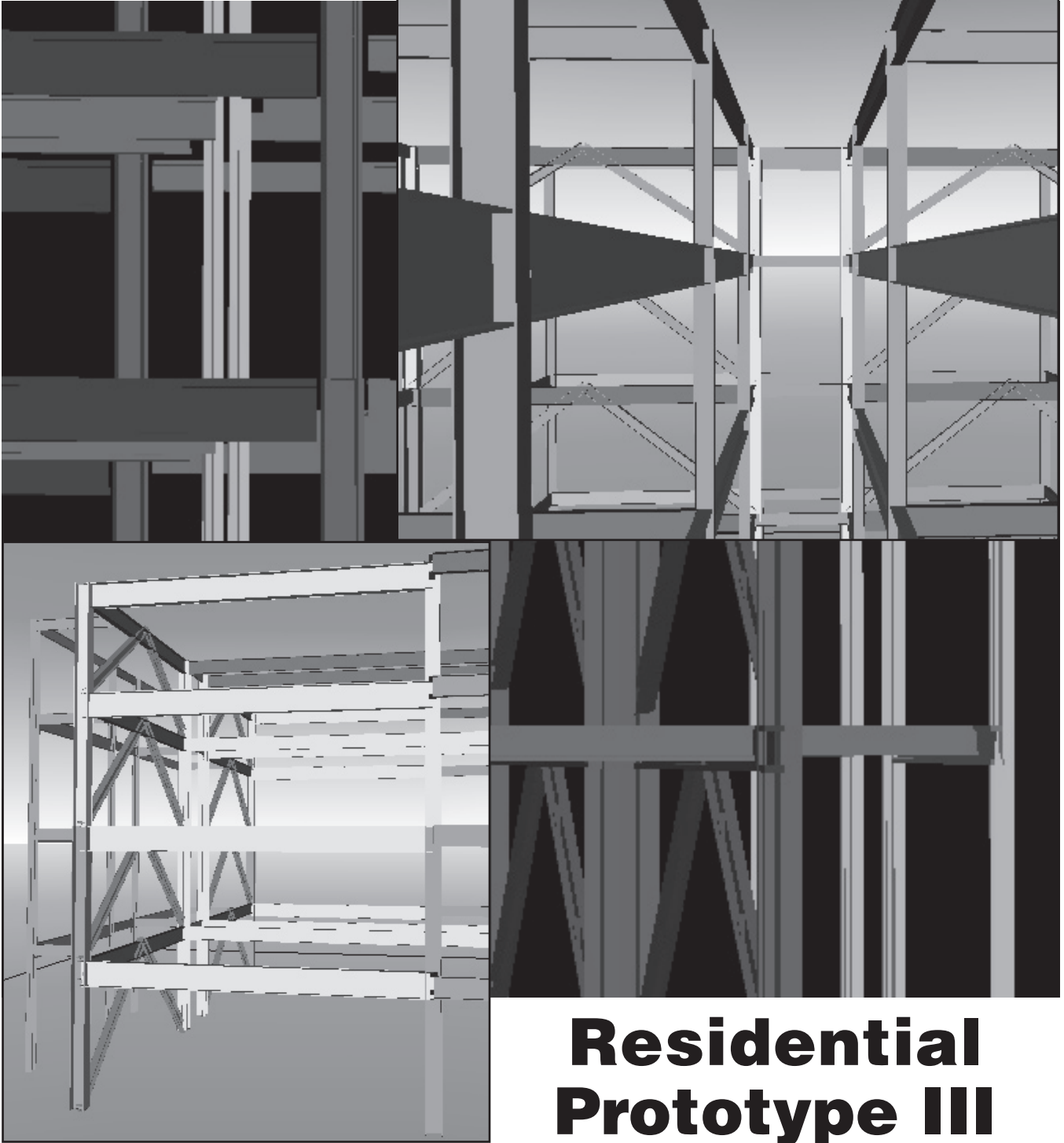


Multi-Story



Residential Prototype III

Steel
SolutionsCenter

Your connection to
ideas + answers

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**The Multi-Story
Residential Prototype III**

Prepared by: AISC Steel Solutions Center

What's this?

This package tells the story of a fictitious project with an imaginary client and illustrates the type of inquiry that the AISC Steel Solutions Center (SSC) often receives—again the project and all participants (besides AISC staff) are fictional. In this case, a Conceptual Solution is prepared for the client, which is then delivered with the continuing support of the SSC, the AISC Regional Engineer, and a local steel fabricator. As a team, AISC and its member fabricators commit to developing efficient, economical solutions in steel and providing continuous support for the life of the project. To best understand, let's look at an overview of the process and then experience the story of the Central Texas Hotel.

