CDOT | COLORADO Department of Transportation

Design-Build

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Colorado Department of Transportation
Innovative Contracting Program
4201 East Arkansas
Denver, CO 80222

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The following source documents are resources being made available to assist Design-Build teams in executing Design-Build programs. They are available by contacting CDOT Innovative Contracting or at the CDOT Innovative Contracting (Design-Build, and CMGC) web page at:

https://www.codot.gov/business/designsupport/innovative-contracting-and-design-build.

Resource Document	Source File	Chapter Reference
State and Federal Design-Build Regulations	pdf	1
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Design-Build Training Presentations	Power Point	2
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Chapter 1: Introduction and State of Practice

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1.1 Introduction

Transportation facilities directly relate to a community's economic health and quality of life. The demands on transportation facilities in the state of Colorado continually grow, along with the competition for available funding and expectations of increased quality and higher Levels of Service. To ensure timely, efficient, and effective responses to these demands, approved projects may be delivered using alternative contracting methods, including the Design-Build contracting process.

The Colorado Department of Transportation (CDOT) has been using the Design-Build project delivery method since the late 1990s. In 1997 CDOT developed the first Design-Build guidelines, and in 2006 CDOT issued its first Design-Build procedural manual. Since that time, CDOT and the Design-Build industry have continued to learn valuable lessons and have further developed more effective and efficient Design-Build processes. This manual represents a major update to the *CDOT Design-Build Manual* and includes CDOT's most recent Design-Build practices and procedures.

The Design-Build process offers potential benefits not achievable with the traditional Design-Bid-Build (D-B-B) delivery method. A comparison of process sequencing shows how the phases of design, advertisement, award, and construction with Design-Build delivery can offer significant savings in time over the D-B-B method. In addition to Design-Build's potential time-saving benefits, the delivery method promotes innovation and potentially saves cost and administrative burden; improves quality without sacrificing schedule and budget; and reduces project risks.

Design-Build is an alternative contracting method where design and construction services are included in a single contract. Using the Design-Build approach, CDOT provides conceptual and preliminary designs and required performance results. The Design-Build delivery method then requires construction firms to team with consultant design firms to work together to design and construct the improvements.

The shift to Design-Build from D-B-B allocates responsibility and risk to the parties who can best manage the processes and outcomes. It allows for innovation in design, construction techniques, construction phasing, sequencing, risk management, traffic management, Public Information, and cooperative communication.

Design-Build procedures continue to advance and evolve with each use. This manual encompasses the lessons learned from Design-Build projects in Colorado and throughout the United States. The manual focuses on the initial project design development, followed by a two-phase selection process, which then transitions to a Design-Build implementation phase. This manual provides procedures, guidelines, information, resources, and insights for the user to successfully develop and implement a Design-Build contracting strategy that is unique yet in compliance with federal regulations, state legislation, and CDOT policy.

1.2 Description of Innovative Project Delivery Methods

For all but the largest of projects, CDOT primarily employs three types of project delivery methods: (1) traditional D-B-B, (2) Design-Build, and (3) Construction Manager/General Contractor (CMGC). The

delivery methods differ in the contractual relationship between CDOT, the contractor, and the designer as represented in **Figure 1-1.**

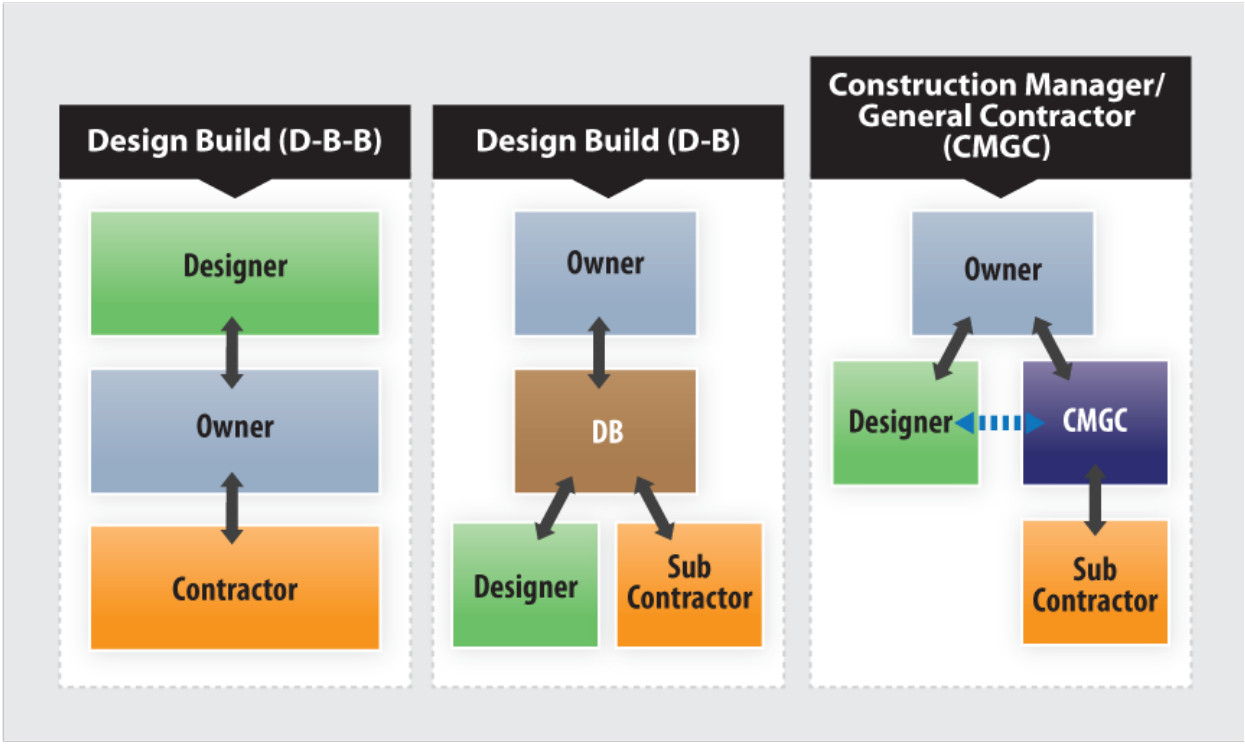


Figure 1-1. Project Delivery Methods Contractual Relationships

1.2.1 Design-Bid-Build

D-B-B has been the most utilized project delivery method and continues to be the method most used by CDOT. The linear nature of the planning, preconstruction, and construction phases is well known and practiced. In this delivery method, CDOT staff or consultant staff design a project, and when construction plans are complete, the project is let for bids to the construction industry. Typically, the lowest bidder wins the project and then construction occurs under CDOT oversight. Using this delivery method, CDOT allocates the majority of the responsibility for risk to itself.

1.2.2 Design-Build

Design-Build is a common alternative project delivery method that began in the 1990s at CDOT and has since become a frequently used delivery method by CDOT. In Design-Build, the owner procures a Design-Build team (a paired contractor and design consultant) with a best-value procurement process. The selected Design-Build team takes over the preliminary design from the owner and develops the final design for the project. When construction packages are ready, the contractor builds the packages until the project is complete.

During this delivery method, the majority of the responsibility and risk for the design and construction is allocated to the selected Design-Build team. The Design-Builder is responsible for the budget, schedule, and quality control. However, for this method to be effective, the owner needs to recognize that there are certain responsibilities and associated risks that the owner is better able to manage. A key to successful Design-Build is to properly allocate the project risks to the parties that are best able to

manage them. The CDOT project team should spend significant efforts during the procurement phase to research project risks and develop the Technical Requirements to properly allocate risk and focus the Design-Build team toward achievement of the project goals.

1.2.3 CMGC

In CMGC, the owner is the primary Project Manager much like in D-B-B. However, with this method, the owner takes on new roles while managing separate contracts with a selected CMGC services contractor and its design consultant team. The owner must act as a facilitator, negotiator, decision maker, collaborator, and manager and must be an active participant in every step of the preconstruction and construction phases. CMGC Project Managers make the final decisions on budget, design, and construction methods and must be able to make risk-based decisions on short timelines to meet project deadlines. The CMGC contractor is actively involved during the preconstruction phase, working collaboratively with the owner and designer to provide suggestions and methods to improve the design for constructability, add innovative value engineering solutions, maximize scope, and optimize schedule and cost. As the design nears completion, the contractor provides the owner with construction pricing that is negotiated to reach an agreed construction price.

Once a construction contract is executed, the contractor's role changes to that of a general contractor (GC) during construction. This is a very traditional role and is similar to the responsibilities of a GC on a D-B-B. The contractor also manages its own risk that it assumed responsibility for or is sharing with the owner.

1.2.4 Comparison of Project Delivery Methods Schedules

The delivery methods differ in the timing of the design, procurement, and construction phases of a project as represented in Figure 1-2.

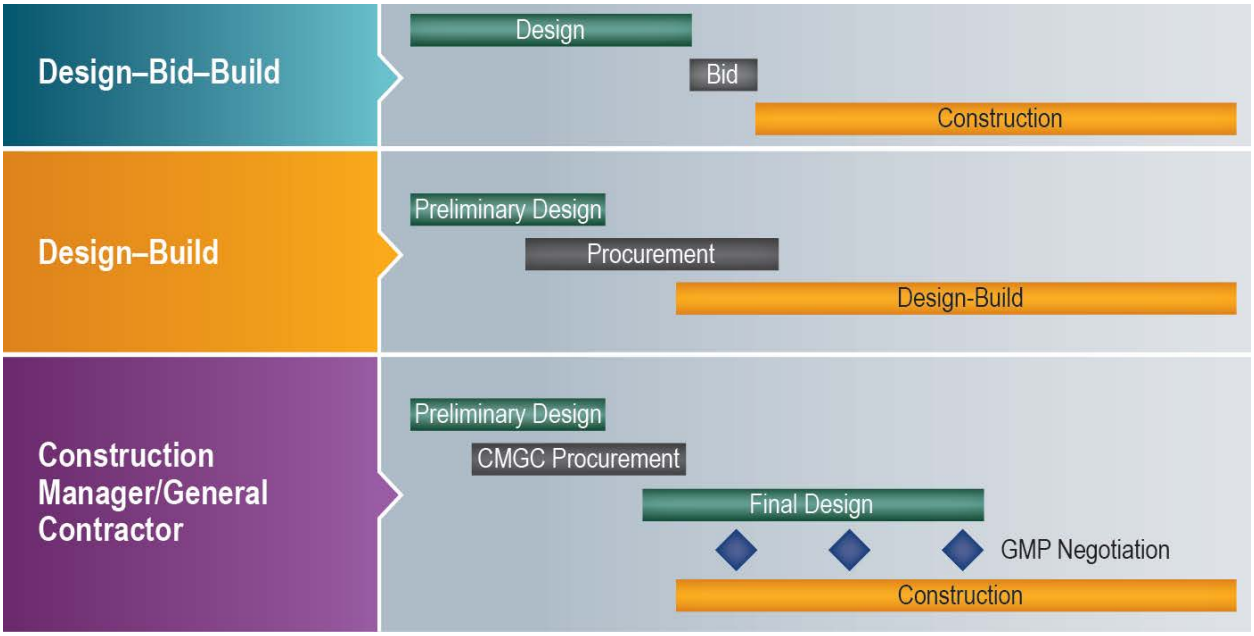


Figure 1-2. Project Delivery Methods Schedule

D-B-B and CMGC are often used to advance the construction phase of a project or accelerate the total project delivery schedule. Although project schedules are still controlled by items such as Right-of-Way (ROW) acquisition, permitting, and funding availability, both Design-Build and CMGC offer opportunities to accelerate the project delivery time. This is accomplished by having overlapping design, procurement, and construction phases. The contractor also has greater control over project phasing and construction methods that can accelerate the project schedule. The designer and contractor collaborate to develop the design, construction methods, and phasing in support of an efficient construction schedule. Schedule and budget certainty is also obtained sooner in Design-Build, as the Design-Builder commits to a construction schedule earlier in the procurement process.

1.3 Current Design-Build Practice

Design-Build is a highly utilized project delivery method by state departments of transportation (DOTs) across the country. Transportation is the fastest growing Design-Build sector in the United States, with transportation Design-Build projects substantially increasing since 2010, both in quantity and value of projects. As of March 2015, there are only 6 states that do not have Design-Build authority in the transportation sector, whereas the remaining 44 states and the District of Columbia all authorize Design-Build for transportation to some degree.[1]

In 2009, the Federal Highway Administration (FHWA) launched the *Every Day Counts* (EDC) initiative in cooperation with the American Association of State and Highway and Transportation Officials (AASHTO) to speed up the delivery of highway projects and to address the challenges presented by limited budgets. The EDC campaign is the FHWA's focused effort to advance a culture of innovation in the highway community in partnership with the states. Through this collaborative, state-based effort, FHWA coordinates rapid deployment of proven, market-ready strategies and technologies to shorten the project delivery. The EDC-1 Innovations, introduced and promoted during 2011 and 2012, further encouraged the use of Design-Build.

1.4 CDOT Design-Build Projects

CDOT awarded its first Design-Build contract in 1997 for the design and reconstruction for approximately 12 miles of I-70 from Airport Road to Bennett, Colorado. In 2001, CDOT in partnership with the Regional Transportation District (RTD) entered into a Design-Build contract for the Transportation Expansion Project (T-REX) project, the largest multimodal transportation project in the history of Colorado. Following the success of T-REX, in 2005 CDOT used the Design-Build method to expand I-25 through Colorado Springs for the $150 million Colorado Springs Metro Interstate Expansion (COSMIX) project. As of 2014, CDOT used Design-Build to deliver over 14 projects worth more than $3 billion.

Projects that have been identified by CDOT for possible Design-Build delivery are submitted by the regions and listed on the Innovative Contracting web page at: https://www.codot.gov/business/designsupport/innovative-contracting-and-design-build.

A project delivery selection matrix report and a contact person are included for each project.

[1] Design-Build Institute of America (DBIA), Design-Build Transportation Fact Sheet (March 2015), retrieved from http://www.dbia.org/news/Documents/transport_fact_sheet_150209.pdf.

1.5 Federal Laws, State Legislation, and Design-Build Regulations

Federal and state legislation continue to evolve in the support of Design-Build project delivery for publicly funded transportation projects. The following section summarizes the existing federal laws and Colorado state legislation that allow for Design-Build and the regulations that govern Design-Build. Refer to the online Appendix on the CDOT Innovative Contracting web page or contact CDOT Innovative Contracting for full versions of the federal laws and Colorado Revised Statutes (C.R.S) § 24-93-101, Integrated Project Delivery Method for Public Projects Act.

1.5.1 Federal Transportation Acts and Design-Build

The last three federal surface transportation funding acts included provisions in the support of Design-Build, which led to the creation and reforms of the FHWA statutory requirements for Design-Build.

On December 10, 2002, in response to Section 1307 of the Transportation Equity Act for the 21st Century (TEA-21), the FHWA published the Final Rule that established regulations for Design-Build contracting in the Code of Federal Regulations (CFR) as Title 23 CFR Part 636. Subsequent modifications required by Section 1503 of the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) resulted in revisions published in a final rulemaking on August 14, 2007. Among the revisions made by SAFETEA-LU were the elimination of the dollar thresholds for qualified projects and permission to release a Request for Proposal (RFP) or award a Design-Build contract prior to completion of the National Environmental Policy Act of 1969 (NEPA) process. Design-Build procurement processes that deviate from the requirements of 23 CFR Part 636 may still require a Special Experimental Project No. 14 (SEP-14) work plan and approval.

The federal surface transportation bill Moving Ahead for Progress in the 21st Century Act (MAP-21) was signed into law on July 6, 2012, and it further defined regulations for using Design-Build to deliver federal-aid projects. MAP-21 made provisions to streamline the environmental review process and broadened the ability for states to acquire or preserve ROW for a transportation facility prior to completion of the review process required under NEPA. MAP-21 also increased funding for the Transportation Infrastructure Finance and Innovation Act (TIFIA) and expanded the types of projects eligible for the program. This increased the states' abilities to engage in public-private partnerships (P3s).

1.5.2 Federal Design-Build Law

Statutory Requirements:

Title 23 of the United States Code (U.S.C.), Part 112(b)(3) provides the FHWA's statutory requirements for the Design-Build project delivery method. It includes the following:

- A state transportation department or local transportation agency may award a Design-Build contract for qualified projects using any procurement process permitted by applicable state and local law.
- Design-Build contract means an agreement that provides for design and construction of a project by a contractor, regardless of whether the agreement is in the form of a Design-Build contract, a franchise agreement, or any other form of contract approved by the Secretary.

Regulatory Requirements:

Title 23 CFR Part 636 provides the FHWA's regulatory policy for the Design-Build project delivery method and is broken into five subparts: Subpart A—General; Subpart B—Selection Procedures, Award Criteria; Subpart C—Proposal Evaluation Factors; Subpart D—Exchanges; and Subpart E—Discussions, Proposal Revisions and Source Selections.

Qualified projects are defined as projects meeting all requirements of Title 23 CFR Part 636.

1.5.3 Federal Regulations and the NEPA Process

Within 23 CFR Part 636, FHWA has put into effect its Design-Build Contracting regulations that establish the parameters by which state transportation departments (STDs) may deliver projects using Design-Build. The section that pertains to how far an STD can take a procurement process prior to the conclusion of the NEPA process follows:

> § 636.109 How does the NEPA process relate to the design-build procurement process?
>
> The purpose of this section is to ensure that there is an objective NEPA process, that public officials and citizens have the necessary environmental impact information for federally funded actions before actions are taken, and that design-build proposers do not assume an unnecessary amount of risk in the event the NEPA process results in a significant change in the proposal, and that the amount payable by the contracting agency to the design-builder does not include significant contingency as the result of risk placed on the design-builder associated with significant changes in the project definition arising out of the NEPA process.
>
> Therefore, with respect to the design-build procurement process:
>
> (a) The contracting agency may:
>
> (1) Issue an RFQ prior to the conclusion of the NEPA process as long as the RFQ informs proposers of the general status of NEPA review;
>
> (2) Issue an RFP after the conclusion of the NEPA process;
>
> (3) Issue an RFP prior to the conclusion of the NEPA process as long as the RFP informs proposers of the general status of the NEPA process and that no commitment will be made as to any alternative under evaluation in the NEPA process, including the no-build alternative;
>
> (4) Proceed with the award of a design-build contract prior to the conclusion of the NEPA process;
>
> (5) Issue notice to proceed with preliminary design pursuant to a design-build contract that has been awarded prior to the completion of the NEPA process; and
>
> (6) Allow a design-builder to proceed with final design and construction for any projects, or portions thereof, for which the NEPA process has been completed.
>
> (b) If the contracting agency proceeds to award a design-build contract prior to the conclusion of the NEPA process, then:

(1) The contracting agency may permit the design-builder to proceed with preliminary design;

(2) The contracting agency may permit any design and engineering activities to be undertaken for the purposes of defining the project alternatives and completing the NEPA alternatives analysis and review process; complying with other related environmental laws and regulations; supporting agency coordination, public involvement, permit applications, or development of mitigation plans; or developing the design of the preferred alternative to a higher level of detail when the lead agencies agree that it is warranted in accordance with 23 U.S.C. 139(f)(4)(D);

(3) The design-build contract must include appropriate provisions preventing the design-builder from proceeding with final design activities and physical construction prior to the completion of the NEPA process (contract hold points or another method of issuing multi-step approvals must be used);

(4) The design-build contract must include appropriate provisions ensuring that no commitments are made to any alternative being evaluated in the NEPA process and that the comparative merits of all alternatives presented in the NEPA document, including the no-build alternative, will be evaluated and fairly considered;

(5) The design-build contract must include appropriate provisions ensuring that all environmental and mitigation measures identified in the NEPA document will be implemented;

(6) The design-builder must not prepare the NEPA document or have any decision making responsibility with respect to the NEPA process;

(7) Any consultants who prepare the NEPA document must be selected by and subject to the exclusive direction and control of the contracting agency;

(8) The design-builder may be requested to provide information about the project and possible mitigation actions, and its work product may be considered in the NEPA analysis and included in the record; and

(9) The design-build contract must include termination provisions in the event that the no-build alternative is selected.

(c) The contracting agency must receive prior FHWA concurrence before issuing the RFP, awarding a design-build contract and proceeding with preliminary design work under the design-build contract. Should the contracting agency proceed with any of the activities specified in this section before the completion of the NEPA process (with the exception of preliminary design, as provided in paragraph (d) of this section), the FHWA's concurrence merely constitutes the FHWA approval that any such activities complies with Federal requirements and does not constitute project authorization or obligate Federal funds.

(d) The FHWA's authorization and obligation of preliminary engineering and other preconstruction funds prior to the completion of the NEPA process is limited to

preliminary design and such additional activities as may be necessary to complete the NEPA process. After the completion of the NEPA process, the FHWA may issue an authorization to proceed with final design and construction and obligate Federal funds for such purposes.

1.5.4 State Legislation and the Code of Colorado Regulations

The use of Design-Build contracting in Colorado is provided for in C.R.S. § 43-1-1401, et seq. The Colorado Revised Statutes authorizes the Code of Colorado Regulations (CCR), which provides the rules and regulations for Design-Build.

The legislation authorizes CDOT to enter into Design-Build contracts and to use an adjusted score Design-Build selection and procurement process. It allows Design-Build contracting to be used regardless of the minimum or maximum cost. Use of Design-Build contracting must be based on the individual needs and merits of the project, and it is subject to approval by the Transportation Commission.

Specific Information on C.R.S. § 43-1-1401, et seq., Design-Build Contracts may be found at:

http://www.lexisnexis.com/hottopics/colorado?source=COLO;CODE&tocpath=1OIUQBI82FNSS0KVX,2QM4VQK3Q08E4JP43,31MTP04ZDHROAKHVS&shortheader=no.

The legislation also requires the creation of the CCR for the implementation and use of Design-Build contracting.

Created to comply with legislation, 2 CCR 601-15 establishes policy and procedure requirements for CDOT to procure Design-Build contracts for transportation projects. It consists of 22 sections. Awareness of, understanding, and, above all, compliance with each section are required.

Section 3 - Policy 2 of 2 CCR 601-15 provides that:

- CDOT may use a Design-Build contract process when the Chief Engineer determines such use is appropriate and in the best interest of the public.
- Based on individual need and merit of the project CDOT may use:
    - the Adjusted Score Design-Build (i.e., the Two Phase Design-Build) Contract process,
    - the Low Bid Design-Build Contract process, or
    - any other process the Chief Engineer determines appropriate.

Also included in Policy 2 of CCR 601-15 are Design-Build contract rules outlined in the following sections:

- Section 4 – Definitions: Defines Design-Build terms, which should not be altered or redefined.
- Section 5 – Subcontracting: States the need to identify goals and participation of subcontractors, including Disadvantaged Business Enterprises (DBEs) and Emerging Small Businesses (ESBs).
- Section 6 – General Requirements for Design-Build Firms: Identifies the Firm's responsibility or liability to legal status and compliance with all applicable requirements.
- Section 7 – Conflict of Interest: Identifies not only Firm objectivity but also consultant conflict.

- Section 8 – Scope of Work: Specifies the need to provide adequate detail and identify applicable standards and specifications in the Invitation for Bid (IFB) or the Request for Qualifications (RFQ).
- Section 10 – Award and Contract: Identifies Best Value, Two Phase, Low Bid, and Fixed Price bases for awarding contracts.

Requirements for Procurement by the Colorado Department of Transportation of Design-Build Contracts for Transportation Projects, 2 CCR 601-15 may be found at the following link: https://www.sos.state.co.us/CCR/GenerateRulePdf.do?ruleVersionId=162.

1.5.5 State Legislation regarding Design-Build Utility Relocations

C.R.S. § 43-1-1411 (2013) provides legislation regarding the process for utility relocations under Design-Build. These processes differ from the utility relocations procedures for D-B-B. C.R.S. § 43-1-1411(3)(a), created for the Design-Build process, allows the Design-Build contractor to perform utility work when the utility owner is unable or unwilling to do so.

In relation to Project-Specific Utility Relocation Agreements (PSURAs), the C.R.S. allows CDOT to pay for the performance of the design work to relocate a utility company's facilities that are affected by the scope of the Design-Build transportation project; advance funds for the performance of the construction work to relocate a utility company's facilities affected by the scope of the Design-Build transportation project; and perform any utility relocation work through the contractor for the Design-Build transportation project in accordance with the utility company's specifications for the relocation work and subject to the utility company's prior review and written approval.

The intent of the legislation is to authorize CDOT to work with the utility company to come to a mutually satisfactory agreement so that the Design-Build transportation project may proceed to be constructed in an efficient manner without causing interruption of utility services.

For any utility company that chooses not to enter into a PSURA with CDOT for the performance of utility relocation work, C.R.S. § 43-1-1411(3) states the following:

> (a) The department may direct the utility company to perform or allow the performance of the utility relocation work within the performance schedule for the design-build transportation project.
>
> (b) The utility company shall pay for damages caused by the company's delay in the performance of the utility relocation work or interference with the performance of the design-build transportation project by other contractors, including, but not limited to, payments made by the department to any third party based on a claim that performance of the design-build transportation project was delayed or interfered with as a direct result of the utility company's failure to timely perform the utility relocation work; except that damages resulting from delays in the performance of the utility relocation work caused by a force majeure shall not be charged to the utility company.
>
> (c) The department may withhold issuance of a permit for the location or installation of other facilities to a utility company until the company pays the department damages caused by the company's delay in the performance of the relocation work or

> interference with the performance of the design-build transportation project by any other contractor. Any person aggrieved by an action of the department in denying a permit may apply to a court of competent jurisdiction for appropriate relief pursuant to the Colorado rules of civil procedure or section 24-4-106, C.R.S.

The legislation also provides CDOT with the following authority:

> (4) The department shall provide written notice to any utility company of a design-build transportation project that will require the relocation of the company's facilities as soon as practicable following the environmental clearance for the project. The notice shall include all available and relevant information concerning the project, including the performance schedule for the project within which the utility relocation work must be completed in order to coordinate with and avoid delay in the performance of the project.
>
> (5) When feasible, the department shall provide a replacement easement for a utility company whose facilities are to be relocated from an easement owned by the utility company to accommodate a design-build transportation project, and the department shall condemn the replacement easement when necessary. If no replacement easement is provided, the department shall fund the initial relocation of the easement owner's facilities and shall also fund all future relocations of those utility companies whose facilities occupy the easement at the time of the design-build transportation project at the department's sole expense in lieu of compensating the utility companies for the loss of the easement. The utility company shall quitclaim to the department that portion of the easement that is replaced or extinguished. (C.R.S. § 43-1-1411)

1.5.6 Colorado Department of Transportation Design-Build Requirements

All Design-Build contracting shall follow the processes and methods presented in the *CDOT Design-Build Manual.* Procedures identified in the manual are based on, and comply with, federal regulation, state legislation, Colorado court rules, and Colorado Department of Transportation policy directives.

