

## 2. Basis of Design (BOD) Example

### 2.1 Introduction

Beginning in the Schematic Design phase and continuing until the project has been constructed, the Consultant with input from the University's project team shall develop and periodically update an Owner's Project Requirements (OPR) document and a Basis of Design (BOD) document. These two documents together shall provide a complete description of the project's design intent. They must be submitted for University review as two separate sections of one design intent document in the initial stages of a project. The OPR forms the foundation for the design, construction, and occupancy and operation of the facility and are the foundation for the Basis of Design (BOD) and the Commissioning Plan (Cx) and is a major component to inform the project work-plan, procurement strategy, and project budget.

The Consultant shall provide the Basis of Design (BOD) following the OPR. The BOD is to be an inclusive, detailed description of the Consultant's concepts, assumptions, calculations, decisions, product selections and operating conditions to meet the University's project requirements and to satisfy codes, Facility Standards (FS2) and industry standards. It shall be formatted to coordinate with and respond to the OPR.

As decisions are made during the Design, Construction, and Occupancy and Operations reviews the OPR document shall be updated to reflect the current project requirements of the Owner.

The frequency of OPR updates and its formulation is tied to the project delivery methodology.

### 2.2 Related Sections:

Sustainability  
OPR Example

### 2.3 Reference Documents:

ASHRAE Guideline 0-2005, "The Commissioning Process"  
USGBC, "LEED® Reference Guide for Green Building Design and Construction"

### 2.4 The BOD requirements shall include the following:

- Project background required to understand the design, including goals, requirements and decisions which significantly affect the design.
- Facility Program and Major Relationships

## A. General Design and Construction Requirements, 2. BOD

- Regulatory, site, schedule and budget limitations which affect the design.
- Codes, standards and guidelines applicable to the project.
  - Life Safety Systems Listing
- Code analysis describing code requirements specific to the project, e.g. smoke evacuation systems, special fire protection requirements, etc.
- Requirements of governing agencies (City, State, NIH, LEED, etc.).
- Climate, site, and utilities information.
- Architectural, mechanical and electrical systems descriptions
  - Partition Systems, UL Ratings
  - Interior Finishes by Use Types
  - Casework/Millwork Description
  - Conveyance Systems
  - Windows, Curtainwalls
  - Envelope Systems
  - Construction Classifications
  - Impact on Main Steam, Chilled Water
  - Design Loads
  - Fire Separations
  - Base and Spare Capacities
  - Diversity and Reliability Assumptions
  - Redundancy
  - Flexibility
  - Back Up Power
  - UPS Systems
  - Sub-Metering
- Outdoor summer and winter design conditions.
- Design assumptions (occupancy schedules, temperature, humidity, air change rates, room pressurization, sound level limits, light levels, glare limits, vibration criteria, EMF shielding, heat loads, water, gases, power, data, grounding, hazardous materials being stored, etc. for spaces not indicated in the OPR.
- MEP systems and BAS sequences of operation.
- Architectural, mechanical and electrical systems operation and maintenance requirements.
- Facility Condition Assessment list marked to indicate tasks included in the project.
- Appendices
  - LEED Checklist
  - Soils and utility services reports.
  - Building load calculations.
  - Systems and equipment sizing calculations.
  - Light level and watts/square foot calculations.
  - Effluent, dispersion, noise, vibration, and other studies

## A. General Design and Construction Requirements, 2. BOD

Develop the OPR and BOD by expanding the project's program and design concept report. Update them as the project goals and requirements are defined and clarified. Submit them at the end of the Schematic Design, Design Development and Construction Document phases along with the other Design Deliverables. Submit a final BOD after Project Award and after incorporation of the bid alternates. Each update shall incorporate new and revised project information including:

- Progress in project design.
- Changes in project goals.
- Changes in project scope.
- Code interpretations.
- Input from Occupants, Construction Managers and Contractors.
- Input from Plant Operations, Department of Public Safety, OSEH, etc.
- Architectural, mechanical and electrical design coordination meetings.
- Value engineering sessions
- Test reports on existing conditions.
- Design calculations.
- Equipment selections.
- The final power system short circuit, protective device coordination and arc flash hazard study including the electronic data file for long term updating by the Owner.
- Energy and water conservation calculations and modeling.
- Updates to LEED Checklist.
- Sound, effluent, dispersion, CFD, vibration, and other studies.
- Bid Alternates and Owner's Options.
- A list of all design deviations from U-M Design Guideline requirements.
- A list of all uncompleted Facility Condition Assessment (FCA) items within the project boundary.

## 2.6 Format

Organize the BOD on a system-by-system basis, preferably in order by CSI Division, using a consistent style for each section. Organize each section from the more global to the more detailed and specific. Number each section and subsection in outline format. Provide a Table of Contents. Submit an electronic file copy along with the required number of printed copies.

## 2.7 As-Built BOD

At the conclusion of the project, the University's Project Manager may elect to have the final BOD updated with as-built information. The content and format for this effort will be negotiated by the Project Manager on a project-by-project basis. To facilitate the production of an as-built BOD document, identify changes during construction that impact the final

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A. General Design and Construction Requirements, 2. BOD

BOD and notify the university's Project Manager accordingly. When writing addenda, CO's and RFI's, the Consultant shall mark them with "Impact on BOD" if they affect the BOD.