Project Inquiries

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

- An owner or architect is developing the concepts for a new project and is interested in determining the advantages available by using a structural steel framing system and contacts the SSC
- A project is over budget in concrete, and a steel alternate is suggested. The architect, engineer, general contractor, or owner contacts a local steel fabricator for assistance who in turn contacts either the SSC or the AISC Regional Engineer for assistance
- A fabricator or regional engineer hears of a new project in the early stages of development and contacts the owner or project architect to discuss similar steel projects and scenarios that could bring the advantages of steel to this project

Developing a Solution

The AISC team and client work together, often through conference calls, to determine what can be done to move the project toward steel. The SSC is involved in providing a wide range of solutions including a simple bay study, lateral system analysis, or foundation comparisons. There is no fee associated with these services other than the commitment from the project decision maker to seriously evaluate the alternatives and to reach an objective conclusion.

What do I have here?

This prototype is one example of a Conceptual Solution the SSC can provide and is the highest level of response and involvement. Often, because it is representative of many steel, multi-story residential structures, SSC clients have found reviewing this level of prototype alone can convey the approach and benefits of using a structural steel system and have moved forward in design.

Since our beginning in 2001, the SSC has been involved in a broad range of projects: multi-story residential structures, parking decks, office buildings. Whether high, medium, or low rise we will help you identify an innovative solution for your project.

And now to the story of the Central Texas Hotel...



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The Multi-Story Residential Prototype III

Prepared by: AISC Steel Solutions Center

The Central Texas Hotel:

Lynda Gemmell has a situation on her hands since the developer, whom she has been working with, told her the construction schedule for a new hotel needs to be reduced—or the project cannot move forward due to financing limitations. She has been reviewing several aspects of the overall schedule and notices that the proposed metal-stud system is going to require a minimum of 26 weeks. She knows this is the standard structural system in the area and is also a favorite of the developer. She wonders if there could be a faster more efficient system to meet the increased project demands?

HELP!

Before her meeting with the developer, Lynda was reading the latest issue of *Modern Steel Construction* and she noticed an advertisement for the American Institute of Steel Construction's Steel Solutions Center (SSC). The ad stated that the SSC could not only help with any technical questions concerning structural steel, but that the SSC could also assist with project work from schematic design, help with pricing, and schedule. Plus, the assistance is free!

Lynda is intrigued and decides to contact the SSC through their toll-free number. When she calls, she is greeted with a live voice instead of a complicated pre-recorded menu. She gives a general description of her project and that she needs assistance on how she could reduce the construction schedule. She is told that a Regional Engineer or a SSC advisor would contact her before the end of the day—already she is impressed, who returns calls that quickly?

Engaging the Resources

That afternoon, a conference call is arranged between Lynda, AISC's South Central Regional Engineer, Rob Kinchler, and SSC's Senior Advisor, Todd Alwood. Lynda had already emailed a typical floor plan and elevation, so Rob and Todd have a very good handle on her project. During this call, it is decided that a full Conceptual Solution would be extremely valuable to keep this project on schedule. Further discussion on several framing systems showed that the "In-Wall Beam System" is the best option. The system uses steel girders located along the demising or corridor walls with 8 in. concrete plank spanning the width of the hotel rooms to the exterior walls. In addition to speed, the system allows for very low floor-to-floor heights because the structural floor depth is only 8 in. and all the interior girders are enclosed within the corridor walls.

Following the conference call, Todd proceeds with the Conceptual Solution. He analyses the structural frame and produces framing plans, lateral elevations, and tonnage/piece figures. These items can be seen in the following pages and were completed within days of the initial conference call.

Although schematic, the information within the Solution gives an excellent starting point to see how the In-Wall Beam System compares to the initial metal-stud option. Since Lynda has a good working relationship with a local fabricator, AAARF Steel, Inc., she asks the SSC to contact them to obtain pricing and schedule. If she had not known a fabricator, the SSC or R.E. would contact an AISC member fabricator to help with the pricing estimate. The completed Conceptual Solution is sent onto AAARF and with the help of the SSC, an initial estimate and schedule is submitted to Lynda. These items can be seen and are discussed at greater length at the end of the Solution.



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The Multi-Story Residential Prototype III

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Delivering the Message

With the Initial Estimate and Schedule, Lynda organizes a meeting with the fabricator and R.E., Rob Kinchler, to present their findings, which include:

- Reduction of the construction schedule by HALF
- Lower soft costs and earlier revenue generation due to decreased schedule
- Satisfaction of floor-to-ceiling height while meeting overall height
- Increased design openness and flexibility for the hotel layout

Lynda is very pleased with the results of the estimate and thinks steel is a good option for reducing the overall construction schedule. Rob further discusses the decreased site expenditures due to the decreased schedule, which in turn would increase hotel revenue by the earlier opening date.

