

Procedure Title:	Steel Erection Safety	SOP Number:	SOP- 100-03-PR-033
Procedure Owner:	Corporate HSE	Issuing Authority:	Chief Safety Officer

Steel Erection Safety

0	8/2/13	Complete Rewrite	DWS	5/12/14
Rev. #	Rev. Date:	Changes	Approved	Issue Date

Steel Erection Safety

SOP Number:	Revision:	Approval Date:
SOP-100-03-PR-033	0	5/12/14

1.0 PURPOSE

The purpose of this procedure is to establish the minimum requirements for safe Steel Erection projects for STIS DBA Southeast Texas Industrial Services.

2.0 SCOPE

This procedure applies to all HenSu Holdings employees, contractors, subcontractors and visitors associated with an HenSu Holdings site.

3.0 RESPONSIBILITIES

The following personnel have responsibilities defined in this procedure:

- HenSu Holdings Managers
- HenSu Holdings Supervisors
- HenSu Holdings Employees
- HenSu Holdings Contractors
- HenSu Holdings Subcontractors
- HenSu Holdings Visitors

4.0 PROCEDURE

Each site shall follow this procedure as they develop their site-specific Steel Erection procedure. Steel Erection is a complex process and prior to work beginning written approval HenSu Holdings Manager is required.

4.1 Approval to begin Steel Erection

4.1.1 Before authorizing the commencement of steel erection, the HenSu Holdings Manager shall ensure that the HenSu Holdings Project Manager or Superintendent is provided with the following written notifications.

4.1.2 The concrete in the footings, piers and walls and the mortar in the masonry piers and walls have attained, on the basis of an appropriate ASTM standard test method of field-cured samples, either 75 percent of the intended minimum compressive design strength or sufficient strength to support the loads imposed during steel erection.

- Any repairs, replacements, and modifications to the anchor bolts were conducted in accordance with the project specifications.

4.2 Commencement of steel erection

HenSu Holdings personnel shall not erect steel unless site supervision has received notification that the concrete in the footings, piers and walls or the mortar in the masonry piers and walls has attained, on the basis of an appropriate ASTM standard test method of field-cured samples, either 75 percent of the intended minimum compressive design strength or sufficient strength to support the loads imposed during steel erection.

4.3 Site layout

4.3.1 The HenSu Holdings Manager shall ensure that the following is provided and maintained.

4.3.1.1 Adequate access roads into and through the site for the safe delivery and movement of derricks, cranes, trucks, other necessary equipment, and the material to be erected and means and methods for pedestrian and vehicular control.

Steel Erection Safety

SOP Number:	Revision:	Approval Date:
SOP-100-03-PR-033	0	5/12/14

- Exception: this requirement does not apply to roads outside of the construction site.

4.3.1.2 A firm, properly graded, drained area, readily accessible to the work with adequate space for the safe storage of materials and the safe operation of the equipment.

4.3.2 Pre-planning of overhead hoisting operations. All hoisting operations in steel erection shall be pre-planned.

4.4 Site-specific erection plan

Where employers elect, due to conditions specific to the site, to develop alternate means and methods that provide employee protection in accordance with 29 CFR 1926.753(c)(5), 29 CFR 1926.757(a)(4) or 29 CFR 1926.757(e)(4), a site-specific erection plan shall be developed by a qualified person and be available at the work site.

4.5 Hoisting and Rigging

4.5.1 Cranes being used in steel erection activities shall be visually inspected prior to each shift by a competent person. The inspection shall include observations for deficiencies during operation. At a minimum the inspection shall include the following:

4.5.1.1 All control mechanisms for maladjustments.

4.5.1.2 Control and drive mechanism for excessive wear of components and contamination by lubricants, water or other foreign matter.

4.5.1.3 Safety devices, including but not limited to boom angle indicators, boom stops, boom kick out devices, anti-two block devices, and load movement indicators where required.

4.5.1.4 Air, hydraulic, and other pressurized lines for deterioration or leakage, particularly those which flex in normal operation.

4.5.1.5 Hooks and latches for deformation, chemical damage, cracks, or wear.

4.5.1.6 Wire rope reeving for compliance with hoisting equipment manufacturer's specifications.

4.5.1.7 Electrical apparatus for malfunctioning, signs of excessive deterioration, dirt, or moisture accumulation.

4.5.1.8 Hydraulic system for proper fluid level.

4.5.1.9 Tires for proper inflation and condition.

4.5.1.10 Ground conditions around the hoisting equipment for proper support, including ground settling under and around outriggers, ground water accumulation, or similar conditions.

