
**Steel Construction** | From the Mill to Topping Out

Smarter. Stronger. Steel.

AISC Night School

Today's audio will be broadcast through the internet.

Alternatively, to hear the audio through the phone, dial 866-519-2796. Passcode: 387037

AISC Night School

Today's live webinar will begin shortly.
Please standby.

As a reminder, all lines have been muted. Please type any questions or comments through the Chat feature on the left portion of your screen.

Today's audio will be broadcast through the internet. Alternatively, to hear the audio through the phone, dial 866-519-2796. Passcode: 387037

AISC Night School

*AISC is a Registered Provider with The American Institute of Architects Continuing Education Systems (AIA/CES). Credit(s) earned on completion of this program will be reported to AIA/CES for AIA members. Certificates of Completion for both AIA members and non-AIA members are available upon request.*

*This program is registered with AIA/CES for continuing professional education. As such, it does not include content that may be deemed or construed to be an approval or endorsement by the AIA of any material of construction or any method or manner of handling, using, distributing, or dealing in any material or product.*

*Questions related to specific materials, methods, and services will be addressed at the conclusion of this presentation.*

AISC Night School

Copyright Materials



AISC Night School

## Session Description

**18.5 Steel Erection: It doesn't get built without the erector**
**November 19, 2018**

Structural steel erection consists of assembling the building's frame on site safely and economically. This session will address how steel erection gets done, from securing the work to executing it. Topics include:

- Erectors' contractual relationships
- Estimating
- AISC Code of Standard Practice
- Erection schematic
- Selling an erection project
- Contracts
- Prefabrication coordination
- Erection pre-mobilization planning
- Prosecuting the work

AISC Night School

## Learning Objectives

- List items that a steel erector must extract from a project's construction documents for supporting an accurate estimate.
- Identify good and bad steel details that affect a steel erector's ability to safely and efficiently perform work.
- List items addressed in a site safety plan.
- List steel erection challenges and solutions highlighted through real project examples.

## Night School 18: Steel Construction

**Session 5: It doesn't get built without the Erector**

**November 19, 2018**

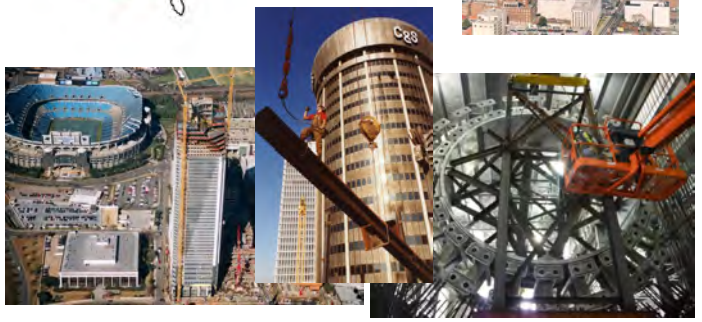
Phil Torchio
President – CEO, Retired
Williams Enterprises of Georgia
parent of Williams Erection Company
Atlanta Steel Erectors
Smyrna, GA

Smarter. Stronger. Steel.

## Night School 18

| | | |
|---|---|---|
| • 18.1 | **Introduction** to the Steel Construction Process | Oct. 15 |
| • 18.2 | The **Manufacturing** of Structural Steel Shapes | Oct. 22 |
| • 18.3 | A Virtual, Detailed Tour of the **Steel Fabrication** Process | Oct. 29 |
| • 18.4 | **Connection Design** as the Fabricator's Representative | Nov. 5 |
| • **18.5** | **It Doesn't Get Built Without the Erector** | Nov. 19 |
| • 18.6 | **Erection Engineering** – Stability During Construction | Nov. 26 |
| • 18.7 | **Field Fixes** and Solutions | Dec. 3 |
| • 18.8 | **Quality** Control and Quality Assurance | Dec. 10 |

WILLIAMS ERECTION CO.



**The Plan for Today:**

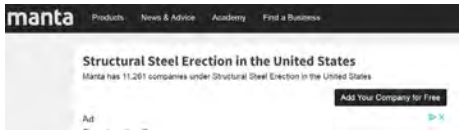
**Part One:**
- Who we are and how we get work to perform
- Estimating the job
- AISC Code of Standard Practice
- Construction Contracts for Erectors
- Erection scheme committed to paper or model
- Selling an Erection Project

**Part Two:**
- We have a contract, now what?
- Erector Pre mobilization planning
- Site specific Erection plan
- Engineered Stability Plan
- Doing the Work

**Part Three:**
- Questions

## Our Community

- Per Manta there are 1,197 Structural Fabricators in the USA, AISC says 1,700
- Per Manta there are 12,733 or 11,261 or 10,086 Steel Erectors




- Changes per the day you search the internet. But there is an order of magnitude more erectors than fabricators

12

# Part One
# Where do the jobs come from?

- 95% of requests for quotation come from Fabricators that we have performed work for in the past
- Pre Qualification requirements of General Contractor / Construction Manager (Owner's Designated Representative for Construction (ODRD))
  - AISC Erector Qualification
  - Bonding Capacity
  - Safety Record
- Drawings, Models and Specifications Furnished by Fabricator
  - In the olden days hard copies now all electronic
- Sample Contract Documents
- Site Visit

13

# Estimate - Drawing Review

- Architectural Drawings for Elevations
- Civil drawings site layout
- Structural Drawings S001 General Structural Notes
- S100 –S500 Structural Drawings
- Specifications 5000 series:

From the Job Specifications - AISC Code of Standard Practice

2.4 FABRICATION

A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC's "Code of Standard Practice for Steel Buildings and Bridges" and AISC's "Specification for Structural Steel Buildings--Allowable Stress Design and Plastic Design."

ERECTION

B. Set structural steel accurately in locations and to elevations indicated and according to AISC's "Code of Standard Practice for Steel Buildings and Bridges" and "Specification for Structural Steel Buildings--Allowable Stress Design and Plastic Design."

14

# Estimate information

**From the drawings**:

- Column counts (may vary if too heavy for crane(s))
- Beam/Girder count
- Truss and or joist count (Truss weights for crane)
- Stud count
- Bracing count, Vertical X or K
- Bracing horizontal
- Decking square footage
- Deck edge angle, bent plate, closure and support angle (attention to attachment)
- Bracing for edge bent plate etc.
- Roof frames - penetrations
- Moment connections
  - Calculate weld weight
- Welded column splices
  - Calculate weld weight
- Detail cost drivers special connections or conditions.

15

# Estimate information

**From the Fabricators**:

- Bolt count and Bolt sizes
- Tonnage
- Stairs part of the package?
- Fabricator or Erector to furnish the Studs?
- Fabricator to drill holes for safety cable?
- Fabricator furnish safety cable posts?
- Column lifting holes?
- Special field weld preparations
- Shop assembly of components
- Shoring
- Bond

16

# Estimate information

**From the GC - ODRC:**

- Job access
- Traffic control for material delivery
- Lay down area
- Gravel and dewatering
- Furnish cranes? What limitations for Erector
- Power 440 three phase?
- Special Safety requirements
- Site personnel requirements
- GC's on site management team
- CCIP OCIP Insurance (deductibles)

17

# AISC Code of Standard Practice

**2016 Code of Standard Practice**
**Preface:**

As in any industry, trade practices have developed among those that are involved in the design, purchase, fabrication and erection of structural steel. **This Code provides a useful framework for a common understanding of the acceptable standards when contracting for structural steel**. As such, it is useful for owners, architects, engineers, general contractors, construction managers, fabricators, steel detailers, erectors and others associated with construction in structural steel. **Unless specific provisions to the contrary** are contained in the contract documents, the existing trade practices contained herein are considered to be **the standard custom and usage of the industry** and are thereby incorporated into the relationships between the parties to a contract.

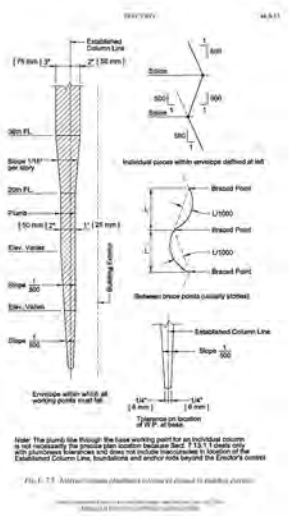
18

# AISC Code of Standard Practice



**Erector**
**Owner's Designated Representative for Design**
**General Contractor**
**Fabricator**

19



20

**Football Hall of Fame**

21

**TABLE 10.1**
**AESS Category Matrix**

| Id | Characteristics | Category: AESS C Custom Elements | AESS 4 Showcase Elements | AESS 3 Feature Elements in close view | AESS 2 Feature Elements not in close view | AESS 1 Basic Elements | SSS Standard Structural Steel |
|---|---|---|---|---|---|---|---|
| 1.1 | Surface preparation to SSPC-SP 6 | | • | • | • | • | |
| 1.2 | Sharp edges ground smooth | | • | • | • | • | |
| 1.3 | Continuous weld appearance | | • | • | • | • | |
| 1.4 | Standard structural bolts | | • | • | • | • | |
| 1.5 | Weld spatters removed | | • | • | • | • | |
| 2.1 | Visual samples | Required | • | • | optional | | |
| 2.2 | One-half standard fabrication tolerances | | • | • | • | | |
| 2.3 | Fabrication marks not apparent | | • | • | • | | |
| 2.4 | Welds uniform and smooth | | • | • | • | | |
| 3.1 | Mill marks removed | | • | • | | | |
| 3.2 | Butt and plug welds ground smooth and filled | | • | • | | | |
| 3.3 | HSS weld seam oriented for reduced visibility | | • | • | | | |
| 3.4 | Cross sectional abutting surface aligned | | • | • | | | |
| 3.5 | Joint gap tolerances minimized | | • | • | | | |
| 3.6 | All welded connections | | optional | optional | | | |
| 4.1 | HSS seam not apparent | | • | | | | |
| 4.2 | Welds contoured and blended | | • | | | | |
| 4.3 | Surfaces filled and sanded | | • | | | | |
| 4.4 | Weld show-through minimized | | • | | | | |
| C.1 | | | | | | | |
| C.2 | | | | | | | |
| C.3 | | | | | | | |
| C.4 | | | | | | | |

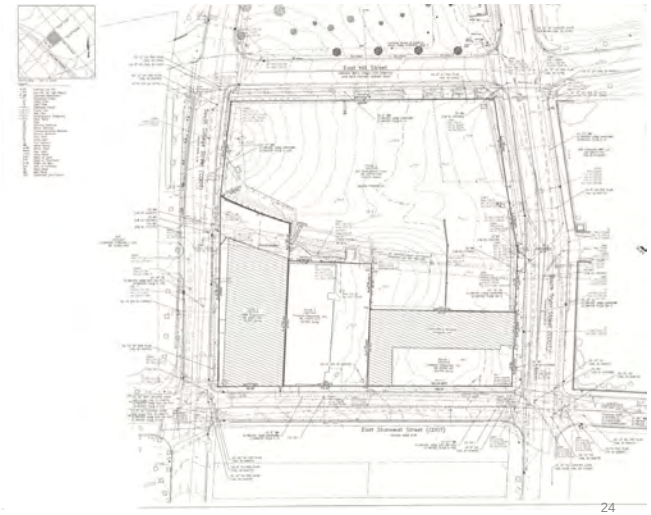
**AESS 1:** Basic elements.
**AESS 2:** Feature elements viewed at a distance greater than 20 ft (6 m).
**AESS 3:** Feature elements viewed at a distance less than 20 ft (6 m).
**AESS 4:** Showcase elements with special surface and edge treatment beyond fabrication.
**AESS C:** Custom elements with characteristics described in the *contract documents*.

22

EXTERIOR AXON - EAST

23

Survey
Site layout



24

S001
General Structural Notes

25

S001 General Structural Notes

| SHAPE | MATERIAL |
|---|---|
| WIDE FLANGES & WT'S | ASTM A992, GRADE 50 |
| MISCELLANEOUS PLATES | ASTM A572, GRADE 50 |
| CONTINUITY PLATES | ASTM A572, GRADE 50 |
| ANGLES & CHANNELS | ASTM A36 |
| RECTANGULAR HSS (TUBES) | ASTM A500, GRADE B |
| ROUND HSS | ASTM A500, GRADE B |
| BOLTS | ASTM A325 N, UON |
| ANCHOR RODS | ASTM F1554, Fy=36ksi, UON |
| THREADED RODS | ASTM A36 |
| STEEL JOIST | PER STEEL JOIST INSTITUTE'S SPECIFICATIONS |
| WELDING ELECTRODES | E70, SEE SPECIFICATIONS FOR CVN REQUIREMENTS |
| WELDED STUDS | ASTM A108 HEADED STUDS: TYPE H4L OR S3L BY NELSON OR EQUAL. |

Notes trigger closer examination and cost drivers

Seismic Job

SS-2 STRUCTURAL STEEL MEMBERS AND CONNECTIONS DENOTED "SLRS" SHALL SATISFY REQUIREMENTS FOR THE SEISMIC LOAD RESISTING SYSTEM IN SPECIFICATION SECTION 05 12 10.

SS-3 WHERE NO CAMBER IS INDICATED, FABRICATE BEAMS SO THAT ANY NATURAL CAMBER IS UPWARD AFTER ERECTION
.

SS-4 SPLICES SHALL BE ALLOWED ONLY AT LOCATIONS SPECIFICALLY INDICATED ON THE STRUCTURAL DRAWINGS UNLESS APPROVED OTHERWISE BY THE SER IN WRITING.

SS-5 FOR STEEL MEMBERS AND EMBEDMENTS EXPOSED TO WEATHER, PROVIDE HOTDIPPED GALVANIZED FINISH.

SS-6 PROVIDE HOLES IN ALL STEEL AS REQUIRED TO PREVENT ANY ACCUMULATION OF WATER. ALL PENETRATIONS THROUGH MAIN MEMBERS SHALL NOT EXCEED 1 1/8"DIA AND SHALL BE GROUND SMOOTH. THESE DRAINS MUST BE KEPT CLEAN

26

**Engineered Erection Stability Plan**

SS-8 FIELD MODIFICATION OF STRUCTURAL STEEL IS PROHIBITED WITHOUT PRIOR APPROVAL OF THE ARCHITECT AND STRUCTURAL ENGINEER.

SS-9 THE CONTRACTOR SHALL SUBMIT A STEEL ERECTION PROCEDURE, PREPARED UNDER THE SUPERVISION OF A STRUCTURAL ENGINEER LICENSED IN THE STATE OF THE LOCATION OF THE PROJECT (THE CONTRACTOR'S ENGINEER) FOR REVIEW BY THE STRUCTURAL ENGINEER OF RECORD. THIS PROCEDURE MUST SINCLUDE THE PROPOSED SURVEY REQUIRED BY THE STEEL SPECIFICATIONS.

SS-10 HOT ROLL SHAPES WITH FLANGE THICKNESS EXCEED 2 INCHES OR BUILT UP HEAVY SHAPE WITH PLATES EXCEED 2 INCHES IN THICKNESS USING COMPLETE JOINT PENETRATION GROOVE WELD THAT FUSE THROUGH THE THICKNESS OF THE FLANGE OR WEB OR USING COMPLETE JOINT PENETRATION BUTT WELD SPLICES SHALL HAVE A MINIMUM CHARPY V-NOTCH IMPACT TESTING VALUES OF O 20 FT-LB AT A MAXIMUM TEMPERATURE OF +70 DEG F. THE IMPACT TEST SHALL BE CONDUCTED IN ACCORDANCE WITH ASTM A673, FREQUENCY P. THE ABOVE REQUIREMENTS DO NOT APPLY IF THE SPLICES AND CONNECTIONS ARE MADE BY BOLTING.

