structural
STEEL

Steel Solutions Center

THE HEALTHCARE STRUCTURE PROTOTYPE I

Exploring Conventional Composite Framing

USING THE AISC STEEL SOLUTIONS CENTER

What's this?

This package illustrates a representative conceptual solution developed by the AISC Steel Solutions Center (SSC). The information typically received by the SSC and the conceptual solution provided in reply are both presented here. The conceptual solution also comes with continued support throughout the life of the project from the SSC and more directly, AISC's Regional Engineers.

Project Inquiries

Projects find their way to the SSC in a number of ways. Common scenarios include:

- An owner or architect is developing concepts for a new project. Interested in exploring the advantages of a structural steel framing system, they contact the SSC.
- Project bids are over-budget in another material such as concrete or wood, and a steel alternative is suggested. The architect, engineer, general contractor, or owner contacts a local steel fabricator for assistance who in turn contacts either the SSC or an AISC Regional Engineer for assistance.
- A fabricator learns about a new project in the early stages of development. They contact the owner or project architect to discuss similar steel projects and to highlight the advantages of various steel framed solutions for the project.

Developing a Solution

The AISC team and the client work together—often via conference call—to determine what can be done to move the project forward in steel. Depending on the time frame, the SSC can provide a wide range of solutions from a simple bay framing study to a full conceptual solution. All SSC services are FREE to our clients; however, a level of commitment from the project decision maker to seriously consider the steel alternative is expected.

What do I have here?

This prototype is one example of a conceptual solution that the SSC can provide. Because it is representative of many similar structures, SSC clients often use this prototype as the first step in moving the project forward in steel.

The SSC has been involved in a broad range of projects since its inception in 2001. SSC staff can help you find innovative economical steel solutions for parking garages, office buildings, multi-story residential buildings, healthcare facilities, educational facilities, industrial structures, bridges, and other projects where structural steel can compete.

Please let us know how we can assist you with your next project.

Wheaton Franciscan Healthcare
Franklin, WI
Constructed in 2007
completed interior

THE HEALTHCARE STRUCTURE PROTOTYPE I

This prototype illustrates a typical scenario of how the AISC Steel Solutions Center (SSC) can help a project decision maker evaluate a steel framed alternative. Below is an example of a healthcare structure challenge.

Healthcare Facility

An owner wanted to build a new healthcare facility in the City of Houston and wanted to explore using Building Information Modeling (BIM) for construction, maintenance, and future modifications of the new facility. The owner and design team were excited about the idea of BIM, but were not sure where to start. The Engineer-of-Record (EOR) of the project used the AISC Steel Solutions Center (SSC) website in the past to ask a question about steel-to-steel connections, and decided to see if the SSC could provide information about the entire BIM process.

Engaging the Resources

The SSC responded to the EOR and provided a number of useful resources that explained the BIM process, what parties are involved in the process, and what steps are necessary to start the BIM discussion with all parties that will be involved. The SSC also provided *Modern Steel Construction* Magazine articles that highlighted structural steel BIM projects. In addition, the SSC introduced the EOR to the AISC South Central Regional Engineer who helped to provide information about the steel supply chain and general steel construciton practices for the area of the proposed healthcare facility. The Regional Engineer also provided information on how to incorporate “green initiatives” in the design and operation of the structure by elaborating on sustainability principles that could be considered.

The AISC Regional Engineer explained that for hospitals, the BIM process creates a virtual model of the structure that can be used during all points in the life of the structure. In addition, the Regional Engineer emphasized that the use of structural steel for the framing of the new facility provides a number of advantages when used in conjuction with BIM. These advantages include:

- Structural steel framed floors can be designed with general loads and still have flexibility for systems to change or move in the structure. The model created from the BIM process can be used to visualize the new locations for these systems and information can be used by the design team to analyze the floor system for additional/modified system loads.
- Structural steel can be utilized in not only expanding a healthcare facility horizontally, but also vertically. Careful planning can ensure that during these expansions, functionality of the building is not lost. The BIM process can also assist the erection team in determining the equipment/sequencing needed for each phase of the construction/expansion of the project.
- During the BIM process all features of the project site can be incorporated into the model (including adjacent structures, roads, utilities, etc.). The modeling of site features can help the design, fabrication, and erection team determine if additional tolerances or special considerations are necessary to aid in the construciton of the project. In addition, locations and sequencing of the equipment and materials for construction can be coordinated using the site information within the BIM model.

Ann & Robert H. Lurie
Children’s Hospital of Chicago
Chicago, IL
Constructed in 2009

Steel Conceptual Solution

After the initial discussions with the EOR, the AISC Regional Engineer felt that a full conceptual solution created by the SSC would help the owner and project team better understand the advantages of structural steel. The Regional Engineer forwarded the initial structural drawings to an SSC Advisor, who then contacted the EOR to discuss the structural drawings to help determine the most suitable steel framing system for the conceptual model. Discussions with the EOR indicated that a conventional composite structural steel framing system was the ideal framing system for the conceptual model. The SSC Advisor created a model of the building using building design software, and provided a full Conceptual Solution to the EOR.

After the SSC issued the Conceptual Solution, the Regional Engineer contacted the EOR to further discuss the Conceptual Solution. The Regional Engineer also informed the EOR that a steel solution has many advantages:

- Compact columns provide the full use of space on each floor.
- Steel systems can easily be designed to meet the stringent vibration criteria for sensitive equipment and procedures.
- Web openings can be used to pass utilities through the beams and, thus, help to minimize story height.
- Steel systems can provide enhanced indoor environments for patients by allowing the design team to utilize various geometries, shapes, and finishes for the interior and exterior of the healthcare facility.

A structural steel framing system will meet the healthcare facility's needs and will provide cost savings up front and over the life of the project. A full conceptual solution created by the SSC tailored to the project's requirements really helped to illustrate the structural steel alternative.