4.5.1.11 The hoisting equipment for level position after each move and setup.

4.5.1.12 If any deficiency is identified, an immediate determination shall be made by the competent person as to whether the deficiency constitutes a hazard.

4.5.1.13 If the deficiency is determined to constitute a hazard, the hoisting equipment shall be removed from service until the deficiency has been corrected.

4.5.2 The operator shall be responsible for those operations under the operator's direct control. Whenever there is any doubt as to safety, the operator shall have the authority to stop and refuse to handle loads until safety has been assured.

Steel Erection Safety

SOP Number:	Revision:	Approval Date:
SOP-100-03-PR-033	0	5/12/14

- 4.5.3 A qualified rigger (a rigger who is also a qualified person) shall inspect the rigging before each shift.
- 4.5.4 The headache ball, hook, or load shall not be used to transport personnel.
- 4.5.5 Safety latches on hooks shall not be deactivated or made inoperable, and shall be inspected prior to start of shift daily.
- 4.5.6 Routes for suspended loads shall be pre-planned to ensure that no employee is required to work directly below a suspended load. Safe path of travel will be barricaded and tagged to inform all personnel of the intended overhead work.
- 4.5.7 All loads shall be rigged by a qualified rigger.
- 4.6 Structural Steel Assembly
 - 4.6.1 Structural stability shall be maintained at all times during the erection process.
 - 4.6.2 The following additional requirements shall apply for multi-story structures:
 - 4.6.2.1 The permanent floors shall be installed as the erection of structural members' progresses, and there shall be not more than eight (8) stories between the erection floor and the upper-most permanent floor, except where the structural integrity is maintained because of the design.
 - 4.6.2.2 At no time shall there be more than four (4) floors or 48 feet, whichever is less, of unfinished bolting or welding above the foundation or uppermost permanently secured floor, except where the structural integrity is maintained as a result of the design.
 - 4.6.3 A fully planked or decked floor or nets shall be maintained within two (2) stories or 30 feet; whichever is less, directly under any erection work being performed.
- 4.7 Walking/working surfaces
 - 4.7.1 Shear connectors (such as headed steel studs, steel bars or steel lugs), reinforcing bars, deformed anchors or threaded studs shall not be attached to the top flanges of beams, joists or beam attachments so that they project vertically from or horizontally across the top flange of the member until after the metal decking, or other walking/working surface, has been installed.
 - 4.7.2 Installation of shear connectors on composite floors, roofs and bridge decks. When shear connectors are used in construction of composite floors, roofs and bridge decks, employees shall lay out and install the shear connectors after the metal decking has been installed, using the metal decking as a working platform. Shear connectors shall not be installed from within a controlled decking zone (CDZ).
 - 4.7.3 Workers shall not be permitted to walk the top surface of any structural steel member installed that has been coated with paint or similar material unless documentation or certification that the coating has achieved a minimum average slip resistance of .50 when measured with an English XL tribometer or equivalent tester on a wetted surface at a testing laboratory is provided. Such documentation or certification shall be based on the appropriate ASTM standard test method conducted by a laboratory capable of performing the test. The results shall be available at the site and to the steel erector.
 - 4.7.4 When deemed necessary by a competent person, plumbing-up equipment shall be installed in conjunction with the steel erection process to ensure the stability of the structure.
 - 4.7.5 When used, plumbing-up equipment shall be in place and properly installed before the structure is loaded with construction material such as loads of joists, bundles of decking or bundles of bridging.
 - 4.7.6 Plumbing-up equipment shall be removed only with the approval of a competent person.