The developer is extremely impressed but is skeptical and hesitant to try an unfamiliar system. Through continued discussion, Lynda, Rob, and the fabricator are able to reassure the developer that structural steel provides strong efficiency, a clear competitive advantage, and simply cuts his usual schedule in half. The developer considers the options and voices his agreement that—“there’s always a **solution in steel!**”

Postscript

Yes, this is just a fictional account. But what happens in this story is being repeated 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 is providing tools for local fabricators to assist local general contractors and architects and engineers in evaluating steel systems, while helping prepare those same individuals to effectively communicate the benefits of steel to their clients and partners. The SSC provides a win-win outcome for everyone involved.

What should you do next?

Take a few minutes and examine the attached prototype—The Conceptual Solution for the Central Texas Hotel. Ask yourself if this system might be beneficial for your next project. And when you start to approach your next project, contact your local steel fabricator, AISC Regional Engineer, or call/e-mail the SSC directly to discuss why steel should be the material of choice for your next project.

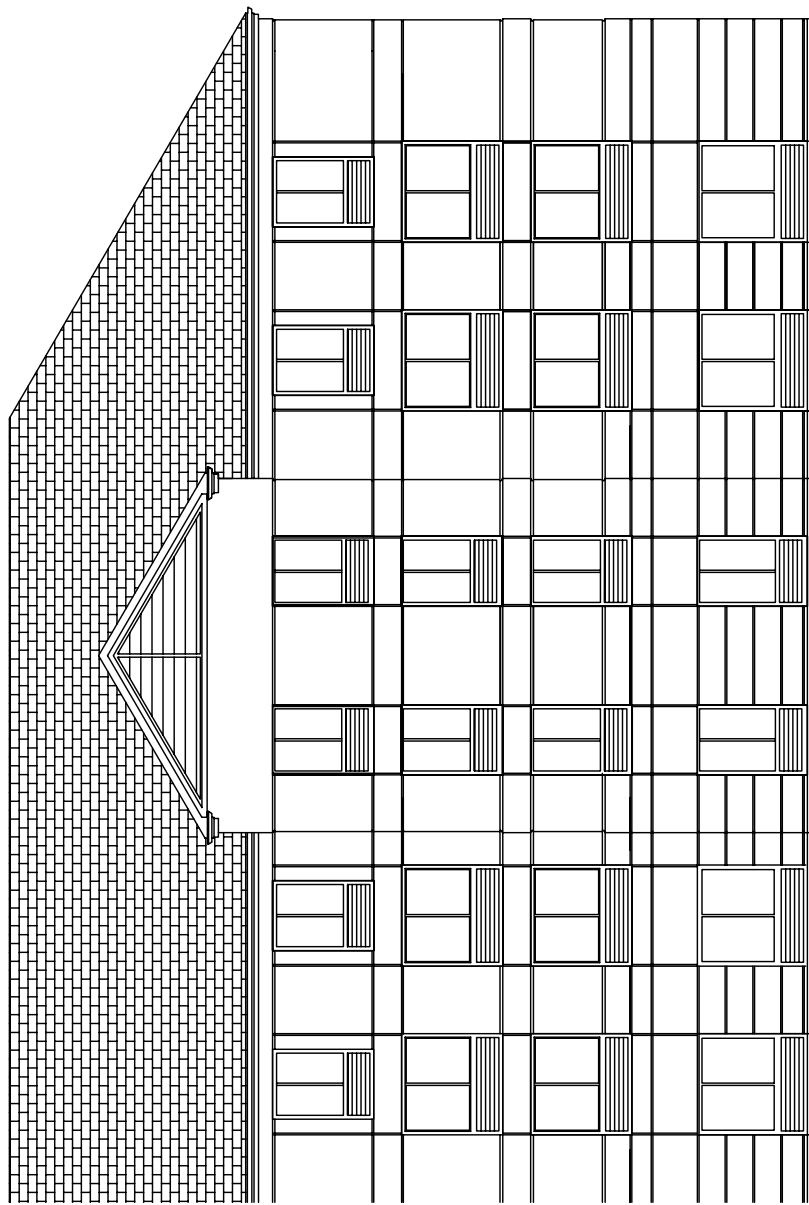


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The Multi-Story Residential Prototype III

Prepared by: AISC Steel Solutions Center

Schematic Elevations



PARTIAL ELEVATION
NO SCALE

- ROOF LEVEL
ELEV = 38'-10"
- FOURTH FLOOR LEVEL
ELEV = 29'-10"
- THIRD FLOOR LEVEL
ELEV = 20'-10"
- SECOND FLOOR LEVEL
ELEV = 11'-10"
- FIRST FLOOR LEVEL
ELEV = 0'-0"



