



## Southern Company Operations

### Technical and Project Solutions

#### Project Shared Services

## PS-01

# Constructability Review Guideline

	<b>Rev. 1</b>
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<b>Revised By</b>	
Constructability	Keith Sawyer
<b>Approved By</b>	
Project Center of Excellence	Carzell Walton

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## **1.0 INTRODUCTION**

### **1.1 What is constructability?**

Constructability is defined as “The optimum use of construction knowledge and experience in planning, design, procurement, and field operations to achieve the overall project objectives.” (Constructability: A Primer, 1986)

### **1.2 What is the constructability review process?**

The constructability review (CR) process is a series of meetings to confirm the project is progressing as the project team planned, through the optimal use of construction knowledge, methodology, and experience.

In the review process, a series of constructability attributes is developed that becomes more detailed and focused as the project progresses. These attributes are reviewed at the constructability review meetings.

### **1.3 Who is involved?**

The constructability lead facilitates each constructability review for projects managed by Technical and Project Solutions (T&PS). Reviews should be approved and documented by:

- Project Manager.
- Constructability Lead.
- Project Engineer (PE).
- Project Controls Manager.
- Asset Manager.
- Construction Site Manager (or Regional Construction Manager if the Site Manager is not yet identified).

Meeting attendees include:

- Project Manager.
- Constructability Lead.
- Project Engineer.
- Discipline Leads as directed by the PE.
- Project Controls Lead.
- Asset Manager.
- Construction Site Manager (or Regional Construction Manager).
- Technical Services Lead.
- Safety representative.
- Quality assurance (QA) representative.
- Outsourced project delivery entities (if applicable).
- Contract strategy representative.

## 2.0 DEFINITIONS

### 2.1 Deliverables

Deliverables are specific items to be covered in a constructability review. They are sufficient in number, form, and substance to provide to the audience a general understanding of the project and the best available input on the attribute. Deliverables indicate to the audience that the attribute has been properly considered in the scope development (CR1) and project definition (CR2) phases. The use of plans, drawings, aerial photographs, model shots, and other visuals is preferred over the use of narratives and other written information.

## 3.0 CONSTRUCTABILITY REVIEW (CR) PROCESS

Each project required to follow the T&PS Project Delivery Process (PDP) requires two constructability reviews:

- **Constructability Review No. 1** is conducted during scope development (before the initial readiness review and prior to the feasibility estimate challenge).
- **Constructability Review No. 2** takes place during project definition (before the final readiness review and prior to the control estimate challenge).

For scalable projects, the Constructability Lead, Project Manager, and Construction Manager will discuss the specific constructability requirements, identify which attributes apply, and determine the level of depth needed for the scalable project.

### 3.1 Constructability Review Management

Review meeting attendance will be documented.

An action item log and general notes will be documented during the review and sent to all in attendance after the meeting to confirm their approval and to capture any deviations from what was discussed in the meeting.

#### References:

[ECS-PDP-03 Scope Development \(Attachment A\)](#)

[ECS-PDP-04 Project Definition \(Attachment B\)](#)

[Attendance Sheet Example \(Attachment G\)](#)

## **4.0 ROLES AND RESPONSIBILITIES**

### **4.1 Project Manager**

The Project Manager ensures constructability reviews are undertaken as required by the PDP, and they are attended by the proper individuals.

### **4.2 Constructability Lead**

The Constructability Lead coordinates with the project team to ensure constructability is incorporated into every phase of the project as required by the PDP. The Constructability Lead helps project teams produce and present the constructability reviews and ensures the constructability deliverables are met.

### **4.3 Project Engineer**

The Project Engineer provides the technical support required by the Constructability Lead for successful completion of the constructability effort. The Project Engineer ensures the results of the constructability effort are incorporated into the project design.

### **4.4 Project Controls Manager**

The Project Controls Manager provides the project controls support required by the Constructability lead for successful completion of the constructability effort. The Project Controls Manager ensures the results of the constructability effort are incorporated into the project estimate and schedule.

### **4.5 Asset Manager**

The asset manager provides the plant support and input required by the constructability Lead for successful completion of the constructability review. The asset manager ensures the constructability plan is communicated with the plant and that the plant's requirements are incorporated into the constructability review. The asset manager ensures the plant outage schedule and manpower requirements are considered in the constructability review.

### **4.6 Construction Site or Regional Construction Manager**

The construction site or regional construction manager provides site input to the constructability review process and ensures the constructability review meets the demand for successful project implementation and construction.

### **4.7 Contract Strategy Manager**

The contract strategy manager provides contract strategy input to the constructability review. The contract strategy manager identifies a potential pool of bidders as required to satisfy the demands of the contracting strategy.

## 4.8 Outsourced Project Delivery Entities

Outsourced project delivery entities will be identified early in the process and may fill roles as needed by the project team. These entities may include:

**Construction Management (CM):** Performs site management, contracting, contract administration, contract change control, and deliverable validation or acceptance in the interest of the owner.

**Construction Project Management and Installation Contractor (CM+IC):** Performs general contracting (detailed contracting strategy) and site coordination. Functions as the installation contractor, performing craft hiring, craft management, and workface planning. Cannot validate or accept construction deliverables in the interest of the owner.

**Early Contractor Involvement (ECI) Contractor:** Performs Level 2 construction planning (CWP) alongside the CM team before construction starts. Can be the same as the partner contractor.

**Engineering:** Performs engineering services and produces engineering deliverables to procurement and construction management.

**Engineering and Procurement (E&P):** Supplies engineering services, produces engineering deliverables, and performs procurements.

**Engineering, Procurement, and Construction Management (EPCM):** In addition to engineering, procurement, and construction management, validates and accepts construction deliverables in the interest of the owner. Does not act as installation contractor. Does not perform craft hiring, management, or workface planning.

**Engineering, Procurement, and Construction (EPC):** Performs all project delivery functions such as engineering, procurement, construction management, and installation contracting including craft hiring, craft management, and workface planning. Cannot validate or accept construction deliverables in the interest of the owner.

**Installation Contractor:** Performs craft hiring, craft management, and workface planning. Scope can include general contracting responsibilities (detailed contracting strategy) or only a small scope of installation work.

## 5.0 DOCUMENT STORAGE

The official repository for all constructability project documentation is PIMS. Each project has the following specific locations:

*Project – Construction Management – Administrative – new folder for Constructability,*

The constructability guide and related process documentation are stored on the Construction Services SharePoint site and on the Constructability internal website.

[Constructability - All Documents](#)

[Project Support-Constructability](#)

## 6.0 CONSTRUCTABILITY GUIDELINE STRUCTURE

Each of the attributes in this constructability guideline includes:

**Description:** Explains the purpose of each attribute.

**Resources and Documents:** Subject matter experts, tools, and related information and assets related to completing constructability reviews and compiling reference tools and supporting documentation.

**Considerations:** Pertinent areas users should consider as they complete each attribute.

**Deliverables:** The delivered products for the attribute.

### NOTE

The minimum expected deliverable for each attribute is a summary-level presentation of results during the constructability review meetings. Proper documentation in the meeting minutes is required.

**References:** Example documents of expected deliverables, where applicable.

**Section Summary:** Provides examples of the documentation used and maintained during and after the constructability review meetings. The examples include attendee sheets, action item logs, attributes log, and meeting minutes.

This guideline consists of 20 attributes. Each attribute falls within one or both constructability reviews.