Steel Erection Safety

SOP Number:	Revision:	Approval Date:
SOP-100-03-PR-033	0	5/12/14

- 4.7.7 Hoisting, landing and placing of metal decking bundles.
 - 4.7.7.1 Bundle packaging and strapping shall not be used for hoisting unless specifically designed for that purpose.
 - 4.7.7.2 If loose items such as dunnage, flashing, or other materials are placed on the top of metal decking bundles to be hoisted, such items shall be secured to the bundles.
 - 4.7.7.3 Metal decking bundles shall be landed on framing members so that enough support is provided to allow the bundles to be un-banded without dislodging the bundles from the supports.
 - 4.7.7.4 At the end of the shift or when environmental or jobsite conditions require, metal decking shall be secured against displacement
- 4.7.8 Metal decking at roof and floor holes and openings shall be installed as follows:
 - 4.7.8.1 Framed metal deck openings shall have structural members turned down to allow continuous deck installation except where not allowed by structural design constraints or constructability.
 - 4.7.8.2 Roof and floor holes and openings shall be decked over. Where large size, configuration, or other structural design does not allow openings to be decked over (such as elevator shafts, stair wells, etc.) employees shall be protected in accordance with SOP-100-03-PR-003 - Fall Protection.
 - 4.7.8.3 Metal decking holes and openings shall not be cut until immediately prior to being permanently filled with the equipment or structure needed or intended to fulfill its specific use or shall be immediately covered.
 - 4.7.8.4 Covering roof and floor openings:
 - Covers for roof and floor openings shall be capable of supporting, without failure, twice the weight of the employees, equipment, and materials that may be imposed on the cover at any one time.
 - All covers shall be secured when installed to prevent accidental displacement by the wind, equipment, or employees.
 - All covers shall be painted with high-visibility paint or shall be marked with the word **"HOLE"** or **"COVER"** to provide warning of the hazard.
 - Smoke dome or skylight fixtures that have been installed are not considered covers for the purpose of this section unless they meet the strength requirements.
 - 4.7.8.5 Decking gaps around columns.
 - Wire mesh, exterior plywood, or equivalent, shall be installed around columns where planks or metal decking do not fit tightly. The materials used must be of sufficient strength to provide fall protection for personnel and prevent objects from falling through.
- 4.7.9 Installation of metal decking
 - 4.7.9.1 Metal decking shall be laid tightly and immediately secured upon placement to prevent accidental movement or displacement.
 - 4.7.9.2 During initial placement, metal-decking panels shall be placed to ensure full support by structural members.
- 4.7.10 Derrick floors
 - 4.7.10.1 A derrick floor shall be fully decked and/or planked and the steel member connections completed to support the intended floor loading.

Steel Erection Safety

SOP Number:	Revision:	Approval Date:
SOP-100-03-PR-033	0	5/12/14

4.7.10.2 Temporary loads placed on a derrick floor shall be distributed over the underlying support members to prevent local overloading of the deck material.

4.8 Column Anchorage

- 4.8.1 All columns shall be anchored by a minimum of 4 anchor rods (anchor bolts).
- 4.8.2 Columns shall be set on level finished floors, pre-grouted leveling plates, leveling nuts, or shim packs which are adequate to transfer the construction loads.
- 4.8.3 All columns shall be evaluated by a competent person to determine whether guying or bracing is needed; if guying or bracing is needed, it shall be installed.
- 4.8.4 Anchor rods (anchor bolts) shall not be repaired, replaced or field-modified without the approval of the project structural engineer of record.
- 4.8.5 Prior to the erection of a column, the Location Manager shall provide written notification to the steel erector if there has been any repair, replacement, or modification of the anchor rods (anchor bolts) of that column.

4.9 Beams and Columns

- 4.9.1 During the final placing of solid web structural members, the load shall not be released from the hoisting line until the members are secured with at least two bolts per connection, of the same size and strength as shown in the erection drawings, drawn up wrench-tight or the equivalent as specified by the project structural engineer of record.
- 4.9.2 A competent person shall determine if more than two bolts are necessary to ensure the stability of cantilevered members; if additional bolts are needed, they shall be installed.
- 4.9.3 Solid web structural members used as diagonal bracing shall be secured by at least one bolt per connection drawn up wrench-tight or the equivalent as specified by the project structural engineer of record.
- 4.9.4 When two structural members on opposite sides of a column web, or a beam web over a column, are connected sharing common connection holes, at least one bolt with its wrench-tight nut shall remain connected to the first member unless a shop-attached or field-attached seat or equivalent connection device is supplied with the member to secure the first member and prevent the column from being displaced.
- 4.9.5 If a seat or equivalent device is used, the seat (or device) shall be designed to support the load during the double connection process. It shall be adequately bolted or welded to both a supporting member and the first member before the nuts on the shared bolts are removed to make the double connection.
- 4.9.6 Each column splice shall be designed to resist a minimum eccentric gravity load of 300 pounds (136.2 kg) located 18 inches (.46 m) from the extreme outer face of the column in each direction at the top of the column shaft.
- 4.9.7 Perimeter columns shall not be erected unless:
 - 4.9.7.1 The perimeter columns extend a minimum of 48 inches (1.2 m) above the finished floor to permit installation of perimeter safety cables prior to erection of the next tier, except where constructability does not allow;
 - 4.9.7.2 The perimeter columns have holes or other devices in or attached to perimeter columns at 42-45 inches (107-114 cm) above the finished floor and the midpoint between the finished floor and the top cable to permit installation of perimeter safety cables required by SOP-100-03-PR-003 - Fall Protection, except where constructability does not allow.

