CHAPTER 7: PROGRAMMING AND DESIGN

7.1 Overview

For the purposes of this manual, we define architectural programming as the research and decision-making process that identifies a project's scope of work. The programming and design process begins once an initial project proposal is approved and consists of Architectural Programming (Programming), Conceptual Design, Schematic Design, Design Development, and Construction Documents (steps 2-8 below). Programming is the research and decision-making process undertaken to identify a project's scope.

During programming, the information that will guide the architect's design is compiled. If any of that information is incorrect or incomplete, the design, and finished project, will reflect those problems. Alternatively, if the program is too detailed it can hamper the creativity of the design. Successful projects strike a balance between what is needed and what is allowed to evolve during the design phase.

Often programming and design are done simultaneously so that there is coordination between the program and the design. The general sequence is:

1) Initial Project Planning
2) Programming
3) Conceptual Design
4) Schematic, Design
5) Detailed Programming
6) Design Development
7) Equipment Planning
8) Construction Documents

Periodically during the feedback process, there are scope, cost and quality assurance checks consisting of:

- Area calculations
- Cost estimates
- Code and regulatory analysis and review
- Design presentation and review
- Value engineering
- Coordination and constructability checking

The design process consists of: 1) deciding what is required, 2) creating a design that meets those requirements, 3) reviewing the design, 4) incorporating the results of the review, and 5) repeating the process in increasing detail, until there is a set of documents that is fully approved and ready for construction. In addition to this process, there is the parallel state funding process with its submittals and reviews. The state funding process adds steps to the design process (see Chapter 5 for details):

1) Preliminary Plan submittal
2) Working Drawings submittal

The Initial Project Proposal (IPP), Final Project Proposal (FPP), and subsequent funding submittals are discussed in Chapter 5 of this manual. These proposals must be coordinated with the design process, incorporated into the architect's contract, and into the design schedule.

7.2 Managing Programming and Design

Programming develops a reasonable set of objectives for the design. Initial planning starts with an intention and ends with the parameters for the project: project type, project scope, and budget criteria. Programming begins with those parameters and ends with detailed objectives for a design in which site, programming and budget are reasonable and compatible with one another.

Programming is the responsibility of the district and must:

- Distinguish between necessities and preferences so the designer can prioritize the elements of the design, satisfying the necessities first and adding preferences as allowed within scope and budget
- Represent the real needs of the end users avoiding untimely changes later
- Have enough detail while maintaining design creativity and flexibility, but not allowing the design to go astray
- Be based on the correct information avoiding expensive surprises later in the project.

During programming, the end users are the most important participants. The project manager is primarily a facilitator making certain that all the program options are discussed, all the necessary information comes to light, all the players participate in the process, and good decisions are made with room for flexibility.

The design process is a problem-solving process which takes all the objectives and parameters and identifies possible solutions. The best solution is then developed in detail.

The project manager works closely with the end users and the architect during design to ensure that:

- The architect has all the necessary information to proceed
- The design approaches suggested by the architect are compatible with the campus
- The architect is performing according to his/her contract and the usual standard of care
- The design solutions all meet the program, planning parameters, and quality control criteria
- The end users understand and have adequate opportunity for review of design alternatives
- All submittals and approvals are complete, timely, and successful
- Systems and materials decisions include value engineering according to campus criteria
- Construction documents are good quality, properly coordinated, and checked by the district

7.2.1 Managing Design

Managing design is striking a balance between brain storming, creativity and regulatory requirements. The project manager and architect communicate regularly to reach consensus in decisions and to ensure that the project does not exceed scope and budget.

7.2.2 Budget Procedures during Programming and Design

The project manager should be aware of the additional factors that influence budget and scope of a project (these factors are discussed in Chapter 5):

- Submittal, review, and approval of the FPP
- Budget language that controls the scope and cost of an approved project
- The need for any subsequent funding applications and reviews

- The procedures to obtain other sources of funds for capital outlay including energy loans from the California Energy Commission
- IOU New Construction Program for Energy Savings
- Preliminary plan reviews and approval by the State Public Works Board
- Construction document review and approval to bid

7.3 Programming

The success of the project design hinges on programming. Programming looks at the initial planning efforts from multiple user points of view and offers:

- Involvement of interested parties in the definition of the scope of work prior to the design effort
- Emphasis on gathering and analyzing data early in the process so that the design is based upon sound decisions
- Efficiencies (cost savings) gained by avoiding redesign as requirements emerge during architectural design

During programming, each individual space is thought through as part of the whole building. The "whole building" design approach creates a successful, high-performance building. To achieve this goal, the district must apply the integrated design approach to the project during the planning and programming phases. People involved in the building design interact closely throughout the design process. District management, faculty and operation and maintenance personnel should be involved to contribute their understanding of how the building and its systems will work for them once they occupy it. The fundamental challenge of "whole building" design is to understand that all building systems are interdependent.

For design programming of a building or complex, the following six-step process covers the necessary steps:

1) Research the project type
2) Establish goals and objectives
3) Gather relevant information
4) Identify strategies
5) Determine quantitative requirements
6) Summarize the program

7.3.1 Research the Project Type (Step 1)

This step is especially necessary if the project manager is working on a project type for the first time. The project manager should become familiar with the following relevant information:

- The types of spaces frequently included in the building type,
- The space criteria (number of square feet per person or unit) for those spaces,
- Typical relationships of spaces for these functions,
- Typical ratios of assignable square footage (ASF—areas that are assigned to a function) to gross square footage (GSF—total area to the outside walls) for this building type,
- Typical costs per square foot for this building type,
- Typical site requirements for the project type,
- Regional issues that might alter the accuracy of the data above in the case of this project, and
- Technical, mechanical, electrical, security and other issues unique to the project type

7.3.2 Establish Goals and Objectives (Step 2)

Working with the project management team, the project manager solicits and suggests broad goal statements that will guide the remainder of the programming process. Each of the following categories of goals should be addressed:

- Organizational Goals:
  - What are the district's goals? What are the associated educational program goals? How does this architectural project fit into the district master and educational plans?
- Form and Image Goals:
  - What should be the aesthetic and psychological impact of the design? Where is the best site location? How should it relate to the surroundings? Should its image be similar to or distinct from neighboring structures? Are there historic, cultural, and/or context implications?
- Function Goals:

- What major functions will take place in the building? How many people are to be accommodated? How might the building design enhance or impact occupant interactions? How does the design improve upon the current educational environment? Does the design provide accessibility to all?