Ann & Robert H. Lurie
Children's Hospital of Chicago
Chicago, IL
Constructed in 2009

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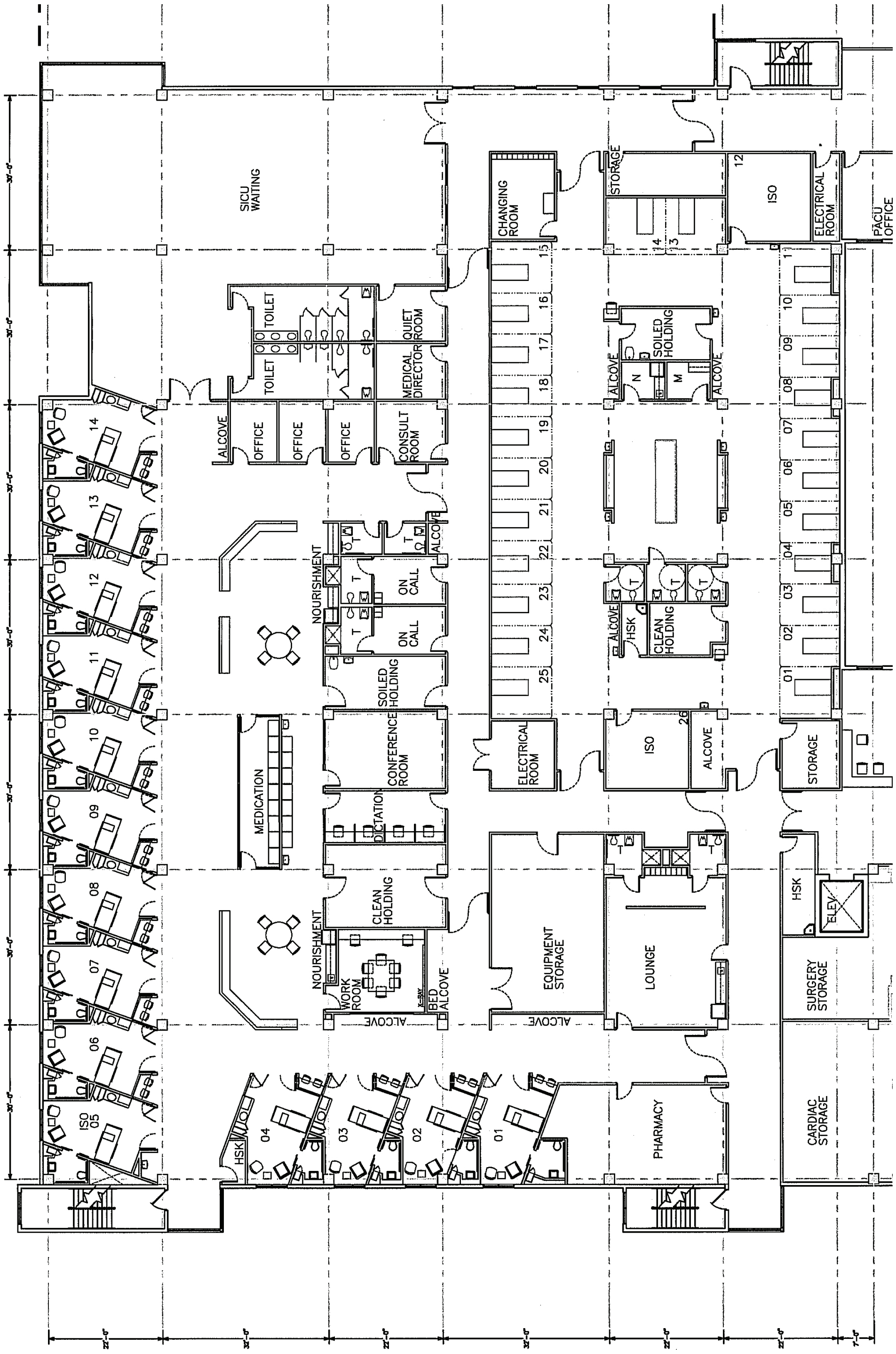
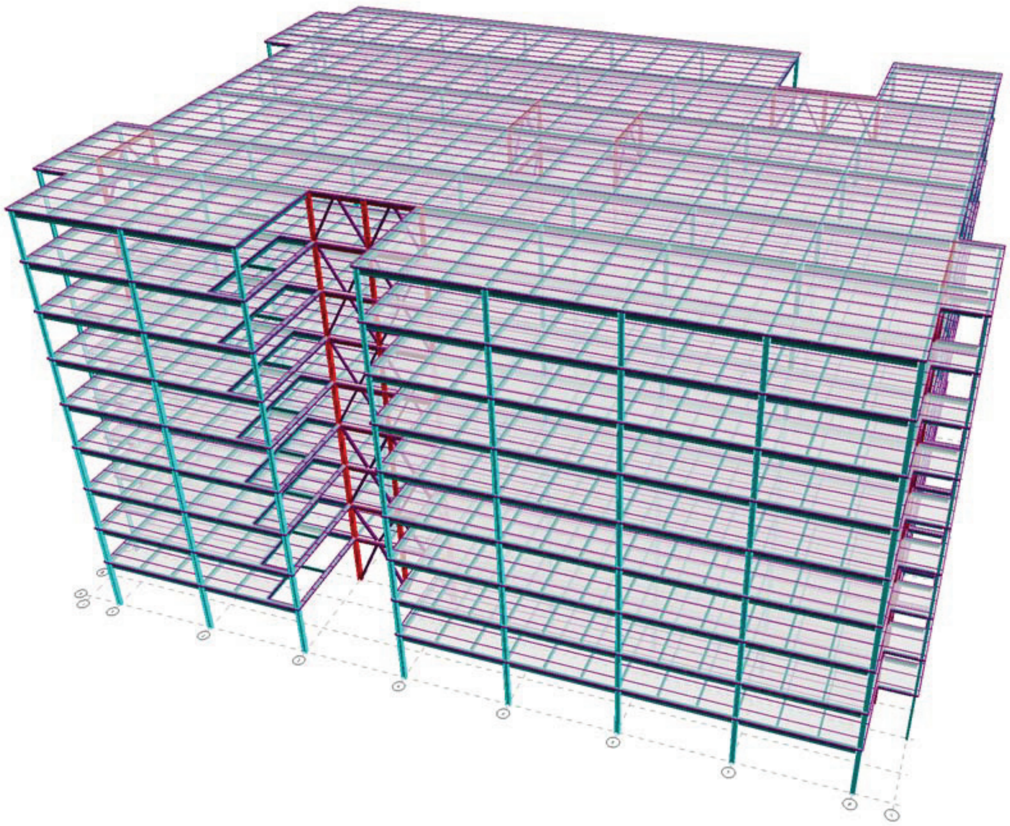
Information Provided to the SSC by the Engineer-Of-Record