Steel Erection Safety

SOP Number:	Revision:	Approval Date:
SOP-100-03-PR-033	0	5/12/14

4.10 Open Web Steel Joists

- 4.10.1 Where steel joists are used, and columns are not framed in at least two directions with solid web structural steel members, a steel joist shall be field-bolted at the column to provide lateral stability to the column during erection. For the installation of this joist:
- 4.10.1.1 A vertical stabilizer plate shall be provided on each column for steel joists. The plate shall be a minimum of 6 inch by 6 inch, and shall extend at least 3 inches below the bottom chord of the joist with a 13/16-inch hole to provide an attachment point for guying or plumbing cables.
- 4.10.1.2 The bottom chords of steel joists at columns shall be stabilized to prevent rotation during erection.
- 4.10.1.3 Hoisting cables shall not be released until the seat at each end of the steel joist is field-bolted, and each end of the bottom chord is restrained by the column stabilizer plate.
- 4.10.2 Where constructability does not allow a steel joist to be installed at the column:
- 4.10.2.1 An alternate means of stabilizing joists shall be installed on both sides near the column and shall:
- Be designed by a qualified person;
 - Be shop installed; and
 - Be included in the erection drawings
- 4.10.2.2 Hoisting cables shall not be released until the seat at each end of the steel joist is field-bolted and the joist is stabilized
- 4.10.3 Where steel joists at or near columns span 60 feet or less, the joist shall be designed with sufficient strength to allow one employee to release the hoisting cable without the need for erection bridging.
- 4.10.4 Where steel joists at or near columns span more than 60 feet, the joists shall be set in tandem with all bridging installed unless an alternative method of erection, which provides equivalent stability to the steel joist, is designed by a qualified person and is included in the site-specific erection plan.
- 4.10.5 A steel joist or steel joist girder shall not be placed on any support structure unless such structure is stabilized.
- 4.10.6 When steel joist(s) are landed on a structure, they shall be secured to prevent unintentional displacement before installation.
- 4.10.7 No modification that affects the strength of a steel joist or steel joist girder shall be made without the approval of the project structural engineer of record.
- 4.10.8 Field-bolted joists:
- 4.10.8.1 Except for steel joists that have been pre-assembled into panels, connections of individual steel joists to steel structures in bays of 40 feet or more shall be fabricated to allow for field bolting during erection.
- 4.10.8.2 These connections shall be field-bolted unless constructability does not allow.
- 4.10.9 Steel joists and steel joist girders shall not be used as anchorage points for a fall arrest system unless written approval to do so is obtained from a qualified person.
- 4.10.10 A bridging terminus point shall be established before bridging is installed.
- 4.10.11 Attachment of steel joists and steel joist girders:

Steel Erection Safety

SOP Number:	Revision:	Approval Date:
SOP-100-03-PR-033	0	5/12/14

- 4.10.11.1 Each end of "K" series steel joists shall be attached to the support structure with a minimum of two 1/8-inch fillet welds 1 inch long or with two ½-inch bolts, or the equivalent.
- 4.10.11.2 Each end of "LH" and "DLH" series steel joists and steel joist girders shall be attached to the support structure with a minimum of two ¼ -inch fillet welds 2 inches long, or with two ¾-inch bolts, or the equivalent.
- 4.10.11.3 Each steel joist shall be attached to the support structure, at least at one end on both sides of the seat, immediately upon placement in the final erection position and before additional joists are placed.
- 4.10.11.4 Panels that have been pre-assembled from steel joists with bridging shall be attached to the structure at each corner before the hoisting cables are released.
- 4.10.12 Erection of steel joists
 - 4.10.12.1 Both sides of the seat of one end of each steel joist that requires bridging under Tables A and B in 29 CFR 19.757(c) (3) shall be attached to the support structure before hoisting cables are released.
 - 4.10.12.2 For joists over 60 feet, both ends of the joist shall be attached as specified in this practice before the hoisting cables are released.
 - 4.10.12.3 On steel joists that do not require erection bridging under Tables A and B in 29 CFR 19.757(c) (3), only one employee shall be allowed on the joist until all bridging is installed and anchored.
- 4.10.13 Employees shall not be allowed on steel joists where the span of the steel joist is equal to or greater than the span shown in Tables A and B in 29 CFR 1926.757(c) (3).
- 4.10.14 When permanent bridging terminus points cannot be used during erection, additional temporary bridging terminus points are required to provide stability.
- 4.10.15 Erection bridging
 - 4.10.15.1 Where the span of the steel joist is equal to or greater than the span shown in Tables A and B, in 29 CFR 1926.757(c)(3) the following shall apply:
 - A row of bolted diagonal erection bridging shall be installed near the midspan of the steel joist;
 - Hoisting cables shall not be released until this bolted diagonal erection bridging is installed and anchored; and
 - No more than one employee shall be allowed on these spans until all other bridging is installed and anchored.
 - 4.10.15.2 Where the span of the steel joist is over 60 feet through 100 feet, the following shall apply:
 - All rows of bridging shall be bolted diagonal bridging;
 - Two rows of bolted diagonal erection bridging shall be installed near the third points of the steel joist;
 - Hoisting cables shall not be released until this bolted diagonal erection bridging is installed and anchored; and
 - 4.10.15.3 No more than two employees shall be allowed on these spans until all Where the span of the steel joist is over 100 feet through 144 feet, the following shall apply:
 - All rows of bridging shall be bolted diagonal bridging;
 - Hoisting cables shall not be released until all bridging is installed and anchored; and

Steel Erection Safety

SOP Number:	Revision:	Approval Date:
SOP-100-03-PR-033	0	5/12/14

- No more than two employees shall be allowed on these spans until all bridging is installed and anchored
- 4.10.15.4 Where any steel joist is a bottom chord bearing joist, a row of bolted diagonal bridging shall be provided near the support(s). This bridging shall be installed and anchored before the hoisting cable(s) is released.
- 4.10.15.5 When bolted diagonal erection bridging is required by this section, the following shall apply:
- The bridging shall be indicated on the erection drawing;
 - The erection drawing shall be the exclusive indicator of the proper placement of this bridging;
 - Shop-installed bridging clips, or functional equivalents, shall be used where the bridging bolts to the steel joists;
 - When two pieces of bridging are attached to the steel joist by a common bolt, the nut that secures the first piece of bridging shall not be removed from the bolt for the attachment of the second; and
 - Bridging attachments shall not protrude above the top chord of the steel joist.
- 4.10.16 Landing and placing loads
- 4.10.16.1 During the construction period, a load placed on steel joists will be distributed so as not to exceed the carrying capacity of any steel joist.
- 4.10.16.2 No construction loads are allowed on the steel joists until all bridging is installed and anchored and all joist-bearing ends are attached.
- 4.10.16.3 The weight of a bundle of joist bridging shall not exceed a total of 1,000 pounds. A bundle of joist bridging shall be placed on a minimum of three steel joists that are secured at one end. The edge of the bridging bundle shall be positioned within 1 foot of the secured end.
- 4.10.16.4 No bundle of decking may be placed on steel joists until all bridging has been installed and anchored and all joist bearing ends attached, unless all of the following conditions are met:
- HenSu Holdings Supervision has first determined from a qualified person and documented in a site-specific erection plan that the structure or portion of the structure is capable of supporting the load;
 - The bundle of decking is placed on a minimum of three steel joists;
 - The joists supporting the bundle of decking are attached at both ends;
 - At least one row of bridging is installed and anchored;
 - The total weight of the bundle of decking does not exceed 4,000 pounds
- 4.10.16.5 The edge of the construction load shall be placed within 1 foot of the bearing surface of the joist end.
- 4.11 Systems Engineered Buildings
- 4.11.1 Each structural column shall be anchored by a minimum of four anchor rods (anchor bolts).
- 4.11.2 Rigid frames shall have 50 percent of their bolts or the number of bolts specified by the manufacturer (whichever is greater) installed and tightened on both sides of the web adjacent to each flange before the hoisting equipment is released.
- 4.11.3 Construction loads shall not be placed on any structural steel framework unless such framework is safely bolted, welded or otherwise adequately secured.