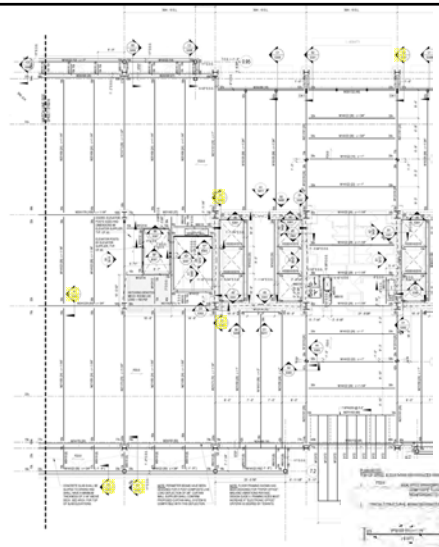
**Impact Requirements WPS and Welder**

SS-11 WELD ELECTRODES FOR THE HEAVY SHAPES NOTED IN SS-10 THAT REQUIRE CVN TESTING SHALL HAVE A CVN OF 20 FT-LB AT -20 DEG. F AND 40 FT-LB AT +70 DEG. F. EXCEPT FOR STRUCTURE THAT IS NOT ENCLOSED AND MAINTAINED AT A TEMPERATURE OF +50 DEG. F OR HIGHER, THE TEST TEMPERATURE SHALL BE O EQUAL TO THE LOWEST ANTICIPATED SERVICE TEMPERATURE (LAST) PLUS 20 DEG. F. LAST SHALL BE -7 DEG. F.

SS-12 STEEL REINFORCEMENT TO EXISTING BEAMS AND COLUMNS SHALL BE WELDED BY QUALIFIED WELDERS USING TECHNIQUES AND SEQUENCES THAT MINIMIZE POST-WELD DISTORTION OF THE MEMBER. WELDING PROCEDURE SPECIFICATIONS AND WELDING SEQUENCES SHALL BE SUBMITTED TO THE ENGINEER OF RECORD FOR REVIEW.

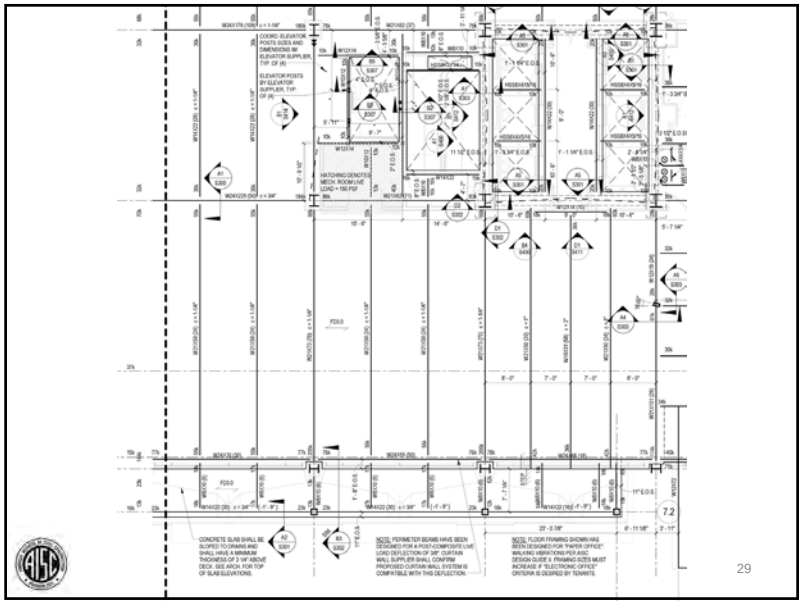
SS-13 WHERE NEW STEEL BEAM FRAMING TIES INTO EXISTING STRUCTURE, FIELD APPLIED CONNECTION IS REQUIRED. CONNECTIONS SHALL BE DESIGNED BY CONTRACTOR'S STEEL CONNECTION DESIGN ENGINEER UON. CONTRACTOR RESPONSIBLE FOR REMOVAL AND REPLACEMENT OF FIREPROOFING IF PRESENT AT CONNECTION.

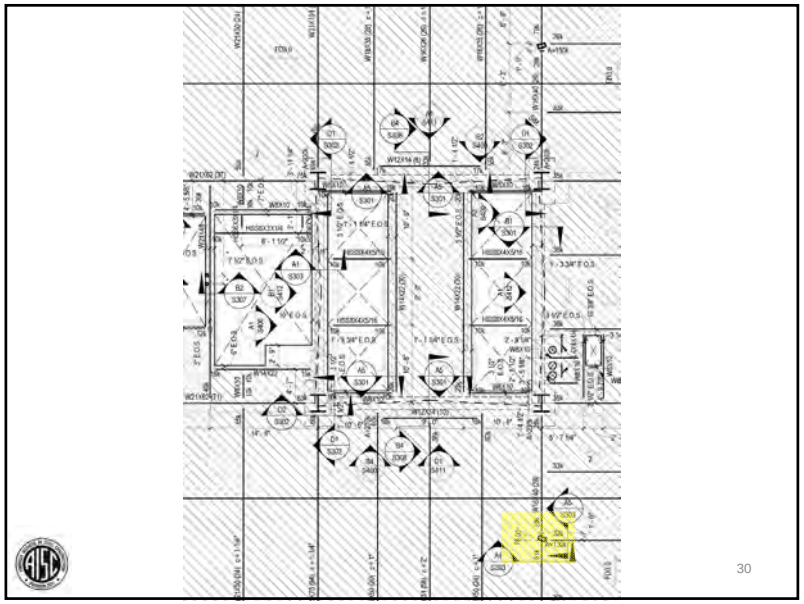
27

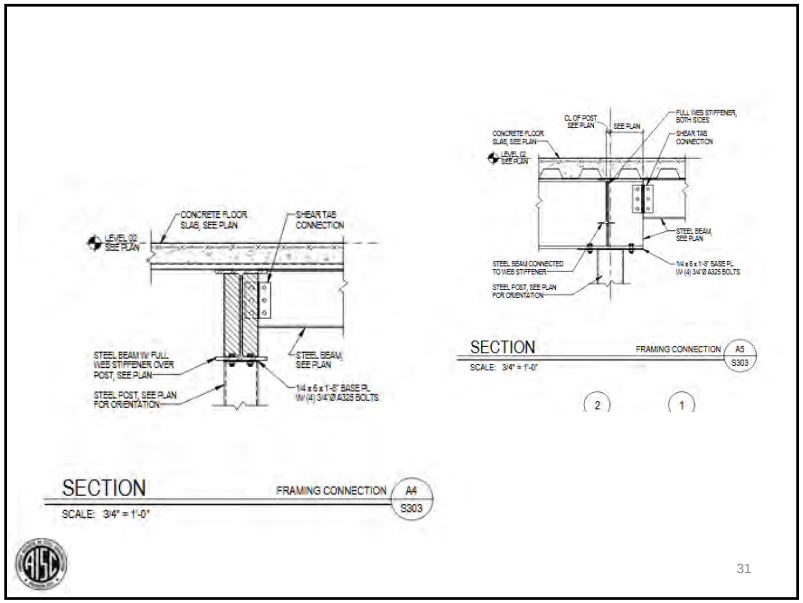


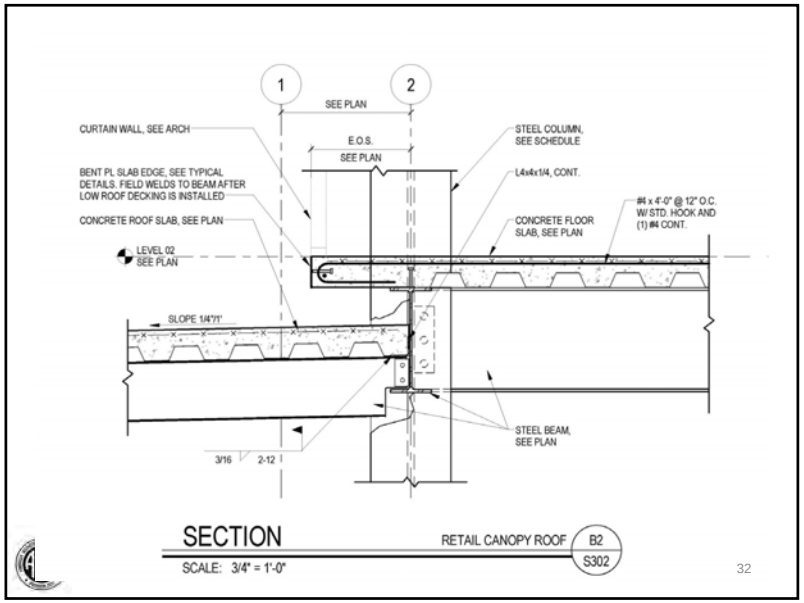
S100
Level 2
Framing Plan

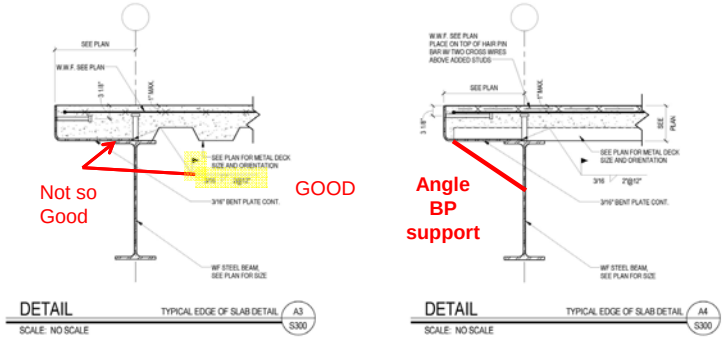
28



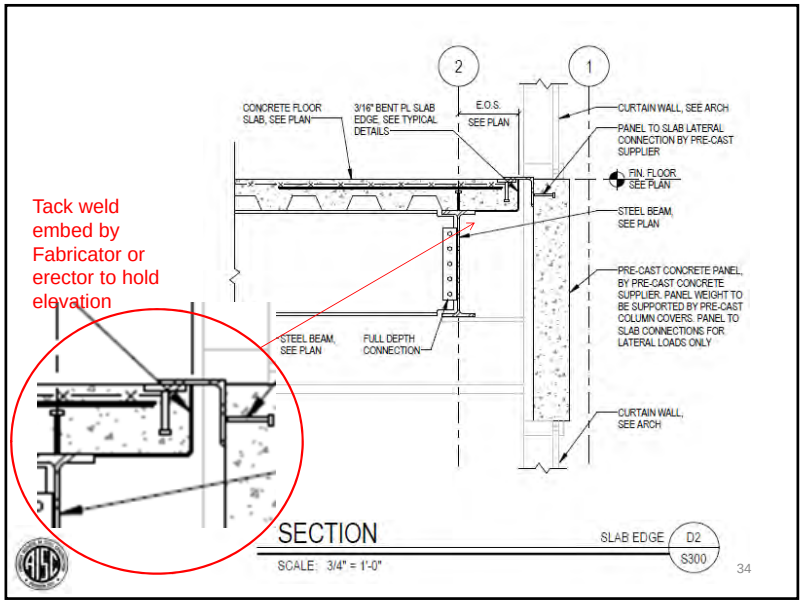



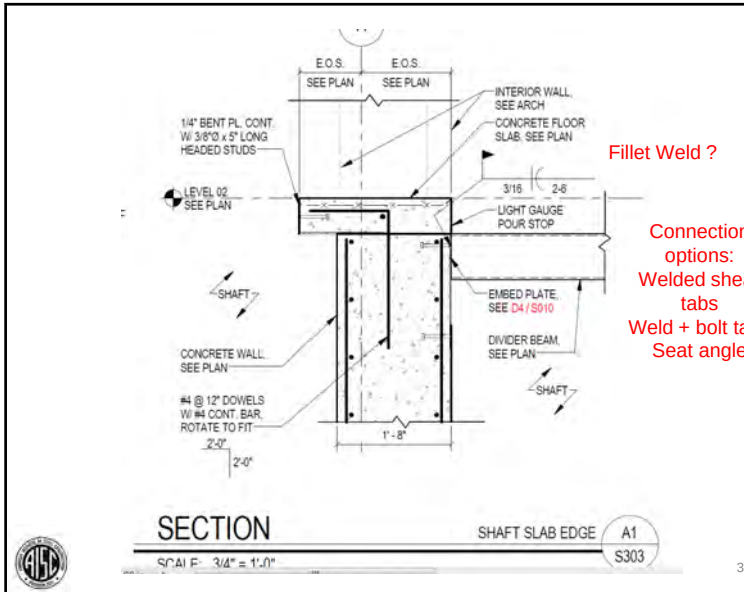



Detail Review

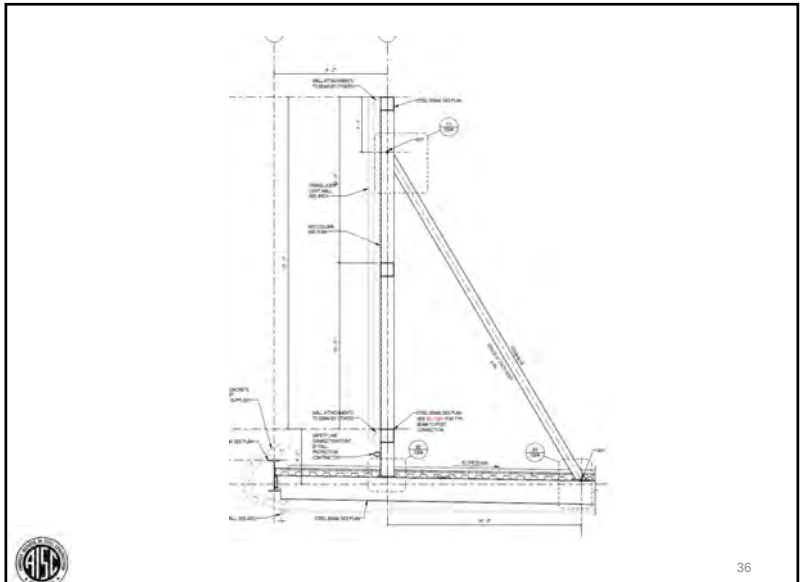
33




34

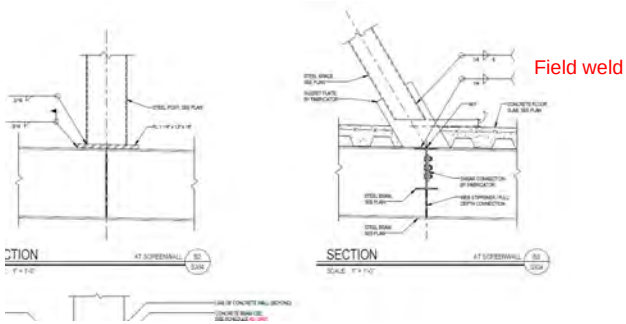



35

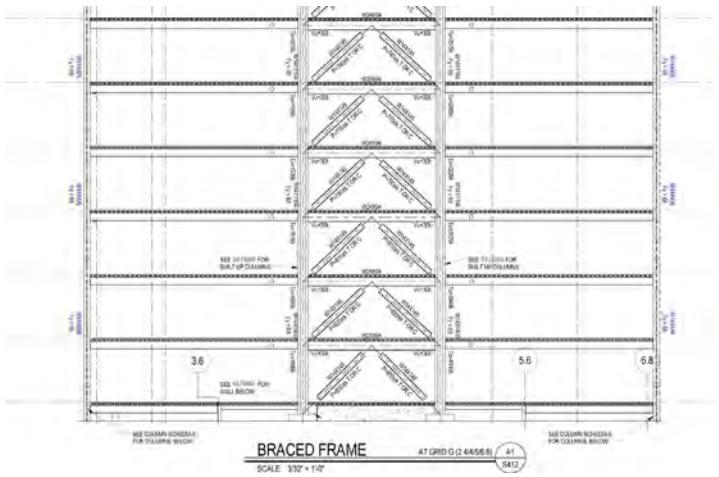


36

Provide bolted field connections to assist location and plumbing
Then field weld to structure.