Typical Plan

URBAN HEALTHCARE FACILITY

Basic SSC Conceptual Framing Model



This Package includes:

- Comments on the Provided Solution
- Steel Quantity Takeoff
- Design Loads and Parameters
- Typical Framing Plans
- Gravity Column Layout
- Gravity Column Schedule
- Special Concentrically Braced Frame Elevations
- Comments on Building Information Modeling
- Comments on Sustainability in Structural Steel Construction

COMMENTS ON PROVIDED SOLUTION

Project Location: Houston, TX
Prepared for: Engineer-Of-Record

Prepared by: SSC Advisor
Regional Engineer: South Central Regional Engineer

The information contained in this document is not intended as a basis for structural design for this or any project. Rather, it is a conceptual approach to the project that demonstrates the viability of the steel system for project requirements, budget, and schedule.

1) The design criteria per the *International Building Code* 2006 (IBC 2006) is summarized and included in the Building Code Criteria page.
2) Based on the available options, the traditional composite floor framing system best fits the needs of the project. This system provides for long spans and column free spaces as well as the opportunity for future structural modifications. In addition, web openings in the floor framing can be created to accommodate the various utilities.
3) In a traditional floor framing system the fabricated steel framing supports a stay-in-place metal form deck with concrete slab or topping. A 2 in. metal deck with a 3½ in. normal weight concrete topping (total depth of 5½ in.) was used for each floor of this project.
4) A general live load of 100 psf was placed upon the entire floor framing system. This live load will allow for increased flexibility in the designated usages of various areas of each floor of the structure.
5) A general live load of 125 psf was placed upon the entire roof framing system. This live load will allow for increased flexibility in size and location of mechanical equipment on the roof of the structure.
6) The steel quantities and geometry of this investigation are provided on the Floor and Roof Framing Plans, the Column Layout Plan, the Column Schedule, and the Frame Elevations on the following pages.
7) Concentrically braced frames were used to estimate the lateral framing quantities of the building. AISC Seismic Provisions were not considered for this study. Lateral frame member sizes are shown in Frame Elevations page.
8) The typical bays of the floor framing system of the second floor of the project were optimized for general walking vibration criteria for computer systems/ operating rooms (vibration criteria can be found in AISC Steel Design Guide Series, Design Guide Number 11, *Floor Vibrations Due to Human Activity*).
9) Sustainable design principles are being considered. Contributions for the structural steel systems for recycled content have been addressed in this packet. Further information on steel sustainability can be found at www.aisc.org/sustainability.

QUANTITY TAKEOFF SHEET

Project Location: Houston, TX
Prepared for: Engineer-Of-Record

Prepared by: SSC Advisor
Regional Engineer: South Central Regional Engineer

Suspended Floor Areas:

323,605 ft^2

Estimated Steel Quantities:

Gravity Columns				
	W14's	295 tons	1.82 psf	250 pieces
Gravity Beams				
	Wide Flange	921 tons	5.69 psf	1,638 pieces
	36,000 studs			
Lateral Frames				
	Columns	104 tons	0.64 psf	70 pieces
	Beams	27 tons	0.17 psf	72 pieces
	Braces (HSS)	68 tons	0.42 psf	144 pieces
Miscellaneous 5%		71 tons	0.44 psf	
		1,486 tons	**9.2 psf**	**2,174 pieces**

– The quantities are based on centerline dimensions.
– Steel not indicated in sketches accounts for framing not included in the estimate such as framing for openings or various members eliminated for simplification. It does not include connection material, slab edge material or façade attachments.

Material Specification

Wide flange shapes are A992, Gr. 50
Rectangular HSS sections are A500 Gr. B

Project Location: Houston, TX
Prepared for: Engineer-Of-Record

Prepared by: SSC Advisor
Regional Engineer: South Central Regional Engineer

This investigation is based on the following criteria. The Steel Solutions Center does not assert that these are the criteria that apply to this project. The criteria are chosen based on the project location and the widely adopted model building code, IBC 2006. Requirements by local and state jurisdictions have not been considered. If actual project criteria differ significantly from those listed, the results presented may no longer be valid.

Gravity Loads

Dead Loads	Composite Deck=57 psf [2 in. metal deck with 3½ in. concrete slab]
Live Loads	Medical=100 psf [Typical Floors]
	Mechanical Roof=125 psf
Superimposed Dead Loads	Medical=15 psf [Partitions, CMEP, etc.]
	Mechanical Roof=20 psf
Cladding Loads	Façade=350 plf

Wind Load Parameters

Basic Wind Speed	90 mph
Wind Importance Factor, I_w	1.15
Exposure Category	B
Topographical Factor	1.00
Drift Limit	H/500