1.6 Design-Build Acronyms and Definitions

The following lists of acronyms and definitions are generally taken from the lists of acronyms and definitions that are a part of CDOT's standard Book 1 Contract for Design-Build projects. Those lists have been reduced here to include just the terms that are most directly relevant to this manual. Some definitions have been revised to provide direct definitions in lieu of references to sections of an RFP Document. Some terms that relate directly to this manual have been added but are not part of the standard Book 1 list of acronyms and definitions.

For the definitive list of acronyms and definitions included in Design-Build contracts, refer to the Book 1 template provided in the online Appendix on the CDOT Innovative Contracting web page or contact CDOT Innovative Contracting.

ACRONYMS

AADT	Annual Average Daily Traffic
AASHTO	American Association of State Highway & Transportation Officials
ABC	Aggregate Base Course
ACC	Alternative Configuration Concept
ADT	Average Daily Traffic
ALPR	Automatic License Plate Recognition
ARE	Additional Requested Element
ATC	Alternative Technical Concept
ATR	Automatic Traffic Recorder
AVI	Automatic Vehicle Identification
BAFO	Best and Final Offer
BMP	Best Management Practices
BNSF	Burlington Northern Santa Fe Railway
CAP	Construction Agreed Price
CatEx or CE	Categorical Exclusion
CCR	Code of Colorado Regulations
CCTV	Closed Circuit Television
CDOT	Colorado Department of Transportation
CDPHE	Colorado Department of Public Health & Environment
CER	Cost Estimate Review
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act, 42 U.S.C. §§ 9601, et seq.
CFR	Code of Federal Regulations
CIP	Cost in Place
CLOMR	Conditional Letter of Map Revision
CM	*Construction Manual* (CDOT)
CMCG	Construction Manager/General Contractor
COE or USACE	Corps of Engineers (United States Army)
COC	Certificate of Compliance
COSMIX	Colorado Springs Metro Interstate Expansion
CPM	Critical Path Method
CPW	Colorado Parks and Wildlife
CQMP	Construction Quality Management Plan
C.R.S.	Colorado Revised Statutes
CTMC	Colorado Traffic Management Center
D-B	Design-Build
D-B-B	Design-Bid-Build
DBE	Disadvantaged Business Enterprise
DBIA	Design-Build Institute of America
DCS	Document Control System
DOTs	Departments of Transportation
DRB	Dispute Review Board
DTM	Digital Terrain Model

DQMP	Design Quality Management Plan
EA	Environmental Assessment
ECM	Environmental Compliance Manager
EDC	*Every Day Counts* (FHWA)
EEO	Equal Employment Opportunity
EIS	Environmental Impact Statement
EMT	Executive Management Team
EOC	Executive Oversight Committee
EPA	Environmental Protection Agency (U.S.)
ESB	Emerging Small Business
ETC	Electronic Toll Collector
FDC	Field Design Change
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FIPIs	Findings in the Public Interest
FIR	Field Inspection Review
FONSI	Finding of No Significant Impact
FP	Finance Plan
FRA	Federal Railroad Administration
FTA	Federal Transit Administration
FTP	File Transfer Protocol
GC	General Contractor
GMP	Guaranteed Maximum Price
HASP	Health and Safety Plan
HWMP	Hazardous Waste Management Plan
IA	Independent Assurance
IAR	Interstate Access Request
ICE	Independent Cost Estimator
ICQC	Independent Construction Quality Control
IDQC	Independent Design Quality Control
IFB	Invitation for Bid
IGA	Intergovernmental Agreement
IMP	Incident Management Plan
ISA	Initial Site Assessment
ITP	Instructions to Proposers
ITS	Intelligent Transportation Systems
LCCA	Life Cycle Cost Analysis
LOIs	Letters of Interest
LOS	Level of Service
LRT	Light Rail Transit
MAP-21	Moving Ahead for Progress in the 21st Century Act
MHT	Method for Handling Traffic
MMP	Materials Management Plan
MOT	Maintenance of Traffic

MOU	Memorandum of Understanding
MS4	Municipal Separate Storm Sewer System
MTIP	Materials Testing and Inspection Plan
MUTCD	*Manual on Uniform Traffic Control Devices*
MVRD	Microwave Vehicle Radar Detector
NC	Nonconformance
NC-1, NC-2, NC-3	Nonconformance Level 1, Nonconformance Level 2, Nonconformance Level 3
NCHRP	National Cooperative Highway Research Program
NCR	Nonconformance Report
NDC	Notice of Design Change
NEPA	National Environmental Policy Act
NICET	National Institute for Certification in Engineering Technologies
NPDES	National Pollutant Discharge Elimination System
NTP	Notice to Proceed
NTP1	First Notice to Proceed
NTP2	Second Notice to Proceed
NWN	Nonconforming Work Notice
OA	Owner Acceptance
OCIP	Owner Controlled Insurance Program
OFMB	Office of Financial Management and Budget
OSHA	Occupational Safety & Health Administration
OVT	Owner Verification Testing
P3	Public-Private Partnership
PCO	Potential Change Order
PCP	Product Control Plan
PDSM	Project Delivery Selection Matrix
PDT	Project Delivery Team (FHWA)
PE	Professional Engineer, or, in the context of ROW, PE shall mean Permanent Easements
PET	Price Evaluation Team
PI	Public Involvement or Public Information
PIM	Public Information Manager
PIP	Public Information Plan
PLS	Professional Land Surveyor
PLT	Project Leadership Team
PMP	Project Management Plan
PMT	Project Management Team
PoDI	Project of Division Interest
POTW	Publicly Owned Treatment Works
PSQF	Permanent Stormwater Quality Facility
PSURA	Project-Specific Utility Relocation Agreement
PTT	Project Technical Team
PUC	Public Utilities Commission

PWQ	Permanent Water Quality
QA	Quality Assurance
QAP	Quality Assurance Plan
QC	Quality Control
QMP	Quality Management Plan
RCO	Request for Change Order
RCP	Request for Change Proposal; Reinforced Concrete Pipe
RE	Resident Engineer
RFC	Released for Construction; Request for Clarification
RFI	Request for Information
RFP	Request for Proposal
RFQ	Request for Qualifications (CDOT)
RHMs	Recognized Hazardous Materials
RMS	Ramp Meter Station
ROD	Record of Decision
ROM	Rough Order of Magnitude
ROW	Right-of-Way
RSAR	Roadway Surface Accomplishment Report
RTD	Regional Transportation District
RWIS	Road Weather Information System
SAFETEA-LU	Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users
SB	Senate Bill
SDB	Streamlined Design-Build
SEP-#	Special Experimental Project No. #
SHPO	State Historic Preservation Officer
SOI	Statement of Interest
SOQ	Statement of Qualifications
STDs	State Transportation Departments
STIP	Statewide Transportation Improvement Program
SWMP	Stormwater Management Plan
TCP	Traffic Control Plan
TDM	Transportation Demand Management
TE	Temporary Easement
TEA-21	Transportation Equity Act for the 21st Century
TECS	Transportation Erosion Control Supervisor
TIFIA	Transportation Infrastructure Finance and Innovation Act
TMP	Transportation Management Plan
TOC	Traffic Operations Center (CDOT)
TR	Technical Requirements
TRB	Transportation Research Board (National Research Council)
T-REX	Transportation Expansion Project
TTI	Travel Time Indicators
UCP	Unified Certification Program

UE	Utility Easement
UIS	Utility Information Sheet
UNCC	Utility Notification Center of Colorado
UPRR	Union Pacific Railroad
URA	Utility Relocation Agreement
U.S.C.	United States Code
USDOT	United States Department of Transportation
USFWS	U.S. Fish and Wildlife Service
VE	Value Engineering
VECP	Value Engineering Change Proposal
VMS	Variable Message Sign
WBS	Work Breakdown Structure

DEFINITIONS

Accept or Acceptance	Formal conditional determination in writing by the CDOT Project Manager that a particular matter or item appears to meet the requirements of the Contract Documents.
Additional Requested Elements (AREs)	Elements of the project that may be incorporated into the Basic Configuration as a part of the Contractor's Proposal.
Alternative Configuration Concept (ACC)	Changes to the Basic Configuration that are proposed by the Contractor and Approved by CDOT. ACCs will be Approved by CDOT that are equal or better in quality or effect to the original Basic Configuration (as determined by CDOT in its sole discretion). ACCs that provide less than equal quality and/or effect with the intent of saving project cost for other undefined uses will not be Approved.
Alternative Technical Concept (ATC)	Changes to the Technical Requirements that are proposed by the Contractor and Approved by CDOT. ATCs will be Approved by CDOT that are equal or better in quality or effect to the Technical Requirements which they replace (as determined by CDOT in its sole discretion). ATCs that provide less than equal quality and, or effect with the intent of saving project cost for other undefined uses will not be Approved.
Alternative Technical Concept (ATC) Conditions	Conditions that CDOT identified during the ATC process that are necessary for Approval of the ATC.
Approve or Approval	Formal conditional determination in writing by the CDOT Project Manager that a particular matter or item is good or satisfactory for the project. Such determination may be based on requirements beyond those set forth in the Contract Documents without payment of additional compensation or a time extension and may reflect preferences of CDOT.
As-Built Documents	All plans reflecting Released for Construction Documents, including any revisions to Released for Construction Documents reflecting the as-built conditions, and supporting documentation.
Baseline Schedule	The Contractor's plan for the project from NTP1 through Final Acceptance. It shall be a detailed Critical Path Method (CPM) Schedule with Work Activities and Completion Deadlines included for the full term of the project.
Basic Configuration	Work within the existing or new ROW that is required to construct the elements of the project as defined in the Contract.
Book 1	The Contract.
Book 2	The Technical Requirements.
Book 3	Applicable Standards, Data and Reports.
Book 4	Contract Drawings.

Calendar Day	Each and every day shown on the calendar, beginning and ending at midnight.
CDOT	The Colorado Department of Transportation.
Change Order	A written amendment to the terms and conditions of the Contract Documents.
Claim	A separate demand by the Contractor for: (i) a time extension, which is disputed by CDOT, or (ii) payment of money for damages arising from work done by or on behalf of the Contractor in connection with the Contract, which is disputed by CDOT.
Completion Deadline	Any or all Contract deadlines as defined in Contract Documents.
Construction Acceptance Testing	Testing performed in accordance with defined CDOT procedures to be used by CDOT to determine if constructed elements are acceptable for the project.
Construction Process Control	The system used by the Contractor to monitor, assess, and adjust production or placement processes to ensure that the final product meets the specified level of quality. Construction Process Control includes sampling, testing, inspection, and corrective action (where required) to maintain continuous control of a production or placement process.
Contract	Depending on the context: (i) the Design-Build Contract, or (ii) collectively, the Contract Documents, which establish the rights and obligations of CDOT and the Contractor.
Contract Deadlines	Completion Deadlines identified in the Contract.
Contract Documents	Documents that collectively establish the rights and obligations of CDOT and the Contractor, which are identified as such in the Contract.
Contract Drawings	The drawings included in Book 4, including the ROW Plans.
Contract Price	The price provided in the Contract as full compensation for the Work and all other obligations to be performed by the Contractor under the Contract Documents.
Contract Schedule	A practical plan to complete the Work within the Completion Deadlines and convey the intent in the manner of the prosecution and progress of the Work.
Contractor	The individual, firm, or corporation contracting with the State of Colorado through CDOT for performance of prescribed work.
Contractor's Engineer	A professional engineer registered in the state of Colorado who is responsible for engineering and administrative supervision of the project on behalf of the Contractor and who is either an employee of the Contractor or a consulting engineer under contract to the Contractor.

Critical Path	The precedence of activities with total Float less than or equal to zero on each applicable Contract Schedule.
Day	One Calendar Day.
Department	The Colorado Department of Transportation.
Design-Build Contract	That certain Design-Build Contract (Project Name) executed by CDOT and the Contractor.
Design Process Control	Frontline QC activities consisting of "self-checks" by the design production staff responsible for development of the design documents. This includes QC checking of design calculations, plans, studies, reports and software validation.
Differing Site Conditions	"Differing Site Conditions" shall mean (a) subsurface or latent conditions encountered at the exact boring holes identified in the geotechnical reports that are part of the Contract and which differ materially from those conditions indicated in the geotechnical reports for such boring holes, or (b) physical conditions of an unusual nature, differing materially from those ordinarily encountered in the area and generally recognized as inherent in the type of work provided for in the Contract. The term shall specifically exclude all such conditions of which the Contractor had actual or constructive knowledge as of the Proposal Due Date. The foregoing definition specifically excludes Utility facilities, hazardous substances, and any conditions that constitute or are caused by a Force Majeure event.
Disadvantaged Business Enterprise (DBE)	A Colorado-certified Disadvantaged Business Enterprise listed on the Colorado Unified Certification Program (UCP) DBE Directory at www.coloradodbe.org.
Draft RFP	The initial RFP issue for industry review prior issuance of the final RFP.
Environmental Approvals	All local, state, and federal environmental requirements, including, but not limited to decision documents, COE Section 404 Permit, COE Section 401 Certificate, CDOT Municipal Separate Storm Sewer System (MS4) Colorado Discharge Permit System (CDPS) Permit, and SB 40 Certification.
Environmental Compliance Work Plan	A plan required to be developed by the Contractor and Approved by CDOT that specifically identifies all environmental compliance requirements for the project and the Contractor's approach for obtaining compliance.
Federal Requirements	All Legal Requirements applicable to work financed with federal funds and the provisions required to be included in FHWA-assisted contracts, including the provisions set forth in Book 1, Exhibit C.
Final Acceptance	Final CDOT acceptance of the project from the Contractor after all of the requirements of the Contract Documents have be met.

Final Design Documents	The total plan and specification documents that define the entire design of the project. They consolidate the RFC, NDC, and FDC Documents into one coherent package and are subject to CDOT Acceptance.
Fixed Price/Best Design Approach	The best value selection method set forth in 23 CFR, Part 627, et seq.
Guaranteed Maximum Price (GMP)	A specified upper limit or the costs submitted on Form J of the Instructions to Proposers if the Form J costs are lower than the specified upper limit.
Independent Assurance (IA)	An unbiased and independent evaluation of all the sampling and testing (or inspection) procedures used in the Quality Assurance program. IA provides an independent verification of the reliability of the acceptance (or verification) data obtained by the agency and the data obtained by the contractor. The results of IA testing or inspection are not to be used as a basis of acceptance. IA provides information for quality system management.
Independent Assurance (IA) Testing	The sampling and testing (or inspection) procedures used in the Quality Assurance program. IA provides an independent verification of the reliability of the Acceptance (or verification) data obtained by the agency and the data obtained by the Contractor. The results of IA testing or inspection are not to be used as a basis of Acceptance. IA provides information for quality system management.
Independent Contractor Quality Control (ICQC)	Formal QC activities performed by a separate Construction QC team that is independent from the production staff. This involves formal QC sampling, testing, and inspection to provide timely data to monitor and guide each production and placement process and to ensure the product conforms with the Contract requirements. Secondarily, this QC data may be included in CDOT's Acceptance determination.
Independent Design Quality Control (IDQC)	Formal QC activities performed by a Design QC team independent of the design production staff. This includes independent technical reviews at key milestones in the design process and audits intended to confirm that the design process is functioning effectively.
Instructions to Proposers (ITP)	The RFP Document that defines the procurement process and Proposal submittal requirements.
Key Personnel	The persons listed on Contract Exhibit D, subject to revision in accordance with the Contract Documents.

Municipal Separate Storm Sewer System (MS4)	A conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, and storm drains): a. owned or operated by a state, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to state law) having jurisdiction over disposal of sewage, industrial wastes, stormwater, or other wastes, including special districts under state law such as a sewer district, flood control district, drainage district, or similar entity; an Indian tribe or an authorized Indian tribal organization; or a designated and approved management agency under section 208 of the CWA that discharges to waters of the United States; b. designed or used for collecting or conveying stormwater; c. that is not a combined sewer; and d. that is not part of a Publicly Owned Treatment Works (POTW). See 5 CCR 1002-61.2(62).
Nonconformance Report (NCR)	The report described in Book 2, Section 3.
Nonconforming Work	Work performed that does not meet the requirements of the Contract Documents.
Notice to Proceed (NTP)	The notice provided to the Contractor so that Work can begin.
NTP1 Payment Cap	The maximum amount the Owner may pay to the Contractor prior to NTP2.
Owner Acceptance (OA)	All activities performed by CDOT to evaluate the degree of compliance with contract requirements and to determine the corresponding value for a given product. Design Acceptance activities by CDOT include reviews of plans, specifications, and other documents prepared by the Design-Builder. Construction Acceptance activities include Acceptance sampling, testing, and inspection of the work by CDOT.
Owner Verification Testing (OVT)	OVT is the Acceptance testing performed by CDOT on projects where ICQC testing data is included in CDOT's Final Acceptance determination. OVT is typically performed at a lower frequency than full Acceptance testing.
Permanent Water Quality (PWQ)	The meaning and requirements as set forth in CDOT's MS4 permit.
Private Utility	A Utility that is owned by a Private Utility Owner.
Private Utility Owner	Any owner or operator of a Utility that is not a Public Utility Owner. However, a private property owner who merely owns one or more service lines is not considered a Private Utility Owner as a result of such ownership.

Project Manager	The person designated by the Contractor to supervise the project persons performing Work and to receive delivery of notices to the Contractor per Book 1, Section 24.9.1.
Project Operationally Complete	Interchanges, ramps, and bridges fully operational and in the final configuration. Final Basic Configuration, roadway lighting, pavement, signals, signage, and striping complete in place.
Proposal or Proposal Documents	Those documents constituting the Contractor's Proposal in response to the RFP, including any best and final offers or supplements to Proposals as may have been requested by CDOT.
Proposal Due Date	The date the Proposal is due as specified in the Instructions to Proposers.
Proposer	An individual, firm, partnership, corporation, joint venture, or combination thereof that was short-listed under CDOT's Request for Qualifications and that submits a Proposal in response to the RFP.
Proposer's Price	The price included by the proposer in Form J of the Instructions to Proposers.
Public Information Plan (PIP)	The plan provided by the Contractor and Approved by CDOT as described in Book 2, Section 4 (or, prior to such Approval, the draft Public Information Plan included with the Proposal Documents).
Public Utility	A Utility that is owned by a Public Utility Owner.
Public Utility Owner	Any owner or operator of a Utility that is entitled to reimbursement of its relocation costs pursuant to C.R.S. § 43-1-225, provided, however, that in the event of any inconsistency between the foregoing definition and the designation of a Utility Owner as either "public" or "private" in the Reference Documents – Utilities, the designation set forth in the Reference Documents – Utilities shall control.
Punch List	The list of Work items, with respect to the project, that remain to be completed after achievement of each milestone completion, each segment completion, or the project completion, limited to incidental items of Work necessary to correct imperfections that have no adverse effect on the safety or operability of the project.
Quality Assurance (QA)	All those planned and systematic actions necessary to provide confidence that a product or facility will perform satisfactorily in service. Quality Assurance is an "umbrella" term that includes Quality Control (QC) activities by the Design-Builder and Acceptance activities by CDOT for both design and construction.

Quality Control (QC)	The system used by the Design-Builder (design consultant, sub-consultants, prime contractor, subcontractors, producers, fabricators, manufacturers) to monitor, assess and adjust their processes to ensure that a product will meet the specified level of quality. The Design-Builder is responsible for implementing a Design QC system and a Construction QC system. There are two tiers of Quality Control: Frontline QC (herein called "Process Control") and Formal QC (herein called "Independent Quality Control").
Quality Control Administrator (QC Administrator)	Designated by the Design-Builder, the person responsible for managing and coordinating all formal QC procedures and activities performed in accordance with the Project Quality Management Plan.
Quality Control Plan (QC Plan)	Prepared by the Design-Builder, a project-specific document that identifies all construction QC personnel and procedures that will be used to maintain all production and placement processes "in control" and meet the specification requirements for an individual construction Work item.
Quality Management Plan (QMP)	A written document that describes the overall QC operating procedures of the Design-Builder and all Design-Build contractor parties (i.e., design consultant, sub-consultants, prime contractor, subcontractors, producers, fabricators, manufacturers) to ensure the quality of the project design and construction.
Reasonable Accuracy	The utility horizontal location to within 10 feet, size to within 12 inches, and no depth accuracy.
Recognized Hazardous Materials (RHMs)	The meaning set forth in Book 2, Section 5.
Record Set	A reproduction of a drawing or set of drawings, design calculations, or other record of engineering work required to be performed by the Contractor's Engineer in accordance with the Rules of Procedures of the State Board of Registration for Professional Engineers and Land Surveyors.
Reference Documents	Documents that are provided by CDOT to the Contractor that contain information relevant to the project. Reference documents should not be considered contract requirements except to the extent they are invoked through the Contract Documents. The Contractor is not entitled to rely on any information contained in the Reference Documents.
Released for Construction (RFC) Documents	The drawings (including plans, elevations, sections, details, and diagrams), specifications, shop drawings, drawings, samples, reports, calculations, and approximate quantities approved by the Contractor for construction as required by Book 2, Section 3.

Remediation Work	After determination by the Contractor that a hazardous substance(s) exists, sampling, treatment, and/or off-site disposal of hazardous substances and materials containing hazardous substances, as Approved by CDOT and in accordance with Book 2, Section 5.
Request for Proposals (RFP) or RFP Documents	The documents issued by CDOT that govern both the procurement process and the design and construction of the project.
Right-of-Way (ROW)	The real property and property interests provided by CDOT, local municipalities and/or Utility Owners (through agreements with CDOT) necessary for ownership and operation of the project.
Risk	An uncertain event or condition that, if it occurs, has a negative or positive effect on a project's goals and objectives.
Risk Register	A document that identifies specific project risks, the likelihood of their occurrence, and approaches to mitigate their effects.
ROW Plans	Plans that define the limits and conditions of the property owned by CDOT as a part of Book 4 Contract Drawings.
Second Notice to Proceed (NTP2)	A written notice issued by CDOT to the Contractor to proceed with the remainder of the Work on the date specified therein.
Shop Drawings	A general term that includes drawings, diagrams, illustrations, samples, schedules, calculations, and other data, which provide details of the construction of the Work and details to be used by the engineer for inspection.
Standard Specifications	Colorado Department of Transportation *Standard Specifications for Road and Bridge Construction* (current edition).
Stormwater Construction Permit	The meaning set forth in Book 2, section 5 and 12.
Stormwater Management Plan	The plan required when a Stormwater Construction Permit is obtained from the Colorado Department of Public Health & Environment (CDPHE).
Technical Criteria	The criteria described in Book 2 that establishes the minimum acceptable standards of quality, materials, and performance for the Work, which will be used as a basis for reviews and Final Acceptance.
Test	The procedure and method of acquiring and recording physical data, comparing it with set standards, and submitting a statement to such conditions or operations that leads to the Acceptance or rejection (deficiency, defective condition, nonconformance*)* of the item.
Test-Based Acceptance	Acceptance based on each Test meeting minimum requirements.

Traffic Control Plans (TCPs)	Plans that define the control of traffic through the project during construction.
Utility or utility	(i) A privately, publicly, or cooperatively owned line, facility, and/or system for producing, transmitting, or distributing communications, power, cable television, electricity, light, heat, gas, oil, crude products, water, steam, waste, signal systems, and other products that directly or indirectly serve the public; (ii) a privately owned irrigation facility. The necessary appurtenances to each utility facility shall be considered part of such utility. Without limitation, any service line connecting directly to a utility shall be considered an appurtenance to that utility, regardless of the ownership of such service line. The term "Utility" is sometimes also used to refer to the owner or operator of any such line, facility, and/or system (a "Utility Owner"). The term "Utility" shall specifically exclude existing storm water facilities, traffic signals, street lights, and proposed utility services for the Park-n-Rides and light rail transit (LRT) substations, without regard to whether or not such items are included in the definition of "Utility" in the Project-Specific Utility Relocation Agreements (PSURAs).
Utility Owner	The owner or operator of any Utility (including both Public Utility Owners and Private Utility Owners).
Utility Relocation Agreement (URA)	An agreement made between CDOT and a Utility Owner that provides a general framework for addressing Utility conflicts associated with the project and that is included in Appendix A (for Public Utility Owners) or Appendix B (for Private Utility Owners) to Book 2, Section 7.0.
Utility Relocation Plans	The design plans for relocation of a Utility impacted by the project to be prepared by the Contractor or the Utility Owner, as determined pursuant to Book 2, Section 7.
Utility Removal Work	Work necessary to remove any Utilities (whether or not in use as of the date of NTP1 or NTP2) for which leaving the Utilities in place is not feasible or not permitted, or which the Contractor otherwise proposes to be removed in order to accommodate or permit construction of the project, regardless of whether or not replacements for such Utilities are being installed in other locations.
Value Engineering Change Proposal (VECP)	The meaning set forth in the Book 1, Section 12.
Verification/Verify	The act of testing or inspecting performed by qualified testing or inspecting personnel employed by CDOT or its designated agent to independently establish conformity to the Contract.
Warranty	Any warranty made by the Contractor in Book 1, Section 21.

Work	All duties and services to be furnished and provided by Contractor as required by the Contract Documents, including the administrative, design, engineering, Quality Control, relocation, procurement, legal, professional, manufacturing, supply, installation, construction, supervision, management, QC inspection and testing, labor, materials, equipment, documentation, and other efforts necessary or appropriate to achieve Final Acceptance except for those efforts that the Contract Documents specify are to be performed by CDOT or other persons. In certain cases, the term is also used to mean the products of the Work.
Work Breakdown Structure	The meaning set forth in Book 2, Section 2.
Working Day	Any Calendar Day other than Saturday, Sunday, or a holiday.

