



# NAC Executive Insights

## Construction Turnover

### Key Points

- Construction turnover is accomplished by a multi-discipline, multi-functional team with an overriding focus on safety.
- The turnover team has the prime role in the establishment of the overall turnover vision and the program that supports project goals and key milestones.
- The construction turnover plan reflects all activities to transition the facility to the commissioning group.
- Construction turnover planning begins at the outset of the project with planning for startup.

### Introduction

This Executive Insight focuses on the roles, responsibilities, and general scope of construction turnover. It focuses on defining construction completion and turnover of plants and facilities to the owner and an established commissioning team. Specific plant characteristics or owner requirements may act to modify elements of this Executive Insight. As such, this Insight should be viewed as a starting point for efficient and effective construction turnover. Although written from the perspective of industrial facilities, it represents a model for infrastructure projects, especially those with major mechanical and electrical elements.

### Overall Roles and Responsibilities

Construction turnover is accomplished by a multi-discipline, multi-functional team with an overriding focus on safety. This turnover team includes:

- **Site management**, thus underscoring the importance of planning for completion and turnover from the beginning of the project. Construction management and site supervisors are important members of this team. The site management team aids in transitioning from area-based construction activities to systems-based checkout, testing, and pre-commissioning. Timely closeout of punch lists is essential to system checkout and startup.
- **The turnover team**, which develops a comprehensive turnover program focused on key project milestones and associated requirements. These should be included in the overall construction and project schedules as a separate work breakdown structure (WBS) and be linked to

appropriate project and construction activities. Tracking turnover activities, much like tracking startup activities, often is not given the attention required throughout the project. At an early stage, the turnover team participates both in development of turnover plans and the site quality manual. The latter ensures that appropriate requirements for equipment and layout, especially access related features, have been addressed. The turnover team also acts to ensure that contract requirements related to turnover have been addressed and documented. Other responsibilities of the turnover team are discussed later.

- **Site safety** is focused on the unique safety implications of pre-commissioning activities occurring in parallel with ongoing construction activities. Live, pressurized, or energized systems create special challenges as well as ensuring that systems being tested in pre-commissioning are sufficiently isolated and identified. The changing safety environment that may evolve daily or even hourly requires close attention.
- **The site project controls team**, in conjunction with others, develops an overall project turnover schedule. This schedule, for example in the mechanical area, would begin with pressure testing of piping and sequentially move through to mechanical completion. The site project controls team will provide the status of construction turnover progress and identify negative trends and opportunities.
- **Construction**, including subcontractors, will have well-defined responsibilities with respect to project turnover. These will include those related to quality performance of the work in accordance with designs, specifications, and codes; pre-commissioning cleaning and testing such as hydrotesting, loop checks, and blowdown; and handover documentation such as quality related documentation, marked-up as built drawings, as-built building information models (BIMs) (serving as operating stage facility and asset models) and punch list status.
- **The client commissioning and operations team** will help define system boundaries and ensure the turnover schedule meets overall startup and commissioning requirements. This team ensures any special requirements before and after pre-commissioning have been identified and met. It will provide any necessary approvals, including those associated with hold and witness points.

Other elements of the overall project team will have roles to play in construction turnover, including construction automation and field engineering.

## Turnover Team Roles and Responsibilities

The turnover team, as one would expect, has the central role in construction turnover. A prime role is to establish the overall turnover vision and the program that supports project goals and key milestones. This team champions turnover within the broader construction team, raising awareness and educating as appropriate. Turnover team responsibilities may broadly be grouped as follows:

- **Lead** – The turnover team has as its primary responsibility ensuring that all contract requirements with respect to construction turnover are met. This is a proactive role that requires engagement with the owner’s organization to establish seamless alignment around the

overall process, communications protocols, and issues resolution. Especially important are the relationships with the owner’s commissioning team. The turnover team drives the turnover schedule, expediting activities as required and maintaining awareness of the status of all systems, including those which have had turnover completed. Turnover requires a shift in focus from an area or work package approach to a system approach. Attention must be paid to any lockouts or isolations that may be required. The turnover team leads the development of turnover packages and ensures any required quality documents are prepared and provided on a daily basis to the owner. The turnover team also is charged with transferring care, custody, and control of systems, meeting schedule and quality requirements, and issuing formal notice of mechanical completion.