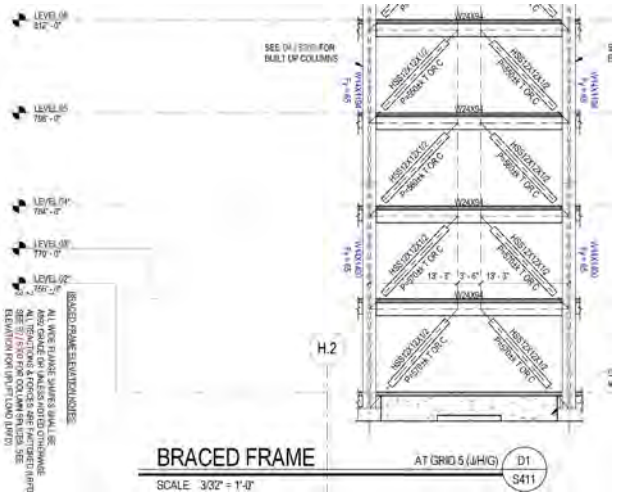



37

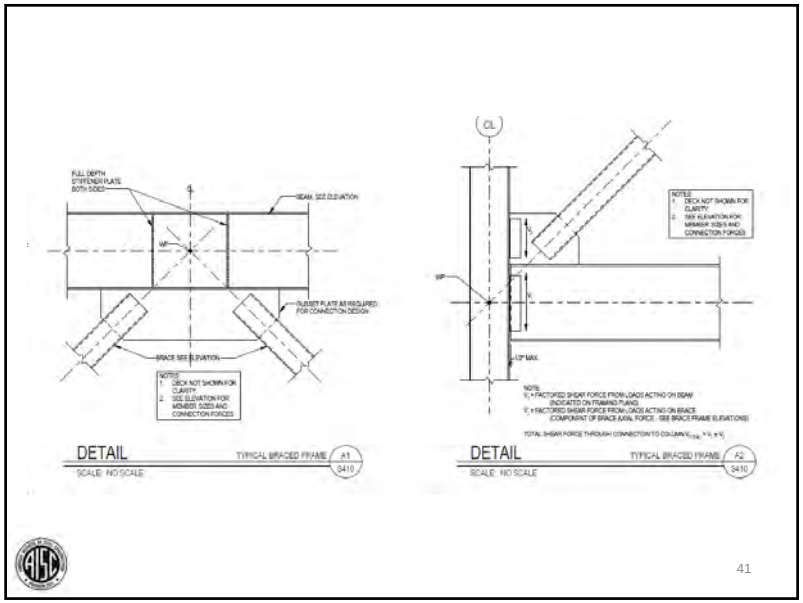



38

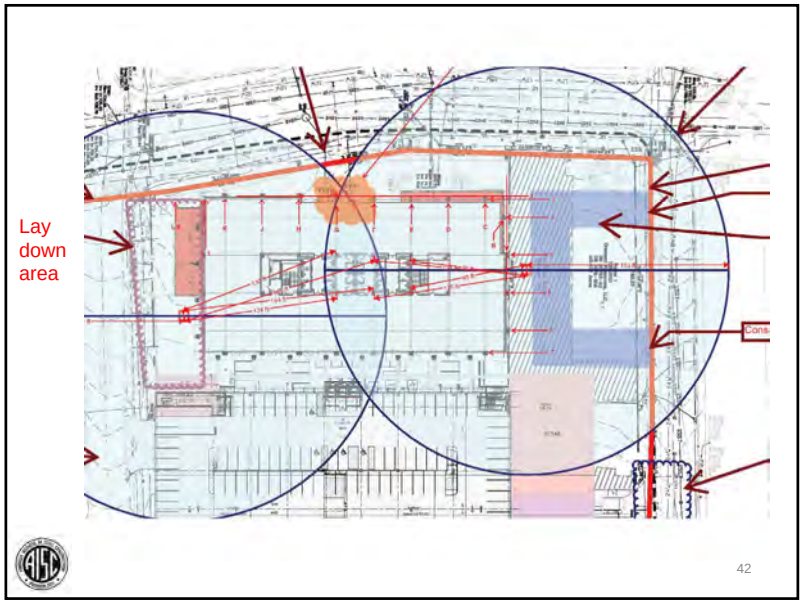

39



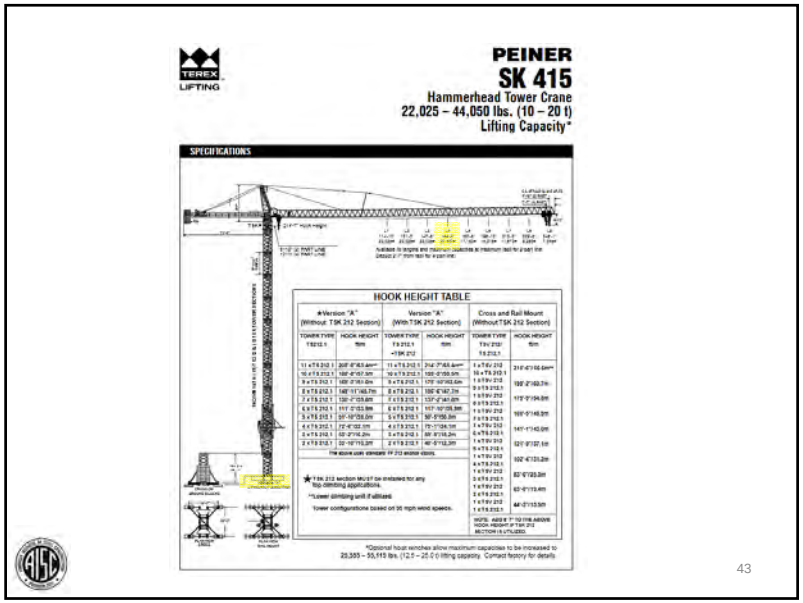

40



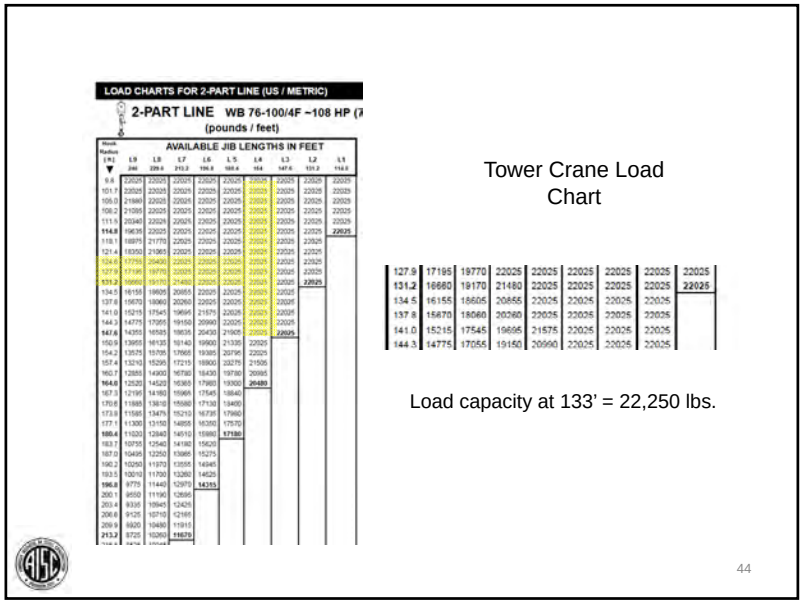

41



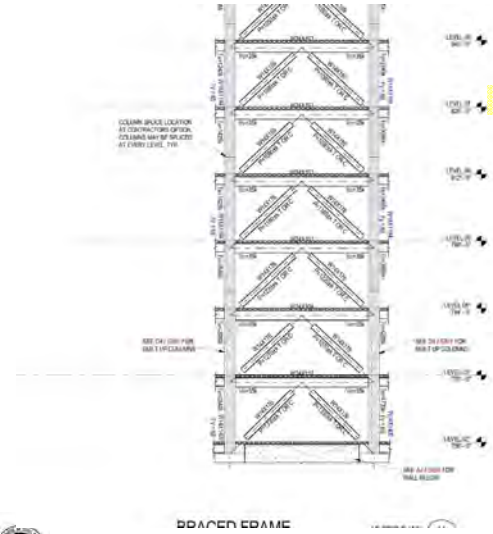

42




43

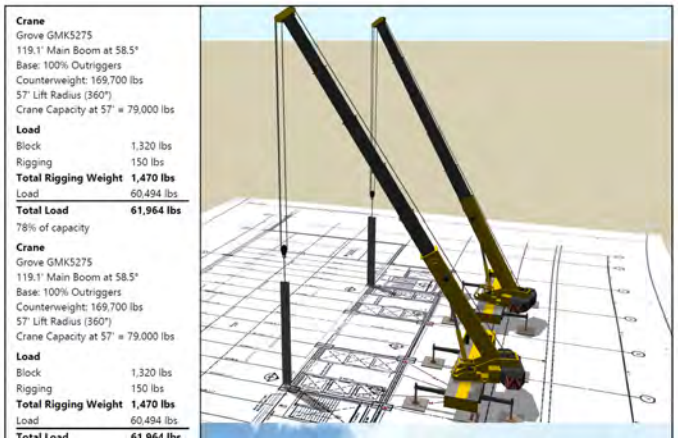



44



Lift Radius 133'
Crane capacity 22,025 lbs.
Safety factor 85%
Allowable load 18,720
Max length of W14 x 1400
Column 13'

45



| | |
|---|---|
| **Crane** | |
| Grove GMK5275 | |
| 119.1' Main Boom at 58.5° | |
| Base: 100% Outriggers | |
| Counterweight: 169,700 lbs | |
| 57' Lift Radius (360°) | |
| Crane Capacity at 57' = 79,000 lbs | |
| **Load** | |
| Block | 1,320 lbs |
| Rigging | 150 lbs |
| **Total Rigging Weight** | **1,470 lbs** |
| Load | 60,494 lbs |
| **Total Load** | **61,964 lbs** |
| 78% of capacity | |


| | |
|---|---|
| **Crane** | |
| Grove GMK5275 | |
| 119.1' Main Boom at 58.5° | |
| Base: 100% Outriggers | |
| Counterweight: 169,700 lbs | |
| 57' Lift Radius (360°) | |
| Crane Capacity at 57' = 79,000 lbs | |
| **Load** | |
| Block | 1,320 lbs |
| Rigging | 150 lbs |
| **Total Rigging Weight** | **1,470 lbs** |
| Load | 60,494 lbs |


46

## Estimate Erection Plan

We know:

- Material Quantities for Erection
- Site conditions for access, shake out, potential use of mobile crane
- Furnished Tower Crane capacity at each pick point
- Piece weight of each crane pick of concern
- Know (or suspect) the need for engineered stability plan
- Desired schedule from GC/Owner
- Contract issues that might drive cost
- Column lengths for Tower crane picks
- Use of large mobile crane at the lower level to avoid cuts
  - Cost of Field welded splice CJP
  - Time required for splice and impact to schedule
  - Do splices need to be complete prior to setting the next tier?
- Shoring and stability requirements
  - Preliminary contact with erection engineer for cost and ideas
- Fabricator's shipping schedule
- Sequences for the job

47

## Estimate Erection Plan cont.

We commit to the plan:

- Critical path Critical activity (often field welding or bolting)
- Staffing for this critical activity
- Equipment for this activity
- Second shift considerations or Overtime
- GC pour schedule drives clean up crew sizes
- Preliminary site specific safety plan
- Office management and field Project Engineer and Ironworker supervision

48

## Williams Erection Company

**Risk & Safety Program**

Site Specific Safety & Erection Plan
Ally Charlotte Center
601 South Tryon Street
Charlotte, North Carolina

49

**Table of Contents - I**



50

**The Not So Good Old Days**

51

## WEC/ASE

**Job Safety Analysis & Training**

**Fall Protection Anchorage**

**Tasks Performed**

We perform many tasks in steel erection that involve fall protection and the requirement to tie off to a proper anchorage. These include
- Steel Erection
- Welding
- Use of Scaffolds
- Climbing Vertical Ladders
- Aerial Lift Operation

**Hazards / Fall Injury Potential**

Erection Activities Exposure You to Hazards & injuries such as:
- Fall from Elevation
- Fall from Scaffold
- Fall from Ladders

Resulting in:
- Broken Bones
- Severe Injury
- Death




**Keys to Controlling the Hazards**

- Only tie off to a proper anchorage capable of withstanding 5000 lbs of force/worker
- Tie off high – above your head if possible to limit fall distance.
- If using a choker, Use only a 5/16" choker for tie off. Use the shortest choker possible to wrap the structural member. Use the choker in basket.
- If using a retractable, affix the retractable to a proper anchorage with the manufacturer supplied carabineer.
- If tying off to a retractable, tie off the retractable hook directly to the harness "D" ring or to a proper "D" ring extension. Never connect a retractable to a shock absorbing lanyard
- WEC/ASE engineered fall protection systems such as skinner lines, rat lines, horizontal life lines must be installed properly under the direction of a competent person and inspected on a daily basis. 2 clamps on each cable. Never saddle a dead horse.
- If using a rope grab, use rope in good condition and keep the rope grab above your head.
- If using a beamer, connect and adjust the beamer correctly.
- In an aerial lift – tie off only to the marked anchorage

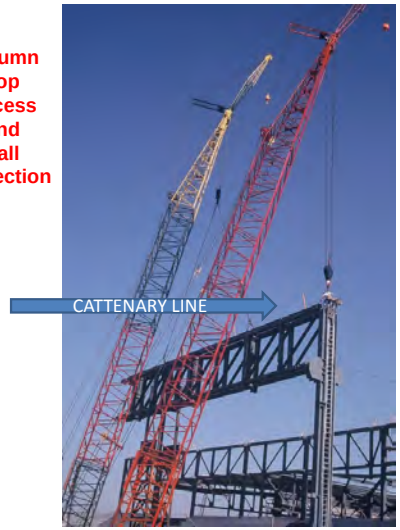
**Protect Yourself & Save Your Life!**

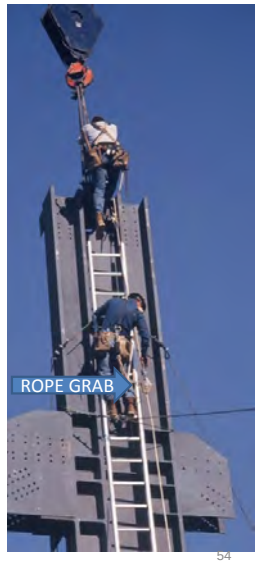
52

**Fall Protection Cable Systems for Stadium Raker Erection**


53

**Column Top Access and Fall Protection**




54

## Gases, vapors, fumes, dusts, mists

- **Engineering controls must be used first where feasible.**
- **When not feasible, PPE must be provided.**
- **PPE is always the last choice for protection.**

55

ATLANTA STEEL ERECTORS & WILLIAMS ERECTION COMPANY
Safety Management System

| | |
|---|---|
| Doc No: | SILICAEXPCNT |
| Initial Issue Date: | 2-8-17 |
| Revision Date: | Initial Version |
| Revision No. | 0 |
| Next Review Date: | 2-8-19 |
| Page: | Page 1 of 15 |

**SILICA EXPOSURE CONTROL**

Preparation: Safety Mgr | Authority: President | Issuing Dept: Safety

**Purpose**

The purpose of the silica exposure control plan (ECP) is to set out our approach to protecting workers from harmful exposure to respirable crystalline silica.

A combination of control measures will be required to achieve this objective. We commit to being diligent in our efforts to select the most effective control technologies available, and to ensure that the best practices, as described in this Exposure Control Plan (ECP), are followed at our worksites.

The work procedures we establish will protect not only our workers but all workers on our worksites. ASE has selected the use of Table 1 for compliance with exposure control program rather than IH sampling method. ASE utilizes DeWalt equipment that has been certified compliant with Table 1 requirements.

**Key Responsibilities**

Due to the significant risk posed by respirable crystalline silica, it is critical that all personnel involved in operations that could potentially create silica dust take specific action to ensure that, as much as possible, a hazard is not created.

**ATLANTA STEEL ERECTORS & WILLIAMS ERECTION COMPANY is responsible for:**

- Substitution of less hazardous products for those that contain crystalline silica is required.
- Ensuring that the materials (e.g., tools, equipment, personal protective equipment) and other resources (i.e., worker training materials) required to fully implement and maintain this exposure control plan (ECP) are readily available where and when they are required.
- Providing a job-specific ECP for each project, which outlines in detail the work methods and practices that will be followed on each site. Considerations will include
  - Availability and delivery of all required tools/equipment
  - Scope and nature of grinding work to be conducted
  - Control methods to be used and level of respiratory protection required
  - Coordination plan

56

# Estimate Erection Plan cont.

We price the plan:

Labor:

- Raising gang(s)
- Plumbing and perimeter safety gang
- Bolt up
- Welding
- Decking
- Stud crew
- Stair crew
- Miscellaneous crew
- Site support
- Travel and per diem
- Weather delay estimate

Equipment:

- Cranes
- Man lifts
- Welding equipment
- Generator (if no power)
- Air compressor
- Hoisting

57

# Pricing continued:

Tools and supplies:

- Welding electrode
- Preheating supplies
- Rigging
- Safety cable
- Posts
- Personal protection equipment
- Fuel
- Small tools
- Delivery

**Formalize the:**

**Erection Scope, Assumptions and Exclusions**

58

**Erection Scope and Provisions**

A. Engineered lift plan and logistics plan is not required or included.
B. Price Based on all wide flange bracing with bolted splices.
C. Welded Column Splices to be converted to PJP to resist indicated loads and an erection load of 200 Kip Feet of Moment.