- Economic Goals:
  - What is the total project budget? What is the attitude toward initial costs versus long-range operating and maintenance costs? What level of quality is desired (often stated in relation to other existing projects)? What is the attitude toward conservation of resources and sustainability (energy, water, etc.)? Have you considered Total Cost of Ownership?
- Time Goals:
  - When is the project to be occupied? What types of changes are expected over the next 5, 10, 15, and 20 years?

7.3.3 Gather Relevant Information (Step 3)

Based upon the goals, the categories of relevant information can be determined and researched. Once gathered, this information is used to prepare documents such as the CEQA documents and Geotechnical Report. Typical categories include:

- Facility users, activities, and schedules:
  - Who is doing what, how many people are doing each activity, and when are they doing it?
  - What equipment is necessary for activities to function properly? What is the size of the equipment?
  - What aspects of the project need to be projected into the future? What is the history of growth of each aspect that requires projection?
  - What are the space criteria (square feet per person or unit) for the functions to take place?
  - What other design criteria may affect architectural programming: access to daylight, acoustics, accessibility, campus/area design guidelines, historic preservation, etc.?
  - What are the energy usage and requirements? Is the project seeking LEED status?
  - What code information may affect programming decisions?
- Site analysis:

    - The site is a major aspect of the design problem and therefore should be included in the program. Site analysis components that often affect design include:
        - Legal description
        - Zoning, design guidelines, and deed restrictions and requirements
        - Traffic (bus, automobile, and pedestrian) considerations
        - Utility availability (a potentially high cost item)
        - Topography
        - Views
        - (As-) Built features
        - Climate (if not familiar to the designer)
    - Geotechnical
        - Site preparation, compacting or replacement of existing soil
        - Foundation type, size and depth
        - Bearing loads and expected settlement
        - Ground water as it may affect the construction
        - Surface water as it may affect the construction
        - Special construction requirements to minimize settling and cracking
    - Vegetation and wildlife
- Existing facilities:
    - Do facilities already exist? Can they be reused (remodel vs. drop and replace or new facility)? Can they be used for another program?
    - If a floor plan exists, do a square-foot take-off of the areas for various functions. Determine the building efficiency (the ratio of existing net-to-gross area). This ratio is useful in establishing the building efficiency target for the new facility.
    - Can it meet code & accessibility standards?
    - Use the existing square footages for comparison when proposing future amounts of space.

7.3.4 Identify Strategies (Step 4)

Programmatic strategies suggest a way to accomplish the goals given what one now knows about the opportunities and constraints. A familiar example of a programmatic strategy is the relationship or “bubble” diagram. These diagrams indicate what functions should be near each other in order for the project to function smoothly. Relationship diagrams can also indicate the desired circulation connections between spaces, what spaces require security or audio privacy, or other aspects of special relationships.

Other types of strategies recur in programs for many different types of projects. Some examples of common categories of programmatic strategies include:

- Centralization and decentralization:
    - What function components are grouped together and which are segregated? For example, in some offices the copying function is centralized, while in others there are copiers for each department.
- Flexibility:
    - What types of changes are expected for various functions? Do facilities need to change over a period of a few hours? A few days? A summer recess? Or is an addition what is really needed?
- Flow:
    - What goods, services, and people move through the project? What is needed at each step of the way to accommodate that flow?
- Priorities and phasing:
    - What are the most important functions of the project? What could be added later? Are there ongoing existing operations that must be maintained?
- Levels of access:
    - Who is allowed where? What security levels are there?
- New technologies:
    - Have the latest technologies been considered?

Ideally, each of the goals and objectives identified in Step 2 will have some sort of strategy for addressing that goal. If not, either the goal is not very important, or more discussion is required to address how to achieve that goal or objective.

7.3.5 Determine Quantitative Requirements (Step 5)

Cost, schedule, and affordable area are interdependent. Costs are affected by inflation through time. Affordable area is determined by available budgets.

In this step, the district must reconcile the available budget with the amount of improvements desired within the project time frame. First, a list of spaces is developed to accommodate all of the activities desired. The space criteria researched in Step 3 are the basis of this list of space requirements. The space requirements are listed as assignable square feet (ASF), referring to the space assigned to an activity, not including circulation to that space.

A percentage for “tare” space is added to the total ASF. Tare space is the area needed for circulation, walls, mechanical, electrical and telephone equipment, wall thickness, and public toilets. Building efficiency is the ratio of ASF to gross square feet (GSF), the total area including the ASF and tare areas. Building efficiency equals ASF/GSF. The building efficiency for a building type was researched in Step 1 and possibly Step 3. See Chapter 5 for more information on cost escalation for state-funded projects.

The desired GSF is then tested against the available budget. In drafting the total project cost, the project manager uses the cost per square foot amount researched in Step 1. Factors for inflation should be included, based upon the project schedule. The Chancellor’s Office will make the necessary adjustments to escalate the project costs of proposals for state funding to the date of the mid-point of construction given that bidders calculate estimates on the assumption that costs could change from the time of the bid date.

The total project cost includes the construction cost (for building and site work), plus amounts for architect's and engineering fees, Division of the State Architect (DSA) plan check fees, furniture and equipment, communications, contingency, printing for bid sets, soils tests, topological surveys, and any other associated costs.

If the bottom line for the project costs is more than the budget, a combination of three things can happen: 1) space can be trimmed back or delegated to a later phase (a reduction in quantity); 2) the cost per square foot can be reduced (a reduction in quality); or 3) additional district funding can be added to the budget. This reconciliation of the desired space and the available budget is critical to defining a realistic scope of work.

7.3.6 Summarize the Program (Step 6)

Once all of the preceding steps are executed, summary statements can be written defining “in a nut shell” the results of the programming effort. All of the pertinent information included above can be documented for the district, project management team members, and the design team. The decision-makers should sign-off on the scope of work as described in the program.

Once a program is completed and approved by the district, the information must be integrated into the design process. Some districts want the project manager to stay involved after the programming phase to insure that the requirements defined in the program are realized in the design work.

7.4 Review of the Final Project Proposal

The district should be satisfied that the project, given the current level of information, is feasible; that is, the proposal is within its projected cost and scope, the site is appropriate, and obvious obstacles to completing the project have been addressed.

Some common problems with FPPs are:

- A proposal is out of date because the project has been shelved waiting for funding
- The cost is not realistic for the scope
- The schedule is not realistic for the scope
- The proposal no longer seems to make sense in the larger campus and community context
- The proposal is based on incomplete information about the site and existing conditions
- The proposal is based on incomplete or inaccurate information about codes and regulations
- The proposal does not include all the necessary systems, e.g., telecommunications, smart technology or energy efficient MEPs
- The conceptual design, the basis for the scope and cost, is based on erroneous assumptions, e.g., that the state will fund all necessary equipment

The district or its project manager checks the assumptions, scope, cost and schedule. This should make the district aware of community college space and cost guidelines before the district evaluates the proposal.