Steel Erection Safety

SOP Number:	Revision:	Approval Date:
SOP-100-03-PR-033	0	5/12/14

- 4.11.4 In girt and eave strut-to-frame connections, when girts or eave struts share common connection holes, at least one bolt with its wrench-tight nut shall remain connected to the first member unless a manufacturer-supplied, field-attached seat or similar connection device is present to secure the first member so that the girt or eave strut is always secured against displacement.
- 4.11.5 Both ends of all steel joists or cold-formed joists shall be fully bolted and/or welded to the support structure before:
 - 4.11.5.1 Releasing the hoisting cables;
 - 4.11.5.2 Allowing an employee on the joists; or
 - 4.11.5.3 Allowing any construction loads on the joists.
- 4.11.6 Purlins and girts shall not be used as an anchorage point for a fall arrest system unless written approval is obtained from a qualified person.
- 4.11.7 Purlins may only be used as a walking/working surface when installing safety systems, after all permanent bridging has been installed and fall protection is provided.
- 4.11.8 Construction loads may be placed only within a zone that is within 8 feet of the centerline of the primary support member.
- 4.12 Falling Object Protection
 - 4.12.1 Securing loose items aloft. All materials, equipment, and tools, which are not in use while aloft, shall be secured against accidental displacement.
 - 4.12.2 Protection from falling objects other than materials being hoisted. The Construction Manager shall bar other construction processes below steel erection unless overhead protection for the employees below is provided.
- 4.13 Fall Protection
 - 4.13.1 Every HenSu Holdings employee, without exception, who is engaged in a steel erection activity that is on a walking/working surface with an unprotected side or edge more than 6 feet above a lower level shall be protected from fall hazards by guardrail systems, safety net systems, personal fall arrest systems, positioning device systems or fall restraint systems.
 - 4.13.2 On multi-story structures, perimeter safety cables shall be installed at the final interior and exterior perimeters of the floors as soon as the metal decking has been installed.
 - 4.13.3 Connectors and employees working in controlled decking zones shall be protected from fall hazards.
 - 4.13.4 Fall Protection will comply with Procedure SOP-100-03-PR-003 - Fall Protection.
 - 4.13.5 Each connector shall:
 - 4.13.5.1 Be protected in accordance with paragraph 2.14.1 of this section from fall hazards of more than two stories or 30 feet above a lower level, whichever is less;
 - 4.13.5.2 Have completed connector training; and
 - 4.13.5.3 Be provided, at heights over 15 and up to 30 feet above a lower level, with a personal fall arrest system, positioning device system or fall restraint system and wear the equipment necessary to be able to be tied off; or be provided with other means of protection from fall.
 - 4.13.6 A controlled decking zone may be established in that area of the structure over 15 and up to 30 feet above a lower level where metal decking is initially being installed and forms the leading edge of a work area. In each CDZ, the following shall apply:

Steel Erection Safety

SOP Number:	Revision:	Approval Date:
SOP-100-03-PR-033	0	5/12/14

- 4.13.6.1 Each HenSu Holdings employee working at the leading edge in a CDZ shall be protected from fall hazards of more than two (2) stories or 30 feet, whichever is less.
- 4.13.6.2 Access to a CDZ shall be limited to only those employees engaged in leading edge work.
- 4.13.6.3 The boundaries of a CDZ shall be designated and clearly marked. The CDZ shall not be more than 90 feet wide and 90 feet deep from any leading edge. The CDZ shall be marked by the use of control lines or the equivalent. Examples of acceptable procedures for demarcating CDZs can be found in Appendix D to subpart CFR 1926.761.
- 4.13.6.4 Each HenSu Holdings employee working in a CDZ shall have completed CDZ training in accordance with CFR 1926.761.
- 4.13.6.5 Unsecured decking in a CDZ shall not exceed 3,000 square feet.
- 4.13.6.6 Safety deck attachments shall be performed in the CDZ from the leading edge back to the control line and shall have at least two attachments for each metal decking panel.
- 4.13.6.7 Final deck attachments and installation of shear connectors shall not be performed in the CDZ.
- 4.13.7 Criteria for fall protection equipment
 - 4.13.7.1 Guardrail systems, safety net systems, personal fall arrest systems, positioning device systems, and their components shall conform to the criteria in Practice SOP-100-03-PR-003 - Fall Protection.
 - 4.13.7.2 Fall arrest system components shall be used in fall restraint systems and shall conform to the criteria in Practice SOP-100-03-PR-003- Fall Protection. Full body harnesses shall be used in fall restraint systems.
 - 4.13.7.3 Perimeter safety cables shall meet the criteria for guardrail systems in Procedure SOP-100-03-PR-003- Fall Protection.
- 4.13.8 Fall protection provided by the steel erector shall remain in the area where steel erection activity has been completed, to be used by other trades, only if the Construction Manager or its authorized representative:
 - 4.13.8.1 Has directed the steel erector to leave the fall protection in place; and
 - 4.13.8.2 Has inspected and accepted control and responsibility of the fall protection prior to authorizing persons other than steel erectors to work in the area.
- 4.14 Training
 - 4.14.1 Training required by this section shall be provided by a qualified person(s) with guidance from The HenSu Holdings HSE department.
 - 4.14.2 Training will be provided for all employees exposed to fall hazards and shall include training and instruction in the following areas:
 - 4.14.2.1 The recognition and identification of fall hazards in the work area;
 - 4.14.2.2 The use and operation of guardrail systems (including perimeter safety cable systems), personal fall arrest systems, positioning device systems, fall restraint systems, safety net systems, and other protection to be used;
 - 4.14.2.3 The correct procedures for erecting, maintaining, disassembling, and inspecting the fall protection systems to be used;
 - 4.14.2.4 The procedures to be followed to prevent falls to lower levels and through or into holes and openings in walking/working surfaces and walls; and

