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6. CPM SCHEDULE ANSWER STATEMENT COMMENTS

1. **Design:** The design phase was given about 11 months. This allows for some buffer time if a design package falls behind. The Civil Package was chosen to proceed first, as it is naturally the first of the construction activities to take place. I show the structural and architectural packages following shortly after. This is a typical design sequence for this type of building. I afforded 1 Backcheck period and frequently 2 are required. However, with a proactive team, the design phase can be a collaborative effort through a series of client and design team meetings. This increases the flow of communication and limits the need for multiple backchecks. Also, the building is a relatively simple structure to design.
2. **Subcontracting:** The Subcontracting sequence is driven primarily by material lead times and sequencing of work in the field. The sequencing I drafted here is typical of most jobs.
3. **Submittals:** The material procurement process can sometimes be a challenging one to schedule. More often than not, the submittal process can begin before the design is complete. But for scheduling purposes this should not be assumed. Schedule submittals to follow design and precede material fabrication. This the safe approach. Also, know your material lead times to best schedule the procurement activities.
4. **Fabrications:** As mentioned above, knowing the lead times of all your specified equipment and materials is critical to the success of your schedule. This information should be gathered from your subcontractors and they should be in written agreement as to the fabrication durations you will publish in your schedule.
5. **Mobilization:** You can typically mobilize whenever you intend to start work, but occasionally the client will specify when mobilization can begin. No such requirement was specified or in your problem statement, so it was scheduled immediately after NTP. However, for the sake of your General Conditions budget, the mobilization should be timed wisely.
6. **Structure:** The critical path almost always passes through the structural work. In this schedule, the placement of the south slab drives the schedule on each floor. It has been given a conservative duration and by minimizing the amount of structural activities on the critical path, there is less opportunity for the schedule to slip. This also provides a consistent attainable goal at each level your concrete operation jumps. The columns and walls are kept off the critical path as to allow for some catch-up time on each floor if required.



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7. **Exterior:** The critical path passes from the structure to the exterior systems. Achieving building dry-in is extremely important to allow finishes to begin. While it is feasible to manage a drywall & taping operation before dry-in, it should not be assumed so on a CPM. A bad weather season could spell disaster for a schedule which relies on finishes beginning before dry-in. If you can manage boarding & taping before dry-in it should be viewed as a bonus opportunity.
8. **Rough-ins:** With the lower level structure completed, you want building wall framing and MEP rough-ins to kick-off as soon as possible. Typically, in a concrete structure, the deck being placed must be fully shored on the 3 levels below. Therefore, rough-in kickoff is tied to the completion of the fourth floor deck. Once the shoring is removed from the first floor, rough-ins may begin.
9. **Finishes:** As noted above, the finishes are scheduled to begin upon completion of building dry-in. This is the safest play. Depending on the time of year (especially in Southern California), finishes may begin before permanent dry-in. It's all a matter of risk management. Note that since boarding and taping kicks off a multitude of finish activities, the boarding, taping & ceiling activities are on the critical path.
10. **Elevators:** Elevator procurement is typically a long lead time. But, the elevator installation is a fairly independent activity that relies on structure being in place, an early machine room rough-in and either temp or permanent power. Therefore, the elevator system has been scheduled to begin in the early building rough-in phase. Note that permanent power and fire alarm are required for elevator commissioning.
11. **Final sitework:** Final sitework is one of those activities that when underway, makes everyone feel like the project is nearing completion. Obviously, one can only begin final sitework when substantial equipment and materials have been moved into the building. Also, structural and exterior systems must be substantially complete such that boom lifts and scaffolds are removed for clear site access. This can be a great motivation tool for exterior system trades to wrap up their work. Completing exterior system work before sitework also minimizes the risk of site furnishing damage.
12. **Commissioning:** This is another activity that can be a long drawn out process and thus difficult to schedule. However, it does have the benefit of being able to commence as MEP systems are installed and signed-off by inspectors. Proactive MEP trades and good General Contractors will test, secure owner sign-offs and protect systems throughout construction thus smoothing the commissioning process.



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13. **Punchlist:** This is yet another intangible process that historically takes longer than anticipated. This is where a quality installation, inspection and protection plan can reap huge benefits. By maintaining a high level of quality throughout the construction process, a punchlist operation can be very manageable. Also note that a punchlist operation can begin as soon as an area's finishes are complete, thus saving time at the end of the job. However, this can be a slippery slope, because if you begin punchlist too early you risk possible damage in areas that cannot be cordoned off. A balance of correct timing and efficient punchlist execution usually make the scheduled punchlist time realistic.
14. **Inclement Weather:** This is always a tricky issue to tackle in a schedule. There are numerous ways to handle it. For example, the days can be dispersed to the historically wettest months and can be expended as needed or carried forward if unused. Next, they can be spread evenly throughout the schedule and expended or carried forward. I feel the best way to handle the 27 days of inclement weather is to schedule them as a single activity at the end of the job. Then, whenever a rain day is used, you reduce the duration of the inclement weather activity by one day. This locks in the completion date, and provides some buffer time at the end of the job if any inclement weather days are remaining.

FINAL NOTES:

As you've probably realized in this exercise, there is a lot of flexibility when designing a project schedule. It is likely that the very different schedules from completely different teams can all feasibly work in the field. This is a difficult exercise for a project team with limited time and resources to assist you in developing the CPM. In real life, we as GC's can call and discuss this with whomever we want. With that in mind, the key to a CPM's success is to make everyone involved buy into the plan. The only way to make everyone buy into the plan is to get them involved. Even if you're sure of when or how long an activity should take place, you should always discuss it with the experts that are going to build it. When they share their knowledge with you, they are staking ownership in your schedule. When *EVERYONE* shares in that ownership, the CPM becomes a great tool to steer a project to success.