If the project has a FPP which has been submitted and approved for funding, the district or its project manager should review the proposal and the supplemental budget language. If there is an inconsistency between what is planned locally and what is described in the budget documents, the Chancellor's Office should be notified immediately.

If a proposal for a state-funded project contains errors, the district must request Chancellor's Office and Department of Finance (DOF) authorization to change cost or scope and reengineer the project, or live with the errors. Since the Chancellor’s Office has a **no augmentation policy**, funds are not available to increase the budget; any cost overages would need to be addressed locally. In many cases, the architect or construction manager will be able to propose design and delivery method strategies to cope with any problems.

7.5 Schematic Design

Schematic design is completed by a licensed design professional, typically the project architect or engineer, and consists of creating and evaluating alternative design approaches to the project until a single design has been selected and approved.

Projects that are intended for state funding consideration must follow the guidelines presented in Chapter 5.

Steps in schematic design:

1) Create and draw alternative designs
2) Evaluate the alternatives in accordance with the program, scope, budget, and quality plan
3) Choose a single design
4) Develop the design enough to assure that it works within the primary criteria
5) Produce a design presentation for review
6) Secure the necessary approvals

7.5.1 Evaluation of Alternatives

It is recommended that the major users participate in the review so they can be satisfied that all the options have been considered. It is suggested that the criteria for reviewing alternatives be determined in advance to avoid conflicts.

7.5.2 Schematic Design Documents

Usually, schematic design documents submitted by the licensed design professional include (see Chapter 5 for a detailed discussion of FPP design document requirements for state-funded projects):

- Site plan
- Floor plans
- Building elevations
- Building sections
- Any perspectives, models, or other presentation materials necessary to describe the design

Support data, also submitted by the architect, usually includes:

- General description — a narrative describing the design concept in response to the program
- Area calculations — a summary of gross and assignable floor areas as they relate to the scope
- Construction cost estimate — a systems level estimate as it relates to the budget for the project
- Code analysis — a brief description of the major code elements
- Outline specification — a brief description of the major systems the architect had in mind

7.5.3 Design Review and Approval

Design review occurs at the end of schematics and design development. It is recommended that the district maintain design standards or goals to ensure consistency amongst the projects on campus. Design consistency aligned with an educational philosophy will help develop a campus character and image.

There should be some form of district representative and instructional representative (or other user) signoff at the end of schematic design, giving the approval to proceed with the selected design.

7.6 Scope and Cost

The project scope is all that needs to be accomplished, including budgets for both time and money, to achieve the project's objectives, and is best represented by the project plans and specifications. Project scope should be clearly defined in the Final Project Proposal and, once the project is submitted and approved for state funding, it may not change (scope creep) without prior DOF approval.

Scope creep refers to changes or growth in a project's scope and can occur when the scope of a project is not properly defined, documented, or controlled. Scope creep is generally considered harmful; and, scope creep without DOF approval is considered "out of process" and will result in the termination of the project.

Scope creep occurs more frequently in projects with long timelines and can be a result of:

- Poor change control
- Lack of proper initial identification of what is required to bring about the project objectives
- Weak project manager
- Poor communication between parties
- Lack of initial product versatility

The district's project manager and architect should monitor scope and cost throughout the design phases. Both should be familiar with the accepted methods for calculating areas and estimating costs, cost guidelines, and budget language.

7.6.1 Gross Square Footage

Gross square footage (GSF) is the sum of all areas included within the outside face of the environmentally controlled envelope for all stories or areas that have floor surfaces.

GSF is computed by measuring from the outside faces of the envelope, disregarding architectural and structural projections extending beyond the envelope face. Within the envelope, vertical circulation space (whether floored or not) and vertical mechanical and electrical shafts shall be counted at each floor. Vertical mechanical and electrical shafts located outside the envelope shall be included as if they were inside the envelope. Refer to the Chancellor's Office Space Inventory Handbook for a more detailed discussion on GSF.

The following areas are included in GSF:

- Basements
- Attics
- Garages
- Enclosed porches
- Penthouses
- Mechanical equipment floors
- Areaways
- Lobbies
- Mezzanines
- Inside balconies
- Unfinished areas
- Vertical circulation areas (with and without floors)
- Mechanical and electrical shafts
- Interior and exterior walls

The following areas are excluded from GSF:

- Attics without flooring and portions of upper floors eliminated by rooms or lobbies which rise above single-floor height
- Floored areas with less than 6'6" clear headroom (unless they can be properly designated and used as mechanical or custodial areas)

Open-to-the-weather spaces such as corridors, porches, balconies, courts, light wells, or space under projecting structure overhead, are counted at a ratio of 50% assigned to gross area.

Refer to the Chancellor's Office Space Inventory Handbook for a more detailed discussion on GSF.

7.6.2 Assignable Square Footage

Assignable square feet (ASF) is the sum of that part of the building designated for program space. ASF is measured from the inside face of walls.

The following areas are included in ASF:

- Offices
- Classrooms
- Laboratories
- Seminar and conference rooms
- Libraries
- File rooms
- Storage rooms
- Special purpose rooms (auditoriums, cafeterias, TV studios, locker and shower rooms, maintenance and research garages, phantom corridors for large non-partitioned spaces, private toilets, etc.)
- Building columns within an assignable room

The following areas are excluded from ASF:

- Free-standing columns or architectural and structural projections
- Custodian spaces (refer to the Space Inventory Handbook for exceptions)
- Circulation
- Mechanical
- Public toilets
- Interior and exterior walls
- Parking structures

Refer to the Chancellor's Office Space Inventory Handbook for a more detailed discussion on ASF.

7.6.3 Cost Estimating

There are three basic methods of estimating construction costs:

1) Building type cost per square foot
2) Cost by building systems and components
3) Cost by building trade or CSI division

7.6.3.1 Building Type Cost per Square Foot

An historical method of cost estimating that assumes a certain type of space or building will have construction costs that are similar to previous spaces or buildings of that type. For example, a chemistry building will have a similar cost to a previously built chemistry building. This method of estimating refers to an established data base of similar spaces to get a cost per square foot and then modifies that cost to allow for location, market conditions, and date of construction. More accurate estimates are obtained using this method when the design of the project is similar to previous projects. The greater the creativity of the design and the more it uses new systems and materials, the less accurate the estimate.

Estimating by cost per square foot is appropriate during the planning and programming phases. The estimate should compare to the “Building Unit Cost Guidelines” provided in FUSION.

7.6.3.2 Cost by Building Systems and Components

This method estimates the project cost by system or component costs per square foot. It is considered a better estimate than a building type estimate because it goes into greater detail.

