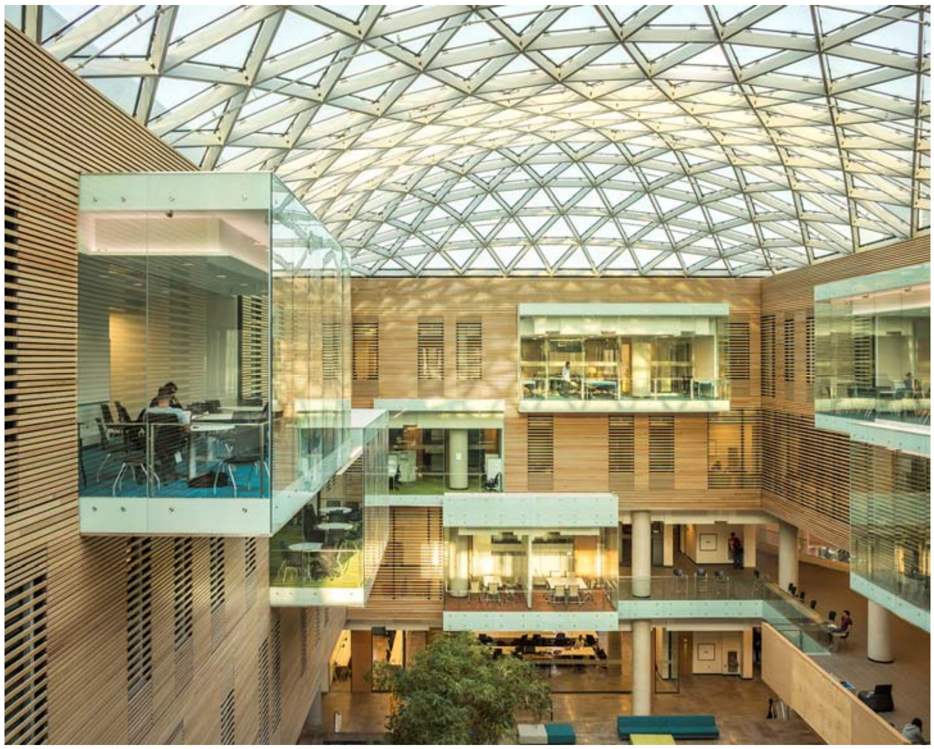
VanBoxmeer & Stranges Ltd.
STRUCTURAL ENGINEERS

Wilfrid Laurier Lazaridis Hall


LAURIER SCHOOL OF BUSINESS & ECONOMICS

OFFICIAL ENTRY RECEIPT

ENTRY CONSENT



PROJECT DESCRIPTION

STRUCTURAL ENGINEERS

Lazaridis Hall
Wilfrid Laurier University

Project Description

Lazaridis Hall in Waterloo, Ontario is designed to meet increasing enrolment demands, provide excellent space for learning, and enhance Wilfrid Laurier University's (WLU) competitive edge. This stand-alone facility serves as a landmark building and gateway along University Avenue for the expansion of the campus to an emerging precinct to the north. The building houses the School of Business & Economics (SBE) and the Department of Mathematics, programs that relate synergistically. With over 4,500 full and part-time students, SBE is WLU's largest and fastest-growing faculty.

The large atrium creates the central hub that interconnects this 220,000 square-foot, four-storey academic facility. Common student areas are distributed around and within the atrium through all floors. A large 42 x 21-meter freeform structural glass and steel skylight creates a light-infused space for this central gathering space. The use of a very efficient, lightweight structure permits maximum visibility of daylight. Glare is addressed through the use of surface fritting and high-performance low-e coatings to ensure a comfortable interior courtyard below.

Major program elements include a multipurpose 1,000-seat auditorium, a 300-seat lecture hall, 150- and 75-seat horseshoe-shaped interactive classrooms. A leading-edge finance lab and math labs are dedicated to the School of Business and Economics and Department of Mathematics. Over 240 offices and administrative suites for both departments are interspersed on floors two through four to provide good faculty-student contact. Alongside common student areas there are private study areas for graduate, masters and PHD students on the upper floors.

A simple material palette of zinc panels, wood, and glass conceals a complex hybrid steel and concrete structure beneath. The building concept is based on the shifting of horizontal planes of each floor plate, bisected by the curvilinear auditorium and 300-seat lecture hall drum. The beauty and clarity of this form is achieved through large overhangs that appear to effortlessly float on top of each other.

Designed from the inside out, the building form celebrates significant program components such as the curvilinear auditorium and 300-seat lecture theatre with a seamless expression both on the interior and exterior. The building is a hybrid concrete and steel building with steel reserved for complex structure, long spans and cantilevers.

For instance, the lecture theatre is supported within the café on remarkably few HSS Steel columns that are a custom design collaboration between architect and structural engineer. These are exposed and treated with intumescent paint. Other columns are carefully embedded within walls keeping the spatial experience clear and uncluttered. The drum's entire roof and sloped seating area is supported by a series of cantilevered welded wide flange roof beams and cantilevered WWF floor beams. The drum roof and seating floor are constructed out of 220 tons of structural steel. The café fits into the interstitial space below and looks out over University Avenue with terracing steps creating seating areas that link to the side walk.

The primary entry from University Avenue to the west is sheltered by an enormous cantilever on the southwest corner at the third and fourth floors. Spanning the length of the 1,000-seat auditorium, the cantilever is achieved with three large span girder trusses, some two stories deep and cantilevering nearly 24 metres. The weight of steel trusses and beam structure in this area is 225 tons. The structural truss supports are exposed to celebrate the steel structure. The truss chord members, web members and connections were coordinated with the architect so that the truss could be integrated into the architecture and exposed within corridors and rooms.

An additional challenge was the large spans required over the three 150-seat classrooms located at the main floor, north of the atrium. Using an all-concrete design approach for the second floor transfer girders proved too challenging due to the larger spans required on the main floor and the size and weights of the concrete transfer girders required to support those loads. A hybrid design of cast-in-place concrete on a structural steel girder support structure was designed. A series of the second floor steel transfer girders and beams were erected with a conventional two-way span cast-in-place concrete structure bearing on the steel girders. This construction approach was used to take advantage of the higher floor-to-floor heights allowing the use of main floor steel transfer girders. The cast-in-place upper floor design maximizes headroom clearances in the upper levels. The weight of the second floor hybrid steel structure is approximately 162 tons.

The skylight may be the largest single layer trussless skylight in Ontario. Economy was essential if the skylight was going to be built as envisaged. The architectural team designed two variations of the skylight that were both tendered. The first version was a custom design with collaboration from structural glass engineers. The second and final built version was a collaboration between the architecture team and design-build manufacturer. The result is a combination of systems – an architecturally-exposed steel frame in combination with a freeform glazing system perched on pedestals for maximum economy of appearance and cost. The configuration with two high points was determined by economy of means to span such a large space. The skylight arrived on site as a kit of parts. The steel was assembled at grade in three sections and craned into position. The triangular glass panels were hoisted into position one by one.

In order to navigate the complex relationship between the hybrid steel and concrete structure, Revit modeling was used as a key tool throughout all phases of design and construction. BIM allowed the project team to refine the design and also allowed all disciplines to interact through design in a way that ensured that the various needs of the project team and any discrepancies were addressed. BIM integration also allows for more careful coordination during construction – sharing the model with the contractor enables the sub-contractors to use the model as a guide while preparing the shop drawings. Overlaying models created for the purpose of fabrication over the design model allowed the project team to quickly hone in on areas that required revision. The steel was manufactured and installed using the BIM model and was carried out without incident or delay.

Project Innovation

In 2009, Wilfrid Laurier University (WLU), located in Waterloo, required a new building be constructed to accommodate expansion and a first class facility for their business and mathematics students. WLU, commissioned Diamond Schmitt Architects Inc. to design an energy efficient building and create a gateway to the University.

There were four major structural challenges to overcome. Namely; a three 150 seat main floor lecture theatres requiring large clear spans; a two storey 24m long cantilever at the southwest corner; a 350 seat lecture theatre housed in a drum-shaped feature, with very few vertical support opportunities; and a large span skylight located over the atrium.

The building was challenged with an overall height limitation; a minor variance would have delayed the crucial opening date. A cast-in-place concrete structure was used to minimize the floor thickness, thus minimizing the building height. The upper two floors above the lecture theatres were designed with a two-way concrete slab. However, to create the desired large clear span over the main floor lecture theatres, this required the upper floor columns to be carried by a transfer structure. To achieve this transfer, a wide flange steel girder system was employed. This innovative technique took advantage of the strength of steel to support the upper concrete structure, and was the perfect solution for achieving span and building height requirements.
The southwest corner of the building was designed as 24m long two storey cantilevered feature. The cantilever was accomplished using three steel girder trusses and a steel floor framing. The exposed vertical and diagonal truss members were intricately coordinated with the architect to allow access through the trusses.

The cantilevered 'drum' feature acts as a beacon for the University's gateway. Its design was quite detailed; where millimeters were at a premium, the term "building a piano" was appropriate. A series of cantilevered trusses and wide flange beams were used in the roof and floor to support the front end of this complex structure on two columns located behind the curtainwall. This gives the drum the appearance of floating above the main foyer and cafeteria.
Lastly, a long span skylight located above the atrium exerts significant lateral thrusts on the roof structure. The gravity and thrust loads were resisted by a series of beams, posts and bracing that transferred the thrust reactions into the concrete roof structure.

Complexity

There was concern with differential deflections between floors above the 150-seat lecture ground floor theatres. The solution would lie in sequencing the construction of the second floor steel transfer girder structure and the upper cast-in-place floors. It was determined the lower steel floors would experience greater deflections than the stiffer upper floors as the loads accumulated from floor to floor down to the transfer structure. The structural consultant devised a temporary shoring scheme for the steel girders and upper floor column loads, and also implemented a positive camber in the concrete floors equal to the expected dead load deflection of the girders when fully loaded. Once the entire structure was complete, the shores were removed and the floors deflected equally.

The 'drum' theatre design was an extreme structural challenge, to say the least. There were many designs and iterations completed to achieve the final structure. The architect's vision featured minimal columns along the main floor curtainwall below to give the drum its floating appearance. Structurally this was achieved in part by cantilevering two main girder trusses within the theatre floor to support columns carrying part of the roof. Next a complex cantilevered structural steel roof system supported all of the drum's walls using hangers. Only when viewing the entire drum structure in a BIM model can the complexity of the steel framing be truly appreciated. The lateral loads were resolved by anchoring the drum floor structure to the adjacent third floor concrete slab, thus eliminating requirements for lateral bracing.

Social and/or Economic Benefits

Optimally situated to give Lazaridis Hall greater exposure and visibility within Waterloo's business and high-tech communities, this facility is designed to foster interdisciplinary collaboration between the School of Business and Economics, Department of Mathematics and the community, which is seen by the university as the way of the future.

Lazaridis Hall strives to signal change: it shifts focus from an internalized campus approach to engage with the community, it establishes an appropriate scale for future development of the Wilfrid Laurier University campus and it urbanizes and animates University Avenue and its surroundings.

The facade facing University Avenue is fully glazed at grade contributing to the life of the street. A dramatic cantilever over the main entrance and a café with semi-sheltered terraces cascading to University Avenue signal a fresh face for the campus to the community.

A large atrium creates a central hub that interconnects this 220,000 square-foot, four-storey facility. The atrium has been conceived as a multi-use space, allowing students to relax, study, gather, and even attend lectures or speaker series hosted by the University. It is fully fit-out with plug-in and data points allowing students to stay connected.

The 1000-seat auditorium is intended to accommodate convocation, special speakers and events, seasonal conferences, potentially a film series. To improve utilization rates, it has been designed to also comfortably accommodate a 400-seat academic lecture with tablet arms at the orchestra level. It has been engineered to optimize speech using the newest techniques for acoustic design.

