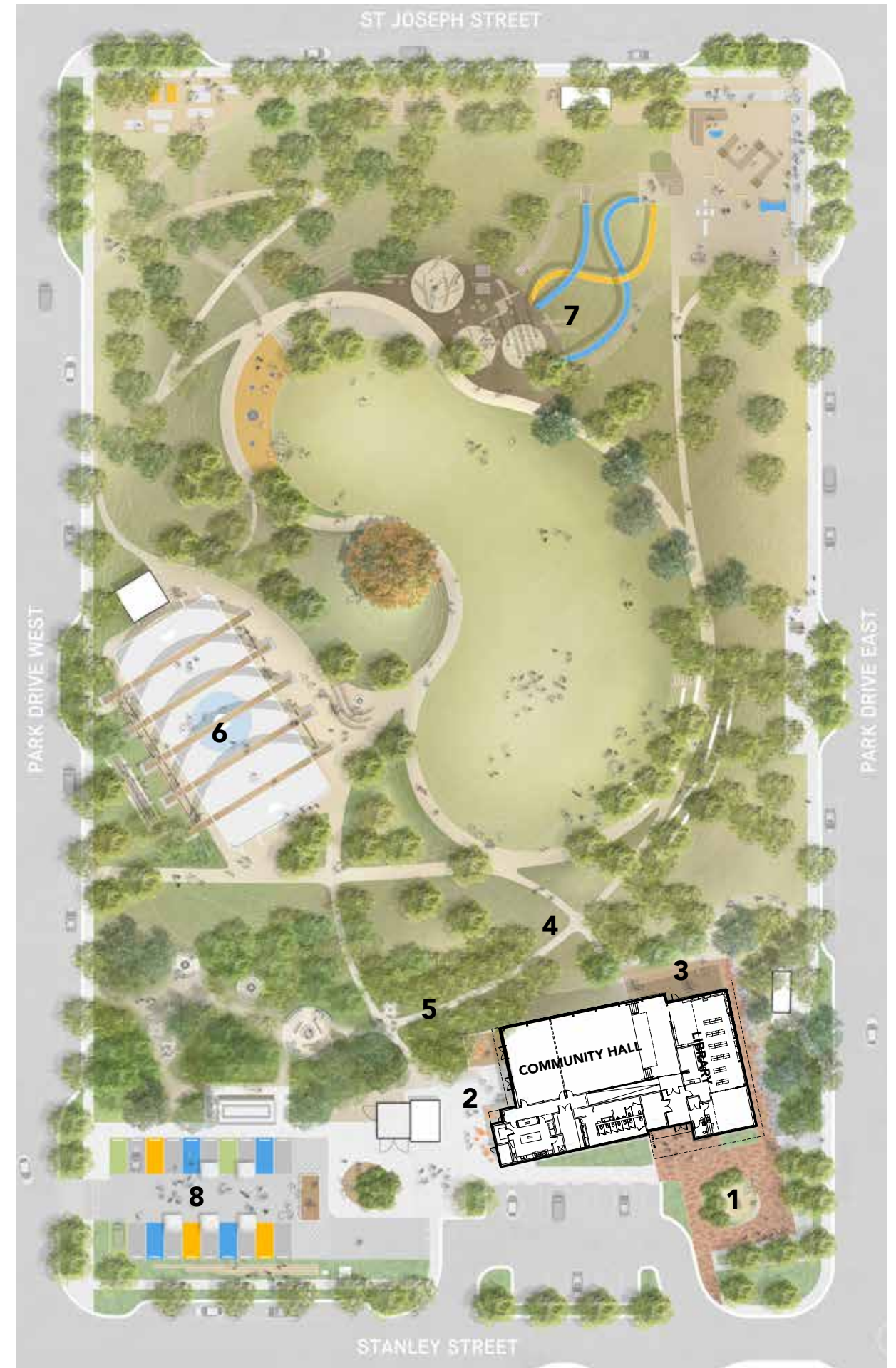
The resident big horn sheep are a protected species and roam the town. Planting was selected to be "big horn sheep proof!"

## Key Exterior Spaces

1. Paint Pots Plaza
2. Brent's Shack Plaza + Deck: gathering area between the existing BBQ shack and the community Hall.
3. Library Deck provides a shaded place for programs and lingering.
4. The tobaggan run - the building was sited to maintain and support this popular slope!
5. Accessible paths are regraded to provide connection to the park.