Given a schematic or design of the project, showing the extent and types of systems and components, the estimate method refers to a data base of systems and components cost per square foot (e.g., the cost of a type of roof or wall construction per square foot) and modifies the costs to allow for location, market conditions and date of construction. More accurate estimates are obtained using this method when more is known about the design of the project and greater use is made of common systems and components. When less is known about the systems or more unique systems and components are used, the estimate will be less accurate. Estimating by building systems and components may be used during schematic design and design development.

7.6.3.3 Cost by Building Trade or Construction Specifications Institute Division

The cost by building trade or Construction Specifications Institute (CSI) Division is the method of estimation used by a contractor to bid the project.

From the construction documents, the estimation refers to: 1) a labor and materials data base, 2) a takeoff of all materials and systems, 3) the total materials, labor and overhead required to do the work at that location, and 4) an index factor to allow for market conditions at a future date of construction. More accurate estimates are obtained using this method when better and more complete documents describing the project are available. Estimating by building trade is used during design development and in construction documents.

All of these estimates rely on the skill of the estimator; the quality of the data base; and the accuracy of the information about the design, site, market and schedule of the project.

The Chancellor's Office will adjust the budgeted cost for state-funded projects at time of bid award request when actual cost is known. As indicated previously, any cost overages will need to be funded locally.

7.6.4 Contingencies

Contingencies are used with all of the methods of estimating to allow for unknown conditions and changes. Typically, there are two types of contingencies — project contingencies and construction contingencies.

The project contingency is an amount to fund **unexpected** management and consultant costs for the project.

The construction contingency is an amount to fund ***unanticipated*** construction costs; e.g., change orders and construction claims that increase the construction cost beyond the estimate. Typically, the state provides a total contingency amount equal to 5% of the total new construction costs and 7% of the reconstruction costs.

7.6.5 Problems with Cost Estimating

Typical mistakes that occur when estimating costs include:

- Assuming a higher level of accuracy than is possible given the information available

- Changing the project scope without changing the budget
- Leaving out some of the cost factors
- Not keeping the estimate current
- Estimating from incomplete documents
- Not realizing that estimates grow as projects progress and more detail is known
- Not estimating costs to the midpoint of construction or other inflation-related factors (used to validate FPP cost estimate)
- Not considering General Terms and Conditions of the contract, construction bonds, project insurance, and other contractor burdens

7.6.6 Indexing

The Chancellor's Office uses the Department of General Services “California Construction Cost Index” (CCCI) index to estimate the effects of inflation on projects. The Chancellor's Office informs the district of the CCCI to be used for developing capital outlay proposals. The index is used to factor the current estimated construction cost to a future cost.

7.6.6.1 Factors Needed to Apply the CCCI Index

1) The index associated with the date of the estimate.
2) The date for the mid-point of construction of the proposed project.
3) The index associated with the mid-point of construction.
4) DOF monthly escalation factor for state funded projects

Once these three factors are obtained, the indexing factor is applied to the project cost by dividing the midpoint of construction date CCCI index by the original cost estimate CCCI. The resultant percentage is multiplied by the original cost estimate to obtain a cost estimate indexed to the mid-point of construction.

Please do not escalate costs to mid-point of construction for projects seeking state funding. The Chancellor’s Office will escalate the costs using DOF approved methodology after we receive a district’s FPP.

Every estimate at any phase of the project should clearly show:

- Any previous estimated construction costs and appropriations and their associated CCCIs

- The current estimate of construction cost in today's costs

7.6.6.2 Factors that Influence Building Costs

- Foundations
  - Weight of structure and loading
  - Soil bearing capacity
  - Basement excavation and shoring
  - Number of stories
  - Contour of site
- Vertical Structure
  - Floor-to-floor height — Ratio of volume to gross floor area
  - Quantity of retaining walls — Ratio of retaining wall area to gross floor area
  - Extent of lateral wind and seismic bracing
  - Weight of structure and loading
  - Attachment to existing structure
  - Vibration criteria
- Floor and roofs
  - Loads
  - Spans
  - Relationship of quantity of slab on grade to suspended slabs
  - Attachment to existing structure
  - Vibration criteria
- Exterior cladding
  - Shape and height of building — Ratio of finished exterior wall to gross floor area
  - Quantity of glazing — Window area ratio
  - Sun shading
  - Quality of cladding materials
  - Attachment to existing structure
  - Parapets

- Roofing and waterproofing
    - Quantity of roof — Roof area ratio
    - Quantity of below-grade waterproofing
    - Type and R value of insulation
    - Roofing materials
    - Skylights and clerestories
    - Attachment to existing structure
- Interior partitions
    - Density of partitions — Interior partition ratio
    - Ceiling heights
    - Size and number of lights and doors
    - Sound insulation
    - Quality of partitions and doors
- Floor, wall and ceiling finishes
    - Percentage of total building finished — Finished area ratio
    - Quality of finishes and extent of special features
- Building fixtures and service systems (Group 1 fixed equipment)
    - Percentage of building finished
    - Use or function of building — extent of equipment included in construction cost or alternatively purchased
- Vertical transportation
    - Number and density of elevators — elevator ratio
    - Type of elevators
    - Number of escalators
    - Number and type or staircases — enclosed fire exit or open architectural
- Plumbing
    - Number of plumbing fixtures
    - Length of piping per fixture
    - Special systems
    - Number of floor and roof drains

- Heating, ventilation and air conditioning
    - Climate
    - Area of wall exposed to weather — finished wall ratio
    - Percentage of building with finished system
    - Type of system and source of heating and cooling
    - Location of systems
    - Number of separately controlled zones
    - Number of required air changes
    - Use of existing central plant
    - Use of thermal storage
    - Energy management systems
    - Board of Governors Energy & Sustainability Policy
- Electrical
    - Load on main breaker
    - Total connected load
    - Percentage of building with finished system
    - Voltage
    - Extent of signal or communication systems
    - Switching requirements
    - Special conduits or ducts for subsidiary systems
    - Emergency power
    - Smoke-detection system
    - Number and type of lights
    - Telecommunications, cable infrastructure and network electronic systems
    - Board of Governors Energy & Sustainability Policy
- Fire-protection, sprinkler systems
    - Flow required over given area (hazard requirement)
    - Type of heads
    - Wet or dry system
    - Access, proximity

    - Local fire marshal requirements
- Site preparation
    - Site clearing
    - Demolition
- Site infrastructure development
    - Grading
    - Landscaping
    - Paving
    - Fire lanes
    - Hazardous materials removal
- Site utilities
    - Utilities
    - Utilities hook-up fees
    - Site drainage
- Off-site infrastructure development
    - Extending utilities, roads, etc. off of the site
- Regulatory factors
    - Local air quality
    - Accessibility (American Disabilities Act)
    - Seismic

7.7 Code Review

The project design must meet the current building code (California Code of Regulations, Title 24) and all other applicable regulations. To assure that the project is being developed in accordance with code, a code analysis needs to be done early in the design phase and periodically reviewed and updated by the architect.

