INTERNATIONAL HI-TECH INDUSTRIES INC.

CASE STUDY - HCD TECHNOLOGY CENTER, Alberta, Canada

BY INTERNATIONAL HI-TECH INDUSTRIES VANCOUVER OFFICE
1096 WEST 10TH AVENUE, VANCOUVER BC V6H 1H8 – TEL: +1 604 733 5400 FAX: +1 604 734 8300
E-mail: info@ihi.ca WEB SITE: http://www.ihi.ca

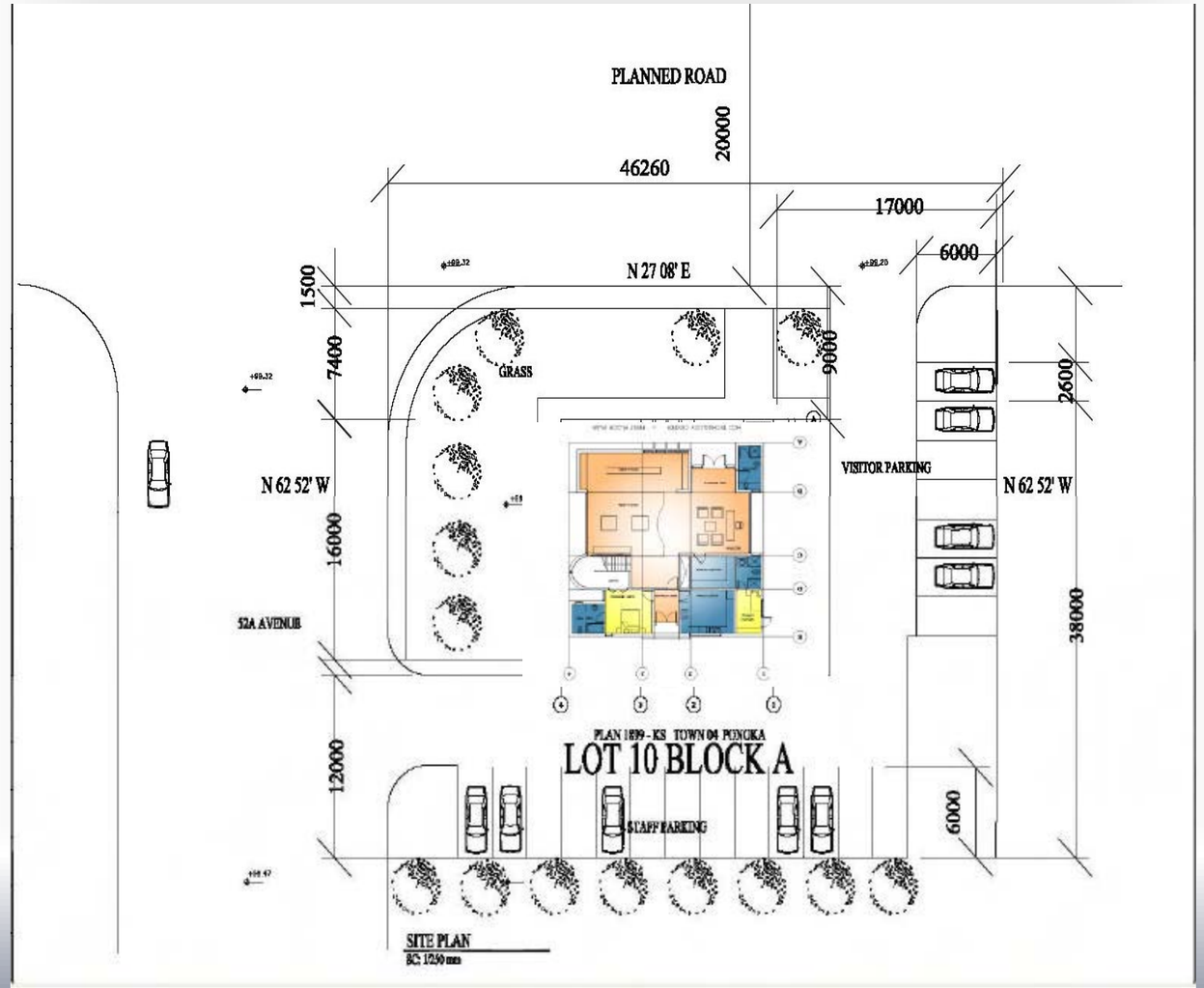
DESIGN AND EXECUTION METHODOLOGY OF IHI UNIQUE PATENTED BUILDING TECHNOLOGY WORLD-WIDE.
UNLIKE ANY KNOWN PRE-CAST CONCRETE PANELS, PRE-FAB ELEMENTS OR ANY CONVENTIONAL CONSTRUCTION.

PERSPECTIVE OF MAIN ENTRANCE WITH UNIQUE SEAMLESS JOINTS & CONNECTIONS UNLIKE ANY PRE-MANUFACTURED PANELIZED ELEMENTS WHETHER MODULAR OR NOT.

PERSPECTIVE SHOWING THE BUILDING'S REAR ENTRANCE

SITE PLAN

IHI SYSTEM CAN BE ASSEMBLED ON ANY SITE WITH VERY LITTLE DISTURBANCE TO SURROUNDING ENVIRONMENT. IHI SYSTEM IS FAST, RELATIVELY QUIET AND VERY CLEAN WITH NO RESIDUAL CONSTRUCTION WASTE.

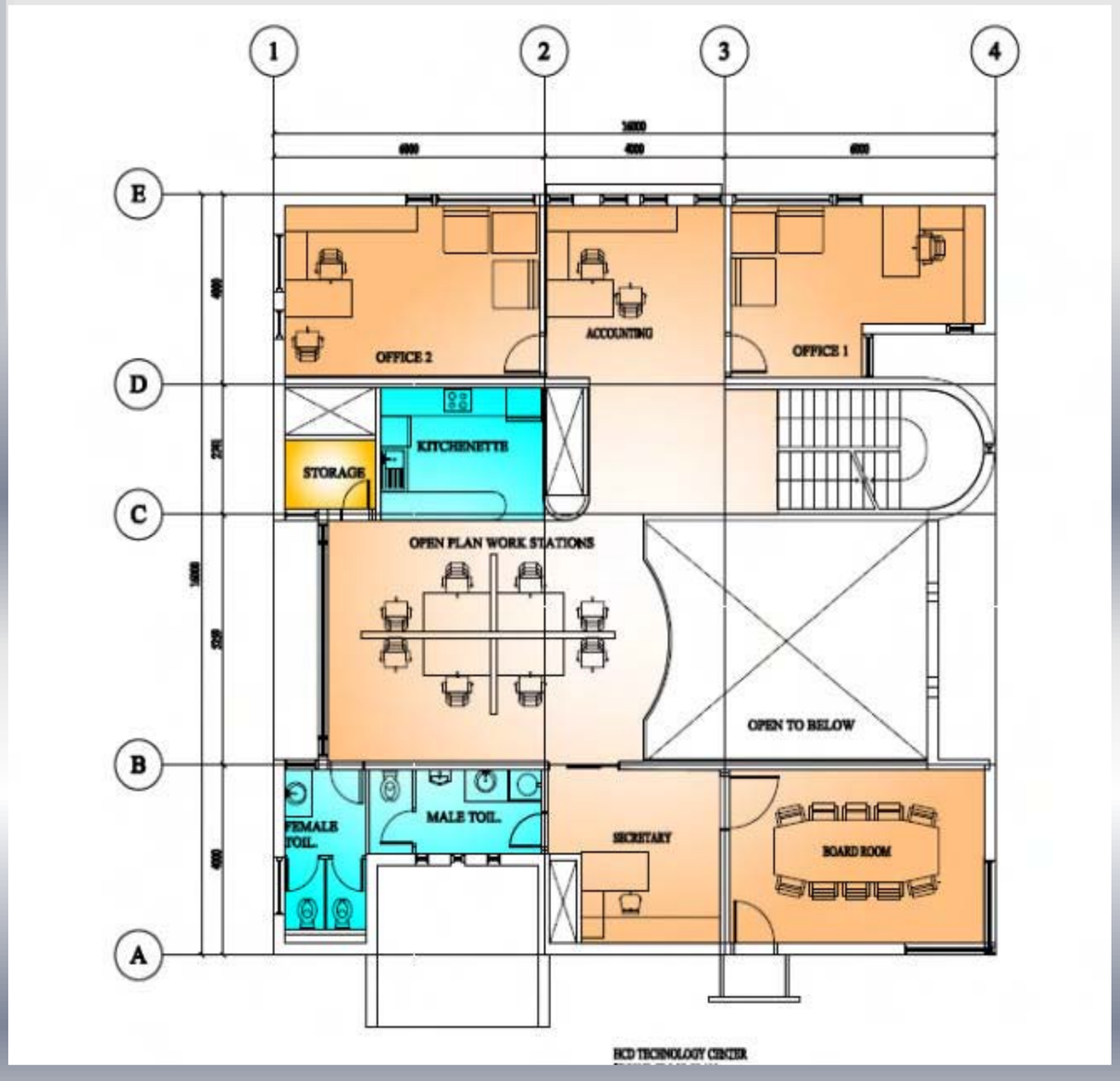


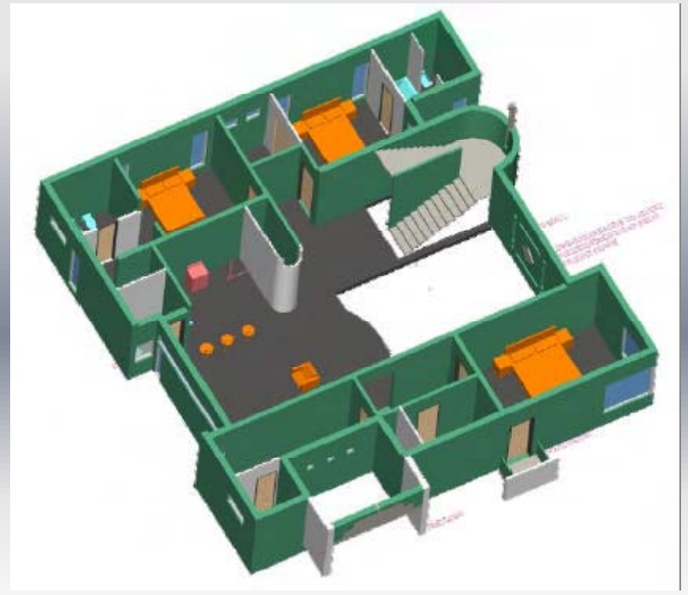
GROUND FLOOR PLAN

ANY DESIGN CAN BE ACHIEVED WITH ANY ARCHITECTURAL FEATURES AND FINISHING THE ARCHITECT REQUIRES.