**CENTRAL TEXAS HOTEL
927 SOUTH STREET
NEW MARKUS, TEXAS**

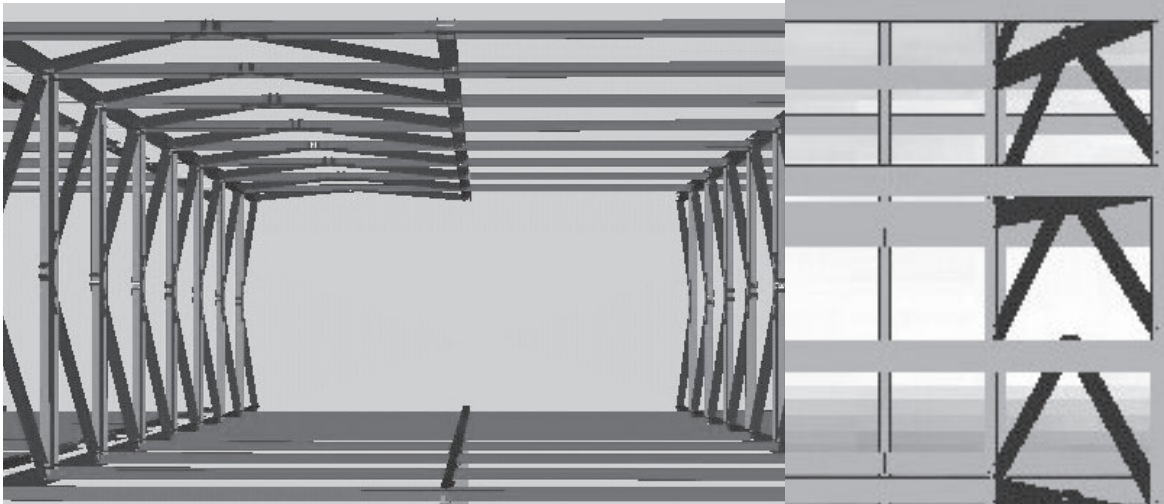
**TYPICAL
BUILDING
ELEVATIONS**



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Conceptual Solutions: Central Texas Hotel

Prepared by: Todd Alwood
Regional Engineer: Rob Kinchler
Date: 12.28.2005



This package includes:

- Comments on the Provided Solution
- Tonnage Takeoff
- Typical Level and Roof Framing Plans
- Lateral Frame Elevations
- Column Comparison
- Typical Structural Details
- Pricing Description
- Pricing Estimate



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Project: **Central Texas Hotel**
Location: **New Markus, Texas**
Company: **Coleman Construction**

Date: **12.28.2005**
Engineer: **Todd Alwood**
Contact: **Lynda Gemmell**

The structural system for the Central Texas Hotel project located in New Markus, Texas, is composed of the steel super-structure whose quantities and geometry are defined through the preliminary framing plans, lateral elevations, and tonnage/piece takeoffs.

This project was based upon parameters defined through architectural drawings and project criteria received on December 19, 2005:

1. Reviewing your needs, we decided an In-Wall Beam System would be best. This system uses girders, enclosed within the corridor demising walls, and then plank spans between the corridor and exterior wall to offer open, flexible spaces. Rob Kinchler will elaborate upon this system, and why it is the most economical and advantageous for your building.
2. The lateral system uses braced frames in the long direction and moment frames in the short direction. Both frames are labeled on the framing plans with member sizes shown on the lateral elevation.
3. An 8-in.-thick precast-concrete plank (without topping) spans between the corridor and the exterior wall, and a 3 in. metal-deck and 5 in. concrete topping is used along the corridor. See the following framing plan for the defined areas.
4. According to industry standards, girders supporting plank are to be shored at third points, confirmed by the Engineer of Record, until the final grouting has cured. The shoring reduces the construction moment and accounts for the beam's unbraced top flange. With this project, only the exterior girders would need to be shored, since the metal deck along the corridor would brace the interior beams.
5. In addition, 3,500 Nelson studs were typically placed at 2 ft 0 in. on center. The studs help brace the top flange of the beams and transfer lateral force from the slab diaphragm into the steel frame.
6. Floor-to-floor height is 11 ft 10 in. for the first level and 9 ft 0 in. for all remaining. Floor-to-ceiling height is 11 ft 2 in. for the first level and 8 ft 4 in. for all remaining (does not include a finished ceiling).
7. **Results for the building are 228 tons at 6.00 psf for the 76,000 ft² structure with 431 pieces of steel.**



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Tonnage & Piece Takeoff Sheet

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Project: **Central Texas Hotel**
 Location: **New Markus, Texas**
 Company: **Coleman Construction**

Date: **12.28.2005**
 Engineer: **Todd Alwood**
 Contact: **Lynda Gemmell**

The following quantity estimate is based on a building area of 76,000 ft²:

Columns (gravity)	21 tons	0.55 psf	60 pieces
Beams (gravity)	100 tons	2.63 psf	203 pieces
Columns (lateral)	51 tons	1.34 psf	88 pieces
Beams (lateral)	46 tons	1.21 psf	48 pieces
Braces (lateral)	10 tons	0.26 psf	32 pieces
TOTAL	228 tons	6.0 psf	431 pieces