It is recommended that the district require a formal code analysis as part of the contract with the architect. The district should review the code analysis at schematic design, design development, and construction documents phases. The code analysis serves several purposes:

7.7.1 Field Act

The Field Act (AB 2342, Stats. 1933), mandating statewide seismic safety standards for public schools, was enacted in 1933. The law banned the construction of unreinforced masonry buildings, required that earthquake forces be addressed in structural design and established a new building code and regulatory procedure for K-12 and community college facilities. The Field Act also established the Office of the State Architect (now the Division of the State Architect (DSA)). The Field Act was followed in 1939 by the Garrison Act which required that existing schools be modernized to meet Field Act requirements. The act outlined a procedure for school boards to follow for pre-Field Act schools, which required that school boards conduct immediate examinations of schools by a state architect or engineer.

SB 588 (Ch. 704, Stat. 2008) enacted in 2008, allows community college districts to choose exemption from Field Act standards. The California Building Code (CBC), Title 24, Part 2, (since 2010) provides an alternative set of structural standards (DSA-SS/CC) for districts that choose this exemption. Community college structures constructed in accordance with DSA-SS/CC must still be reviewed by DSA for fire and life safety, access compliance and seismic safety issues, and must meet the same seismic safety performance levels for occupant safety as those constructed to the Field Act (DSA-SS). At the time of this manual update, provisions for seismic performance are covered in amendment to Chapters 16, 19, 20, 21, 22 and 23 of the CBC.

7.7.2 DSA Plan Review

DSA reviews construction projects for Title 24 compliance. DSA's oversight of fire and life safety, access compliance and structural safety of community colleges facilities is governed by the California Education Code sections 81130, et seq.

The Field Act and CBC, Title 24, Part 2 imposes requirements on California schools that are not present in other types of construction approval processes:

- Licensed design professionals must prepare drawings and specifications for proposed construction work
- Drawings and specifications must be verified by DSA for compliance with applicable building codes
- The building codes utilized in the design of school buildings contain structural provisions superior to many other types of facilities, with consideration for known seismic activity in California

- A community college district must hire a DSA-certified inspector to oversee construction. The inspector selection must be approved by the design professionals and the DSA
- The California Administrative Code, Section 4-333 (b) 1 (PDF — 9 KB) regarding employment of project inspectors specifies that the inspector is permitted to have an employment relationship with an entity providing services to the school district if the entity only provides services directly related to project inspection (see *California Administration Code* Section 4-333(b)1 regarding employment of project inspectors)
- Changes to approved drawings and specifications for DSA-regulated portions of the project shall be submitted and approved by DSA prior to commencement of work
- The design professionals, the inspector of record and the contractor file verified reports with DSA indicating the work has been performed in compliance with the approved plans and specifications

DSA formalized the Collaborative Process in 2006. The Collaborative Process is an alternative to the traditional plan review process, and engages DSA early in the design process with the district and design team, continuing through plan review and approval.

The Collaborative Process is intended to ensure the safety of community college projects through a collaborative, consistent and timely project development and review. Predictable project delivery timeframes are achieved by collaboration regarding project schedule, Title 24 code requirements, and plan review requirements.

The Collaborative Process review process includes design phase meetings with the district, design team and DSA to review and address:

- Title 24 code requirements
- Project schedule requirements
- Plan review process requirements

The Collaborative Process features:

- Pre-established milestone meetings during project design with the district, design team and DSA project team (i.e., designated senior staff for the project)
    - The number of meetings depends on project size and complexities. As an example, a large project may have three meetings during the design

process (i.e., 100% schematic design phase, 90% design development, and 75% construction documents)

- DSA senior staff “desk review” of design documents subsequent to each meeting, to identify significant code conflicts that could otherwise adversely affect intake or the plan approval time commitment
- Complete plan review is conducted upon intake, with coordination of the plan review with design phase collaborative decisions and agreements

In addition to, and less complicated than, the formal process, DSA offers an informal preliminary review process to assist districts with preliminary plan review. The Informal Preliminary Review Process includes:

- One or two preliminary review meetings during project design phase with the CCD, design team and DSA
    - Typically, one meeting is held prior to design development and another meeting prior to completing construction documents.
- Complete plan review is conducted upon intake, with coordination of the plan review with preliminary review meeting minutes

Informal Preliminary Review Process benefits include:

- Time frame goals may be established for collaborative meetings, intake, completion of plan review, and plan approval date.
- Code and plan review requirements are reviewed with senior DSA staff during design, to promote successful intake and expedient plan review.
- Regional Office CCD Project Coordinator is available to the CCD and design team for scheduling preliminary review meetings and project status inquiries.

7.7.2.1 Excluded from DSA Plan Review

Structures that are not considered to be regulated by DSA as “school buildings,” when they constitute the entire scope of construction, include but are not limited to:

- One-story buildings not over 250 square feet in floor area when used exclusively as accessory facilities to athletic fields (equipment storage, toilets, snack bars, ticket booths, etc.)
- Greenhouses, barns and storage sheds used exclusively for plants or animals and not used for classroom instruction (small groups of pupils or teachers may enter these structures for short periods of time)

- Light poles or flagpoles less than 35 feet tall
- Antenna towers less than 35 feet tall or less than 25 feet above a building roofline
- Retaining walls less than 4 feet above the top of foundations and not supporting a surcharge
- Concrete or masonry fences less than 6 feet above adjacent grade
- Yard walls less than 6 feet above adjacent grade
- Signs, scoreboards or solid-clad fences less than 8 feet above adjacent grade
- Bleachers and grandstands with five rows of seats or less
- Open-mesh fences and baseball backstops
- "Temporary-use" buildings on community college sites used for less than three years
- "Trailer Coaches" that conform to the requirements of the Health and Safety Code, Division 13, Part 2, commencing with section 18000, that are not greater than 16 feet in width and used for special education purposes for no more than 12 pupils at a time (or 20 pupils for driver training purposes)

Note that additional exceptions to DSA approval requirements exist for various unusual situations. For more information about these exceptions, please refer to the Education Code or contact one of the DSA Regional Offices (http://www.dgs.ca.gov/dsa/AboutUs/contact.aspx).