HCD TECHNOLOGY CENTER – FIRST FLOOR PLAN

FIRST FLOOR PLAN



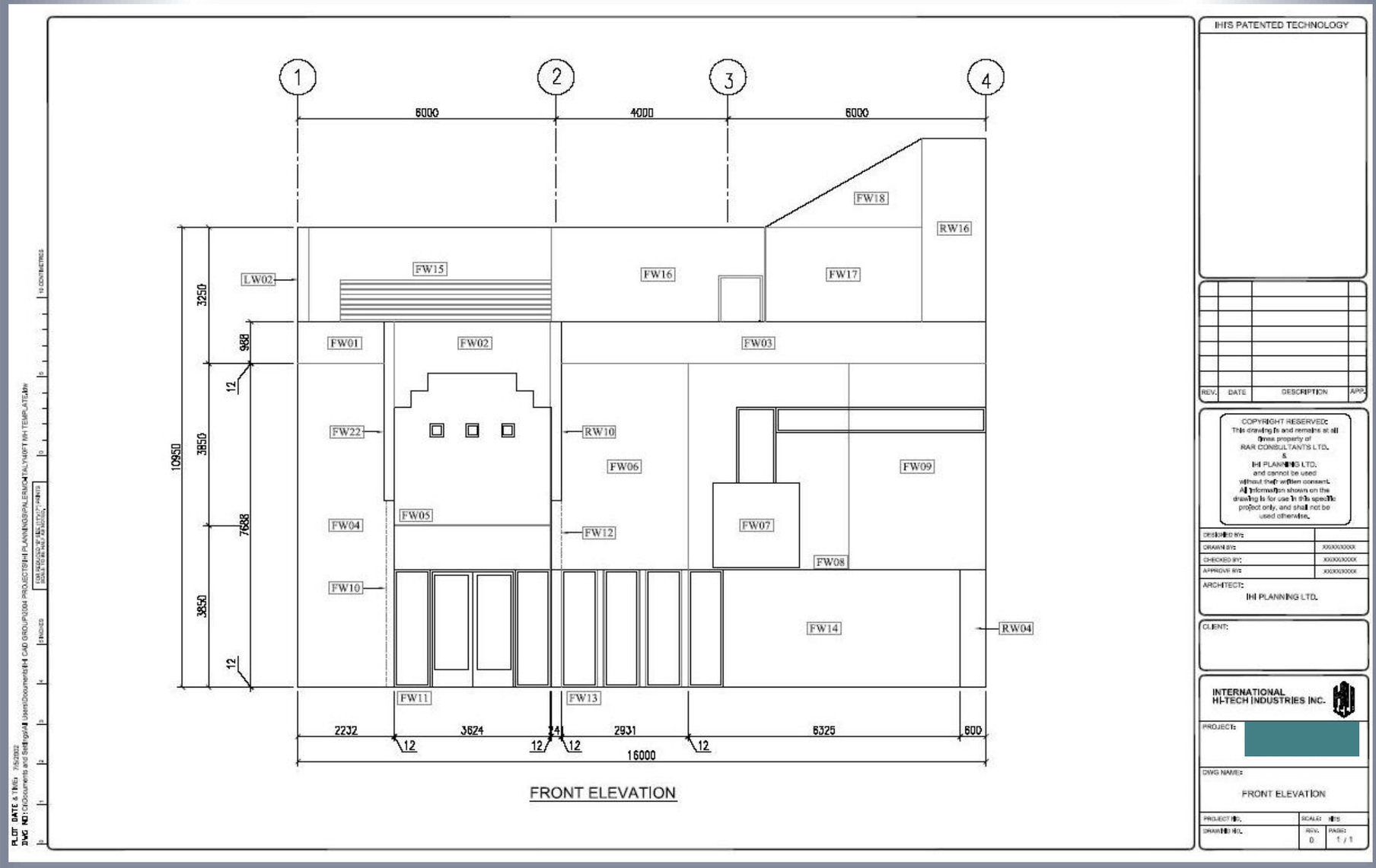


ROOF PLAN

ANY DESIGN LOAD CAN BE ACHIEVED WITH MINIMAL ADDITIONAL COST OVER THE IHI SLAB PANELS.

FRONT ELEVATION

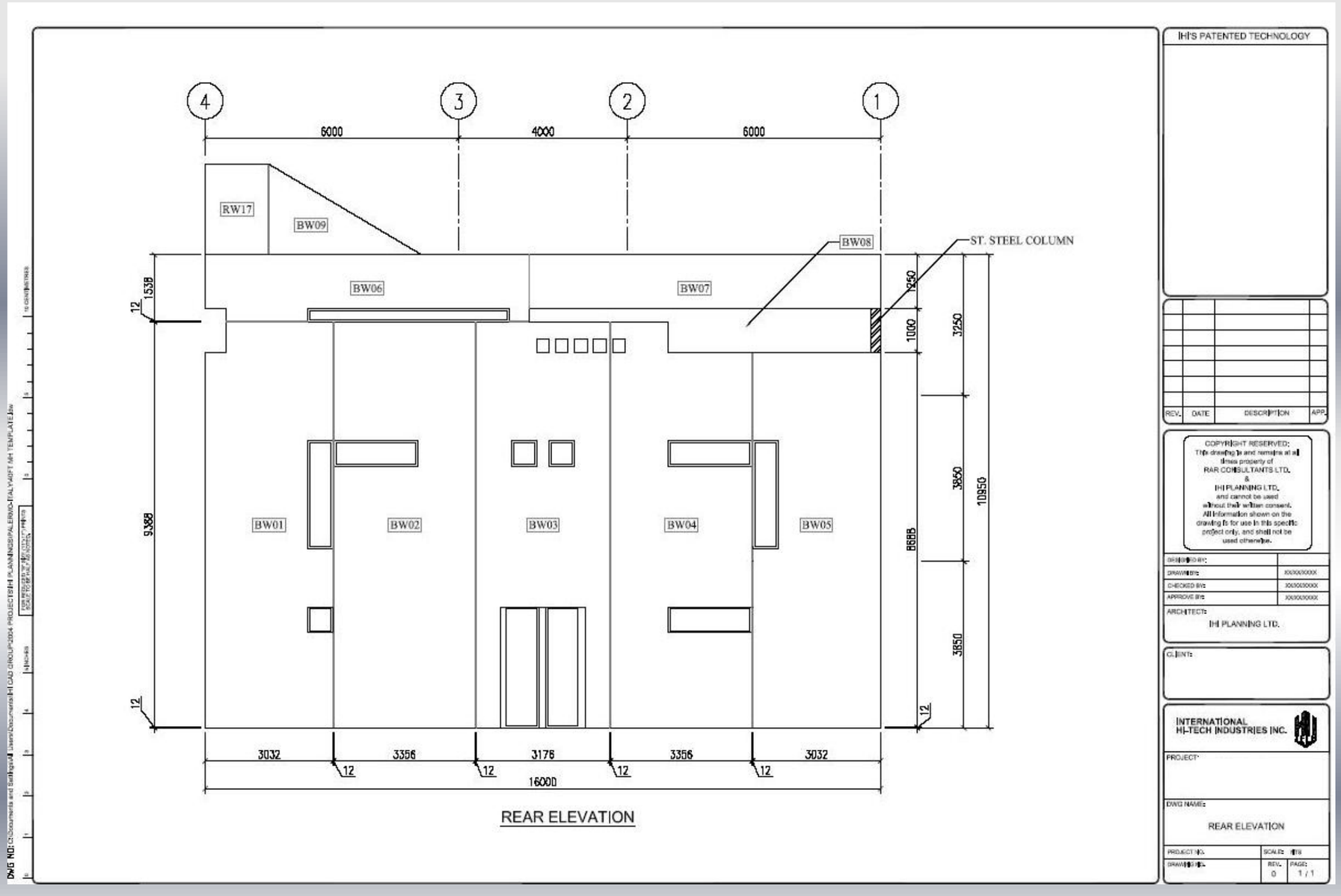
EXTERIOR STRUCTURAL IHI PANEL LAYOUT
JOINTS ARE SEAMLESS, HOWEVER THEY ARE SHOWN HERE FOR ILLUSTRATION PURPOSES.