PHASE 2:  
The community hall has inspired further work in the park including:

6. Radium Stadium - relocation of the ice rink
7. Extension of the existing playground to using the slope to connect to the park below.
8. Market court expansion







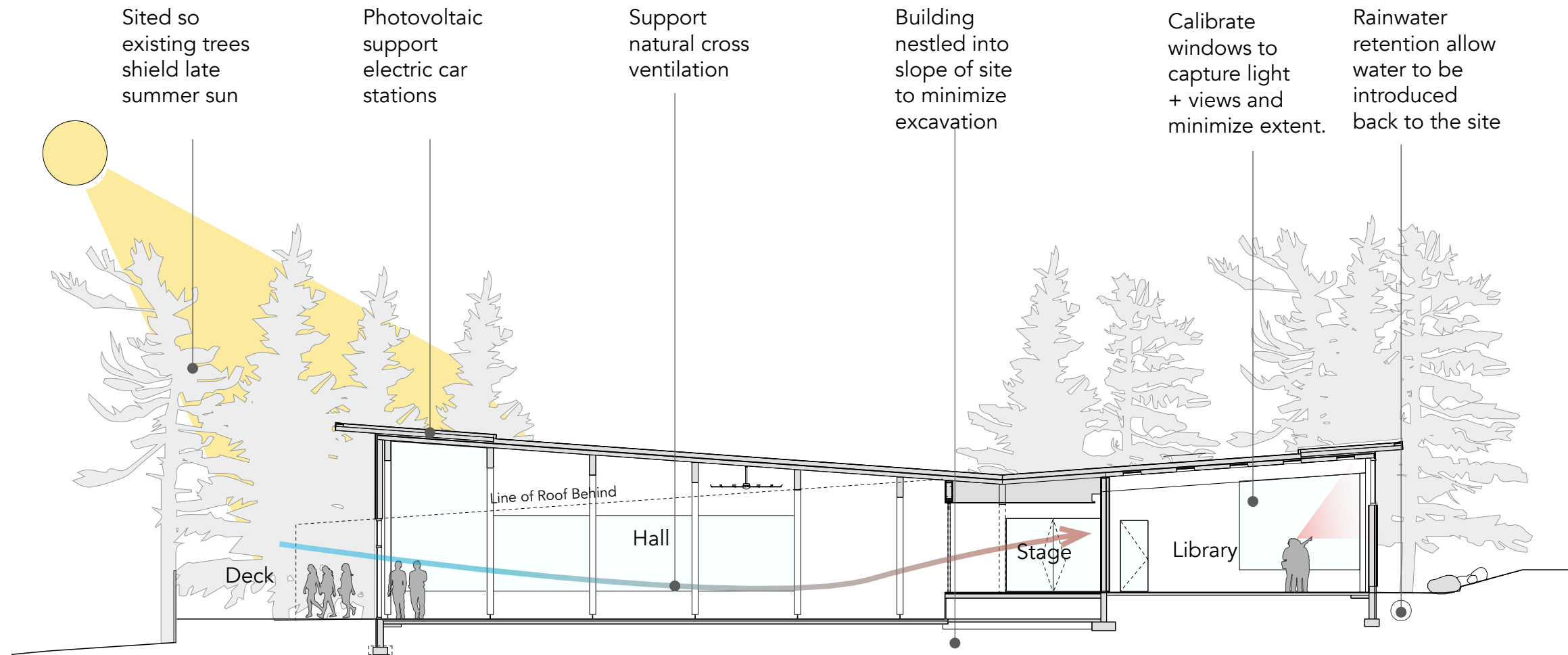
*The sloped form follows the natural topography of the site, highlighting views to the mountains beyond.*

# Light and Air

The building is sited to maximize passive strategies with a long linear form on the east-west axis, permitting natural daylighting and cross ventilation. Strategically located roof overhangs control solar exposure. Window locations are carefully calibrated to capture the views of the mountains and connect to the park while maintaining less than 40% opening for energy efficiency.

Lighting is critical to the success of this people-oriented community facility. Strategies include:

- East west axis with north/south orientation permits control of the light,
- 100% daylight and exterior views in public spaces, including washrooms,
- 100% of occupied space within 7 m of an operable opening,
- Natural north light provides even light in the Hall,
- Existing Pine trees shade the late north-west summer sun.
- Clerestories with overhangs calibrate the southern light and bring light into the Hall and the circulation spine,
- Occupancy sensors in public areas to reduce energy consumption, and
- LED lighting to provide high-efficiency lighting solution that reduces life-cycle cost.



Natural Ventilation in section.





## Social Wellness

The building is the living room and social heart of the community. Co-locating the Library and the Hall provides cross-pollination and increases usage. The community kitchen was designed with the local seniors group to ensure accessibility and ease of use.

The siting of the building creates a variety of exterior rooms within the public realm that can be occupied throughout the year. Indoor-outdoor connectivity promotes social well being and expands year round use of the 8,000 sqft building.