Basic Lateral-Force-Resisting System

Concentrically Braced Frames

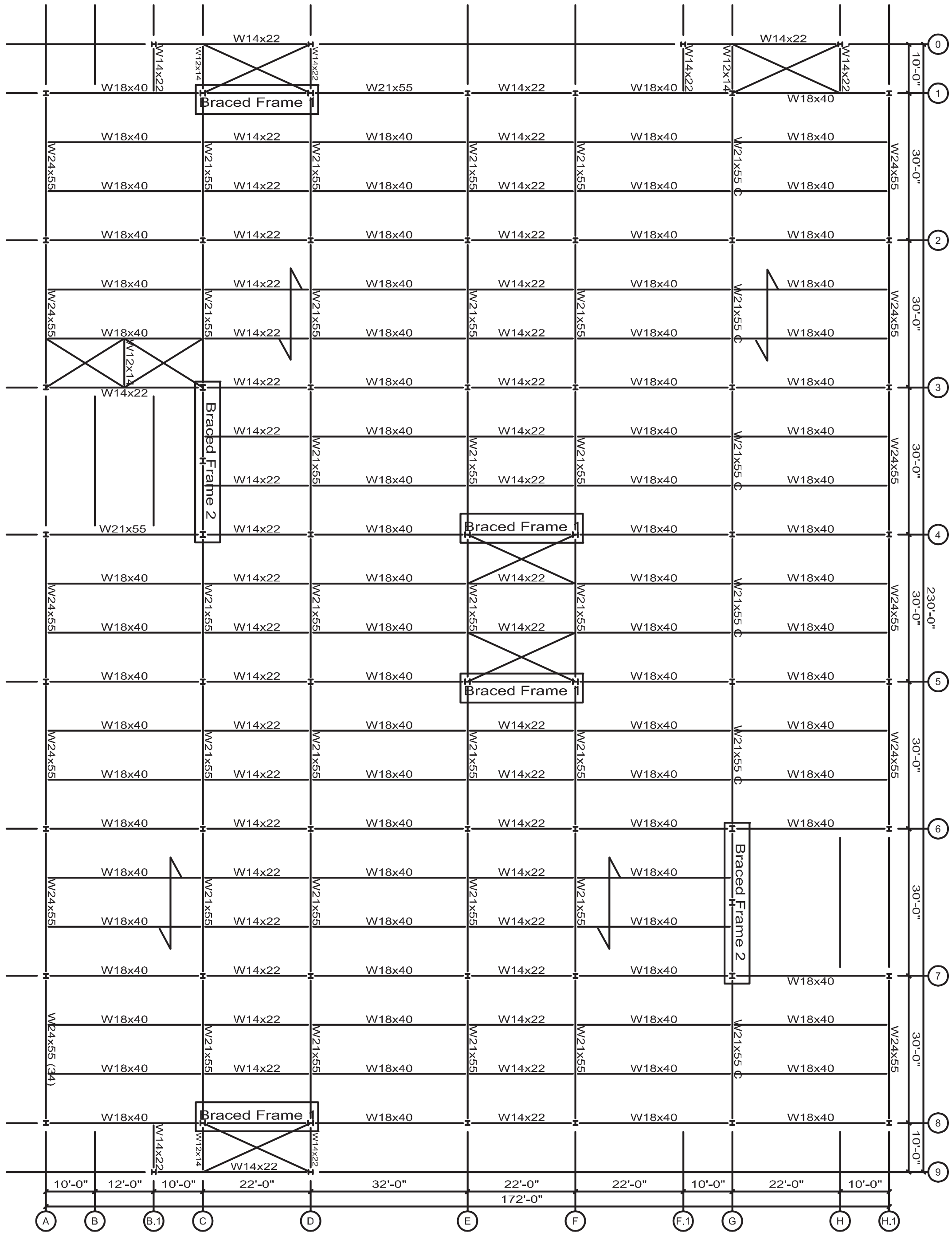
Seismic Design Parameters

Site Class	D
Seismic Importance Factor, I_E	1.50
Seismic Design Category	C
Spectral Response Acceleration at Short Periods (0.2s), S_S	0.162 g
Spectral Response Acceleration at Short Periods (0.2s), S_S	0.162 g

	X-axis	Y-axis
Building Period Coefficient, C_T	0.020	0.028
Response Modification Coefficient, R	3.0	3.0
System Overstrength Factor Ω_O	3.0	3.0
Deflection Amplification Factor, C_d	3.0	3.0

Note: The requirements of the AISC *Seismic Provisions* WERE NOT used in determining the quantity estimate for this project. Whether or not the special seismic requirements must be taken into account in the design is based on the applicable building code and local requirements.

