



Engineers



## Integrated Project Delivery Experience

Consulting Engineering Services

Creative Thinking Practical Results

# Regional Integrated Project Delivery Leads

RJC is Canada's leading structural engineering firm with Integrated Project Delivery (IPD) Experience. We develop long-lasting trusting relationships with our clients, beginning at the project level on every job. It is critical to have essential resources dedicated to an IPD project to create an opportunity for trust to form early on, allowing the project to realize the benefits of these relationships throughout the remainder of the project. Our firm's IPD experts bring a wealth of experience, fostering a collaborative approach that ensures efficient communication, minimizes risks, and delivers innovative structural solutions.



*Pat Elischer, Principal*



*Jeff Rabinovitch, Principal*



*Kumbo Mwanan'gonze, Principal*

## British Columbia Region IPD Projects:

- Vernon Active Living Centre, Vernon
- 1636 Clark Residential Development, Vancouver
- City of Burnaby Fire Hall 4 & 8, Burnaby
- City of Burnaby RCMP Facility Replacement, Burnaby
- City of Burnaby Rowan Childcare, Burnaby
- Township of Langley Brookwood Fire Hall, Langley

## Alberta Region IPD Projects:

- Ricochet Oil Corp. Aquatic Centre, Drayton Valley
- Red Deer Polytechnic Student Residence, Red Deer
- St. Lorenzo Ruiz 6-9 School, Red Deer
- St. Patrick's Community School Modernization, Red Deer
- Escuela Mill Creek K-6 School, Edmonton
- Soraya Hafez School, Edmonton
- Thelma Chalifoux 7-9 School, Edmonton

## Ontario Region IPD Projects:

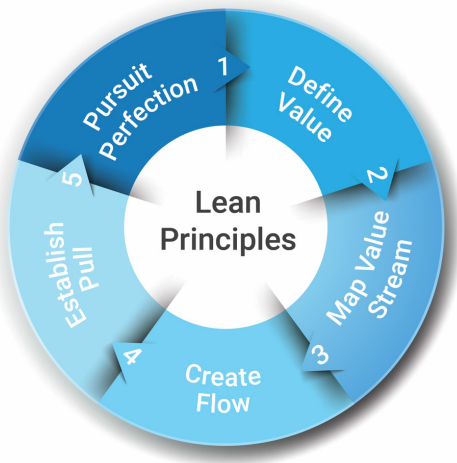
- University of Toronto Temerty Building, Toronto
- St. Jerome's University Campus Renewal Project, Waterloo
- Oakville Arena and Trafalgar Park Revitalization, Oakville
- Oakville Trafalgar Community Centre, Oakville
- Royal Canadian Dragoons Facilities, Petawawa
- CNL Advanced Nuclear Materials Research Centre, Chalk River

Respected for his collaborative and proactive work style, **Pat Elischer** continuously leads IPD projects to success. Through his skillful navigation of the complexities inherent in IPD, he plays a pivotal role in optimizing project outcomes. **Jeff Rabinovitch's** team-focused approach and depth of experience have led him to be the structural lead for numerous IPD projects across various sectors. Jeff has demonstrated his exceptional project management skills by leading project scheduling Pull Planning exercises and successful Target Value Design workshops. As the structural lead on IPD projects, **Kumbo Mwanan'gonze** skillfully adapts between providing focused solutions with consultants and trades and addressing overarching general strategies with ownership groups. All of our IPD Leads are active participants in the IPD process and contribute to projects on every level through 3P exercises, 5 Whys, and CBAs, as well as being dynamic team members in the Big Room.

# Integrated Project Delivery Experience

At RJC Engineers, we have cultivated extensive national experience on Integrated Project Delivery (IPD) projects by leveraging our solid relationships and role as a trusted advisor to excel using this unique project delivery model. The use of a collaborative multi-party contract, which establishes a framework for cooperation and shared decision-making and alignment to achieve project goals, is a defining feature of an IPD contract. However, the behavior and leadership of all individuals in the room genuinely make IPD a successful model for building excellence.

Embracing the principles of the IPD framework, we consistently foster open communication, mutual trust, and shared responsibility, delivering innovative and efficient structural and envelope solutions. Our extensive experience with IPD has enhanced project outcomes and solidified our commitment to a collaborative approach that prioritizes client goals, sustainability, and the overall success of the built environment.



A common aspect of IPD projects is the use of Lean Methodology and Tools in the design and construction process, which aims to drive value for the Owner and project by minimizing waste and optimizing project outcomes. RJC's Team applies our substantial experience with Lean to approach design and construction as a detailed process, pull planned and managed by all stakeholders, with the overarching goal being to minimize waste and optimize all project resources.

Through our vast experience on IPD projects, we have seen the value Lean Methodology and Tools can drive into the design and construction of buildings when implemented by having the right Team in the room.

## CHALLENGE CONVENTIONAL THINKING

RJC's project teams challenge the conventional norms of design and construction to reduce waste and drive more value for our projects. Conventional trade scopes were challenged on the Thelma Chalifoux and Soraya Hafez projects to put the work in the hands of the trade best suited to complete it. For example, the light gauge metal trade provided the conventional exterior wall framing and the structural framing for the glazing openings – work traditionally provided by another trade. By achieving a better workflow and schedule, cost savings were realized.