Chapter 2: Initial Project Development, Goal Setting, and Delivery Method Selection

Chapter 2: Initial Project Development, Goal Setting, and Delivery Method Selection

Not all projects can and should be delivered with the Design-Build project delivery method. With the time and resource investment required to properly execute a Design-Build procurement process, each project needs to be carefully scoped and scheduled, its project goals set, its staff and resource requirements considered, and an initial project risk assessment completed before the method of delivery is selected for the project.

Colorado Department of Transportation's (CDOT's) formal Project Delivery Selection Matrix (PDSM) should be employed as a best practice to identify the appropriate method of delivery for the project. Several of the characteristics of Design-Build delivery noted by the PDSM follow:

- Design-Build can expedite the overall project delivery schedule or the construction schedule.
- Design-Build can obtain aggressive project pricing with a process of innovation focused on cost-efficient solutions.
- Design-Build is most effective when funding available for design and construction of the basic project is known and set.
- Design-Build requires that the project scope of work and the desired performance be fully defined through a preliminary project design development and detailed Technical Requirements.
- Design-Build requires the project team to have the resources (usually including potential consultant support) to preliminarily advance the design and execute a formalized and extensive procurement process.
- After the procurement phase, the project team (often including consultant support) must have the resources to oversee the implementation (design and construction) of the project, including possible co-location requirements.
- To be most effective, the project risks should be well understood and definable and properly allocated between the owner and the Design-Builder.

Using the PDSM methodology, these factors and more are considered in conjunction with other characteristics of traditional Design-Bid-Build (D-B-B) and Construction Manager/General Contractor (CMGC) to identify the best method of delivery for the project.

The initial process of project development, goal setting, and delivery method selection is shown on the flowchart diagram in Figure 2-1.

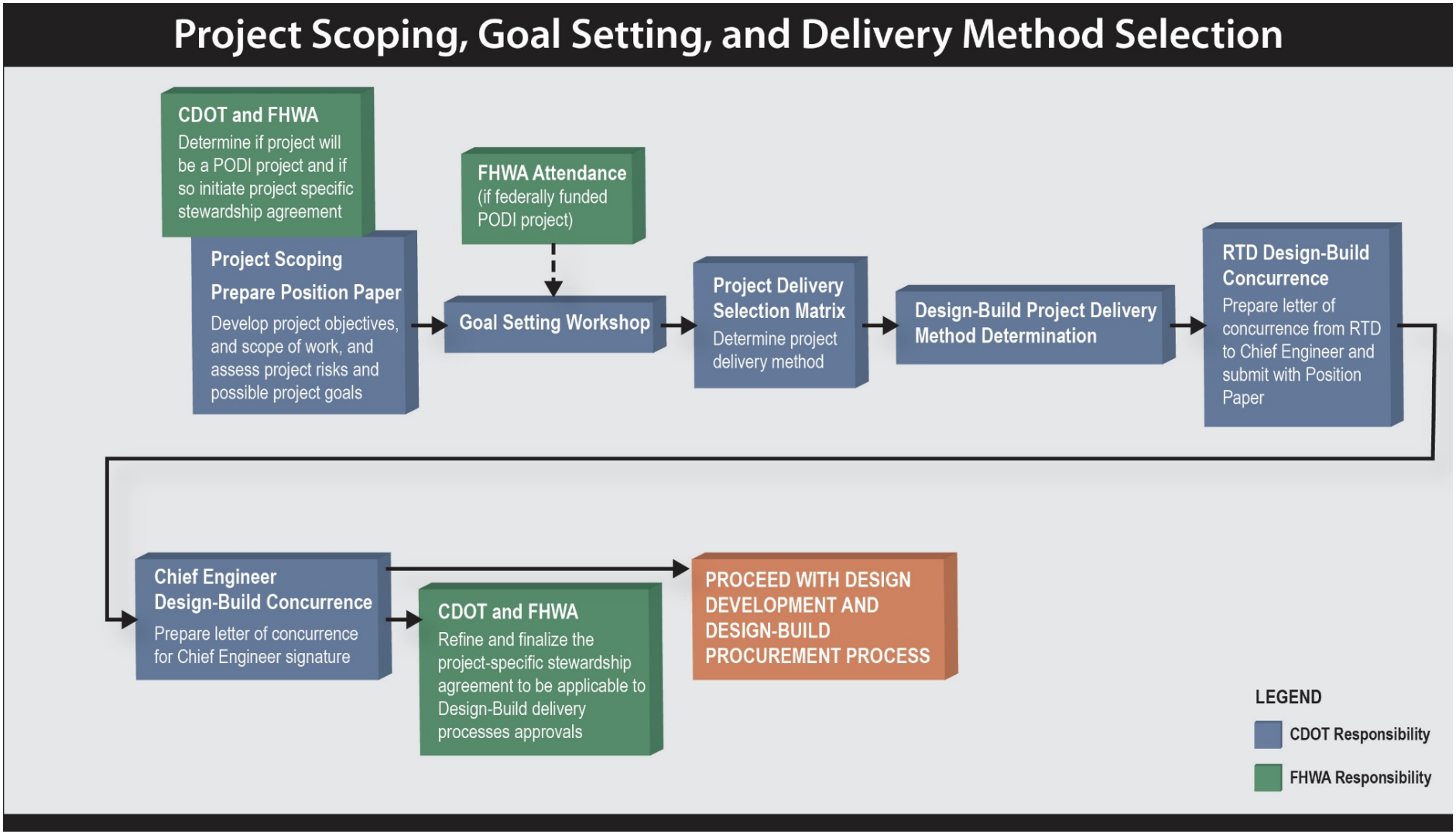


Figure 2-1. Project Scoping, Goal Setting, and Delivery Method Selection

2.1 Initial Project Development

2.1.1 Identification of Funding and Schedule

CDOT prioritizes projects through the development and ongoing maintenance of the Statewide Transportation Improvement Program (STIP) as required by federal regulations. The STIP is managed by the Office of Financial Management and Budget (OFMB).

In order to be included in the STIP, a project must be scoped and a total project estimate must be prepared. The resident engineer creates a draft baseline schedule that identifies key project milestones and related activities, which is then reviewed by the CDOT specialty unit managers and subsequently approved by the Region management team.

CDOT's project scoping and development is further described in the *2013 CDOT Project Development Manual*. The current manual (revised March 28, 2016) can be found at:

https://www.codot.gov/business/designsupport/bulletins_manuals/project-development-manual/revs-to-project-manual/2013-project-development-manual.pdf/view.

The project team should review the established project schedule and funding source(s) along with any associated requirements, as these may affect the project delivery method and the decision to use Design-Build.

2.1.2 Scoping a Design-Build Project

The scoping of a project should begin with the development and review of the project's goals and risks. The identified goals and risks can then be used to prepare the PDSM and determine the best project delivery method. There are three steps in selecting a delivery method:

1. Establish project-specific goals.
2. Perform an initial project risk assessment.
3. Complete a PDSM.

When initially scoping a project for possible Design-Build project delivery, the project team should consider the project schedule and resources available to manage the process. Design-Build projects place a unique demand on project team members in both the development and execution of the procurement process and in the oversight of the project implementation (design and construction). The project team must become knowledgeable in Design-Build delivery and have the commitment of resources necessary to perform its processes. If the project team members do not have prior experience implementing Design-Build delivery for a project of similar nature, then they should attend training sessions. CDOT has developed a Design-Build training program that includes an executive summary session and sessions in RFP development and contract administration.

The project team should review the project for elements that can be favorably addressed by the Design-Build project delivery method. These may include:

- the capability to provide a best value process that evaluates the technical merit, cost, and schedule in the selection of a Design-Builder for the project, with a focus on meeting and exceeding the project goals;

- the capability to expedite the overall delivery schedule of the project, particularly for large, complex projects;
- the capability to minimize the construction durations and construction impacts of the project;
- the promotion of innovation to provide an equal or better product that more efficiently utilizes project budget; and
- an effective means of addressing project risks by allocating them to the parties that are best able to manage them.

A unique benefit of Design-Build delivery is the Alternative Technical Concept (ATC) process that is used as part of the best value procurement process. Through confidential one-on-one meetings between the owner and contractor, the contractor is allowed to propose ATCs that specifically revise the Technical Requirements of the project. If the owner determines that an ATC provides an equal or better product, the owner may approve the ATC proprietarily and confidentially for the contractor who proposed it.

ATCs provide a powerful incentive for proposers to provide a best value project, both in terms of its technical merit and its price and schedule. Oftentimes, the selection of the Design-Build delivery method is driven by the proposers' approved ATCs. The ATC process is one of the most significant ways in which Design-Build delivery provides a best value project that is very responsive to the project goals.

2.1.3 Risk Identification and Analysis

A "risk" is defined as an uncertain event or condition that, if it occurs, has a negative or positive effect on a project's goals and objectives. Understanding which risks can and must be controlled by CDOT and which risks can and should be shared with the contractor results in an efficient and effective bid package, a competitive bidding environment, and overall lower costs.

Risk management is discussed in more detail in Chapter 3, however a basic understanding of the risk characteristics relative to the different methods of project delivery is important in initial project scoping, goal setting, and selection of the appropriate delivery method.

Traditional D-B-B delivery uses prescriptive provisions and fully completed designs that effectively assign most of the risk to CDOT. A primary benefit of alternative delivery methods such as Design-Build and CMGC is the ability to contractually allocate specific risks to the party best able to manage that risk. When project risks can be well defined, an advantage of the Design-Build delivery method is that those risks can be properly assigned in the Technical Requirements. When there is a high potential of unknown risks or poorly understood risks, the CMGC delivery method can be beneficial because it provides a forum to communicate and discuss risk in the design phase and to collaboratively address and reduce risk with the owner, contractor, and design consultant.

Risk assessment should be a continual process throughout the project development. An initial assessment of project risks needs to be performed by the project team at the time of the initial project scoping to assist with the selection of the appropriate delivery method. Project risks also need to be continually reviewed throughout the development of the RFP, the design development phase, and the construction phase of the project. The risk analysis and management process generally includes these five steps:

1. Identify the risk.
2. Assess and analyze the risk.

3. Mitigate and plan for the risk.
4. Allocate the risk.
5. Monitor and control the risk.

Design investigations and design development by the owner in Design-Build delivery is focused on minimizing and managing project risks. Elements of the design are advanced not blindly to an arbitrary level of completion but as necessary to manage their risks. Low-risk areas of the project may need to be advanced to only a very low level of development to adequately address the risks associated with the scope of work, however high-risk areas of the project may need to be developed to a more significant level to address the risks and properly allocate them. The identification of risk and preparation of a risk management plan leads to the development of a Risk Register for the project, which is further explained in Chapter 3 of this manual.

2.2 Project Goal Setting

You must define your goals in order to define what you value. When you know what you value, you can determine best value based upon objective criteria.

An understanding of project goals is essential to the selection of an appropriate method of delivery. The goals influence the project development, procurement, implementation, and administration of the contract. The goals communicate what CDOT values for the project and become distinguishing factors between proposers when determining which Proposal provides the best value to CDOT. These goals should strongly influence contractors, consultants, and others in assembling their teams, in preparing Proposals for the project, and in guiding the project throughout the design and construction phases.

Project goals should reflect the project's need, objectives, and benefits. A position paper should be developed for the project to specifically define the project needs and objectives, its specific scope of work, the project goals, and ultimately the benefits of the selected method of delivery.

It is the project goals that unify the owner (CDOT), designer, and contractor into a collaborative Design-Build team. The project goals also become the basis of the partnering charter; rather than each party guarding its own interests, any potential disputes are filtered through the lens of the project goals and decisions are made based on what best meets the project goals.

Following are some generic examples of transportation project goals. The goals for transportation projects are generally similar. Nevertheless, the project goals must be considered specifically for each project and remain consistent over the life of the project.

Typical Generic Project Goals:

<u>Schedule</u>

- Minimize the project delivery time.
- Complete the project before a specified date.
- Make the project fully operational prior to a specified date.
- Accelerate the start of project revenue.

Cost

- Minimize the project cost.
- Maximize the project budget.
- Complete the project on budget.
- Maximize the project scope and improvements within the project budget.

Quality

- Meet and exceed the project requirements.
- Provide a design and construction that minimizes project risks.
- Provide the most highly qualified organization to perform the Work.
- Provide a high-quality design and construction.
- Provide a high-quality design and construction that best addresses the complexity of the project.
- Provide an aesthetically pleasing project.

Functional

- Maximize the life cycle performance of the project.
- Maximize capacity and mobility improvements.
- Provide innovative solutions to the complex project problems.
- Minimize inconvenience to the traveling public during construction.
- Maximize safety of workers and the traveling public during construction.

Significant transportation projects should include a goal setting workshop early in the project development, prior to selection of the delivery method. The workshop can be conducted by the project team or can be facilitated by an outside expert. Facilitated goal setting workshops preferably include expertise in both goal setting for transportation projects and innovative contracting.

Oftentimes, transportation projects include significant stakeholder interests beyond the department of transportation (DOT) project teams. In these cases, it is advantageous to include stakeholders in goal setting. This is best accomplished by including the stakeholders in the goal setting workshop or by soliciting their input in one-on-one meetings prior to the workshop if their participation in the workshop is not feasible. In projects with multiple funding sources, it is particularly important to solicit input from funding partners in the development of the project goals.

Representation to consider in assembling the goal setting team includes the following:

- Regional program engineer
- Regional resident engineer or Project Manager
- Consultant Project Manager and key staff
- Specialty project staff (major contributors)
- Lead agency representation (Federal Highway Administration [FHWA], Federal Transit Administration [FTA], Federal Railroad Administration [FRA], Regional Transportation District [RTD])
- Entity funding partners (local government)
- Facilitator
- Other stakeholders

It is important for CDOT executive management to support the project goals. Their support is usually attained through the approval of the project goals by the project Executive Oversight Committee. An example worksheet for the development of the initial project definition and goals is provided in Figure 2-2. When the worksheet is completed and the project goals are determined, it can provide the basis of a position paper that summarizes the initial project definition and goal setting.

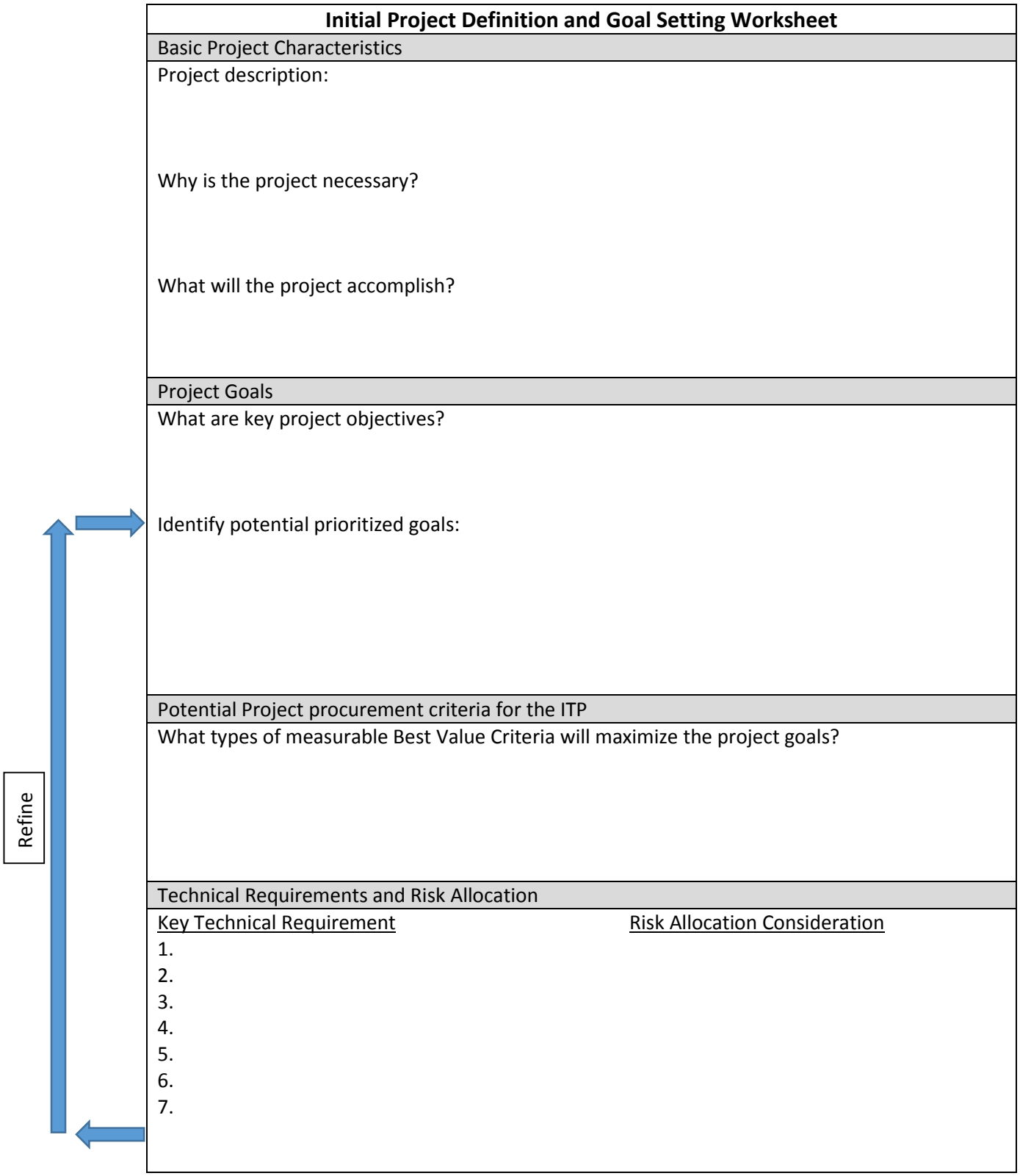


Figure 2-2. Initial Project Definition and Goal Setting Worksheet

2.3 Selecting the Project Delivery Method

The project delivery method is the process by which a project is comprehensively designed, procured, and constructed. The delivery method generally begins with the development of a project design and continues through the administration of the construction. The choice of delivery method influences many aspects of the project at different stages, including the:

- project scope definition;
- organization of contractors, designers, and various consultants;
- sequencing of design and construction operations;
- execution of design and construction;
- environmental approvals;
- testing, inspection, and Acceptance; and
- start-up and close-out procedures.

The different project delivery methods are distinguished by the manner in which contracts between the owner, designers, and builders are formed and the technical relationships that evolve between each party as described in the contracts. The key contractual relationships of the primary methods of delivery are described below:

D-B-B is the traditional project delivery method in which the owner completes its own designs, or retains a designer to furnish complete design services, and then advertises and awards a separate construction contract based on the designer's completed construction documents.

With this delivery method, the agency owner is responsible for the details of design during construction; as a result, in D-B-B the owner is responsible for the cost of any errors or omissions encountered in construction.

Design-Build is a project delivery method in which the owner procures both design and construction services in the same contract from a single, legal entity referred to as the Design-Builder, or simply the Contractor. The method typically uses a two-phase selection process that includes Statements of Qualifications, short-listing, Proposals and a final selection of the Design-Builder. The Design-Builder controls the details of design and the critical path for the project delivery life cycle and is responsible for the cost of any errors or omissions encountered in construction.

CMGC is a project delivery method in which the owner contracts separately with a designer and a construction manager. The owner can either perform the design itself or contract with an engineering firm to provide the design. The owner selects a construction manager to provide input into the design phase of the project. A defining characteristic of this delivery method is a sole source negotiated contract between the owner and the construction manager to perform the construction. CMGC brings the contractor into the design process early in its development.

2.3.1 The Project Delivery Selection Matrix

The evolution of innovative contracting methods of project delivery such as Design-Build and CMGC has made it important to evaluate projects early in their development to determine the most beneficial method of delivery. CDOT, the transportation industry, FHWA, and the University of Colorado have jointly developed the PDSM tool for assessing traditional D-B-B, Design-Build, and CMGC delivery for a

given project in order to select the delivery method most suitable for a project. Use of the PDSM is expanding throughout the transportation industry and is increasingly being used by other state DOTs.

The PDSM is available on the Innovative Contracting website at:

https://www.codot.gov/business/designsupport/innovative-contracting-and-design-build.

The PDSM manual provides the detailed methodology and worksheets to use for the delivery selection process, which is summarized in the narrative of this manual.

The PDSM is a formal, documented approach for CDOT highway project delivery selection. The manual provides generic forms for use by CDOT staff and project team members. By using these forms, a brief project delivery selection report can be generated for each individual project. The primary objectives of this document are to:

- present a structured approach to assist CDOT in making project delivery decisions;
- assist CDOT in determining if there is a prevailing or an obvious choice of a project delivery method; and
- provide documentation of the project delivery decision in a Project Delivery Decision Report.

The PDSM should not be used to justify a predetermined decision of delivery method. Though often the project team will begin the PDSM process with an initial bias toward a method of delivery, it is vital that the team is committed to use the PDSM to aid in an objective assessment of delivery methods for the project.

The PDSM and Design-Build Delivery:
There are eight factors to consider when using the PDSM approach to selecting the method of delivery. The PDSM process starts by evaluating four primary factors, followed by a risk assessment, which essentially constitutes a fifth primary factor. Usually, an assessment of the five primary factors determines the most advantageous method of delivery. The primary factors, as they are related to Design-Build, are:

1. **Delivery Schedule**
   Design-Build can get a project under construction before completing design. The parallel process of design and construction can accelerate the project delivery schedule; however, procurement time can be lengthy due to the time necessary to develop the design, prepare an adequate RFP, evaluate Proposals, and provide for a fair and transparent selection process.

2. **Complexity and Innovation**
   Design-Build incorporates Design-Builder input into the preliminary design process through best value selection and contractor-proposed ATCs—which results in a cost-oriented approach to providing complex and innovative designs. For this approach to be effective Design-Build requires that desired solutions and outcomes to complex projects be well defined through contract requirements and, in particular, the Technical Requirements.

3. **Level of Design**
   In Design-Build, the project design is advanced to the level necessary to precisely define contract requirements and properly allocate risk. The level of design is most commonly 30 percent or less but can vary by discipline as is necessary to define the scope and manage the risk.

4. **Project Cost**
   Designer-Builder collaboration and ATCs can provide a very cost-efficient response to project goals. Costs are determined with Design-Build Proposals, early in the design process. Design-Build can allow a variable scope bid to match a fixed budget.

5. **Project Risk Assessment**
   Design-Build provides an opportunity to properly allocate risks to the parties best able to manage them, but it requires risks allocated to the Design-Builder to be well defined to minimize contractor contingency pricing of risks.

Three secondary factors are then assessed, primarily on a pass/fail basis to ensure that they do not adversely impact the actual project delivery selection. The secondary factors are:

6. **Owner Staff Experience and Availability**
   Technical and management resources and expertise are necessary in Design-Build to develop the RFQ and RFP and to administrate the procurement. Then there is a concurrent need for both design and construction resources to oversee the implementation phase of the project. Experience and availability of the owner are viewed by a Design-Builder as risks and can influence the innovation a Design-Builder pursues during the Proposal period, either positively or negatively.

7. **Level of Oversight and Control**
   Oversight and control of the design are exercised in a much different manor in Design-Build (design requirements, criteria, and desires must be written into the RFP contract requirements). In construction, oversight and control are most often provided through auditing the Quality Assurance program that is provided by the Design-Builder.

8. **Competition and Contractor Experience**
   Design-Build allows for a balance of price and non-price factors in the selection process. The delivery method is mature enough in Colorado to routinely expect qualified and experienced Design-Builders to competitively respond to Design-Build procurements.

Table 2-1 provides a summary comparison of the first four primary factors for CMGC, Design-Build, and D-B-B. Table 2-2 provides a summary comparison of the fifth factor: the project risks for these delivery methods.

The PDSM is typically prepared during a four-hour workshop with a delivery selection panel that should consist of the following members:

- A facilitator that is neutral toward the delivery method
- The Project Management Team
- An individual with innovative contracting experience, especially with CMGC and Design-Build experience for complex projects
- Representatives from key specialty groups
- Environmental Specialty Group representation (for most projects with environmental clearances)
- Other stakeholders (local agencies, FHWA, RTD, etc.)