TYPICAL FLOOR FRAMING PLAN

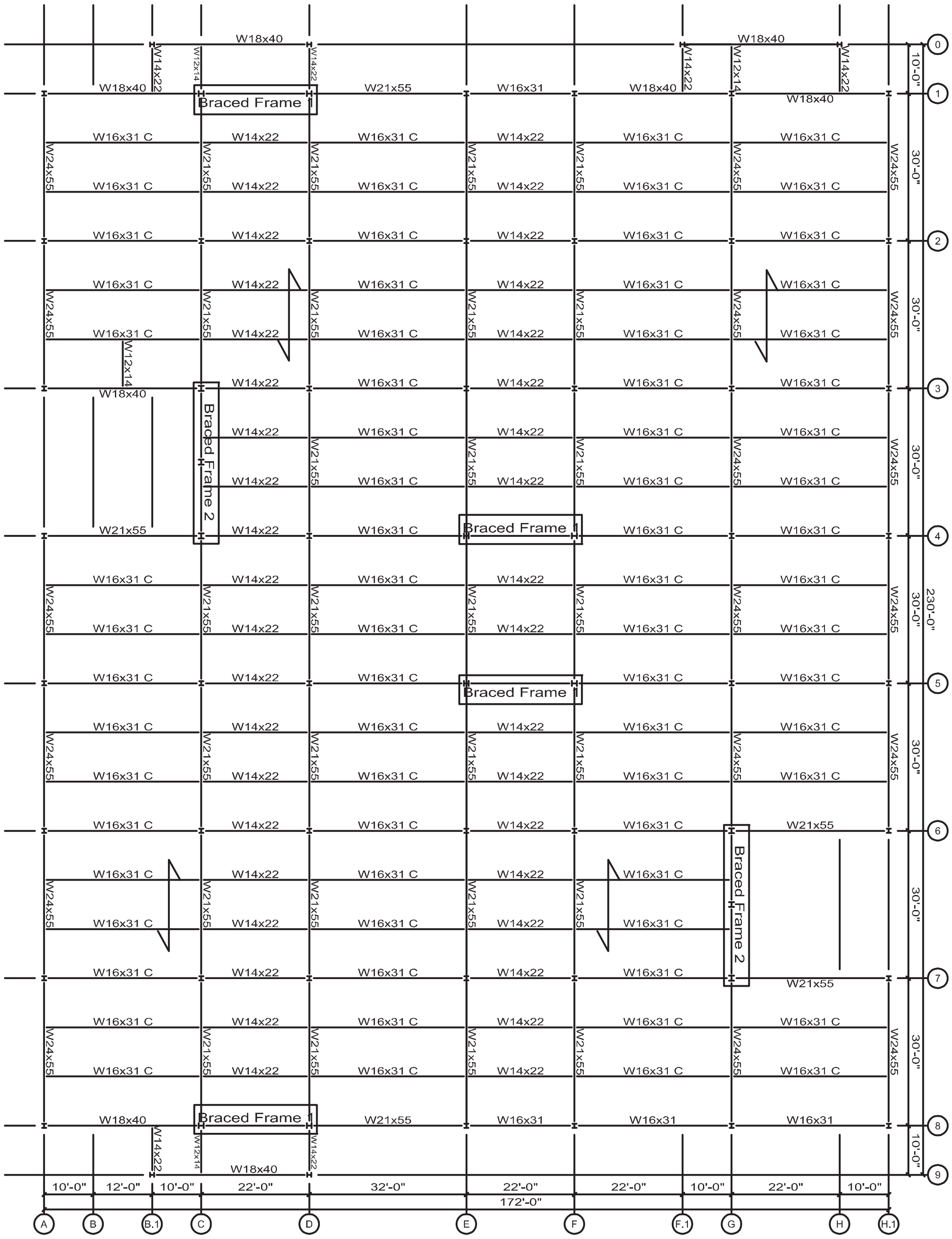


NOTES:

1) Each member is marked with the estimated wide-flange member size. If present, the designation "C" indicates an assumed camber from ¾ in. to 2½ in.
2) The floor slab consists of 2 in. metal deck with 3½ in. topping (total depth of 5½ in).
3) ⟵⟶ Indicates direction of the floor deck.
4) ▭ Boxes indicate the locations of lateral system frames.

NOT FOR CONSTRUCTION

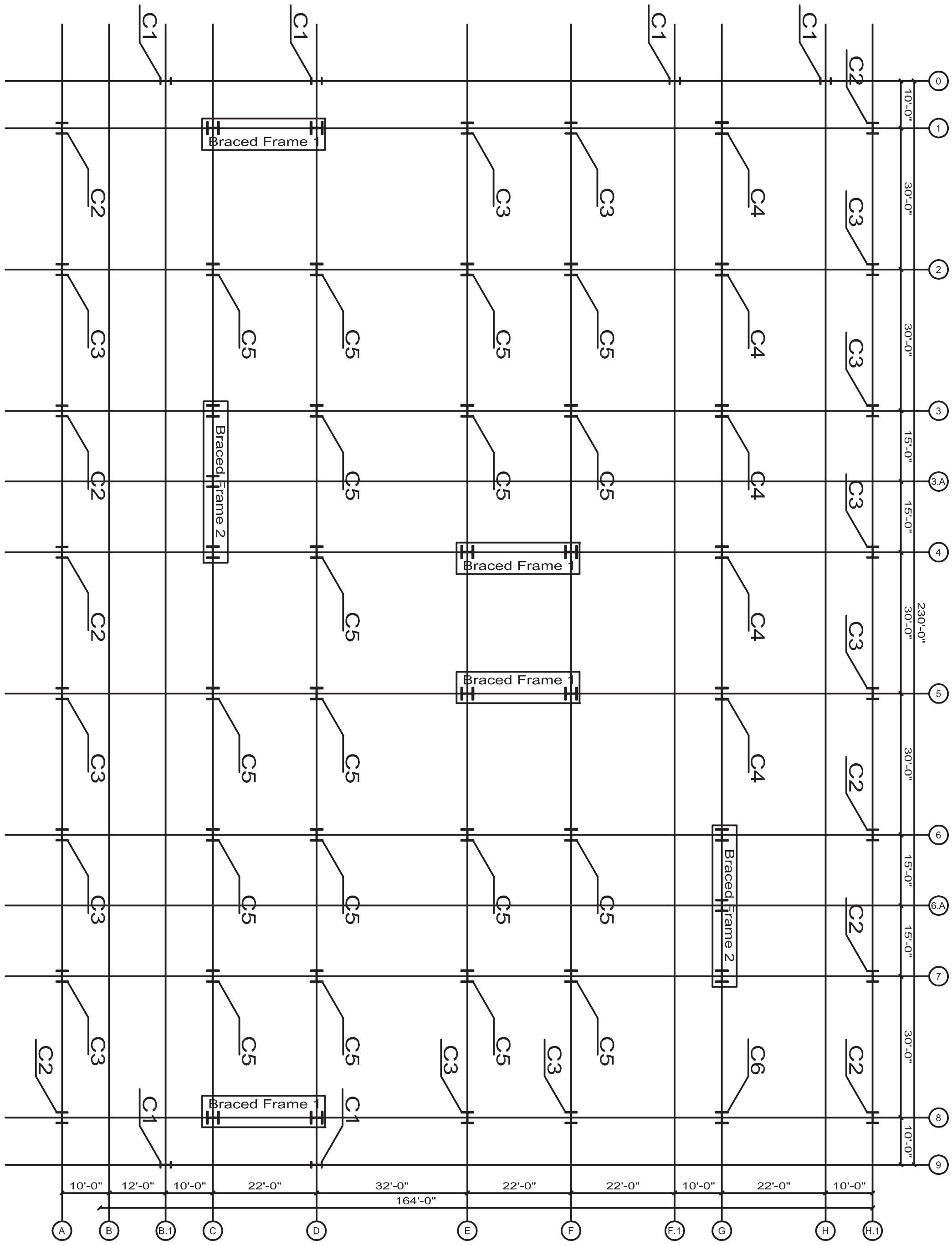
ROOF FRAMING PLAN



NOTES:
1) Each member is marked with the estimated wide-flange member size. If present, the designation “C” indicates an assumed camber from ¾ in. to 2½ in.
2) The floor slab consists of 2 in. metal deck with 3½ in. topping (total depth of 5½ in).
3) Indicates direction of the roof deck.
4) Boxes indicate the locations of lateral system frames.