### Comfort

- The DLT ceiling system integrates acoustic panels and lighting with the wood structure creating a visually compelling and aurally comfortable environment.
- The sprung wood floor, in the Hall, is gentle on the muscles and is well used for dances, recreation and weddings.

### Movement

- The Hall is a place for exercise, dance, yoga, pickle ball and bowling, prenatal classes, sports camps and celebration. It accommodates programs for all ages encouraging physical activity.

### Mind

- The Hall and Library, as a place of social connectivity and life-long learning, will assist in creating a healthy community, reducing loneliness through activity and engagement.
- Connection to the natural environment has been demonstrated to reduce stress.

### Equality

- The community facility is open and accessible to all, supporting residents and visitors.
- The day-lit washrooms have been conceived as a gender neutral zone, with a communal sink area providing a safe environment that balances privacy, respect and safety.

## Water Conservation

The storm water from the roof and the site is collected and naturally dispersed into the park below. All fixtures within the facility are low flush for conservation.

## Planting

The landscape approach is to restore the slopes of the kettle hole with local species. All landscape species have been selected to minimize water consumption, and to be resistant to the resident big horn sheep.

## Energy Present and Future

The building orientation, form and openings were designed to maximize passive benefits. Large roof overhangs, combined with carefully located windows and building orientation work, to reduce heat gain during summer months and maximize heat gain during colder winter months.

A high-performance building envelope, combined with passive design strategies and energy efficient mechanical systems were used to minimize the building energy loads. A heat recovery ventilation system is augmented with large low velocity fans and passive ventilation strategies, to reduce cooling demand. Air source heat pumps and high efficiency boilers provide heating for the building, switching between systems to maximize efficiency.

Annual energy intensity is 274 kWh/m<sup>2</sup>/year, 36% less than the baseline model for ASHRAE 90.1-2010. The extensive use of daylighting further reduces the energy load by 8.2 kWh/year/m<sup>2</sup>.

Active energy strategies include photo-voltaic panels located on the roof to supplement energy requirements and to provide power for level 2 and 3 car charging stations. The roof is designed for future installations of additional panels.



*Daylit washrooms feature low flush fixtures and a communal sink area for inclusion and equality.*



*Clerestoreys reduces need for the LED integrated lighting..*

## Lighting

LED source was used exclusively in the building. Taking advantage of deep daylight penetration and the use of LED source resulted in a reduction of the connected Lighting Power Density (LPD) approximately by 30% from ASHRAE 90.1 -2010 baseline.

The lighting concept and lighting control system design for this project take full advantage of the substantial amount of daylight present throughout the building. A central lighting control system automatically dims luminaries within daylight zones. Closed loop DayLight Harvesting Sensors (DLHS) are installed throughout the building near windows, glazing, and skylights.

All enclosed spaces in the building are equipped with manual ON and Auto-Off occupancy sensors. The public areas of the project are controlled by a central lighting control system, and are augmented by smart scheduling for after-hours use.