Table 2-1. Comparison of Primary Evaluation Factors for Delivery Methods			
Factor	**D-B-B**	**Design-Build**	**CMGC**
Delivery Schedule	• Requires time to perform sequential design and procurement • If design time is available, has the shortest procurement time after the design is complete	• Can get a project phase under construction before completing total design for the project • Parallel process of design and construction can accelerate project delivery schedule • Procurement time can be lengthy due to the time necessary to develop an adequate RFP, evaluate Proposals, and provide for a fair, transparent selection process	• Quickly gets contractor under contract • Can expedite initial construction packages • Parallel process of development of contract requirements, clearances, design, procurements, and construction can accelerate project schedule • Schedule delay can result from coordinating design between the construction manager and the designer • Schedule delay can result from cost negotiations
Complexity and Innovation	• Allows the owner to fully resolve complex design issues and qualitatively evaluate designs before construction bidding • Innovation provided by CDOT/consultant expertise and through traditional owner-directed processes such as value engineering (VE) studies and contractor bid alternatives	• Incorporates Design-Builder input into the design process through: 1. best value selection 2. contractor-proposed ATCs • ATCs focus on innovative, cost-efficient solutions to complex problems • Requires that desired outcomes to complex projects be well defined through contract requirements	• Allows independent selection of designer and contractor based on qualifications, experience, and project approach • Effectively addresses complex and innovative designs through three-party collaboration by the owner, designer, and contractor • Focuses on a qualitative design approach
Level of Design	• 100% design by owner, with owner having complete control over the design	• Design advanced by owner to the level necessary to precisely define contract requirements and properly allocate risk (typically 30% or less)	• Can utilize a low level of design prior to procurement of the CMGC contractor • Allows joint collaboration of CDOT, the designer, and the CMGC in the further development of the design • Iterative nature of design process risks extending the project schedule
Project Cost	• Competitive bidding provides a low-cost construction for a fully defined scope of work • More cost change orders due to contractor having no design responsibility	• Designer-Builder collaboration and ATC process can provide a cost-efficient project • Can allow a variable scope bid to match a fixed budget • Poor risk allocation can reduce cost efficiency or can jeopardize the success of the procurement	• Owner, designer, and contractor collaboration to reduce risk pricing can provide a cost-efficient project • Noncompetitive negotiated construction agreed price (CAP) introduces price risk • Allows flexibility to design to a budget

Table 2-2. Comparison of Project Risks for Delivery Methods			
Project Risk	**D-B-B**	**Design-Build**	**CMGC**
General Characteristics	• Requires that most design-related risks and third-party risks be resolved prior to procurement to avoid costly contractor contingency pricing and change orders and claims	• Provides opportunity to properly allocate well-defined and known risks to the parties best able to manage them • Risks allocated to Design-Builder must be well defined to minimize contractor contingency pricing of risks	• Provides opportunity for the owner, designer, and contractor to collectively identify and minimize project risks and either allocate risk to the appropriate party or share risk • Has potential to minimize risks associated with innovative and complex design and construction
Site Conditions and Investigations	• Site condition risks are generally best identified and mitigated during the design process prior to procurement to minimize the potential for change orders and claims	• Certain site condition risks can be allocated to the Design-Builder provided they are well defined and associated third-party approval processes are well defined • Unreasonable allocation of site condition risk results in high pricing due to risk • Site investigations by owner should include but are not limited to: 1. basic design surveys 2. hazardous materials 3. geotechnical investigations 4. utilities investigations	• CDOT, the designer, and the contractor can collectively assess site condition risks, identify the need to perform site investigations in order to reduce risks, and properly allocate or share risk prior to CAP
Utilities	• Utilities risks are best allocated to the owner and are mostly addressed prior to bid to minimize potential for claims	• Utilities responsibilities need to be clearly defined in the contract requirements and appropriately balanced between Design-Builder and owner *Private utilities*: Need to define coordination and schedule risks as they are difficult for Design-Builder to price. Best to have utilities agreements before procurement. Note: By Colorado regulation, private utilities have schedule liability in Design-Build projects, but they need to be made aware of their responsibilities *Public Utilities*: Design and construction risks can be allocated to the Design-Builder, if properly incorporated into the contract requirements	• Can utilize a lower level of design prior to contracting and joint collaboration of CDOT, the designer, and the contractor in the further development of the design

Table 2-2. Comparison of Project Risks for Delivery Methods (*continued*)			
Project Risk	**D-B-B**	**Design-Build**	**CMGC**
Environmental	• Risk is best mitigated by obtaining all environmental clearances prior to bid	• Certain environmental approvals and processes that can be fully defined can be allocated to the Design-Builder. Agreements or memorandums of understanding (MOUs) with approval agencies prior to procurement are best to minimize risks	• Environmental risks and responsibilities can be collectively identified, minimized, and allocated by the owner, the designer, and the contractor prior to the negotiation of the construction agreed price (CAP)
Right-of-Way (ROW)	• ROW clearances are best obtained before bid	• ROW clearance commitments can be defined to allow Design-Build before completing all acquisition • ROW acquisition responsibilities and risks can be shared if well defined	• ROW risks and responsibilities can be collectively identified, minimized, and allocated by the owner, the designer, and the contractor prior to the CAP
Drainage and Water Quality	• Drainage and Permanent Water Quality (PWQ) systems are designed prior to bid	• Generally, the owner is in the best position to manage the risks associated with third-party approvals regarding compatibility with off-site systems and should pursue agreements to define requirements for the Design-Builder	• The owner, the designer, and the contractor can collectively assess drainage risks and coordination and approval requirements, minimize and define requirements, and allocate risks prior to the CAP
Third-Party Involvement (FHWA, railroads, Public Utilities Commission [PUC], funding partners, adjacent jurisdictions, etc.)	• Third-party risk is best mitigated through the design process prior to bid to minimize potential for change orders and claims	• Third-party approvals and processes that can be fully defined can be allocated to the Design-Builder • Agreements or MOUs with approval agencies prior to procurement should be obtained to minimize risks	• Third-party approvals can be resolved collaboratively by the owner, designer, and contractor

2.3.2 Approval for Design-Build Delivery Method Use

Once a region has completed a PDSM and written the PDSM Report outlining why Design-Build has been found to be appropriate or most appropriate for the project, the resident engineer or the Project Manager must prepare one letter of concurrence from the RTD to the Chief Engineer, which should be supported by a project position paper. Templates for these documents can be found in the online Appendix on the CDOT Innovative Contracting web page or by contacting CDOT Innovative Contracting.

2.3.3 Training

As is discussed throughout this manual, Design-Build delivery is a much different process than traditional D-B-B delivery. For this reason, CDOT has established a best practice of providing training to the CDOT project teams for all major Design-Build projects. Even when many members of the CDOT project team have previously worked on Design-Build projects it is valuable to undergo the training again to refresh the project team's understanding of the delivery method. The training is provided in four modules. PowerPoint presentations for each of the modules can be found in the online Appendix on the CDOT Innovative Contracting web page or by contacting CDOT Innovative Contracting. But review of those presentations should not be considered as a substitute to the actual training. The training modules are:

Module 1: Executive Summary

Module 2: RFP Development

Module 3: PTT (Project Technical Team) Kickoff

Module 4: Contract Administration

Chapter 3: Risk Management

Chapter 3: Risk Management

3.1 Risk Management Processes

Risk Definition
A project risk is an uncertain event or condition that, if it occurs, has a negative or positive effect on a project's goals and objectives. A risk may have one or more causes and, if it occurs, one or more impacts.

This chapter provides a summary of risk management and the tools that the Colorado Department of Transportation (CDOT) has developed to assist with project risk management, with a focus on risk management for Design-Build delivery. For a detailed discussion of risk management of transportation projects the reader is referred to National Cooperative Highway Research Program (NCHRP) Report 658, *Guidebook on Risk Analysis Tools and Management Practices to Control Transportation Project Costs* (available at http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_658.pdf).

Risk management is the identification, analysis, planning, allocation, and control of project risks. It is a central concept to Design-Build project delivery. The ability of Design-Build delivery to properly allocate risks to the parties that are best able to manage them is a key attribute of the delivery method. Through Design-Build delivery, risks that would otherwise reside with the owner in traditional Design-Bid-Build (D-B-B) instead can be assigned to the Design-Builder.

Not all risks should be passed on to the Design-Builder, as certain risks can best be managed by the owner. When risks that are best managed by the owner are passed through to the Design-Builder, often the result is an increase in contingency (risk) pricing for the project, or an unnecessary increase in the schedule for the project, or both. Improperly allocated risk can potentially jeopardize the success of the project by increasing exposure to claims and litigation. The advantages that Design-Build offers in managing risk can be recognized only through the proper allocation of risk.

The risk analysis and management process generally includes the following five steps:

1. Identify and discuss project risk.
2. Assess and analyze the risk.
    - What is the probability of the risk (high, medium, or low)?
    - What are the consequences of the risk?
3. Mitigate and minimize the risk.
4. Allocate the risk.
5. Monitor and manage the risk.

As shown in Figure 3-1, risk management is a continual and iterative process.

Figure 3-1. Risk Management Process

Risk management should start in the planning phase of a project and continue through to the completion of the project. The five steps are detailed below.

1. Identify and Discuss Project Risk

Generally, project risks are first identified during CDOT's Project Delivery Selection Matrix (PDSM) process, which is summarized in Chapter 2 of this manual. Risk assessment is a primary consideration in determining the appropriate method of delivery.

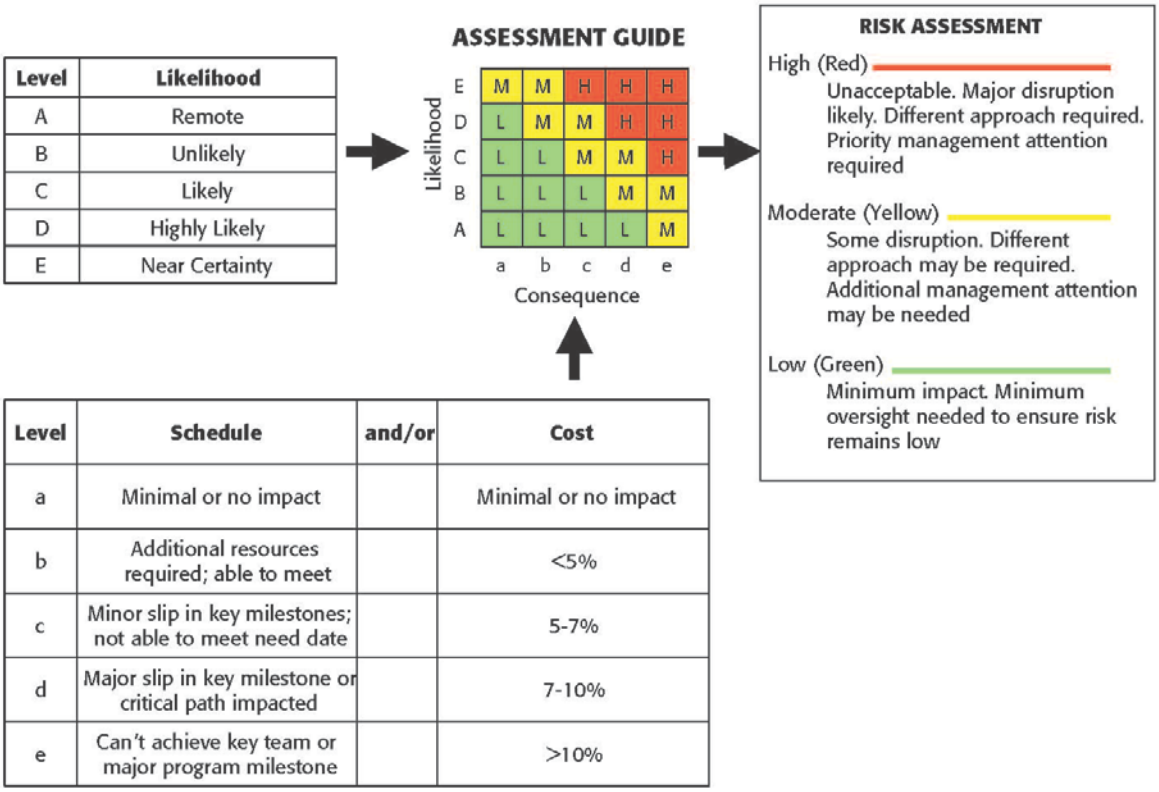
The project risk assessment in the PDSM provides a starting point for the development of the initial project Risk Register. Additional project risks are then identified and addressed and added to the Risk Register throughout the design development process.

2. Assess and Analyze the Risk

Though risk management should be a continuous process through the life of the project, there needs to be an especially strong emphasis on it during the initial design development and Request for Proposal (RFP) development phase of the project. Risk management should in fact drive much of those processes. Risk is identified, assigned, and then mitigated through the development of both the project design and the RFP Technical Requirements. Because of its importance, CDOT's specialty groups should be involved early on in the project risk discussions.

Risk mitigation plans may include additional investigations, additional design, and stakeholder coordination activities that are performed by the project team during the development of the RFP.

Assessment of risk should include an examination of both the probability of the risk and the consequences of the occurrence. Figure 3-2 depicts a process for risk assessment.



Level	Schedule	and/or	Cost
a	Minimal or no impact		Minimal or no impact
b	Additional resources required; able to meet		<5%
c	Minor slip in key milestones; not able to meet need date		5-7%
d	Major slip in key milestone or critical path impacted		7-10%
e	Can't achieve key team or major program milestone		>10%

Figure 3-2. Risk Assessment Process (adapted from Federal Highway Administration, *Guide to Risk Assessment and Allocation for Highway Construction Management*, October 2006)

3. Mitigate and Minimize the Risk

Though generally design development by the owner should be limited to allow the most design flexibility for the Design-Builder, the design needs to be advanced to the extent necessary to ensure project risks can be identified and properly managed and allocated. The owner's design must ensure that the project is well defined, is buildable, and facilitates strong Proposal designs with manageable risks. To meet these objectives, every discipline of the design needs be individually assessed, which results in differing levels of design development. Some elements of the project may only require a low level of design effort, whereas other elements of the design may require much higher levels of development to define the work and minimize risk.

Table 3-1. Example of Design-Build Project Risk Allocation Matrix

	Design-Bid-Build		Design-Build	
Risk	**Agency**	**Contractor**	**Agency**	**Contractor**
Design Issues				
Project scope definition	X		X	
Design criteria	X		X	
Geotech investigation – Initial borings on preliminary design	X		X	
Geotech investigation – Initial borings on Proposal	X			X
Plan conformance with regulation/guide/RFP	X			X
Environmental				
NEPA/SEPA	X		X	
Environmental Mitigation Commitments[1]	X		X	X
Final Design Environmental Approvals[1]	X		X	X
Permitting	X		X	X[2]
Right-of-Way				
Establishing right-of-way limits	X		X	
Acquire right-of-way	X		X	
Local Agency				
Identification of initial local agency impacts	X		X	
Establish final/actual local agency impacts	X			X
Modifications to existing local agency permits	X			X
Utility				
Establish initial utility locations/conditions	X		X	
Relocation of utilities under agreement during contract		X		X
Modified agreement with private utility based on final design	X			X
Railroads (RR)				
Obtain initial RR agreement based on preliminary design	X		X	
Coordination with RR under agreement	X			X
Public Relations				
Community relations	X		X	
Public safety		X		X
Construction				
Initial performance requirements	X		X	
Final construction/materials QA/QC Plan	X			X
Material quality		X		X
Construction quality and safety		X		X
Force Majeure				
Natural hazard (tornado, earthquake, etc.)	X		X	
Change in law	X		X	
Differing Site Conditions				
Changed and differing site conditions	X		X	
Warranty				
Long-term ownership/final responsibility	X		X	
Insurance		X		X

Source: K.D. Molenaar, D. Gransberg, S. Scott, D. Downs, and R. Ellis, *Recommended AASHTO Design-Build Procurement Guide: Final Report*, Project No. 20-7/TASK 172, National Cooperative Highway Research Program, *Source continued:* Transportation Research Board, National Research Council (Aug. 2005): 36. http://onlinepubs.trb.org/onlinepubs/archive/NotesDocs/NCHRP20-07%28172%29_FR.pdf.

[1] Line added by authors of this manual to reflect CDOT methodologies.
[2] Added by authors of this manual to reflect CDOT methodologies.

4. Allocate the Risk

Once a risk has been identified and analyzed, it should be assigned to either CDOT or to the contractor. The goal is to assign the risk to the party who is best able to mitigate the risk. Risks can be allocated solely to the contractor or CDOT, or they can be shared. However, because shared risks can lead to disputes, they should be avoided if at all possible. In situations where it seems that shared risk may be appropriate, the project team should first consider a more detailed assessment of the sub-factors that drive the risk and to try to assign each risk associated with the sub-factors solely to the best party who is best able to mitigate it.

Table 3-1 provides a risk allocation matrix with guidance on how transportation project risks are typically allocated in traditional D-B-B and in Design-Build delivery projects.

During the Design-Build procurement phase, project risks are specifically addressed through the development of the Technical Requirements of the RFP. The Technical Requirements specify the Design-Builder's responsibilities for managing and resolving the elements of the design and construction of the project and should clearly identify and allocate risk. When risks are shared between CDOT and the Design-Builder, the Technical Requirements should also clearly define the risk sharing and the collaborative processes that are required to jointly address the risk.

5. Monitor and Manage the Risk

An important advantage of Design-Build is the collaborative environment that it fosters between the owner and the Design-Builder during the implementation phase of the project. Truly successful Design-Build projects are dependent on collaboration and partnership in risk management. Through strong collaboration the project risks can be effectively managed to the benefit of the Design-Builder, the owner, and the project as a whole. To facilitate such a process, it is valuable to maintain a Risk Register through the construction of the project and schedule regular management meetings to review the status of risk resolution.

3.2 Risk Register

The Risk Register is a tool used to guide and document the risk management process. The purpose of the Risk Register is to define the risks, document the risks, identify cost and schedule impacts associated with the risks, and produce mitigation plans for the risks. The project team should develop a Risk Register and refine it throughout the design development, procurement, and implementation of the project. Ideally, the initial Risk Register is developed as a part the project delivery selection, and it progressively evolves as the project is advanced through all of its stages to completion

The Risk Register is not intended to identify all of the project risks, as that can require an extensive and potentially counterproductive effort. The purpose of the Risk Register is to assist the project team in the efficient management and allocation of risks. To that end, the Risk Register focuses on key risks that can significantly impact the project goals, costs, schedule, and performance.

The outline and CDOT template for a typical Risk Register includes the following:

Risk Tracking Number and Description
Status of the Risk (active or resolved)
Potential Impacts of the Risk
Oftentimes the risk impacts are described in terms of schedule and cost, but they can also include stakeholders, product quality and other elements.
Risk Level
A subjective assessment of the importance of resolving the risk
Strategy
A general identification of the approach to address the risk such as:
Define—to advance investigations and designs provide a better definition of the risk and associated responsibilities to minimize threats
Mitigate—to take specific action to minimize or eliminate threats
Response Actions
A detailed description of the specific actions to execute to manage the risk
Risk Owner
Identification of the party(ies) to whom the risk is allocated

An example of a Risk Register is provided in Table 3-2. The example shows a typical Risk Register in the early design phases of a project. As the project design becomes more advanced, the Risk Register becomes more detailed, assigning specific costs and schedule impacts to risks, to both help inform mitigation decisions and to determine contingency pricing needs for the project.

Table 3-2. A Sample Risk Register

RISK REGISTER Project Name: Example Project Name **Project Number: XX-XXXX**

Risk Identification			Risk Assessment		Risk Response		Allocation	
ID #	Status	Identified Risk	Potential Impact (cost, schedule, etc.)	Risk Level	Strategy	Response Actions	Risk Owner	Updated
10	Active	Potential contaminated soils within the project limits	If undefined and unmitigated in advance, encountering the materials during construction could have significant cost and schedule impact and could result in potential contractor claims	High	Define and Partially Mitigate	• CDOT performs physical investigation prior to Notice to Proceed (NTP) to characterize and perform some mitigation in advance if possible • CDOT accepts cost responsibility through force account and Contractor accepts schedule responsibility	CDOT and Contractor	10/12/2014
11	Active	Bridge crossing at Noname Creek	• A detailed hydraulic floodplain analysis is required to identify bridge crossing geometry creating Federal Emergency Management Agency (FEMA) approval schedule risk and structure cost risk for proposers if they are unable to perform detailed analyses prior to submittal of Proposals • A 404 permit is needed if working in the creek and a stream crossing plan are necessary	Medium	Define	• CDOT performs initial floodplain survey and analysis to provide a default structure opening requirement that proposers can rely on • CDOT encourages Alternative Technical Concepts (ATCs) for more innovative design • CDOT initiates discussion with floodplain administrator to define FEMA approval process for Contractor	CDOT (bridge) Contractor (permit and plan)	11/23/2014
12	Resolved	Delay of Right-of-Way (ROW) acquisition	ROW acquisition is behind schedule and will not be completed at the planned NTP date of the project, jeopardizing project start-up date	Medium	Define	• CDOT and Design Consultant to determine likely ROW acquisition dates and provide a schedule of parcel acquisition dates in the Technical Requirements that Contractor is entitled to rely on • Consider ATCs for Contractor to assume acquisition responsibilities	CDOT	9/13/2014
13	Active	Potential contaminated groundwater	Contaminated groundwater may need to be treated or removed for the construction of drilled caissons	Med	Define	Require Contractor to develop a Hazardous Waste Management Plan (HWMP) to address how contaminated groundwater will be mitigated and allocate cost and schedule risk to the Contractor	Contractor	10/20/2014
13	Resolved	Permanent Water Quality (PWQ) system	The current Municipal Separate Storm Sewer System (MS4) permit is vague and ambiguous, creating risk that contractor-proposed Water Quality designs will not be approved by CDOT	High	Define	• Develop a Technical Requirement that defines a default system (and/or acceptable details) that the Contractor can rely on (CDOT essentially accepts CDPHE risk) • Consider Contractor ATC for innovation if Contractor accepts approval risks	CDOT	12/2/2014
14	Active	Dry utility relocation delays	Project has a number of telecommunication lines that are running the full length of the roadway that will have to be relocated by private utility company, which could substantially impact the project schedule	High	Mitigate	• Work with private utilities up front to develop utilities agreements that include relocation schedule commitments • Remind utility agencies of their regulatory schedule responsibilities (C.R.S. § 43-1-1412)	CDOT	11/24/2014
15	Resolved	Nesting birds	Nesting birds, protected under the Migratory Bird Treaty Act, may delay construction during the nesting season	Medium	Mitigate	Identify conditions that contractor can implement to prevent birds from nesting, including Senate Bill 40 permitting to remove trees	CONTRACTOR	11/4/2014

3.3 Typical Design-Build Risks on Transportation Projects

Though each project has unique risks, the risks that follow are present on most transportation projects.

Site Conditions and Investigations:

Certain site condition responsibilities can be allocated to the Design-Builder provided they and any associated third-party approval processes are well defined. However, an unreasonable allocation of site condition risk results in high contingency pricing by the contractor. At a minimum, site investigations should be performed by the owner to minimize overall project risk and to provide the necessary base information for proposers to complete their pursuit designs without redundant investigations being performed by each proposer. These investigations typically include the following:

- Basic design surveys—as necessary for the proposers to complete their Proposal design
- Contaminated materials and groundwater investigation—at a minimum to characterize the general nature of mitigation requirements
- Geotechnical investigations—as necessary for proposers to advance the design of structures foundations, retaining walls, and pavements as required for their Proposals
- Utilities investigation—physical determination of horizontal and vertical locations at critical locations of potential conflicts

Utilities:

Utilities responsibilities need to be clearly defined in the contract requirements and appropriately allocated to either the Design-Builder or to CDOT:

Private utilities: The owner needs to define coordination and schedule risks as they are difficult for the Design-Builder to price. It is preferable to have utilities agreements executed with each private utility before the completion of the procurement. The agreements should define the scope of anticipated relocations, relocation responsibilities (both construction and design), and the schedule for the relocations. Note: By state regulation (C.R.S. § 43-1-1412) private utilities have schedule liability in Design-Build projects, but they need to be made aware of their responsibilities.

Public Utilities: Design and construction risks can be allocated to the Design-Builder, if the work and approval processes are fully defined in the Technical Requirements.

Environmental Permitting:

Typically, environmental permitting can be more effectively managed by the owner because the owner has stronger working relationships with the permitting agencies and a better understanding of the processes. However, certain environmental approvals and processes that can be well defined can be allocated to the Design-Builder. Agreements or memorandums of understanding (MOUs) with permitting agencies that define approval requirements and processes can significantly reduce risks to the Design-Builder. In situations where permitting can be clearly defined and allocated to the contractor, scheduling benefits can be recognized.

Right-of-Way:

In the majority of Design-Build projects, the owner acquires the Right-of-Way (ROW) necessary to construct the project. When all of the ROW is not acquired by the owner prior to the start of

construction, a ROW clearance schedule should be provided in the Technical Requirements to define and minimize schedule risk for the Design-Builder. This schedule becomes part of the contract and provides an assurance to the proposers that the risk is recognized and allocated to the owner. ROW acquisition responsibilities and risk can be transferred to the Design-Builder, with potential schedule benefits, but because the state agency needs to become involved in any condemnation process, ROW acquisition responsibilities then become a shared risk that must be carefully defined in the Technical Requirements. To avoid the shared risk, preferably the owner performs all of the ROW acquisition.

Railroads:

The railroad companies are a particularly challenging third party to manage in Design-Build projects. They often require very advanced designs before executing construction and maintenance agreements, which constitute their formal approval of grade separation structures over their facilities. Their processes introduce a high level of risk to proposers needing to include the costs and schedules for work that interfaces with the railroad in their Proposals. Typically, the risks can be best minimized and managed by the owner advancing the designs as much as possible in advance of the Design-Build procurement phase.

Drainage and Water Quality:

Often project drainage facilities receive flows from outside the project limits and/or release flows to outside the project limits. When the project design is likely to change historic flow patterns or release volumes, it is necessary to negotiate with adjacent owner agencies for the revised conditions. In this situation the owner is usually in a better position to manage the risk. Ideally, MOUs or intergovernmental agreements should be developed to define off-site drainage requirements for the Design-Builder.

Permanent Water Quality (PWQ) requirements are continually evolving and are frequently difficult to define and assess. As a result, PWQ is often a high-risk item for the Design-Builder. CDOT has ultimate responsibility for any water that is treated from their ROW, therefore, a prescriptive approach to water quality Technical Requirements that the Design-Builder can rely on minimizes contingency pricing by the Design-Builder. Design-Build delivery then allows the Design-Builder to propose more maintenance-efficient and effective alternative systems.

Third-Party Involvement:

In general, third-party involvement can be most effectively managed by the owner. Railroad companies, the Federal Highway Administration, public utilities commissions, adjacent jurisdictions, funding partners, and other third parties often have established relationships with the owner that the owner can benefit from. In particular, third-party agencies that have contributed funding to the project usually participate in the owner's project management organization and decision-making process. In cases where the owner can clearly define processes and approval requirements, it can be beneficial to allocate some third-party risks to the Design-Builder, who is in a better position to incorporate those well-defined processes into its design and project schedule.

Chapter 4: Project Organizational Structure and Design Development

Chapter 4: Project Organizational Structure and Design Development

4.1 Project Organizational Structure

Design-Build projects are typically large projects that involve multiple agencies and stakeholders and require large project teams. For the projects to be executed efficiently it is important to set up a formalized organizational structure that defines roles, responsibilities, and decision-making authority. The specific organization for a given project may vary but the general structure is usually consistent with the structure shown in the diagram. The roles of the key individuals and groups are:

Project Director: The Project Director is the single point of authority responsible for the administration and implementation of the project. The Project Director is typically a Colorado Department of Transportation (CDOT) resident or program engineer and usually leads both the Project Management Team (PMT) and the Project Leadership Team (PLT). The Project Director is CDOT's sole contact person and addressee for receiving all communication regarding the project. The Project Director is the only person on the project team that has approval authority, and all approvals by the Project Director should be documented in writing. The Project Director provides guidance from a programmatic level and is a liaison to the Executive Oversight Committee (EOC). The Project Director has the authority to remove any team member for failure to comply with the confidentiality requirements of the project.

Project Manager: The Project Manager role is often provided on large projects. The Project Manager directly supports the Project Director in leading the project and assumes specific leadership responsibilities at the direction of the Project Director. Often the Project Manager leads the development of the design and the Request for Proposal (RFP) development and is involved in more of the intimate details of the project. As the project moves into construction, the Project Manager often leads the design and construction oversight activities, and the Project Director becomes more involved in the administration of the Design-Build contract.

