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Performance-Based Design

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Focusing on whole building performance provides a structured discussion at all phases of service. As a space and use program is being developed, performance criteria should also be developed. This will be followed by conceptual and schematic design phases in which the assumptions underlying the program can be tested and the performance criteria verified. At this stage, all members of the team (owner, designer, builder and operator) should describe the models and simulations to be performed or the references to be consulted to assure the programmed performance levels can be achieved.

Design development is the time for intensive modeling simulation and analysis to feed into the detail design and coordination process. Virtual construction modeling should begin at this time to guide considerations of construction sequencing and maintainability. The line between design development and contract documents is becoming less sharp as plans, sections and elevations may be taken directly from digital building models. Technical specifications, critical detailing and final detailed coordination are still the tasks of this last phase of document production. As always, the construction process needs to be observed to assure that systems and materials are installed as intended by the contract documents. Final acceptance is based on review and demonstration that the building will perform as designed.

The process model described above was adapted from the commissioning process model and now includes steps of whole building performance-based design and construction process:

1. Start with owner's program document or statement of intent and outline the level of performance intended.
2. Provide basis of design and state measurable criteria and standards to be met in project design.
3. Verify design and simulate performance and demonstrate attainment of desired performance level.
4. Document design for construction and back-check details against model inputs.
5. Verify construction and formally document compliance with documents.
6. System startup testing and test models with real operating data and modify performance models for future use.
7. Post-occupancy re-commissioning and conduct whole building performance evaluation, feed data into generalized/normalized databases for use in future programming and verify maintenance.

Simulation and analysis of all forms of performance will lead to measurably higher performance. Higher performance in nearly every way is more sustainable performance, so the quest for high building and site performance leads to greater environmental sustainability.

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