Constructability Reviews 1 and 2 each have a distinct list of characteristics, but will present all deliverables with the latest and best available information.

- CR1 will include information for attributes 1 through 10.
- During CR1, if information is available for an attribute listed for CR2, that information will be included with CR1.
- CR2 will include information for attributes 1 through 20, including any new or updated information for attributes 1 through 10.
- An attribute for which there is no information available will not be included in the CRs. A notation will be made that no information is currently available.

### Constructability Review No. 1

1. [Constructability Assessment](#)
2. [Modularization, Prefabrication, and Preassembly](#)
3. [Project Safety Plan](#)
4. [Site Improvement Plan and Logistics](#)
5. [Construction Equipment Access](#)
6. [Heavy Haul/Lifting Plan](#)
7. [Impacts to Existing Facilities](#)
8. [Project Installation Risk Assessment](#)
9. [Construction Work Package List](#)
10. [Permitting Requirements](#)

During CR1, if information is available for an attribute listed for CR2, that information will be included with CR1.

### Constructability Review No. 2

- |  |   |
|--|---|
| 1. <a href="#">Constructability Assessment</a>                     | 11. <a href="#">Installation Contracting Methodology</a>            |
| 2. <a href="#">Modularization, Prefabrication, and Preassembly</a> | 12. <a href="#">Installation QA/QC Plan</a>                         |
| 3. <a href="#">Project Safety Plan</a>                             | 13. <a href="#">Security Plan</a>                                   |
| 4. <a href="#">Site Improvement Plan and Logistics</a>             | 14. <a href="#">Outage Work Integration Plan</a>                    |
| 5. <a href="#">Construction Equipment Access</a>                   | 15. <a href="#">Construction Management Plan</a>                    |
| 6. <a href="#">Heavy Haul/Lifting Plan</a>                         | 16. <a href="#">Construction Installation Estimate</a>              |
| 7. <a href="#">Impacts to Existing Facilities</a>                  | 17. <a href="#">Project-Specific Craft Labor Availability Study</a> |
| 8. <a href="#">Project Installation Risk Assessment</a>            | 18. <a href="#">Craft Worker Productivity Improvement</a>           |
| 9. <a href="#">Construction Work Package List</a>                  | 19. <a href="#">EPC Summary Level Schedule</a>                      |
| 10. <a href="#">Permitting Requirements</a>                        | 20. <a href="#">Post-construction Site Restoration Plan</a>         |

CR2 will include information for attributes 1 through 20, including any new or updated information for attributes 1 through 10.



## 6.1 Attributes

### 6.1.1 Attribute: Constructability Assessment

**Description:** The constructability assessment is a product of the constructability review and is a vital part of the process for developing the risk matrix. During the initial review, the Constructability Lead conducts a preliminary analysis of the project scope to confirm the project is viable and reports the findings to the project team. The constructability lead will consider the key elements of the PDP: safety, scope, schedule, cost, quality, and risk.

**Resources and Documents:**

- General arrangements.
- Aerial views.
- Historical photos.
- Historical knowledge.
- General project scope definition.

**Considerations:**

- Operations.
- Maintenance.
- Design.
- Construction.
- Value engineering.

**Deliverables:**

- Scope overview statements.
  - What will the project achieve for the plant?
  - How will it be achieved?
- Work scope list.
  - Major scope of work such as heavy earth moving and duct removal and replacement.
  - Pictures, model shots, drawings, and related items for each phase of the project shown in sequence of construction.
  - Discussion of significant challenges with any or all of the scope items.
- Summary statements.
  - Safety: Normal means and methods; special considerations for this project.
  - Scope: Normal scope items, means, and methods; special scope and other considerations.
  - Quality: Normal means and methods; special considerations
  - Risk: Normal risks associated with a project of this type; unusual risks requiring special means of mitigation.
  - Constructability considerations for: Operations, Maintenance, Design, Construction.

**References:**

None

### 6.1.2 **Attribute:** Modularization, Prefabrication, and Preassembly

**Description:** This attribute focuses on identifying opportunities for modularization, prefabrication, and preassembly to improve the project safety, quality, cost, schedule, and risk profiles.

#### **Resources and Documents:**

- General arrangements.
- Site plans.
- Equipment drawings and information.
- General project scope definition.

#### **Considerations:**

- Safety.
- Quality.
- Cost.
- Schedule.
- Risk.
- Value engineering.
- Local labor availability and productivity.
- Site constraints and logistics.
- Methods of delivery (barge, rail, or truck).
- Heavy equipment requirements.
- Minimize impacts to existing facilities.
- Lessons learned.
- Outage durations.
- Permitting.
- Heat trace plan.
- Skid mount when available.

#### **Deliverables:**

(Similar for CR1 and CR2 based on best available information)

- Modularization, Prefabrication, and Preassembly statements:
  - List of work to be modularized, prefabricated, or preassembled.
  - Pictures, model shots, drawings, and so forth showing planned optimization.
  - Anticipated benefit or drivers from optimization:
    - Cost.
    - Schedule.
    - Others of significance.
    - Significant challenges with optimization.
- Modularization, prefabrication, and preassembly checklist.
- Heat trace plan for overall project.

#### **References:**

[Attachment C: Modularization Checklist](#)

### 6.1.3 **Attribute:** Project Safety Plan

**Description:** The project safety plan reduces exposure to hazards in work areas, organizes a performance-driven framework for continued focus and improvement on safety, and ensures compliance with regulatory requirements governing workplace safety.

**Resources and Documents:**

- Environmental, Health, and Safety (EH&S) safety manual.
- Plant procedures.
- Safety and health regulations (U.S. Occupational Safety and Health Administration [OSHA]).

**Considerations:**

- Any special and non-routine work (rock blasting, working over water, and other unusual circumstances).
- Disturbances to plant operations.
- Any special concerns identified by project team and other stakeholders.
- Safety exceptions.

**Deliverables:**

- CR1:
  - High level risk assessment that identifies scope hazards outside of core business.
  - List of identified scope hazards.
- CR2:
  - Perform EH&S procedures gap analysis and identify need for new procedures.
  - List any new procedures required.
  - Statement on the development of the safety manual implementation plan:
    - Normal implementation means and methods.
    - Project specific means and methods.

**References:**

[T&PS EH&S Procedures and Guidelines](#)

#### **6.1.4 Attribute: Site Improvement Plan and Logistics**

**Description:** This attribute identifies any improvements to the site necessary to support construction activities. It develops a site plan that optimizes use of space and notes changes to the existing site, resulting in efficient construction.

**Resources and Documents:**

- General arrangement drawings.
- Aerial views.
- Plant photographs.

**Considerations:**

- Site type: greenfield or brownfield.
- Construction entrance.
- Craft, supervision, and CM parking and traffic flow.
- Security improvements and additions, including fencing.
- Haul roads.
- Laydown areas.
- Crane walk paths and work pads.
- Major equipment passage, access, and operating clearances.
- Fabrication areas.
- Material flow.
- Construction power for office and work areas.
- Construction offices (trailers or permanent facilities).
- IT infrastructure.
- Phone service.

**Deliverables:**

- Site improvement plan and logistics statements:
  - Review the site, general work areas, and crew work areas:
    - Aerial photos, site plans, and general arrangement drawings.
    - Significant features.
    - Safety considerations.
    - Optimized for craft travel, transport, wait times, and productivity.
    - Coordinated with plant operations and maintenance.