Environmental Benefits

The project is positioned to achieve LEED Gold certification and OADA Standards for accessibility.

The bright, interconnected atrium contributes daylight and view within a large floor plate so that virtually all occupied spaces – including the 245 faculty offices – have windows to the exterior, atrium or courtyard. A central feature stair within the atrium offers a healthy alternative to the elevator.

Green roofs are located where they enhance occupant overlook or provide an accessible outdoor event courtyard on the fourth floor. Rooftops are high albedo to mitigate heat island effect and are used to gather and divert rainwater to a below-grade cistern for reuse in toilet flushing and irrigation. The roof structural design is PV ready and WLU is proceeding with a large-scale PV installation.

Passive energy reducing strategies include a highly efficient building envelope, less than 40 percent window-to-wall ratio, and building cantilevers to provide solar shading of the fully glazed ground floor on the south side. Energy conserving strategies including low lighting density both indoors and outdoors; radiant heating and cooling; a radiant slab at the base of the atrium; displacement ventilation within the auditorium and all teaching spaces with tiered floors to provide the best possible air quality; chilled beams in remaining teaching spaces and administrative and office spaces; on-demand individual controls combined with occupancy sensors provide significant energy savings. Building controls tied to a central campus system monitor building performance for measurement and verification will also be displayed on an educational kiosk located in the central atrium.

Meeting Client's Needs

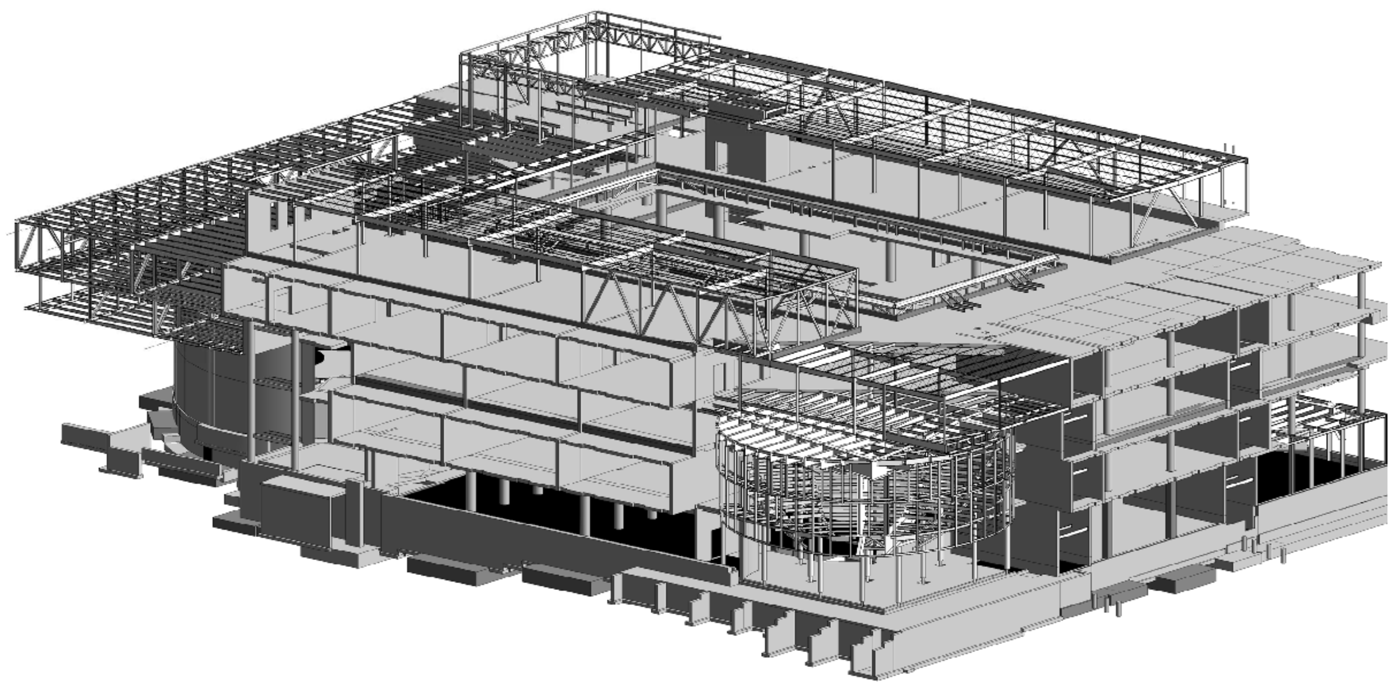
Lazaridis Hall in Waterloo, Ontario is designed to meet increasing enrolment demands, provide excellent learning spaces, and enhance Wilfrid Laurier University's (WLU) competitive edge. The Owner requires that this building serves as a landmark gateway building along University Avenue. The building houses the School of Business & Economics (SBE) and the Department of Mathematics, programs that relate synergistically. With over 4,500 full and part-time students, SBE is WLU's largest and fastest-growing faculty.

Major program elements include a multipurpose 1000-seat auditorium, a 300-seat lecture hall, 150- and 75-seat horseshoe-shaped interactive classrooms. A leading-edge finance lab and math labs are dedicated to the School of Business and Economics and Department of Mathematics. Over 240 offices and administrative suites for both departments are interspersed on floors two through four to provide good faculty-student contact. Alongside common student areas there are private study areas for graduate, masters and PHD students on the upper floors.

Classrooms are supported by leading-edge educational video conferencing technology to support distance learning and connection with partners locally and abroad. A finance lab, complete with Bloomberg trading terminals, enables students to have real world experiences within an academic environment.

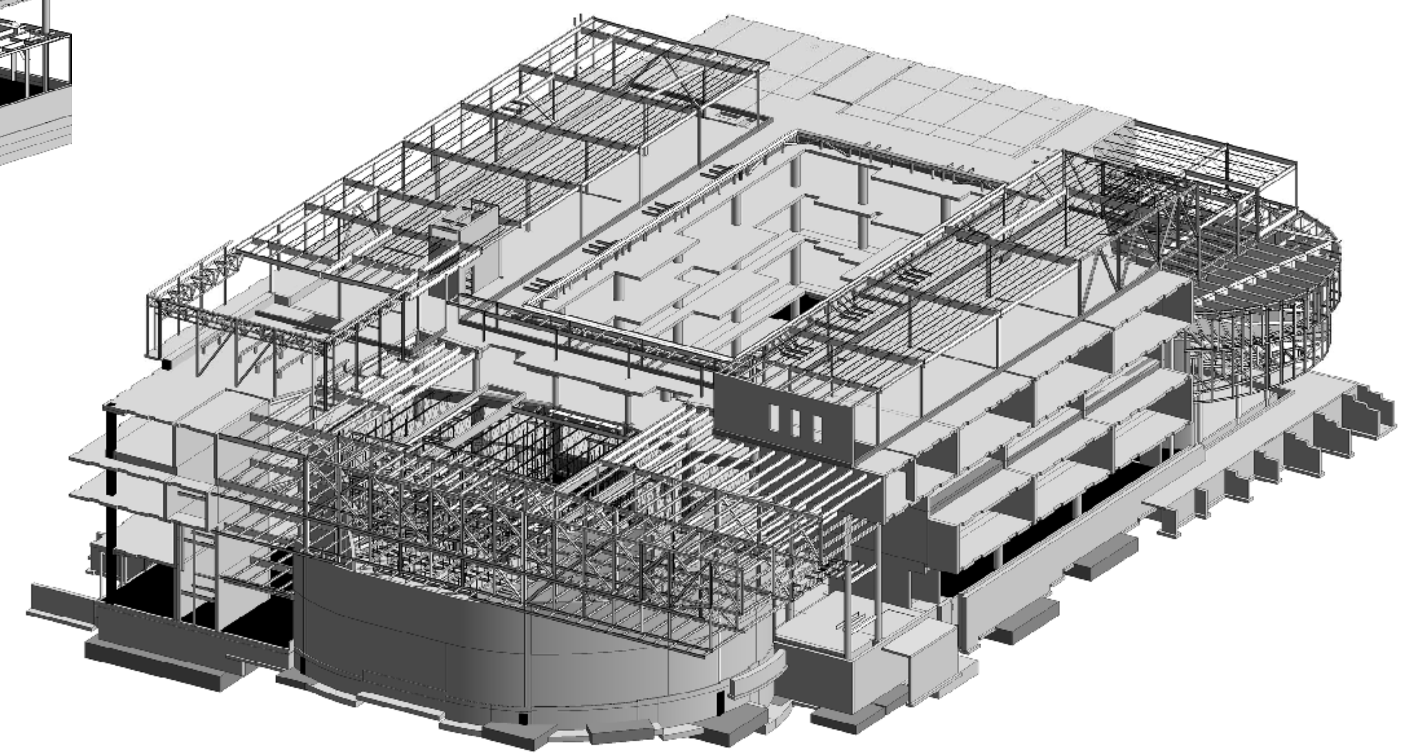
Designed from the inside out, the building form celebrates significant program components such as the curvilinear auditorium and 300-seat lecture theatre with a seamless expression both on the interior and exterior. The building is a hybrid concrete and steel building with steel reserved for complex cantilevered steel girder trusses in both the offices and drum feature.