**PROVISIONS:**

- Access inside and around structure, including all roads, ramps, etc. to be provided and maintained by the general contractor.
- All steel and deck shall be sequenced by Williams Erection Company, delivered to the hook by the fabricator.
- No Marshaling of steel is included in this proposal. Controlling contractor (GC) to provide adequate area for unloading and shakeout of material within reach of the erecting cranes.
- Fabricator to provide a 13/16" diameter hole approximately 1' from each end of the top flange of each beam or girder framing column to column only for safety tie off system. Sketch available upon request.

59

**PROVISIONS CONT'D.**

- Horizontal and vertical control lines to be by the general contractor.
- We include two strands of 3/8" galvanized aircraft cable to be installed at the perimeter and all major interior openings (including roof). Maintenance and removal will be by the general contractor including all handrail posts and becomes the property of the general contractor.
- This proposal is based on the current edition of **AISC "Code of Standard Practice".**
- Power will be provided by the general contractor. 480 Volts, 3-Phase, 600 Amps. Including cost of power, hook up and material.
- All bent plate or continuous angles shall be shipped loose. If plate is loose then shop attach studs or deform anchors to vertical leg. Fabricator to provide outriggers for all bent plate 1'-0" or greater.

60

**PROVISIONS CONT'D.**

- Fabricator to shop assemble all support frames to maximum extent possible.
- Sidelaps of all floor deck shall be "Button Punched".

**Exclusions:**
- Cost of bond
- Waiver of subrogation
- Builders Risk Deductible
- Liquidated Damages in excess of 1% of contract price

61

## Pricing wrap up:

- Total cost (this is truly direct cost)
- Mark up
- Base sales price

- Requested alternates

62

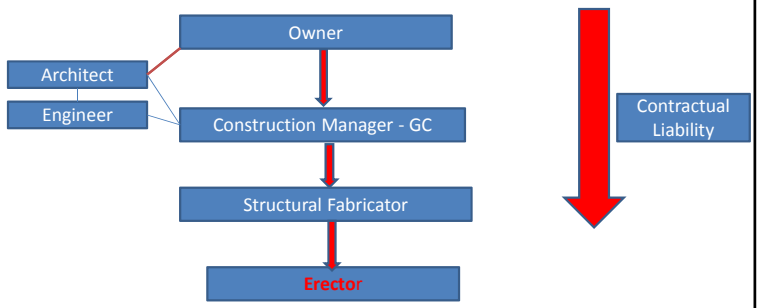
## Bid Types:

- Steel in Place – Fabrication and Erection
- Sealed Bid Erection Only
- Cost plus not to exceed
- Commitment from Fabricator
- Auction

63

## Steel Erection Contractual Relationships

- **Subcontracted to the Structural Fabricator**




64

**Steel Erection Scary Contractual Requirements**

- **Contract flow down** - **Incorporation of all the contracts above**

- **Schedule changes**
- Subcontractor agrees to comply with any schedule for the Project set forth in the Contract Documents, and with any subsequent updates or modifications to the Project schedule issued by the Owner, the Prime Contractor, or Fabricator.
- **Pay if Paid**
  Progress Payments, less applicable retainage, shall be paid to Subcontractor within 7 days after Fabricator receives payment from the Prime Contractor. To the extent enforceable under applicable law, Fabricator's receipt of payment from the Prime Contractor is specifically made a condition precedent to Fabricator's obligation to make payment to the Subcontractor. In the event of such nonpayment by the Owner or Prime Contractor, Subcontractor's rights and remedies shall be the same as those available to Fabricator under the Trade Contract.

65

- **Requirement to proceed without change orders**

  Time of the Essence - The Subcontractor agrees and recognizes that time is of the essence in its performance of this Subcontract Agreement. Subcontractor further recognizes that the Owner, the Prime Contractor, and Fabricator may sustain financial loss if the Project or any part of it is delayed because the Subcontractor fails to perform any or all of its Work in accordance with the Contract Subcontract Agreement. Subcontractor agrees to begin performance when directed by Fabricator and to perform in such a manner, at such times, and in such order as Fabricator may direct, so as not to delay the Project. **Subcontractor agrees that in the event of any claim, dispute or other matter in question arising out of or relating to this Subcontract Agreement (hereinafter "dispute"), the Subcontractor shall continue to diligently perform all obligations as required under this Agreement and will not directly or indirectly stop or delay the Work in any way, notwithstanding the existence of such dispute(s).**

66

With the signing of the contract the marriage is official.
Torchio's two laws of construction contracts:

1. **A bad contract with a good customer is much to be preferred to a good contract with a bad customer**

2. **Perfect performance of the parties obviates the contract.**

**The way to assure the contract stays in the drawer is to perform as expected and communicate with your customer.**

The Golden Rule
Bonding
Legal Process
Mediation
Arbitration
Court

67

## PART TWO
## We have a job!

The marriage occurs for the particular job.

- Contract finalization
- Pre detailing meeting
- Requested changes for ease of erection or economic betterment

68

**Part Two:**

- We have a contract, now what?
- Erector Pre mobilization planning
- Site specific Erection plan
- Engineered Stability Plan
- Doing the Work

69

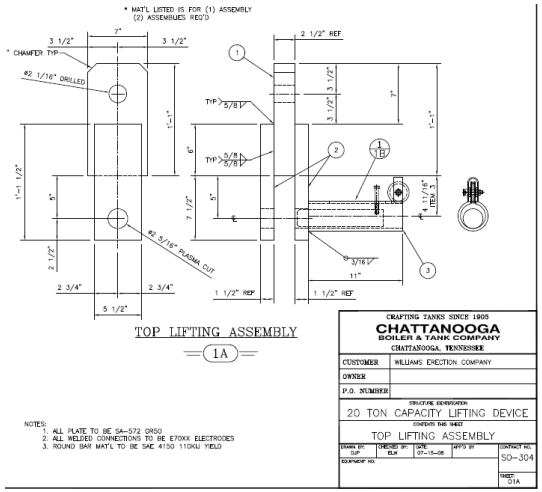
# Pre Mobilization Planning

**Fabricator's pre detailing meeting**

- Finalize sequencing
  - Driven by lay down area, shake out area, delivery restriction for traffic control
- Finalize connection design for erection ease
- Welded splice joint design
- Erection connections for hoisting
- Stability provisions

70

# Column Hitch




71

## Erection Sequence Plan from Site Erection Plan

Note that multipe sequences may arrive on site and be unloaded, cribbed and spread in laydown area or erected directly off of truck. For clarify, we are listing the receiving of each sequence in order. Basic Erection Sequence is to erect columns, erect beams so as to box in floor by floor for column stability in addition to connecting frame to core concrete embeds. This erection plan may be adjusted at the discretion of the WEC project manager and foreman.

**The Basic Sequence Summary Tables Are As Follows:**

**Steel Erection Project Set Up**

| Sequence # | Description – 300 Tryon Tower Erection Set Up |
|---|---|
| Set Up | Verify Field Survey Anchor Bolts and Shear Wall Embeds – All Sequences as Tower Proceeds |
| Set Up | Locate and Set up WEC office and con ex |
| Set Up | Locate and Arrange Electrical for Welding Equipment |
| Set Up | Inspect Rigging and Check Rigging Certification for All Riggers |
| Set Up | Perform WEC safety orientation for initial crew |

**Embed and Connection Material Steel Erection**

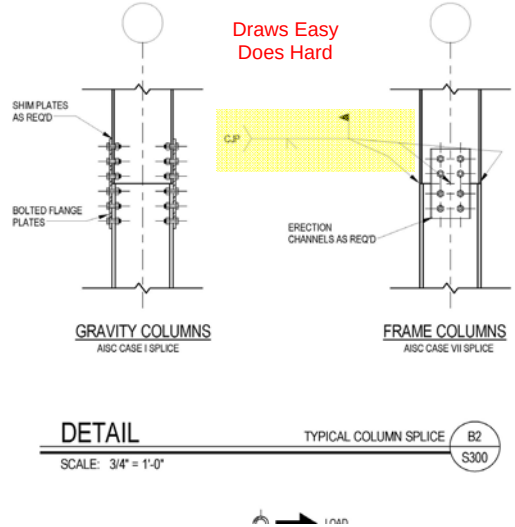
| Sequence # | Embed Sequences |
|---|---|
| 1 | Verify & Install Embeds Below Ground - Follow Embed Drawings |
| 2 | Verify & Install Embeds Ground Floor to Level 5 - Follow Embed Drawings |
| 3 | Verify & Install Embeds Level 6 to Level 5 - Follow Embed Drawings |
| 4 | Verify & Install Embeds Level 16 & Above - Follow Embed Drawings |
| **Sequence #** | **Clips / Connection Material to Concrete** |
| 5 | Verify & Install Clips & Connection Steel Below Ground Floor – Follow Connection Drawings |
| 6 | Verify & Install Clips & Connection Steel Ground Floor to Level 5 |
| 7 | Verify & Install Clips & Connection Steel Level 6 to Level 16 |
| 8 | Verify & Install Clips & Connection Steel Level 16 & Above |
| **Sequence #** | **Canopy @ Level 2 and 3** |
| 9 | Erect Canopy Steel Level 2 Erection on Hold |
| 10 | Erect Canopy Steel Level 3 Erection on Hold |

72

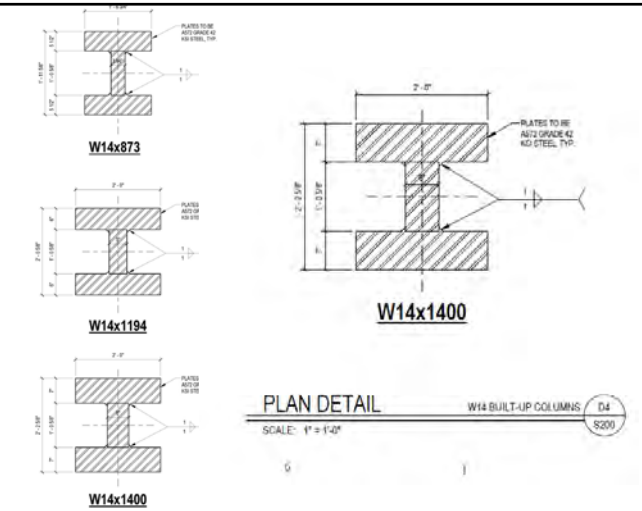
**Tower Steel Erection**

| Sequence # | Sequence Location | Description – 300 Tryon Tower Erection |
|---|---|---|
| 11, 21, 31,41,51 | Ground Floor / Main | Receive Sequence Steel, unload, crib and spread in laydown area or erect off truck |
| 11, 21, 31,41,51 | Ground Floor / Main | Stand columns, level and plumb |
| 11, 21, 31,41,51 | Ground Floor / Main | Erect sequence beams, boxing in columns – install at least 2 bolts per connection |
| 11,21,31,41,51 | Ground Floor / Main | Weld Connections and Column Splices as per drawings |
| 11, 21, 31,41,51 | Ground Floor / Main | Connect Sequence Steel to Embeds and Connections at Core |
| 11, 21, 31,41,51 | Ground Floor / Main | Install plumb cables in accordance with stabilization plan |
| 11,21,31,41,51 | Ground Floor / Main | Final Bolt, Up, Weld, Detail & Deck Sequences & Perimeter Cable |
| 61,71,81 | Ground Floor / Core | Receive Sequence Steel, unload, crib and spread in laydown area or erect off truck |
| 61,71,81 | Ground Floor / Core | Stand columns, level and plumb |
| 61,71,81 | Ground Floor / Core | Erect sequence beams, boxing in columns – install at least 2 bolts per connection |
| 61,71,81 | Ground Floor / Core | Connect Sequence Steel to Embeds and Connections At Core |
| 61,71,81 | Ground Floor / Core | Weld Connections and Column Splices as per drawings |
| 61,71,81 | Ground Floor / Core | Install plumb cables in accordance with stabilization plan |
| 61,71,81 | Ground Floor / Main | Final Bolt, Up, Weld, Detail & Deck Sequences & Perimeter Cable |
| 61,71,81 | Ground Floor / Main | Inspect, Turn Over Floor / Obtain Floor Turnover Documentation |
| Transfer Truss | Ground Floor / Main | Receive and Set Up Leihberr 1220 5.2 Crane & Inspect |
| Transfer Truss | Ground Floor / Main | Inspect & Layout Special Truss Erection Rigging |
| Transfer Truss | Ground Floor / Main | Assemble Transfer Truss in Laydown Area |
| Transfer Truss | Ground Floor / Main | Confirm Inspection and Operator's license for TC-1 21 LC 400 |
| Transfer Truss | Ground Floor / Main | Follow Critical Lift Plan for Transfer Truss |
| Transfer Truss | Ground Floor / Main | Bolt / Weld Truss Connections per Truss Connection Detail |
| 12,22,32,42,52 | 1M / Main | Receive Sequence 5 Steel, unload, crib and spread in laydown area |
| 12,22,32,42,52 | 1M / Main | Erect sequence beams, boxing in columns – install at least 2 bolts per connection |
| 12,22,32,42,52 | 1M / Main | Weld Connections and Column Splices as per drawings |
| 12,22,32,42,52 | 1M / Main | Connect Sequence Steel to Embeds and Connections at Core |
| 12,22,32,42,52 | 1M / Main | Install plumb cables in accordance with stabilization plan |
| 12,22,32,42,52 | 1M / Main | Final Bolt, Up, Weld, Detail & Deck Sequences & Perimeter Cable |
| 62,72,82 | 1M / Core | Receive Sequence Steel, unload, crib and spread in laydown area or erect off truck |
| 62,72,82 | 1M / Core | Erect sequence beams, boxing in columns – install at least 2 bolts per connection |

73




74




75

**Complete Joint Penetration (CJP) for W14 x 1194**

Assume 30 degree bevel, 3/8 root - AWS D1.1
Prequalified B U 4a (leaving out the web)

Flange weld area 6" X 3.46" X 24" = 498 $in^3$
Root opening 2 @ 6" X .375 X 24" = 108$in^3$
Run off tabs 4@ (6"X 3.46 X 2")/2 = 83$in^3$

**Total Volume 690 $in^3$ Steel weight 193 lbs.**
**FCAW weight 230 lbs.**

Assuming a welder deposits 35 lbs. of FCAW an 8 hour shift this is a **6.5 Man day column splice**

76

77

78

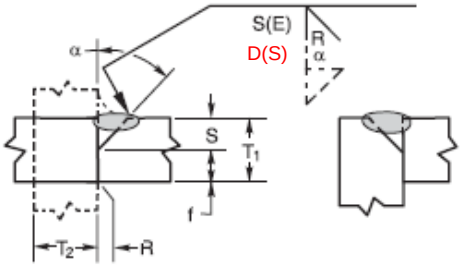
79

**AWS D1.1 Currently** S E
**AWS D1.1 D 2020** D S

| CL | Level | upper col | lower col | Tension | | |
|---|---|---|---|---|---|---|
| F5 | 4 | W14x1194 | W14x1400 | 4295 | 3.25 | 3.125 |
| F5 | 6 | W14x1194 | W14x1194 | 3570 | 2.75 | 2.625 |
| F5 | 8 | W14x1194 | W14x1194 | 2885 | 2.375 | 2.25 |
| F5 | 10 | W14x873 | W14x1194 | 2235 | 2.375 | 2.25 |
| F5 | 12 | W14x808 | W14x873 | 1645 | 1.875 | 1.75 |
| F5 | 15 | W14x605 | W14x808 | 1110 | 1.625 | 1.5 |
| F5 | 17 | W14x257 | W14x605 | 675 | 1.25 | 1.125 |
| F5 | 19 | W14x257 | W14x257 | 285 | 0.875 | 0.75 |
| F5 | 21 | W14x257 | W14x257 | 105 | 0.75 | 0.625 |
| F5 | 23 | W14x257 | W14x257 | 165 | 0.875 | 0.75 |
| F5 | 25 | W14x257 | W14x257 | 220 | 0.875 | 0.75 |
| F5 | 27 | W14x90 | W14x257 | 55 | NA | CJP |
| G4 | 4 | W14x1194 | W14x1400 | 1510 | 1.5 | 1.375 |
| G4 | 6 | W14x1194 | W14x1194 | 1165 | 1.25 | 1.125 |
| G4 | 8 | W14x1194 | W14x1194 | 860 | 1.125 | 1 |
| G4 | 10 | W14x873 | W14x1194 | 580 | 1.125 | 1 |
| G4 | 12 | W14x808 | W14x873 | 355 | 0.875 | 0.75 |
| G4 | 15 | W14x605 | W14x808 | 170 | 0.75 | 0.625 |
| G4 | 17 | W14x257 | W14x605 | 21 | 0.625 | 0.5 |
| G4 | 19 | W14x257 | W14x257 | 0 | 0.625 | 0.5 |
| G4 | 21 | W14x257 | W14x257 | 155 | 0.75 | 0.625 |
| G4 | 23 | W14x257 | W14x257 | 355 | 1 | 0.875 |
| G4 | 25 | W14x257 | W14x257 | 530 | 1.125 | 1 |
| G4 | 27 | W14x90 | W14x257 | 85 | NA | CJP |
| G5 | 4 | W14x1194 | W14x1400 | 3575 | 2.75 | 2.625 |
| G5 | 6 | W14x1194 | W14x1194 | 2885 | 2.375 | 2.25 |
| G5 | 8 | W14x1194 | W14x1194 | 2285 | 2 | 1.875 |