**Reference:**

[Attachment D: Site Improvement Plan and Logistics Example](#)

### 6.1.5 **Attribute:** Construction Equipment Access

**Description:** This attribute ensures adequate equipment access to the working area. This planning effort allows the Construction Services representative to note risks associated with equipment access and to provide an opportunity to develop mitigation plans before construction begins.

**Resources and Documents:**

- Plant photographs.
- General arrangements.
- Engineering drawings.
- Physical measurements.
- Equipment specification sheets.
- Load lists for mechanical equipment.
- Geotechnical reports.

**Considerations:**

- Access requirements for caisson rigs, pickers, and related equipment.
- Impact of construction on underground utilities and protecting them where required.
- Ground stability study of all haul roads.
- Travel paths for equipment.
- Relocations and modifications necessary for construction access.
- Equipment and load sizes to be handled.
- Horizontal and vertical clearance restriction along haul paths.
- Confirm equipment usage plan with Operations, especially as it relates to outages.
- Overhead and side obstruction.

**Deliverables:**

- Construction equipment access statements:
  - Identify each characteristic for overall site, general work areas, and crew work areas.
    - Close-in aerial photos, site plans, and general arrangement drawings.
    - Specific locations.
    - Haul routes to and from the site.
    - Local temporary laydown and staging areas.
    - Fueling considerations.
    - Plant interfaces.

**References:**

None.

### 6.1.6 **Attribute:** Heavy Haul and Lifting Plan

**Description:** The heavy haul and lifting plan determines the overall philosophy for handling and erecting major components of the project. The plan addresses how loads will be handled from site delivery to erection. It includes early identification of expected loads, equipment needs, and equipment placement to ensure hauling and lifting capabilities will be met.

#### **Resources and Documents:**

- Crane vendors.
- Crane load charts.
- Load lists.
- Heavy haul contractors.
- 3-D models.
- Local and regional transportation authorities.

#### **Considerations:**

- Include crane or other specialized equipment needs, defined and documented with drawings or sketches.
- Determine size and weight of major components to be delivered from offsite.
- Conduct a study of prefabrication, preassembly, and modularization at offsite facilities (PPMOF) to determine feasibility for the project.
- Conduct a transportation study in conjunction with the items above.
- Determine what and where prefabrication, preassembly, and modularization will be done onsite.
- Determine size and weight of components to be transported onsite.
- Repetitive functions.
- Elements of lift plan.
- Rigging arrangements.
- Risks associated with lifts.
- Non-routine, complex, critical lifts.

#### **Deliverables:**

- Heavy haul or lifting plan statements (300 T-rated crane or specialty lifts).
  - Haul path, haul plan, and crane pad.
    - Operating radii drawing.
    - Load charts.
    - Special rigging considerations.
    - Obstructions.
    - Underground facilities.
    - Ground preparation.
  - Special lifting equipment.
    - Objects.
    - Equipment type and configuration
    - Lift objects.
    - Equipment location and layout.
  - Lift plan
    - Equipment configuration.
    - Lifting layout.
    - Load charts.
    - Special rigging considerations.
    - Lift objects.
    - Crane location and layout.
    - Crane configuration.

#### **References:**

Crane locations and supporting construction data examples:

[Attachment E, Heavy Haul Example - M18000 section view](#)

[Attachment F, Heavy Haul Example - M18000 Loc D6](#)

### 6.1.7 **Attribute:** Impacts to Existing Facilities

**Description:** This attribute identifies changes to existing plant facilities and infrastructure required to support construction activities.

**Resources and Documents:**

- Current site drawings.
- Site photos.
- Models.

**Considerations:**

- Relocations:
  - Underground.
  - Permanent site access.
  - Permanent buildings.
  - Process related facilities.
  - Temporary relocations.
- Demolitions and removals.
- Tie in outage assessment loss-of-power to new equipment.
- Ground pressure tests along planned travel paths.
- Permanent and temporary traffic patterns.

**Deliverables:**

- Impacts to existing facilities statements:
  - Demolitions.
  - Relocations.
  - Modifications and upgrades:
    - Temporary.
    - Permanent.
  - Accommodations:
    - Temporary.
    - Permanent.

**References:**

None.

### **6.1.8 Attribute: Project Installation Risk Assessment**

**Description:** The project installation risk assessment supports the overall project risk assessment effort by identifying risk areas associated with the proposed construction work plan.

**Resources and Documents:**

- Craft labor studies.
- Qualified contractor lists.

**Considerations:**

- Labor force.
  - Quality.
  - Quantity.
  - Labor rates.
  - Per diem or incentives.
  - Labor relations.
  - Productivity.
- Qualified contractors.
- Commodity availability and pricing.
- Equipment availability.
- Transportation and logistics.
- Weather.
- Force majeure.

**Deliverables:**

- Project installation risk assessment statements:
  - List of risks ranked by severity (high to low).
  - Brief statement on nature of major risks.
  - List of mitigation strategy for major risks.

**References:**

None.



### 6.1.9 **Attribute:** Construction Work Package (CWP) List

**Description:** The construction work package list identifies the Construction Work Packages created by the Integrated Project Planning (IPP) Team. A Construction Work Package (CWP) is a single Division of Work (DOW) grouping of construction scope with distinct boundaries.

**Resources and Documents:**

- General Arrangements and site plans.
- Construction Work Areas (CWA).
- General Project Scope Definition.

**Considerations:**

- Level II estimate.
- Division of work.
- Contracting strategy.
- Scope.
- Contracting expertise.

**Deliverables:**

- CWP Framework List (Rev A) – the list of CWPs for a project created prior to **CR1** that shows one CWP per CWP type for project scope within an area. This list is a binary indicator of construction scope within an area.
- CWP List (Rev 0) – the refined list of CWPs for a project created prior to **CR2**. If the IPP core team has decided that a single CWP needs to be broken into multiple CWPs within the same area, this list can show multiple CWPs of the same CWP type per area. This list is a more detailed overview of construction scope within an area.

**References:**

[AWP-01 Advanced Work Packaging Work Instructions](#)

### **6.1.10 Attribute: Permitting Requirements**

**Description:** This attribute ensures all permitting requirements are met on time as mandated by local, state, and national authorities. It ensures the Construction Services organization provides necessary information to support the permit application process where necessary.

**Resources and Documents:**  
None.

**Considerations:**

- Environmental.
  - Spill, prevention, control and countermeasures (SPCC) plan.
  - Stormwater pollution prevention plan (SWPP).
  - Air pre-construction.
  - Asbestos.
  - National pollutant discharge elimination system (NPDES).
  - Acid rain program and NOx budget trading program.
  - Health Department notification.
- Local, state, and national requirements.
- Wetlands.
- Threatened and endangered species.
- Cultural resources (archaeological and historical).
- Railroad.
- FAA (stack and crane)
- Others.

**Deliverables:**

- Permitting requirement statements:
  - Permitting matrix.
  - Integration into level 2 schedule.
  - Permitting risks.
  - How timing of permits affects the contracting strategy.

**References:**

[Attachment I: Permitting Matrix Template](#)

#### **6.1.11 Attribute: Installation Contracting Methodology**

**Description:** During this process, the Construction Services representative develops a contracting strategy that considers safety, scope, schedule, cost, quality, risk, and other elements to determine the optimal strategy, or mix of strategies, for installation.

**Resources and Documents:**

- Contract strategy matrix.
- Craft labor studies.
- Qualified contractor lists.