Executive Oversight Committee: The EOC provides overall policy guidance for the project and the Design-Build procurement process. The EOC comprises executive level staff with representation from the CDOT Region, CDOT Headquarters, and the Federal Highway Administration (FHWA). Local governments that participate in funding the project or are within the project limits should be considered for membership on the EOC. The EOC is the project representative of and reports directly to the CDOT Chief Engineer. It is important to recognize that the EOC is empowered to make decisions on behalf of the Chief Engineer, which provides a responsiveness at the project level that is necessary to promote and support project innovation.

The EOC:

- confirms the project goals;
- confirms the release of the Letters of Interest (LOIs);
- confirms the release of the Request for Qualifications (RFQ);
- confirms the Statement of Qualifications (SOQ) Evaluation Plan;
- confirms the short-listed firms;
- confirms the Proposal Evaluation Plan;
- approves the release of the RFP; and
- presents the recommended apparent successful proposer to the Chief Engineer, who will ultimately make the final selection.

Project Management Team: The PMT provides an upper level of management on large projects. It includes key members from the PLT and is supplemented by representatives of key stakeholders, FHWA, and critical technical disciplines. The PMT should also include the CDOT NEPA Manager and CDOT legal counsel on complex projects. PMT representatives of stakeholders and local jurisdictions ensure their organization's interests are fully considered in the development of the procurement documents. The PMT provides recommendations to the EOC.

Project Leadership Team: The PLT is responsible for the day-to-day management, coordination, and development of the project and the Design-Build procurement process. The PLT comprises members of CDOT, the consultant team, local agency funding partners, and public involvement representatives. On large projects, it is often valuable to have on the team a Design-Build procurement specialist that is provided by the CDOT Region, CDOT Headquarters, or consultant team. If the project is a FHWA Project of Division Interest (PoDI), then the FHWA should be invited to provide representation on the PLT.

The PLT has final decision-making authority over the project's daily management and coordination activities. The PLT is responsible for the delivery and the development of the procurement documents, including but not limited to: LOIs, RFQs, short-list selection criteria, evaluation of SOQs ("short-listing"), RFP Documents (Books 1–4 and Reference Documents), Proposal evaluation criteria, Proposal evaluations, recommendation to the EOC naming the apparent selected proposer, and debriefs of unsuccessful proposers.

The PLT oversees and directs the activities of the technical teams and incorporates their work products into the procurement documents. The PLT is responsible to ensure all parties involved in the project are aware of and have signed confidentiality agreements. The PLT reports directly to the PMT.

Project Technical Team (PTT): The PTT comprises discipline leads that may be staff from CDOT or its consultant, depending on the availability of CDOT technical staff. The discipline leads direct, prepare, and/or assist in designing, developing, and writing the Book 2 Technical Requirements, supporting Reference Documents, standards, details, and specifications required for the RFP. Members of the PTT may serve on an evaluation board to assist in determining short-listed firms and/or the apparent successful proposer. The PTT reports to the PLT.

Figure 4-1 on the following page shows a typical organization for a Design-Build project.

4.2 Confidentiality and Conflict of Interest

During the procurement process, the project team must adhere to strict requirements that apply to all communications with submitters and third parties who are not a part of the project team. Each project team member must sign a pledge to maintain the confidential status of the RFP and any information relating to Proposals or selection of proposers. The exception is FHWA team members who are not allowed to sign confidentiality agreements. Confidentiality agreements are essential to maintain fairness and impartiality during the procurement process. The RFP development, its content, and most importantly the selection process must not be discussed outside of the project team. Additionally, all confidential documents must be kept in a secure location that is not accessible to potential proposers. It is especially important during the selection process that confidential documents are secured at a central location, and they are not to be taken from that location.

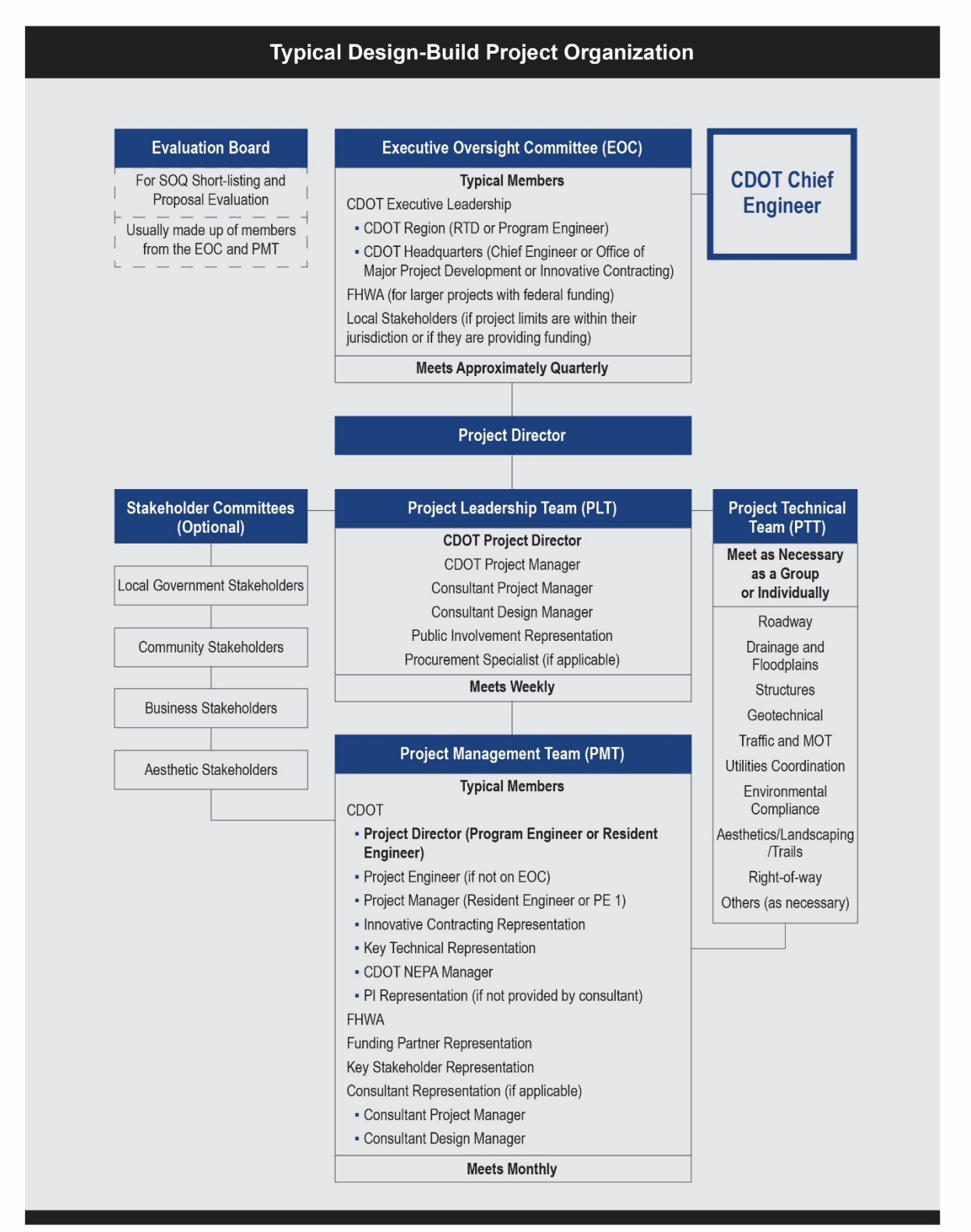


Figure 4-1. Typical Design-Build Project Organization

In order to ensure the integrity of the Proposal process, confidential information regarding the procurement process must not be divulged to any representative of any construction firm, any consultant, any member of the media, any member of the public, and any person who is not a member of the project team. Internal confidential information exchange shall be conducted only as necessary to conduct the procurement process. When information is released to proposers, it is important that the information is released to each competing proposer simultaneously and uniformly, thus ensuring that no one proposer gains a competitive advantage over another.

4.3 Procuring a Design Consultant

Given the level of effort that is required of the owner's team, both in the procurement phase and the implementation phase of the project, CDOT often procures the services of a program management consultant team. The consultant team can provide expert support in the following activities:

- Project goal setting
- Project Delivery Selection Matrix (PDSM) facilitation
- Design development
- Development of RFQ, RFP, and Contract Documents
- Supporting the procurement phase of the project
- Supporting the implementation (construction) phase of the project

Consultants can be procured either separately for the procurement and implementation phases of the project or under a single contract that issues separate consecutive task orders for the procurement and implementation phases of the project.

Care should be exercised to ensure there is no conflict of interest with any members of the consultant's team. The state Design-Build regulations specifically prohibit consultants participating on both the owner's team and the Design-Builder's team. Per 2 CCR 601-15, Section 7, members of the Design-Build team are prohibited from having any involvement in the development of:

- the scope of work of the project,
- the RFQ or RFP for the project, and
- more than 20 percent of the preliminary design of the project.

If there is any question of potential conflict of interest, then the consultant should formally petition CDOT for a determination prior to pursuing a role on the project. If it is determined to use a program management consultant on the CDOT team, then it is in the best interest of both CDOT and the industry to procure the consultant early in the process to minimize potential conflicts of interest and provide consultants that are not selected for the role the best opportunities to pursue positions on Design-Build teams.

4.4 Design Development

Design development for Design-Build projects is a distinctly different process than for Design-Bid-Build (D-B-B) or Construction Manager/General Contractor (CMGC) projects. In D-B-B and CMGC, the designer is working directly for the owner, whereas in Design-Build the designer works directly for the contractor. It is important to recognize that not having a direct contractual relationship with the designer does not exclude the owner from the design process in Design-Build projects. In fact, in the most successful Design-Build projects, the owner is intimately involved in the design development from the initial development of the project, through the procurement phase of the project, and throughout the implementation phase of the project to its completion.

Figure 4-2 illustrates the design development process.

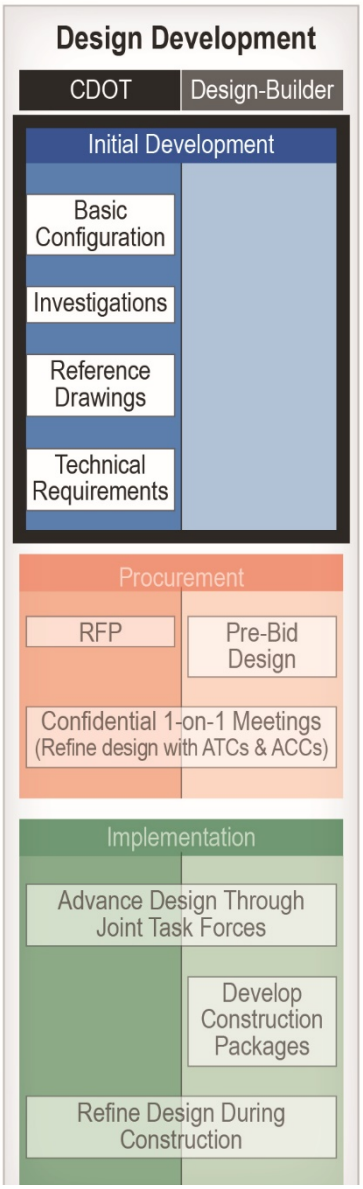


Figure 4-2. Design Development

Initial Development: The development is initiated by the owner, who defines the scope of the project with the Basic Configuration. The owner also undertakes on-site investigations to gather information needed to define project requirements and allocate risk. These usually include utility and geotechnical investigations, examining existing drainage and maintenance problems, and so forth. The design then advances to the preliminary design stage during which Reference Documents (including the preliminary plans) and Technical Requirements are developed. The focus of this phase of the design development is to:

- ensure the project scope and requirements are well defined and reflect the project goals;
- ensure the project is constructible within the identified budget;
- provide necessary data, investigations, and analyses to proposers; and
- advance the design as necessary to properly identify, manage, and allocate risks, such as Right-of-Way (ROW), environmental compliance, and so forth.

The NEPA process needs to be carefully addressed in the initial project development phase. The project team needs to understand and distinguish which elements of NEPA are to be completed by CDOT (and when), and which elements of NEPA are the Design-Builders responsibility. NEPA processes can have a significant impact on the project schedule.

Procurement: The design is then refined by the proposers in the procurement phase. The owner maintains involvement in the design process during this phase through one-on-one meetings with proposers. Often there is a perception that in Design-Build, the procurement phase's only purpose is to select the Design-Builder for the project. Although that is a primary objective of the process, there is also significant advancement of the design throughout the procurement phase that is critical to setting the direction of the final design that follows selection. The procurement phase of the project needs to

be properly structured and allow enough time to foster design development, which leads to innovative designs that benefit the project. This process is elemental to the advantages of Design-Build delivery. The procurement process is described in detail in Chapter 5.

Implementation: After selection of the Design-Build proposer is finalized, the design is further developed through a collaborative process between the owner and the Design-Builder. This is usually accomplished by establishing design task forces through which the Design-Builder and the owner collaborate on project-related specialties such as environmental compliance, drainage, traffic management, public relations, roadway and structure design, and so forth. In the most successful projects, the owner's involvement in the design during the implementation phase goes beyond design reviews and approvals to working together with the Design-Builder to develop design refinements that benefit both parties. Because the owner maintains Acceptance authority over the design, it is most efficient for the owner to provide immediate feedback and guidance at design task force meetings in order to assure that expectations for design Acceptance are known prior to any official submittal of any contract deliverables. The implementation process is described in Chapter 8.

4.4.1 Organization of Design Documents

The organization of the design documents in Design-Build delivery varies significantly from other methods of delivery such as D-B-B and CMGC. In D-B-B and CMGC, the design is completed to 100 percent by the owner and presented in the design plan drawings and details and the technical specifications (CDOT Standard Specifications, Standard Special Provisions, and Project Special Provisions). In Design-Build there is a need to specify both the design work and the construction work in the RFP, which becomes the contract for the selected Design-Builder. Therefore, the RFP must include all of the binding requirements of both the design and construction processes within its provisions. The RFP also needs to communicate the design development that has been performed in advance by the owner, as it will form the starting point for the Design-Builder's design development.

After selection of the Design-Builder for the project, the design is advanced to its completion. The design documents that are developed during the implementation phase typically fall into five categories:

1. Preliminary design plans, which formalize the preliminary design of the project.
2. Released for Construction (RFC) Documents, which direct the construction of the project.
3. Notice of Design Changes (NDCs) and Field Design Changes (FDCs), which provide revisions to the RFC Documents as the design is further refined throughout the construction.
4. Final Design Documents, which are submitted to obtain CDOT's formal Acceptance of the project design.
5. As-Built Documents, which are submitted to obtain CDOT's formal Acceptance of the project construction.

Additional discussion of design development in the implementation phase of the project is provided in Chapter 8.

Structure of RFP and Design-Build Contract:

Table 4-1 on the following page summarizes the elements of the RFP and Design-Build contract.

Table 4-1. Design-Build Documents

Book 1 – Contract	
Book 1 is the overriding Contract that governs the design and construction of the project. Key elements of the book include:	

• Contract Terms
• Defined Terms
• Warranties
• Equal Employment Opportunity/Disadvantaged Business Enterprise
• Bonding
• Insurance
• Payment
• Project Schedule
• Completion and Milestone Dates
	• Processes and Procedures
	  o Dispute Resolution
	  o Change Management
	  o Partnering
	  o Third-Party Cooperation
	  o Audit and Inspection Rights
	  o Incentives and Disincentives
	  o Value Engineering

Book 2 – Technical Requirements	
Book 2 provides the project-specific Technical Requirements of the project, including design criteria, methodology, and deliverables; project-specific construction requirements; and operational requirements. Book 2 is divided into 20 sections:	
01. General (includes the Basic Configuration) 02. Project Management 03. Quality Management 04. Public Information 05. Environmental 06. Third-Party Agreements 07. Utilities 08. Right-of-Way 09. Survey 10. Geotechnical and Pavements	11. Earthwork 12. Drainage 13. Roadways 14. Signing, Pavement Marking, Signalization, and Lighting 15. Structures 16. Transportation Management Plan 17. Landscaping 18. Maintenance during Construction 19. Intelligent Transportation System 20. Modification of Standard Specifications
Book 3 – Applicable Standards, Data and Reports	**Book 4 – Contract Drawings**
Book 3 includes documents such as CDOT design guides, American Association of State Highway & Transportation Officials (AASHTO) design standards, *Manual on Uniform Traffic Control Devices* (MUTCD), local design standards, CDOT M & S standards, CDOT construction and materials manuals.	Book 4 contains drawings that are considered to be contractually binding. Typical Contract Drawings include ROW Plans, architectural plans and details, geotechnical boring logs, and binding third-party plans and details.
Reference Documents	
Reference Documents are nonbinding plans, details, reports, and investigations related to the project. Elements of Reference Documents can become binding to the extent that they are referenced to in the Contract Document. Reference Documents communicate the design development done by the owner. Reference Documents typically include:	
• Preliminary Plans and Details • Preliminary Phasing Scenarios • Preliminary Drainage Reports	• Surveys (if not in Book 3 or 4) • Preliminary Geotechnical Recommendations • NEPA Documents (EA, EIS, FONSI, ROD)

As shown in Table 4-1, the Design-Build documents are organized into four books and Reference Documents. Each of the books is an essential part of the contract, and a requirement occurring in one is as binding as a requirement occurring in all. The books are intended to be complementary, but as they are Contract Documents it is important that there be an order of precedence, as follows:

1. Book 1 – Contract, as executed by CDOT and the Contractor
2. Book 2 – Technical Requirements

3. Book 3 – Applicable Standards, Data and Reports
4. Book 4 – Contract Drawings
5. Proposal Documents, to the extent they meet or *exceed* the requirements of the other Contract Documents. In other words, if the Proposal Documents include statements that can be contractually interpreted as commitments to provide higher quality, scope, or value or to perform additional services to the benefit of CDOT, then they are contractually binding.

Reference Documents are provided to support the Contract Documents. They are not binding contractual documents, but they communicate the design development that has been done to date by the owner.

4.4.2 The Basic Configuration

The Basic Configuration defines fundamental parameters of the project, and it is a critical provision in the Contract Documents. The Basic Configuration is described in the RFP in Book 2, Section 1. Unlike the project description, which is furnished to the proposers as information, the Basic Configuration is a contractual obligation to which the Design-Builder must conform. The Basic Configuration describes the scope of the improvements and elements that at a minimum must be included in the Proposal by a Design-Build team. It should provide a concise but complete description of the scope of the construction work of the project. The Basic Configuration is generally a narrative description and not a set of plans, exhibits, or technical documents.

The Basic Configuration combines with the technical provisions of the RFP to fully define the project. Generally, the Basic Configuration describes what is to be built, and the technical provisions describe how it is to be designed and constructed.

The essence of writing the Basic Configuration is finding the appropriate balance between maintaining sufficient control over the basic design and allowing enough room to incorporate innovative ideas from the proposers. The owner should have a good understanding of project goals and risk allocation before developing the Basic Configuration.

The project limits should be defined in the Basic Configuration. The project limits are typically defined by the limits of the owner's ROW. ROW acquisition is typically best performed by the owner with the goal of developing a footprint in which the Basic Configuration can be constructed. Then the proposers can assess any needs and risks of additional ROW acquisitions to accommodate their specific designs.

The project limits are also important with regard to environmental clearances. The project limits should ensure that the environmental footprint of the construction does not exceed that of the environmental decision document.

Conceptual horizontal and vertical alignments are often provided (or referenced) with the Basic Configuration. The Basic Configuration defines ranges of acceptable alignments to provide flexibility while ensuring that the facility aligns with adjacent facilities, environmental requirements, and long-range corridor plans.

Critical project components, such as interchanges, on- and off-ramps, and number of lanes, often are included in the Basic Configuration.

The Basic Configuration also can be performance based, requiring defined traffic operations and accessibility to certain locations rather than specifying the number of lanes and location of interchanges (e.g., meeting specific Levels of Service, based on the approved 20-year traffic forecast).

However it is defined, the Basic Configuration is the foundation of the project scope of work and its elements may not be omitted, altered, or substituted in a Proposal without approval by the EOC.

The Basic Configuration should be defined in such a way as to give the Design-Build team leeway to make design adjustments that provide cost or schedule advantages while maintaining compliance with project goals, objectives, criteria, and other contract requirements. The "envelope" described by the Basic Configuration provides the Design-Build team the flexibility to modify the preliminary design developed by the owner, which is important in transferring the ownership of the design from the owner to the Design-Build team. In writing the Basic configuration, the owner should avoid imposing unnecessary controls over the design that may lay liability for design defects on the owner and limit the Design-Builder's flexibility for innovation.

An example of a Basic Configuration is provided in Figure 4-3.

1.1 Project Description

The project is located on I-25 in northern Colorado Springs, starting at Pine Creek and proceeding north to the Monument Interchange. The project involves the widening of the I-25 corridor to six (6) through lanes, plus auxiliary lanes, from the Pine Creek Bridges north to the existing concrete pavement, with a twelve (12) foot outside shoulder and a twelve (12) foot inside shoulder and eight (8) foot outside shoulder adjacent to auxiliary lanes. Additional paving will be required north of the existing concrete pavement for the NB lanes.

1.2 Basic Configuration

The Basic Configuration is defined as work within the ROW that is required to conform to the eight (8) lane configuration and six (6) lane configuration of I-25 north of Colorado Springs and typical sections at selected locations, as shown in the Basic Configuration Exhibit. The Basic Configuration is further defined as follows:

1. Lane Configuration:
    a. From Pine Creek to Interquest Parkway
        i. Three 12ft. travel lanes
        ii. 12-ft. inside shoulder (future HOV lane), 12-ft. outside shoulder without auxiliary lanes
        iii. Auxiliary lanes with 8-ft. outside shoulder
    b. Interquest Parkway to Monument Interchange
        i. Three 12ft. travel lanes
        ii. 12-ft. inside shoulder and 12-ft. outside shoulder
2. Any structures constructed shall conform to the eight (8) lane configuration or the six (6) lane configuration as shown in the Reference Documents.
3. Improvements to the I-25 / Northgate Interchange on- and off-ramps
    a. Eliminate loop ramps
    b. Convert to diamond interchange with signalized intersections. The proposed ramps shall be compatible with the proposed action of the I-25 Environmental Assessment (EA)

Figure 4-3. Basic Configuration Example

4.4.3 Preliminary Investigations

Preliminary investigations are important elements of the design. They provide the information to proposers that is necessary for them to perform their Proposal design. Preliminary investigations also reduce project risk for both the owner and the proposers, and as result they support an aggressively priced project. Results of preliminary investigations can be incorporated in Book 3 (Applicable Standards, Data and Reports), Book 4 (Contract Drawings), or the Reference Documents. Because a primary purpose of the investigations is to reduce risk, it is beneficial for the results of the investigations

to be put in Book 3 or Book 4, whenever possible, so that the proposers are entitled to rely upon the information; however, if the information must be validated or is specific to the Basic Configuration only, it is more appropriate to put it in the Reference Documents. The need for preliminary investigations should be based on the risk assessment process discussed in Chapter 3. Some common preliminary investigations are:

- Design Surveys: These are necessary to provide a database for the Proposal designs. If design surveys are not performed by CDOT, then the effort will be duplicated by all proposers simultaneously during the procurement period and also may not be completed adequately to support strong and accurate Proposal designs. Design surveys should be supplemented with as-built information on existing facilities.

- Geotechnical Investigations: The basic geotechnical information necessary to design pavements (if applicable), bridges, and retaining walls reflecting the Basic Configuration should be completed and provided to proposers. Geotechnical information need only include the boring logs and test results and should be included in Book 4. If geotechnical recommendations are provided, they should be separated out from the basic data and provided in the Reference Documents for information only.

- Utilities Investigations: Utilities coordination and relocations almost always have the potential to be a major risk on transportation Design-Build projects. A strong investigation program performed by the owner in advance of the procurement significantly reduces risk potential and helps the proposers to give CDOT the best technical and price proposals possible.

- Environmental Investigations: Additional environmental information is often necessary to reduce risks for both the owner and the Design-Builder. In particular, Hazardous Materials Investigations should be conducted to identify the best approach to minimize and/or allocate hazardous materials risk. At a minimum, investigations should be performed to accurately characterize the nature and locations of any hazardous materials. Additional site investigation to accommodate potential project Permanent Water Quality (PWQ) features may also be warranted.

Preliminary investigations are further discussed in Chapter 7, “Structure and Content of the Request for Proposal.”

4.4.4 Design Development of the Reference Documents

CDOT’s design development leading to the procurement process is primarily presented in the Reference Documents. The Reference Documents typically include preliminary plans and design reports. It is important to understand that the Reference Documents are for information only and do not dictate design requirements to the Design-Builder. Similarly, the Design-Builder is not entitled to rely on any designs that are provided in the Reference Documents.

The reason for segregating the owner’s advance design effort in this manner is to clearly define the legal design responsibilities for the project. Design-Build delivery seeks to allocate the primary design responsibility solely to the Design-Builder. Wherever the design responsibility is shared, the professional liability associated with that design (and any errors and omissions) can be difficult to assign. For example, if the owner requires a specific horizontal or vertical alignment that is out of compliance with design criteria, or that requires the design of an associated element of the project to be out of compliance, then the owner shares the professional liability associated that substandard product.

Though they are nonbinding, the Reference Documents serve important purposes. They communicate the intent and expectations of the owner with regard to the project design, and as such they provide valuable insights to the proposers, whose designs are in turn evaluated by the owner as a part of their Proposals. The Reference Documents also provide the proposers with a starting point for their further advancement of the design during the Proposal phase of the project, significantly reducing the need to duplicate the design development performed by the owner prior to the Proposal phase of the project.

Sometimes it is valuable to invoke certain elements of the Reference Documents into the project contract through Book 2 – Technical Requirements. A common example is to incorporate roadway typical sections shown in the Reference Documents into the Contract Documents. Another example is invoking certain elements of the NEPA documents (when they are included in the Reference Documents instead of Book 3). When elements of the Reference Documents are invoked into the contract by reference they are as binding as the section of the contract in which they were referenced. Rather than citing the Reference Documents, the preferred way of incorporating elements of the Reference Documents into the Contract Documents is by creating separate exhibits that are included in the relevant sections of Book 2. That approach avoids confusion over which elements of the Reference Documents are binding.