IMAGES



Revit Image — Southeast Corner

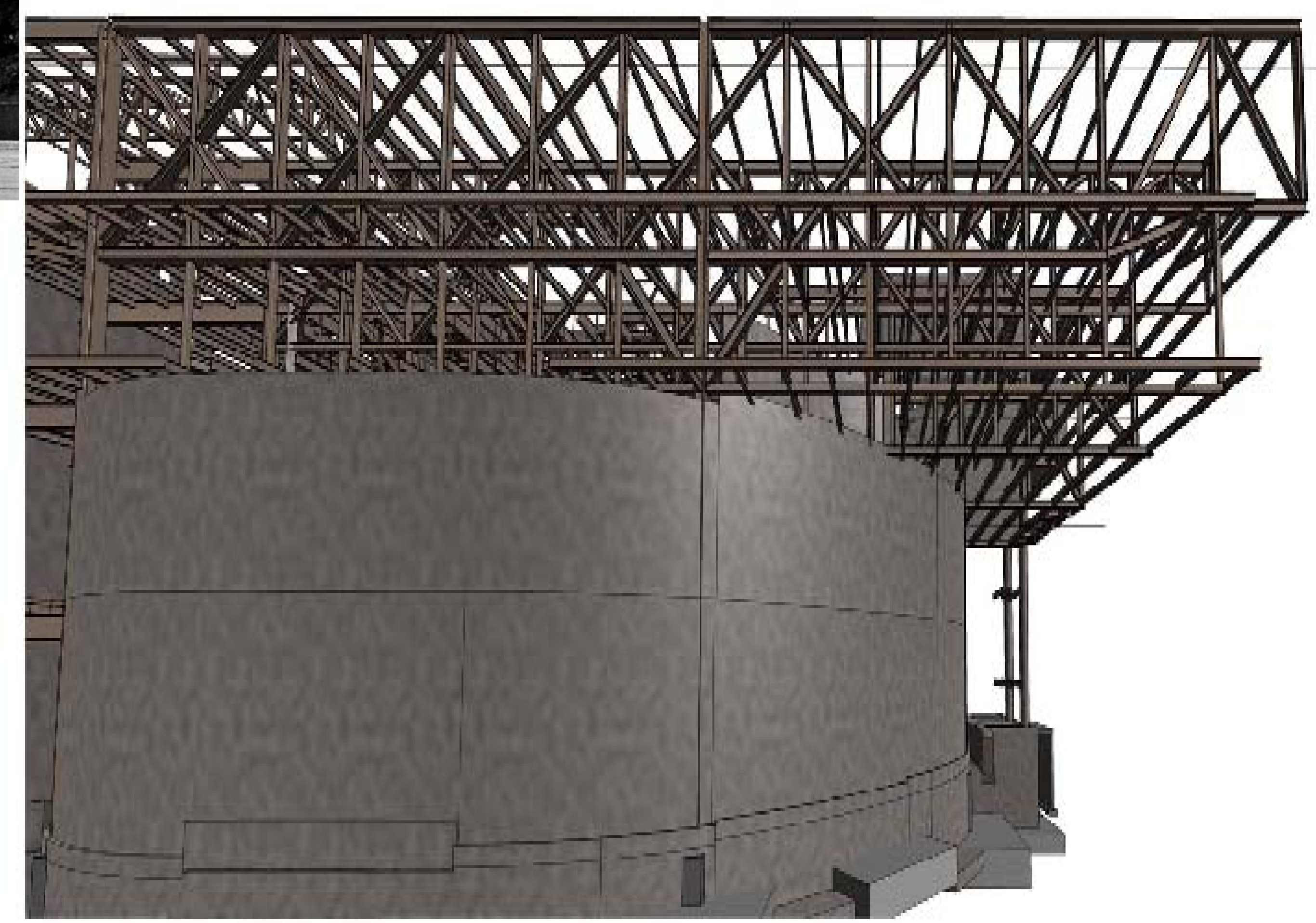
Image — Southwest Corner



Revit Image — Southwest Corner

Cantilevered Truss — West Elevation

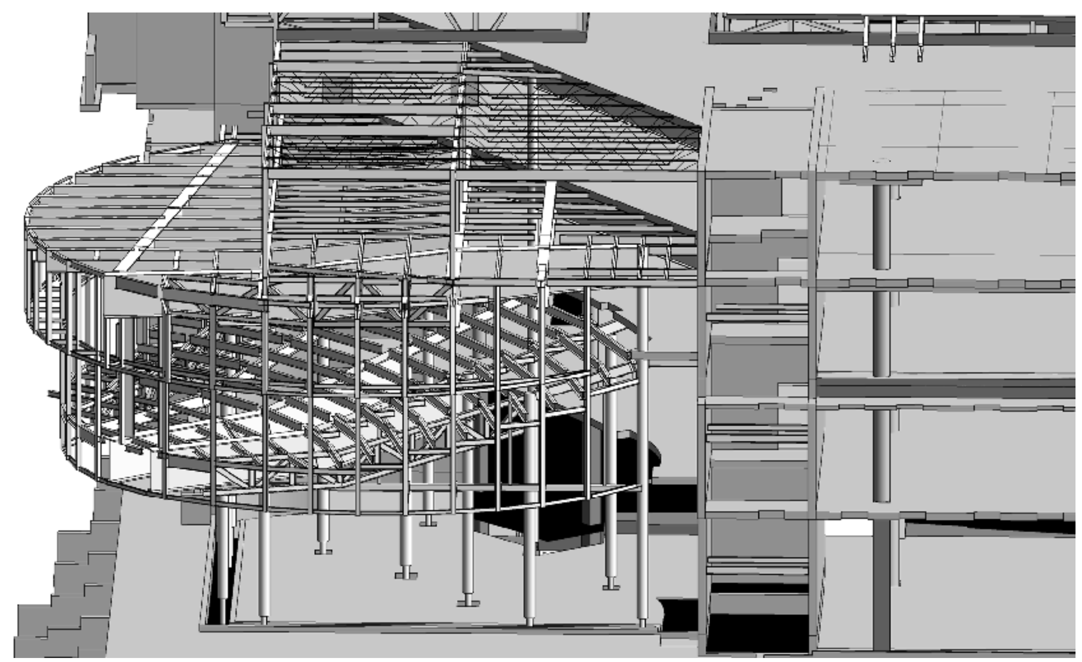
Existing Elevation



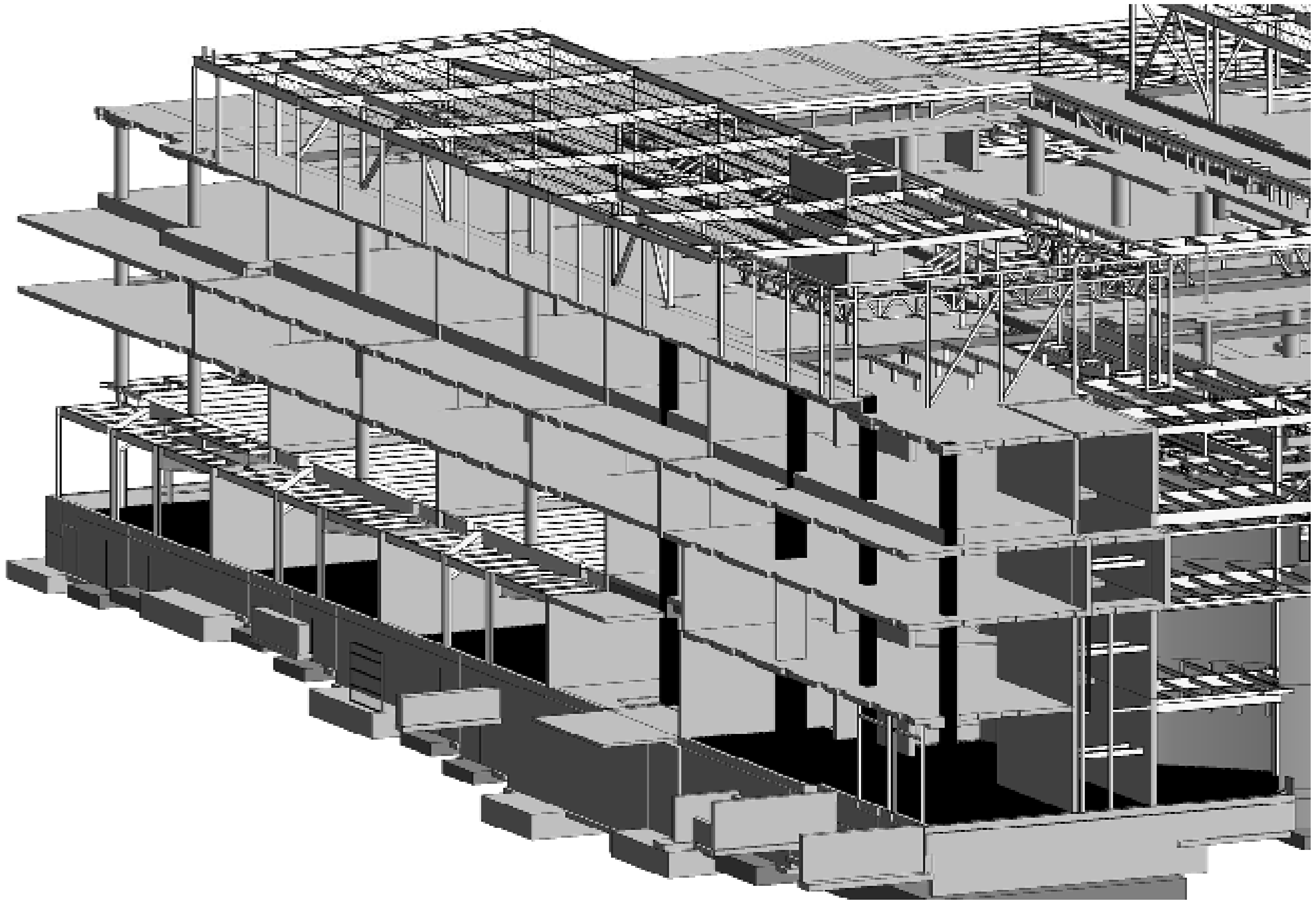
REVIT Image Truss —West Elevation

Drum—Support Framing

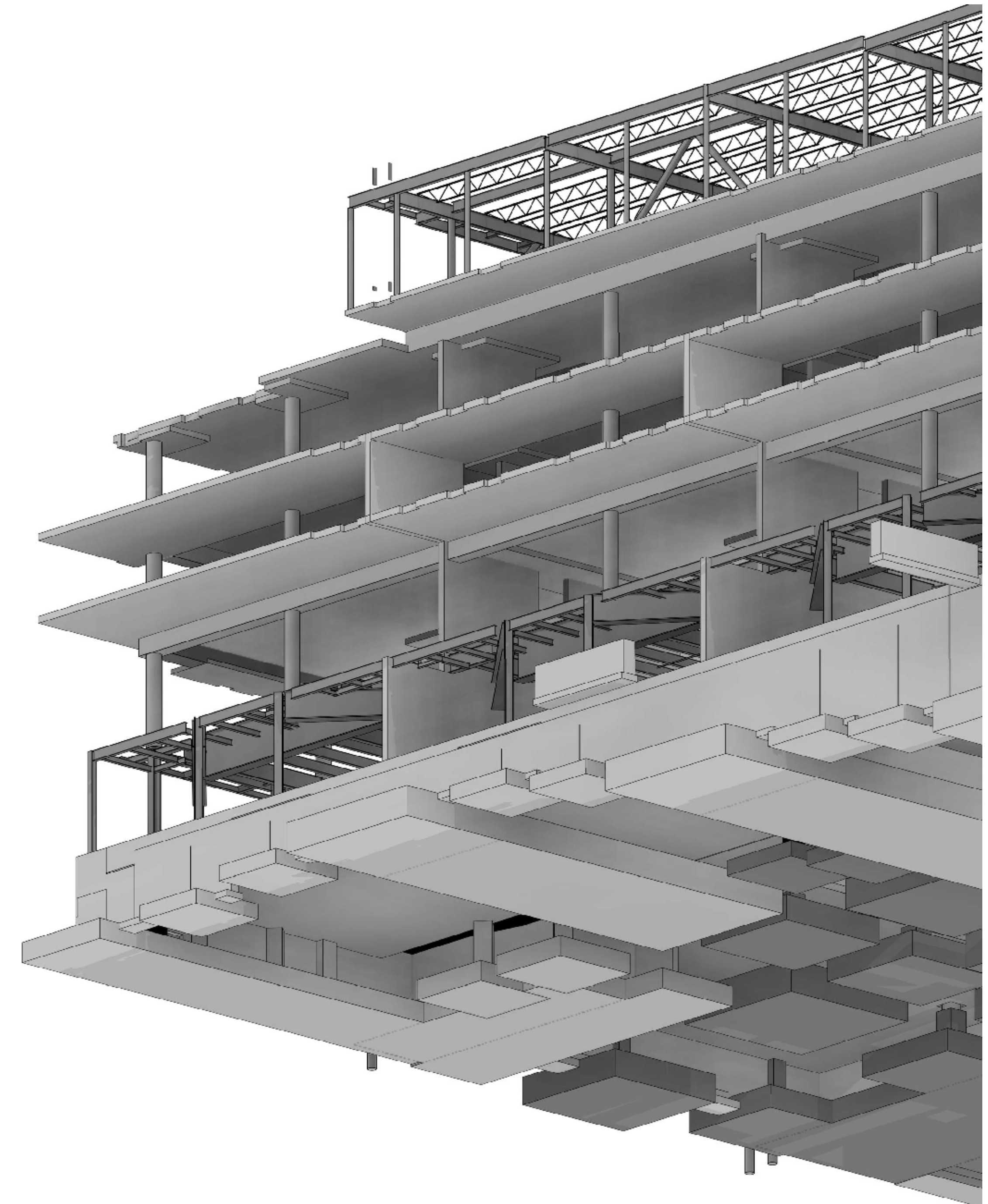
Drum— Interior Viewing South



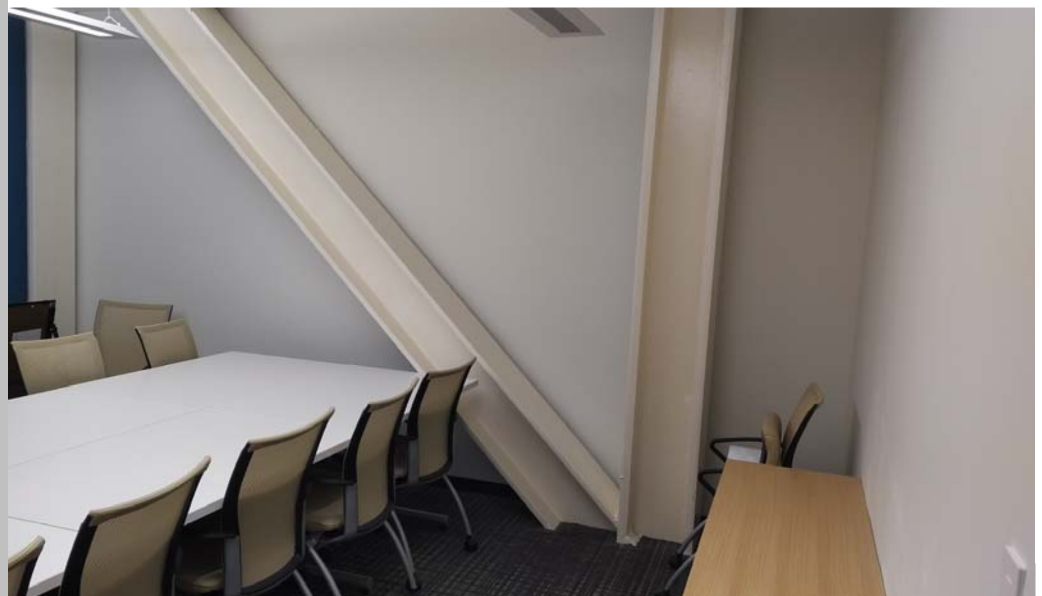
Revit Image—Drum East Elevation



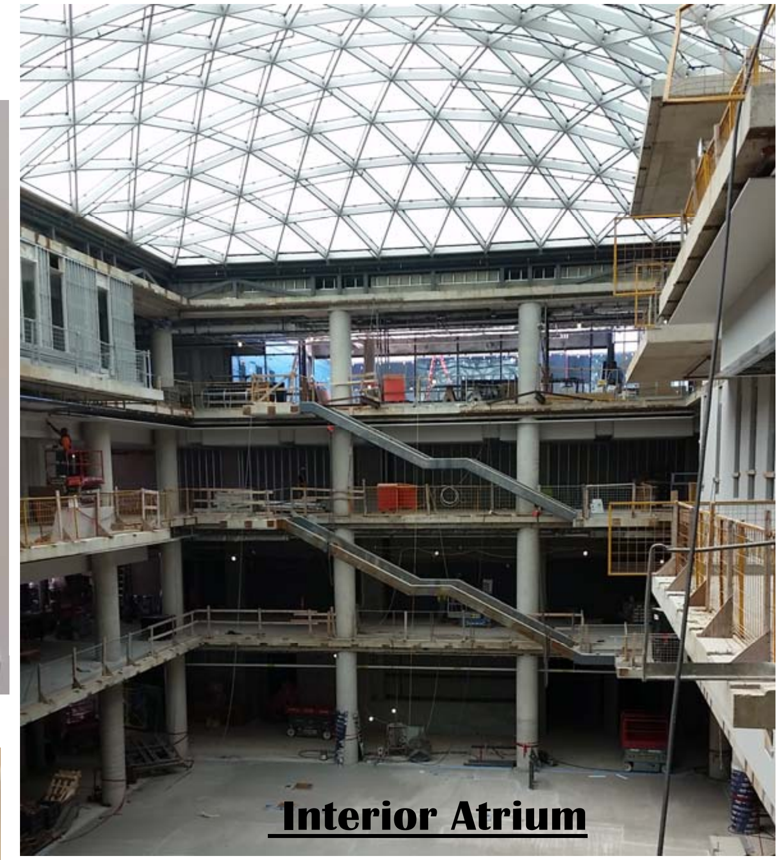
Revit Image— North Elevation
Concrete on Steel Girders