PJP Welds sized per tension and moment loads
and use of 70 KSI Filler Metal

80




81

**PJP for W14 x 1194**

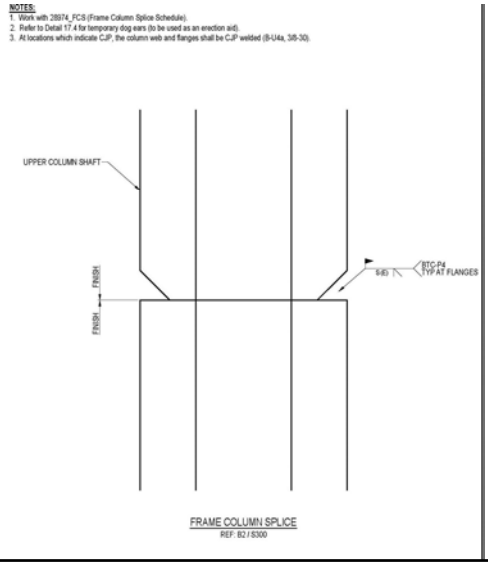
Assume 45 degree bevel, AWS D1.1 Prequalified BTC P4 GF
Weld Groove from Table 3.25"
Flange weld area 3.25" X 3.25" X 24" = 254 $in^3$
Root opening 0
Run off tabs 4@ (3.25"X 3.25 X 1.5")/2 = 32$in^3$

Total Volume 286 $in^3$ Steel weight 80 lbs. FCAW weight 95 lbs.

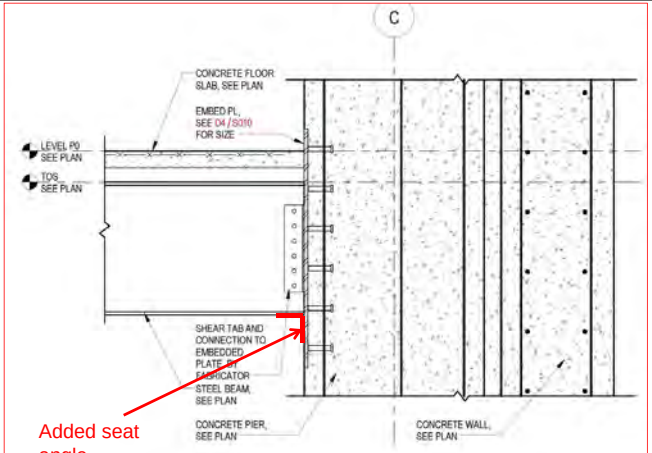
Assuming a welder deposits 50 lbs. of FCAW an 8 hour shift this is a 1.9 Man day column splice

Labor saving by using PJP = 4.6 man days
Direct labor cost at $50 per hour = $1,840
Indirect savings ??

82




83




84

## Some Interesting Jobs and Special Erection Considerations

85

86

87

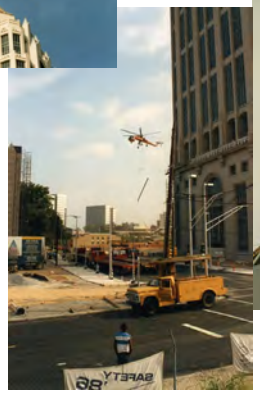

88

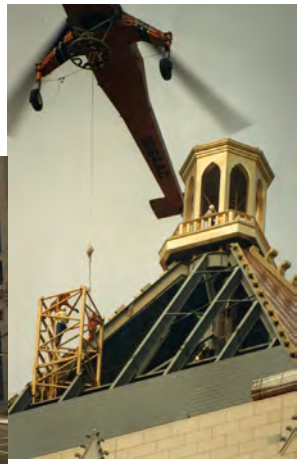
89

Multi Crane Combinations

Concrete cored building with exterior cranes tied off to the core prevented cranes going higher.
Third crane installed to complete skin and steel erection

90





**Alternative Hoisting**
**20,000 Lb. Capacity**

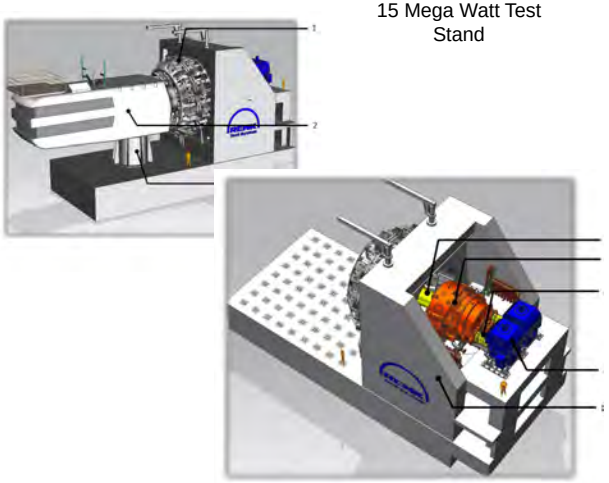
91

Precision Placement of Concrete Embed

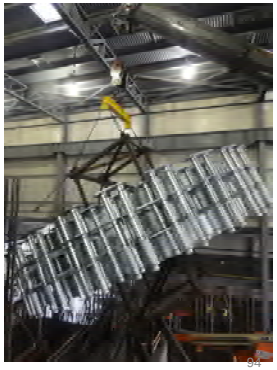
Small (relatively) but Precise

92

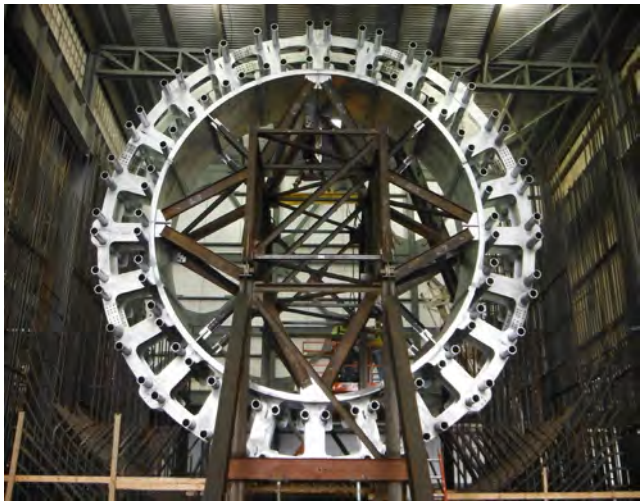
15 Mega Watt Test Stand



93

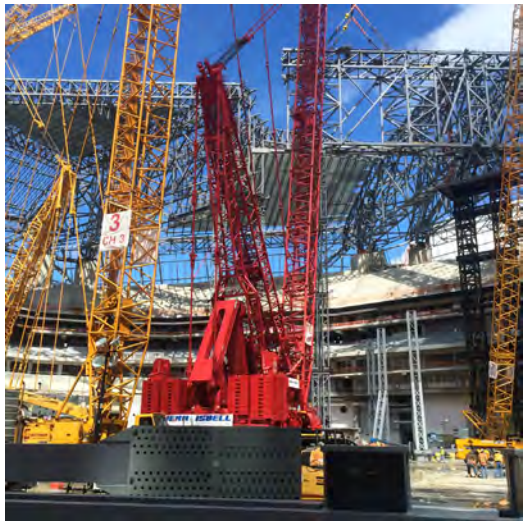


94

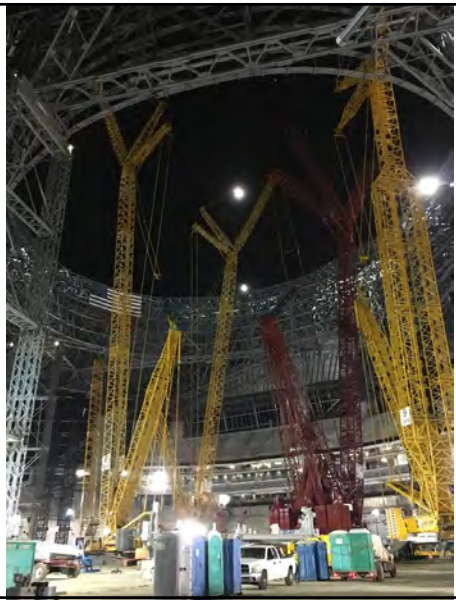


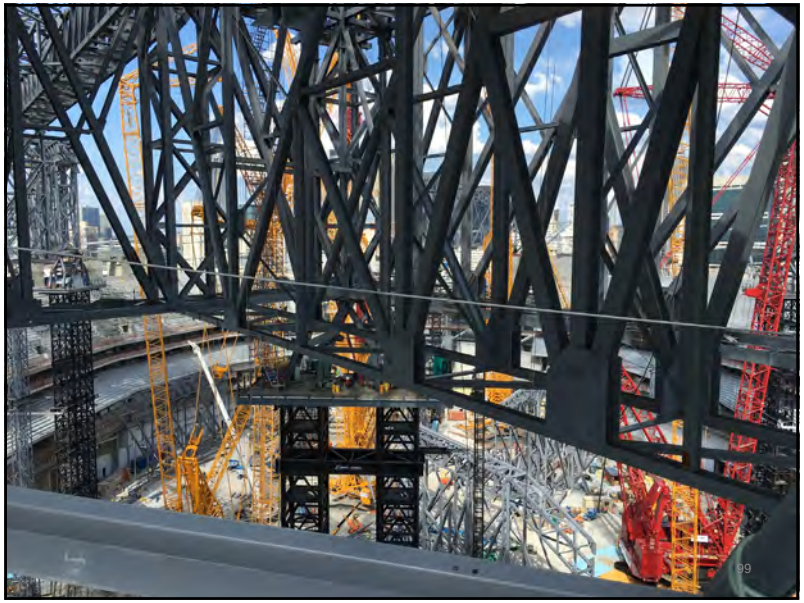
95

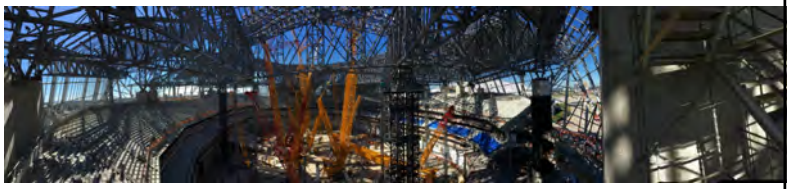
Large Cranes
600 Ton Lifts

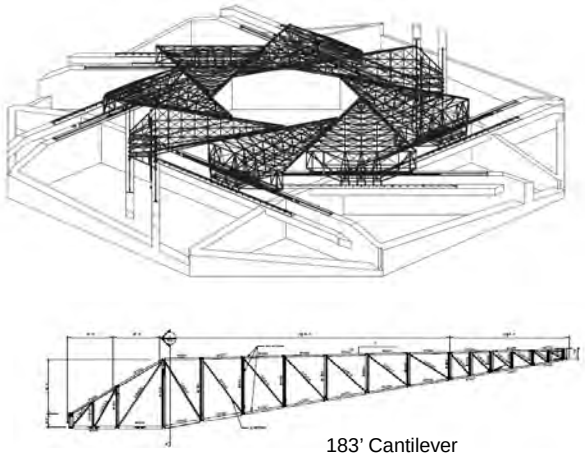


96



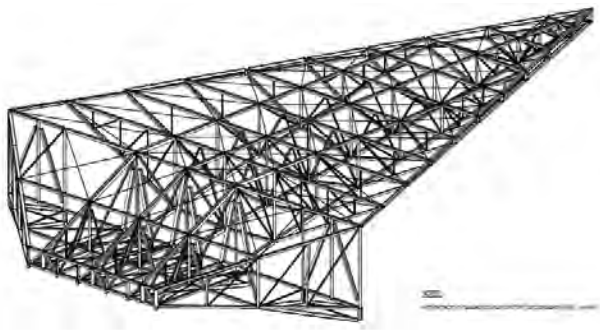





183' Cantilever

101



102

103

**Thanks to Tim Duke, CWI for these Pictures**

104

Alternative to use of large cranes:

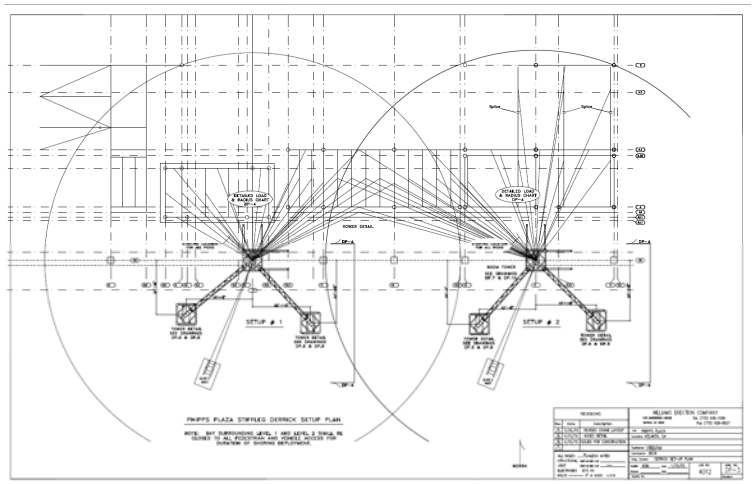
Derrick VS 500 ton Truck Crane

$3,500/ Month

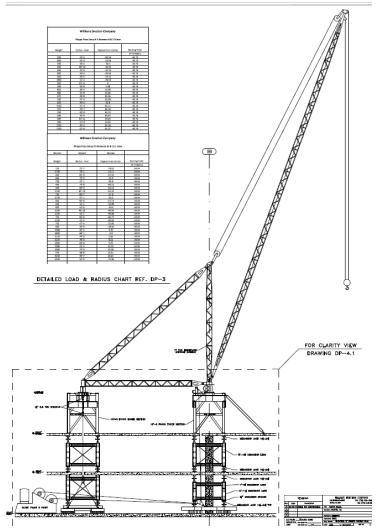
VS

$4,000/ day

105




106



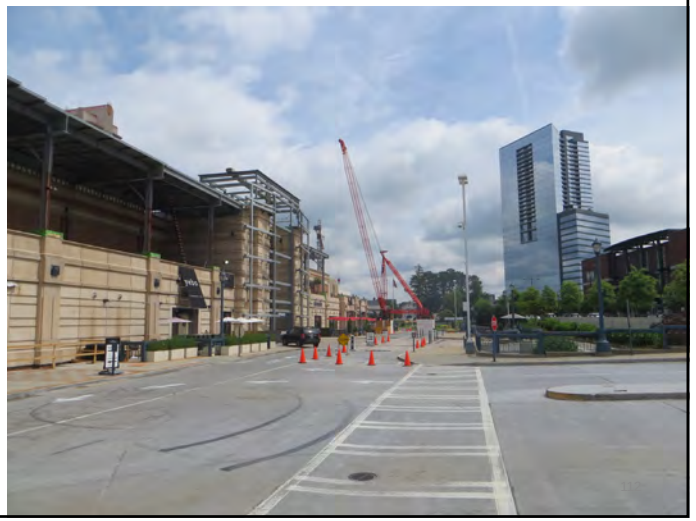

107

**Williams Erection Company**

**Phipps Plaza Setup # 1 Between 8 & 12 Lines**

| Weight | Radius - Feet | Degree From Center | Starting Point |
|---|---|---|---|
| | | | 14'-0 Radius |
| 390 | 34'-9 | -60.24 | -43.76 |
| 820 | 43'-9 | -52.04 | -43.76 |
| 300 | 48'-0 | -40.5 | -43.76 |
| 650 | 38'-10 | -46.13 | -43.76 |
| 650 | 32'-9 | -34.74 | -43.76 |
| 800 | 39'-2 | -20.94 | -43.76 |
| 650 | 28'-5 | -19.12 | -43.76 |
| 1850 | 22'-2 | -39.06 | -43.76 |
| 650 | 26'-11 | 0 | -43.76 |
| 300 | 36'-8 | 5.08 | -43.76 |
| 855 | 28'-0 | 13.39 | -43.76 |
| 680 | 33'-8 | 24.56 | -43.76 |
| 370 | 48'-8 | 25.56 | -43.76 |
| 500 | 37'-5 | 29.59 | -43.76 |
| 920 | 40'-2 | 35.8 | -43.76 |
| 1150 | 41'-9 | 42.11 | -43.76 |
| 370 | 29'-7 | 44.18 | -43.76 |
| 730 | 60'-9 | 43.72 | -43.76 |
| 500 | 46'-9 | 45.87 | -43.76 |
| 500 | 50'-11 | 50.24 | -43.76 |
| 500 | 55'-4 | 53.94 | -43.76 |
| 1750 | 47'-0 | 63.16 | -43.76 |
| 1150 | 63'-9 | 61.32 | -43.76 |