Steel Erection Safety

SOP Number:	Revision:	Approval Date:
SOP-100-03-PR-033	0	5/12/14

- 4.14.2.5 The fall protection requirements of this Procedure.
- 4.14.3 In addition to other forms of training HenSu Holdings employees shall be provided rigging training to employees engaged in the following activities.
 - 4.14.3.1 Employees who perform multiple lift rigging will be provided training in the following areas:
 - The nature of the hazards associated with multiple lifts; and
 - The proper procedures and equipment to perform multiple lifts.
 - Each connector will be provided training in the following areas:
 - The nature of the hazards associated with connecting; and
 - The establishment, access, proper connecting techniques and work practices.
 - 4.14.3.2 Where CDZs are being used, the employer shall assure that each employee has been provided training in the following areas:
 - The nature of the hazards associated with work within a controlled decking zone; and
 - The establishment, access, proper installation techniques and work practices.
- 4.14.4 Structural steel erection crews shall work under the direction of experienced HenSu Holdings Supervisor.
- 4.14.5 HenSu Holdings employees, nor subcontractors shall not ride on loads being hoisted, nor slide down ropes, columns, or ladders.
- 4.14.6 Wire rope slings or beam clamps shall be used to lift loads of structural steel weighing over 500 pounds. Care shall be taken to avoid sharp bends in the wire rope by using softeners between the wire rope and the load. Bundle ties shall not be used to lift reinforcing or structural steel.
- 4.14.7 If float scaffolds are used during steel erection, they shall be used in accordance with OSHA 1926 and HenSu Holdings policies.
- 4.14.8 The use of wire rope or similar material for temporary safety railing shall be discouraged. Planning and coordinating of timely steel shipments shall be arranged with vendors to maximize use of permanent perimeter protection (standard guardrail systems) as steel erection progresses.
- 4.14.9 The HenSu Holdings fall protection plan shall be strictly enforced and adhered to by all personnel.
- 4.14.10 Air hoses, extension cords, and welding leads shall not be laid, or run through, walkways, stairways. In the event that an air hose, extension cord or welding lead must be run across a walkway it shall be covered or otherwise protected to prevent a tripping hazard or damage and interference with the source.
- 4.14.11 Record Retention
- 4.14.12 Training and testing record of each HenSu Holdings employee shall be kept on file in the project's HSE office until project closeout.
- 4.14.13 Inspection and maintenance of hoisting and lifting equipment shall be performed and documented in accordance with HenSu Holdings Procedures and manufacturers' standards on a monthly basis and a copy of these records shall be maintained in the Site HSE files.

5.0 REFERENCES

SOP-100-03-PR-003	Fall Protection
29 CFR 1926.750	Steel Erection

Steel Erection Safety

SOP Number:	Revision:	Approval Date:
SOP-100-03-PR-033	0	5/12/14

6.0 TERMINOLOGY

Site	Any location where HenSu Holdings personnel are involved in work activities.
------	--

7.0 EXHIBITS

None