Revit Image— North Elevation
Concrete on Steel Girders



Interior Images —Cantilevered Truss



Interior Atrium

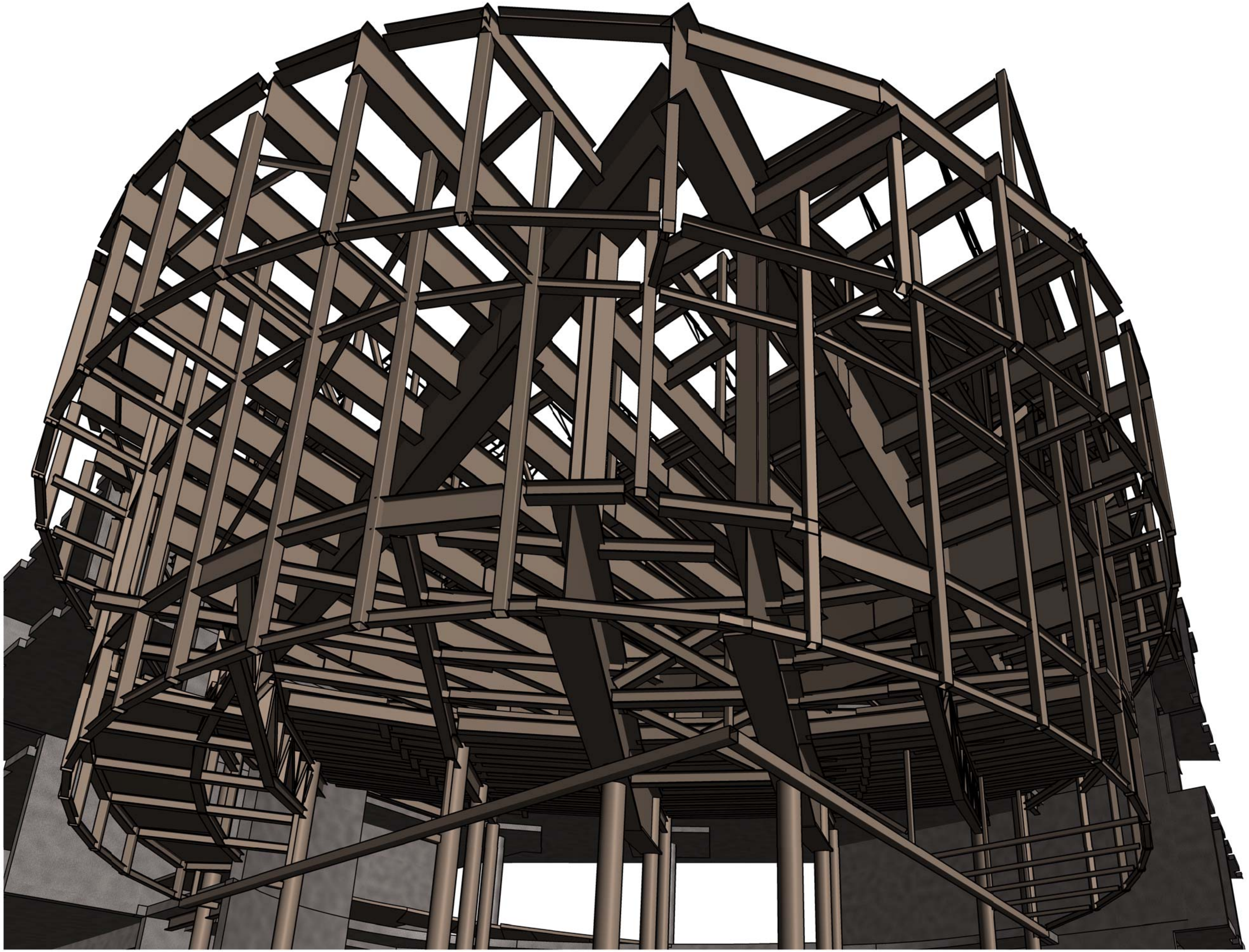
Drum Roof—Structure

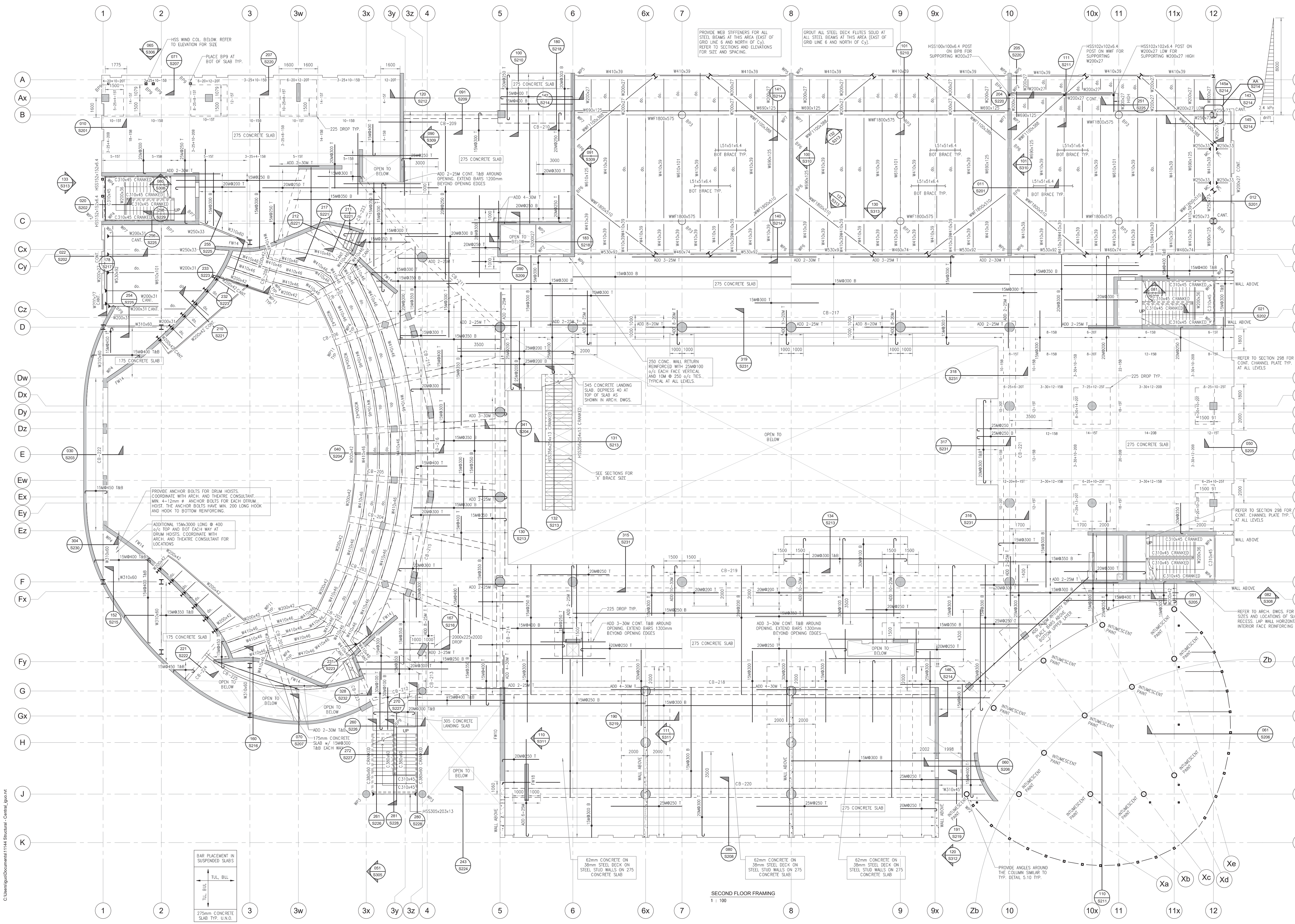
Girder Structure
Upper Floor Support

Drum Floor Structure

VB&S

APPENDIX





SECOND FLOOR FRAMING
1 : 100

SECOND FLOOR CONCRETE FRAMING PLAN NOTES

1. TOP OF CONCRETE SLAB IS AT ELEVATION 5000 (341.00 GEODETIC) U.N.O. VERIFY ALL ELEVATIONS WITH ARCHITECTURAL DRAWINGS.
2. TYPICAL ONE-WAY AND TWO-WAY CAST IN PLACE CONCRETE SLAB CONSTRUCTION: FLAT CONCRETE SLAB (275mm THICKNESS U.N.O) WITH 3000x225x3000 OR CONTINUOUS DROP PANELS (U.N.O.) SUPPORTED ON CONCRETE WALLS AND CONCRETE COLUMNS.
3. REINFORCING SHOWN ON PLAN IS THE PRINCIPAL REINFORCING ONLY. SEE STRUCTURAL SECTIONS (S200 SERIES) AND TYPICAL DETAILS (S500 SERIES) FOR ALL ADDITIONAL SECONDARY REINFORCING TO ALSO BE PLACED IN SLAB.
4. SEE CONCRETE BEAM, WALL AND COLUMN SCHEDULES ON DRAWINGS S401–S408 FOR REINFORCING. BEAM REINFORCING SHOWN IN THE SCHEDULE IS IN ADDITION TO THE SLAB REINFORCING SHOWN ON PLAN. PRINCIPAL REINFORCING SHOWN ON PLAN IS NOT TO BE PLACED WITHIN THE WIDTH OF THE BEAM.
5. SEE ARCHITECTURAL DRAWINGS FOR SLOPES TO DRAINS IN FLOOR AREAS. MAINTAIN ALL STRUCTURAL THICKNESS SHOWN.
6. REFER TO ARCHITECTURAL DRAWINGS FOR COLUMN OFFSETS FROM GRIDLINES.
7. REQUIREMENTS FOR OPENINGS THROUGH SUSPENDED CONCRETE SLAB HAVE BEEN SHOWN ON PLAN BASED ON THE LATEST MECHANICAL, ELECTRICAL AND ARCHITECTURAL INFORMATION AVAILABLE TO THE CONSULTANT. SIZE AND LOCATION OF ALL OPENINGS IN THE SLAB ARE TO BE COORDINATED WITH ALL DRAWINGS AND THE MECHANICAL CONTRACTOR PRIOR TO CREATION OF REINFORCING SHOP DRAWINGS. SEE TYPICAL DETAIL 3.27 FOR PLACEMENT OF PRINCIPAL REINFORCING, AND ADDITIONAL REINFORCING AROUND MECHANICAL OPENINGS.
8. SPECIAL ATTENTION SHOULD BE GIVEN TO LOCATION OF PIPE SLEEVES THROUGH SUSPENDED SLABS. ADDITIONAL BARS ARE REQUIRED AT PIPE SLEEVE LOCATIONS (SEE TYPICAL DETAIL 3.27)
9. ADD 2–20M CONTINUOUS ALONG ALL SLAB EDGES. LAP 2–20M ADDITIONAL TOP BARS AT MIDSPAN AND 2–20M ADDITIONAL BOTTOM BARS AT SUPPORTS