7.7.2.2 Project Closeout and Certification

State administrative regulations require that all projects financed with state bonds comply with Project Closeout procedures. The main objectives of the closeout procedures are to ensure the following:

- The project is complete with all state funds to be used are claimed and all disputes regarding project costs, if any, resolved
- The project scope is consistent with that approved by the DOF and the Legislature
- FUSION has been updated to show final project costs per the JCAF 32 and final Quarterly Report

- The final JCAF31 in FUSION is consistent with the project as depicted in the district's certified Space Inventory Report at the time the building came on line, and
- The district followed Public Contract laws and regulations in the construction of the project

DSA Project Certification verifies that the constructed project complies with the codes and regulations governing school construction. Project certification consists of examination of specific project files for documents required to be submitted before, during and after construction, and to determine if outstanding issues have been resolved. After the file is examined, the project file is closed either with certification or without certification. Projects that are not certified will not be eligible for future DSA review and therefore not eligible for state-funding. In addition, non-certification of projects may make district staff and boards personally liable in the event of a catastrophe.

See Appendix M for a Chancellor's Office Project closeout checklist and DSA certification documents and procedures.

7.7.3 Deferred Code Approvals and Change Order Approvals

Change orders should be kept to a minimum. Districts have historically had difficulty obtaining DSA deferred code and change order approvals during the construction process. Delays in obtaining these approvals make districts vulnerable to delay claims by the contractor and other cost increases. The design of the project should be done so as to avoid, to the greatest extent possible, construction materials and methods that may require deferred code approvals. Likewise, code approval for change orders can delay a project and cause additional code check fees.

Design elements that may be deferred are limited to:

- Access floors
- Bleachers (seating layout must be shown at time of submittal)
- Elevator guide rails and support brackets
- Exterior wall systems — precast concrete, glass fiber reinforced concrete, etc.
- Skylights (do not defer if Engineering reports, or complete information is available)

- Window wall systems or storefronts with spans greater than 10 feet
- Stage rigging
- Others, as agreed to in advance by DSA

7.8 Design Development

During design development all of the remaining design decisions are resolved for all significant elements and systems in the design.

Steps in design development:

1) Review and revision of schematic documents
2) Addition and coordination of all the design systems; e.g., structural, electrical, mechanical
3) Design of all significant details or elements
4) Value engineering with life-cycle costing
5) Updated scope, cost estimate, code analysis

7.8.1 Design Development Documents

- Site plan
- Landscape plan
- Floors plans
- Elevations and sections
- Detail drawings
- Interior details
- Structural drawings
- Mechanical drawings
- Electrical drawings
- Drawing of any significant special systems
- Outline specifications

The drawings and specifications should be complete enough to describe the entire design with all its major elements.

7.8.2 Support Data

- Area calculations
- Report of design criteria used for the systems
- Code analysis
- Energy analysis
- Estimated project construction cost by systems

The support data includes the design criteria used to design the systems; e.g., structural, mechanical, temperature, air changes, and humidity requirements for the mechanical system. It is suggested that operations and maintenance personnel review design criteria.

7.9 Equipment Planning

In conjunction with the evaluation and choice of building systems, Group 1 — Fixed Equipment needs, and Group 2 — Movable Equipment needs should be developed and coordinated during the design development phase. While the characteristics of a piece of equipment may suggest its initial classification as Group 1 or Group 2, it is the designed use of the equipment and its installation characteristic that determine its ultimate classification. Equipment which is mobile, but must be used as part of the function of a specialized room in order for that room to operate, such as equipment for a television studio, may be considered Group 1 or Group 2 equipment depending on the extent to which the equipment is essential to the basic effective use of the facility. Districts should justify all equipment needs, whether Group 1 or Group 2, if it is reasonable to expect questions about the appropriateness of a request.

7.9.1 Group 1 — Fixed Equipment

“Group 1 — Fixed Equipment” (Group 1 equipment) is defined as: building fixtures and support systems that become an integral part of the facility during construction. Group 1 equipment needs are described in the project working drawings and specifications. Group 1 equipment has the following characteristics:

- It is securely attached to the facility
- It functions as part of the building

- Removal of the equipment results in visible damage to the building or impairs the designed use of the facility
- The equipment is generally interpreted to be real property rather than personal property
- Once installed, the piece of equipment loses its identity as a separate unit

7.9.2 Group 2 — Movable Equipment

"Group 2 — Movable Equipment" (Group 2 equipment) is the designation given to equipment not identified as Group 1 equipment. Such equipment usually can be moved from one location to another without significantly changing the effective functioning of facilities at either location. Group 2 equipment includes library books and other related library materials. Currently, funding may be requested for Group 2 equipment needs in space dedicated to new programs and in net expansion space in existing programs. The need for new equipment should be reduced as much as possible through the use of any existing equipment. It is assumed that all existing Group 2 equipment for an active program will be transferred into remodeled or expanded space before new equipment is requested. Group 2 equipment needs that constitute technological upgrades generally will not be honored unless the district can demonstrate that program changes are so significant that they constitute an introduction of a new program. All equipment designs should include these factors when justifying the Group 2 equipment requests in the FPP.

When developing Group 2 needs for new or expanded programs, districts should design their telecommunications and information systems so as to avoid purchases of equipment that will become rapidly outdated. Telecommunication equipment requests should include software, supporting peripherals, file sorters, front-end processors, and any other elements required to make a complete system. Consideration should be given to tying in with a larger campus system such as a fiber optic backbone which links the major buildings. Further, requests for equipment should be accompanied by a short summary of the local plan and total costs for activation of that equipment. The full plan, while not submitted to the Chancellor's Office, would list each equipment system; installation cost; warrantee cost; timing and cost for special testing or balancing; process and cost for training staff to operate equipment; cost for initial programming; and any other procedures and costs associated with getting the equipment fully on line.

A detailed list (refer to sample in Appendix E) of Group 2 Moveable Equipment needs, net of transferred existing equipment if any, must be submitted before the project CE phase is considered for funding but can be submitted with the FPP if district elects to do so.

7.10 Value Engineering

"Value engineering" is the review of systems in the project to verify that the best system has been chosen given the budget and functional criteria.

Usually, value engineering is what an architect strives to do as a project progresses. Often, however, architects use systems and materials with which they are familiar rather than take time for in-depth analysis of alternatives. The district may follow the architect's recommendations or require the architect to do some value engineering as part of its contract. The district may, alternatively, retain other consultants for value engineering. If the project is complex, expensive, or comes in well over budget, value engineering may save a significant amount of money or steer the district toward better systems.