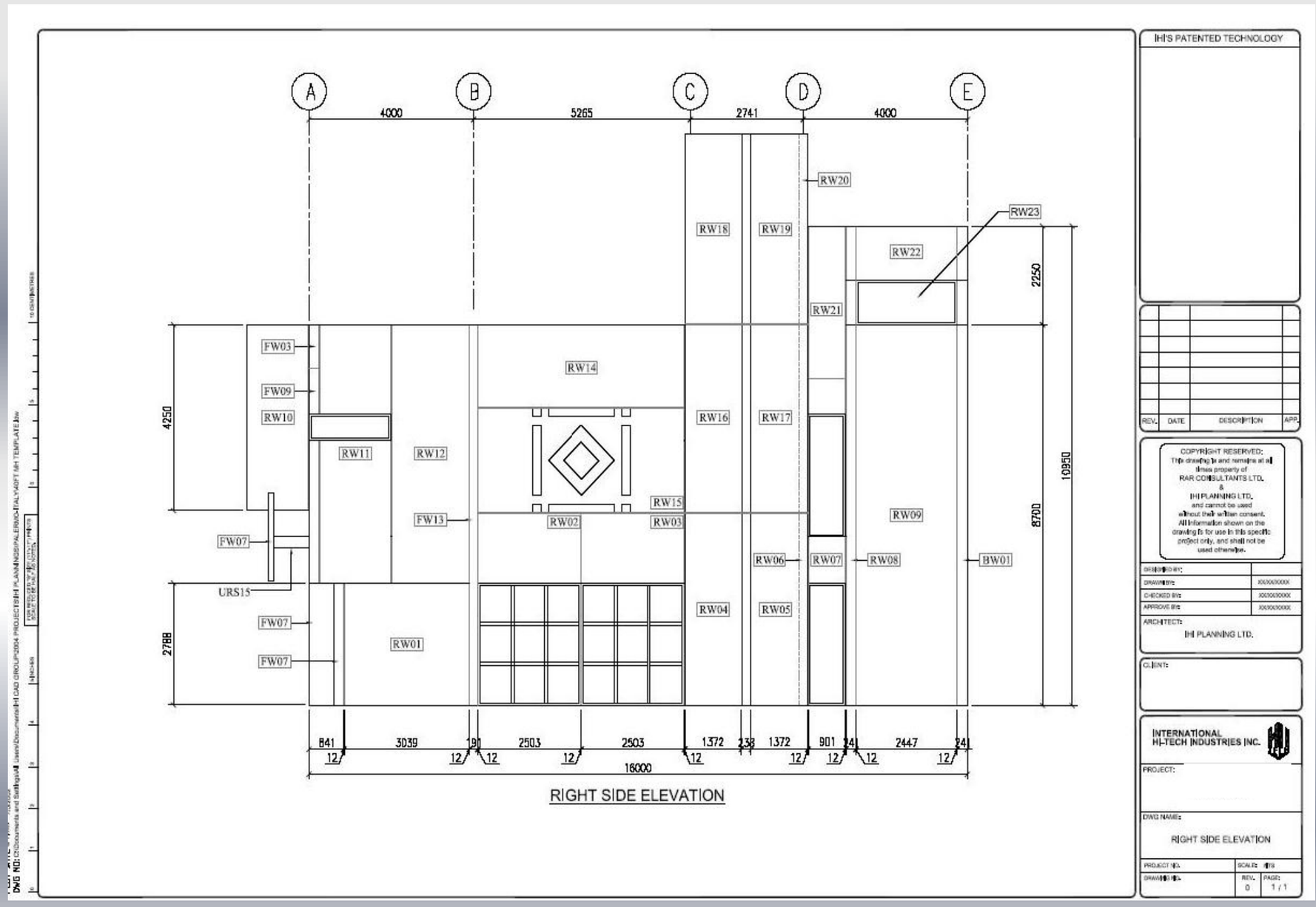
REAR ELEVATION

EXTERNAL STRUCTURAL IHI PANEL LAYOUT

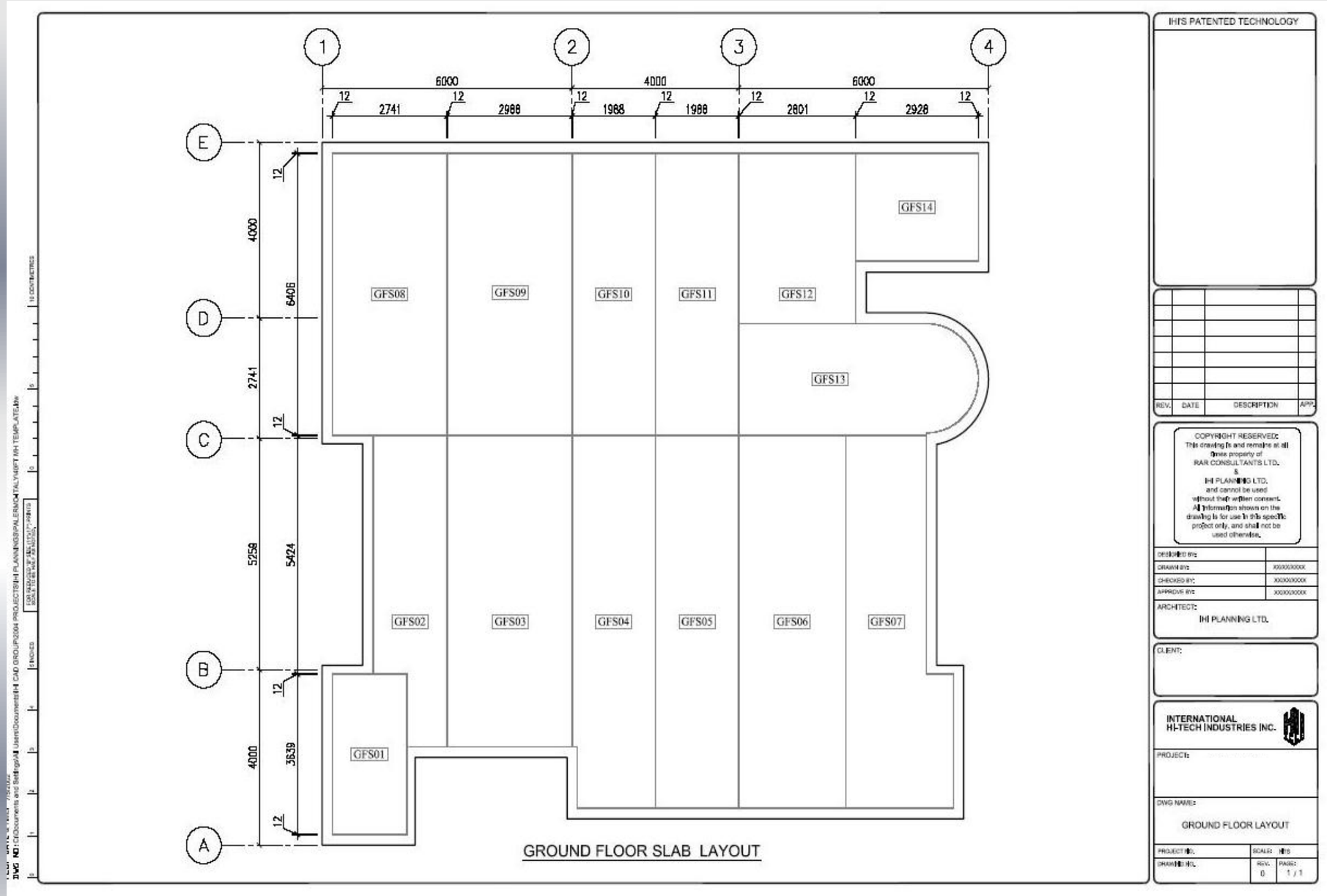
JOINTS ARE SEAMLESS, HOWEVER THEY ARE SHOWN HERE FOR ILLUSTRATION PURPOSES.



SIDE ELEVATION – EXTERIOR PANEL LAYOUT



GROUND FLOOR SLAB - PANEL LAYOUT

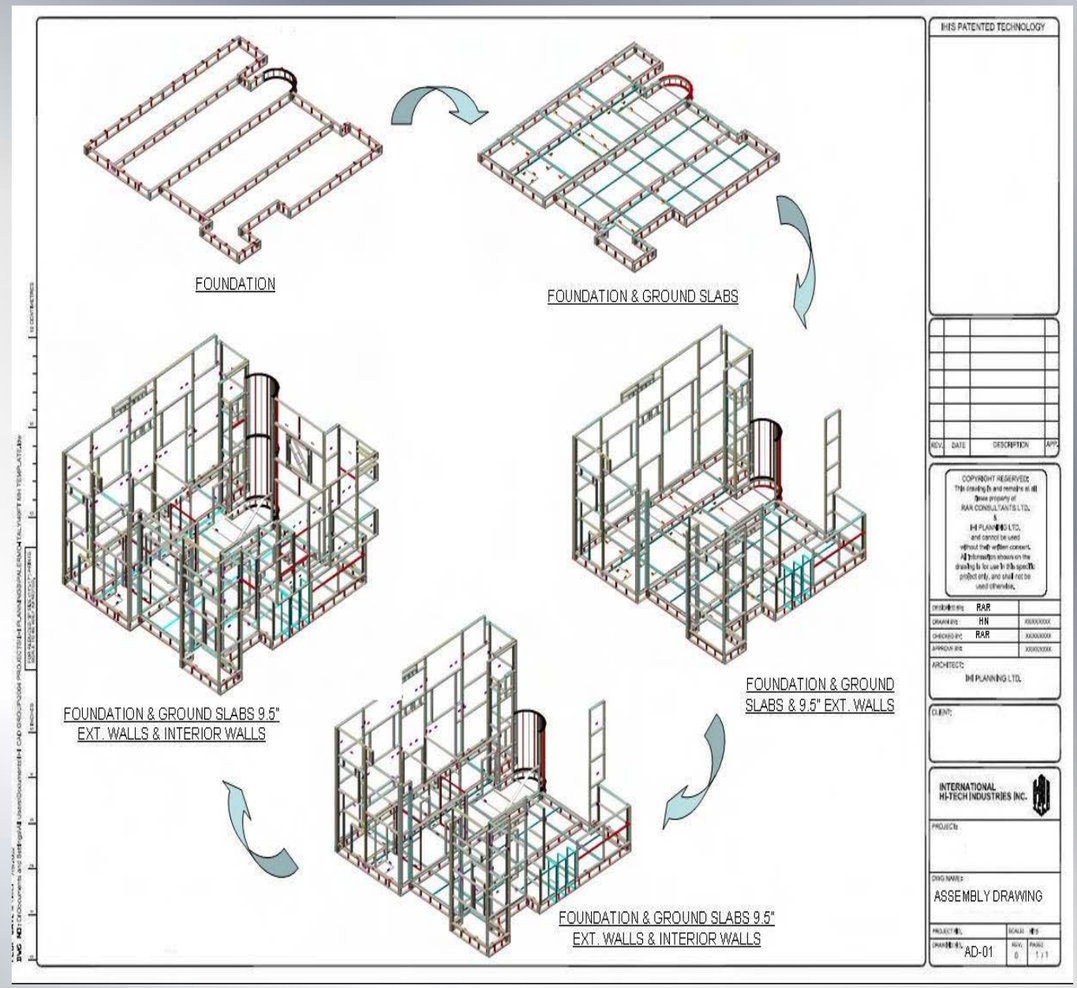


Schematic views of 3d steel space structure showing steel framing of panels prior to adding insulation material & concrete.

All panels can work under tension, compression, torsion, and sheer.

All connections are bolted and welded together to form a continuous ductile structure that can allow changes and modifications at any given time.