To maximize the efficiency and effectiveness of the procurement process, it is important to release as much of the information generated during the initial design development phase of the procurement process as possible through the Reference Documents. There may be rare exceptions of confidential documents related to politically sensitive issues or third-party considerations, but for the most part the more information that is provided to the proposers the better they can develop designs and Proposals that maximize their ability to fulfill CDOT's goals for the project. The proposers are not entitled to rely on the Reference Documents and have the responsibility for validating the information, which enables the approach of full disclosure.

The level to which the design development should be advanced is very dependent upon the specific nature of the project and the associated risk. The owner must provide enough of the preliminary design for the project to ensure that the project scope is sufficiently characterized (through the Basic Configuration), to ensure constructability, and to minimize risks for proposers and for the project as whole. Although it may seem logical to advance the entire preliminary design to a set percentage of design (such as 30 percent), such an approach does not respond to the objectives of pre-procurement design development in Design-Build delivery. Each element of the project must be examined to determine how much design needs to be completed to convey the scope while not placing undue risk on the Design-Builder for design. The best RFPs contain elements with varying levels of design as necessary to define the scope of work and manage the risk. The goal is to convey the project's scope to the proposer with a minimum level of design so that the proposer may create an innovative design and be fully responsible for any errors and omissions in the end product.

The Design-Build Institute of America (DBIA) addresses the level of design development:

> Procurement documents need to address line and grade development in a manner that allows flexibility with ROW, environmental, storm water facilities, utility impacts and other project characteristics without advancing the design to a level that stifles innovation and best value. Utilizing this approach can stimulate the benefits of competitive design creativity which drives design-build delivery. A defined set of line and grade documents will provide sufficient detail to define the project footprint, horizontal and vertical alignment, proposed bridge and retaining structures, required

> environmental mitigation, ROW and utility impacts while still allowing for best-value procurement that achieves maximum benefit from the use of design-build delivery.[2]

The level of design development required prior to issuing the project RFP should flow out of a risk assessment and the initial completion of the Risk Register, as described in Chapter 3. Some common design elements that often need to be advanced are:

- Utilities coordination and agreements: These are based on the Basic Configuration to minimize the significant risks associated with utilities relocation schedules and costs.
- Third-party designs and requirements: CDOT is typically in a better position to manage third-party risks and to advance third-party coordination to provide definitive requirements in the RFP (i.e., intergovernmental agreements and/or third-party review commitments and protocols).
- Railroad designs and agreements: Railroad approvals and agreements are often subject to a high degree of uncertainty and risk. CDOT is typically in the best position to advance railroad designs, approvals, and permitting so that railroad-related requirements are not in the critical path of the project schedule. Railroad coordination is most often to some degree a shared risk.
- Pavement type selection: Industry sensitivity to pavement types, life cycle cost analysis, and related processes often make it impractical to allow the Design-Builder to take on pavement design.
- Master drainage report (conceptual), including drainage crossing hydrology and hydraulics: This eliminates the need for proposers to duplicate costly and time-consuming efforts in the procurement phase.
- PWQ: It is often beneficial to address the uncertainty of Municipal Separate Storm Sewer System (MS4) compliance by providing preliminary designs for default systems and facilities.
- Environmental permitting: In some cases, the permitting process can be advanced more effectively by CDOT than by the proposers during the procurement to minimize environmental agency approval risks.

The NEPA process should be considered when advancing the design development. NEPA regulations dissuade developing the overall design of the project to more than 30 percent prior to the completion of the NEPA decision document.

4.4.5 Right-of-Way Acquisitions

In the majority of Design-Build projects, the owner acquires the ROW necessary to construct the project. The design development needs to be advanced as necessary to allow for the preparation of ROW Plans and to complete the subsequent acquisition processes.

The ROW Plans usually provide the contractually binding limits of the projects, and are included in Book 4 – Contract Drawings.

4.4.6 Design Development of the Technical Requirements (Book 2)

As design development for the project advances with the development of the preliminary plans, it becomes important to concurrently begin drafting the Technical Requirements. Both of these key aspects of the owner's design development need to be well advanced for inclusion in the Draft RFP (refer to Chapter 5). Whereas the preliminary plans are nonbinding inclusions in the Reference Documents, the Technical Requirements are the primary binding documents that tell the Design-Builder

[2] Design-Build Institute of America (DBIA), *Design-Build Done Right Transportation Sector Best Design-Build Practices* (January 2015), 3, retrieved from http://www.dbia.org/resource-center/Documents/bestpractices_transportation.pdf.

how to manage and design the project. As shown in Table 4-1, the Technical Requirements are organized into 20 sections by discipline.

Refer to Chapter 7, "Structure and Content of the Request for Proposal," in this manual for additional discussion of the Technical Requirements.

4.4.7 Cost Estimating

Cost estimating is an important part of the design development process. Most large Design-Build projects have budgetary constraints, so it is vital to ensure that the Basic Configuration can be constructed within a set budget. In addition, FHWA considers large projects of more than $500 million (year of expenditure) to be "Major Projects" that require a formal Cost Estimate Review (CER).

Many CDOT Design-Build best value Proposal formats include a Guaranteed Maximum Price (GMP) that cannot be exceeded by the proposers, requiring accurate early estimates by CDOT. Best value formats also typically include Additional Requested Elements (AREs) that require accurate estimates by CDOT to properly include in the Proposal scoring formats.

Design-Build projects do not have the luxury of having a 100 percent design completed for developing an engineer's estimate prior to the bid of the project. As a result, the project team needs to develop the means to accurately estimate the project without reliance on a detailed bid item quantity breakdown.

Parametric estimating is one methodology that is often employed to prepare cost estimates for Design-Build projects during the initial design development stage of the procurement process. This method identifies historical projects of similar character and evaluates costs of various elements of work as a percentage of core item costs for the project. Another procedure to employ is to identify the elements of the project that bear the highest costs and perform detailed estimates for those items. Developing an accurate estimate usually requires the use a combination of approaches and possibly independent review.

The use of an Independent Cost Estimator (ICE) can be a valuable tool to use to validate critical cost estimates. ICE firms perform production-level cost estimates using the same procedures that contractors employ in bidding projects. The methodology can provide a significant improvement in the level of confidence in the accuracy of the cost estimate.

Chapter 5: Design-Build Procurement Process

Chapter 5: Design-Build Procurement Process

The Design-Build procurement process is one of most important phases of Design-Build delivery. It is important to recognize that the procurement phase is much more than selection of the Design-Builder for the project. It is a pivotal step in the design development of the project. It implements a collaborative process between the owner and the Design-Builder to advance the design of the project in a manner that both maximizes the project goals and provides the most cost-efficient designs to achieve those goals. During this phase, the owner advances the project by continued development of the Basic Configuration, the Reference Drawings, and the RFP Documents that guide the design of the project, and the Design-Builder develops a detailed Proposal that further advances the project design development. Together, the owner and Design-Builder collaborate on a refined design and a Proposal that reflects the values of the owner through a series of industry review meetings and confidential one-on-one meetings. These processes, unique to Design-Build, are key elements in recognizing the advantages that Design-Build delivery can offer in providing the most efficient and timely project.

The primary steps of the Design-Build procurement process are:

Issue a Request for Letters of Interest (LOIs): Notify the industry of the upcoming procurement and define the field of Design-Builders that are interested in pursuing the project.

Issue a Request for Qualifications (RFQ): Solicit statements of qualifications and provide the industry with the basic definition of the project.

Receive and Evaluate Statements of Qualifications (SOQs): Determine the firms that can best meet the project goals and create the short list of firms to invite to participate in the Proposal process.

Issue a Draft Request for Proposals (Draft RFP): Provide proposers with a detailed near-final RFP to review and evaluate.

Conduct Industry Review Meetings: Solicit input from the industry on the Draft RFP to facilitate improvements to the RFP in response to industry concerns.

Issue a Final RFP: Provide proposers with final procurement and selection processes and final Contract Documents that govern the design and construction of the project.

Conduct Confidential One-on-One Meetings: Collaborate with potential Design-Builders to refine the design through development of proprietary Alternative Technical Concepts (ATCs), or allow them to modify the Basic Configuration with proposed Alternative Configuration Concepts (ACCs).

Requests for Clarification (RFC) and Addendums: Provide additional clarifications of the RFP Documents and make modifications to the RFP by issuing addendums.

Receive and Evaluate Proposals: Select the Design-Builder for the project.

The procurement process is illustrated in Figure 5-1 and detailed further in Figure 5-2.

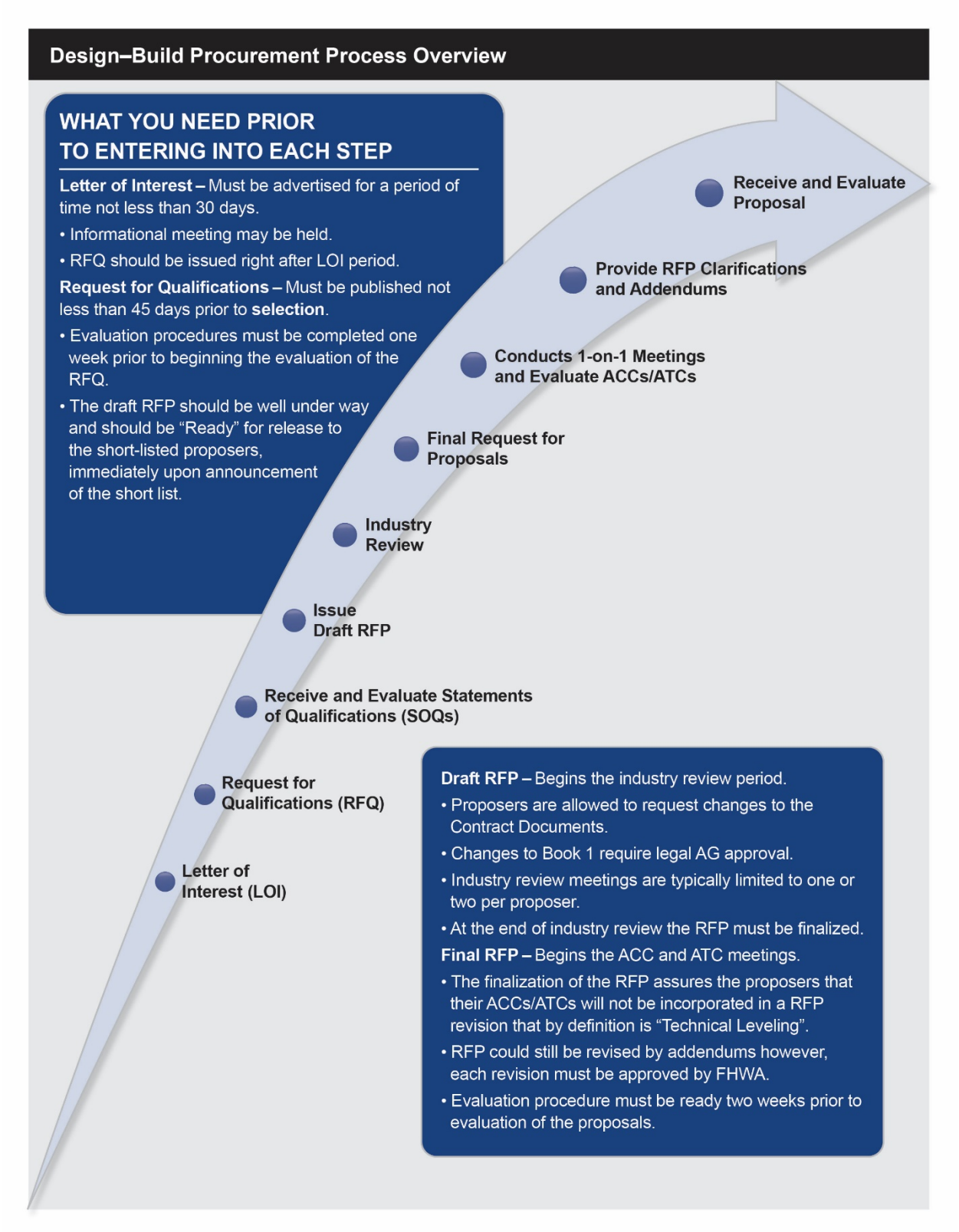
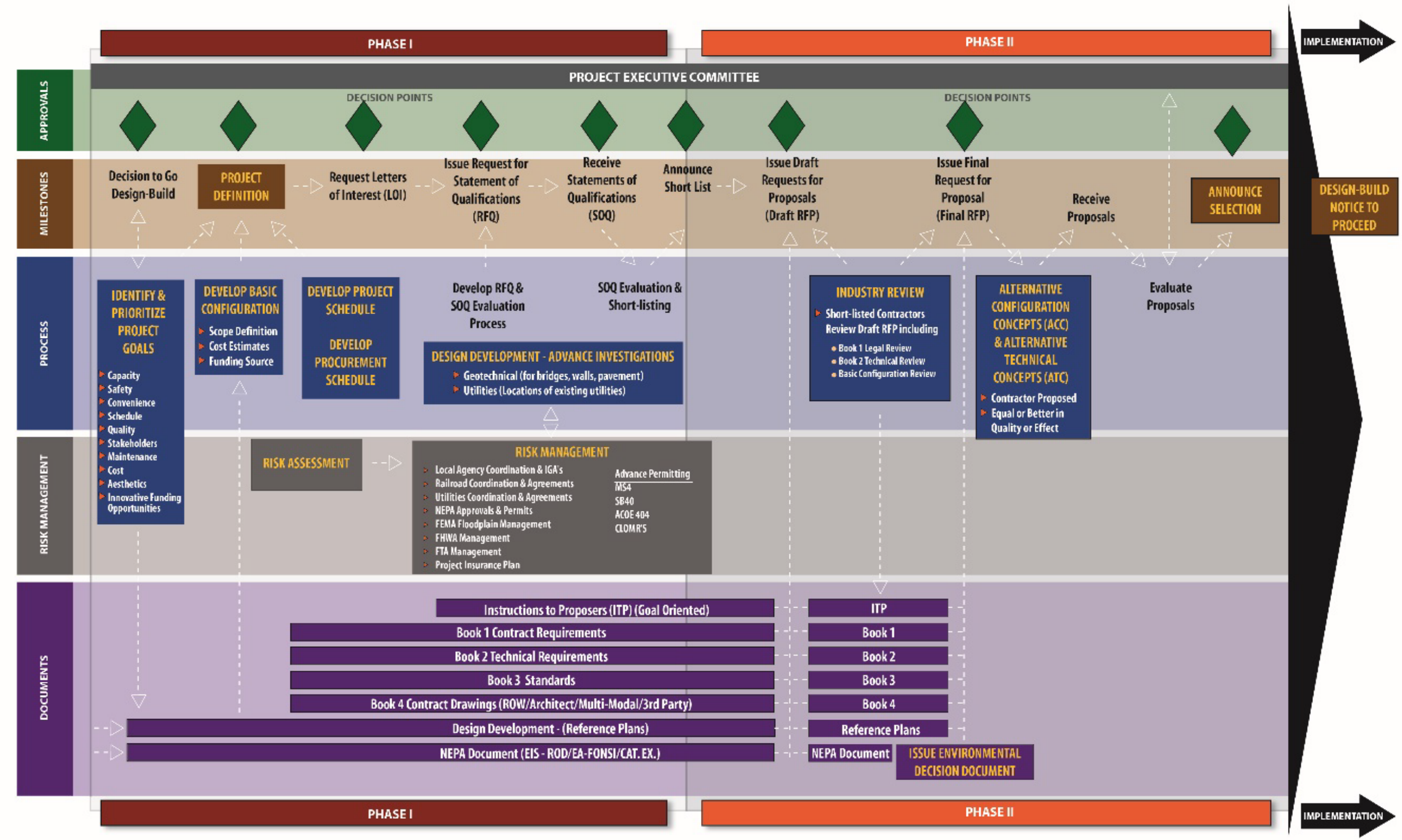


Figure 5-1. Design-Build Procurement Process Overview



DESIGN-BUILD PROCUREMENT PROCESS

Figure 5-2. The Two-Phase Design-Build Procurement Process

The process as outlined is a two-phase selection procedure in that it involves an SOQ and short-listing phase before the Proposal phase. This process should be followed for most Design-Build projects of significant size and complexity. The Colorado Department of Transportation (CDOT) also allows a Streamlined Design-Build (SDB) process that does not include the short-listing phase but instead goes directly to the Proposal phase of the project. SDB is most appropriately used for small projects of moderate complexity with well-defined scopes. In those cases, SDB can provide significant benefits by shortening and simplifying procurement processes.

The procurement steps represent the process of selecting the Design-Builder. But the procurement phase includes many activities beyond just the procurement process. All of the activities of the procurement phase are shown in Figure 5-2. As can be seen from the diagram, an extensive work effort is necessary to support the procurement process and to simultaneously advance the project development.

A typical procurement project schedule is provided in Figure 5-3. The Microsoft Project source file for the schedule template can be found online on the CDOT Innovative Contracting web page at:

https://www.codot.gov/business/designsupport/innovative-contracting-and-design-build.

The example schedule identifies approximately a one-year timeline for the procurement process, which is generally appropriate for Design-Build projects that are $50 million or more in construction value. Though Design-Build delivery offers a strong potential to minimize the overall delivery time, it does require a significant duration for the procurement phase to recognize its benefits. Both the owner and the Design-Builder advance the project development in the procurement phase. In particular, the Design-Builders will expend about 10 percent to 15 percent of their total design effort in their Proposal designs, if time allows, which greatly benefits the project as a whole.

5.1 Request for Letters of Interest

As is customary with developing, advertising, and awarding work, CDOT publically communicates its intent to procure the Design-Build project. This communication effort informs industry partners of CDOT's intent to solicit industry Proposals, and it establishes a process and opportunity for CDOT and industry partners to begin to exchange information, gain understanding, and measure interest. CDOT's initial release of information is prepared in a formal notice to the industry as a request for LOIs. For Design-Build projects this request is advertised by being published for a period of not less than 30 days in a newspaper of wide circulation, such as the in the *Construction Daily Journal,* weekly throughout the 30-day period. To economize the effort, the advertised notice is brief and refers to the detailed request for LOIs, which is made available online.

An example of a request for LOIs is shown in Figure 5-4, and a source file template request for LOIs is available in the online Appendix of this manual on the CDOT Innovative Contracting web page or by contacting CDOT Innovative Contracting. The request for LOIs shall be prepared on official CDOT letterhead paper and, at a minimum, should include the following information:

- a brief description of the project,
- the approximate construction value,
- the project goals,
- the schedule for the procurement process,

- CDOT's anticipated date to issue the RFQ, and
- the specified cut-off date by which interested firms must submit Statements of Interest (SOIs).

An informational meeting may be conducted by CDOT to provide an opportunity for firms to ask questions and for CDOT to clarify project information and the procurement process. If the project team intends to hold an informational meeting, then the date, time, and place of the meeting should be included in the request for LOIs.

LOIs can be mandatory or optional, to be determined on a project basis. Mandatory LOIs can provide the project team with a better understanding of the industry interest in the project, but they can also be misleading when they include responses from Contractors that may not be likely to pursue the project.

Authorization of the letter content and approval to release should be obtained from the Executive Oversight Committee (EOC).

Typical Design-Build Procurement Schedule

May 20, 2015

ID	Task Name	Duration	Start	Finish	Predecessors
1					
2	**Executive Committee**	**205 days**	**Thu 1/1/15**	**Thu 10/15/15**	
3	Approve Project Goals	0 days	Thu 1/1/15	Thu 1/1/15	
4	Approve Request for LOIs	0 days	Thu 1/1/15	Thu 1/1/15	
5	Approve Basic Configuration	0 days	Fri 2/20/15	Fri 2/20/15	
6	Approve Release of RFQ	0 days	Fri 2/20/15	Fri 2/20/15	
7	Approve Design-Builder Shortlist	0 days	Thu 5/7/15	Thu 5/7/15	
8	Approve Best Value ITP Format	0 days	Thu 5/7/15	Thu 5/7/15	
9	Approve Release of Final RFP	0 days	Thu 6/25/15	Thu 6/25/15	
10	Approve Selection of Design-Builder	0 days	Thu 10/15/15	Thu 10/15/15	
11					
12	**Procurement Process**	**255 days**	**Thu 1/1/15**	**Wed 12/23/15**	
13	Request Letters of Interest (LOIs)	0 days	Thu 1/1/15	Thu 1/1/15	4
14	Industry Review (Open Process)	70 days	Wed 1/7/15	Tue 4/14/15	18FF,13
15	LOIs due	0 days	Thu 4/9/15	Thu 4/9/15	13FF+35 days
16	Prepare Request for Qualifications (RFQs)	39 days	Thu 1/1/15	Tue 2/24/15	13
17	**Issue RFQ**	0 days	Tue 2/24/15	Tue 2/24/15	16,6
18	Proposer Prepare SOQs	35 days	Wed 2/25/15	Tue 4/14/15	17
19	Receive SOQs	0 days	Tue 4/14/15	Tue 4/14/15	18
20	Review SOQs	12 days	Wed 4/15/15	Thu 4/30/15	19
21	**Announce Shortlisted Contractors**	0 days	Thu 5/7/15	Thu 5/7/15	20,7
22	**Issue Draft RFP**	0 days	Thu 5/14/15	Thu 5/14/15	54,21FS+5 days
23	Industry Review (shortlisted Contractors)	20 days	Thu 5/14/15	Wed 6/10/15	22
24	Compile Final RFP	15 days	Thu 6/11/15	Wed 7/1/15	23
25	**Issue Final RFP**	0 days	Wed 7/1/15	Wed 7/1/15	24,9,53
26	1 on 1 Meetings & ATC Process	30 days	Thu 7/16/15	Wed 8/26/15	25FS+10 days
27	Proposers Prepare Proposals	60 days	Thu 7/2/15	Wed 9/23/15	24
28	**Receive Proposals**	0 days	Wed 9/23/15	Wed 9/23/15	27
29	Evaluate Proposals	20 days	Thu 9/24/15	Wed 10/21/15	28
30	**Award Project**	**0 days**	**Wed 10/21/15**	**Wed 10/21/15**	**29,10**
31	Contract Execution	45 days	Thu 10/22/15	Wed 12/23/15	30
32	**Notice-to-Proceed**	**0 days**	**Wed 12/23/15**	**Wed 12/23/15**	**31**
33					
34	**Design Development**	**174 days**	**Mon 10/20/14**	**Thu 6/18/15**	
35	Develop Basic Configuration	115 days	Mon 10/20/14	Fri 3/27/15	
36	Supplementary Field Investigations	60 days	Fri 1/2/15	Thu 3/26/15	
37	Risk Assessment	60 days	Thu 1/8/15	Wed 4/1/15	
38	Design Refinement (for risk allocation)	90 days	Thu 1/8/15	Wed 5/13/15	
39	Design Refinement (for AREs)	70 days	Thu 2/26/15	Wed 6/3/15	23SF+15 days
40	Utilities Coordination and Agreements	130 days	Fri 12/19/14	Thu 6/18/15	
41					
42	**RFP Development**	**105 days**	**Fri 2/20/15**	**Thu 7/16/15**	
43	Prepare Book 1 - Contract	40 days	Fri 2/20/15	Thu 4/16/15	
44	Prepare Draft Instructions to Bidders (ITP)	55 days	Mon 2/23/15	Fri 5/8/15	8FF
45	Develop Draft Book 2 - Technical Requirements	55 days	Fri 2/27/15	Thu 5/14/15	
46	Develop Book 4 - Contract Drawings	55 days	Fri 2/27/15	Thu 5/14/15	
47	Assemble Book 5 - Reference Documents	55 days	Fri 2/27/15	Thu 5/14/15	
48	Compile Draft RFP	15 days	Fri 5/15/15	Thu 6/4/15	44,45,46
49	Prepare Final RFP	30 days	Fri 6/5/15	Thu 7/16/15	48,23FF
50					
51	**Clearances**	**183 days**	**Mon 10/20/14**	**Thu 7/2/15**	
52	Environmental Clearence	180 days	Mon 10/20/14	Fri 6/26/15	
53	EA FONSI, EOS ROD, CE, etc	0 days	Fri 6/26/15	Fri 6/26/15	52
54	Interstate Access Request	145 days	Mon 10/20/14	Fri 5/8/15	
55	Local Agency Funding Commitments	120 days	Mon 10/20/14	Fri 4/3/15	
56	Intergovernmental Aggreements (IGAs)	90 days	Fri 2/20/15	Thu 6/25/15	
57	CDOT 128 Clearance	0 days	Thu 7/2/15	Thu 7/2/15	
58	Right of Way Acquisition	300 days	Mon 10/20/14	Fri 12/11/15	

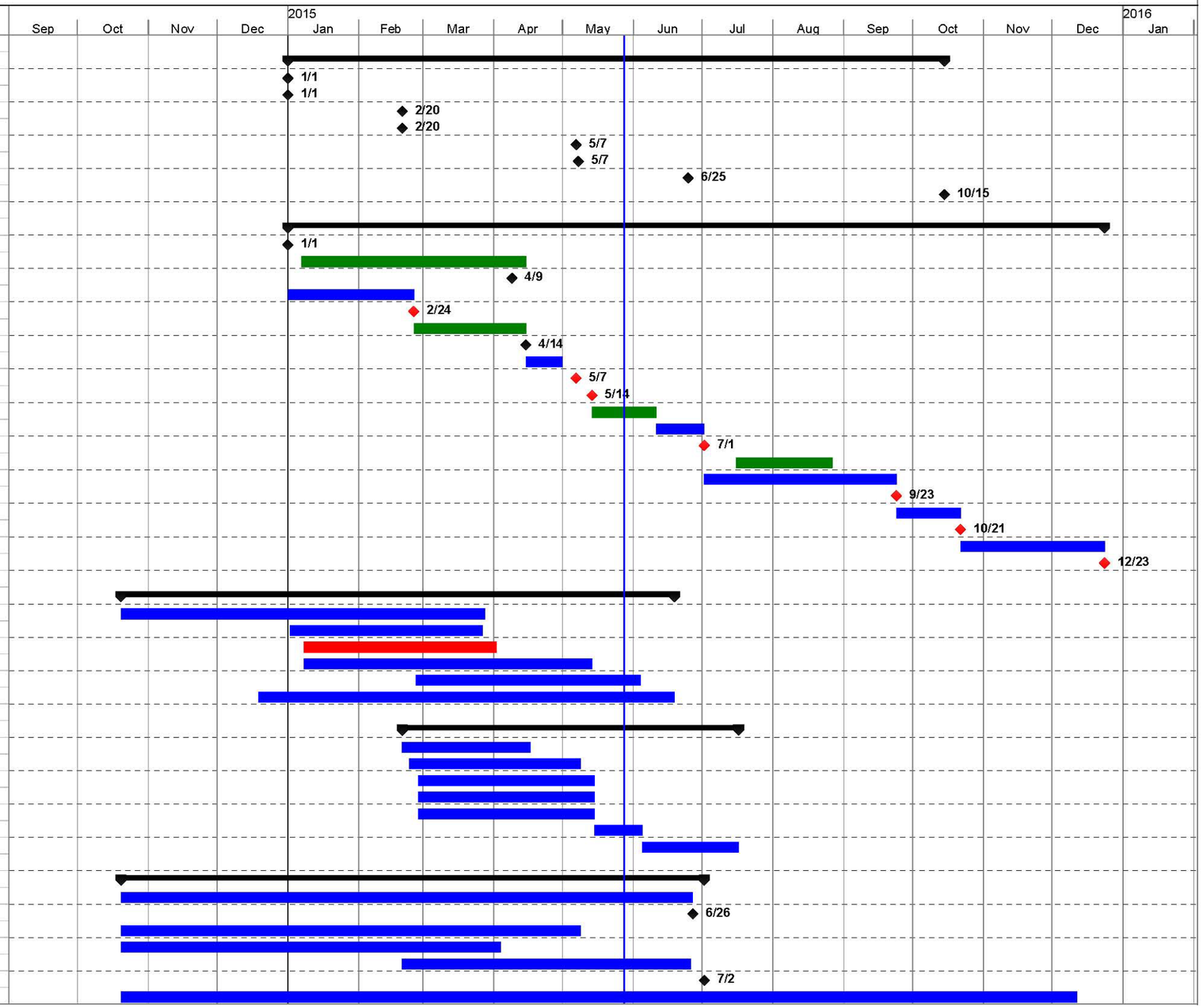


Figure 5-3. Typical Design-Build Procurement Schedule

STATE OF COLORADO

COLORADO DEPARTMENT OF TRANSPORTATION
Region Two – North Program
1480 Quail Lake Loop (2170) (CFR Plus)
Colorado Springs, Colorado 80906
(719) 634-2323 / Fax (719) 227-3298

DEPARTMENT OF TRANSPORTATION

Date: January 6, 2014

Request for Letters of Interest for Design-Build Services
I-25/Cimarron Interchange Design-Build Project

The Colorado Department of Transportation (CDOT) is proposing to reconstruct the I-25 over Cimarron Street (US 24) Interchange and is soliciting Letters of Interest from companies or teams interested in providing Design-Build Services for the project.

