





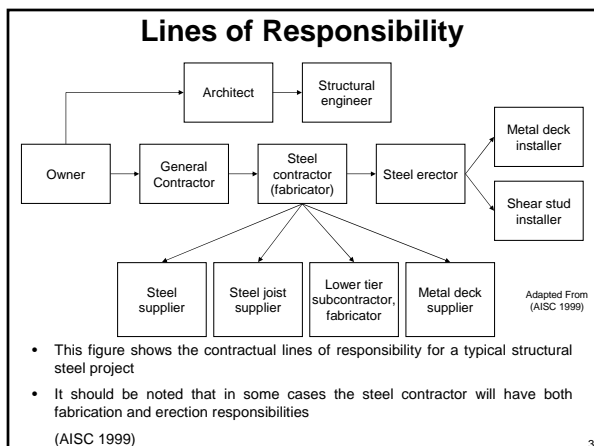
Jobsite Layout Considerations

The controlling contractor must consider many factors when laying out a site to support construction operations

- Site and building size and configuration
- Location of adjacent roads, buildings, and utilities
- Soil conditions and excavation requirements
- Construction sequence and schedule
- Location of underground utilities
- Equipment requirements
- Material quantity, storage, and delivery
- Worker parking
- Tool and equipment storage
- Construction operations facilities and trailers
- Sanitary facilities

(AISC 1999) 2



Pre-Bid Essentials

1.2 VEHICLE ACCESS AND PARKING

A. Access Roads

1. Owner's existing roads may be used for access to and egress from the Project site, provided such use does not interfere with Owner's operations. The Owner will determine the type and maximum weight of the equipment which the Contractor may operate on these roads.
2. Keep Owner's roads free of construction spillages and debris at all times. Repair damage caused to these roads by Contract-related construction vehicles by replacing damaged pavement and curbing to match existing construction. Refer to 01560.10 in Section 01000.

B. Construction Parking

1. Refer to Section 01500.

1.3 FIELD OFFICES, BUILDINGS AND SHEDS

A. General

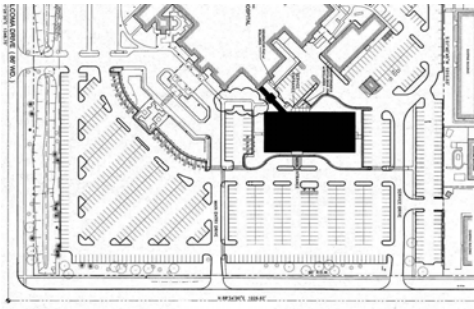
1. Provide temporary field office and other temporary buildings for storage and maintenance as needed.

The steel contractor will need information from the controlling contractor including:

- Soil conditions
- Schedule
- Sequencing of other trades
- Crane size and provider
- Placement of crane, job trailer, storage and laydown area
- Site access points
- Deliveries
- Parking
- Beginning and ending points for erection of steel
- Workslope

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Site Plan



- Site plans usually include existing site conditions, adjacent roads, and topographical information
- Above is an example of a site plan that is included in the project drawings
- The black area shows the location of the building to be constructed

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Site Size and Configuration



- The jobsite layout and equipment used will be controlled by the site constraints
- High on the list of considerations a steel erector will have are:
 - Crane size and location(s)
 - Laydown area size
 - Laydown area location

(Mincks and Johnston 2004)

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Layout for Optimization



- The goal of site layout is to optimize erection processes
 - The number of crane locations is kept to a minimum
 - Laydown areas should be as close as possible to the structure
- This is all dependent on site size and crane specifications
- The entire structure shown above was able to be erected with the crawler crane located in one position on the left side of the building

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Building Footprint On Site



The relationship between a new building's footprint and the size of the site has a significant impact on the erector's planning and sequencing

Space is required for:

- Deliveries
- Construction Materials
- Equipment
- Temporary Facilities

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Laydown Area Location



- Laydown areas may move as erection progresses to keep the steel as close as possible to the point of installation (Mincks and Johnston 2004)
- At the site shown above the laydown area started within the building footprint and moved to a smaller area outside the building footprint as erection progressed

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Crane Inside Building Footprint



- Additional communication may be required if the steel contractor determines that it is necessary to operate the crane within the footprint of the building to be erected
- Installation of some utilities and systems may need to be delayed to avoid damage from the crane

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Planning the Schedule



The overall project schedule and erection sequencing are somewhat dependent on:

- Crane locations
- Size of the building being constructed

Per the Occupational Safety & Health Administration Standard 1926.753(d) people, other than the employees engaged in the initial connection of the steel or employees necessary for the hooking or unhooking of the load, are not to be under a hoisted load.