108



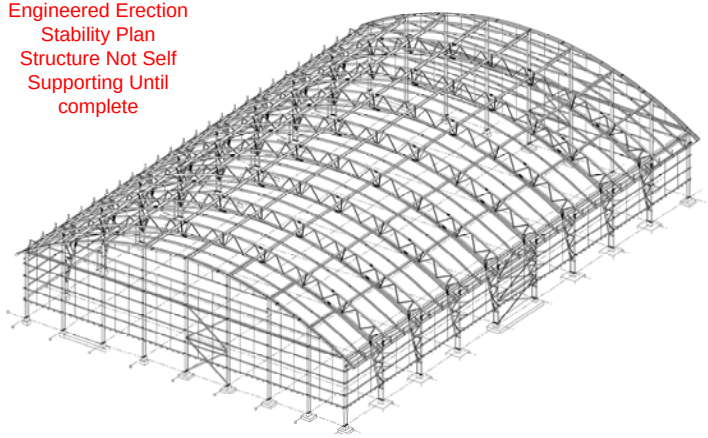
## Engineered Erection Plans

## Big and Light

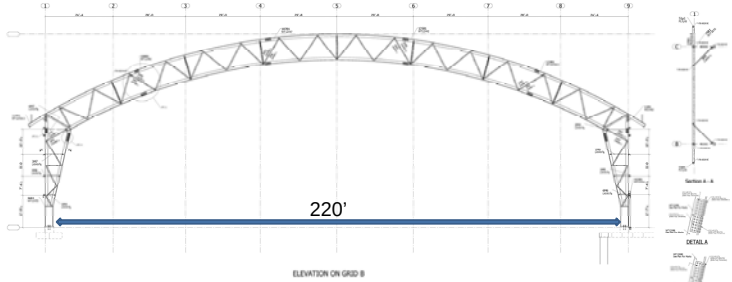
## Big and Heavy

113

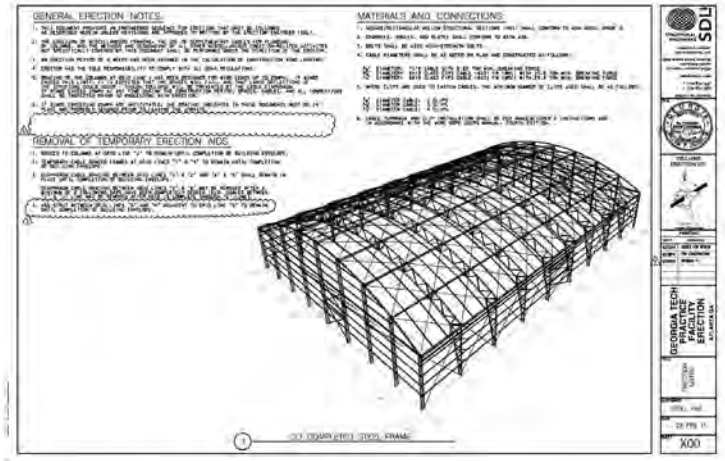
**Georgia Tech Football Practice Facility**
Engineered Erection Stability Plan
Structure Not Self Supporting Until complete



114




115




116

## GENERAL ERECTION NOTES:

1. THIS DOCUMENT PROVIDES AN ENGINEERED SEQUENCE FOR ERECTION THAT MUST BE FOLLOWED AS DESCRIBED HEREIN UNLESS REVISIONS ARE APPROVED IN WRITING BY THE ERECTION ENGINEER (SDL).
2. THE ERECTION OF MISCELLANEOUS FRAMING, THE USE OF SUPPLEMENTARY CABLES FOR PLUMBING OF COLUMNS, AND THE METHODS AND SEQUENCING OF ALL OTHER MISCELLANIOUS ERECTION-RELATED ACTIVITES NOT SPECIFICALLY COVERED BY THIS DOCUMENT SHALL BE PERFORMED UNDER THE DIRECTION OF THE ERECTOR.
3. AN ERECTION PERIOD OF 6 WEEKS HAS BEEN ASSUMED IN THE CALCULATION OF CONSTRUCTION WIND LOADING.
4. ERECTOR HAS THE SOLE RESPONSIBILITY TO COMPLY WITH ALL OSHA REGULATIONS.
5. BRACING OF THE COLUMNS AT GRID LINE J HAS BEEN DESIGNED FOR WIND LOADS UP TO 25MPH. IF WINDS EXCEED THIS LIMIT, IT IS EXPECTED THAT THE BRACES WILL FAIL, AND THAT LARGE DEFLECTIONS OF THE STRUCTURE COULD OCCUR - THOUGH COLLAPSE WILL BE PREVENTED BY THE CABLE DIAPHRAGM. IF WINDS EXCEED 25MPH AT ANY TIME DURING THE CONSTRUCTION PERIOD, BRACES, CABLES, AND ALL CONNECTIONS SHALL BE INSPECTED PRIOR TO PROCEEDING WITH ERECTION.
6. IF WINDS EXCEEDING 25MPH ARE ANTICIPATED, THE BRACING INDICATED IN THESE DOCUMENTS MUST BE IN PLACE AND PROPERLY SECURED PRIOR TO LEAVING THE JOBSITE.

## REMOVAL OF TEMPORARY ERECTION AIDS

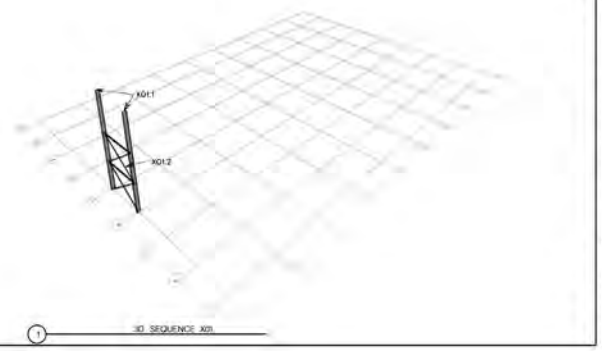
1. BRACES TO COLUMNS AT GRID LINE "J" TO REMAIN UNTIL COMPLETION OF BUILDING ENVELOPE.
2. TEMPORARY CABLE BRACED FRAMES AT GRID LINES "1" & "9" TO REMAIN UNTIL COMPLETION OF BUILDING ENVELOPE.
3. DIAPHRAGM CABLE BRACING BETWEEN GRID LINES "1" & "2" AND "8" & "9" SHALL REMAIN IN PLACE UNTIL COMPLETION OF BUILDING ENVELOPE.

   DIAPHRAGM CABLE BRACING BETWEEN GRID LINES "2" & "8" MAY BE REMOVED AFTER A MINIMUM OF 2 FOLLOWING BAYS HAVE BEEN COMPLETELY DECKED (E.G. CABLES BETWEEN "1" & "3" LINE MAY BE REMOVED AFTER DECK IS COMPLETE THROUGH "G" LINE).
4. HSS STRUT BETWEEN GRID LINES "G" AND "H" ADJACENT TO GRID LINE "9" TO REMAIN UNTIL COMPLETION OF BUILDING ENVELOPE.

117

X01.1 ERECT W30 COLUMNS AT GRID LINES J-4 AND J-5.
X01.2 ERECT PERMANENT HORIZONTAL BRACING BETWEEN COLUMNS.

NOTE: IF WIND SPEED IS ANTICIPATED TO EXCEED 25MPH, COLUMN BRACES SHALL BE IN PLACE IN ACCORDANCE WITH SHEETS X03 AND X04.



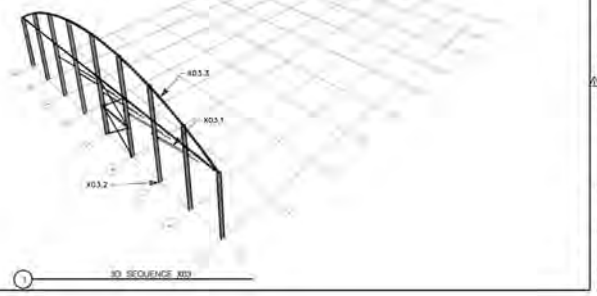

3D SEQUENCE X01

SDL
GEORGIA TECH PRACTICE FACILITY ERECTION
X01

118

X03.1 ERECT TILT-UP BRACES TO W30 COLUMNS AT GRIDS J-3, J-4, J-5, J-6, AND J-7. SEE SHEET X04 FOR DETAILS.
X03.2 WELD PLATE WASHERS TO TOP OF BASE PLATES AT COLUMNS ON GRID LINE J WITH ¼" FILLET WELDS ALL AROUND.
X03.3 ERECT W12 ARCH BEAM AT TOP OF W30 COLUMNS.

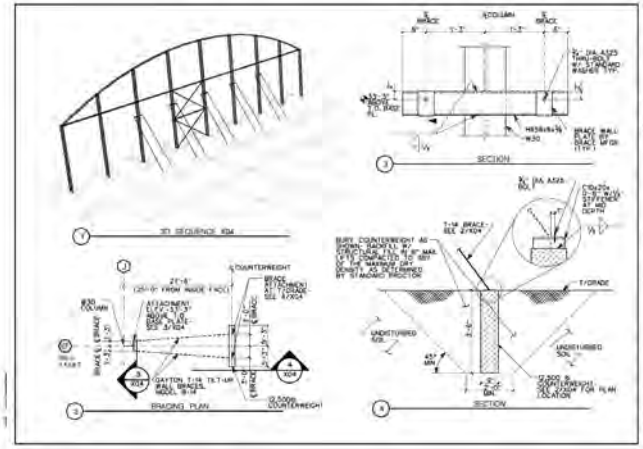
NOTE: IF WIND SPEED IS ANTICIPATED TO EXCEED 25MPH PRIOR TO SETTING OF TRUSS AT GRID LINE J, COLUMNS AT GRID LINES J-1, J-2, J-8, AND J-9 SHALL BE GUYED TO 2000LB MIN. DEADMEN IN EACH DIRECTION OR TEMPORARILY TAKEN DOWN.




3D SEQUENCE X03

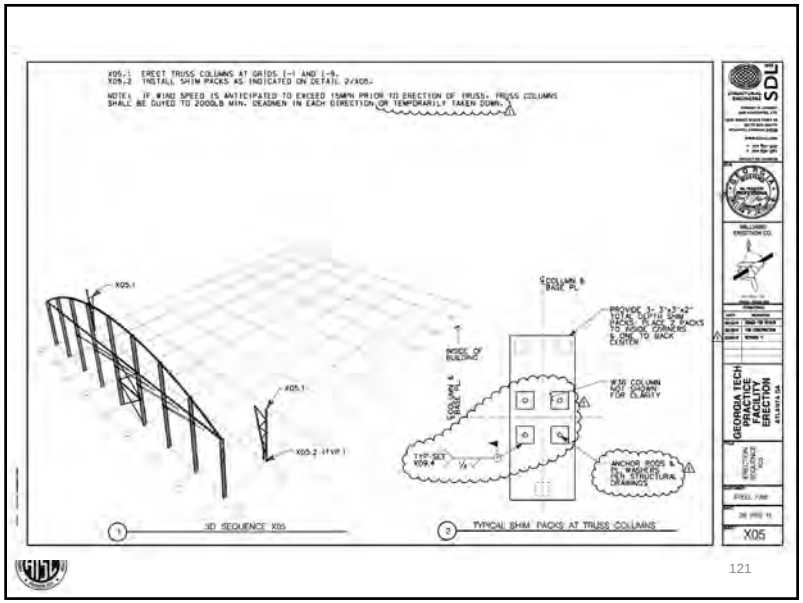
SDL
GEORGIA TECH PRACTICE FACILITY ERECTION
X03

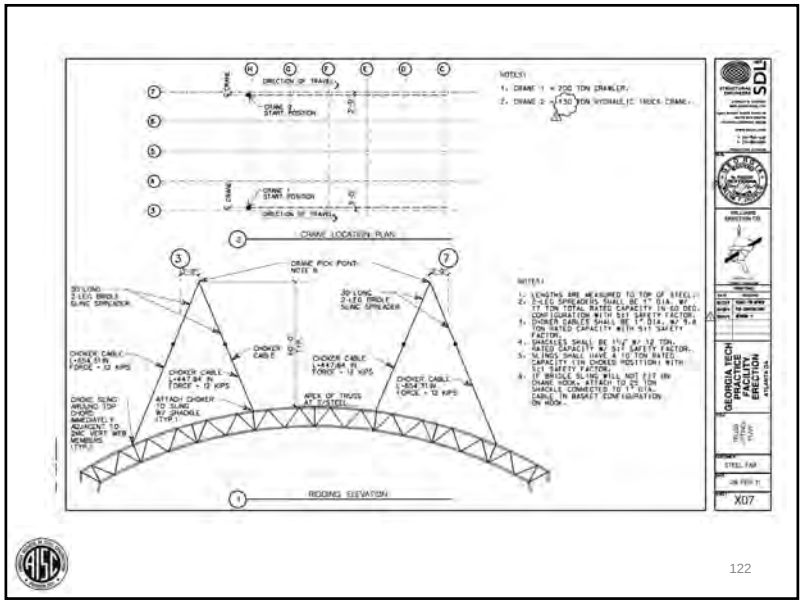
119

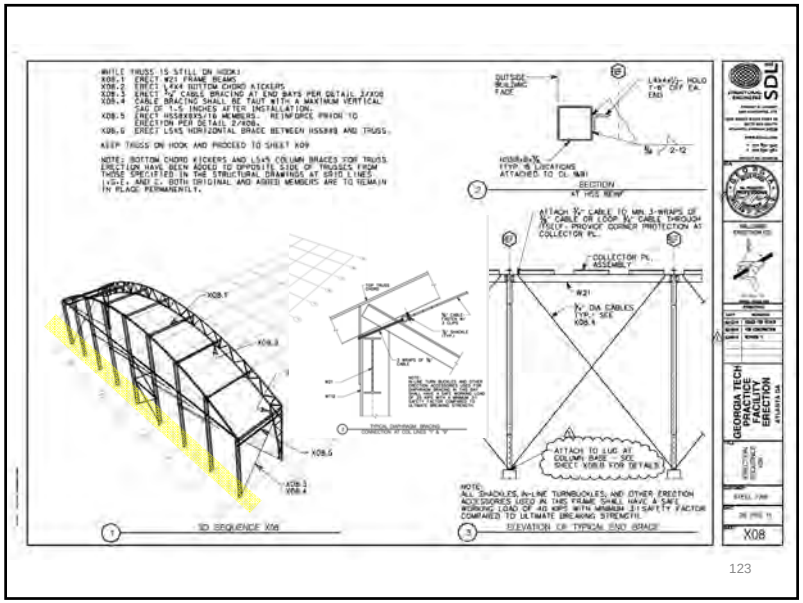


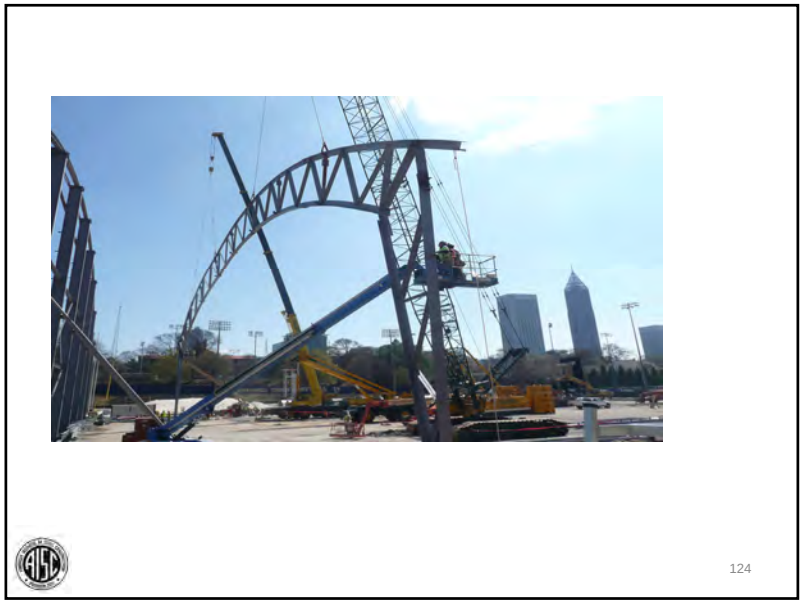

SDL
GEORGIA TECH PRACTICE FACILITY ERECTION
X04

120



**Big and Heavy**


Project: RSA Judicial Office Building
Location: Montgomery, AL
GC: Bailey Harris
Fabricator: SteelFab

Project consisted of 3- 150 ft. span two story transfer trusses supporting a nine story building over a National Historic Register Building in downtown Montgomery. The trusses were assembled in place utilizing an outrigger skyhook system anchored to the adjacent concrete structure for the first truss. Truss elevation was managed by hydraulic jacking system.