Soraya Hafez School, Edmonton

# Lean Principles, Tools, and Techniques

Each IPD team should individually explore the many LEAN tools and techniques available, along with an understanding of the experience and dynamics within the IPD team partners, to determine the most effective path forward. Teams should embrace the flexibility to adapt to the specific needs of each project and the Team to ensure support for the IPD team through the Validation process, Detailed Design, and Construction. Some common principles and tools include:

## ESTABLISHING CONDITIONS OF SATISFACTION

Early in the Validation Phase, the project team determines what the success of the project looks like. These Conditions of Satisfaction are the project values. They are used by the Team as a “guidebook” to reference continually to ensure that each decision the Team makes supports the key project goals and objectives. Like a company’s values, The Conditions of Satisfaction should be communicated and acknowledged by all IPD partners and are often posted in the Big Room to maintain during the project.

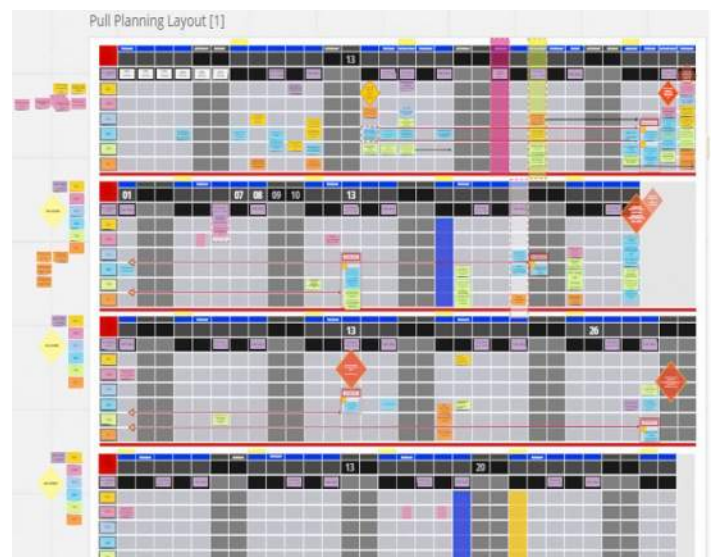
## IMPLEMENTING LEAN THINKING

Throughout the design process, our Teams utilize Lean thinking to drive better value in the design and construction processes. With a culture of Plan-Do-Check Adjust, we effectively engage with tools like Pull Planning to ensure we all understand the required flow of information to achieve success. And learn from small failures in the Team through the use of Root Cause Analysis - the 5 Whys, to improve our processes and approach in the future.

## TARGET VALUE DESIGN

Target value design is a collaborative design process involving designers, builders, suppliers, estimators, and owners, often co-located in one place to collaboratively produce a design that provides the best value for the project and the owner.

Fundamentally, high-performing design teams need to change from the traditional mindset of ‘budgeting a design’ (i.e. pricing out a design after it has evolved to a project milestone like 30% schematic) to ‘designing to a budget’, where systems and program are costed on a high-level short cycle process to help the Team make broader decisions without investing time and resources to advancing a design that the project cannot afford.



Royal Canadian Dragoons Facility Pull Planning

Target Value Design involves using various LEAN tools such as;

- **Set Based Design** – keeps design options flexible and open for as long possible during the development process.
- **Choosing By Advantage** – values-based decisions are reached by consensus by exploring all of the relevant attributes of the system or product with a transparent and visual record.
- **A3** – a consistent method of capturing and approving the Team’s decisions

As the design of an IPD project advances, the project Team must continually check it against the definition of value, conditions of satisfaction, and project target cost.

The design is continuously tracked and evaluated against the established values and cost model as work progresses toward key project milestones. For the structural systems, RJC leverages the experience of the building trades and estimators.

# Approach to Co-Location & the Big Room

## FOSTERING A POSITIVE TEAM CULTURE

IPD relies on collaboration among all members to achieve better project results. Successful collaboration depends on:

- Open communication
- Mutual respect and trust
- Having the 'right people' in the room
- Early involvement of key participants
- Early goal definition and value setting
- Leveraging technology

The Team must establish culture early and maintain it throughout the project. On-boarding activities establish expectations of team members and promote respectful collaboration. A positive culture is necessary to create an environment where team members feel "safe" to express ideas and challenge conventional norms. Big Room sessions must encourage broad, open discussions to ensure team members feel their contributions are respected and valued. Regular team health check-ins are required to evaluate whether a positive team culture is being maintained and whether corrective actions need to occur.

## THE ROLE OF THE BIG ROOM

Big Room meetings and co-located work environments are critical to the success of IPD projects. While the frequency, duration, and attendees in the Big Room may change, the Team should ensure the right decision-makers are in the room at the right time to bring value to the project continually. Having well-established agendas and accurate work plans is crucial to a Big Room's success. The strategic use of the project implementation team, or PIT meetings, allows smaller groups to work on critical portions of the overall pull plan in more detail without burdening the entire Big Room. This approach re-engages the room through report-outs and 'Lean up' the design and construction process.