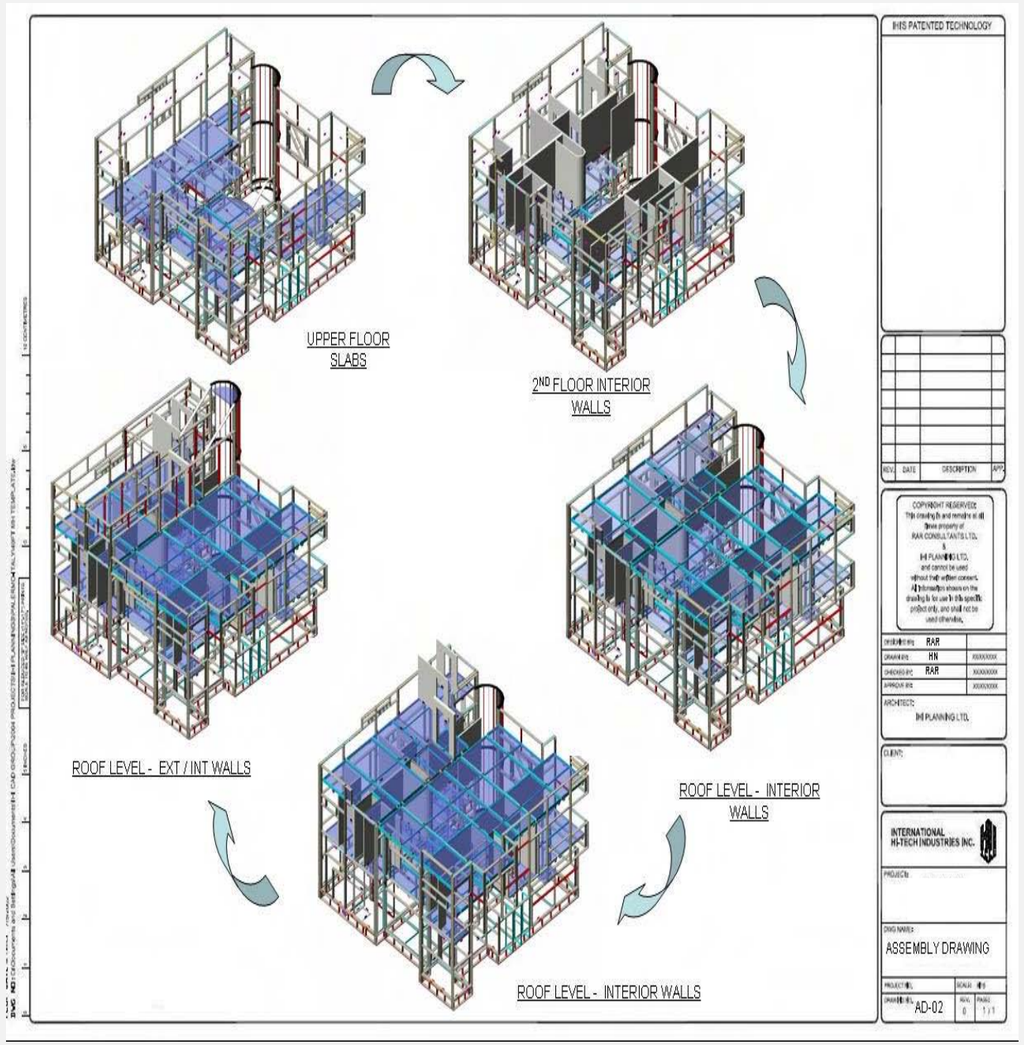
Unlike any other system, the above unique features can only be achieved with the IHI system where the structural frames form individual custom-made built-in formwork for each individual panels without affecting budget and the speed of construction and without using any single conventional pre-cast mould or even bracing and/or scaffolding during construction.



SCHEMATIC VIEWS

(SHOWING CONCRETE / INSULATION MATERIAL AS TRANSPARENT)
The 85 mpa (12000 psi) high-strength concrete not only gives the panels the stiffness and rigidity but also acts as a perfect automated structural base for any architectural finishing. The volume of IHI concrete is approx. 40% as compared to *pre-cast* or *cast-in situ*. This huge advantage not only reduces the cost of concrete, but also increases both the static and dynamic strength to weight ratio of each panel significantly, mainly due to the fact that the pre-formed rigid insulation integrated within each panel replaces the majority of the redundant concrete found in pre-cast and cast-in-situ concrete structures. Most importantly, the effective average 2.5 cm – 3.5 cm concrete on each side of each panel, connected via high-strength IHI concrete 5 - 7.5 cm diam. cylinders, allow heavy equipment to drive over the panels without any problem and help significantly to reduce the heat transfer and rise from one side of the panel to another due to fire, hence giving each panel a huge advantage as far as fire rating is concerned. Due to the physical characteristics of each panel, not only the high thermal rating is a bonus, but also the structural and airborne significant noise reduction. In addition, due to the limited volume of concrete used in each panel. IHI can afford to purchase the best quality raw material with any additives needed to finish the surface according to the client's request, without affecting the budget.

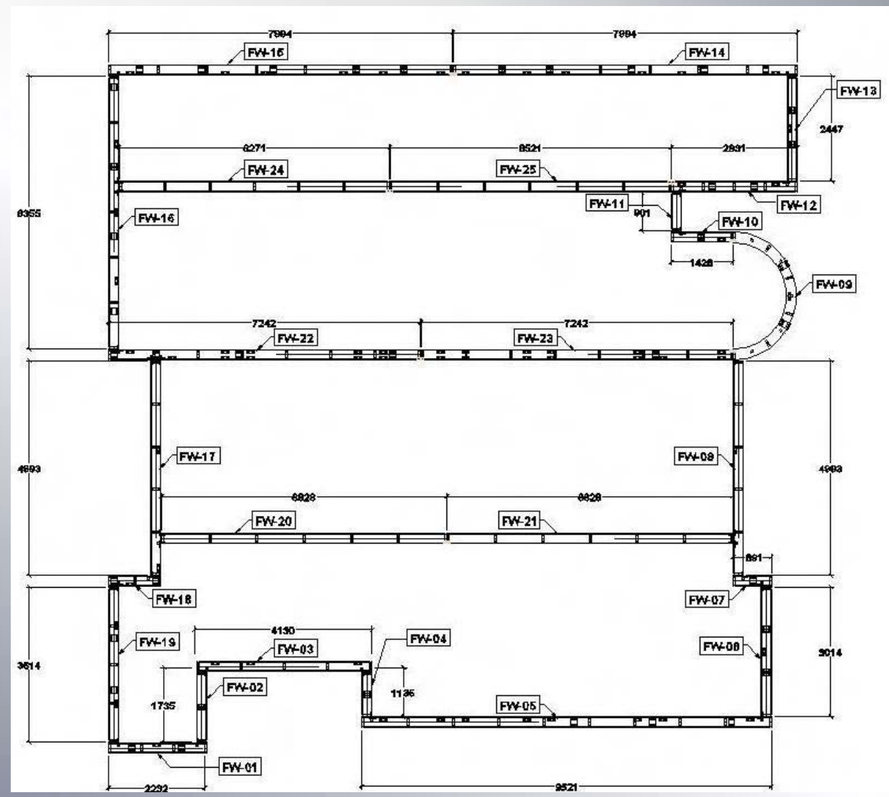
All above are mostly foreign to pre-cast and cast-in-situ concrete.

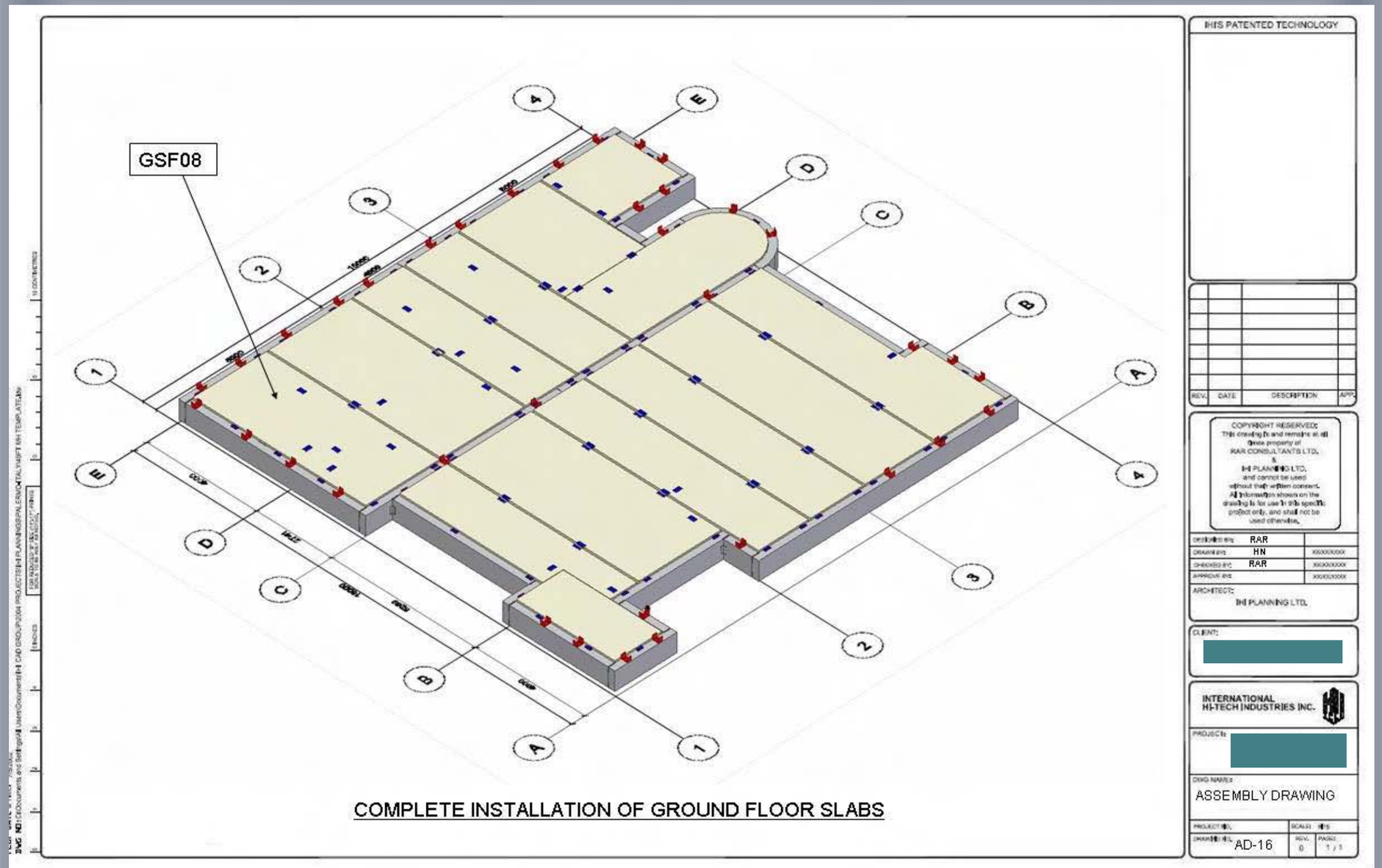


LAY DOWN FOUNDATION

A Crane is required to lift and lay-down insulated foundation panels on pre-leveled ground with at least 95% compacted gravel/road base and sand. The insulated floor slabs and foundation panels are first bolted together and then fully welded. Due to the high-strength to weight ratio of each panel, not only the insulated floor structure acts as floating foundation but also it is reinforced and stiffened by the foundation panels that will eventually act as retaining sub-structural walls. In addition, due to above, a unique rigid high density rubber strip and pad are integrated within the 3-dimensional structure to create not only a special advantageous stress and structural noise filtration but also a sealed environment between various spaces in the building.