NOT FOR CONSTRUCTION

COLUMN LAYOUT



NOTES:

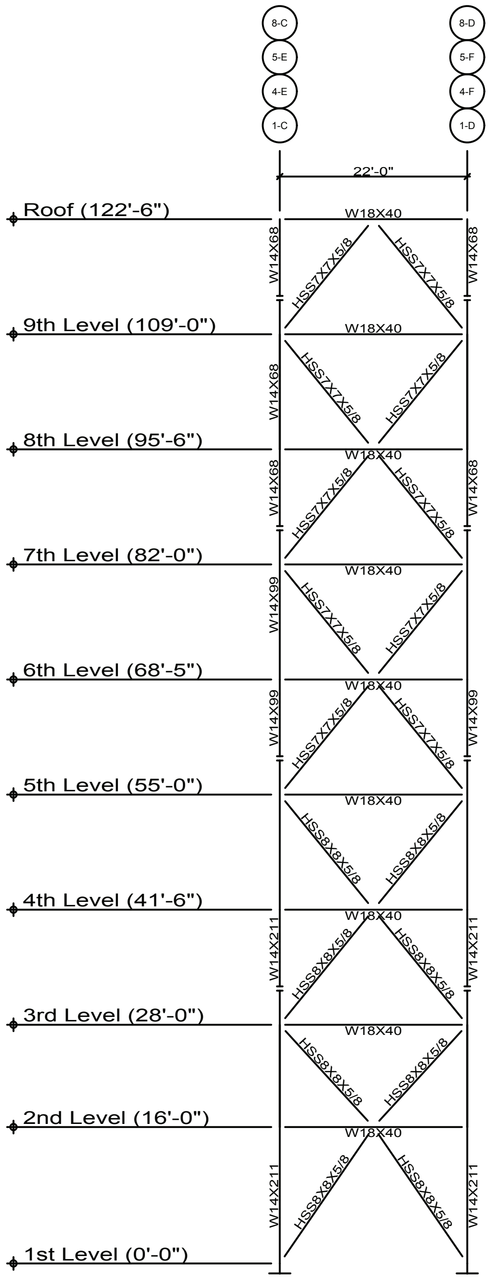
1) The columns located within the boxes are columns for the lateral system (Chevron braced) frames. NO base plate detail was assumed for the column bases.

NOT FOR CONSTRUCTION

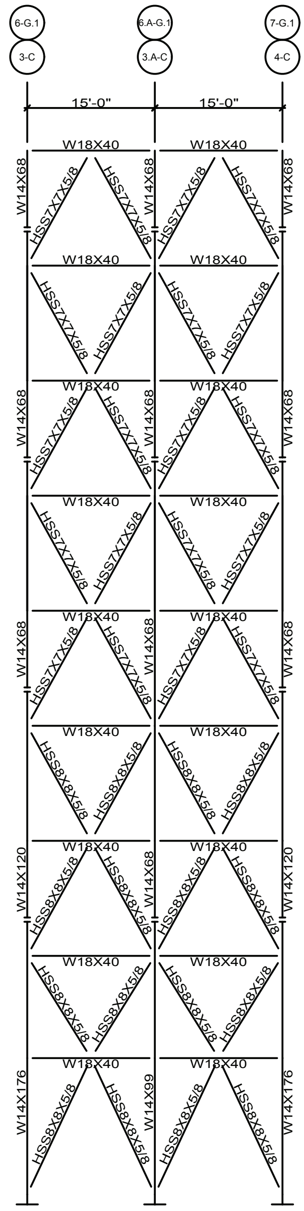
Level	C1	C2	C3	C4	C5	C6
Roof (122'-6")						
9th Level (109'-0") to Roof	W14X43	W14X43	W14X43	W14X53	W14X53	W14X43
9th Level (109'-0")						
8th Level (95'-6")						
7th Level (82'-0") to 9th Level	W14X43	W14X43	W14X68	W14X99	W14X68	W14X68
7th Level (82'-0")						
6th Level (68'-5")						
5th Level (55'-0") to 7th Level	W14X43	W14X68	W14X99	W14X120	W14X99	W14X99
5th Level (55'-0")						
4th Level (41'-6")						
3rd Level (28'-0") to 5th Level	W14X43	W14X99	W14X99	W14X176	W14X145	W14X99
3rd Level (28'-0")						
2nd Level (16'-0")						
1st Level (0'-0") to 3rd Level	W14X43	W14X99	W14X120	W14X211	W14X176	W14X145
1st Level (0'-0")						
COLUMN MARK	C1	C2	C3	C4	C5	C6

NOT FOR CONSTRUCTION

FRAME ELEVATIONS



Braced Frame 1



Braced Frame 2

NOT FOR CONSTRUCTION

Building Information Modeling

Building Information Modeling (BIM) is the process of generating and managing a building database in a graphic, multi-dimensional building information model (also abbreviated BIM). The BIM can be used for the entire life cycle of a building project and can contain items that include building geometry, spatial relationships, geographic information, sizes and quantities of building components, and energy system information.

The BIM process requires a great deal of advanced planning and early involvement prior to construction, which in turn helps to eliminate time-consuming design and field issues, materials savings, earlier occupation, and lower up-front costs. The BIM process and model can be advantageous in a variety of ways for almost all parties involved the construction process:

Owner

BIM allows an owner to capture facilities lifecycle data reducing maintenance cost over the lifecycle of the building.

Architect/Engineer/Detailer

The Building Information Model can provide for a more accurate steel tonnage, resulting in foundation savings. The BIM model allows design teams to view complicated configurations and connections in 3D. The BIM process also reduces requests-for-information (RFIs) and change orders by identifying collisions and interferences virtually on the model before they ever become issues in the field.

Fabricator

BIM can streamline the entire structural steel fabrication process. Today's high-tech fabrication shops can upload electronic information directly into fabrication equipment without having to convert 2D drawings into different formats. The BIM model can provide for a more accurate steel tonnage, resulting in more accurate estimating/bidding and material savings.

Erector

Erection considerations can be handled before the foundation has been poured. Representations of construction equipment can be placed on the model to allow the erection team to evaluate site conditions and site scheduling. And with collisions and interferences evaluated on the model, time-consuming field modifications and repairs are almost eliminated. Therefore, using the BIM process results in a compressed schedule and faster erection time.

Specialty Contractor

The BIM process enhances scheduling of all subcontractors on the project. With BIM, the subcontractors will know which phase of their work can begin, and the conditions of the construction site they can expect prior to the start of their work. Also, collisions between systems (MEP, HVAC, specialty equipment, etc.) and the structural steel can be evaluated prior to construction, almost eliminating field re-routes or fixes; resulting in a compressed schedule and faster erection time.