Total quantity of Nelson Studs = 3,500 Studs

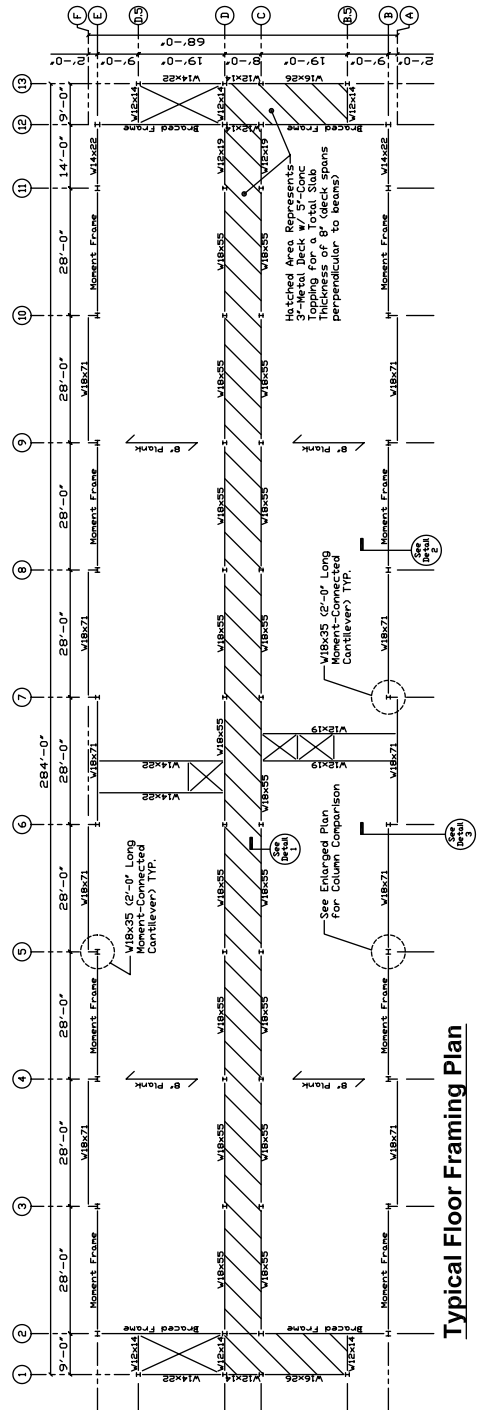
*The quantities are based on centerline dimensions

**Miscellaneous steel is not included in the above-mentioned total tonnage. Miscellaneous steel includes such items as: framing for openings, connection material, slab edge material, screen walls, base plates, and architectural elements (i.e. façade attachments, stairs, lintels, etc.).