## A CULTURE OF KAIZEN – CONTINUOUS IMPROVEMENT

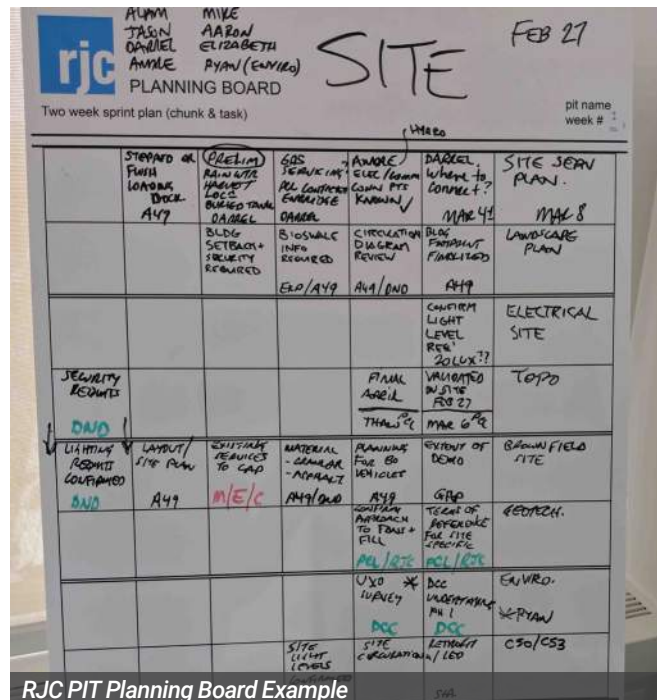
Every Big Room session ended with a Plus/Delta review on the St. Patrick's Community School Modernization project. More importantly, the next Big Room began with a review of action items established from the previous Plus/Delta review, ensuring a culture of continuous improvement.



IPD Team Health Check-In



City of Burnaby Fire Hall 4 & 8 Big Room Meeting



RJC PIT Planning Board Example

# Shared Risk Shared Reward

IPD is a highly collaborative process where collective success replaces individual success. The IPD project delivery model embraces the belief that cost and time issues can be better controlled if they are understood by all parties early in the project and collectively resolved as quickly as possible. The 'poly-party' contract in IPD projects creates a shared risk environment where all parties work to remove obstacles in design or construction for the betterment of the overall project.

All parties place their potential profit at risk in exchange for collectively managing project challenges and sharing in the rewards for a successful project.

The effective implementation of Lean tools and techniques helps to mitigate risk. Target Value Design and Choosing by Advantages allow key project decisions to ensure they bring the best value to the project, meet the Owner's Conditions of Satisfaction, and stay with base target cost objectives.

Additionally, the continuous estimating philosophy used for IPD projects ensures that design and construction items that may disrupt project cost and time targets are quickly identified and brought to the project team for timely and effective resolution. A Risk Register is created at the start of the project and monitored at all Big Room sessions to ensure that design and construction issues that present risk are continuously monitored and evaluated. This risk management approach identifies the risk, evaluates the severity, applies possible solutions, and monitors and analyzes the effectiveness of subsequent steps.

Throughout the validation and preconstruction phase of the project, risks were monitored to ensure that the overall project costs reflected the current understanding of the design and construction issues. As the design progressed and the project became more defined, items could be removed from the Risk Register and carried through into construction with certainty. Budgets previously assigned to project risks can then be returned to the project to enhance the Owner's value.

► For the St. Patrick's Community School IPD project, continuous estimating, and effective monitoring of the Risk Register trended the project under allowable cost. The Senior Management Team was able to add scope to the project from the highest priority items on the Added Value Incentive list prepared by the Owner.

Risk Category	Risk Type	Identified Risks	PI	Imper	Probab	Ri	Exposure	Low Range	High Ra
Construction	Allowance	Unrealistic quality expectations during construction which can lead to rework, schedule delays, claims, additional costs and labour issues.		Medium	High		\$ 980,000	\$ 405,000	\$ 64
Construction	Allowance	Working Efficiently - Poor working conditions for subcontractors to complete work efficiently. This will cause a difference in conditions assumed in tender and may result in a claim.		Low	High		\$ 95,000	\$ 45,000	\$ 4
Escalation	Allowance	Cost inflation which is higher than the contingency earned within the estimate due to material shortages, government policy, world markets, etc will increase costs.		Medium	Low		\$ 980,000	\$ 98,000	\$ 28
Escalation	Allowance	Carbon taxes increasing the cost of products		Low	Very High		\$ 124,000	\$ 86,800	\$ 11
Escalation	Allowance	Trade union contracts expire. With negotiations underway. Due to the tight start date of construction we should be sheltered from potential strike actions, however cost increases are likely this spring affecting the Base Target Cost.		Very Low	Very Low		\$ 43,400	\$ 434	\$ 7
Estimate	Allowance	Errors or incorrect assumptions may exist within the estimate.		Low	Medium		\$ 124,000	\$ 37,000	\$ 4
Governance	Allowance	The IPD process is new. We may find that there may be differing legal liabilities between partners which may impact the openness of the process.		Very Low	Very Low		\$ 43,400	\$ 434	\$ 5
Governance	Allowance	There may be a tendency to revert to standard contract delivery methods as opposed to sticking with the IPD process. This may impact the openness of the process causing ineffective decision making, missed deadlines or additional costs.		Low	Very Low		\$ 124,000	\$ 12,400	\$ 1
Management Oversight	Allowance	The IPD Process is new to many of the team members. There is a risk that the process will not be well understood or not fit into current corporate		Very Low	Very Low		\$ 43,400	\$ 434	\$ 5