- This will limit work of other trades during erection of steel

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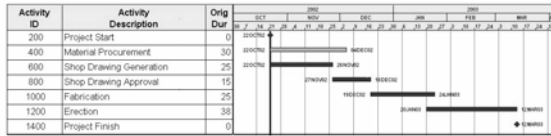
Planning the Schedule



- If the size of the building and/or jobsite allows the erection of steel to progress efficiently without hoisting over other trade workers it may be possible for other contractors to work during the erection of steel
- At the site shown above a new sewer line, foundation waterproofing, and floor slab reinforcing are being installed as structural steel is being erected

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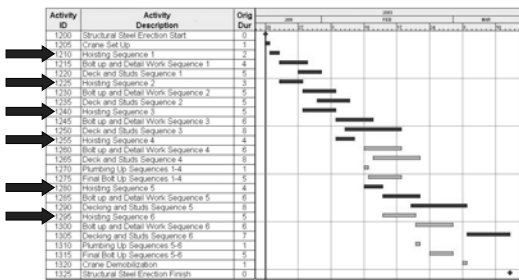
Planning the Schedule



- Structural steel is a long lead time item that is typically ordered immediately after contract execution
- It is important to make thorough plans and scheduling decisions early in the project and stick to them
- Once the schedule has been determined it is important that it not be changed
- It may not be possible to make late material and/or equipment changes without delays due to limited availability

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Planning the Schedule



- The steel erector and fabricator break down large steel projects into sequences
- A given sequence defines a section of the project and the pieces of steel included in that section
- The project shown above is divided into six sequences (AISC 1999)

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Adjacent Roads



- Pedestrian traffic must be kept at a safe distance from the construction site
- Fencing and barricades may be necessary to block off all or part of a road during construction operations

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Site Access Points



- The controlling contractor, as stated in the Occupational Safety & Health Administration Standard 1926.752, is responsible for providing access points into the construction site
- The steel contractor is responsible to communicate any necessary special access requirements to the controlling contractor

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Worker Parking



- Parking for workers is another important consideration in the jobsite layout
- Parking availability on and around a jobsite will typically be addressed in the bid package for a project
- If parking is available on the jobsite it should be located as close to the work operations as possible without causing interference with work operations (Mincks and Johnston 2004)
- Space is available for only a couple of vehicles at the jobsite shown above

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Worker Parking



In some cases parking will not be available on the jobsite

- Parking on a street or in an adjacent parking area may need to be arranged
 - For the job pictured above, parking spaces along adjacent streets were leased from the city for the duration of the project
- Some situations may require that a remote parking area be secured and transportation be provided for workers from the parking area to the jobsite

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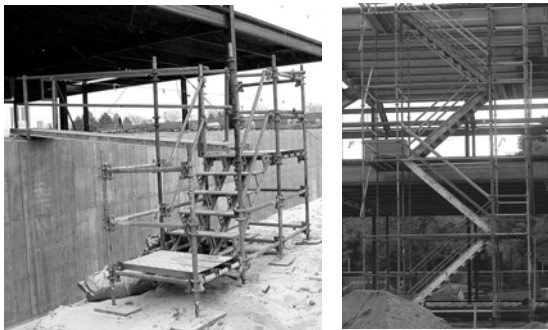
Entrance Points for Workers



- The controlling contractor usually provides access for workers into the structure of the building (above left)
- Access for the erector's employees from floor to floor is provided by the erector (above right)

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Entrance Points for Workers



- The controlling contractor may provide a footbridge over the excavation around a foundation wall (above left) or temporary stairs to upper levels (above right)

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Soil Conditions and Excavation



- Proper jobsite conditions are the responsibility of the controlling contractor (AISC 2000, OSHA 2001)
- It is important to consider how soil conditions and excavation of a site will change over the duration of a project

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Soil Conditions and Excavation



- Bearing capacity of soil in areas where a crane will operate should be verified
- Consideration must be given to the proximity of the crane to the edge of an excavation or foundation wall
- A geotechnical engineering report furnished by the controlling contractor may be necessary
- In the pictures above the crane is positioned very close to an excavation retaining wall