10. THE GENERAL CONTRACTOR IS TO COORDINATE WITH MECHANICAL AND ELECTRICAL TRADES TO ENSURE THERE ARE NO MECHANICAL OR ELECTRICAL SERVICES RUN ON THE SURFACE OF EXPOSED CONCRETE ELEMENTS. ALL SUCH SERVICES ARE TO BE HIDDEN BEHIND ARCHITECTURAL FINISHES ON THE OPPOSITE SIDE OF THE WALL, OR ROUTED AWAY FROM LOCATIONS WHERE EXPOSED CONCRETE IS USED AS THE FINISHED STRUCTURE. SMALLER SERVICES LESS THAN 2" DIAMETER CAN BE RUN WITHIN WALLS AND SLABS AS LONG AS MULTIPLE RUNS ARE SUFFICIENTLY SPREAD OUT SO AS NOT TO IMPAIR THE STRUCTURAL PERFORMANCE OF THE WALL OR SLAB. PROVIDE ROUTING DRAWINGS INDICATING SERVICE SIZE AND PROPOSED LOCATIONS WELL IN ADVANCE TO POURING EXPOSED CONCRETE FOR REVIEW BY ARCHITECTURAL, MECHANICAL, ELECTRICAL, AND STRUCTURAL CONSULTANTS.
11. TEMPERATURE STEEL PLACED PERPENDICULAR TO SLAB EDGE SHALL BE PLACE IN TLL WITH 180° HOOK.

SECOND FLOOR STEEL FRAMING PLAN NOTES

1. UNDERSIDE OF STEEL DECK ELEVATION VARIES. REFER TO PLANS, SCHEDULES, SECTIONS AND ARCHITECTURAL DRAWINGS FOR ELEVATIONS.
2. TOP OF STEEL BEAM IS AT UNDERSIDE OF ROOF DECK UNLESS NOTED ON PLANS THUS –XXX BELOW UNDERSIDE OF ROOF DECK.
3. STEEL DECK FABRICATOR TO DESIGN DECK AND DETERMINE DECK THICKNESS (GAUGE) BASED ON LOADS SHOWN ON PLAN AND SCHEDULE.
4. ADDITIONAL SNOW LOAD ACCUMULATION IS INDICATED AS "DRIFT" AND IS SHOWN ON PLAN. THIS LOAD IS IN ADDITION TO THE BASIC SNOW LOAD LISTED ON SCHEDULE. NOTE DRIFTS ARE CUMULATIVE. SEE DASHED PROFILE BOUNDARIES ON PLAN.
5. SEE ARCHITECTURAL DRAWINGS FOR COLUMN OFFSETS FROM GRID LINES.
6. BEAMS DENOTED WITH MC ARE TO BE CONNECTED FOR FULL MOMENT AND SHEAR CAPACITY OF BEAM UNLESS NOTED OTHERWISE.
7. DESIGN THE STEEL DECK AND STEEL JOISTS, INCLUDING THEIR CONNECTION TO SUPPORTING ELEMENTS FOR A FACTORED DIAPHRAGM SHEAR FORCE OF 5.0 kN/m.
8. DESIGN THE STEEL DECK, STEEL JOISTS AND THEIR CONNECTIONS TO SUPPORTING MEMBERS FOR AN UNFACTORED UNIFORM UPLIFT PRESSURE OF 1.0kPa.
9. TIE JOISTS ARE INDICATED ON PLANS AS "TJ" ON PLAN. EXTEND BOTH TOP AND BOTTOM CHORD MEMBERS AND CONNECT THEM TO COLUMN, BEAM, OR WALL.
10. OWSJ FABRICATOR TO DESIGN JOIST AND BRIDGING SYSTEM BASED ON LOADS INDICATED ON PLAN AND SCHEDULES.

ISSUED

No.	Date	Description
6	Feb 21/13	ISSUED FOR TENDER
7	Mar 08/13	ADDENDUM #01
8	Mar 14/13	ADDENDUM #02
12	Jun 07/13	ISSUED FOR CONSTRUCTION

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Global Innovation Exchange - Wilfrid Laurier University

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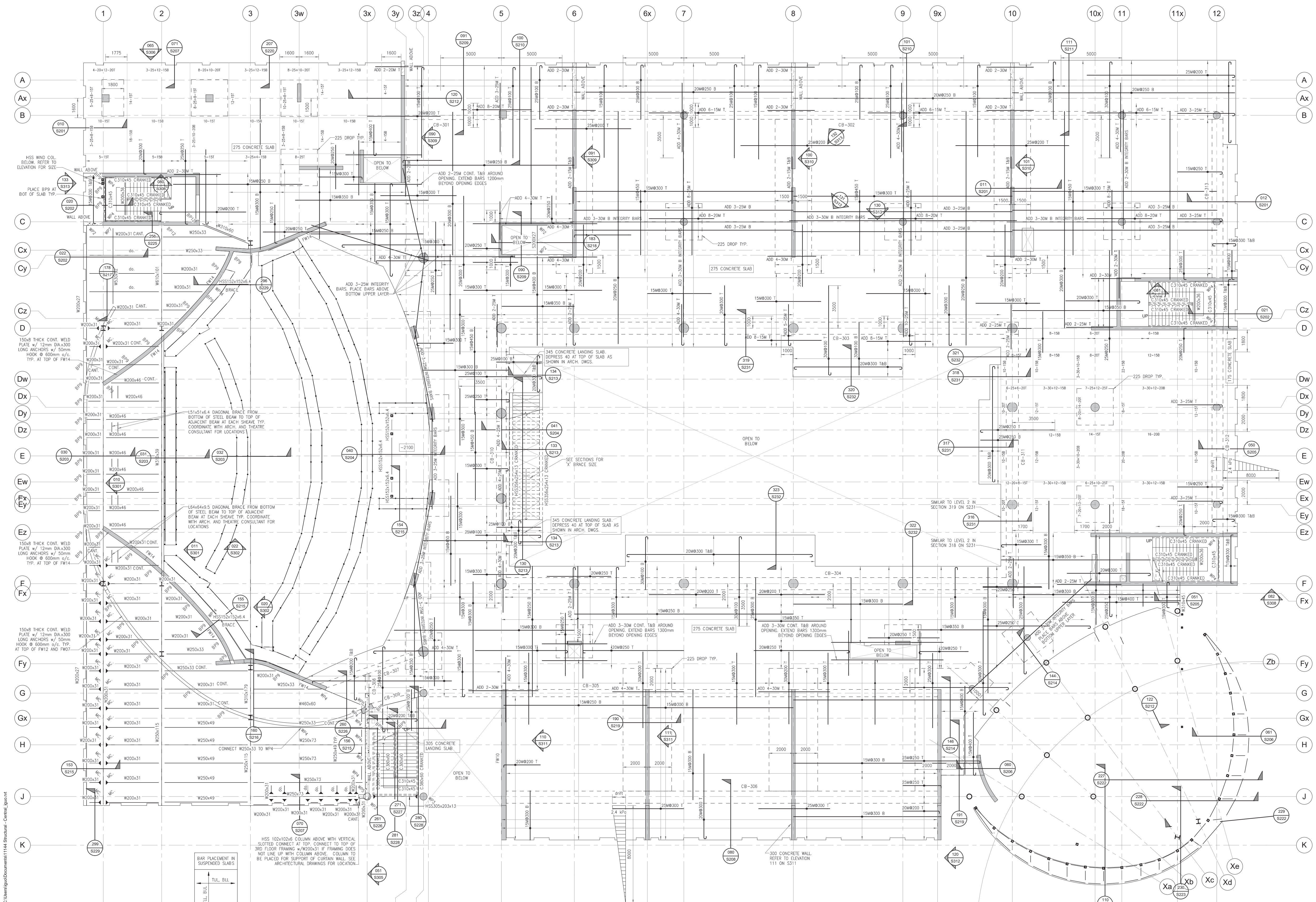
SECOND FLOOR FRAMING PLAN

Scale: 1 : 100
Project No: 11144
Date: Mar 28 2013

S102

ISSUED

No.	Date	Description
6	Feb 21/13	ISSUED FOR TENDER
7	Mar 08/13	ADDENDUM #01
8	Mar 14/13	ADDENDUM #02
10	Mar 28/13	ADDENDUM #04
12	Jun 07/13	ISSUED FOR CONSTRUCTION