CIS/2

The structural steel industry has been a leader in BIM in the United States. The American Institute of Steel Construction helped drive the advance of BIM by endorsing CIMSteel Integration Standards/Version 2 (CIS/2) as the open standard for data exchange in structural steel design. CIS/2 is the specification providing the building product model for structural steel and format for electronic data interchange among software applications dealing with steel design, analysis, and manufacturing. To learn more about BIM and CIS/2 log onto www.aisc.org/cis2.

Photo courtesy of Magnusson Klemencic Associates

Further Support

Once the conceptual solution was completed, the AISC Regional Engineer passed the solution onto an AISC Member Fabricator and Erector who had experience with the BIM process. The Regional Engineer then coordinated a conference call between the owner, EOR, Fabricator and Erector, and the Steel Solutions Center Advisor. The SSC Advisor answered questions about the conceptual solution, and explained how CIS/2 provides interoperability (the ability of various systems to work together) between various structural steel software programs. The Fabricator explained the role the steel fabricator plays in the BIM process, provided general cost information using the tonnage provided in the conceptual solution, and provided a description of the fabrication shop's previous BIM projects.

The Erector also explained what roles the erector and general contractor play in the BIM process, as well as how BIM can be used to coordinate the scheduling of the structural steel, MEP systems, and specialty equipment.

Delivering the Message

With the SSC's Conceptual Solution, the AISC Member Fabricator's initial estimate and schedule, and the Fabricator's and Erector's experience, the owner and design team were able to discuss additional advantages that a structural steel framing system can provide, including:

- A system that easily accommodates the intense medical, mechanical, and electrical requirements
- Column free areas provide for efficient staff circulation and patient flow and future space modification and upgrades
- Reduced soft costs and earlier revenue generation due to shortened schedule when compared to other building materials
- Various sustainable benefits including use of locally available materials with a high recycled content that can be easily expanded or deconstructed in the future with little to no negative environmental impact

The owner's and EOR's experience with the Steel Solutions Center provided them with the information that they needed to help them consider the use of BIM and structural steel for their project needs. The owner benefitted from the general information about the structural steel supply chain, fabrication, and erection to help those who are not familiar with all of the steps in the life of a steel project. The EOR benefitted from the technical information that the SSC provided to aid in the design of a structural steel system. In addition, the owner and EOR were pleased to know that AISC will provide a high level of service throughout the life of their project. They voiced their agreement that "there is always a solution in steel!"

Postscript

The fictional account described in this story is being repeated at the Steel Solutions Center on a daily basis. Project decision makers are reaching out to AISC Regional Engineers and the SSC for new ideas to solve their project challenges. The SSC has resources to help you throughout the life of your project, and the SSC has worked with everyone involved with the construction industry—mills, service centers, fabricators, engineers, architects, general contractors, and code officials just to name a few. The SSC can offer solutions that provide reduced foundation weight and cost, increased speed of erection, and help with seismic lateral resisting systems. The SSC has prepared and provides tools that help all parties involved to effectively communicate the benefits of steel to their clients and partners. The SSC provides a win-win outcome for everyone involved, and best of all, it is a free service!

What should you do next?

Take a few minutes and examine the attached prototype—The conceptual solution for the conventional framing in a healthcare project. Ask yourself if this system might be beneficial for your next project. When you start to approach your next project, contact your local steel fabricator, AISC Regional Engineer, or call/e-mail the Steel Solutions Center directly to discuss what benefits a steel solution can provide to your project.

There's always a solution in steel.


Photo courtesy of Douglas Steel Fabricating Corporation

Henry Ford Hospital
Detroit, MI
Constructed in 2009

STEEL AND SUSTAINABILITY

The green buildings movement is increasing at a rapid pace. More and more owners, architects, engineers and contractors are realizing the benefits of sustainable design and construction practices. Selecting structural steel as the framing system is one step toward improving the green or sustainable performance of health-care facilities and other building types. There are multiple credit opportunities for structural steel under the U.S. Green Building Council's Leadership in Environmental and Energy Design (LEED®) for New Construction program. These include MR Credit 1.1: Building Reuse—Maintain Existing Walls, Floors and Roof, MR Credit 2: Construction Waste Management, MR Credit 3: Materials Reuse, MR Credit 4: Recycled Content, MR Credit 5: Regional Materials and ID Credit 1: Innovation in Design. (For more information on these credits, visit www.usgbc.org.) Structural steel also provides sustainability gains and opportunities beyond the LEED system.

Recycled Content

Steel made via the electric arc furnace process (all wide-flange members, channels and angles and some plate and hollow structural sections) has an industry-average recycled content of 93.3%.

Recycling Rate

There is an established market for steel scrap (structural and otherwise), and 98% of all structural steel is recycled at the end of a building's life.

Cradle-to-Cradle

Many materials can be recycled, but most are down-cycled to a different product. For example, concrete from a deconstructed building can be used again as road aggregate, but it can rarely be used again as aggregate for structural concrete. Steel, on the other hand, can be recycled over and over again, or "multi-cycled," without losing any of its strength or properties. This makes steel a true cradle-to-cradle product as opposed to a cradle-to-grave product. And it's not just structural steel. Steel products of all types can become steel products of all other types.

Offsite Fabrication, Onsite Erection

Steel is fabricated in highly automated facilities to strict tolerances, greatly minimizing additional work and the resulting additional labor hours and equipment required on a project site, thus lowering the steel-framed structure's environmental footprint.

Erection Schedule

The erection schedule for a steel-framed health-care structure is about one-third less than that of competing framing systems. This reduced construction schedule not only lowers the steel-framed structure's environmental footprint, it also allows the steel-framed health-care facility to open earlier.

Foundations

Lighter steel-framed health-care structures result in lighter foundation loads, thus decreasing the amount of material needed for the foundation.

Environmental Impact

A study conducted by independent consultants compared the environmental impact of two medical office buildings in Omaha—one framed with structural steel framed and one with concrete framed projects—and concluded that the steel building came out ahead in four of five categories: global warming potential, eutrophication potential, acidification potential and smog potential. The fact that the results in each category, including primary energy demand where steel lagged concrete by 1%, are within 10% of each other indicates that the choice of a structural framing system should not be made on the basis of the environmental impact of the materials alone. It is not just the selection of materials that is important from a sustainable perspective, but also the optimization of those materials in both the design and the actual construction process.