Sample Risk Register

A 'pre-mortem' risk assessment is undertaken early in the project to mitigate design and construction-related risks. All major designers and sub-trades sit in a room and discuss possible "what-if" issues for each scope of work to avoid potential problems. Every possible scenario is assigned a cost implication and a likelihood of occurrence. A list is compiled at the end, determining the highest-risk scenarios, allowing transparency and collaboration to reduce the possibility of these issues occurring.

# BIM & Virtual Collaboration

## BIM & RECORD DRAWINGS

Through the IPD process, BIM is used to create data-sharing structures that serve as a team knowledge base; live review of the model becomes a part of the Big Room meetings. We expect to use an integrated BIM model using REVIT service or a cloud-based technology for this project

RJC has been producing structural drawings with REVIT since 2001. Being one of the first to use REVIT allows us to bring years of best practices and a high level of confidence in our abilities to meet the project requirements. We have collaborated on many projects varying in size and complexity using REVIT, bringing many years of best practices to the project. We currently use this software on all our projects to increase our ability to mitigate risk, foster collaboration, and facilitate clash detection.

REVIT allows for advanced clash detection with the architectural and other disciplines' design and trade fabrication models. As a testament to our BIM capabilities, RJC has recently seen our structural models used by the contractor and project manager during construction and the owner during post-occupancy facility operations. Our approach to BIM is tailored to suit the delivery of the project during design and post-occupancy operational requirements of the facility.

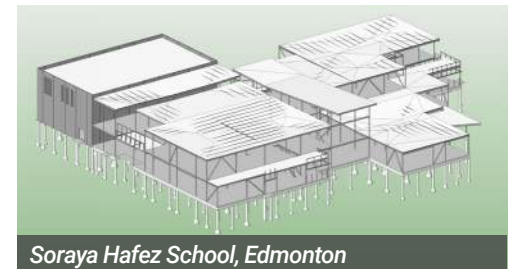
As a by-product of BIM, RJC has the advantage and ability to produce photorealistic renderings and animations, allowing clients to understand our designs quickly in an interactive 3D domain. Throughout construction, design enhancements and construction trade efficiencies are continuously added to the BIM Model, resulting in real-time record documents as the project progresses.



*Athabasca Multiplex Expansion, Athabasca*



*Thelma Chalifoux School, Edmonton*



*Soraya Hafez School, Edmonton*

In addition to the BIM Processes, integration of design can go further. **On some projects we have collaborated early with the detailing of structural steel and delegated design for mass timber – utilizing a shared model approach for design and production documentation.** This requires collaborative structural design and detailing which provides value by:

- Efficient use of modelling reducing duplication of effort.
- Early input to efficient choices such as connection detailing, which are significant contributors to cost.
- Early input that reduces potential for delay arising from requests for information or for repeat shop drawing submissions.