# Materials and Resources

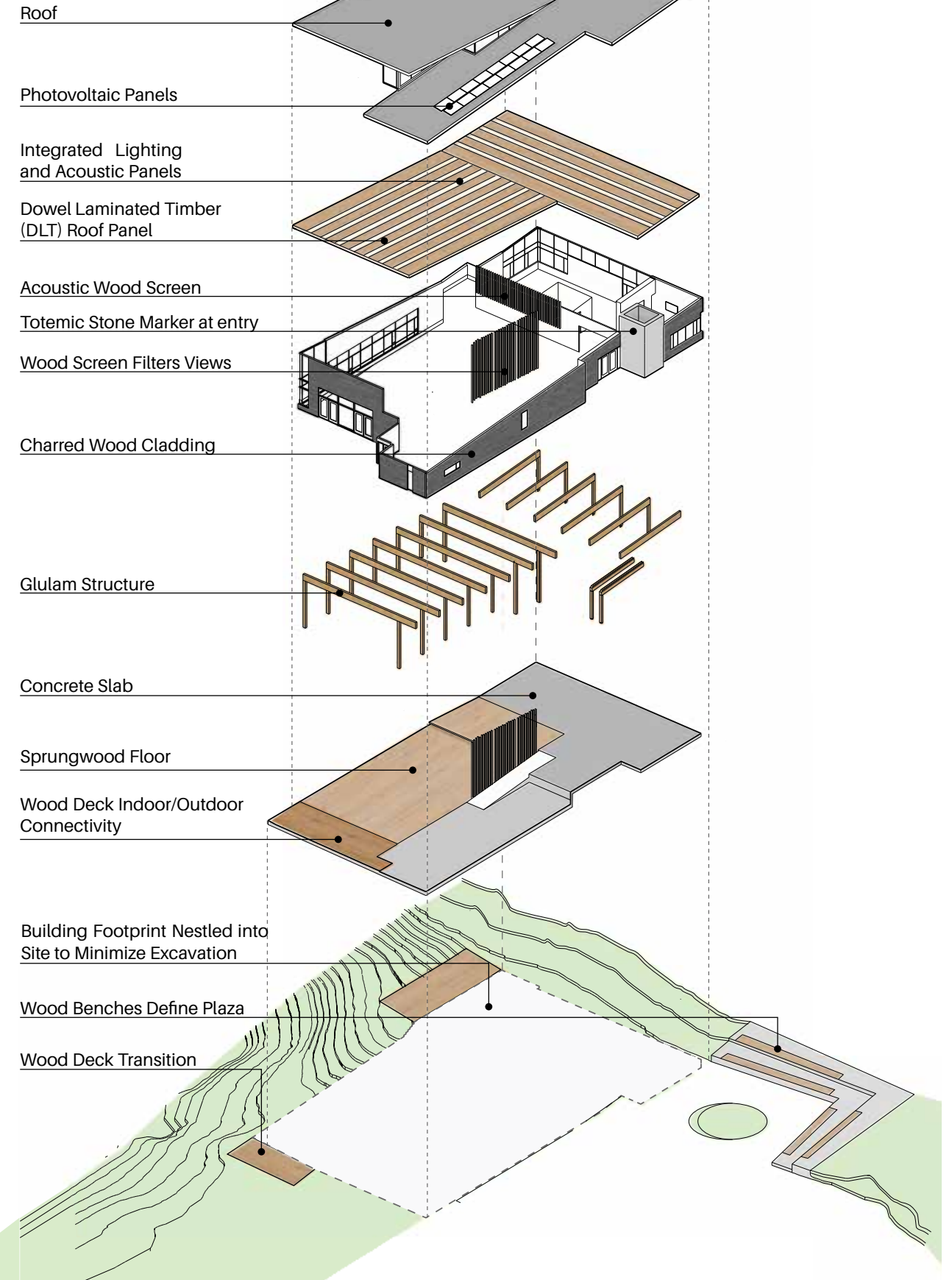
The Radium Community Hall and Library is primarily a wood building reflective of the primary industry and resources of the valley. Wood is used as the structure, cladding and interior material. This is one of the first DLT buildings constructed in Canada - a unique system that is **100% recyclable** as it contains no glues or metal fasteners.

## Prefabrication Methodology

The DLT and glulam were fabricated off site. Wood stud walls were fabricated on site and then lifted into position. The prefabricated structure and DLT roof panel system resulted in a condensed construction time, an economic building, and a community home that reflects the mountain community.



## Local Ingredients







## Cladding

The exterior of the building is clad in charred wood siding, referencing the agrarian shed forms of the valley. Manufactured in Brisco, 8 km from the site, an auger system was custom built to allow for a controlled charring of the timber (see below). The dark char provides a quiet background to the landscape beyond and highlights the DLT roof structure (see right).

Fabricated from local timber, the charred cladding is durable, rot and insect resistant and references the ranching culture of the Valley.





## Structure and Form

The primary structural system for the Hall and the Library includes glulam post and beam structure with 1220 mm wide pre-fabricated dowel laminated roof panels. Services, lighting, and acoustic panels are integrated into the panel system - balancing a high performance acoustic environment with the beauty of the wood structure.





## Interior Wood

The interior spaces are defined by the variegated DLT roof structure, and are layered with minimal wood detailing at key areas. The ramp down into the hall is lined with a wood screen, emphasizing the changing height of the space, filtering views into the hall, and referencing the pine forests. Composite wood and acoustic panels provide sound attenuation at the stage.



## Education and Information Sharing

### Community Engagement

From the outset of the design process, the inclusion of the community as active project partners instilled ownership, created social connections and resulted in a finished building that reflects the mountain community and was built maximizing local resources.

### Wood Stakeholders Process

At the outset of the project, we held a Wood Stakeholders workshop to identify local materials and trades, build partnerships, and understand the local construction industry. This unique process combined with construction management was responsible for the creation of the "100 mile building."

### Construction Management

The construction manager, a local resident, was present from the first design meeting and the wood stakeholders workshop. This continuum contributed to the achieving the 100 mile building with 80% of the work and materials supplied within the valley.

### Market Transformation

As one of the first DLT buildings in Canada, the design team has presented the unique design process at professional lectures.