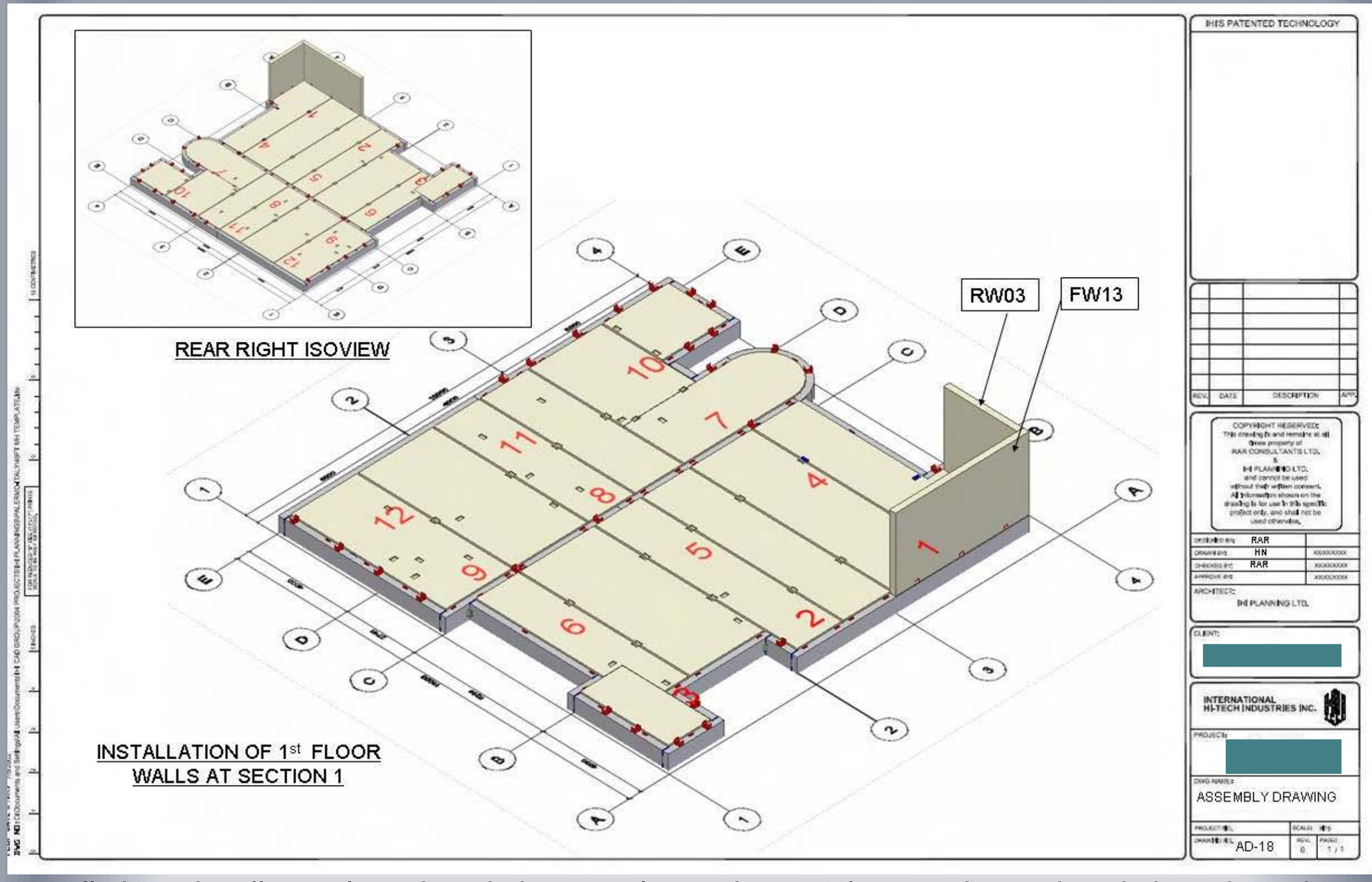
All above are mostly foreign to pre-cast and cast-in-situ concrete.