The purpose of the project is to provide enhanced operations and correct existing safety and design deficiencies for both the interchange and the I-25 mainline in the immediate vicinity of the interchange, and to serve the anticipated short term and long term travel demands in the area. The design-build budget for the project is estimated to be in the range of $65 million to $85 million.

CDOT has determined that design-build delivery provides the best process to complete the design and construction of the project.

The prioritized goals for the project are:

1. Maximize overall safety, capacity and operation of the interchange and the surrounding transportation network within the project budget.
2. Complete project construction to be fully operational before July 1, 2017.
3. Minimize impacts and inconvenience to the community, motorists, businesses, downtown and the public during construction.
4. Achieve an aesthetically-pleasing design compatible with current and future amenities and enhancements in and around the interchange.

Procurement Process

A Request for Qualifications will be sent to those companies or teams submitting a Statement of Interest containing the Information required below.

After evaluation of the Statement of Qualifications from prospective design-build teams, CDOT will establish a short list of eligible teams. A Request for Proposals (RFP) will be sent to those teams, and submittals will be evaluated using best-value criteria. The RFP will include a conceptual design and will encourage innovation from the private sector to maximize the project scope delivered.

Figure 5-4. Example Request for Letters of Interest (LOIs)

The approximate anticipated schedule for the project procurement is:

Request for Qualifications:	March/April 2014
Statements of Qualifications Due:	April/May 2014
Shortlisted Design-Build Teams Announced:	May/June 2014
Draft RFP Issued:	May/June 2014
Final RFP issued:	July/August 2014
Proposals Due:	September/October 2014
Notice of Award:	October to December 2014
Notice to Proceed:	December 2014 to February 2016

Statements of Interest must be sent by registered mail, Federal Express, UPS or a similar delivery method that furnishes proof of having been received by CDOT no later than 3:00 pm Thursday, February 20. Letters of Interest that are sent via email or fax will not be accepted.

Please address Statements of Interest to:

Lesley Mace, Project Manger
I-25/Cimarron Interchange Design-Build Project, SA 19039
1480 Quail Lake Loop
Colorado Springs, Co 80906

The following must be included in the Statements of Interest:

1. Title: Statement of Interest for the I-25/Cimarron Interchange Design-Build Project
2. Company or team name
3. Contact Person
4. Address, phone, fax and email information

Only those firms submitting a Statement of Interest meeting the above requirements will receive a Request for Qualifications. Letters of Interest will also be used to compile a list of interested companies for any notices and announcements relating to this project. Conceptual design data and reports will be made available via the project website:

www.coloradodot.info/projects/i25cimarron8thDB

Figure 5-4. ***(continued)***

5.2 Phase 1—Request for Qualifications, Statements of Qualifications, and Short-Listing

The RFQ process is the first phase of the two-phase procurement process for Design-Build delivery. It is a formal and structured process that must comply with federal regulations, state statutes, and the Code of Colorado Regulations (refer to Chapter 1 in this manual for a discussion of the Design-Build regulations). The RFQ asks interested submitters to provide an SOQ in response to criteria defined within the RFQ. The RFQ should not be issued until the completion of the 30-day minimum duration allowed for LOIs, and the RFQ should be published at least 45 days prior to the SOQ submittal date.

SOQ submitters should be offered opportunities for one-on-one meetings with CDOT after the release of the RFQ. One-on-one meetings can be very valuable to the submitters for clarifying the project goals and needs to be addressed in the CDOT project. The meetings are most valuable when the CDOT project team freely interacts with the submitters, as opposed to following a rigid outline of predetermined acceptable information to release. The meeting should start with a briefing from CDOT that is consistent across all meetings. Care should be taken to ensure that contradictory information is not provided. These meetings are not confidential as the RFQ is still under development, therefore the sharing of proprietary information from potential submitters should be discouraged during this phase of the procurement. Meeting notes should be taken by the CDOT project team to document the discussions, but as the meetings are informal and the information provided is nonbinding, the meeting notes should not be issued to the submitters.

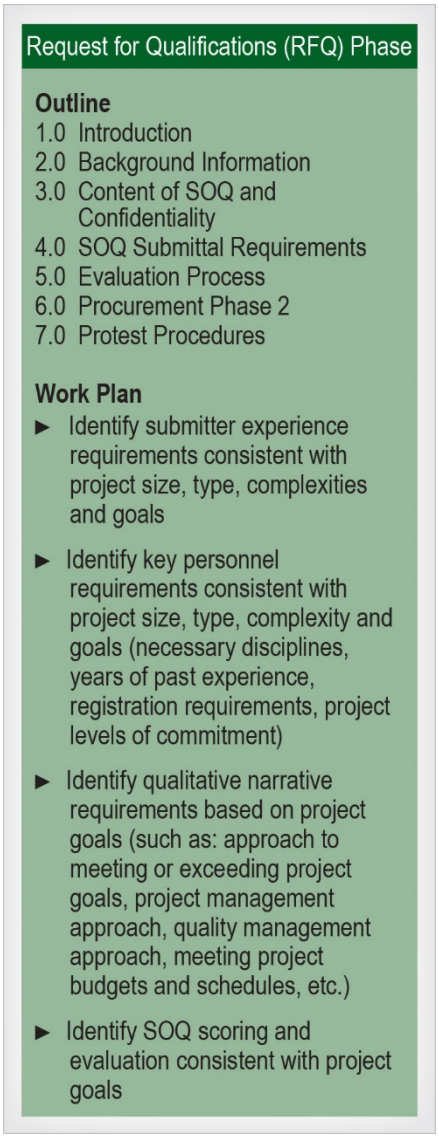


Figure 5-5. RFQ Elements

The key elements of the RFQ and the work plan that the project team needs to perform to develop the RFQ are summarized in Figure 5-5 above. A typical RFQ and the word source file RFQ template are available in the online Appendix on the CDOT Innovative Contracting web page or by contacting CDOT Innovative Contracting.

5.2.1 Development and Structure of the Request for Qualifications

RFQ development is an important part of the procurement phase process. A well-thought-out, well-written RFQ facilitates a short-list determination that is based on how well the Design-Build team can meet the goals of the project and incorporate the unique attributes of the project. Though RFQ examples and templates are provided as a part of this manual, the RFQ must be developed specifically for each project. The appropriate selection of short-listed Design-Builders directly affects the success of the project. The release of the RFQ must be approved by the EOC.

Structure of the RFQ:

As with all of the elements of procurement phase, the RFQ should focus on the project goals. The goals should guide the scores awarded to submitters based on the qualifications and experience of the Design-Builder and the merits of the technical and management narratives.

The RFQ should clearly communicate to the submitters that the way SOQs respond to meeting the project goals is a key element of the evaluation.

The amount of information required from submitters and the page limits and organization of the SOQ should be well thought out and clearly communicated to the submitters. Overly extensive SOQs are a burden to both the submitters and reviewers and often provide limited additional value. Page limits of approximately 25 to 35 pages, exclusive of resumes, experience descriptions, and forms, are typical for Design-Build projects in the $50 million to $250 million range. Page limits for projects under $50 million should be limited to about 15 pages.

The typical sections of an SOQ are:

Submitter Experience: Submitter experience is provided in both the narrative of the Proposal and in accompanying forms that provide project descriptions. The RFQ typically identifies the specific types of experience to be evaluated. Some typical types of experience follow:

- Interstate highway and interchange reconstruction under traffic in urban areas
- Bridge structure replacement under traffic in urban areas
- Construction/reconstruction using innovative designs, methods, and materials
- Accelerated construction schedules
- Design-Build delivery
- Public involvement
- National Environmental Policy Act (NEPA)/environmental compliance in Design-Build

Prioritizing the types of experience can help the submitters focus on what is most important to the owner and should reflect the experience that CDOT values for the project. The types of experience should be limited to those attributes that are truly most important to successfully delivering the project. By requesting only descriptions of experience types that are most relevant to the project, CDOT gives submitters the opportunity to concisely present only their most applicable experience, and CDOT obtains a better understanding of the submitter capabilities to perform the project. The RFQ should never include a request for the submitters to detail a long list of experience types as it dilutes the amount of pertinent information they can provide to the owner to evaluate.

It is considered a Design-Build best practice to check references when evaluating a submitter's experience. A list of comment questions should be developed to ask all references, although references should also be encouraged to speak freely on all aspects of the submitter's performance on their projects.

Organization and Key Personnel: An organizational chart is typically required. Key Personnel information is provided in both the narrative of the Proposal and the accompanying resumes. Key

Personnel are team members that the submitter must commit to putting on the project. Typical Key Personnel are listed below:

- Design-Build Project Manager
- Design manager
- Construction manager
- Design-Build quality manager
- Environmental Manager
- Other Key Personnel necessary to meet unique project requirements

It is not uncommon to require the submitter to designate the engineer in responsible charge of construction on their organizational chart, as that individual will have the primary responsibility of ensuring that the project is constructed in compliance with the design and contract requirements. The organizational chart can also communicate the proposed relationships of the quality manager (who should have an independent line of authority), construction manager, design manager, and the Project Manager. Submitters can be encouraged to add, at their sole discretion, additional Key Personnel to their project team. The approach provides more latitude to the submitters to meet the challenges of the project requirements with additional commitments. Key Personnel added by the submitters are subject to the same contractual requirement as Key Personnel identified by the owner; primarily, they must be committed to the project unless a replacement is approved by the owner.

Project Understanding and Approach: The "Project Understanding and Approach" section should be broken into two separate subsections: "Technical Approach" and "Management Approach."

1. Technical Approach: The submitters are asked to provide their technical understanding of the project, the project's critical technical issues, and the submitter's approach to resolving the issues in a manner that meets or exceeds the project goals.

2. Management Approach: The submitters are asked to provide their approach to managing the project. Specific topics, often including the following, are identified:

- Budget management
- Schedule management
- Design and construction management
- Quality management
- Safety management
- Environmental management
- Public Information

Management approaches have a tendency to be standardized narratives, so it important to encourage the submitters to address project-specific management issues where possible and to limit the page count devoted to this subsection.

RFQ Definition of the Evaluation Process:

The description of the evaluation process in the RFQ primarily provides the submitters with the evaluation and scoring criteria that CDOT utilizes. It should include critical information to allow submitters to focus on those aspects of the project that CDOT most values. The evaluation criteria

contained in the RFQ should identify any specialized capabilities required for the project. The criteria should be centered on assessing the submitter's ability to perform the work. The criteria factors should be weighted according to their relative importance to the successful completion of the project.

Factors that are identified for evaluation in the RFQ should correspond with the information that the submitters are required to provide in the SOQ. For example, if experience with accelerated construction schedules is identified in the submittal section, then it should also be identified as an evaluation criterion. Ambiguity or inconsistencies between those two sections of the RFQ make it difficult both for the submitters to understand what CDOT values and for the evaluators to understand how to accurately score the SOQs. Ambiguities must be avoided so that CDOT is able to conduct objective evaluations and to defend itself from protest due to arbitrary and capricious selection.

Beyond the specific submittal requirements and evaluation criteria, submitters should be encouraged to provide discussion on how they are best qualified to specifically meet the project goals.

The scoring allocation of the main sections and subsections of the Proposal should be identified. Below is a typical range of scoring allocation by section title:

- Submitter Experience (25 to 35 points)
- Organization and Key Personnel (20 to 25 points)
- Project Understanding and Approach – Technical Approach (25 to 35 points)
- Project Understanding and Approach – Management Approach (15 to 20 points)

It is important to consider the project goals when determining the scoring allocation for the SOQ. For example, if a project goal is to minimize the construction schedule, then the project team should consider the relative importance of experience, Key Personnel, technical approach, and management approach in ensuring that that goal is achieved. Considering all of the project goals in a similar manner helps determine the appropriate allocation of scoring for the SOQ.

5.2.2 SOQ Evaluation and Short-Listing

The detailed process of evaluation of SOQs and Proposals for a Design-Build procurement is discussed in Chapter 6 of this manual. Some of the key elements of the SOQ evaluation procedures follow:

- A formal, written evaluation procedure is developed for each specific project SOQ. The evaluation procedure is then approved by the EOC.
- The selection process should follow a well-defined and well-documented methodology that is transparent and defensible.
- Confidentiality of the process is essential to ensure that the integrity of the process minimizes the potential of a protest of the selection. Nondisclosure certificates should be signed by all reviewers and the SOQ documents should be kept in a secure area.
- The final determination of the short-listed Design-Builders should be approved by the EOC.
- FHWA typically participates as an observer in the SOQ short-listing process.

Federal guidelines state three to five firms should be short-listed and invited to submit Proposals. The Design Build Institute of America (DBIA) recommends short-listing three firms in "Principles of Best Value Selection."[3] Limiting the short list is important, recognizing the substantial level of effort that is required for Design-Build proposers to advance the design and prepare Design-Build Proposals. Limiting the short list strikes a balance between fostering competition and limiting the overall industry level of effort. The higher submitters perceive their probability of being selected, the more they are motivated to invest in their Proposals; this results in stronger best value Proposals from which the owner may select. Short-listing at least three firms provides the owner insurance so that if one firm withdraws, two firms remain to preserve a competitive selection process.

CDOT has established a best practice recommendation that three SOQ submitters be short-listed and invited to submit Design-Build Proposals.

CDOT reserves the right, at its sole discretion, to cancel the RFQ; issue a new RFQ; reject any or all SOQs; seek or obtain data from any source that has the potential to improve the understanding and evaluation of the responses to the RFQ; seek and receive clarifications to an SOQ; and waive any deficiencies, irregularities, or technicalities in considering and evaluating the SOQs. The RFQ does not commit CDOT to enter a contract or proceed with the procurement of the project. CDOT assumes no obligations, responsibilities, and liabilities, fiscal or otherwise, to reimburse all or part of the costs incurred by the parties responding to any RFQ. All such costs shall be borne solely by each proposer.

5.3 Phase 2—Request for Proposals, Pursuit Design, Proposals and Selection

Phase 2 of the procurement process for Design-Build delivery is initiated with the selection of the short-listed SOQ submitters that will be invited to submit a Design-Build Proposal for the project. Phase 2 includes a critical step in the project procurement: the submittal and evaluation of Proposals leading to the selection of the Design-Build contractor. However, most of the work performed in Phase 2 actually centers on the advancement of the design, both by the owner and the Design-Build proposers.

As shown in the highlighted section of Figure 5-6, during this stage of the project delivery, the owner advances the design through the development of the RFP Documents and the Reference Documents, including the Basic Configuration design, the Technical

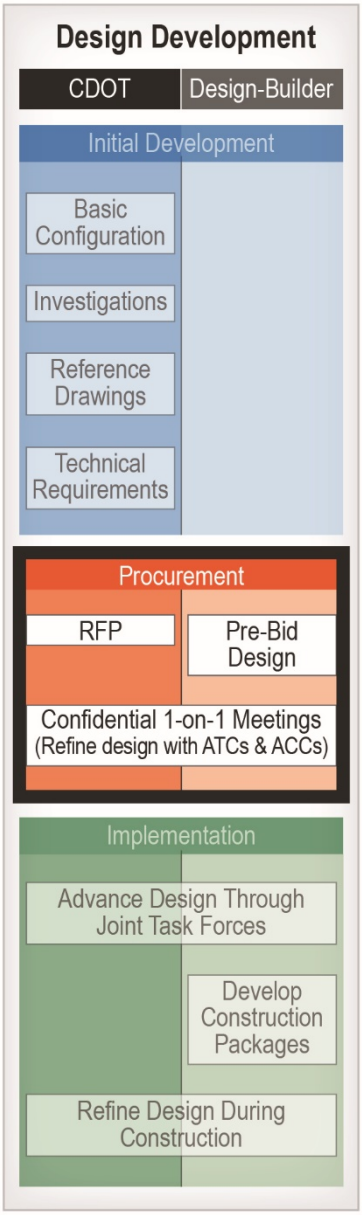


Figure 5-6. Design Development

[3] Design-Build Institute of America, "DBIA Position Statement: Principles of Best Value Selection" (2012), 2, retrieved from https://www.dbia.org/resource-center/Documents/ps_bestvalue.pdf.

Requirements detailed in Book 2, and the contract defined in Book 1. The owner further advances the design through its continuing efforts in utilities and other third-party coordination and agreements and also advances permitting and environmental clearances. These efforts should be guided by risk mitigation and management considerations.

Simultaneously, the Design-Build proposers perform their pre-bid (Proposal) designs to allow them to contractually bid and schedule the project. The Design-Build proposers typically also coordinate with third parties, to the extent allowed by the owner, to refine their designs and reduce their risks.

Together the owner and the Design-Build proposers collaboratively develop innovative design solutions to the project through the interactive ACC/ATC process to best meet the goals of the project.

The design development that occurs during the Phase 2 of the procurement process is where many of the advantages that Design-Build delivery can offer in terms of innovation, schedule, and price can be realized. The competitive nature of the procurement drives the innovation.

5.3.1 The Draft RFP and Industry Review

The RFP is usually issued in two steps, first as a Draft RFP and then as a final RFP. This two-step process allows the short-listed proposers to provide input into the development of the RFP through a process that is referred to as "industry review." Proposer input into the development of the RFP can be beneficial in reducing project risks and improving best value. Proposers can identify Technical Requirements and contract clauses that are ambiguous or onerous and will result in risk pricing and/or potential claims. The owner then has the opportunity to revise the language to obtain stronger Proposals and minimize the potential for disputes. Changes to the RFP during industry review are global and go out to all proposers simultaneously. This is different than proposed changes as a result of the proprietary and confidential ACC/ATC processes that occur after the issuance of the final RFP.

When CDOT first started using Design-Build delivery, industry review was critical to the development of strong RFPs. Capitalizing on experience, CDOT has created RFPs that are more standardized and stronger documents, reducing the importance of the industry review. Nonetheless the industry review process still provides value in strengthening the RFP, getting contract buy-in from the proposers, and initiating and further developing relationships for the Phase 2 procurement. An industry review process should always be conducted, though the process can be streamlined on smaller projects.

The Draft RFP should be issued immediately or as soon as possible after the announcement of the short list. Short-listed proposers will want to start advancing their designs as rapidly as possible and are very limited in what they can do until the Draft RFP is issued. It is important to understand that the Draft RFP must be very near to its final completion for the industry review process to be effective. Ideally, the Draft RFP is in its final form excepting changes that respond to the industry review. In practice, there are inevitably portions of the Draft RFP that are not yet finalized and parts of the Draft RFP that are updated for the final RFP based on design progress, third-party coordination, and risk reduction activities. However, these revisions should be limited. If there is potential for substantial changes to the Draft RFP, then its issuance should be delayed until potential revisions are minimized.

The industry review process primarily consists of one-on-one meetings with each of the short-listed proposers to solicit input on the Draft RFP. The Draft RFP should be issued enough in advance of the industry review meetings to allow the proposers adequate time to review the document. One set of

review meetings is usually adequate to solicit RFP input, although on large and complex projects additional meetings can be beneficial. There should be enough flexibility in the schedule to accommodate additional meetings if necessary. Proposers should be provided four hours of meeting time to ensure all of their concerns can be sufficiently discussed.

As with most one-on-one meetings, when the industry review meetings are conducted somewhat informally they are often more productive. Because CDOT's primary role is to listen at these meetings, there is no need to maintain the same topics of discussion for each proposer. However, the project team should keep comprehensive notes of the meetings for internal use. The meetings are often more productive when proposers provide an agenda to the project team prior to the meetings. This provides the owner the opportunity to research issues in advance and to provide any necessary technical staffing at the meetings.

The CDOT team should initiate the meetings by discussing the ground rules for the meetings. The ground rules should be included in a handout so participants can be reminded of them throughout the meetings. Industry review meetings should include the following ground rules:

- The primary purpose of the industry review meeting is to develop a strong industry understanding of the RFP and to solicit industry input on the RFP.
- The meetings are informal to promote more interaction. The meetings are not formally documented.
- RFP comments received from one proposer may be shared with other proposers to assess the industry consensus on changes being considered. CDOT does not, however, divulge the names or identities of proposers providing review comments.
- Proposers are cautioned about discussions concerning Proposal ideas and ATCs; though CDOT makes reasonable efforts to maintain confidentiality, while the RFP has not been finalized, issues and topics discussed may not be considered proprietary and could be reflected in the final RFP.

Though the meetings are to solicit input from the proposers, the meetings should be initiated with a briefing from the CDOT team. Typical topics of the briefing are schedule, funding, third-party coordination updates, clearances, permitting, and ongoing investigations. For this part of the meeting, care should be exercised by the CDOT team to ensure that the same information is disseminated to all of the proposers.

A valuable topic to discuss at the industry review is the Proposal scoring format provided in the Draft RFP. As the Proposal scoring is the key to obtaining best value, it is important that it is clearly communicated and understood. Scoring discussions with proposers during the industry review can help the project team understand how the scoring is to be reflected in Proposals, which can lead to scoring improvements in the final RFP.

Proposers sometimes try to use the industry review meetings as opportunities to initiate discussions on Proposal ideas, ATCs, and ACCs. The project team should discourage such discussions as they are more appropriate to address during the one-on-one meetings held after issuance of the final RFP. In some instances, such as accelerated procurement schedules, ATC and ACC discussions are warranted. In those cases, it is important to clearly communicate to proposers that ATCs and ACCs discussed in advance of the issuance of the final RFP are at risk of being compromised by the language of the final RFP.

5.3.2 The Final RFP Process

The issuance of the final RFP indicates that the following has occurred:

- CDOT has obtained formal federal authorization.
- CDOT has allotted equal time to each short-listed proposer to discuss development of any changes that potentially could be included in the RFP (industry review meetings).
- Industry review comments have been reconciled and, if approved, included in the RFP.
- All changes that are included in the RFP have been reviewed for legal sufficiency.
- Typically, the decision document has been published.
- The project team members have identified the selection formula and evaluation plan they intend to use to determine best value, and the Instructions to Proposers (ITP) is finalized.

The final RFP process is more formalized than the Draft RFP process; industry comments and questions are addressed through the RFC process and additional changes to the RFP are made through the issuance of formal addendums. The release of the final RFP provides proposers with a high level of confidence in both the contract requirements and the selection criteria and process, allowing them to proceed with significant investments in both the design development and the Proposal development. At this point in the procurement process, proposers also develop ACCs and ATCs to propose to CDOT to provide best value benefits to the project.

5.3.3 Instructions to Proposers

The ITP provides guidance to the proposers on submittal requirements, procurement processes, and Proposal evaluation criteria. Most important, the ITP defines the ways the project goals will be optimized to provide the owner best value through a combination of cost, schedule, and technical considerations. The key elements of the ITP are summarized in Figure 5-7. A typical ITP and the source file ITP templates are available in the online Appendix on the CDOT Innovative Contracting web page or by contacting CDOT Innovative Contracting.

The ITP is initially released with the Draft RFP to allow industry review to provide commentary on the document prior to its finalization and release with the final RFP.

When the final ITP is issued as part of the final RFP, the ITP must be complete with only minor changes incorporated by subsequent addendums. The key elements of the ITP are discussed in the following sections.