THIRD FLOOR FRAMING PLAN
1 : 100

THIRD FLOOR FRAMING PLAN NOTES

1. TOP OF CONCRETE SLAB IS AT ELEVATION 9700 (345.70 GEODETIC) U.N.O. VERIFY ALL ELEVATIONS WITH ARCHITECTURAL DRAWINGS.
2. TYPICAL ONE-WAY AND TWO-WAY CAST IN PLACE CONCRETE SLAB CONSTRUCTION: FLAT CONCRETE SLAB (275mm THICKNESS U.N.O) WITH 3000x225x3000 OR CONTINUOUS DROP PANELS (U.N.O.) SUPPORTED ON CONCRETE WALLS AND CONCRETE COLUMNS.
3. REINFORCING SHOWN ON PLAN IS THE PRINCIPAL REINFORCING ONLY. SEE STRUCTURAL SECTIONS (S200 SERIES) AND TYPICAL DETAILS (S500 SERIES) FOR ALL ADDITIONAL SECONDARY REINFORCING TO ALSO BE PLACED IN SLAB.
4. SEE CONCRETE BEAM, WALL AND COLUMN SCHEDULES ON DRAWINGS S401-S408 FOR REINFORCING. BEAM REINFORCING SHOWN IN THE SCHEDULE IS IN ADDITION TO THE SLAB REINFORCING SHOWN ON PLAN. PRINCIPAL REINFORCING SHOWN ON PLAN IS NOT TO BE PLACED WITHIN THE WIDTH OF THE BEAM.
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SHORING NOTES FOR AREAS BOUNDED BY GRIDS 6 TO 12 AND A TO Cy (APPLIES TO DRAWINGS S102 TO S105)

a) In order to ensure dead load deflections are spread equally on concrete framed levels 3 , 4 and low roof (Level 5) special shoring and reshoring are required as described below:

i) All levels down to ground floor (slab-on-grade level) are to be continuously shored until the level 5 has achieved 28 day concrete strength.
ii) Below the second floor, steel framed level, each steel beam is to be shored to ground floor (slab on-grade level) for accumulated load of upper concrete levels. Spacing of shores at this level are to be determined by Contractor s shoring engineer based on capacities of steel beams and load on subsoil bearing.
iii) Third floor false work is to be shored down to slab-on-grade level and when reshores are to be installed on level 2, shores are to be placed directly over steel beams.
iv) Reshores at second floor (below level 3) are to be fully installed before pouring any concrete on level 4.
v) Similarly reshores are to be installed on level 3(below level 4) before pouring level 5.
vi) After level 5 has achieved 28 day strength the shores below level 2 can be loosened slightly to allow a maximum 6mm deflection at midspan of beams.
vii) Repeat loosing of reshores below level 3 to allow maximum 6mm deflection followed by levels 4 and 5.
viii) Repeat step vi & vii 3 more times until reshores do no bear any weight and can be fully removed.
ix) Alternate shoring schemes that directly shore concrete columns above the 2nd level at column grids B7, C7, B9, C9,B11, and C11 can be proposed by the Contractor as long as the shoring at these grid locations are designed for the accumulated load from concrete levels above until the 5th level is poured and cured. If this method of shoring is to be employed the steel beams on level 2 will still require shoring before placing concrete on level 3 and level 4.

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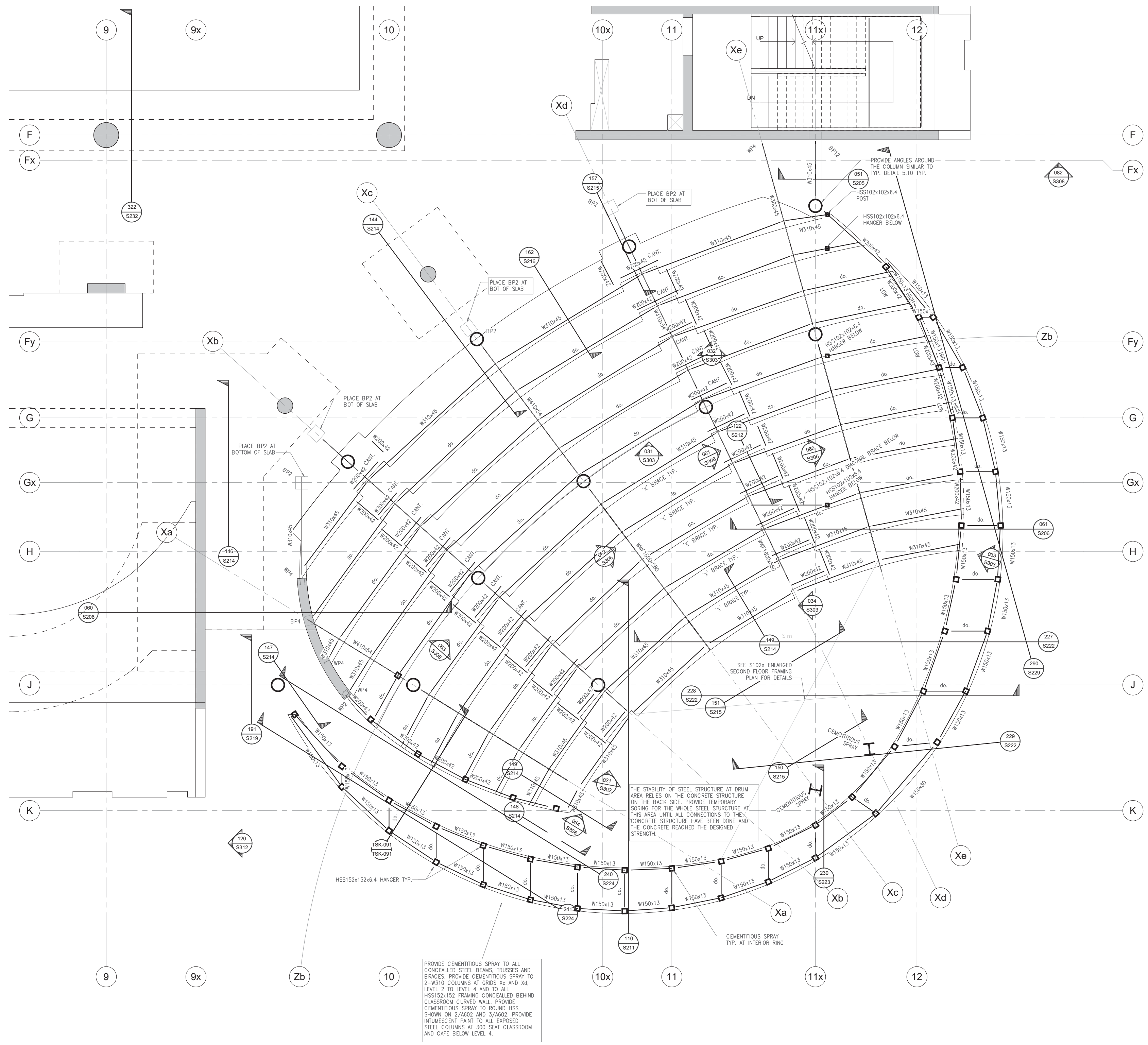
THIRD FLOOR FRAMING PLAN

Scale: 1 : 100
Project No: 11144
Date: Mar 28 2013

S103

6/7/2013 1:45:39 PM



THIRD FLOOR FRAMING PLAN @ 300 SEAT CLASSROOM
1 : 50

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DO NOT SCALE DRAWINGS.

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ALL TENDER DOCUMENTS AND RELATED ADDENDA GOVERN THESE DRAWINGS. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO ENSURE THAT ALL ADDENDA ITEMS ARE ACCOUNTED FOR DURING CONSTRUCTION

ISSUED

No.	Date	Description
6	Feb 21/13	ISSUED FOR TENDER
8	Mar 14/13	ADDENDUM #02
10	Mar 28/13	ADDENDUM #04
12	Jun 07/13	ISSUED FOR CONSTRUCTION

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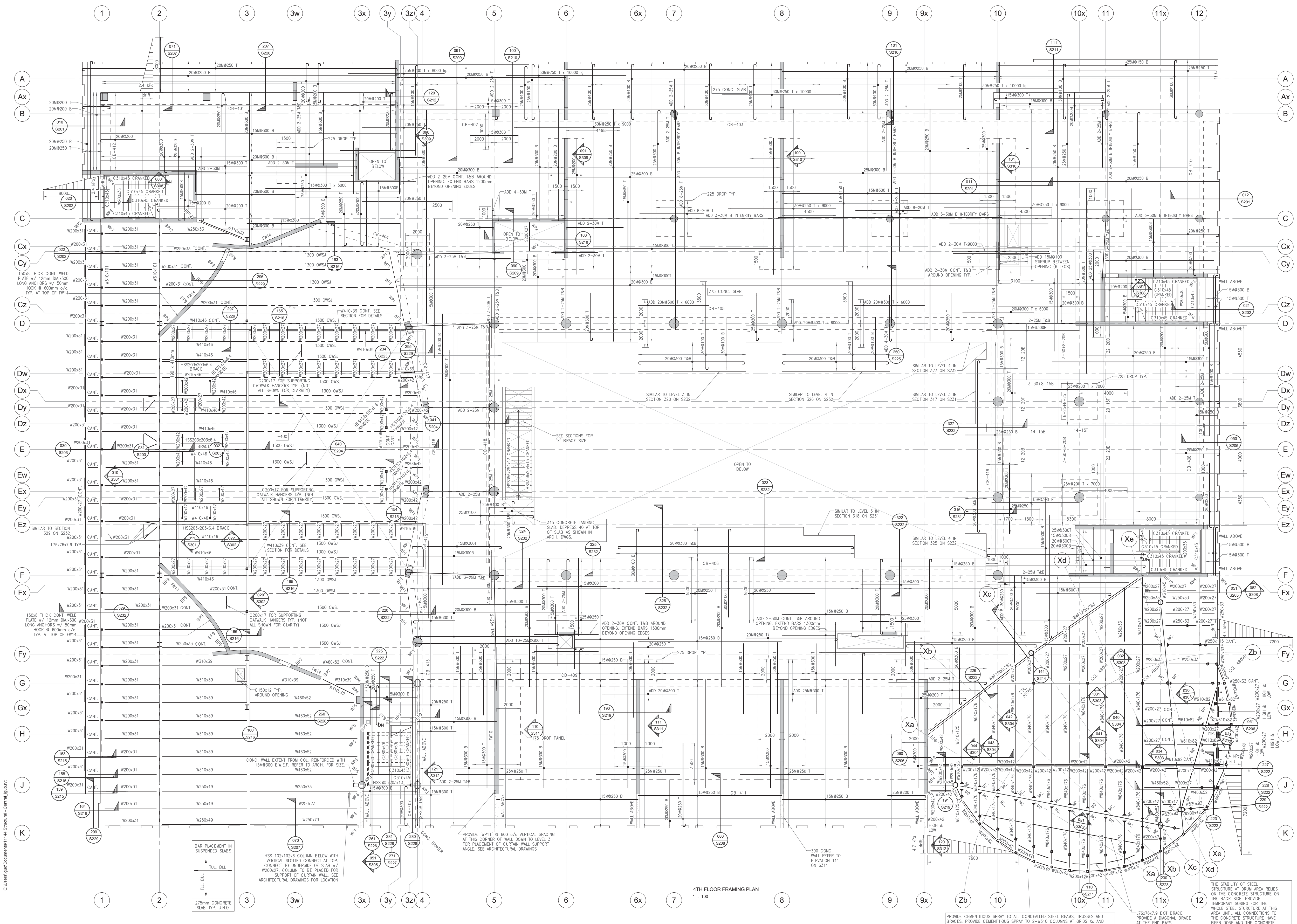
ENLARGED THIRD FLOOR FRAMING PLAN @ 300 SEAT CLASS ROOM