**The IPD process and trade collaboration are a good delivery model for further leveraging this sort of collaboration.**



IPD Project Experience

*Red Deer Polytechnic Student Residence, Red Deer, AB*

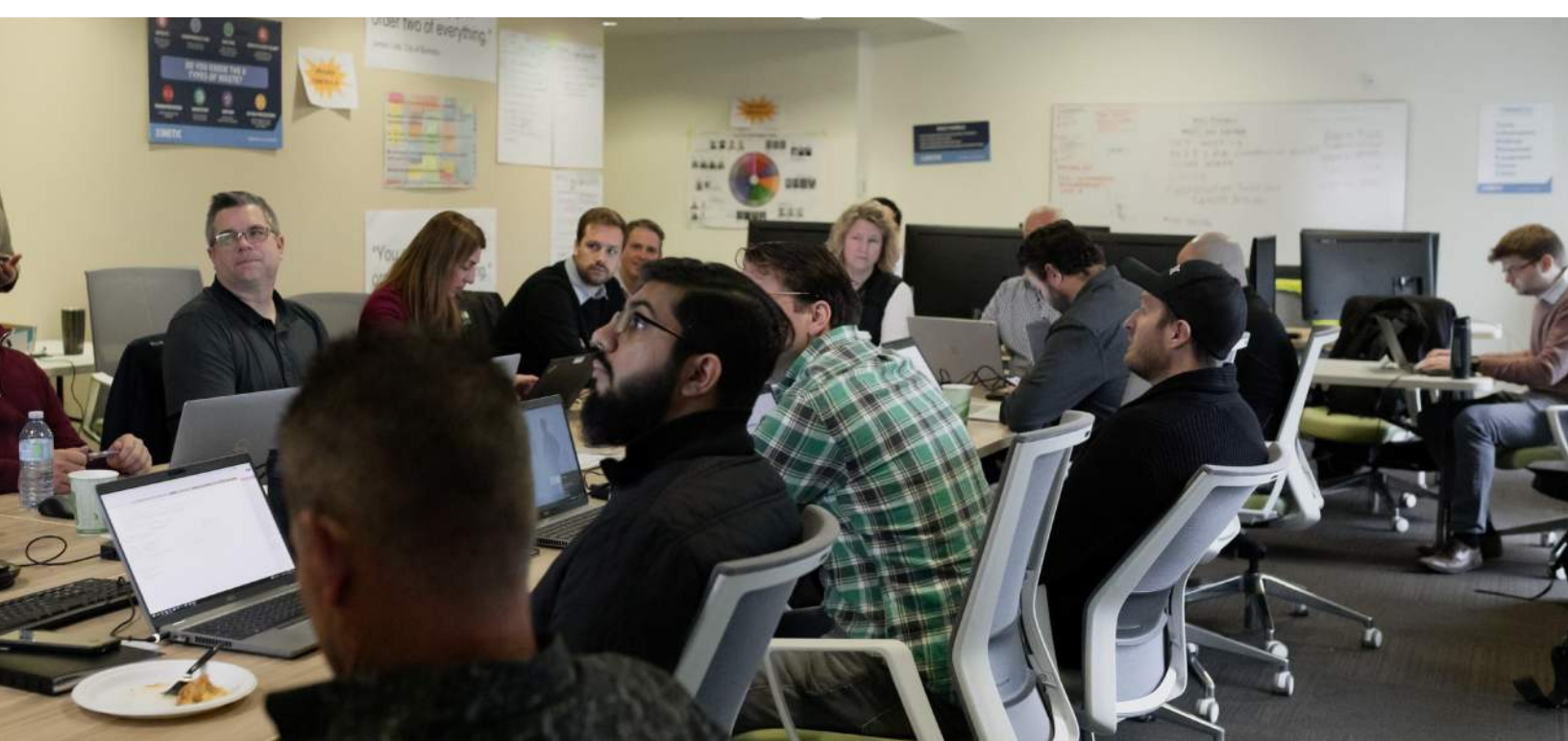




### 1636 CLARK, VANCOUVER, BC

1636 Clark is a new state-of-the-art mid-rise, residential affordable housing development that provides Community Health Services at the main podium and housing units above. The project includes City-owned spaces that focus on Indigenous healing and wellness through employment as well as culturally appropriate services to meet cultural and healing needs of the Indigenous community. This project is recognized in the 8th Annual Architect's Newspaper Best of Design Award program. BC Housing is using an integrated project delivery method for this project.