Value engineering is normally carried out in four phases:

1) Gathering information such as site analysis and cost estimates
2) Brain storming alternative systems and materials
3) Analyzing the ideas that resulted from the brain storming
4) Making recommendations to the district to incorporate some of the ideas into the design

Value engineering is fundamentally a form of quality control. It relates to several other forms of quality control:

- Value analysis or management — similar to value engineering only applied to the design as a whole as well as to various systems
- Life-cycle costing — the analysis of the cost of alternative systems over their entire life span from purchase through operation and maintenance to change-out or demolition
- Constructability review — the review of systems and structures for construction access, construction sequence, system installation conflicts, job site sequencing, ease of construction, ease of operation and maintenance, and ease of change-out

- Coordination check — the review of systems and structures as they relate to other systems and structures on the project; e.g., running a series of systems in a ceiling without conflicts
- Bid-ability review — adequacy of the information in the documents for bidding

All of these terms refer to the careful design of the project so that it can be constructed with ease, using systems and structures which provide good value over time, and satisfy the parameters of the project.

Additional forms of review tied to this analysis include:

- Independent Cost Review — a “third party” construction cost estimate to compare with the project architect’s estimate
- Utility company energy review — a review of the building and its systems to ensure they exceed Title 24 standards by the appropriate percentage established in the Board of Governor’s Energy & Sustainability Policy

All of the analysis of value engineering is done based on the cost estimate. If the estimate is incorrect, so is the cost analysis. On a complex project with a variety of systems, a thorough check of the estimate or a second estimate is advised.

If possible, a project should be checked as follows:

1) At the programming phase — Are there elements of the program that conflict, are unduly expensive, require special operations or maintenance, or simply make no sense in the circumstances of the project?

2) At the schematic design phase — Is the basic layout and massing of the building appropriate to the expected form of construction; e.g., steel, concrete? Is the layout conducive to the likely systems for the building? Are elements of the design, such as fenestration, cost effective for operations and maintenance?

3) At the design development phase — What systems will provide the best value? What materials will provide the best value? Are these choices easily incorporated into the construction? Will they conflict with any other materials or systems? What will be their labor and material costs for operation and maintenance?

4) At the construction documents phase — Are the drawings and specifications free of errors and omissions? Can they be used to construct the project as desired at the appropriate quality level?

Often a group of experts can come up with more alternatives and more creative alternatives than a single consultant. The districts can provide value engineering and other checks by:

- Having knowledgeable in-house technical staff review the project
- Bringing a consultant construction manager on board during design to review the design
- Hiring an independent cost estimator
- Hiring several independent consultants; e.g., architect, mechanical engineer for review
- Using a general contractor to review the documents for constructability

In all cases, the earlier any problems are discovered the better. Once such a review process is begun, it is suggested that it be continued throughout the design phases.

7.11 Request for Approval of Preliminary Plans

In accord with Government Code, Section 13332.11, State Public Works Board (PWB) approval is required for preliminary plans to ensure that projects proceeding to the subsequent phases of working drawings and construction are consistent with legislatively approved cost and scope and are carried out with all due speed and diligence. Refer to Appendix L for a complete list of items that districts are required to submit at each milestone of the state capital outlay fund release process.

Districts are to submit copies of the following documents to the Chancellor's Office to request approval of preliminary plans:

- Letter requesting approval of preliminary plans and release of working drawing funds and, if applicable, explanations of any scope or cost changes made or planned since project was funded by the Legislature
- Completed preliminary plans and specifications (one copy only)
- JCAF 32 — updated cost summary, if necessary
- Construction Schedule (see base of the JCAF 32), if necessary
- Quantities and Unit Costs Supporting the JCAF 32 (Architect's Detailed Cost Estimate which ties to the JCAF 32)
- JCAF 31 — analysis of building space use and WSCH

    - If there are space changes, contrast FPP to preliminary plans, i.e., a side-by-side comparison with justification for change from the FPP
- Design recommendations from the utility company for achieving the Board of Governors' energy and sustainability policy
- Final CEQA determination stamped by the State Clearinghouse — all CEQA waiting periods must be completed before the preliminary plans can be approved by the PWB. Please note that filing only with the county is not adequate for state funded projects
- 2 11" x 17" copies of the site plan, elevation and floor plans

The Chancellor's Office reviews the submittal and forwards to the DOF copies of the following items in addition to one copy of each of the items listed above:

- A PWB agenda item and briefing document describing the project
- A completed "Request for Approval to Proceed or Encumber Funds" (DF14D) to seek approval of preliminary plans and release of working drawing funds
- If scope or costs have changed from that authorized by the Legislature, compelling justification for the scope or cost change. (A Twenty-Day letter or a DOF budget change request letter may be required depending on budget status of the construction phase. This will result in a delay to the construction schedule.)
- A cost history for the project
- Any other related documents needed to obtain approval of preliminary plans

The district must submit preliminary plans to the Chancellor's Office for review at least 45 calendar days prior to the scheduled meeting of the PWB. The Chancellor's Office then reviews the submittal, prepares the package and transmits it to the Department of Finance at least 35 calendar days prior to the PWB meeting date. If the preliminary plans contain a significant change in cost or a change in scope from that authorized by the Legislature, at least 24 additional calendar days may be needed to process a formal request to Legislative Committees and the PWB to approve the changes (see Chapter 8, Subsection 8.7.2 titled Twenty-Day Letter).

7.11.1 California Environmental Quality Act Completion of Requirements

The environmental document required by the California Environmental Quality Act must be completed before a project is submitted to the PWB for approval of preliminary plans and authorization to begin working drawings (Section 6680 of the State Administrative Manual). If an Environmental Impact Report (EIR) is required, the draft EIR should have been completed during schematics with the final EIR completed during design development. (refer to Chapter 6, Section 6.10 for further discussion of the California Environmental Quality Act).

Upon PWB approval, the Chancellor's Office will immediately notify and send a signed DF14D to the district. The district should not commence with working drawings prior to receipt of the signed DF14D.

7.12 Construction Documents

The objective of the construction document phase is to produce DSA approved, clear, complete, error-free documents that meet the agreed upon program, design, decisions, scope, budget and quality. Construction documents consist of the specifications, drawings, and data for the contractor plus support data to facilitate reviews and approvals.

During the construction documents phase, the design documents are translated by the architect, engineer or designer into working drawings and specifications for the construction of the project. At this point in the project, if the district has properly performed its duties in the programming phase, all significant design decisions should have been made and approved, and the district shouldn't need to make any further changes. Design changes during construction can cause delays, increase design fees and increase errors in the production of the documents.

