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Coordinated Construction Phasing on Airports: A Comprehensive Phasing Approach Helps Airports Efficiently Rehabilitate or Replace Aging Facilities

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Many U.S. airports are bursting at the seams with increasing passenger and cargo traffic. They are under severe pressure to replace outdated facilities that are not keeping pace with growing demand and no longer meet modern building standards and passenger expectations. Reconstruction or replacement of existing facilities in a busy 24/7 operational airport environment – whether terminal, landside or airside – often must be completed within tight schedules, as well as within highly congested and constrained work areas. Airport capital programs require a coordinated, multi-disciplined approach to construction phasing planning for the airport to remain safe and fully operational during construction.

This approach to construction phasing plans allows airports to rehabilitate or replace outdated terminal, landside and airside facilities in efficient, coordinated construction sequences over a pre-determined period and within available footprints. A coordinated approach minimizes airport disruptions, maintains required passenger and cargo services and needed security measures. It also enables a safe environment for airport and airline operations, passengers, vehicle traffic, pedestrians and contractors.

Development of detailed construction phasing plans saves time and money by avoiding out-of-sequence construction and minimizing the need for temporary structures and facilities. Going into a construction program with a detailed phasing plan also enables airline operations and network planners, airport operations and engineering staff, and FAA air traffic control staff to properly plan, schedule and mobilize for upcoming construction activities to avoid costly and time-consuming surprises.

The most effective construction phasing plans require advance planning, design and teamwork long before construction begins. Consider the following key strategies:

- **Start with the end in mind**
Successful phasing plan development begins with the end condition. All decisions should be focused on how to most efficiently get from today's conditions to the completion of construction. As program designs evolve and are refined, the phasing plans need to be refined and developed in tandem.
- **Know your constraints and consider timing**
Before spending time developing phasing concepts, take some time to understand program constraints. What is the target opening date? What is the soonest an existing facility can be closed? What are the peak travel hours, seasons and holidays that need to be accommodated? What are the airline's flight schedules and fleet mix during the anticipated construction window? Are there any winter weather, surface

movement and guidance control systems operations and daylight considerations? What are the primary and secondary runway flow directions?

For example, phasing plans for northern airports must consider provisions for snow removal and deicing operations as well as pavement repair, replacement or construction during winter construction periods. Understanding these types of constraints will lead to more effective plan development.

- **Consider the future**
In an airport environment, projects rarely happen independently, and there are almost always other airport projects to consider. "Existing conditions" at the start of construction may look very different than they currently appear. Successful phasing plans must depict anticipated conditions that will exist at the start of a particular phase, which may be different than today, involving future improvements or modifications by other project teams.
- **Access and security – how are you going to get there?**
A phasing plan is of little value if construction areas cannot be safely accessed by the contractor. Haul routes, airport operations area and site security, vehicle crossings of active airfield areas, staging and batch plant areas all need to be factored into a successful phasing plan.



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- **Involve your stakeholders**
Relationships matter. Developing a solid construction phasing plan takes teamwork and an investment of time and energy by all stakeholders. Positive and open working relationships established early in the planning stage are key to a successful plan. Recognize that each stakeholder has distinct needs,

concerns and criteria that must be considered. Early and frequent involvement is critical to success, including such stakeholders as:

The Airport

Airport operations, maintenance, facilities and engineering staff often are the most knowledgeable on the unique characteristics and facilities of an individual airport and bring a critical perspective to successful construction phasing and safety plan development.

Airlines

Airlines play a central role in an airport's operations and growth and must be actively engaged when developing and refining construction phasing plans. It is essential that airports maintain adequate availability of and access to aircraft gates throughout construction.

For example, during the ongoing Salt Lake City Airport Terminal Redevelopment Program, airlines have been closely involved in the program through their technical representative. This phasing approach is helping ensure that adequate airline gate capacity is maintained for each year of this 10-year construction program.

Air Traffic Control

The local FAA air traffic control staff often can provide valuable insight into how an airfield operates during certain hours or seasons. ATC also can provide an understanding of primary airfield operational routes that must be maintained and secondary routes that may be considered for potential detour or operational restrictions to accommodate construction.