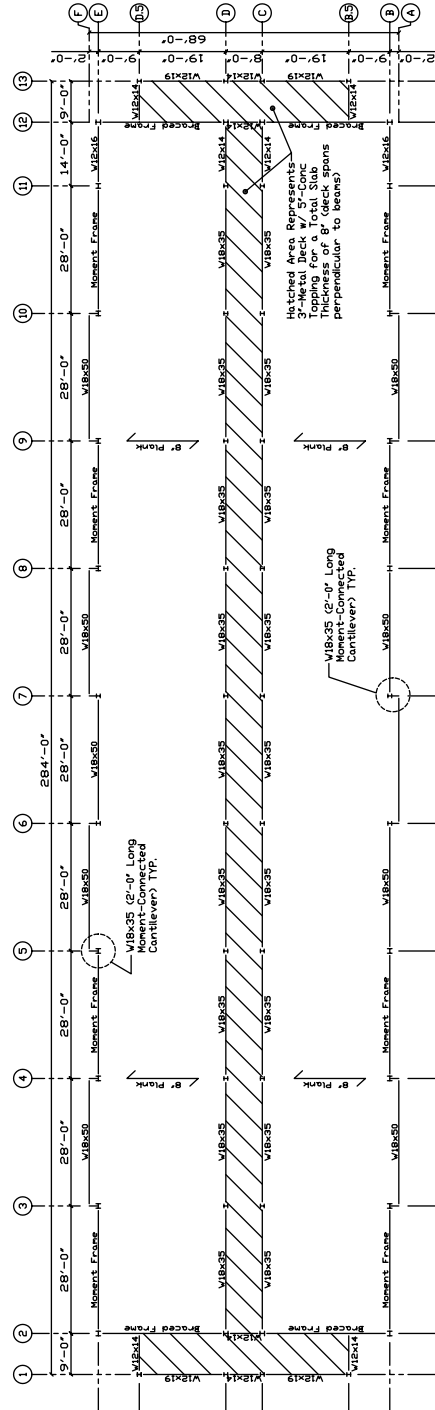


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Structural Plan

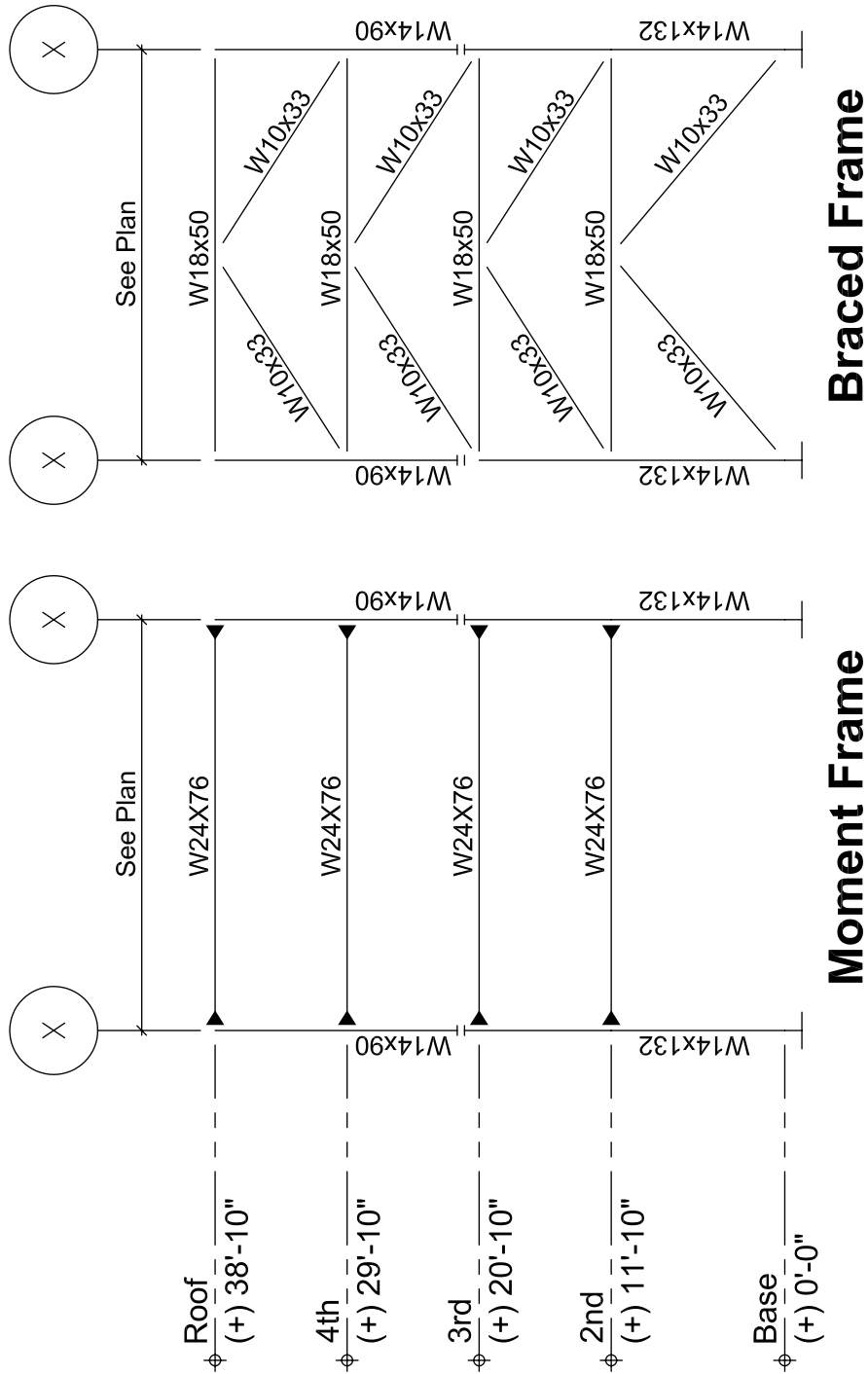


Typical Floor Framing Plan

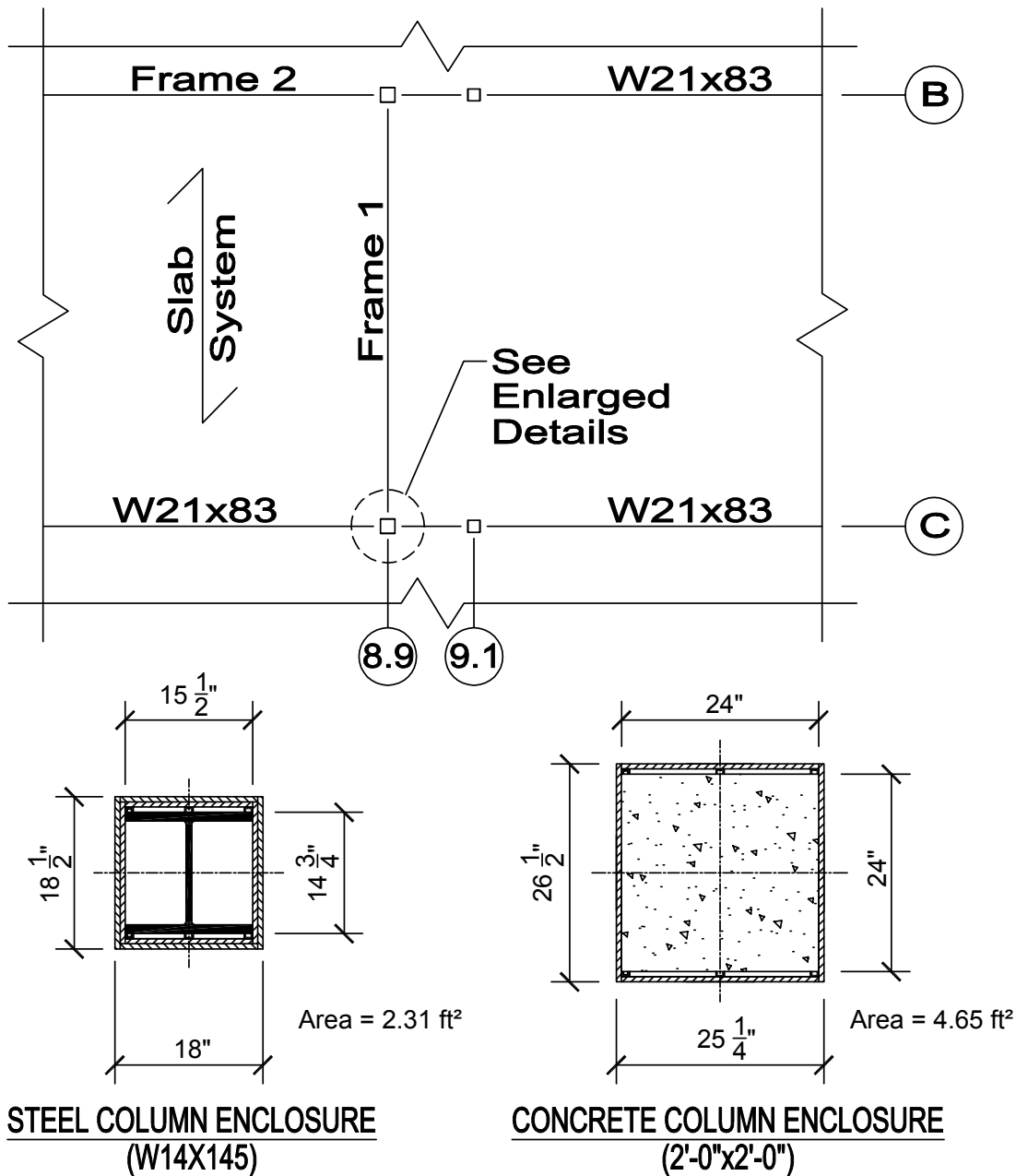


Roof Framing Plan

Structural Elevations



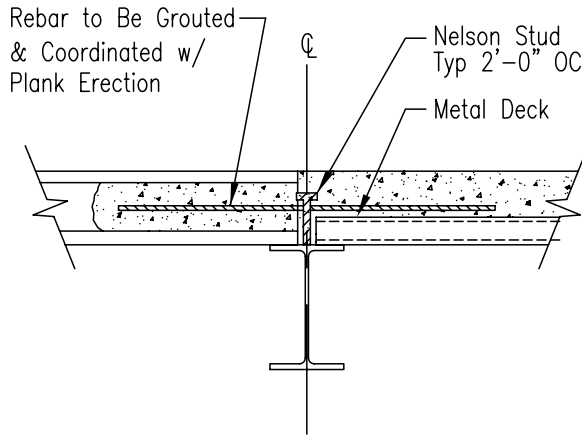
Architectural Details



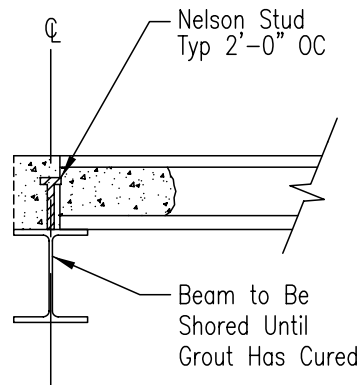
The details above compare area and dimensions for both a finished steel and concrete column (both are presumed to be lateral and located on the first level, which will usually be the largest). The concrete column is two-times larger than the steel column, which may not greatly effect the overall sellable square footage, but this would greatly effect the column's projection into a client's unit simplifying the layout and spatial aesthetics.