Steps in the construction documents phase:

1) Review and revision of preliminary plans per reviews and approvals
2) Determination of any bid alternates
3) Production of construction documents with alternates, if applicable
4) Code review at 50% document completion
5) Completion of CEQA-required reports, if not already completed

6) Production of a bid estimate and other support data
7) Formal coordination and constructability check of the documents
8) Completion of documents with dates, stamps and signatures
9) Code review at 100% completion and approval

Support data for DSA approval includes: a code analysis, structural calculations, and energy calculations. Support data to get approval to bid from the Chancellor's Office is discussed in the next chapter. There may also be special data to be produced for the bid and construction process such as a commissioning plan, estimates of alternates, an estimated construction schedule, special request for sole source, etc.

7.12.1 Drawings

The construction drawings include:

- Title Sheet
- Civil
- Architectural
- Structural
- Mechanical, Plumbing, Fire Protection
- Electrical
- Landscape
- Other drawings as needed to comply with existing building codes

The district is ultimately responsible for the technical content of the drawings and insuring that all the drawings are properly dated, stamped and signed by the district's architect and engineer (see Chapter 5 for more information on working drawings. Additionally, it is a good practice to request electronic copies of all design documents as part of the specifications (refer to Chapter 6, Section 6.4 on selecting design professionals).

The operations and maintenance department should review the drawings for compatibility with the campus infrastructure, utilities, telecommunications, subsurface conditions, or any other hidden conditions. Construction drawings should be made available to the district's maintenance and operations department for use after the project is completed.

7.12.2 Specifications

The specifications describe “what” while the drawings show “how many” and “where.” In the event of a disagreement between the drawings and specifications, the specifications govern the scope of work unless stated otherwise in the contract.

There are four types of specifications:

1) Descriptive specifications list the important properties of the product without the use of trade names
2) Proprietary specifications designate the product by brand name
3) Performance specifications outline the ends to be achieved by the product
4) Reference specifications list the standards (e.g., ASTM Standards) which a product must meet

Specifications may be “open” or “closed.” “Open specifications” are used to allow for competitive bid. Materials or systems referred to by trade name have two or more trade or brand names listed followed by the words “or equal.” A “closed specification” limits competitive bidding by establishing such stringent requirements that only a single material or system can meet them.

Closed specifications cannot be used on public projects except:

- In an emergency
- When they are part of an existing system
- When it has been determined to be in the public’s best interest or
- It is required for a test of the material or product to determine its suitability for future use

Specifications are written in the CSI format and include the title sheet, index, Division 1 General Requirements and Divisions 2-16 technical requirements.

Division 1 includes a description of the work, allowances, alternatives, change orders, coordination, field engineering, regulatory requirements, abbreviations, special procedures, meetings, schedule, submittals by the contractor, quality control, construction facilities, temporary utilities, materials and equipment, substitutions, guarantees and warranties, unit prices, and contract closeout. All of the items in Division 1 are crucial to the success of construction management and need to be reviewed in detail by the district.

Divisions 2-16 include site work, concrete, masonry, metals, wood and plastics, thermal and moisture protection, doors and windows, finishes, specialties, equipment, furnishings, special construction, conveying systems, mechanical and electrical. These divisions need to be checked for open specifications, technical content and coordination with the drawings, general conditions, and other specification sections. Districts should be especially alert to items furnished by the owner, testing requirements, submittals, job conditions, and warranties as they appear in the technical specifications.

Plans and specifications must be stamped, dated and signed by the architect and engineer. For state-funded projects this must occur prior to the DF14D request for working drawing approval.

7.12.3 Bidding Alternates

The purpose of bidding alternates is to have some flexibility regarding contract costs when bids come in. Deductive alternates deduct work from the contract and additive alternates add work to the contract. The district may incorporate additive or deductive alternates into the construction documents on state-funded projects only **with prior approval of the Chancellor’s Office and the DOF**. Alternates cannot be used to change the project’s programmatic scope unless there is a compelling reason to do so and prior approval has been obtained from the Chancellor’s Office and the DOF.

If bid alternates are being considered, they need to be agreed upon at the beginning of the construction documents phase so they can be incorporated into the drawings and specifications. Alternates developed just prior to bidding may cause delays, increase design fees and increase errors.

One alternative a district has is to use district funds to support additive alternates in the project. However, prior approval by the Chancellor’s Office and the DOF is still required regardless of whether or not the district is fully funding an alternate (additive or deductive).

To get Chancellor’s Office approval of alternates, the district needs to submit:

1) Current project status report
2) Current cost estimate
3) List of alternates with estimated costs
4) Detailed justification for the request

It is recommended that this submittal be made at the earliest date the information is available, preferably by 50% completion of construction documents.

For state funded projects, if a district elects an additive or deductive alternate at bid award, the additive or deductive alternate becomes part of the approved scope of work. Once elected, the district does not have the discretion to omit completing the additive or deductive alternate.

7.12.4 Data for the Contractor

The construction documents may contain information and reports in addition to the drawings and specifications. These might include geotechnical reports, abatement reports, structural calculations, campus construction staging areas, special campus parking fees, or anything else pertinent to the contract. This information should be referenced in the specifications and, wherever possible, incorporated directly into the specifications. If it is not of direct relevance to the bid or contract, it needs to be provided to the contractor at a later date as a matter of information. The supporting data is kept to a minimum because it will become a legal part of the contract along with the drawings and specifications.

7.12.5 Regulatory Requirements

A code analysis must be performed on a project to demonstrate that the project meets current building codes, other code requirements, and state regulations. When the project is complete, the code review documents in conjunction with the drawings and specifications are important to the maintenance and operation of the project. They help to determine the feasibility of retrofits, remodels and additions, where the building can be changed and where it should be left as originally constructed.

7.12.6 Bid Estimate

The bid estimate is required to obtain approval to go to bid as discussed in Chapter 8. It should be in CSI format showing materials, labor and overhead. The bid estimate should be broken out in the same categories as the bids, as required by the bid instructions, so that the cost estimate can be compared with the bids.

7.12.7 Area Calculations

For state-funded projects, the Chancellor's Office will compare area calculations from the preliminary plans with the working drawings. If there are variations, a side by side analysis of the previously approved space and the current proposed space will be required of the district to verity the project remains within approved scope.

7.13 Coordination and Constructability

Construction documents can be very extensive; having adequate time to check the detail and coordination of the drawings is critical. The district should perform its own detailed check of the drawings using in-house staff or an independent consultant. Consultants should check the drawings for errors and code compliance. A code check by a reputable consultant prior to the formal review for approval may speed up the code approval process.

As part of the constructability check, it is recommended that the equipment for the project be reviewed in detail for sequence of procurement, installation, testing and activation procedures. Also, it is important to verify the availability of the equipment within the project time frame and review for potential problems with parts and warrantees.

7.14 Code Approvals

Construction documents must be submitted to DSA for code approval. The district should ensure that code compliance issues are resolved during the review process.