**Considerations:**

- Design status (percent complete).
- Schedule.
- Availability of T&PS construction management personnel.
- Core competencies (internal and external).
- Work packages.
- Contract strategy:
  - Lump sum.
    - Time and material.
    - Unit price.
    - G-Max.

**Deliverables:**

- Installation contracting methodology statements:
  - Independent contract packages: Lump sum, Time and Materials, Unit price, Other.

**References:**

None.

### **6.1.12 Attribute: Installation QA/QC Plan**

**Description:** The Installation QA/QC plan ensures both conformance to T&PS quality standards and adherence to policies and procedures.

**Resources and Documents:**

- Construction Quality Program Overview (OR-01).
- Construction Quality library (Vol. 5) in Playbook.

**Considerations:**

None.

**Deliverables:**

- Installation QA/QC plan statements:
  - Quality implementation process meets or exceeds:
    - T&PS basic quality plan (BQP).
    - Quality Control Procedures.
  - Construction plans:
    - OR-01: Quality requirements for work to be performed by Construction Services.
    - CO-03: Used by Construction Services personnel who interact with contractors and oversee the contractor's quality program.
    - CQR-1: Identifies the minimum Quality Program requirements for a contractor who is providing equipment, material, or construction services for T&PS construction sites.
  - Plant's site-specific requirements, if any.
  - Any special requirements related to the site or Scope of Work such as welding of specialty metals.

**References:**

[BQP](#)

[Contractor Quality Requirements \(CQR-1\)](#)

[Construction Quality Program Overview \(OR-01\)](#)

[Contractor Quality Programs Evaluation and Oversight \(CO-03\)](#)

[Construction Quality library in Playbook](#)

### 6.1.13 **Attribute:** Security Plan

**Description:** The security plan is implemented to protect project personnel, craft labor, materials, and equipment from harm and to establish the rules and regulations necessary for an orderly work environment. Safety plan guidance minimizes disruptions to plant operations and construction.

**Resources and Documents:**

- Plant security rules.

**Considerations:**

- Site type:
  - Greenfield.
  - Brownfield.
- Contractor access.
- Guard house or shack.
- Security staff.
- Fencing and gates.
- Turnstiles and metal detectors.
- Security cameras.
- Offsite traffic control.
- Lighting.
- Badging requirements and process.
- Vehicle tags.
- Fitness-for-duty requirements.
- Information technology (IT) requirements.
- Security vehicles.

**Deliverables:**

- Security plan statements:
  - Plant based:
    - Existing without enhancements.
    - Existing with enhancements.
  - Project based
  - Construction entrance.
  - Security staff and equipment.
  - Other features
- Significant security features.

**References:**

None.

#### **6.1.14 Attribute: Outage Work Integration Plan**

**Description:** The outage work integration plan identifies the scope and expected duration of any outage work necessary to support completion of the project. This effort provides critical schedule information that is needed early to incorporate into the plant outage planning process, and it identifies the drivers for outage integration.

**Resources and Documents:**

- System outage personnel.
- Plant outage personnel.
- L-2 schedule.
- Fleet outage planning schedule.
- Regularly scheduled plant maintenance outages.
- Labor supply and demand studies.

**Considerations:**

- Fleet workforce outage planning.
- Project-specific outage requirements.

**Deliverables:**

- Outage work integration plan statements:
  - Scope of work.
  - Schedule for work.
  - Integration with plant outage:
    - Scope.
    - Schedule.
    - Logistics.

**References:**

None.

### **6.1.15 Attribute: Construction Management Plan**

**Description:** The construction management plan provides project cost estimates and cash-flow input for staffing and temporary construction costs associated with the project. Staffing information resulting from this effort is also factored into the overall T&PS staffing strategy.

**Resources and Documents:**

- Indirect and direct cost projection spreadsheets. The Construction Services representative will use the spreadsheets to project staffing and temporary construction costs for the project in accordance with the suggested contract strategy.

**Considerations:**

- Contractor strategy.
- Class of the estimate.
- Unique temporary construction costs.

**Deliverables:**

- Construction management plan statements:
  - Organization charts:
    - FTEs.
    - Supplemental staff.
    - Other T&PS groups.
- Staffing plan schedule.
- Facilities:
  - Existing.
  - Newly established.
- Cost:
  - Labor.
  - Temporary construction.
  - Total.
  - Craft workhours.
  - Average \$/workhour.

**Reference:**

Generic Examples of Construction Management and Temporary Construction Costs:

[CM Estimate Spreadsheet](#)

[Construction Management Staffing Guide](#)

### **6.1.16 Attribute: Construction Installation Estimate**

**Description:** The construction installation estimate provides projected cost and cash flow information to support development of the overall project estimate.

**Resources and Documents:**

- Productivity metrics.
- Indirect and direct cost projection spreadsheets.
- Equipment and heavy lift plan.

**Considerations:**

- Sequence and schedule major construction segments with buy-in by T&PS Design.
- Provide CM budget.
- Productivity review.
- Contractor overheads and indirect costs.
- Owner and contractor construction equipment.
- Temporary construction.
- Demolition estimate.
- Scaffolding estimate.

**Deliverables:**

- Construction installation estimate statements:
  - Total estimate EPC.
  - Construction estimate summary:
    - Total construction cost.
    - Taxes + owner's material.
    - Total estimate, including taxes.
  - Direct construction cost:
    - Labor.
    - Material.
    - Subcontracts.
    - Total.
  - Direct labor:
    - Direct labor hours.
    - Average W2 wage.
    - Average W2 wage with burdens and benefits.
    - Per-diem.
  - Labor productivity factors for major quantities:
    - Productivity factor basis:
      - Historical from similar projects.
      - Crew and work hour basis.
      - Combination.
    - Productivity factors.
      - Lf of cable, tn of steel, lf pipe, cy soil, etc.

**References:** None.



### **6.1.17 Attribute: Project-Specific Craft Labor Availability Study**

**Description:** The project-specific craft labor availability study assesses the project's craft labor needs and the ability of local and regional resources to meet those needs. Special attention must be paid to the craft for which the labor demand exceeds 60 percent of the identified local labor pool. Staffing risk mitigation options should be considered at that time.

**Resources and Documents:**

- T&PS Labor Relations department.
- Labor organizations.
- Contractors.
- Available published studies.
- ABC, AGC, and other trade organizations.
- Market analyses (CLMA, Alpha Resources, CLRC, others).

**Considerations:**

- Labor availability, productivity, quality, absenteeism, and turnover could become an issue when the labor demand for a craft exceeds 60 percent of the identified local labor pool.

**Deliverables:**

- Project-specific craft labor availability study:
  - Demand by craft.
    - System.
    - Regional.
    - Site:
      - T&PS contractors.
      - Plant contractors.
      - Transmission contractors.
    - Skilled labor risk assessments (pain point charts).
  - Labor availability mitigation strategies:
    - Broader geographical reach.
    - Craft use flexibility (use of alternative trades where appropriate).
    - Increased composite crew use.
    - Supplemental non-union workers (union projects).
    - Specialty contractors.
    - Schedule adjustment.
    - Temporary compensation adjustments.
    - Others.

**References:**

[Attachment H: Boilermaker Availability Example](#)

### **6.1.18 Attribute: Craft Worker Productivity Improvement**

**Description:** The craft worker productivity improvement effort will incorporate labor productivity improvement best practices into planning to increase direct work by minimizing travel, transport, and wait times. The effort will focus only on the pre-construction planning activities associated with the productivity improvement guideline.