#### Turnover Package

The turnover package includes system descriptions; drawings illustrating the boundary limits of any turnover package; a list of all included components; and other scope-defining information, including any temporary isolations or blockouts, lockouts, or plugs that must be removed prior to commissioning by the owner.

- **Support** – Support activities undertaken by the turnover team include quality-related support (for example, a site quality manual); input into risk reviews, including development of any mitigation plans; construction contract activities to ensure required documentation is available in required timeframes; and schedule input to ensure proper scheduling of pre-commissioning activities, with key milestones noted. The turnover team provides key support to ensure a well-planned approach to turnover that facilitates pre-commissioning as well as commissioning, startup, operations, testing, and final handover.
- **Coordinate** – The turnover team coordinates extensively with other elements of the broader construction team and the owner’s commissioning team. Specific responsibilities include coordinating with engineering, construction, and operations in the preparation of system boundary drawings (or tagging and coding in the BIM model); coordination with engineering to ensure the necessary turnover deliverables are received and, at an earlier stage, ensuring purchase orders include required documentation, testing, and commissioning spares and vendor support; providing the status of piping testing, cleaning, and loop checkout; and planning coordination of all pre-commissioning activities, including those related to vendor representatives.
- **Review** – The turnover team reviews all automation plans, recognizing the importance of these plans in construction turnover and subsequent commissioning. The team confirms required hardware and software are on-site and available, including any necessary licenses.
- **Status** – The turnover team provides the status of quality documentation and punch list items and informs management and others of that and any critical issues.

## Construction Turnover Plan

The construction turnover plan reflects all activities to transition the facility to the commissioning group. These activities include not only those associated with physical completion of the work, but testing, inspection, and walk downs to confirm compliance with drawings and specifications. Non-process project elements such as civil, structural, and general systems can be defined, with boundaries much like process systems, for turnover purposes.

The turnover and acceptance plan should include the elements reflected in Table 1 as a minimum.

Table 1 Turnover Plan Elements		
1. Overall turnover scope	7. Quality related documents to be used and how managed	13. Vendor representatives listing and requirements
2. Turnover objectives (note any joint occupancy or early commissioning/operations)	8. Punch list definition, categorization, and process for sign-off	14. Completion documentation and responsibilities
3. Organization of the turnover team	9. Subsystem completion package definition and required certifications	15. Turnover schedule
4. Roles and responsibilities both within the team and interfacing groups (RACI matrix)	10. Protection and preservation requirements and responsibilities	16. Special requirements related to as built BIM
5. Common definitions, acronyms, and abbreviations to aid in clarity of communication	11. Pressure testing responsibilities and procedure	17. Special requirements for existing operating facility
6. Subsystem scope and delineation	12. Loop checking responsibilities and procedures	18. Special requirements for any joint occupancy

## Summary

Construction turnover planning begins at the outset of the project. During the scope definition and concept phase, the turnover team and the client develop a high-level commissioning and startup schedule and confirm the scope of key milestones and activities (such as mechanical completion, pre-commissioning, turnover, commissioning, and startup). During preliminary engineering and construction planning, the turnover team develops initial turnover system definitions and limits, including scope and associated documents. This is when the initial draft of the turnover and acceptance plan is prepared and coordination with construction and quality begins. During detailed engineering, system boundaries for

turnover are defined and fixed and the final turnover and acceptance plan is prepared. During the construction phase, the balance of the turnover activities previously described are performed.

The objective of construction turnover is a smooth transition to the commissioning team and efficient vertical startup<sup>1</sup>.

### **About the Author**

Bob Prieto was elected to the National Academy of Construction in 2011. He is a senior executive who is effective in shaping and executing business strategy and a recognized leader within the infrastructure, engineering, and construction industries.

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<sup>1</sup> Vertical startup refers to minimizing the time from when a plant is complete until it has gone to full production.