Scale: 1 : 50
Project No: 11144
Date: Mar 28 2013

S103a



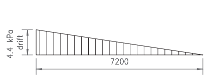
4TH FLOOR FRAMING PLAN
1 : 100

4TH FLOOR CONCRETE FRAMING PLAN NOTES

1. TOP OF CONCRETE SLAB IS AT ELEVATION 13700 (349.70 GEODETIC) U.N.O. VERIFY ALL ELEVATIONS WITH ARCHITECTURAL DRAWINGS.
2. TYPICAL ONE-WAY AND TWO-WAY CAST IN PLACE CONCRETE SLAB CONSTRUCTION: FLAT CONCRETE SLAB (275mm THICKNESS U.N.O) WITH 3000x225x3000 OR CONTINUOUS DROP PANELS (U.N.O.) SUPPORTED ON CONCRETE WALLS AND CONCRETE COLUMNS.
3. REINFORCING SHOWN ON PLAN IS THE PRINCIPAL REINFORCING ONLY. SEE STRUCTURAL SECTIONS (S200 SERIES) AND TYPICAL DETAILS (S500 SERIES) FOR ALL ADDITIONAL SECONDARY REINFORCING TO ALSO BE PLACED IN SLAB.
4. SEE CONCRETE BEAM, WALL AND COLUMN SCHEDULES ON DRAWINGS S401-S408 FOR REINFORCING. BEAM REINFORCING SHOWN IN THE SCHEDULE IS IN ADDITION TO THE SLAB REINFORCING SHOWN ON PLAN. PRINCIPAL REINFORCING SHOWN ON PLAN IS NOT TO BE PLACED WITHIN THE WIDTH OF THE BEAM.
5. SEE ARCHITECTURAL DRAWINGS FOR SLOPES TO DRAINS IN FLOOR AREAS. MAINTAIN ALL STRUCTURAL THICKNESS SHOWN.
6. REFER TO ARCHITECTURAL DRAWINGS FOR COLUMN OFFSETS FROM GRIDLINES.
7. REQUIREMENTS FOR OPENINGS THROUGH SUSPENDED CONCRETE SLAB HAVE BEEN SHOWN ON PLAN BASED ON THE LATEST MECHANICAL, ELECTRICAL AND ARCHITECTURAL INFORMATION AVAILABLE TO THE CONSULTANT. SIZE AND LOCATION OF ALL OPENINGS IN THE SLAB ARE TO BE COORDINATED WITH ALL DRAWINGS AND THE MECHANICAL CONTRACTOR PRIOR TO CREATION OF REINFORCING SHOP DRAWINGS. SEE TYPICAL DETAIL 3.27 FOR PLACEMENT OF PRINCIPAL REINFORCING, AND ADDITIONAL REINFORCING AROUND MECHANICAL OPENINGS.
8. SPECIAL ATTENTION SHOULD BE GIVEN TO LOCATION OF PIPE SLEEVES THROUGH SUSPENDED SLABS. ADDITIONAL BARS ARE REQUIRED AT PIPE SLEEVE LOCATIONS (SEE TYPICAL DETAIL 3.27)
9. ADD 2-20M CONTINUOUS ALONG ALL SLAB EDGES. LAP 2-20M ADDITIONAL TOP BARS AT MIDSPAN AND 2-20M ADDITIONAL BOTTOM BARS AT SUPPORTS
10. THE GENERAL CONTRACTOR IS TO COORDINATE WITH MECHANICAL AND ELECTRICAL TRADES TO ENSURE THERE ARE NO MECHANICAL OR ELECTRICAL SERVICES RUN ON THE SURFACE OF EXPOSED CONCRETE ELEMENTS. ALL SUCH SERVICES ARE TO BE HIDDEN BEHIND ARCHITECTURAL FINISHES ON THE OPPOSITE SIDE OF THE WALL, OR ROUTED AWAY FROM LOCATIONS WHERE EXPOSED CONCRETE IS USED AS THE FINISHED STRUCTURE. SMALLER SERVICES LESS THAN 2" DIAMETER CAN BE RUN WITHIN WALLS AND SLABS AS LONG AS MULTIPLE RUNS ARE SUFFICIENTLY SPREAD OUT SO AS NOT TO IMPAIR THE STRUCTURAL PERFORMANCE OF THE WALL OR SLAB. PROVIDE ROUTING DRAWINGS INDICATING SERVICE SIZE AND PROPOSED LOCATIONS WELL IN ADVANCE TO POURING EXPOSED CONCRETE FOR REVIEW BY ARCHITECTURAL, MECHANICAL, ELECTRICAL, AND STRUCTURAL CONSULTANTS.
11. TEMPERATURE STEEL PLACED PERPENDICULAR TO SLAB EDGE SHALL BE PLACE IN TLL WITH 180° HOOK.

4TH FLOOR STEEL FRAMING PLAN NOTES

1. UNDERSIDE OF STEEL DECK ELEVATION VARIES. REFER TO PLANS, SCHEDULES, SECTIONS AND ARCHITECTURAL DRAWINGS FOR ELEVATIONS.
2. TOP OF STEEL BEAM IS AT UNDERSIDE OF ROOF DECK UNLESS NOTED ON PLANS THUS -XXX BELOW UNDERSIDE OF ROOF DECK.
3. STEEL DECK FABRICATOR TO DESIGN DECK AND DETERMINE DECK THICKNESS (GAUGE) BASED ON LOADS SHOWN ON PLAN AND SCHEDULE.
4. ADDITIONAL SNOW LOAD ACCUMULATION IS INDICATED AS "DRIFT" AND IS SHOWN ON PLAN. THIS LOAD IS IN ADDITION TO THE BASIC SNOW LOAD LISTED ON SCHEDULE. NOTE DRIFTS ARE CUMULATIVE. SEE DASHED PROFILE BOUNDARIES ON PLAN.
5. SEE ARCHITECTURAL DRAWINGS FOR COLUMN OFFSETS FROM GRID LINES.
6. BEAMS DENOTED WITH MC ARE TO BE CONNECTED FOR FULL MOMENT AND SHEAR CAPACITY OF BEAM UNLESS NOTED OTHERWISE.
7. DESIGN THE STEEL DECK AND STEEL JOISTS, INCLUDING THEIR CONNECTION TO SUPPORTING ELEMENTS FOR A FACTORED DIAPHRAGM SHEAR FORCE OF 5.0 kN/m.
8. DESIGN THE STEEL DECK, STEEL JOISTS AND THEIR CONNECTIONS TO SUPPORTING MEMBERS FOR AN UNFACTORED UNIFORM UPLIFT PRESSURE OF 1.0kPa.
9. TIE JOISTS ARE INDICATED ON PLANS AS "TJ" ON PLAN. EXTEND BOTH TOP AND BOTTOM CHORD MEMBERS AND CONNECT THEM TO COLUMN, BEAM, OR WALL.
10. OWSJ FABRICATOR TO DESIGN JOIST AND BRIDGING SYSTEM BASED ON LOADS INDICATED ON PLAN AND SCHEDULES.



UNFACTORED SNOW DRIFT @ PLANTER & TERRACE ADJACENT TO ALL SIDES OF WALLS

ISSUED

No.	Date	Description
4	Nov 16/12	ISSUED FOR BUILDING PERMIT
6	Feb 21/13	ISSUED FOR TENDER
7	Mar 08/13	ADDENDUM #01
8	Mar 14/13	ADDENDUM #02
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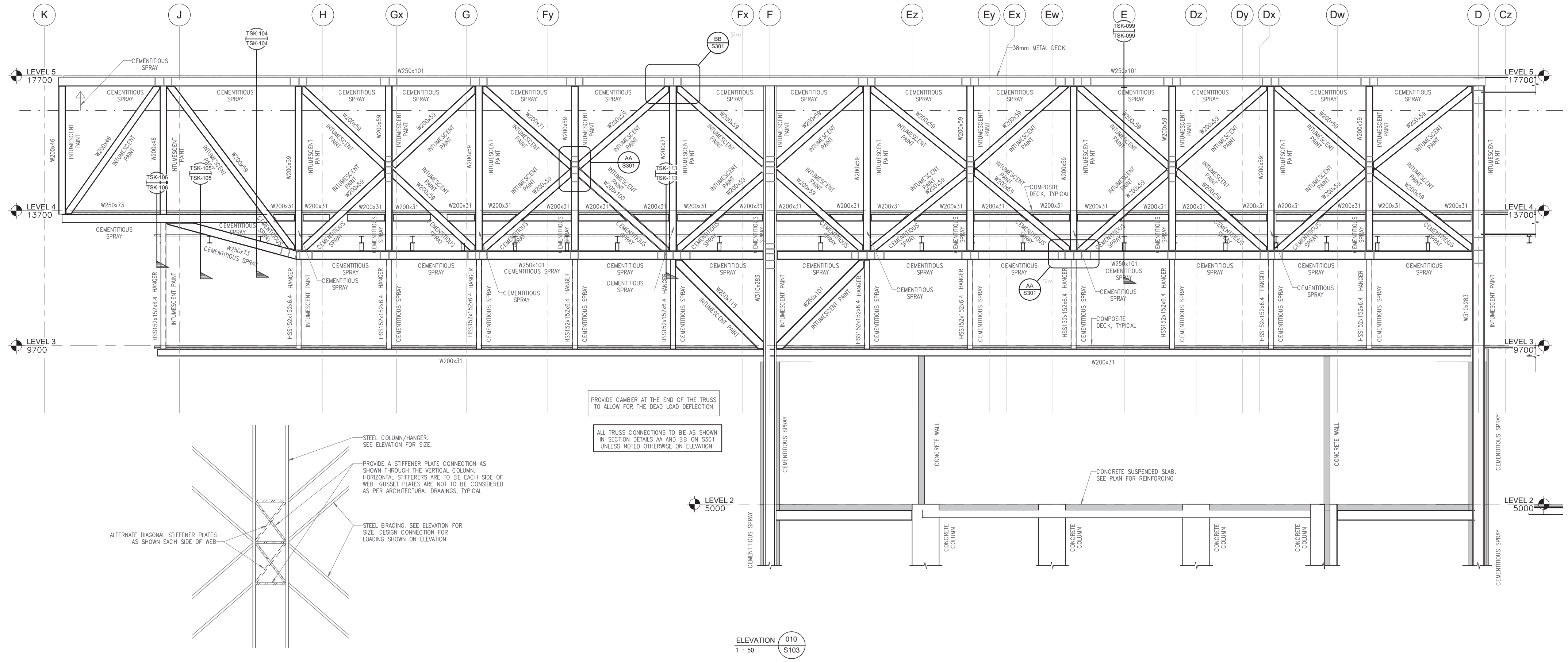
4TH FLOOR FRAMING PLAN

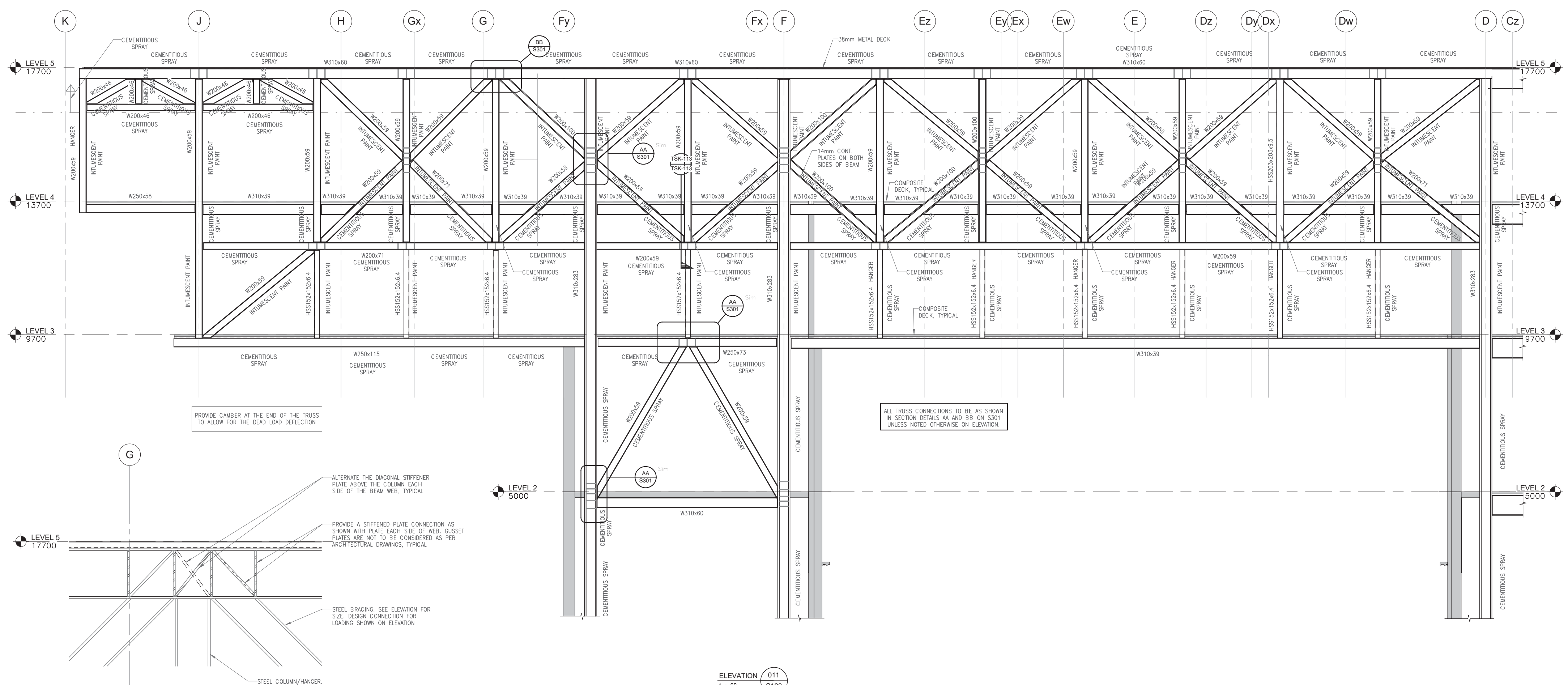
Scale: 1 : 100
Project No: 11144
Date: Mar 28 2013