Structural Details

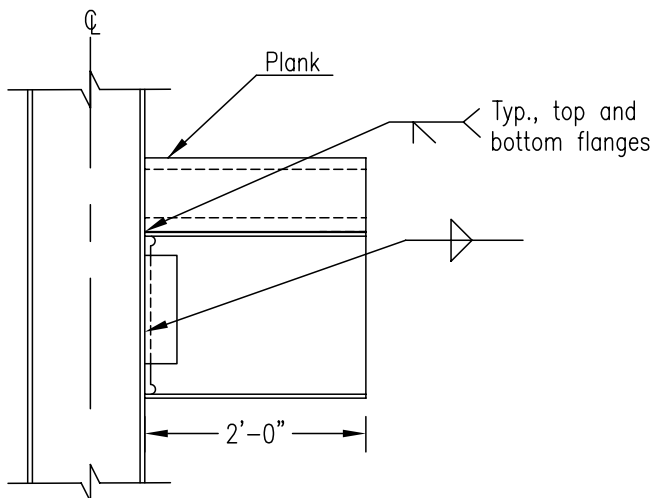
Note – Check with Plank Manufacturer for Required Bearing and Clearance Dimensions for all Details.



1 - INTERIOR BEARING



2 - EXTERIOR BEARING



3 - EXTERIOR MOMENT CONNECTION

DETAIL(S) ARE NOT FOR CONSTRUCTION

Comments on Conceptual Solution

Project: **Central Texas Hotel**
Location: **New Markus, Texas**
Company: **Coleman Construction**

Date: **12.28.2005**
Engineer: **Todd Alwood**
Contact: **Lynda Gemmell**

With the Steel Solutions Center's Conceptual Solution in hand, Rob Kinchler works with Jay Cross of AAARF Steel, Inc., Lynda's local fabricator. Rob sets up an initial conference call with Jay and Todd Alwood to discuss the Solution and criteria used to design. They learn that Jay has never priced or fabricated a steel and plank building and he has some misgivings, which go along with any new expedition. Jay also uses this opportunity to ask questions concerning the Solution, such as:

1. Why is an In-Wall Beam System used?
2. Is he supplying the plank?
3. Could he use HSS sections for the bracing instead of W-sections?
4. Should he include a topping for the plank?
5. Does he need to provide an erection price for plank?

The first question leads Rob to suggest coming into Jay's office and giving a lunchtime presentation on the In-Wall Beam System so that the staff will have a greater knowledge on this system when they prepare their estimate. Plus, it will give Rob an opportunity to sit down with Jay to review the Solution and ease his misgivings.

Jay is able to use the SSC and Rob's expertise to help execute a successful and competitive estimate for Lynda to present to her developer. Jay also confirms to Lynda that the In-Wall Beam System is the quickest and most efficient method to meet her schedule requirements.

Even though this is a fictitious story made up by the staff of the Steel Solutions Center, it is happening to us every day. Developers to architects to contractors come to us every day to find out if there is a better steel answer for their project and we tell them...

...There's always a **solution in steel!**



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Comments on Conceptual Solution

Project: **Central Texas Hotel**
Location: **New Markus, Texas**
Company: **Coleman Construction**

Date: **12.28.2005**
Engineer: **Todd Alwood**
Contact: **Lynda Gemmell**

AAARF Steel, Inc. is pleased to offer our budget price and schedule to Detail, Fabricate, Deliver, and Install the Structural Steel and Precast Plank for the Central Texas Hotel project.

Budget Price:

Fabrication: \$520,000.00*

Includes detailing, metal deck, connection bolts, anchor bolts, FOB jobsite, sales tax, and labor.

Steel Erection: \$287,000.00*

Includes steel, perimeter safety cable, metal deck, crane.

Precast Erect: \$190,000.00*

Includes placing of plank, weld plates, grouting.

Schedule Estimate:

Detailing and Advance Bill of Material after receipt of design documents:

2 weeks* (materials to be obtained from service centers)

Completion and Submittal of Shop and Field Drawings for approval:

2 weeks* (presuming standard connections to be determined prior to detailing)

Fabrication after receipt of approved drawings:

5 weeks*

Steel and Plank Erection:

5 weeks*

1. All prices for raw material and buyouts is present day pricing.
2. No paint or galvanizing on any steel.
3. Precast plank furnished by others.
4. Stairs and handrails are not included.
5. Miscellaneous steel is not included.

* These figures were provided by one fabricator and only reflect the conditions, criteria, and location of this specific project. The reader should NOT take these figures as market guidelines, since pricing and schedule will vary by region, fabricator, present market conditions, etc. The reader should either contact their local fabricator or the Steel Solutions Center for any questions they may have.



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In today's fast-paced, competitive construction industry, success is often a matter of access to the right information at the right time. AISC's **Steel Solutions Center** makes it easy for you to explore traditional and innovative solutions enabling you to find, compare, select, and specify the right system for your project by providing:

- Framing studies
- Total structural systems, with project costs and schedules
- Framing systems that will reduce the total project cost
- An outline of the positive impacts structural steel will have on your project, including faster schedules for reduced construction loans and earlier revenue generation.

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Call or e-mail AISC's **Steel Solutions Center** today to explore a steel solution for your next project.

866.ASK.AISC
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There's always a **solution in steel!**

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