Engineered erection plan and procedure was provided

Total Truss Weight for Each Truss – 300 tons fully assembled.

Hoisting by 500 ton hydraulic Liehbherr Luffing Crane

125


**Project:** RSA Judicial Office Building
**Location:** Montgomery, AL
**GC:** Bailey Harris
**Fabricator:** SteelFab

**Erection and assembly of the final truss sections supported by the skyhook system connected to previously erected trusses. Each truss consisted of over 400 lf. of field welding and 16,000 bolts per truss.**

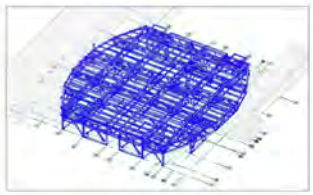
126

# ERECTION NOTES

## GENERAL ERECTION NOTES

## MATERIALS AND CONNECTIONS

**Erection Stability Plan for Heavy Structure with Life Safety Issues**



3D OVERALL PODIUM VIEW

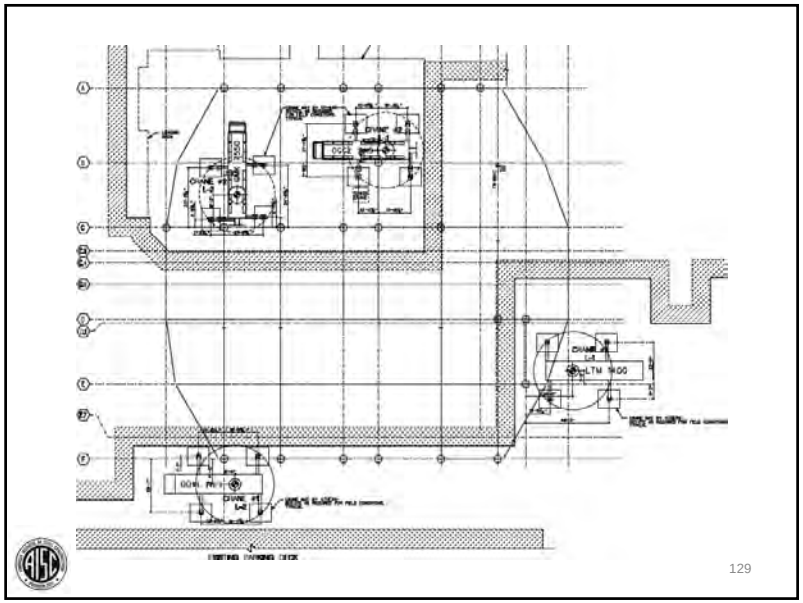
SDL

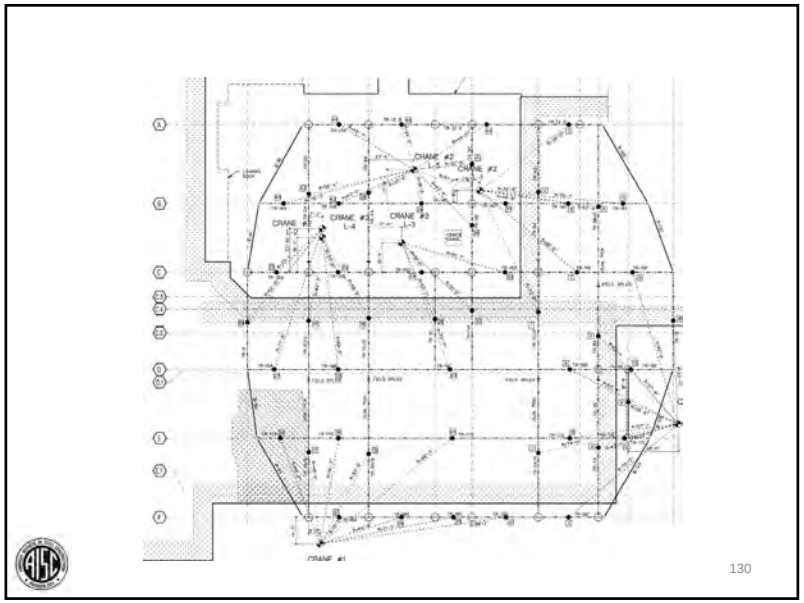
ERECTION NOTES
STEELFAB
06/05/11
X5-1

127

1. THIS DOCUMENT PROVIDES AN ENGINEERED SEQUENCE FOR ERECTION THAT MUST BE FOLLOWED AS DESCRIBED HEREIN UNLESS REVISIONS ARE APPROVED IN WRITING BY STANLEY D. LINDSEY AND ASSOCIATES (SDL).
2. THE ERECTION OF MISCELLANEOUS FRAMING, THE USE OF SUPPLEMENTARY CABLES FOR PLUMBING OF COLUMNS, AND THE METHODS AND SEQUENCING OF ALL OTHER MISCELLANEOUS ERECTION#RELATED ACTIVITIES NOT SPECIFICALLY COVERED BY THIS DOCUMENT SHALL BE PERFORMED UNDER THE DIRECTION OF THE ERECTOR.
3. AN ERECTION PERIOD OF SIX WEEKS TO ONE YEAR HAS BEEN ASSUMED FOR THE PODIUM STEEL IN THE CALCULATION OF CONSTRUCTION WIND LOADING.
4. ERECTOR HAS THE SOLE RESPONSIBILITY TO COMPLY WITH ALL OSHA REGULATIONS.
5. CONNECTION DESIGN OF TRUSS CONNECTIONS FOR CONSTRUCTION LOADING WAS DELEGATED TO STEELFAB INC. FINAL CONSTRUCTION FORCES WERE PROVIDED TO STEELFAB BY SDL ON JUNE 20, 2011, WITH A SUPPLEMENTARY EMAIL DATED JULY 29, 2011.
6. THE ANALYSIS AND DESIGN OF TEMPORARY BRACED FRAMES AND THEIR CONNECTIONS FOR ERECTION WAS PERFORMED BY SDL AS ILLUSTRATED IN THE X4 SERIES DRAWINGS DATED JUNE 20, 2011.
7. THE GENERAL ERECTION SEQUENCING INFORMATION PROVIDED IN THIS DOCUMENT SHALL BE USED IN CONJUNCTION WITH THE DETAILED ERECTION DRAWINGS PROVIDED BY STEELFAB INC.
8. MEMBERS ILLUSTRATED WITHIN EACH SEQUENCE IN RED ARE NEW TO THAT SEQUENCE, AND MEMBERS ILLUSTRATED IN BLUE HAVE BEEN PREVIOUSLY ERECTED.
9. THE EXACT ORDER OF THE SUB#STEPS (LETTERED A, B, C, ETC) WITHIN EACH MAIN TRUSS ERECTION STEP IS NOT CRITICAL PROVIDED THAT ALL STEPS ARE COMPLETE PRIOR TO RELEASING THE TRUSS SECTION FROM THE CRANE.
10. ALL COLUMN BASEPLATES MUST BE GROUTED AND GROUT MUST ACHIEVE 75% OF ITS SPECIFIED 28#DAY COMPRESSIVE STRENGTH PRIOR TO ERECTION OF THE SUPPORTED TRUSS SECTION.
11. SEE STEELFAB SHEET E250 FOR TYPICAL TRUSS DETAILS INCLUDING ERECTION SEQUENCING INFORMATION FOR THE COMPLETION OF TRUSS CHORD SPLICES, WING PLATE CONNECTIONS, LOOSE COVER PLATES, AND TEMPORARY GUSSET ERECTION AIDS.

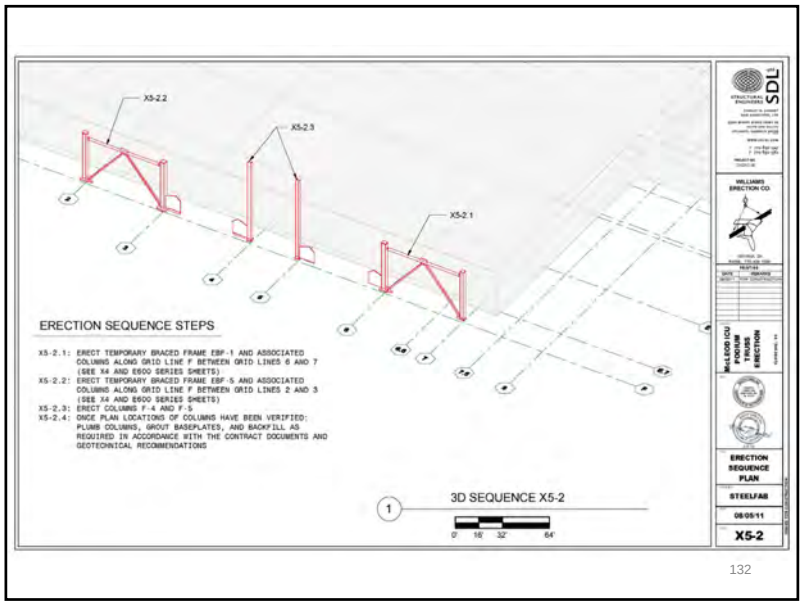
128

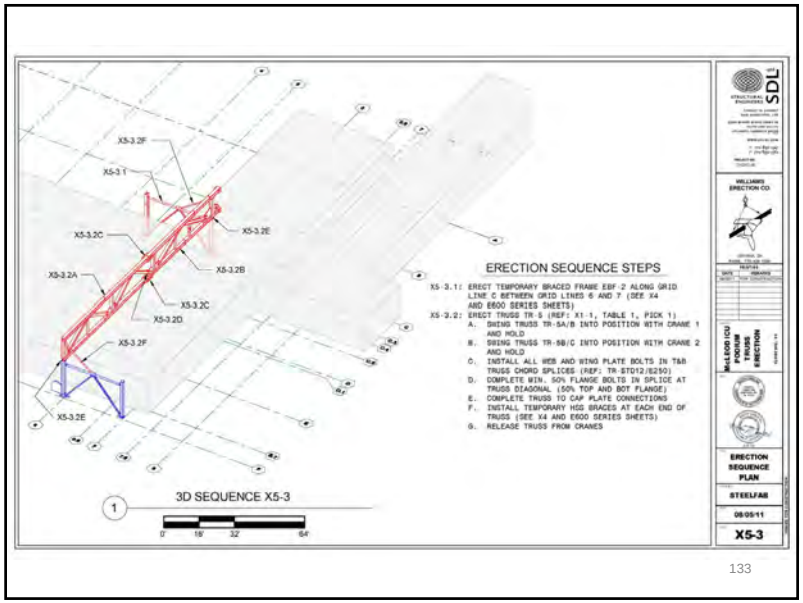



| Grid | Piece wt. | Weighed | Rigging | Lift Wt. | Total | Radius | |
|---|---|---|---|---|---|---|---|
| 8:D-C | 62,825 | X | 4500 | 67,325 | 67,325 | 53'-11" | 55 |
| 2:D-F | 186,976 | X | 6000 | 192,976 | 398,174 | 48'-5" | 50 |
| 2:C-D | 199,198 | X | 6000 | 205,198 | | 44'-3" | 45 |
| 3:D-F | 160,728 | X | 6000 | 166,728 | 330,870 | 53'-8" | 55 |
| 3:C-D | 158,142 | X | 6000 | 164,142 | | 48'-9" | 50 |
| E:2-3 | 24,515 | X | 4500 | 29,015 | 29,015 | 56'-3" | 60 |
| D:2-3 | 47,968 | X | 4500 | 52,468 | 52,468 | 69'-3" | 70 |
| F:2-3 | 56,584 | X | 4500 | 61,084 | 61,084 | 17'-2" | 20 |
| C:2-3 | 58,158 | X | 4500 | 62,658 | 62,658 | 20'-0" | 20 |
| D:3-5 | 103,930 | X | 4500 | 108,430 | 108,430 | 70'-7" | 75 |
| E:3-6 | 90,926 | X | 4500 | 95,426 | 95,426 | 88'-7" | 90 |





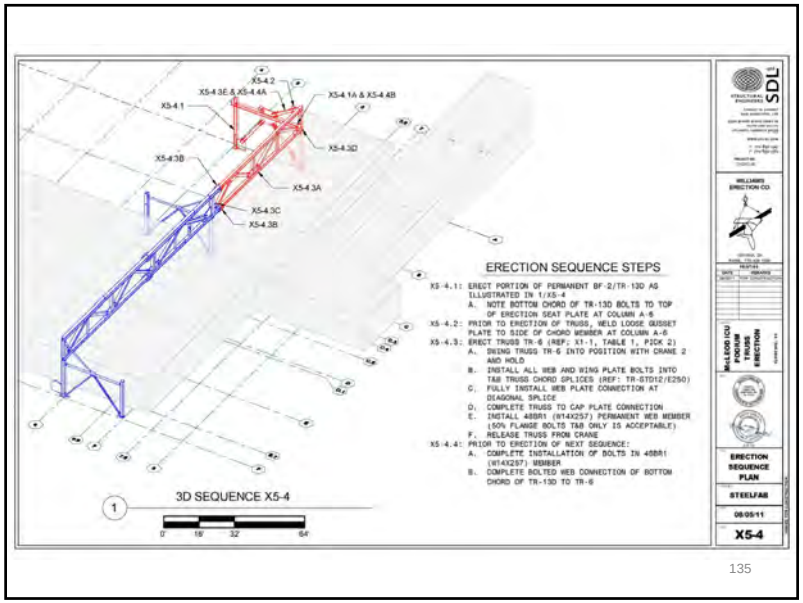



133

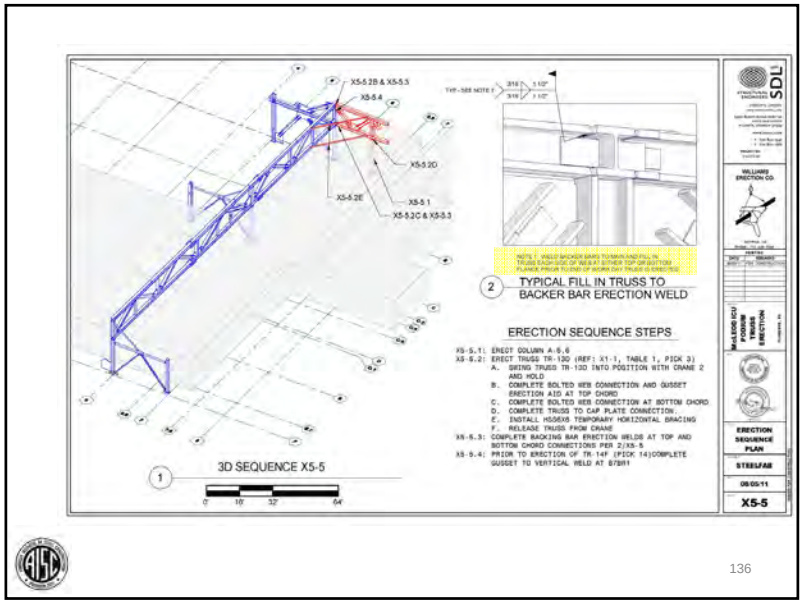


**McLEOD REGIONAL MEDICAL CENTER ICU TOWER ERECTION, FLORENCE, SOUTH CAROLINA:** McLeod Regional Medical Center proposed the construction of a new ICU tower in the location of their existing cafeteria and central utility plant; however, due to the extreme difficulty and expense associated with shutting down the utility plant for an entire hospital complex, the new building was supported by a grid of 19 transfer trusses that had to be erected over the existing and fully operational building. Each truss weighs up to 365,000lbs and several included splices to be completed over the existing hospital. Stanley D. Lindsey and Associates, Ltd (SDL) worked with Williams Erection Company to provide erection services for this operation. Stability analysis was performed at each stage of the erection for gravity loads and construction wind loading. SDL also worked closely with the fabricator and provided connection concepts and construction loads for connection design including temporary splicing connections. SDL provided crane layout and configuration plans for each crane location. In addition to the crane layout plans, a 3D Revit-based erection sequence plan was provided to illustrate each erection step. Intense coordination was required between all parties, and SDL provided several presentations including animations of crane locations and pick sequencing to clearly communicate the plan to the contractor and owner.