S104



ELEVATION 010
1 : 50 S103

DETAIL AA
1 : 10 S301



ELEVATION 011
1 : 50 S103

DETAIL BB
1 : 10 S301

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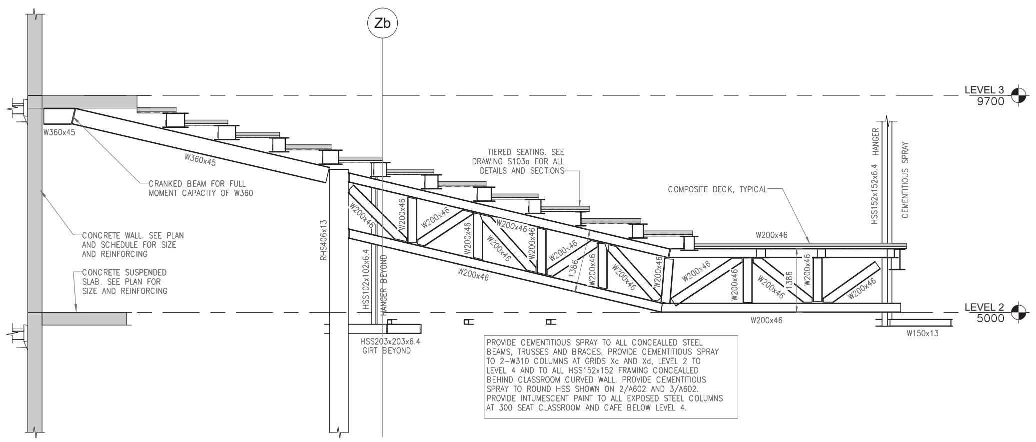
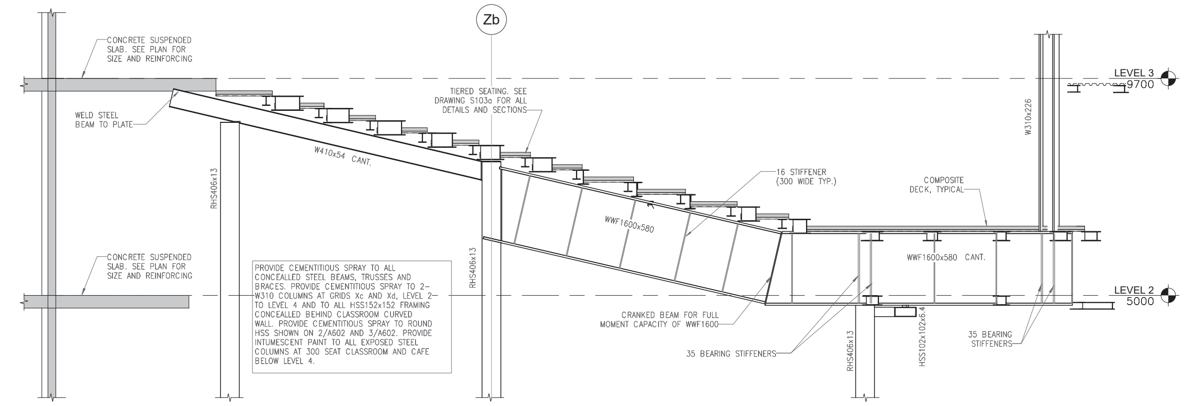
ELEVATIONS

Scale: As indicated
Project No: 11144
Date: Mar 28 2013

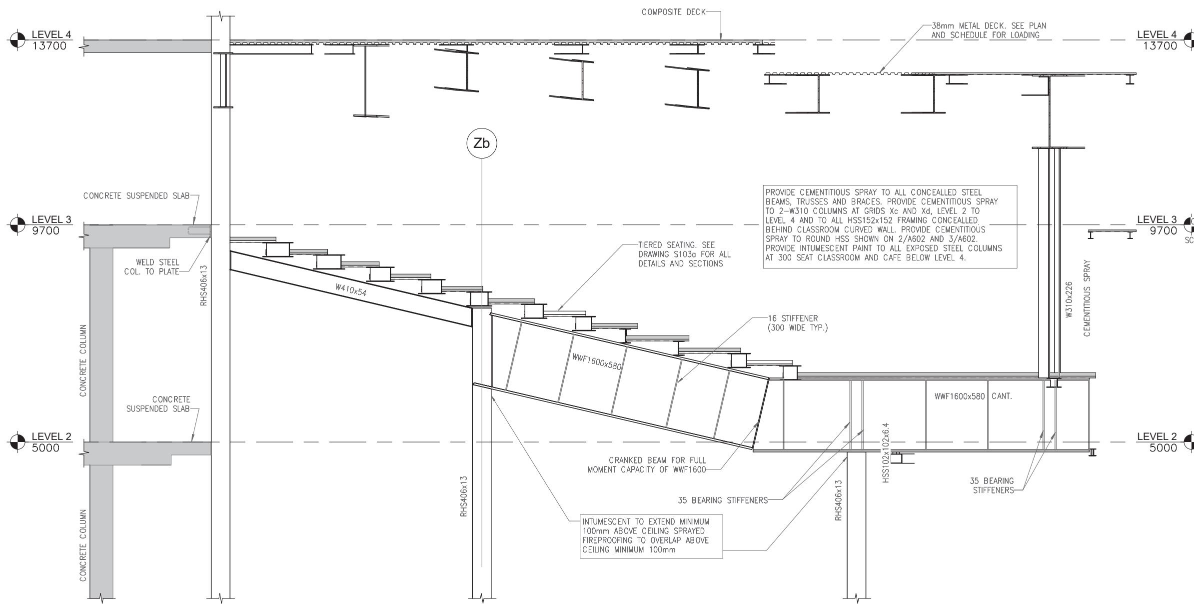
S301



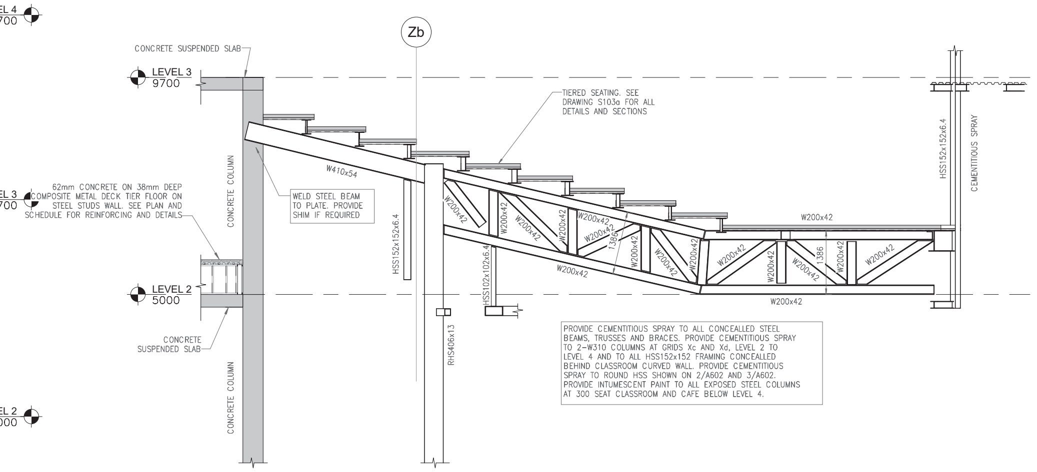
ELEVATION 060 S102a
1 : 50



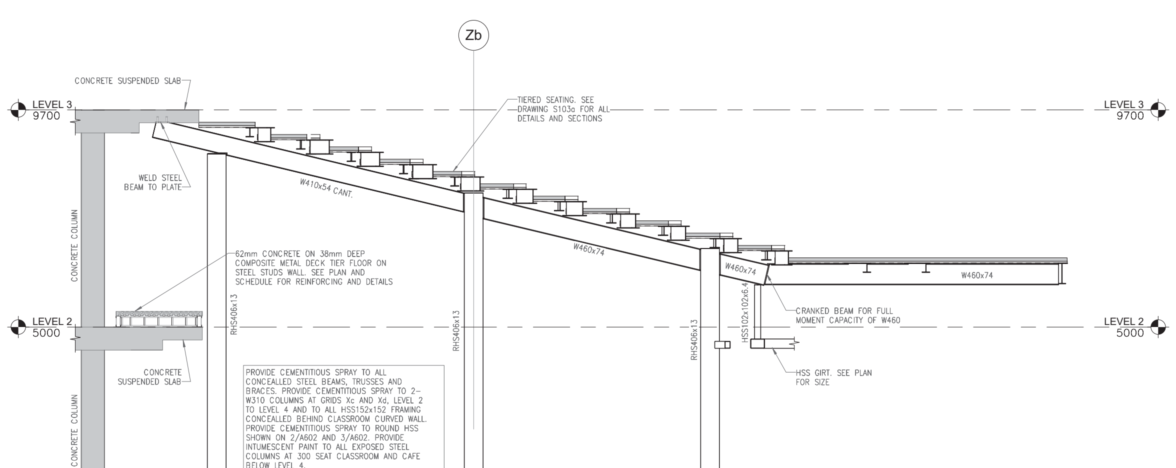
ELEVATION 061 S102a
1 : 50



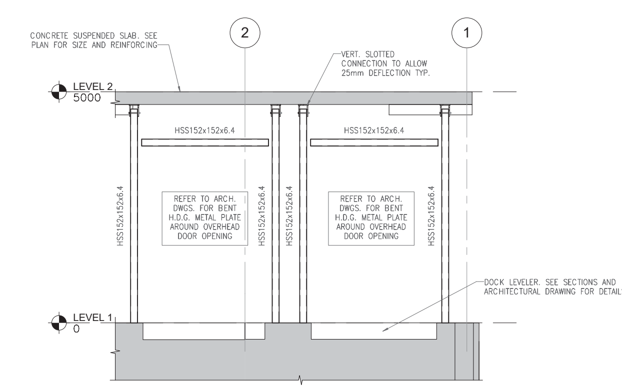
ELEVATION 062 S101
1 : 50



ELEVATION 064 S102a
1 : 50



ELEVATION 063 S102a
1 : 50



ELEVATION 065 S100
1 : 50

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ELEVATIONS

Scale: 1 : 50
Project No: 11144
Date: Mar 28 2013

S306

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