#### **Resources and Documents:**

- Productivity Improvement Guideline.
- Site plans.
- General Arrangement drawings.
- Local work area plans.

#### **Considerations:**

- Incorporate into the pre-construction project planning best practices in logistics, contracting, and installation work packaging to minimize travel, transport, and wait times.

#### **Deliverables:**

- Logistics plans:
  - Project area:
    - Parking lot.
    - Brass alley.
    - Fabrication yards.
    - Laydown yards.
    - Staging areas.
    - Warehouses.
    - Haul routes.
    - Equipment maintenance areas.
    - Bussing of craft.
  - General work areas:
    - Field offices.
    - Construction power.
    - Site work vehicle parking.
    - Equipment location and storage areas.
    - Tool rooms.
    - Material storage areas.
    - Elevators
  - Crew work areas:
    - Foreman work stations.
    - Clearances.
    - Hot work and other permits.
    - Tool containers.
    - Break areas.
    - Restrooms and hand wash stations.
    - Water coolers.
    - Smoking areas.
    - Construction power.
    - Air, water, and other necessary utilities.
    - Temporary lighting.
- Contract strategy relative to productivity improvement.
- Installation work packaging (IWP):
  - Project philosophy.
- Preliminary summary level list of installation work packages.

#### **References:**

[Productivity Improvement Guideline](#)

### **6.1.19 Attribute: EPC Summary Level Schedule**

**Description:** The critical path method (CPM) schedule will show the linkages between engineering, procurement, and construction and will identify the critical path.

**Resources and Documents:** EPC Summary Level Schedule.

**Considerations:**

- L-2 – outage and critical items, L-2 – DOW.
- Define and show unit outage dates and durations on engineering, procurement, and construction (EPC) schedule.
- Define, scope, and show critical path outage work on EPC schedule.
- Establish regulatory and generation requirements and COD dates.
- Derive from estimate quantities and code structure.
  - Estimate and schedule to have consistent DOW and commodity coding.
- Tie to current planned outage dates.
  - Ensure relocations requiring outages are clearly defined and scheduled.
  - Provide recommendations to the asset manager.
  - Negotiate outages required for construction and to accommodate the construction schedule.
  - Coordinate with fleet outage planning for labor and generation sensitivities.
- Review permitting duration and linkages to project critical dates.
- Incorporate procurement duration for equipment, materials, and contracts.
- Incorporate major equipment lead times.
- Incorporate latest contract strategies.

**Deliverables:**

- Level 2 EPC schedule statements:
  - 1 page summary level schedule.
  - Incorporates current contracting strategy.
  - Significant milestones.
  - Significant critical items.
  - Correlation with plant outage schedules.

**References:**

None.

### **6.1.20 Attribute: Post-Construction Site Restoration Plan**

**Description:** The post-construction site restoration plan ensures the site is restored to its preconstruction condition or better. This attribute identifies the areas to be restored.

#### **Resources and Documents**

- General arrangement layout.
- Site photos (preconstruction and post construction).

#### **Considerations:**

- Temporary infrastructure.
- Original site conditions.
- Buildings.
- Roadways and paving.
- Landscaping.

#### **Deliverable:**

- Post-construction site restoration plan statements:
  - Listed items:
    - Site.
    - Buildings.
    - Equipment.
    - Laydown yards.
    - Temporary roads.
    - Removals.
    - Others.

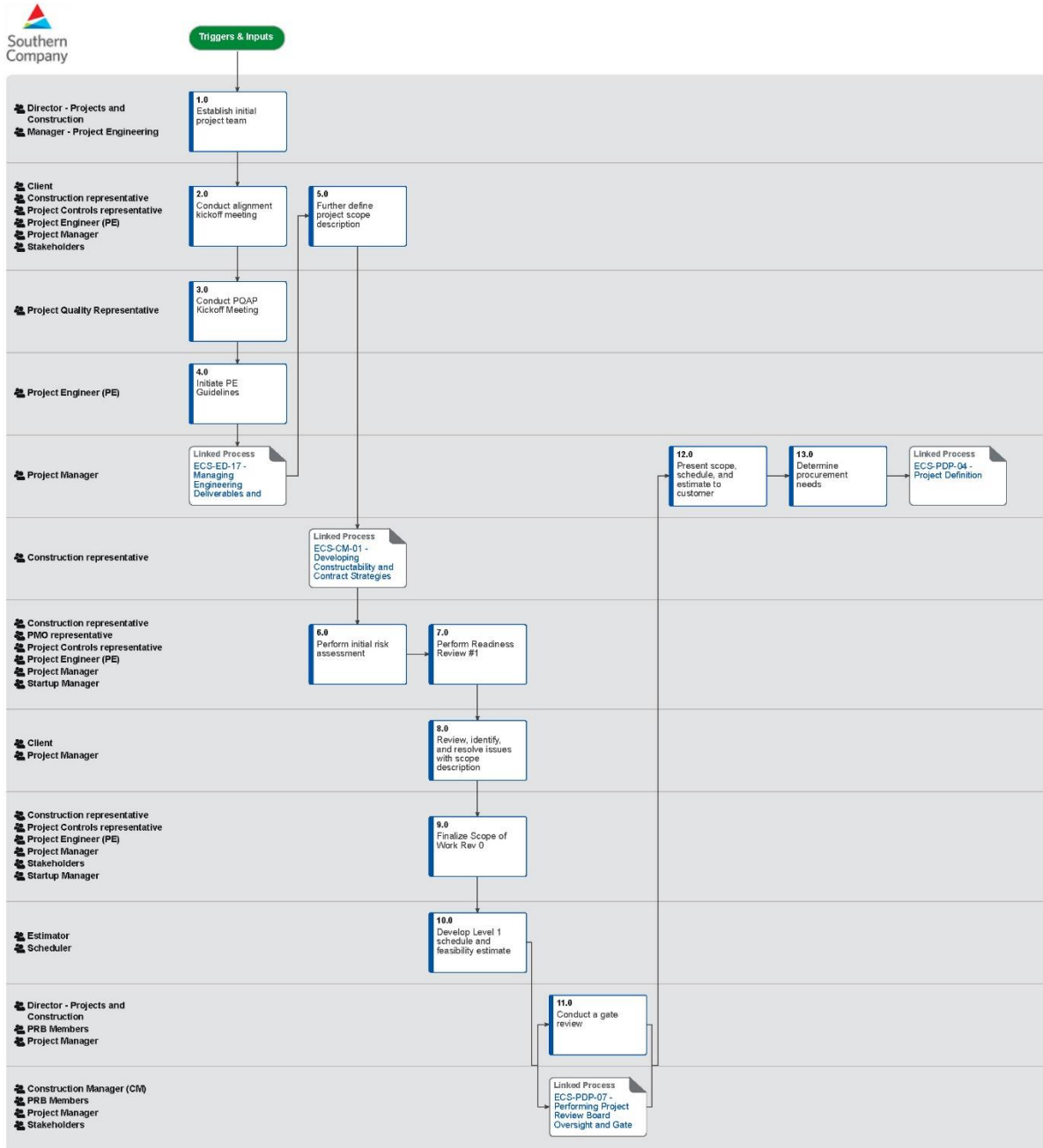
**References:** None.