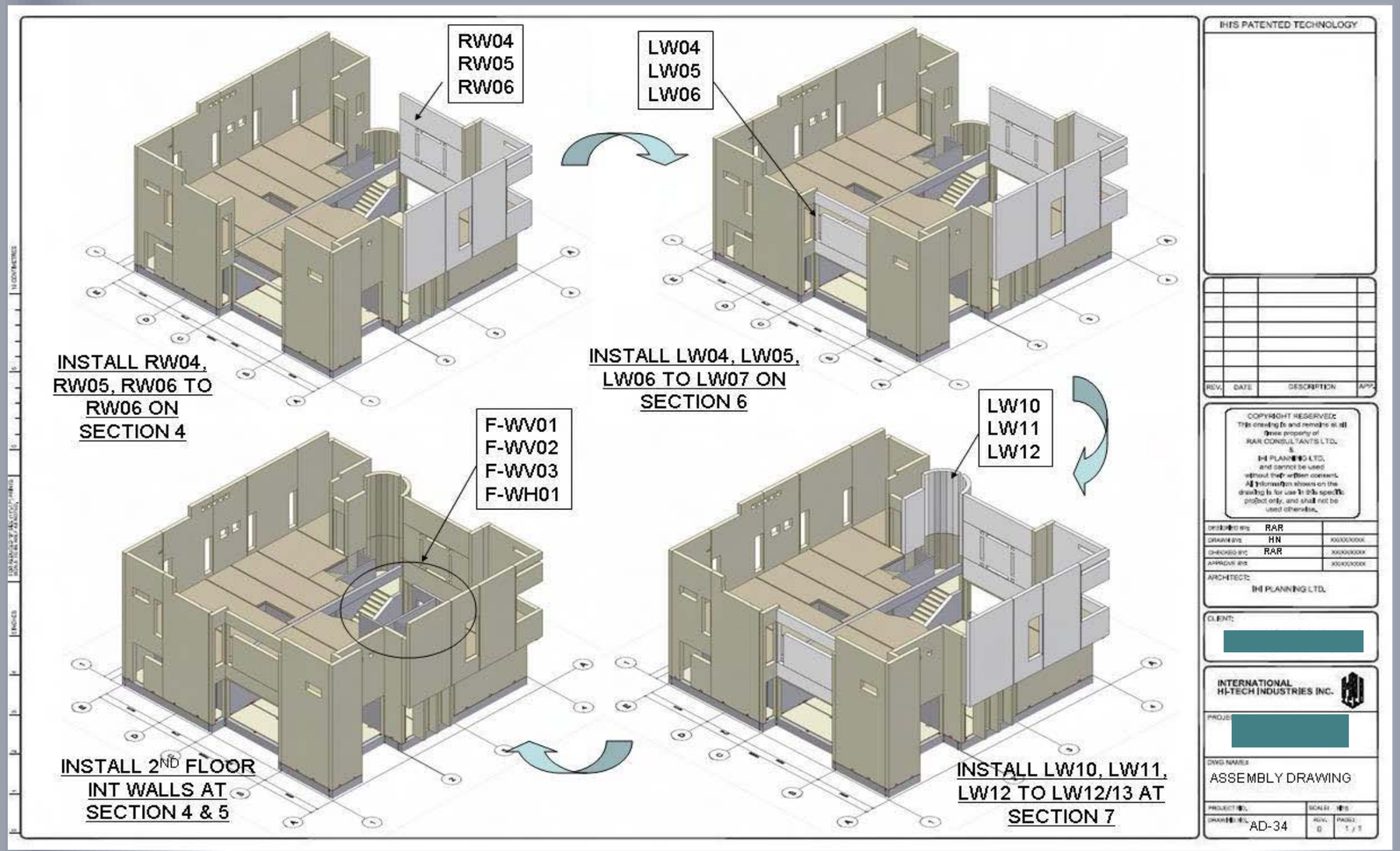


COMPLETE INSTALLATION OF GROUND FLOOR SLABS

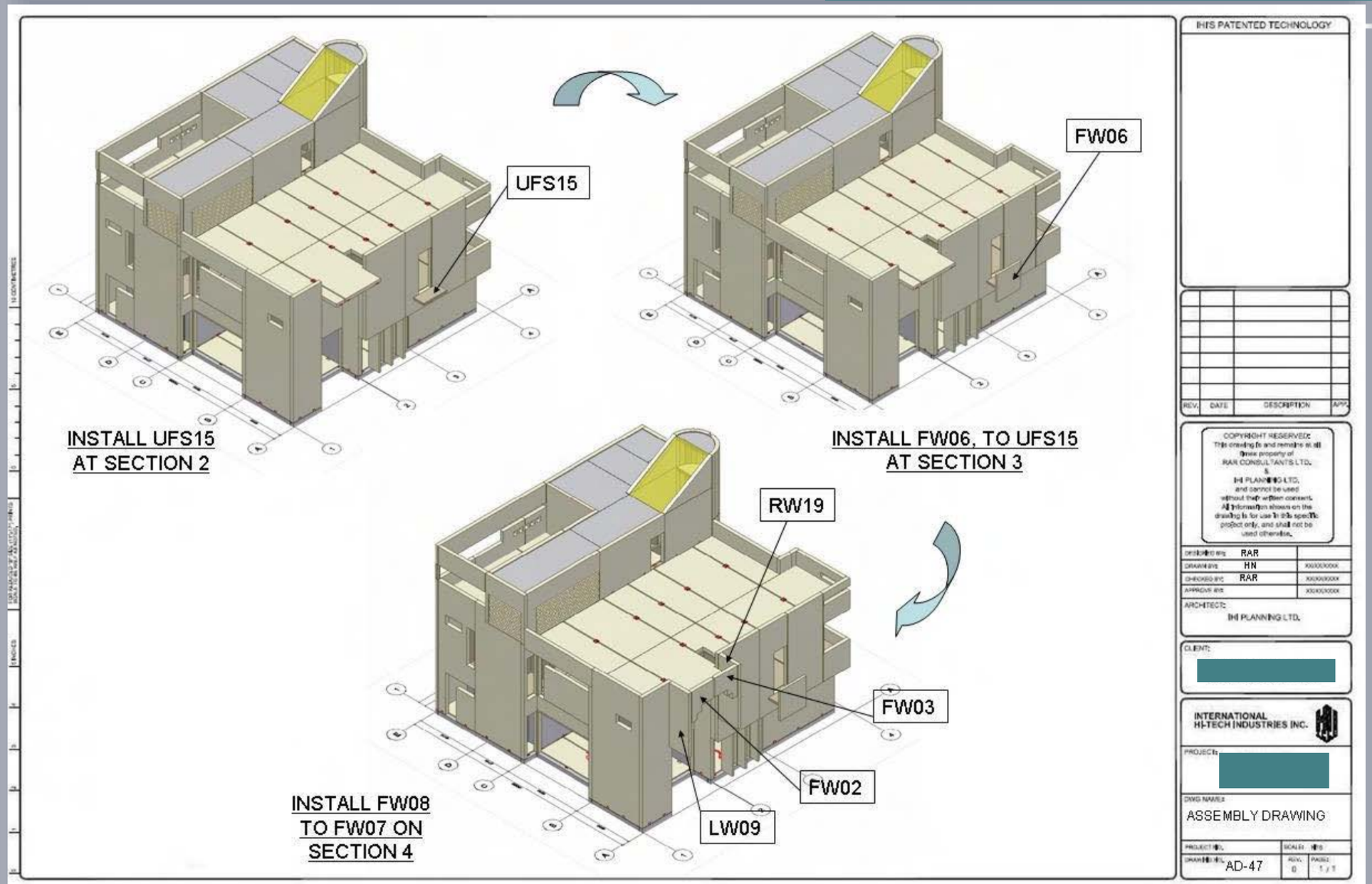
Only a 25 ton crane is used to lift and install ground floor slabs– Please refer to description of previous slides and the unique advantages of the IHI system over pre-cast and cast-in-situ concrete.



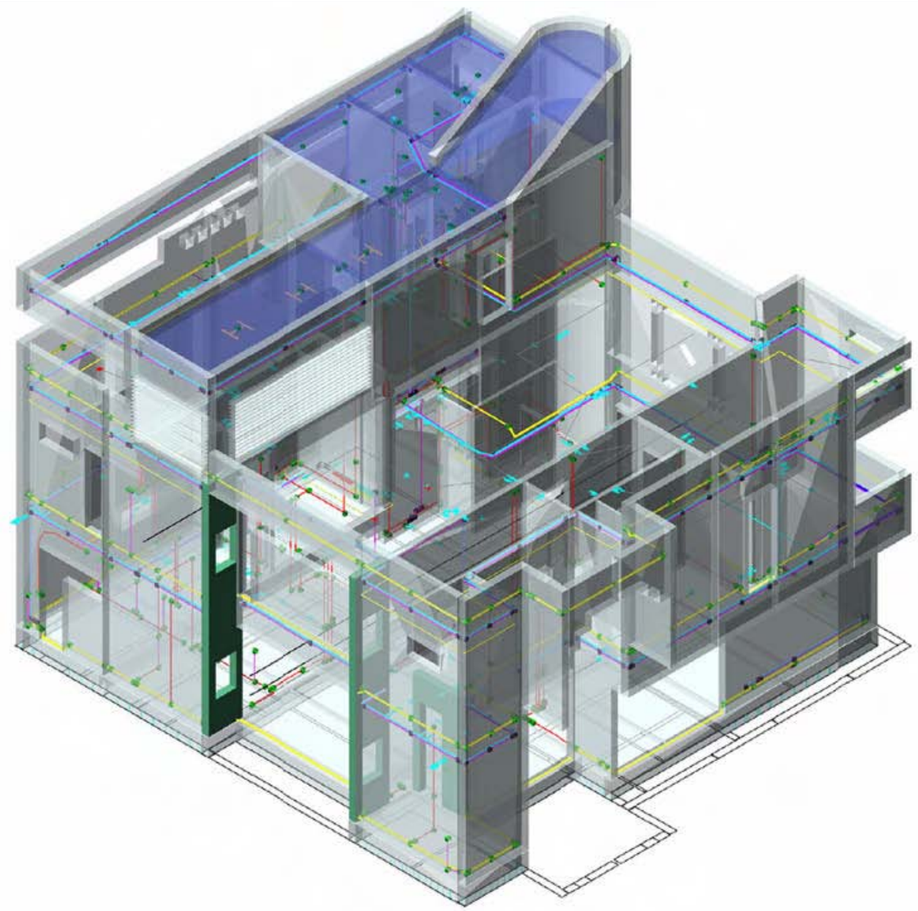
Installation of wall panels to foundation panels as shown. Please refer to description of previous slides. Due to the cost advantage of the IHI panels, all steel within 2.5 cm from the outside surface are upgraded to stainless steel elements to eliminate any potential corrosion for generations to come without affecting the budget.



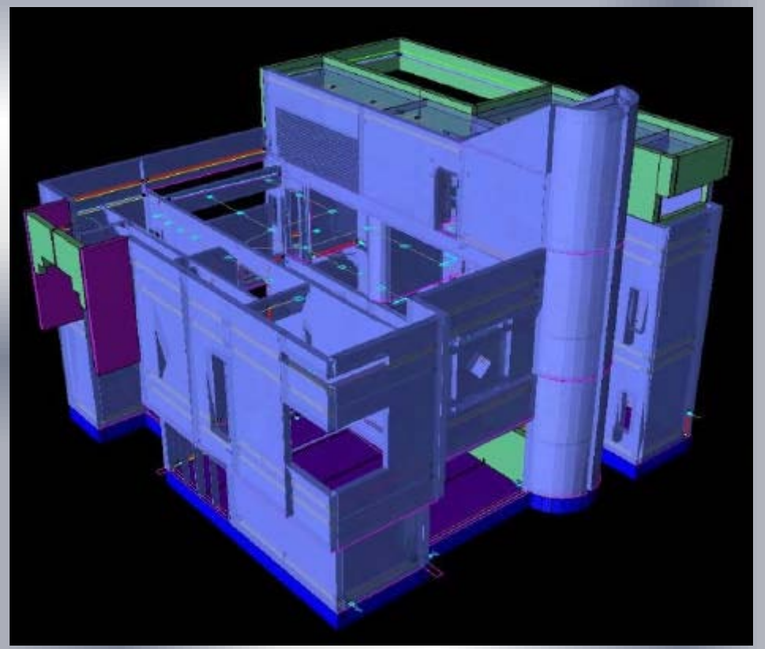
These slides are taken from the assembly manual where no bracing and/or scaffolding is required, unlike any other systems specially pre-cast concrete.



These slides are taken from the assembly manual where no bracing and/or scaffolding is required, unlike any other systems specially pre-cast concrete. Special notice has to be highlighted due to the fact that large panels are installed on top of large openings. Please see following site photos.



STANDARD 3-D ELECTRICAL CONDUIT LAYOUT INSIDE IHI PANELS.



ADVANCED 3-D ELECTRICAL BUILT-IN RACE-WAY SYSTEM – OPTIONAL

HCD CHOSE THIS OPTION.

This option is virtually not achievable with any kind or type of conventional or pre-cast construction while maintaining the same total panel thicknesses as that of IHI and most importantly while maintaining the structural, fire, thermal and acoustical characteristics of the structure.

INTERNATIONAL HI-TECH INDUSTRIES INC.

QUALITY CONTROL ASSURANCE ASSEMBLY OF THE IHI PANELS STEEL FRAMES PRIOR TO CONCRETING AND INTRODUCING HIGH END ELECTRICAL AND MECHANICAL 3-WAY FLEXIBLE CHANNEL SYSTEM AT REDUCED COST.

MECHANICAL, ELECTRICAL AND PLUMBING ACCESS U-CHANNELS TO IHI BUILDINGS TO PROTECT THE MECHANICAL SYSTEMS FROM ANY DAMAGE DUE TO ANY ALLOWABLE AND NON ALLOWABLE SETTLEMENTS IN PERMA FROST AND VERY POOR SOIL CONDITIONS.

EXACT DRY RUN IN IHI's R & D YARD (PRIOR TO SHIPPING TO SITE) FOR THESE U-CHANNELS. EXCAVATIONS SHOULD HARDLY EXCEED 0.5 m IN DEPTH IN FEW SPECIFIC LOCATIONS.

ANOTHER VIEW SHOWING THE BACK OF AN INTERIOR CONNECTION FOR THE EXTERIOR WALLS CONNECTED TO THE PERIMETER FOUNDATION & TO OTHER INTERIOR AND EXTERIOR WALLS.

A NICE PERSPECTIVE OF VIRTUALLY EARTHQUAKE PROOF FOUNDATION-SLAB-WALL CONNECTION. ALL SITTING OVER THE IHI FLOOR SLABS (WITH CONCENTRATED LOADS) AT IHI'S MAIN MANUFACTURING FACILITY.

THE STAINLESS STEEL ELEMENTS ARE VERY VISIBLE WITHIN 2.5 CM OF THE EXTERIOR SURFACE OF THE PANELS.