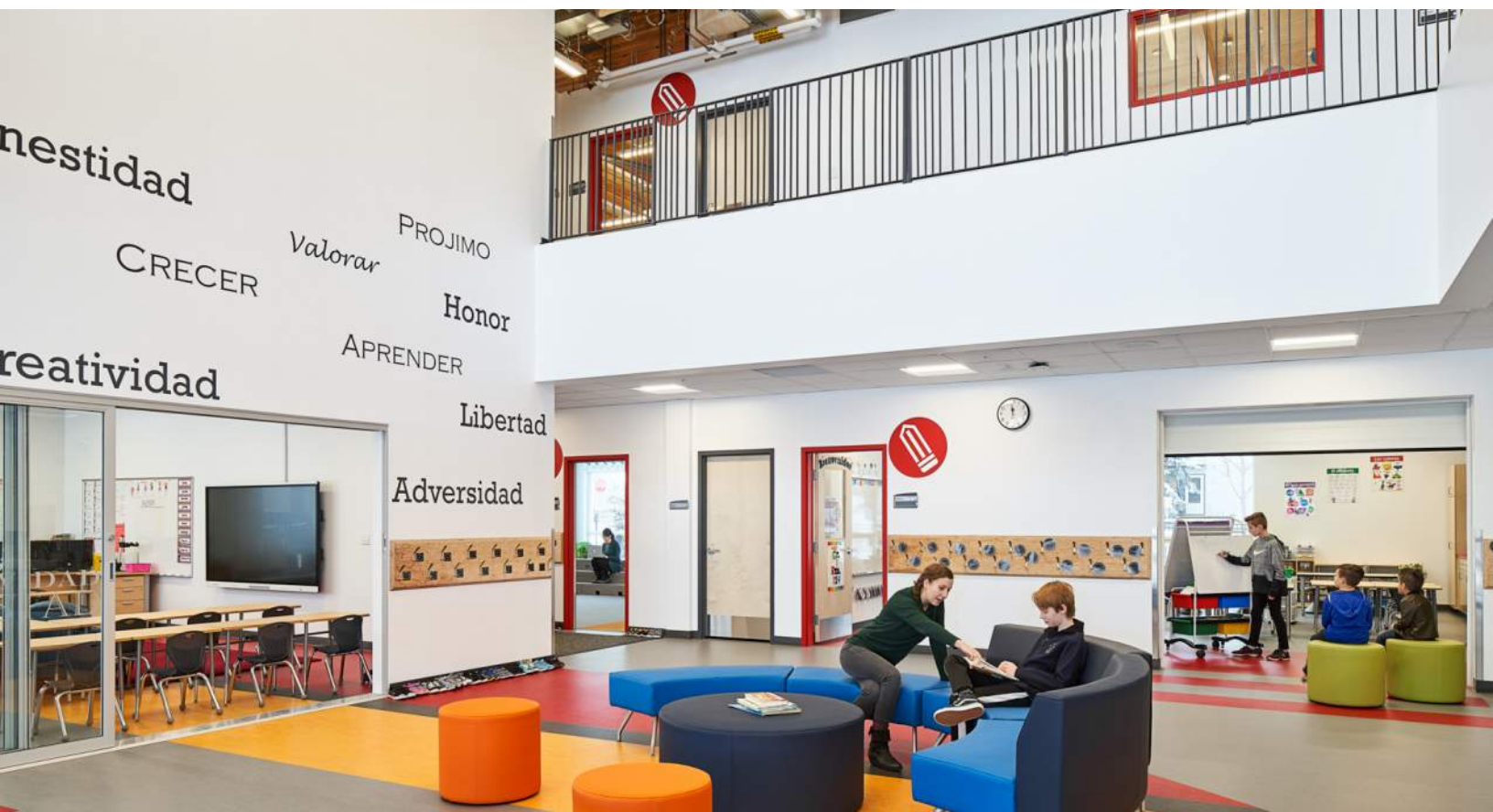
As the Structural and Building Enclosure Design Partner for 1st and Clark, RJC is involved in this flagship IPD project in BC. RJC's role includes contributing to big-room meetings, pull planning, sprint reporting, and consistent communication through the validation and design phase. Our team uses cutting-edge technology and detailed BIM360 models for early clash detection and to resolve design conflicts before the start of construction. We believe in the principles built on by the IPD process and have seen firsthand the advantages of having a cohesive design, construction and ownership team when making critical decisions.



### CITY OF BURNABY FIRE HALL 4 & 8, VANCOUVER, BC

In order to meet the needs of the community, the City of Burnaby brought together an experienced IPD team to develop two new state-of-the-art fire stations. With an overall budget of \$50M, the new facilities will improve response time and coverage during fire emergencies, ensuring the well-being and safety of the community.

Each of the fire halls are being replaced with a two-storey, 15,000 sq. ft. structure with three drive-through bays. They are seismically designed to meet post disaster standards. The fire halls house separated decontamination space for crews, and are designed with low-carbon heating and operations. Both structures incorporate long spanning glulams over the apparatus bays.



#### [ESCUELA MILL CREEK K-6 SCHOOL, EDMONTON, AB](#)

The Escuela Mill Creek School replacement project delivered a new two-story K-6 Spanish bilingual school for 350 students. It is the first 21st Century Learning approach facility within the Edmonton Public School Board (EPSB) designed to provide modern, flexible and adaptable learning environments. To help generate a significant amount of its energy, the school is primarily clad in photovoltaic panels on exterior walls and rooftop panels supported on tracking-type frames. The school is a “living textbook” for students intending to provide learning opportunities by showcasing aspects of the building construction.

The Integrated Project Delivery (IPD) model is used for six school projects by EPSB, with Escuela Mill Creek being the first. Construction was completed a month ahead of schedule for the \$11.5M school, that is LEED V4 Silver certified.



#### [RED DEER POLYTECHNIC STUDENT RESIDENCE, RED DEER, AB](#)

Red Deer College (RDC) Student Residence is a five-storey, 62,000 sq. ft., 147-unit building delivered through the Integrated Project Delivery method.

Sustainability was a critical factor in the planning stages and is part of the RDC Alternative Energy Initiative. To help meet RDC's goal of minimizing its carbon footprint the Residence was designed to include 545 electricity-generating, vertically installed solar panels, predominantly on the sunny south side of the building.

The hybrid superstructure consists of four levels of wood framing supported by a structural steel transfer level. The wood structure incorporates a mix of light frame and mass timber components fully integrated over the height of the superstructure and made full use of the IPD process.



#### ST. LORENZO RUIZ 6-9 SCHOOL, RED DEER, AB

St. Lorenzo is a two storey, 71,500 sq. ft. middle school constructed to accommodate up to 735 students and 70 staff. The new school was delivered using IPD methodology, utilizing the expertise of the design and construction team from conceptualization through construction. The design features a learning environment that meets 21st-century standards and includes many regular and specialized classrooms, student spaces, teacher spaces, a music room, a gymnasium, a reception area, storage, washroom, and maintenance rooms.