## 7.0 ATTACHMENTS

- [Attachment A, PDP Scope Development Flow Chart](#)
- [Attachment B, PDP Project Definition Flow Chart](#)
- [Attachment C, Modularization Checklist](#)
- [Attachment D, Site Improvement Plan and Logistics Example](#)
- [Attachment E, Heavy Haul Example - M18000 section view](#)
- [Attachment F, Heavy Haul Example - M18000 Loc D6](#)
- [Attachment G, Attendance Sheet Example](#)
- [Attachment H, Boilermaker Availability Example](#)
- [Attachment I, Permitting Matrix Template](#)

Attachment A: ECS-PDP-03 Scope Development process map

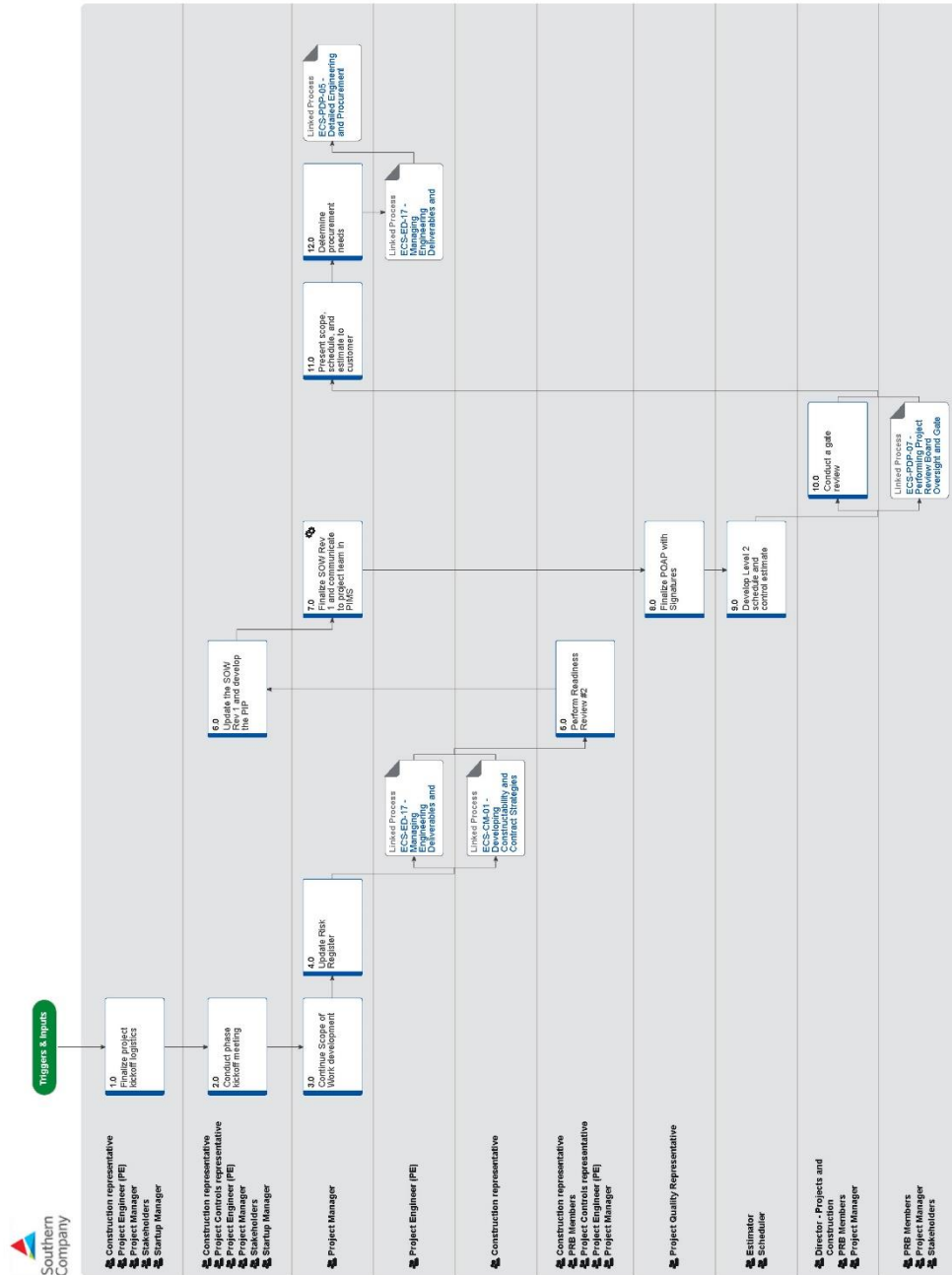
ECS-PDP-03 - Scope Development v5.0



[Process ECS-PDP-03](#)

Attachment B: ECS-PDP-04 Project Definition process map

ECS-PDP-04 - Project Definition v7.0



[Process ECS-PDP-04 Project Definition](#)