Early Involvement

Adopting a collaborative, integrated project delivery methodology on a steel-framed health-care project means getting the fabricator involved early. An experienced fabricator can help you choose more efficient steel assemblies, saving you time, materials, and money. Collaborative design combined with a steel framing system and building information modeling (BIM) can result in a project that uses less material, which results in less labor, less cost and less environmental impact.

Flexibility

Steel framing allows for easier reconfiguration or expansion of any type of structure. This is especially important with hospitals and other health-care-related structures where ever-evolving patient needs and equipment requirements mandate regular facility changes.

Deconstruction

Steel-framed health-care facilities can be easily deconstructed, and members can be remanufactured into new members or reused with minimal additional fabrication work. Only 2% of all structural steel from health-care projects ends up in a landfill, with 98% being recycled into new steel products.

Flynn ON HEALTHCARE

ARCHITECTS "I particularly enjoy working with architects at the beginning of a project because, well, that is when the most creative structural solutions are born. We have to really understand the architect's vision, their goals, to provide world-class structural design for our healthcare projects. For hospitals, that means understanding the relationships between the different departments, the desired design aesthetic, the project goals and challenges, and how best to deliver all of this within an established budget. It's never a cookie-cutter design! We deliver the most value to the project when we participate in the process early."

Lanny J. Flynn, P.E., S.E. Principal. Heads up the Healthcare Specialist Group at Magnusson Klemencic Associates. Harmonizes creativity with structural engineering. Appreciates the flexibility of steel shapes to enhance the vision of today's architects and healthcare facilities.

PATIENT CARE "The primary focus of hospitals is patient care, which demands intense medical, mechanical and electrical systems with very rigid architectural requirements…efficient staff circulation and patient flow, acuity adaptable rooms, patient- and family-friendly spaces, and integration of infrastructure. There are also required levels of transparency, as well as stringent vibration criteria for sensitive equipment and procedures. The structure must support all these demands and be flexible enough to change rapidly. Steel structural systems are great for this type of design. As hospitals bring in new technologies and adjust patient care strategies, steel structures are able to easily morph to make these modifications possible."

SEISMIC "Hospitals need to function after an earthquake, so Codes impose more stringent requirements on their design. Steel is a wise choice, because it is a very ductile and predictable material. One of our recent hospital designs involved a 700,000-square-foot expansion and utilized a unique steel bracing system with a well-defined ductile steel core designed to dissipate the energy imparted by an earthquake. That system actually bettered code requirements and, because of the steel bracing system, actually reduced the structural costs of the foundation system and columns. The hospital not only saved money, but also received a better-performing building."

PERFORMANCE-BASED "MKA has taken a leadership role in the development of performance-based seismic design for new buildings, with over 3 dozen successful projects. A performance-based approach is becoming the trend in seismic design, rather than prescriptive Code-based structures. Performance-based design involves a very detailed analytical process that identifies anticipated demands on structural elements and sets parameters of acceptable performance for each element. Armed with that knowledge, we proportion and create the structure to support those criteria. In light of the benefits to be gained by the industry, MKA has even sponsored physical testing to verify performance and further advance the technology."

FAST TRACK "Hospitals are about patient care, but the financial part of the operation is equally important. If you are not successful financially, you can't deliver the best patient care. Steel pays the dividends on fast track construction, and for hospitals, fast track is always an issue. The shorter the construction, the faster they can treat patients!"

DESIGN "Twenty years ago, hospitals were more institutional. They had repetitive grids, boring public areas, and drab décor. Today's hospitals incorporate amenities you see in five-star hotels, and the framing is moving away from institutional to the longer spans of steel. In one of our recent hospital designs, a portion of the patient-care wing was cantilevered 120 feet. Steel made it possible.

BIM "Our firm has doing this for quite some time, even though the transition to BIM (Building Informational Modeling) is occurring as we speak. We actually use a BIM delivery system for all of our hospital designs, because of the benefits it provides in coordinating structure with the intense MEP systems and Architectural requirements embedded in modern healthcare design. In one hospital where we used a BIM delivery, all the structural steel framing was developed in 3D object-based design. The mechanical routing of the intense duct work and HVAC systems through the interstitial truss work was shown, and a lot of conflict checking and coordination occurred early on in the design phases avoiding downstream coordination issues. BIM is a real time saver, and steel is leading the way."

TRANSPARENCY "Today's healthcare designs call for openness and controlled transparency. Small, sleek, structural members and long spans aid in supporting this concept. Steel systems are an excellent choice to create open and transparent spaces which help to improve the experience of the patient and the patient's family and friends."

STEEL "Owners saving money, saving time, increasing building performance, and lengthening the hospitals service life is what steel is all about. You have more ability to dial-in performance with steel."

THE HEALTHCARE STRUCTURE PROTOTYPE I

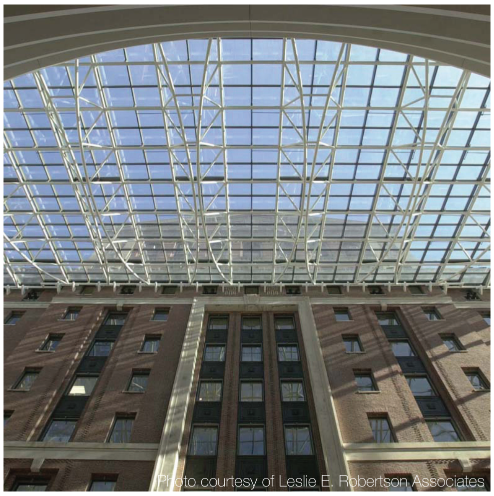


Photo courtesy of Leslie E. Robertson Associates


Photo courtesy of Thornton Tomasetti

above, left:
Bellevue Hospital Center
New York, NY
Constructed in 2005

above, right:
Johns Hopkins Hospital
New Clinical Building
Baltimore, MD
Constructed in 2008

right:
Reid Hospital
Richmond, IN
Constructed in 2008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