THE PHOTOS SPEAK FOR THEMSELVES

PERFECTION IS NOT ONLY A PASSION WITH THE IHI SYSTEM BUT ALSO COMES AT A REDUCED PRICE UNLIKE ANY OTHER KNOW SYSTEMS.

PARTIAL INTERIOR REINFORCING IS CLEARLY SHOWN. THE WHOLE BUILDING CAN BE CARRIED IN ONE PIECE . THEREFORE, ZERO PARTIAL OR RELATIVE SETTLEMENT. IHI BELIEVES THAT THIS IS A GREAT ADVANTAGE (AMONG MANY OTHER THINGS) ON ANY OTHER CONVENTIONAL (OR OTHERWISE) SYSTEM AND SPECIALLY PRE-CAST CONCRETE..

A CLEAR HORIZONTAL & VERTICAL CHANNELS TO ACCOMMODATE ANY CHANGES WITHOUT AFFECTING BUDGET DURING THE FAST CONSTRUCTION PERIOD. THIS IS TOTALLY FOREIGN TO OTHER CONVENTIONAL SYSTEMS INCLUDING PRE-CAT CONCRETE.

A CLOSER LOOK AT OPEN HORIZONTAL CHANNELS. THE IHI SYSTEM IS FLOOD, HURRICANE & TERMITES PROOF. IT WON'T BURN, IT IS FULLY INSULATED INCLUDING FOUNDATION & GROUND SLAB PANELS. OVER & ABOVE IT IS VIRTUALLY EARTHQUAKE PROOF AT NO ADDITIONAL COST.

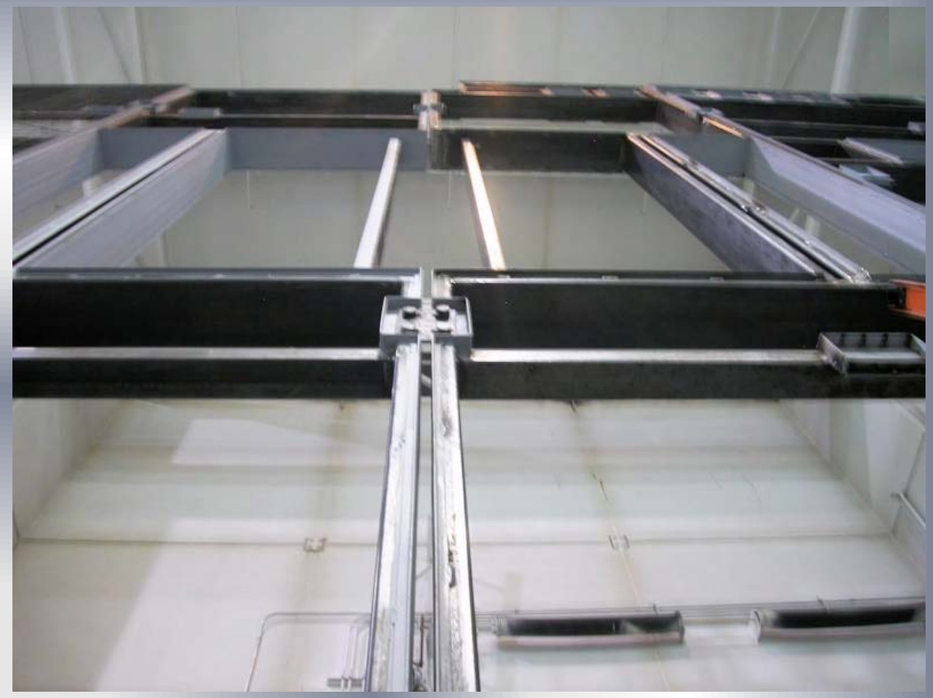
A VERY NICE FIT FOR A BEAUTIFUL, SMOOTH & STRONG IHI PANEL.

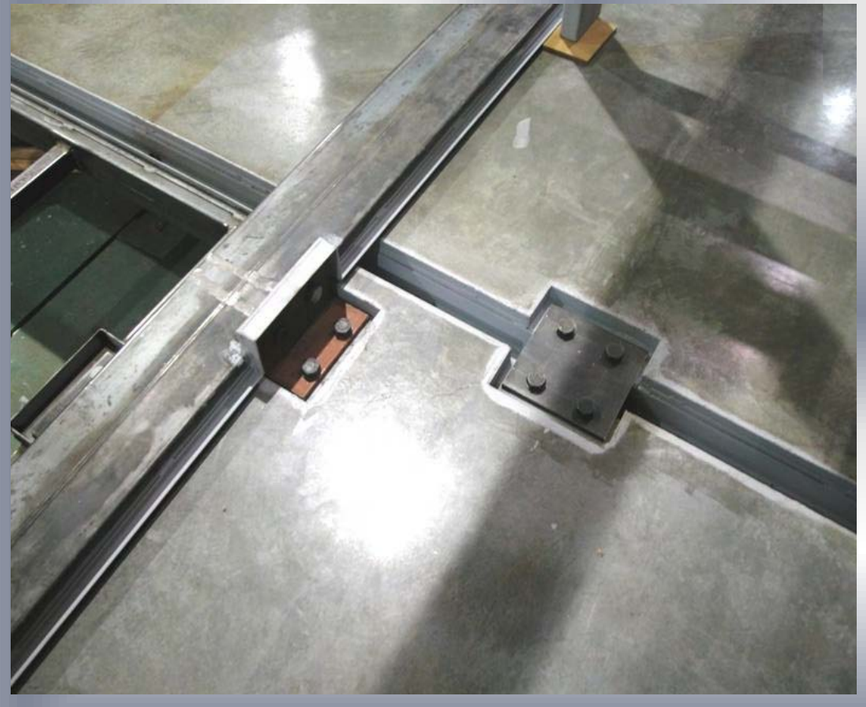
IHI SYSTEM IS NOT ONLY UNIQUE BUT ALSO PATENTED WORLD-WIDE.

ALL CONNECTIONS ARE FULLY CONCEALED, BRACED & DUCTILE FOR GENERATIONS TO COME. AGAIN, THIS IS TOTALLY FOREIGN TO OTHER CONVENTIONAL SYSTEMS INCLUDING PRE-CAST CONCRETE.

INTERNAL VIEW OF THE STAIRCASE AND ITS CURVED LANDING.

A PERSPECTIVE VIEW OF THE CURVED LANDING IN THE STAIRCASE AT ONE END.





INTERNAL VIEW OF TWO EXTERIOR PANELS SHARING ONE LARGE WINDOW (THE BRACINGS AT CENTER ARE TEMPORARY) THE EXTERIOR WALL PANELS ARE 12 M. (40 FT.) HIGH.

ALTHOUGH IHI ALLOWS FOR SOME TOLERANCE ON SITE TO SPEED UP CONSTRUCTION & REDUCE ERECTION COSTS; DURING DRY RUNS THE TOLERANCE IS VIRTUALLY ZERO. THE PRODUCT IS NOT A CONSUMABLE ITEM THAT ENDS UP INTO FILL AFTER DEMOLITION. THE NEW VERSION USING IHI'S SPECIAL CONCRETE IS VIRTUALLY DESIGNED TO BE EVER LASTING AND TO BE WITNESSED BY GENERATIONS TO COME.

PERFECT FIT FOR FOUNDATIONS, SLABS & WALL CONNECTIONS. THE CONCRETE IS 12,000 PSI & EXTREMELY SMOOTH. U-CHANNELS WILL ENCASE PERPENDICULARLY THE EXTERIOR BEAM FOUNDATION WHERE APPLICABLE. OPEN CHANNELS BETWEEN FLOORS ARE VERY VISIBLE. SAME COMMENTS AS BEFORE.

ASSEMBLY OF BUILDING ON SITE – PART 1

NORTHERN ALBERTA, CANADA PHOTOS BY ROGER A. RACHED THAT FEATURE PART OF IHI'S UNIQUE SYSTEM

.

Note: The net effective working time for this phase is approx. 10 hrs. using a certified crane operator, a certified welder, and a crew of 3 (average) with experience in demolition but with no previous experience in new building construction. This crew was selected by our local partner with the aim to train the local labour. Despite the lack of the necessary tools like levels, plumb lines, etc., the crew was trained on site by the President of IHI, Roger A. Rached and was able to proceed with the assembly of the building following a detailed assembly manual under the supervision of a General Contractor.

This is like a giant meccano set and is totally not achievable with any other system including pre-cast concrete.

Arrival on site

Shows the arrival of the curved panels that were especially strapped for the 24 hr. trip from Vancouver due to the high strength to weight ratio large number of panels can be easily stacked for shipping. Another significant advantage for IHI against pre-cast.

Some panels require wide loads.

Shows that the assembly requires one large (80/100 ton) mobile crane for erection, and one small (25 ton) Picker for preparation of panels in sequence, when needed and during the erection process and the installation of foundation and ground floor slabs.

Wide loads being unloaded during the insulated foundation assembly process.

Unloading of the insulated +curved panels during the assembly process.

The well levelled foundation between well compacted soil is ready to receive the insulated IHI floor panels.

This picture shows the first IHI insulated ground slab with MEP openings. The floor acts also as an integral part of the insulated floating foundation specially during the permafrost season and where soil conditions are very poor.

This picture shows clearly the curved insulated foundation of the staircase.

This picture shows typical compaction procedure between the IHI insulated foundations.

This picture shows a 30 ft. insulated ground insulated slab (6 inches thick) spanning with no deflection. A unique feature for IHI due to the high strength to weight ratio.

The IHI ground panel fits perfectly with the insulated foundation panels.

This picture shows the excellent fit at the 2 corners .

This picture shows the installers for the first time trying to utilize what they learnt on site with respect to levelling and plumbing; prior to tightening the bolts and moving forward to the next panel. A very fast learning curve to installers totally unmatched by any other system of this scale.

Another panel ready to be lifted.

These pictures show again a 6 inch IHI insulated panel spanning without deflection. Please see previous comments.