**Attachment C: Modularization Checklist**

Project: Future Project #2 Date: 9/26/2016

**Modularization Checklist**

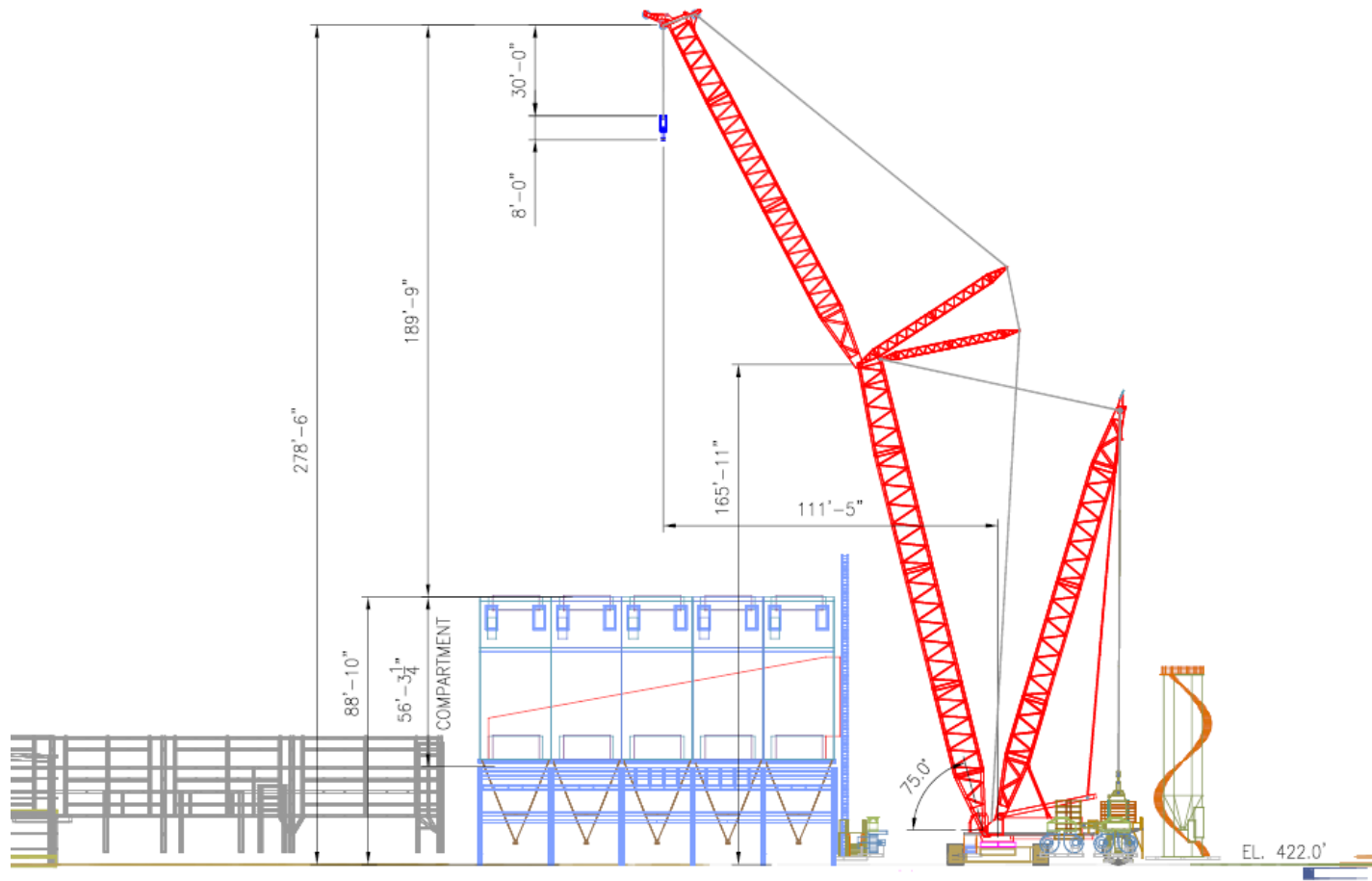
	Cost Savings	Schedule Impact	Modules or Pre-Assembled	Implement? Y/N	Modularization / Pre-assembly by	Modularization / Pre-assembly Drivers					Supporting documentation	Transportation Issues	Defined in Spec	Defined in Design Criteria	Description/Requirements/Constraints
						Safety	Cost	Schedule	Quality	Other					
<b>Baghouse</b>															
Modules			Modules	Y	Vendor							Issues due to barging	Y		12 of 20 baghouse compartments will be modularized and barged to the site
Lifting Lugs			Pre-Assembled	Y	Vendor							none			Get 3rd party to design lifting lugs and PSP to install during design.
Seal Air Skids															
<b>Steel</b>															
Stair Towers			Pre- Assembled		Vendor							none			
Pipe Bridge			Pre- Assembled		Vendor							none			
Platforms			Pre- Assembled		Vendor							none			
<b>Ductwork</b>															
C Sections															
Duct Modules			Modules	Y	Vendor							Issues due to barging	Y		All ductwork will be modularized and barged to the site.
Lifting Lugs			Pre-Assembled	Y	Vendor							none			Get 3rd party to design lifting lugs and PSP to install during design.
Doors			Pre-Assembled	Y	Ductwork Vendor							none			PSP to install ductwork doors.
Slide Bearings															
Insulation			Pre-Assembled	Y	Ductwork Vendor							none			Investigating this option.
<b>Piping</b>															
Pipe Bridge			Pre-Assembled	Y	Offsite fab shop							none			Getting piping pre-assembled as much as possible.
Instrument Air System			Pre-Assembled	Y	Offsite fab shop							none			Getting piping pre-assembled as much as possible.
Service Air System			Pre-Assembled	Y	Offsite fab shop							none			Getting piping pre-assembled as much as possible.
Potable Water			Pre-Assembled	Y	Offsite fab shop							none			Getting piping pre-assembled as much as possible.
Waste Water			Pre-Assembled	Y	Offsite fab shop							none			Getting piping pre-assembled as much as possible.
Seal Air			Pre-Assembled	Y	Offsite fab shop							none			Getting piping pre-assembled as much as possible.
<b>Electrical</b>															
PEEC			Modules	Y	Vendor							none			Booster Fan PEEC
Breaker Rack															
<b>Instruments</b>															
Instrument Stands															



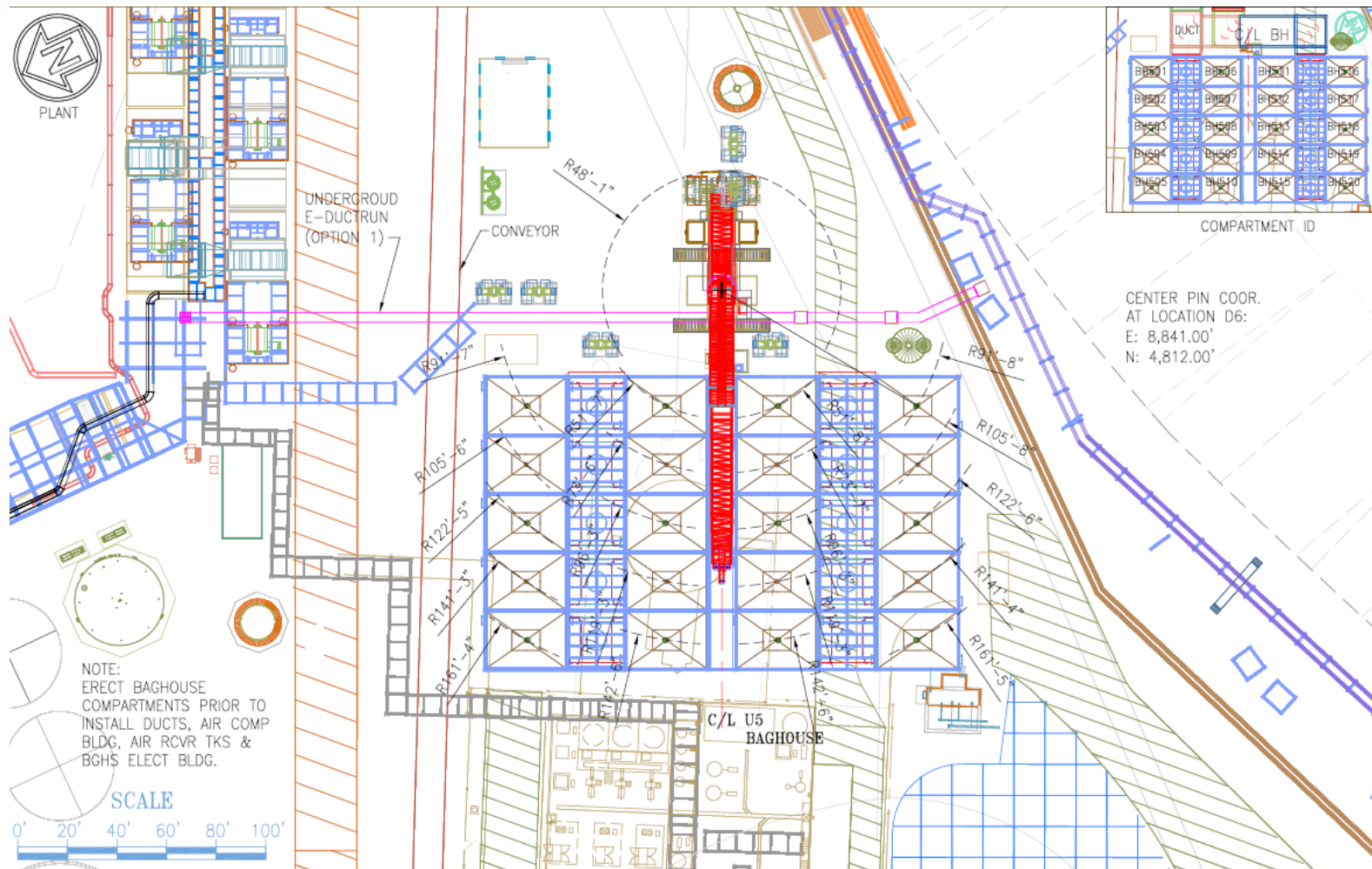
**Attachment D: Generic Site Improvement Plan and Logistics Example**