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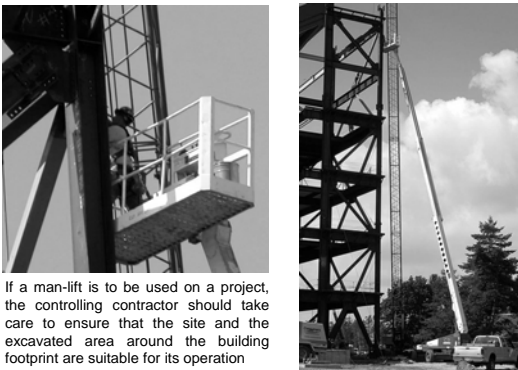
Soil Conditions and Excavation



- The type of soil on a jobsite and the excavation requirements for a project will dictate if the outside edge of an excavation is to be shored, sloped, or benched
- Care should be taken not to remove more soil than necessary if the excavation is sloped or benched
- An excavation that is sloped more shallowly than originally specified may:
 - Create problems with the erector's predetermined crane locations
 - Require extra effort for the erection crew to safely access the top of the foundation to erect steel

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Use of a Man-Lift



If a man-lift is to be used on a project, the controlling contractor should take care to ensure that the site and the excavated area around the building footprint are suitable for its operation

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Overhead Utilities



A jobsite should be free from overhead obstructions such as power lines or telephone lines

(AISC 2000)

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Underground Utilities



- Precautions may need to be taken if a crane will be operated over certain underground utilities
- The controlling contractor should inform the erector of underground utilities located within or near the construction site

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Underground Utilities

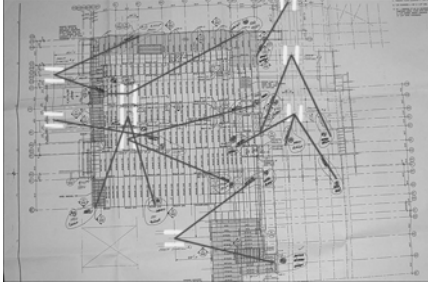


- In this case, a fire hydrant (right) which was not to be removed happened to be located in the middle of the desired crane location
- The stone base and timber mat provide just enough clearance for operation (above)



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Finalization of Jobsite Layout



- The finalized jobsite layout will include laydown area details and crane locations
- On the drawing above the crane locations have been determined by the erector
- The yellow bars represent locations of the crawler crane tracks
- The red lines represent the critical lifts to be performed from each location
 - A lift is critical if it is in excess of 75% of the crane capacity

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Jobsite Condition Requirements



- Per the Occupational Safety & Health Administration Standard 1926.752 and the AISC Code of Standard Practice Section 7.2, the Owner or Owner's Designated Representative for Construction shall provide and maintain certain jobsite conditions (AISC 2000, OSHA 2001)
- The following slides describe the required provisions

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Adequate Access Roads



Adequate access roads into and through the site for the safe delivery and movement of:

- Derricks
- Cranes
- Trucks
- Other necessary equipment

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Adequate Access Roads



- Adequate access roads must be provided into and through a site for safe delivery and movement of materials
- There must be means and methods for pedestrian and vehicular control



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Space On the Jobsite



Space on the jobsite that is:

- Firm
- Properly graded
- Properly drained

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Space On the Jobsite



Space on the jobsite that is:

- Readily accessible to the work
- Sufficient for safe operation of equipment

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Space On the Jobsite



Space on the jobsite that is:

- Adequate for safe and secure storage of materials
 - Enables the Fabricator and Erector to operate at maximum practical speed
- * Unless the structure occupies the full available jobsite

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Jobsite Condition Requirements



The provisions described on the previous slides are to be met by the Owner or the Owner's Designated Representative for Construction

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Operations Facilities



- A steel contractor will usually need to have a job trailer or other portable dry space on the site
 - If a job trailer cannot be placed on the site due to limited space, the controlling contractor should provide a dry, secure space from which the steel contractor can operate
 - Labor rules usually require the availability of a dry shack for workers to use for breaks and lunches
- (Mincks and Johnston, 2004)

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Operations Facilities



- The steel contractor will usually have a limited number of workers on the jobsite at a time, so space requirements for a job trailer are minimal
- In the case shown above, a large transport van (center back) was used as the dry facility for the workers
- Provisions for a job trailer or dry shack, such as electricity and water, will usually be the responsibility of the steel contractor
- The controlling contractor typically provides sanitary facilities on a jobsite (Mincks and Johnston 2004)