#### [RICOCHET OIL CORP. AQUATIC CENTRE, DRAYTON VALLEY, AB](#)

Ricochet Oil Corp. Aquatic Centre is a new one-storey, 29,000 sq. ft., aquatic facility delivered utilizing the IPD methodology. The design includes an eight-lane pool, a 25m lap pool, a leisure pool, a lazy river, a steam room, a hot tub, change rooms, a multipurpose room, and support spaces.

The facility is designed with energy efficiency in mind from the roof to foundations. Sustainable materials, finishes and construction techniques were used during the building process, the roof holds a 300kw photovoltaic system that provides solar energy to the centre, and all plumbing utilizes low flow technology.



#### ST. PATRICK'S COMMUNITY SCHOOL MODERNIZATION, RED DEER, AB

RJC was part of this IPD three-phase renovation and expansion project. Modernization included updating the mechanical systems and demolishing six middle school classrooms and two elementary classrooms to reorganize the space into a more open, collaborative, brighter learning space. The primary intent of the 16,600 sq. ft. addition and 48,384 sq. ft. of modernization was to increase student capacity to 750.



### [SORAYA HAFEZ K-6 SCHOOL, EDMONTON, AB](#)

Soraya Hafez School is an innovative 21st-century learning environment focused on collaboration and flexibility for its teachers and K-6 students. The new school is named in honour of Soraya Hafez, a former Edmonton educator recognized and awarded for her advocacy for Arabic language and culture.

The two-storey school accommodates 650 students. The Integrated Project Delivery (IPD) approach facilitated high levels of collaboration, communication, and creativity by all team members to deliver efficient and effective planning and scheduling throughout the project.





#### THELMA CHALIFOUX (LARKSPUR) NEW 7-9 SCHOOL, EDMONTON, AB

This two-storey junior high school is approximately 89,000 sq. ft., and designed to provide space for 900 students. Sustainability was integral to designing a building to achieve LEED Silver certification. Amenities of this 21st Century Learning centre include group classroom layouts, breakout rooms and quiet study spaces, a culinary grade teaching kitchen, performing arts room, and a flexible maker space with an outdoor patio.

Notable elements of the design include a precast gymnasium, outdoor heated canopies, outdoor amphitheater, in-slab heating and cooling, and Alberta's largest solar array (245 kW) on a junior high school.



### [CNL ADVANCED NUCLEAR MATERIALS RESEARCH CENTRE, CHALK RIVER, ON](#)

The \$700M, 210,000 sq. ft. ANMRC is a state-of-the-art research complex that will be one of the most extensive nuclear research facilities ever built in Canada. The facility will be the backbone of CNL's research and development infrastructure. It will feature 23 laboratories, accommodate 160 employees, and consolidate key capabilities from aging facilities scheduled for decommissioning at the site.

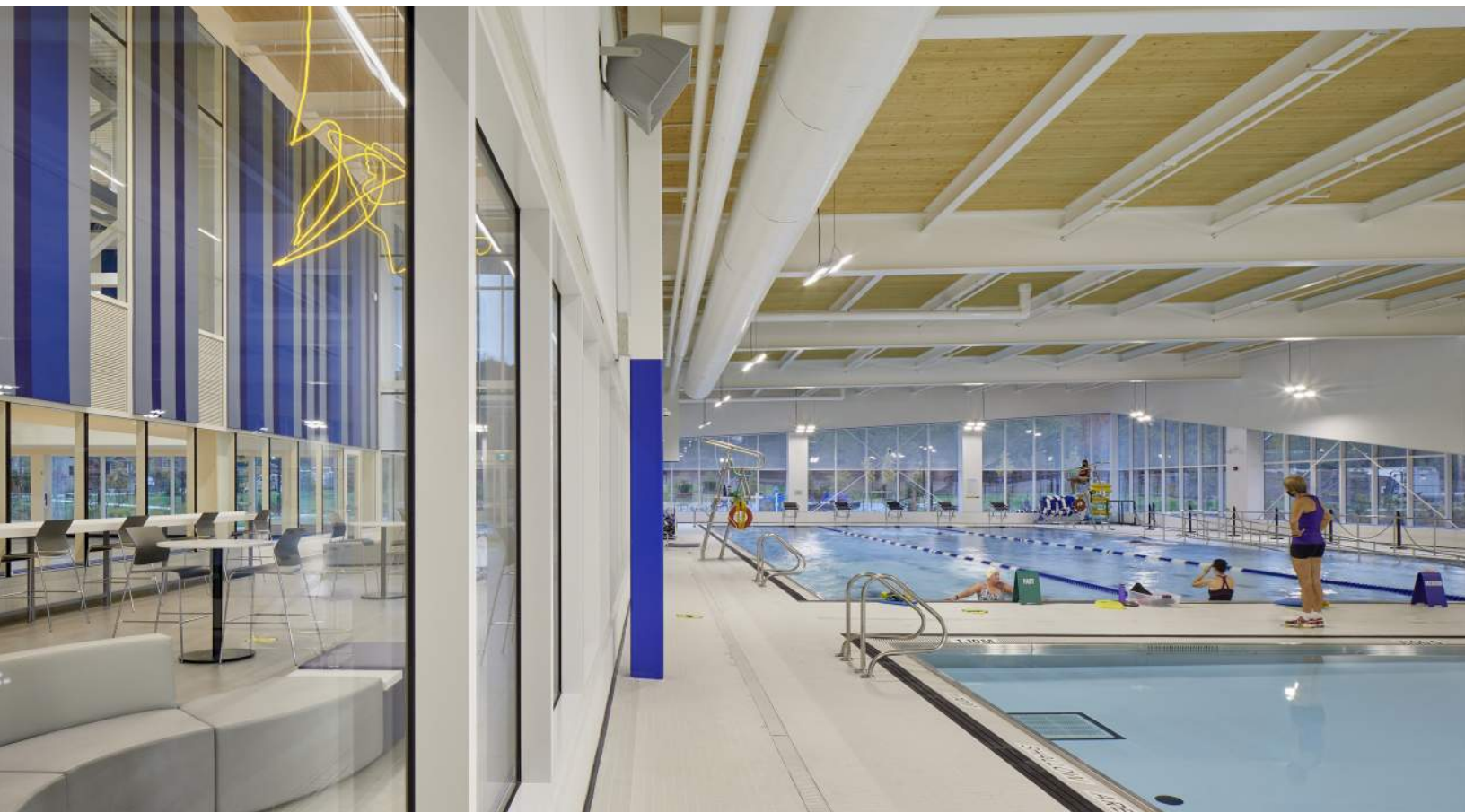
Among other functions, the ANMRC's design supports Canada's clean energy goals by providing services critical to the life extension and long-term reliability of existing reactors, including Canada's fleet of CANDU® nuclear power reactors and other designs worldwide. In particular, as the largest single capital investment in the revitalization of the Chalk River campus, the ANMRC will feature 12 new shielded hot cells that will enable post-irradiation examination of small modular reactor (SMR) and next-generation nuclear fuels in addition to glovebox facilities to support the development of advanced fuel fabrication concepts.