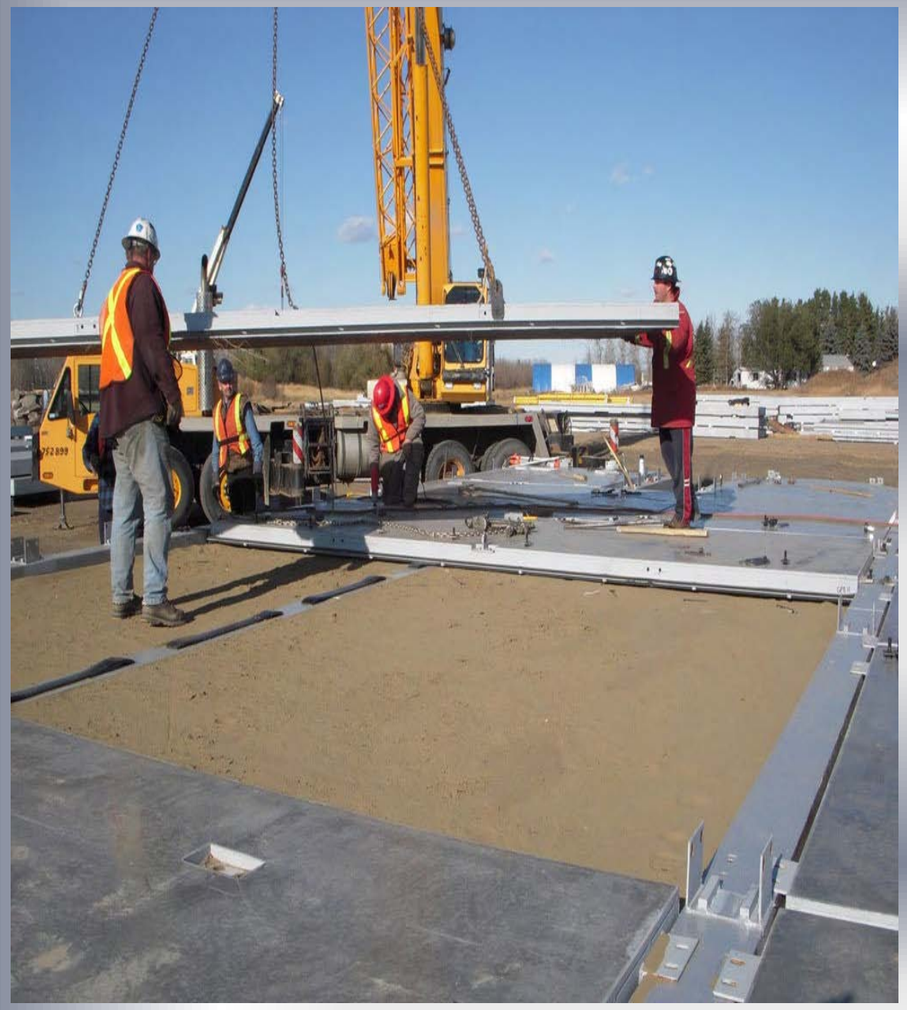
This picture shows again a perfect fit. Bolts are not tightened prior to levelling and plumbing.

Perfectly smooth high-strength concrete panels connected through an open channel which can be easily used to pass extra MEP services if needed prior to filling with plaster.

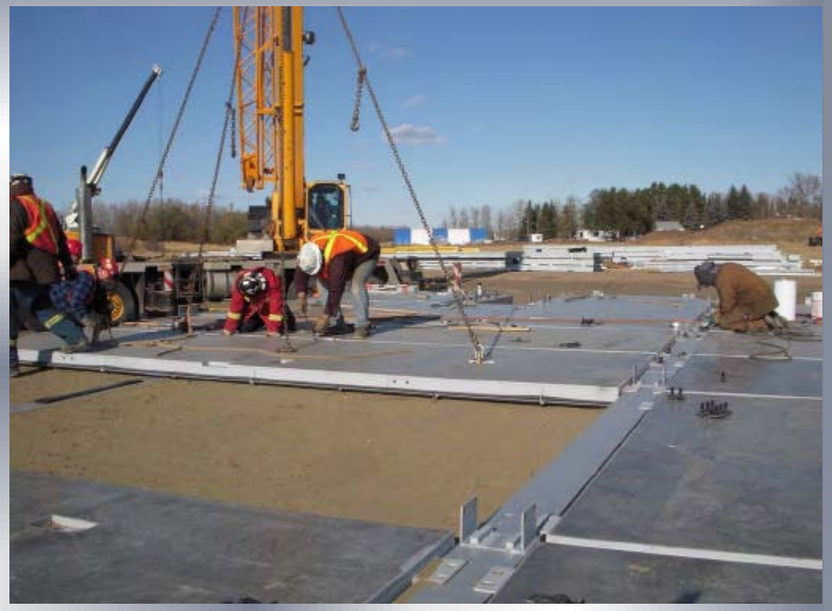
All bolts are perfectly lined up after tightening the IHI slab to the beam foundation using a 1.5 ton pulling device. Though the panels are extremely strong, they can be easily worked around for perfect alignment unlike any pre-cast or conventional cast-in-situ.

Same comments as previous slides.

Same comments as previous slides.



Same comments as previous slides.



Same comments as previous slides.

Same comments as previous slides.

Unmatched structural concrete quality finish at reduced cost.

Mechanical and electrical raceways are very visible.

Installation of the first wall panel. Major and unique structural advantages for IHI system. 40 foot approx. panel lifted at one end only & spanning its dead weight over the whole length without any noticeable deflection. Again, IHI panels work in tension, compression, torsion, sheer and bending. Window openings allow stresses to redistribute along the perimeter of the openings.

Photos clearly show exact connection fit at the base of the panel while installing. Electrical low and medium channels are clearly shown at the base below an open channel for plumbing distribution. Opening in the IHI slab panel for underground IHI trenches is clearly shown. Due to the strength, ductility and continuity of IHI wall panel, nylon ropes were more than sufficient to tie the panels to pre-designed built-in concealed brackets in the insulated floor slabs and foundation. All above is also not achievable with Pre-cast concrete.

First corner has to be secured from a 100 km./hr. wind blowing without notice. At 60 km./hr. operation stops for safety. However, with rain and/or snow the operation continues.

The whole town is very interested in the system, and in full support headed by the Mayor.

We had to lift the man lift on the panels, since the surrounding soil was not levelled and too windy to operate in a stable manner. The machine weighs 6 tons and the average thickness of concrete is 2.5 cm. Certainly above is not achievable by any other system.

Tack-welding bolts after levelling & squaring all corners by the welder in the man lift.

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(left) Adding internal walls during the erection process, acted as lateral supports for the approx. 40’ exterior wall panels to be erected. There was no need for any traditional heavy bracing.

(right) Panels are relatively light and flexible to fit in place with all accurate openings allowing developers to pre-order all windows and doors at design stage. Again, all above is very hard to achieve with other known systems.

Major and unique structural advantages for IHI system. 40 foot approx. panel lifted at one end only & spanning its dead weight over the whole length without any noticeable deflection. Again, IHI panels work in tension, compression, torsion, sheer and bending.

All above is not achievable with any known pre-cast or conventional concrete systems.

Panels ready to be lifted after attaching all accessible brackets to expedite erection time.

Same as previous slide with another panel that is symmetrical.

The vertical intermediary steel is just 2” x 6” x 1/8” hollow structural steel (HSS), acting as temporary bracing during the erection. This will be knocked off after completion of assembly to form a large window.

Another example with a much larger opening at the base. The temporary bracing shown in the top right picture (at the bottom of the panel) will be removed after assembly to form the opening for the rear entrance access to the building.

The alignment and the smoothness of the 12,000 psi high-strength concrete is very visible.

Assembly of first curved wall for the staircase.

No bracing and/or scaffolding is required. All panels are uniquely architecturally and structurally integrated to each other.

Again, Part 1 of the assembly was conducted relatively fast taking into consideration that the crew was all from the local town with no previous experience in construction (other than demolition experience) with the exception of the certified welders and crane operator that were obligatory on the job. There is a local General Contractor in charge of supervising the job.

Simple manual pulling devices are used to line up panels easily. IHI panels are very strong but flexible unlike pre-cast or any other concrete panels.

ASSEMBLY OF BUILDING ON SITE – PART 2

NORTHERN ALBERTA, CANADA -

This slide shows on the left an accessible duct space in the pantry room. On one side, the IHI steel frame will be covered with concrete fibreboard after installation of ducts, electrical panel board, etc.. In the background the curved panels for the staircase are clearly shown.

A very unique, clean, quick and flexible continuous system.

View from the South-East corner.

Assembly of second floor slab.

View from the South side of the property showing the installation of one of the second floor slabs.

View from the east side of the property showing the closing of the South-West corner. All interior walls are IHI panels finished with the same material as the exterior walls. Besides the many disadvantages and limitations of pre-cast concrete panels, its is very expensive to have interior pre-cast panels, however, as we can see with IHI, all panels are made out of the same system.

View from the South-West corner – rear entrance to the Technology Center . All temporary bracings within the window or door openings were knocked off after erecting the whole building.

View from one of the offices

View of the lounge at roof level from the Patio.

Installing an IHI beam into place.

View from the South – the picture shows the 2 large openings for windows on both sides of the display area covering the Southern and the Northern view. Large panels were installed on top of these openings. This is totally unique to IHI and can not be achieved with neither pre-cast or cast in situ concrete (please see page 64 bottom right).

Assembly of the second IHI beam above the display area of the HCD Technology Center. Same comments as before.

Same comments as before.

Same comments as before

These slides show the North façade of the building with its cantilevered canopy over the main entrance and cantilevered balcony of the conference room in the second floor. Not only IHI panels work perfectly well under tension, compression, torsion and bending but also behave in a superior and unique way as cantilevered structures due to the high strength to weight ratio described before. All above is unique to IHI.

Installation of the last (curved) panel into place which brings to completion the overall assembly of the HCD Technology Center.

View of the exhibition stage on the ground floor as seen from the second level ready for the installation of electrical, mechanical and finishing works.

Same comments as before.

Interior views of the staircase and second floor

This slide shows the curved panels that form part of the building's staircase. This building element is made of 6 panels connected to each other which is the equivalent of a 6 storey building. Fiber concrete flashing will be used over the peel and stick rubber membrane to finish nicely all corner edges while maintaining all thermal breaks.

View from the North-West corner of the fully assembled building. The corner unobstructed opening in the conference room will have a special corner window with but-joint glass corner to enhance the very nice view. The same detail is repeated at the roof level with an unobstructed corner element.

As shown, any architectural design and features can be achieved with the IHI system.

IHI is building TOMORROW'S WORLD TODAY....!