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Layout Responsibilities



- The controlling contractor is responsible for precise location of building lines and benchmarks on a jobsite and must provide the erector with a plan showing such information
- It is the responsibility of subcontractors to layout their work and inspect any construction in-place before beginning their work
- The steel fabricator supplies the controlling contractor with anchor rod setting plans for setting the structural steel anchor rods (AISC 1999, AISC 2000)

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Layout Responsibilities



- Prior to mobilization, the steel contractor should field-check the placement and elevations of the anchor rods
- Additional costs and delays may result if anchor rods are found to be improperly placed after mobilization (AISC 1999)

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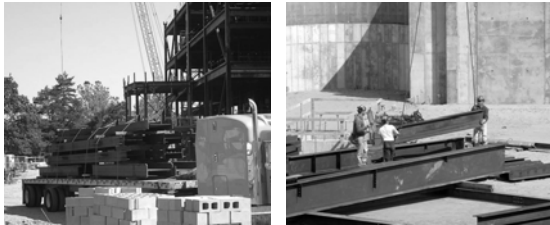
Erection and Installation Equipment



- The erector will typically provide most, if not all, of the erection equipment needed
- Typical equipment used for structural steel erection includes:
 - Crane(s)
 - Generators
 - Air Compressors
 - Man-lifts
 - Welding Equipment
 - Hand Tools

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Delivery of Steel



- Structural steel erection requires the delivery of steel by the truckload
- It is common practice to unload steel from a truck into a laydown area
- A crew will then shakeout the steel into the order that it will be erected
- There may be several truck loads of steel in the laydown area at one time to prevent the erection process from being interrupted
- The size and location of the laydown area are important factors to be considered with structural steel erection

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Delivery Access



- A flagman may be necessary to direct traffic around the construction site entrance point and unloading zone during delivery times
- Signs and gates should be used to ensure that pedestrians cannot accidentally enter the construction site

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Materials On Site



- Material delivery, quantity, and storage requirements will vary from project to project
- There are, however, some common requirements for structural steel construction

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Laydown Area



- The laydown area needs to be flat, firm, and well drained
- Cribbing is usually placed under the structural steel members for ease of rigging and to keep the steel clean
- Steel erectors generally prefer to have a minimum of two truckloads of steel in the laydown area to ensure that erection can continue without interruption
- A typical structural steel project will require a laydown area that is between 50 feet by 50 feet and 100 feet by 100 feet
 - This area allows the steel members to be appropriately spaced and organized for efficient erection

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Laydown Area



Some projects, where large, built-up trusses are used, will require a much larger laydown area for fabrication on the jobsite

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Limited Space for Deliveries



- For projects where delivery space is limited, extra coordination will be required to accomplish quick unloading
- Requirements might include:
 - An off-site staging area for delivery trucks to wait until directed to proceed to the site or for trailers to be dropped until they are needed
 - Radio communication between delivery drivers and the jobsite
 - A flagman to direct traffic around the delivery point

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Adjacent Property



If the size of the site and the relationship of the building to the site and surrounding properties require that loads be lifted over adjacent property, then certain precautions may need to be taken:

- Vacancy of the affected adjacent property
- Additional barricading to ensure a safe construction zone
- Extra care to minimize the risk of damage to any adjacent property

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References

- AISC. (1999). *Construction Management of Steel Construction*. American Institute of Steel Construction, Inc. Chicago, IL.
- AISC. (2000). *Code of Standard Practice for Steel Buildings and Bridges*. American Institute of Steel Construction, Inc. Chicago, IL.
- Mincks, W. R., and Johnston, H. (2004). *Construction Jobsite Management*. Delmar Learning, Clifton Park, NY.
- Occupational Safety & Health Administration, (OSHA). (2001). Standard Number 1926.752. "Site layout, site-specific erection plan and construction sequence." Washington, DC.
- Peurifoy, R. L., and Schexnayder, C. J. (2002). *Construction Planning, Equipment, and Methods*. McGraw-Hill Companies, Inc. New York, NY.
- Shapiro, H. I., Shapiro, J. P., and Shapiro, L. K. (2000). *Cranes and Derricks*. McGraw-Hill Companies, Inc. New York, NY.

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