#### OAKVILLE ARENA AND TRAFALGAR PARK REVITALIZATION, OAKVILLE, ON

The Oakville Arena and Trafalgar Park Revitalization project includes the conversion of the existing Oakville Arena to a 65,500 sq. ft. facility. The existing wood truss roof is a designated heritage feature and has been retained in the new design of the structure. The project includes an NHL-sized ice pad, two-bay garage, seniors' centre, public meeting spaces, a full-sized gymnasium, an interior walking track, and exterior washroom facilities. It also includes the construction of a new two-storey fire hall.

RJC did a detailed analysis of the existing trusses in the roof to determine their capacity relative to the current Ontario Building Code requirements. The challenge was to provide additional capacity while limiting the aesthetic impact on these important heritage elements. Ultimately, we were able to limit the intervention to tightening the existing tension rods, which allowed the trusses to preserve their existing appearance.



#### [OAKVILLE TRAFALGAR COMMUNITY CENTRE, OAKVILLE, ON](#)

This project involved designing and constructing a new 54,000 sq. ft. community centre and associated site amenities, a new neighborhood park and renovations to the existing parking garage. It includes a training pool and a 25m lap pool constructed using stainless steel walls (Natare system). Amenities include a 10,000 sq. ft. double gymnasium with two regulation-sized volleyball courts, a fitness centre with a running track, multipurpose meeting rooms and space for intergenerational programming. The facility features a two-storey galleria that links the aquatics area and the gymnasium.

The structure consists of conventional steel through-out, aside from an exposed glulam roof deck over the galleria, creating an inviting atmosphere in the space. This \$34M project is targeting LEED Silver



#### ROYAL CANADIAN DRAGOONS FACILITIES, OTTAWA, ON

The Royal Canadian Dragoons (RCD) are the senior cavalry regiment of the Canadian Army based out of the Garrison Petawawa. The RCD currently occupies 15 buildings, with the majority of buildings over 50 years old. Seven existing facilities were demolished and replaced with a new 106,487 sq. ft. facility containing offices, meeting rooms, and storage/equipment repair facilities, and almost 20,000 sq.ft. of existing infrastructure was renovated.



### ST. JEROME'S UNIVERSITY CAMPUS RENEWAL PROJECT, WATERLOO, ON

The St. Jerome's University Campus Renewal project was a \$47M residence and academic facility. It was Canada's first post-secondary education facility project to use the Level 3 IPD project delivery model. The campus square footage more than doubled as a result of the redevelopment. The project included designing and constructing a new 360-bed student residence, a new academic center with offices, classrooms and research space, and an expansion of the food services area. In addition, the north section of Sweeney Hall was removed and the Notre Dame Chapel made into a stand-alone structure. The remaining Sweeney Hall rooms became offices and the Fireplace Lounge and Sr. Leon White Room was used as off-campus student space.

The additional residence facilities and a new academic building provide physical support for an improved educational and student experience. Implementing LEAN methods that optimized construction efficiencies supported the team's goal to minimize waste during project delivery. BIM Technology determined the interaction and location of building operating systems to streamline the layout. RJC applied years of best practices to develop a streamlined and efficient process to deliver the project in REVIT to LOD400.