**Attachment E: Heavy Haul Example - M18000 section view**



**Attachment F: Heavy Haul Example - M18000 Loc D6**



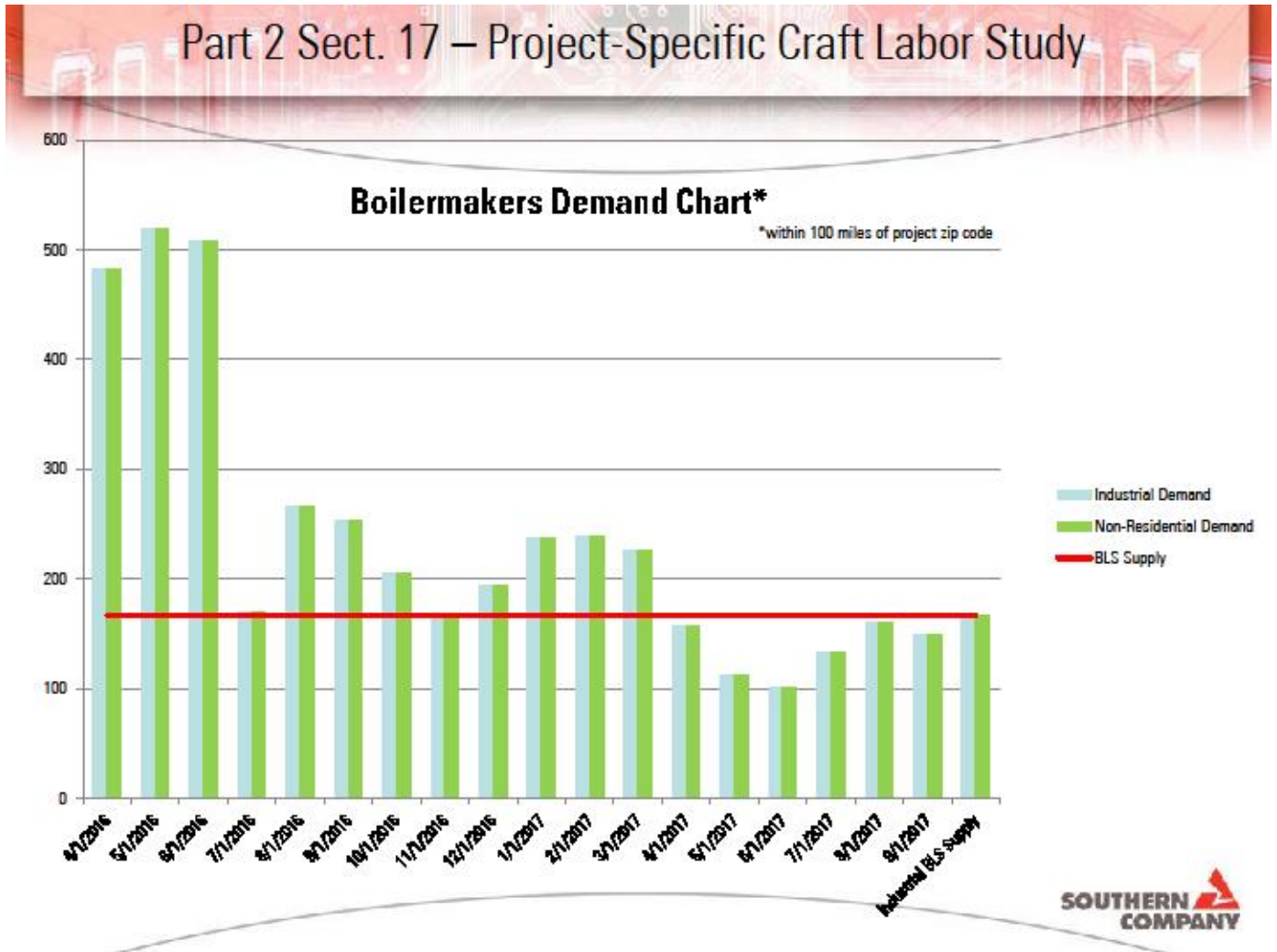
**Attachment G: Attendance Sheet Example**

**Constructability Review Sign In Sheet**  
**Project: FUTURE PROJECT #2**

**Attendees Log**

		Scope Phase	Definition Phase
		CR #1	CR#2
<b>Attendee:</b>	<b>Role:</b>	7/22/2016	10/4/2016
Rosalyn Hill	Project Manager	<i>Rosalyn Hill</i>	<i>Rosalyn Hill</i>
Jay Sullivan	Constructability Lead	<i>Jay Sullivan</i>	<i>Jay Sullivan</i>
Donald Adkins	Project Engineer	<i>Donald Adkins</i>	<i>Donald Adkins</i>
	Discipline Leads as directed by PE		
Bob Smith	Project Controls Lead	<i>Bob Smith</i>	<i>Bob Smith</i>
Fred Jones	Asset Manager	<i>Fred Jones</i>	<i>Fred Jones</i>
Phil Andre	Construction Site Manager(or Regional Manager)	<i>Phil Andre</i>	<i>Phil Andre</i>
Terry Stephens	Technical Services Lead	<i>Terry Stephens</i>	<i>Terry Stephens</i>
Johnny Phelps	Safety Representative	<i>Johnny Phelps</i>	<i>Johnny Phelps</i>
Albert James	Quality Assurance Representative	<i>Albert James</i>	<i>Albert James</i>
Eric Stearns	Contract Strategy Representative	<i>Eric Stearns</i>	<i>Eric Stearns</i>

**Attachment H: Boilermaker Availability Example**



**Attachment I: Permitting Matrix Template**

Status as of: 02/15/2017							
Permit / Plan	Preparer	E&CS Contacts	Date Permit Info Required	Application Submittal date	Permit Required date	Status / Action Requiring Perm	E&CS Actions Needed
Acid Rain Program & NOx Budget Trading Program CEMS Certification (EPA)							
Air pre-construction							
Asbestos Notifications							
Best Management Practices (BMP) Erosion and Sediment Control Plan - Construction							
Building Permit (Grading, Structural, Electrical, Mechanical)							
Clean Air Interstate Rule, Mercury Rule, Regional Haze Rules							
Coal Pile Changes							
Construction - Spill, Prevention, Control and Countermeasures (SPCC) Plan							
Continuous Emissions or Opacity Monitoring Systems; CEMS or COMS							
Corps Of Engineers (COE) - Individual/Nationwide							
Cultural Resources Review							
Facility Response Plan (FRP) per Oil Protection Act 1990 (OPA 90)							
FEMA Flood Plain							
FERC Project Boundaries							
Hazardous Waste Management Plan							
Health Department Notification							
Historic Preservation Office Approval							
Hydro test water discharge							
Local Fire Department Notification							
National Pollutant Discharge Elimination System (NPDES) – storm water (Construction permit)							
National Pollutant Discharge Elimination System (NPDES) – waste water							
Operations - SPCC (EPA) (Spill Prevention, Control & Counter Measures)							
Railroad - Right of Entry/Utility Occupancies							
Risk Management Plan (EPA)							
SARA Title III Reporting (emergency planning and reporting on hazardous and toxic chemicals)							
Solid Waste Landfill							
Stack and Crane (FAA)							
State License for radiation sources (NDE/Testing/Flow Meters)							
Tank Removals and remediation							
Temporary Authorization to Operate (TAO)							
Toxics Release Inventory (TRI) Reporting							
Water Withdrawal (ADECA) Alabama Department of Economic and Community Affairs							