Contractors

Contractor engagement can provide valuable input and testing of a construction phasing concept. However, the timing and extent of contractor input needs to be sensitive to a project's delivery method, whether design-bid-build, design-build, or construction manager at risk (or general contractor/construction manager). The right level of involvement from the contractor will help to avoid conflicts of interest for contractors that may perform the construction.

Other stakeholders

Local utility providers, municipalities, state DOTs, Transportation Security Administration and even concessionaires need to be involved whenever their facilities may be impacted. Engaging with these stakeholders early allows them to properly plan their own work, helping to avoid unintended impacts and potentially costly delays.

- **Develop an initial, but flexible, concept**
Getting all stakeholders together early in phasing plan development is critical to success.

To make the most of stakeholder time, invest effort in developing an initial concept. The initial concept should be defined enough to cover anticipated construction elements and general durations, but flexible enough to accommodate comments, ideas and suggestions from stakeholders. The goal of the initial concept is not to have the final solution, but to provide a framework to facilitate discussion and to uncover stakeholder concerns, leading to ideas and solutions for group buy-in.

- **Don't forget the utilities**

The initial planning efforts surrounding phasing plan development often involve questions of how to maintain access to the primary airport facilities during construction, such as terminal buildings, concourses, passenger services, airport roadways, runways and taxiways. Supporting all these facilities is typically a complex web of underground utilities, including power, communications, water, storm drainage, sewer, natural gas and fuel lines that may be out of sight but must be considered when developing any phasing plan. Many times, maintaining utility services to existing buildings or other facilities will drive significant portions of an overall construction sequence.

- **Off-the-shelf approaches don't work**

Experience in airport construction and in construction phasing plan development at airports is a valuable asset. However, it is important to remember that no two airports are alike, with different airfield layouts, terminal and landside configurations, airline and aircraft mix, peak travel times and climate conditions. As each airport is unique, phasing plans must be similarly unique and specific to the project, the site and the owners' and users' needs. Applying cookie-cutter approaches may not work.

- **Accommodate change**

A well thought out and detailed phasing plan is an invaluable tool for identifying how a project is to be built. However, it is rare when actual construction is completed exactly in accordance with the plan, especially for large, complex, multiyear programs in the dynamic around-the-clock operational environment of an airport. A good phasing plan will be flexible enough to enable airport operations, contractors and others to respond to unforeseen or changed conditions without detrimental effects to the overall progression of work.

- **Refine, communicate. Modify, communicate.**

Clear, consistent communication with the stakeholder team is essential while the plan is refined throughout the final design process. Development of detailed construction phasing plans is very dynamic, as proposed changes to one phase will likely impact preceding and following phases. Technology tools, including

screen sharing and video conferencing, make communicating and sharing information easier but work best when combined with face-to-face meetings and site visits. It is important to develop a comprehensive communications plan in the earliest planning stage and choose the communication modes, frequency and content that best suits the team and the project.

A construction phasing plan also is affected by the chosen delivery method. Most airport projects are delivered with one of three common project delivery mechanisms. Design-bid-build, historically the most common at most airports, involves the airport producing detailed design documents (often under contract with a design firm) and awarding a construction contract to the lowest qualified bidder.

Design-build uses a single entity, typically a construction firm or joint venture, to design and build a complete project based on owner-provided programming or scoping documents and can be appropriate for large, fast-tracked projects.

The construction manager at risk delivery method (sometimes known as GMGC or GCCM) is somewhat of a hybrid between D-B-B and D-B methods, with a designer contracted to

the airport similar to D-B-B and with a second contract during the design process for a construction manager, typically executed around 15 – 30 percent design completion. The CMAR is responsible for managing and awarding individual construction contracts.

The CMAR delivery method can be a good way to engage a construction team early in the design process to facilitate phasing plan development on large and complex airport projects without precluding individual specialty and building contractors performing the work.

Each delivery method has advantages and disadvantages, and the owner's selected method should be based on the unique needs of a particular project and its stakeholders. However, no matter the delivery method, development of a detailed construction phasing plan is critical to a project's success in the busy confines of an airport environment.

Focusing on these 10 key strategies while developing construction phasing plans will lead to the most effective possible plans and will enhance construction efficiency and safety. A detailed and thoughtful approach to construction phasing is increasingly critical as airports struggle to manage congestion and limited space, while airport operations are projected to grow over the next two decades.

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