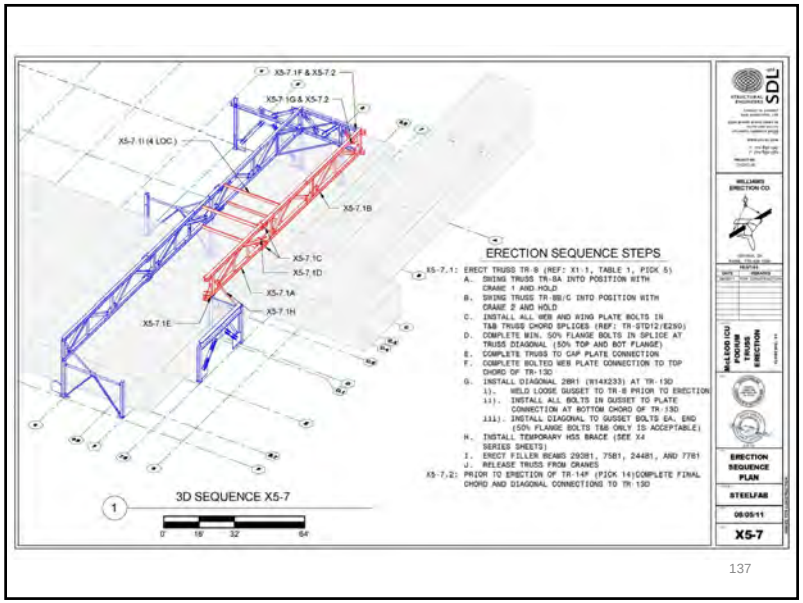
134



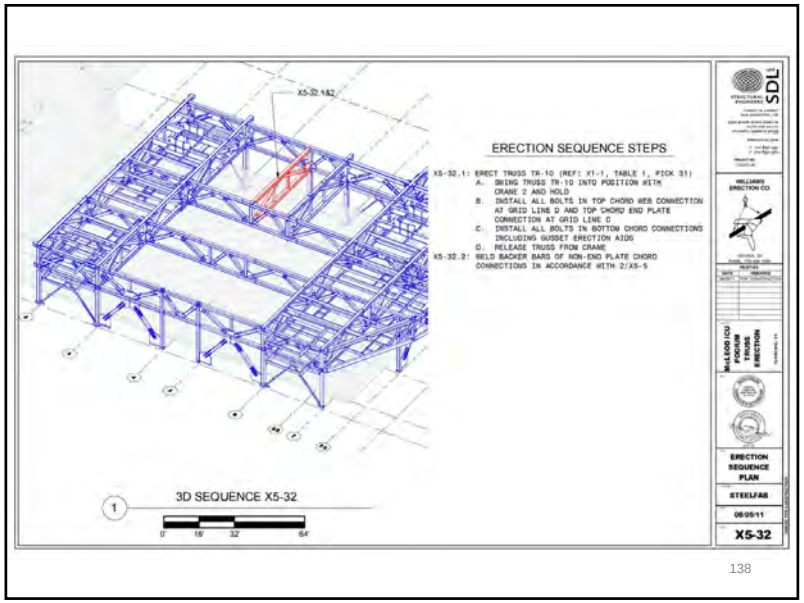

135



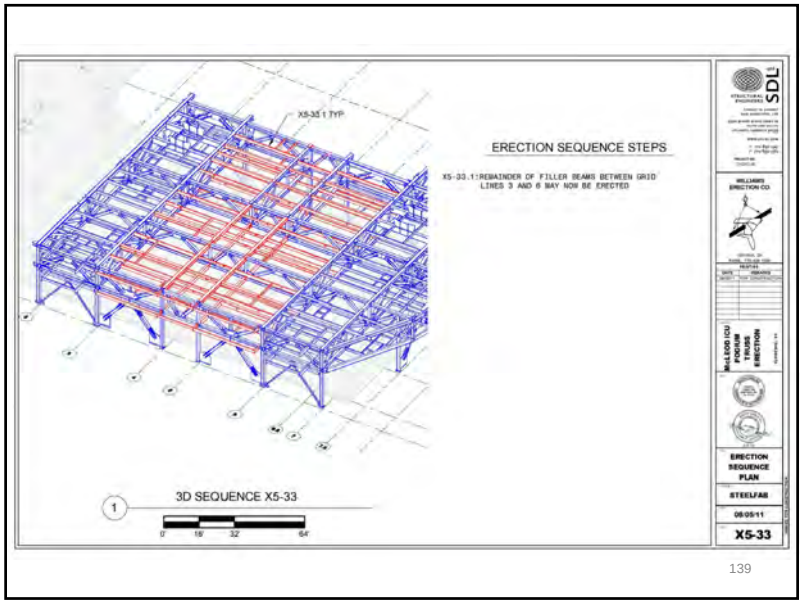

136



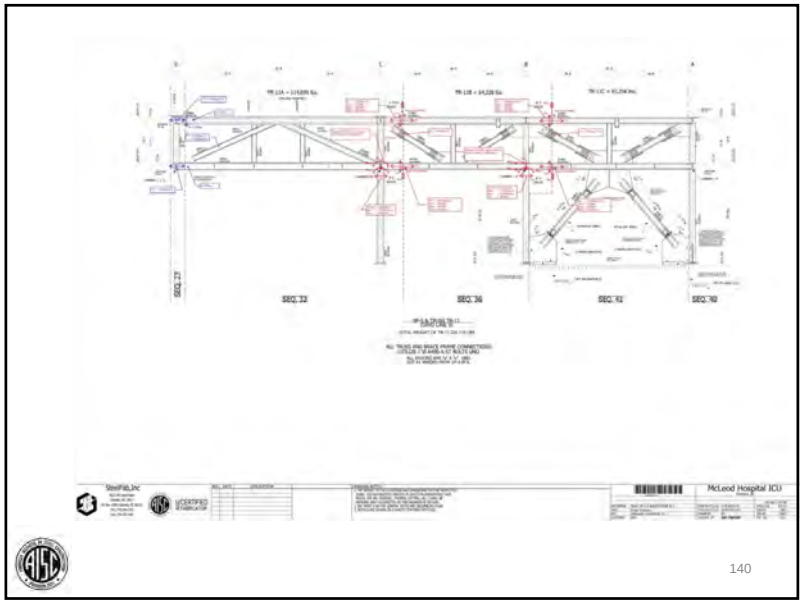

137



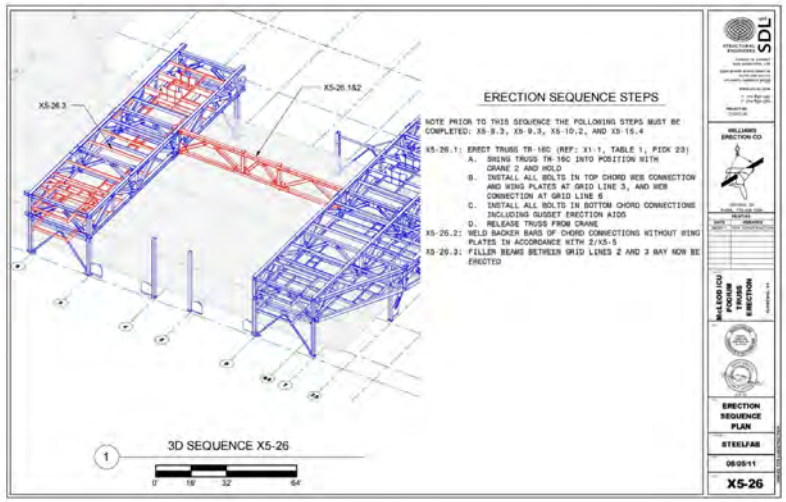

138



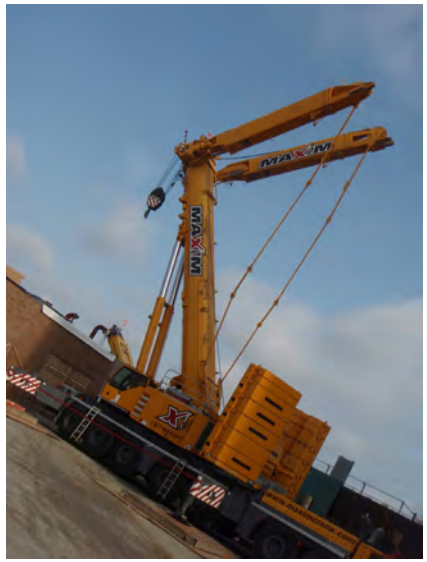

139



140




141




142

**McLeod Hospital Over Build (Video)**

- This consists of building a truss system over the existing staff cafeteria, laundry and power facility for the existing operating hospital

143

**AISC** | Questions?

Smarter. Stronger. Steel.

## Individual Webinar Registrants

### CEU/PDH Certificates

Within 2 business days…

- You will receive an email on how to report attendance from: registration@aisc.org.
- Be on the lookout: Check your spam filter! Check your junk folder!
- Completely fill out online form. Don't forget to check the boxes next to each attendee's name!

## Individual Webinar Registrants

### CEU/PDH Certificates

Within 2 business days…

- New reporting site (URL will be provided in the forthcoming email).
- Username: Same as AISC website username.
- Password: Same as AISC website password.

## 8-Session Registrants

### CEU/PDH Certificates

One certificate will be issued at the conclusion of all 8 sessions.

## 8-Session Registrants

Access to the quiz: Information for accessing the quiz will be emailed to you by Wednesday. It will contain a link to access the quiz. EMAIL COMES FROM NIGHTSCHOOL@AISC.ORG

Quiz and Attendance records: Posted Tuesday mornings.
www.aisc.org/nightschool - click on Current Course Details.

Reasons for quiz:

•EEU – must take all quizzes and final to receive EEU
•CEUs/PDHS – If you watch a recorded session you must take quiz for CEUs/PDHs.
•REINFORCEMENT – Reinforce what you learned tonight. Get more out of the course.

NOTE: If you attend the live presentation, you do not have to take the quizzes to receive CEUs/PDHs.

## 8-Session Registrants

**Access to the recording:** Information for accessing the recording will be emailed to you by this Wednesday. The recording will be available for three weeks. For 8-session registrants only. EMAIL COMES FROM NIGHTSCHOOL@AISC.ORG.

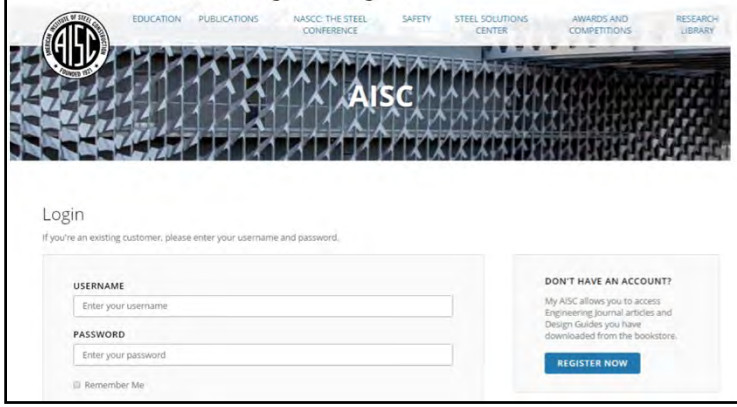
**CEUs/PDHS –** If you watch a recorded session you must take AND PASS the quiz for CEUs/PDHs.

## Night School Resources for 8-session package Registrants

Find all your handouts, quizzes and quiz scores, recording access, and attendance information all in one place!

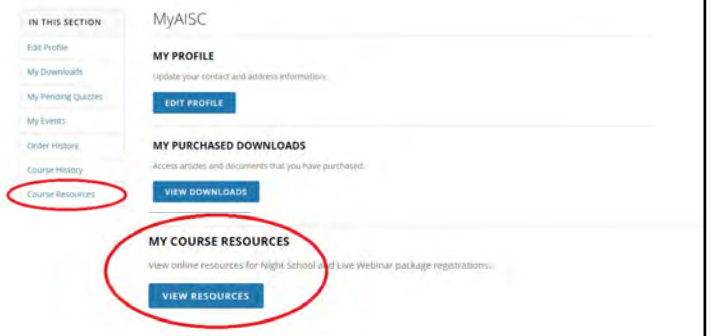
## Night School Resources for 8-session package Registrants

Go to www.aisc.org and sign in.




## Night School Resources for 8-session package Registrants

Go to www.aisc.org and sign in.



## Night School Resources for 8-session package Registrants


Night School 13: Design of Industrial Buildings

**8-SESSION PACKAGE RESOURCES**

| Event | Date | Handouts | Video | Quiz | Attendance |
|---|---|---|---|---|---|
| NS13 - Design Criteria | 1/30/2017 7:00:00 PM | Handouts | View<br>Passcode: NS13DSN | Pass<br>Score: 80 | Pending |
| NS13 - Economic Considerations | 2/6/2017 7:00:00 PM | Handouts | Available 02/08/2017 5pm EST | Available 02/08/2017 5pm EST | Pending |
| NS13 - Lateral Load Systems and Details | 2/13/2017 7:00:00 PM | Handouts | Available 02/15/2017 5pm EST | Available 02/15/2017 5pm EST | Pending |
| NS13 - Preliminary Design Procedures | 2/27/2017 7:00:00 PM | Handouts | Available 03/01/2017 5pm EST | Available 03/01/2017 5pm EST | Pending |
| NS13 - Crane Girder Design and Frame Analysis | 3/6/2017 7:00:00 PM | Handouts | Available 03/08/2017 5pm EST | Available 03/08/2017 5pm EST | Pending |
| NS13 - Frame Member and Connection Design | 3/13/2017 7:00:00 PM | Handouts | Available 03/15/2017 5pm EST | Available 03/15/2017 5pm EST | Pending |
| NS13 - Transfer Crane Girder & Longitudinal Bldg Bracing Dsn | 3/27/2017 7:00:00 PM | Handouts | Available 03/29/2017 5pm EST | Available 03/29/2017 5pm EST | Pending |
| NS13 - Building Envelope and Bracing Design | 4/3/2017 7:00:00 PM | Handouts | Available 04/05/2017 5pm EST | Available 04/05/2017 5pm EST | Pending |
| NS13 - Final Exam | 4/10/2017 7:00:00 PM | | | Available 04/12/2017 5pm EST | |

## Night School Resources for 8-session package Registrants

- Weekly "quiz and recording" email.
- Weekly updates of the master Quiz and Attendance record found at www.aisc.org/nightschool. Scroll down to Quiz and Attendance records.
  - Updated on Tuesday mornings.

## Night School Resources for 8-session package Registrants

- Webinar connection information:
  - Found in your registration confirmation/receipt.
  - Reminder email sent out Monday mornings.
- Link to handouts also found here.

**AISC** | Thank you

Smarter. Stronger. Steel.