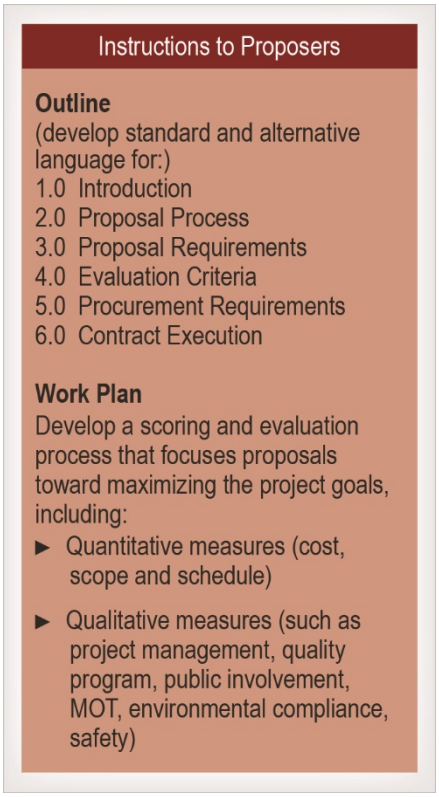


Figure 5-7. ITP Elements

5.3.3.1 Evaluation Parameters

As the primary purpose of the ITP is to provide a process for the selection of the Design-Builder for the project, a logical first step in the development of the ITP is to identify the evaluation parameters and procedures that will be used for the selection. The evaluation parameters and procedures will then guide the development of the other elements of the ITP. Figure 5-8 illustrates the process. Design-Build delivery typically uses a best value selection methodology, which is generally defined as "a procurement process where price and qualitative factors are considered in the evaluation and selection process."[4] The project goals should be directly related to best value parameters, which typically include cost, time, scope, and technical design considerations and construction operational considerations (such as Maintenance of Traffic [MOT] and Public Involvement [PI]) parameters). For example, if a project goal is to minimize inconvenience to the traveling public, then a best value operational parameter could be the MOT approach and commitments, and a best value time parameter related to that goal could be commitments to minimize the duration of construction impacts. The best value parameters are then tied together with the Proposal price through a best value evaluation formula (algorithm). Each parameter is then assigned specific scoring criteria. Given the critical nature of the exercise, it is important that the evaluation procedure be tested against numerous scenarios through an iterative process to determine the parameters, formula, and criteria that best reflect the project goals.

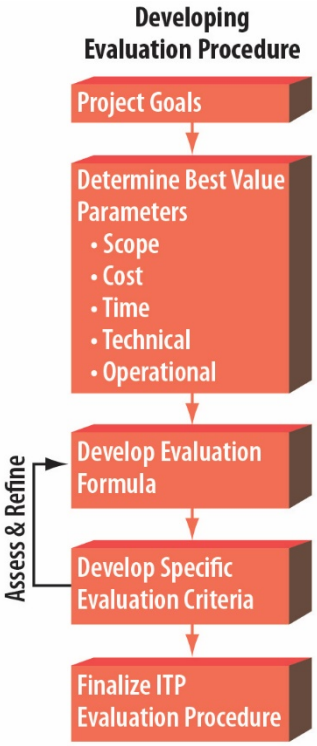


Figure 5-8. Developing Evaluation Procedure

5.3.3.2 Design-Build Best Value Formulas

Best value formulas fall into the following categories:

- **Low Bid (with a prerequisite of passing minimum Technical Requirements):** Once CDOT determines which proposers meet the minimum technical criteria, the successful proposer is chosen objectively based solely on the lowest bid. This approach is used by CDOT only on small SDB projects.
- **Price + Time (with a prerequisite of passing minimum Technical Requirements):** This is a variation of the low bid approach that adds an objectively determined time element, similar to an A+B bid in a traditional Design-Bid-Build (D-B-B) delivery. This approach is most commonly used for CDOT SDB projects.
- **Weighted Criteria:** In this approach, best value parameters are determined and weighted by point values that reflect prioritized project goals. Each parameter is then scored, including the Proposal price and schedule components.

  Often the technical parameters of the Proposal are qualitatively scored independently of the cost elements of the Proposal, which is referred to as a blind evaluation. After the technical scoring is completed, cost is independently scored by a quantitative formula and added to the other best value parameters to obtain the final score. This is the approach dictated by the Code

[4] American Association of State Highway and Transportation Officials, *AASHTO Guide for Design-Build Procurement 2008* (Washington, DC: AASHTO, 2008), 3.

of Colorado Regulations (2 CCR 601-15), and it is the approach that CDOT uses on most Design-Build projects.

Time elements of the Proposal can be either qualitatively scored or quantitatively scored by formulas.

- **Qualitative Cost and Technical Score Trade-Off:** This approach is similar to the Weighted Criteria approach, but rather than assigning scoring value to Proposal prices, the difference in Proposal prices is subjectively compared to the differences in the other best value parameters to assess whether or not a higher priced Proposal provides the best value due to the benefits the Proposal offers. This approach is not available to CDOT as it is specifically prohibited by the previously noted regulations.
- **Fixed Price Best Proposal:** This method sets a Guaranteed Maximum Price (GMP) and then allows proposers to vary the project technical approach and scope to fit within the GMP. The scope is typically varied through the use of Additional Requested Elements (AREs), which the proposer has the option of committing to. Each ARE is assigned point values in the ITP that reflect the value the owner places on the implementation of the ARE relative to the overall project. For example, a proposer may be able to obtain an additional three points in its overall score if the proposer commits to construct a bridge that was not included in the Basic Configuration. A weighted scoring criteria is then developed to assess the other best value parameters. When this method is used, care should be taken to estimate the GMP and the AREs accurately to ensure proposers are able submit Proposals at or below the GMP. Ideally, some proposers will be able to include some but not all the AREs in their Proposals at the price of the GMP. CDOT uses elements of this method.

CDOT standard practice for Design-Build delivery (except for SDB projects) is to use the Weighted Criteria approach with an independent quantitative calculation of the cost score. CDOT publically reveals the price proposal scores that are then added to the previously determined technical scores to obtain the publically announced determination of the apparent selection. This approach provides a very transparent process that ensures the Proposal price does not influence the technical scores.

The CDOT standard practice often allows for variable scope by including optional AREs along with a price proposal. The CDOT standard practice also uses a GMP, requiring that price to be equal to or less than a GMP (upset price) to ensure projects meet budgetary constraints.

Technical scores and price proposals are combined for the total evaluation score on CDOT Design-Build projects generally using one of the alternative algorithms in Table 5-1 on the following page.

There are many variations of these general formulas that may be applicable to specific projects, but for the most part the best value scoring formulas should stay close to these general methods to maintain a consistency of approach to which the industry can respond.

The determination of the exact algorithm to use should be focused on obtaining the best value in terms of achieving the goals of the project. The algorithm should be tested against numerous scenarios to ensure it provides the best value and to guard against unintended consequences.

Table 5-1. CDOT Design-Build Alternative Algorithms to Determine Total Evaluation Score		
Alternative Algorithm	**Formula**	**Result**
Technical Score Adjusted by Price	Total Score = Ts x (GMP/Pp)	*The highest score determines the apparent best value.*
Proposal Price Score Adjusted by Technical Score	Total Score = Pp/Ts	*The lowest score determines the apparent best value.*
Qualitative Technical Score plus Quantitative Price Score	Total Score = Ts + (Pmax x Plow/Pp)	*The highest score determines the apparent best value.*
Qualitative Technical Score plus Quantitative Price Score (based on defined dollars per point)	Total Score = Ts + [Pmax – ((Pp – Plow)/($ per Pt))]	*The highest score determines the apparent best value.*

Note:
Ts = Technical Proposal score: the sum of all other best value scoring elements, including AREs
Pmax = Maximum Proposal price points
Pp = Proposal price
Plow = Lowest Proposal price
$ per Pt Factor = A defined dollar amount per point value
GMP = Guaranteed Maximum Price

5.3.3.3 Specific Criteria and Scoring

CDOT's standard approach is to provide a maximum of 100 points for the total Proposal score, although the total points can be increased to provide more discretion in the scoring. The way those points are allocated between the various best value parameters should reflect the weighting of elements that best reflects the project goals. One key factor that is not usually captured in the project goals is the importance of price. The way in which price is quantitatively incorporated into the best value formula must be carefully considered to ensure the selection committee and the executive leadership is comfortable with potential outcomes that result in a proposer being selected with a price higher than the lowest Proposal price. For that reason, it is imperative that the CDOT team test the evaluation procedure against numerous scenarios.

Examples of best value parameters that can be assigned point values are shown in Table 5-2 on the following page.

Often the ITP identifies core CDOT values that are not project-specific goals but are nonetheless important to the success of the project and are therefore scored. Quality and safety are examples of CDOT core values.

Qualitative best value parameters that are determined to be part of the evaluation procedure are further elaborated upon in the ITP to provide more specific direction to the proposers on the important aspects of each parameter.

Table 5-2. Relating Project Goals and Values to Best Value Scoring Parameters	
Project Goals	**Possible Best Value Parameters**
Maximize operational capacity	• Project technical approach and commitments • AREs
Maximize use of available funds	• AREs • Additional Proposal scope commitments
Manage impacts during construction, or Minimize inconvenience to the traveling public, or Minimize inconvenience to the stakeholders	• MOT approach and commitments • PI approach and commitments • Time of completion • Duration of construction impacts
Complete the project on or before a set date	• Time of completion • Time to obtain key schedule milestones
Provide a high-quality project	• Quality Management Plan approach and commitments • Technical approach and commitments
Safety of the public and workers	• Safety Management Plan approach and commitments
Maximize project durability or Minimize life cycle costs of project	• Maintenance Level of Service commitments • Low-maintenance structures • Low-maintenance pavement • Other low-maintenance designs

The time-related parameters can be assessed either qualitatively or quantitatively. An example of a quantitative formula for schedule is:

Schedule Score = Max Points × (lowest proposed duration/proposer's duration)

There many other ways to quantitatively score time. Though schedule is often assessed with a formula, it is not uncommon to score time-related items subjectively, with other qualitative technical elements.

5.3.3.4 Additional Requested Elements

Sometimes, CDOT incorporates AREs into the best value in order to maximize the project scope. AREs are specific, well-defined, and often prioritized additions to the Basic Configuration that the proposer can optionally decide to include in its Proposal. Each ARE has a defined point value that typically is provided in its entirety to the proposer. However, there have been some innovative past uses of variable scope AREs that are in turn variably scored. Variable scope AREs allow the proposers to more closely match the GMP to the project scope of work.

Proposers should be required to include all AREs before being allowed to provide a Proposal price less than the GMP. Under no circumstance should the proposer be allowed to provide a Proposal price higher than the GMP that includes AREs.

As AREs represent additional costs to the contractor, the relationship between ARE scoring and the price scoring formula should be carefully considered. Points assigned to the AREs should be weighted in such a way that the proposer is incentivized to include the AREs in the Proposal.

Proposers can be allowed the option of including or excluding any or all AREs if they feel that would give them the best opportunity to provide the best value to the owner. Or, proposer's can be directed to include AREs in an order of priority defined by the owner. However, the more flexibility the proposers are given to select which AREs to include in their Proposals, the more opportunity they have to include those AREs that best match their designs, construction methods, and means, which generally provides better project value. AREs also can be indirectly prioritized by the CDOT team by providing more points per dollar for the more important AREs.

AREs do not always fall within the umbrella of the NEPA decision document governing the project. In those cases, the proposers need to be informed of their responsibilities related to obtaining the necessary environmental clearances for the ARE.

5.3.3.5 Guaranteed Maximum Price

CDOT uses a GMP to control the maximum Proposal price and meet the budgetary constraints of the project. The ITP will state:

"If one or more Proposals are submitted with a Proposer Price equal or less than the Guaranteed Maximum Price (GMP) and a Technical Proposal score of Good or better, CDOT intends to award the Project according to the scoring methods outlined in the ITP, without consideration of Proposals that have Proposer Price above the GMP."

This puts strong pressure on the proposers to submit Proposal prices at or below the GMP. However, the use of a GMP requires that CDOT provide a Basic Configuration with a high probability that contractors are able construct at or below the GMP price. This requires that the CDOT team develop a reliable construction cost estimate even though the level of the design of the project is typically less than 30 percent. In some cases, the design of certain high-risk elements may need to be further advanced to reduce cost-estimate risk; this approach should be used sparingly because it is basically duplicates the efforts of the proposers.

The use of AREs can significantly reduce the risk of Proposal prices exceeding the GMP. Their use allows the GMP to be set so there is strong certainty that the Basic Configuration can be obtained at a price less than the GMP. AREs can then be used to give the proposers an opportunity to increase the project scope and price up to the level of the GMP. The use of probabilistic estimating procedures can be beneficial in identifying ARE cost ranges. The project cost should have a very high probability of being within the GMP without any AREs, with a commensurately low probability of being within the GMP if all the AREs are included.

Because of the critical nature of properly setting the GMP, CDOT has adopted a best practice of obtaining a construction cost estimate from an Independent Cost Estimator (ICE) to verify the project team's cost estimate. ICE firms perform production-level cost estimates using the same procedures that contractors employ in bidding projects. The methodology can provide a significant improvement in the level of confidence in the accuracy of the cost estimate.

5.3.3.6 Evaluation Plan

A formal evaluation plan must be developed, documented, and approved by the EOC. The evaluation plan provides a detailed approach to the Proposal evaluation process including the selection team, advisors and assistants, specific scoring processes and worksheets, meeting schedules, and security and confidentiality procedures. Evaluation of SOQs and Proposals for a Design-Build procurement is discussed in detail in Chapter 6 of this manual.

5.3.3.7 Structure of the Proposal

The ITP defines the structure of the Proposals, which should generally comply with the following format:

Volume I	Executive Summary (up to 15 pages)
Volume II	Proposer Information and Certifications (using forms provided in the ITP) and price proposal (Form J)
Volume III	Technical Proposal (up to 100 pages)
Volume IV	Project Plans, ARE(s), ATCs, and Schedule

Page limits should be set for Volume I and Volume III. Volume IV, which include the project plans, does not typically have a page limit. The purpose of the executive summary in Volume I is twofold: (1) to provide the evaluation team with a summary of the Proposal and (2) to provide the EOC and stakeholders a summary of the contractor's conception of and approach to the project and the means by which the contractor meets or exceeds the project goals.

The price proposal is provided in a separately sealed Volume II that is provided independently to the Price Evaluation Team (PET). The PET provides a review of the competency of all the legal, bonding, and miscellaneous forms and certificates required for a responsive submittal. The PET also opens the sealed proposers' price proposals and reviews the competency of the pricing, after completion of the technical evaluations, in accordance with Colorado Design-Build regulations (2 CCR 601-15 § 11). ***The PET must be completely independent of the technical review team.***

To both eliminate the need to review Proposals that exceed the GMP and comply with the Colorado Design-Build regulations, the ITP can require proposers to provide a separately sealed certification of whether or not their Proposal price is within the GMP without revealing the actual price.

The amount of information required from submitters and the page limits and organization of the Proposal should be well thought out and clearly communicated to the proposers. Overly extensive Proposals are a burden to both the proposers and reviewers, often provide limited additional value, and can overload the reviewers with insignificant information that distracts from the truly important aspects of the Proposal.

5.3.4 Alternative Configuration Concept / Alternative Technical Concept Process

ACCs and ATCs form the backbone of the innovation process in Design-Build delivery. They are confidential and proprietary changes to the contract requirements that are approved by CDOT for a specific proposer based on the owner's determination that the ACC/ATC provides a product that is equal to or better than the corresponding Basic Configuration or the Technical Requirements. ACCs change the Basic Configuration that is defined in Book 2, Section 1 (General) of the Technical Requirements. ATCs are concepts that propose changes to all subsequent sections of Book 2 – Technical Requirements.

CDOT can, however, identify certain sections or parts of sections that are specifically excluded from consideration of ATCs through the ITP.

Because ACCs can change the Basic Configuration of the project, approval of ACCs are typically required from the EOC. ATCs are typically approved by the Project Director or the Project Leadership Team (PLT) to facilitate an expeditious process, which is critical for an effective ATC process.

Proposers are willing to expend considerable effort to identify and develop ACCs and ATCs that provide equal or better products for less cost in order to gain an advantage over competitors as they vie to be the winning team. The most impactful ACCs/ATCs actually provide a better product for less cost. Often the proposer that is most successful in the ACC/ATC process wins the project.

The ACC/ATC process is a collaborative effort for both the owner's team and proposer's team. They are in essence working together to advance the project design in a manner that provides the most cost-efficient project that meets and exceeds the project goals. Owners' teams that embrace the collaborative process obtain the most value for their projects.

Confidential one-on-one meetings provide the venue for the ACC/ATC collaboration. A minimum of two four-hour confidential one-on-one meetings should be offered to each proposer, and if possible there should be available time in the schedule to add more meetings as they are often beneficial to the process. The extent of one-on-one meetings should be tailored to the project; more complicated projects should have longer procurement periods and additional ACC/ATC meetings.

Confidentiality must be strictly maintained, and to that end the CDOT team should consist of a core group from the PLT that has decision-making authority and can provide a strong basic understanding of the project and the RFP. The core group is then supplemented by technical experts as necessary to address the specific topics of the meeting.

Proposers should be encouraged to provide agendas in advance of the meetings to allow the CDOT team to familiarize themselves with the topics and provide any necessary technical expertise at the meeting. To maintain security and confidentiality, no physical documentation or electronic files should be taken from the meeting.

The CDOT team should strive to provide strong, reliable direction to the proposer teams at the meetings. ACCs and ATCs can have significant impact on the proposers' designs, which are being rapidly advanced throughout this phase of the procurement. If proposers have to wait for formal responses to formal submittals to understand CDOT's position on their ACCs/ATCs, their design development process can be severely limited. When CDOT provides reliable feedback at the meetings, the contractor has greater opportunities to refine ACCs and ATCs and obtain CDOT approvals. It is important for both parties to recognize that only ACCs and ATCs that have received written approval can be included in a Proposal.

To support the real-time decision making, the CDOT team should make use of time-outs during which the CDOT team can confidentially discuss the proposer's concepts and develop responses. It is not always possible to provide decisive responses to ACCs and ATCs at the meeting. In those instances, it is more effective to schedule subsequent meetings rather than require the proposer to formally submit an ACC/ATC without knowing the likely outcome. When a proposer has to submit the formal ACC/ATC without knowing the likely outcome, it results in a costly need for the proposer to advance the design

and Proposal preparation on two potential outcomes, and it does not contribute to efficient solutions to the challenges of the project. Any additional meetings must be offered equally to all proposers.

The CDOT team should designate a note taker to keep comprehensive notes of the meeting for CDOT's records. To maintain confidentiality, formal minutes of the meetings are not distributed to the attendants. Therefore, it is important for CDOT to have a clear internal record of the discussions.

ACC and ATC discussions should not include cost discussions because cost savings should not be relevant to CDOTs "equal or better" decisions. Approval logic should never be based on the idea that the ATC is equal or better because the money saved by using the ATC can be applied to other elements of the project. ACCs and ATCs should not be considered as opportunities to negotiate price and scope; in all cases they must provide an equal or better product relative to the Basic Configuration, AREs, and the Technical Requirements.

ACCs and ATCs do not always fall within the umbrella of the NEPA decision document governing the project. In those cases, the proposers need to be informed of their responsibilities related to obtaining the necessary environmental clearances for the ACC/ATC.

5.3.5 Requests for Clarification and Addendums

In the ITP, a process for proposers to formally submit RFCs, via email and signed letters, throughout the final RFP procurement process must be provided. CDOT then posts responses to RFCs on the project website, without revealing the names of the submitters. It is most effective to maintain a continuous process of responding to RFCs as quickly after their receipt as possible. Ideally, CDOT responds to all RFCs. An expeditious approach is to post all RFCs shortly after they are received, provide prompt responses to the RFCs that can be quickly answered, and identify the other RFCs as "response pending." RFCs do not need to be posted as addendums as they are clarifications and not revisions to the RFP.

Project directors are discouraged from having informal discussions with the proposers outside of the one-on-one meeting process, as such action can potentially compromise a fair and impartial selection process and expose the procurement to more risk of a protest.

After the issuance of the final RFP, all further modifications to the RFP must be implemented through formal addendums. Formal addendums need approval from the Federal Highway Administration (FHWA) prior to inclusion into the final RFP. On large and complex Design-Build projects, addendums are inevitable. Addendums that involve important changes to the contract requirements should be issued promptly and without waiting to accumulate addendum revisions. Issuance of relatively minor addendums can usually wait, but contractors should be notified of CDOT's intent to formally issue the addendum as soon as practicable. When addendums are required due to RFCs, a beneficial approach is to respond to the RFCs by informing proposers of specific changes that will be in future addendums, thereby maximizing the time proposers have to respond to the addendum.

When addendums are issued, a track changes type of format can be used to assist the proposers in identifying the changes to the RFP. Track changes can be included directly in the addendum pdf, or in a supplemental Word file for informational purposes only.

Addendums must not compromise confidential ACCs and ATCs presented by proposers. After the issuance of the final RFP, innovation proposed by proposers is owned proprietarily by the proposers and must not be shared with their competitors through an addendum. The exception to this rule is when a

proposed ATC or ACC takes advantage of an error or inconsistency in the RFP that should be corrected by an addendum.

5.3.6 Document Control and Data Management

All four books of the RFP and the ITP and the supporting Reference Documents result in a large amount of time-sensitive data that must be made available to the proposers. Because the design development is continually advanced during the procurement phase, the data must be frequently updated throughout the procurement. Expeditious data updates benefit the project by allowing proposers' designs and Proposals to be more responsive to the project conditions. CDOT maintains the project data through the CDOT project website. In some cases, a third-party project-specific database is maintained (sometimes provided by CDOT's project consultant).

However the data is provided, it must be easily accessible and efficient for both downloading and updating of information. Formal addendums with notifications to proposers must be used for formal contract modifications. However, supporting information and informal changes to documentation should be continually provided to the proposers as it becomes available. The volume of information might make it very difficult for proposers to understand what information has been added or modified without being notified by CDOT. An efficient approach to the problem is to maintain a data log. The data log provides a chronological listing of information that is posted or revised on the website. It is easy for the proposers to periodically check the data log to identify when new information has been posted.

5.3.7 Public Opening

To ensure transparency and build continued trust with the industry, CDOT publically discloses each proposer's technical Proposal score, Proposal price (for those prices that are at or below the GMP), and total score. The disclosure is made during CDOT's standard bid opening process, where the proposer with the highest best value score is announced as the "Apparent Selected Proposer."

Proposal prices that are over the GMP should be withheld at the bid opening to preserve the potential for a Best and Final Offer process, as is discussed in the following section.

The qualitative scoring is completed and approved by the EOC prior to the bid opening, allowing the Proposal prices to be incorporated into the scoring and the total score to be announced at the public bid opening. It is important to note that the Colorado Design-Build regulations require that the qualitative scoring be completed prior to opening the price proposals (2 CCR 601-15, Section 11, Part B, item No. 8).

5.3.8 Best and Final Offers

CDOT reserves the right to enter into a Best and Final Offer (BAFO) process with the proposers if all of the Proposal prices exceed the GMP. The BAFO process allows the Project Director to enter into discussions with the proposers, make revisions to the RFP, and solicit revised technical and price proposals with the goal of obtaining lower Proposal prices that meet the GMP. It is important to recognize that that BAFO process represents the last opportunity for the owner to award the project when the defined procurement process does not result in an acceptable Proposal. The BAFO process should not be considered a standard of practice to be used to negotiate the project scope and price.

The BAFO process typically includes:

- formal discussions with proposers;
- notice that the BAFO process is the opportunity to submit a BAFO;
- notice of a common cut-off date and time that allows a reasonable opportunity for submission of written BAFOs; and
- notice that if any modification is submitted, it shall be received by the date and time specified and is subject to the late submissions, modifications, and withdrawals of Proposals provisions of the ITP.

The BAFO process typically is not necessary provided there is one competent Proposal with a price at or below the GMP. But when a BAFO is necessary, the Colorado Design-Build regulations (2 CCR 601-15, Section 13) require that Proposal prices be kept confidential in order to avoid the use of "auction techniques" in the BAFO process. For this reason, if there are any Proposal prices that are over the GMP during the bid opening, they should be kept confidential until such a time as it is determined that a BAFO will not be necessary for the project.

After receipt of the BAFOs, CDOT does not reopen formal discussions and the BAFO becomes the basis for any award. BAFOs are evaluated as stated in the ITP based on the consideration of the revised technical and price proposals.

5.3.9 Stipends

CDOT typically provides stipends to unsuccessful but responsive proposers. The stipend provides a partial reimbursement to the proposers for their efforts in advancing the project design and preparing their Proposals. Stipends should be provided in the range of 0.05 percent to 0.15 percent of the GMP or the anticipated bid cost. Though the amount is generally much less than the investments by the proposers, it is still a valuable reimbursement commitment from the owner. In return for the stipend, CDOT is entitled to use any and all concepts, ideas, ATCs, and information contained in the Proposals without limitation. Each proposer acknowledges this CDOT right. However, proposers may refuse the stipend if they desire to maintain the ownership of all of the information in their Proposals.

CDOT provides the successful proposer with all the ATCs and ACCs of the unsuccessful proposers who accepted stipends as soon as practicable for incorporation as a Value Engineering Change Proposal (VECP) at the discretion of the proposer. The unsuccessful proposers are relieved of any responsibility and liability for any of their concepts and designs that are used for the project.

5.3.10 Protest Procedures

Losing proposers are entitled to protest the selection as set forth in the Design-Build regulations 2 CCR 601-15 § 22 and in C.R.S. §§ 24-109-101-404. The procedures provide, among other things, that the CDOT Chief Engineer or his designee is authorized to settle and resolve any protest within seven working days after the protest is filed. The decision shall inform the protesters of their right to appeal administratively or judicially in accordance with C.R.S. §§ 24-109-201-206. The decision is subject to appeal to the executive director of CDOT.

Protests may be made regarding CDOT's approval of changes in a proposer's organization or decisions regarding responsiveness, best value evaluation rankings, or Award of the Contract. Protests must be filed by hand delivery to the CDOT Project Manager within seven working days of being informed by CDOT of the decision being protested. The protester shall concurrently file a Notice of Protest with the other proposers. The Notice of Protest shall state the grounds of the protest.

If a Notice of Protest is filed, CDOT may proceed with the procurement. However, CDOT shall not Award the Contract until the protest is withdrawn or decided.

If the protest is denied, the firm filing the protest shall be liable for CDOT's costs reasonably incurred in defending against the protest, including consultant fees and all unavoidable damages sustained by CDOT as a consequence of the protest. If the protest is granted, CDOT shall be liable for payment of the protesting firm's reasonable costs, as defined in 2 CCR 601-15 § 22, No. 3.

5.4 Design-Build Delivery Interface with Other Processes

Design-Build delivery is unique in the way in which it interfaces with many processes that are integral parts of CDOT transportation projects. Primary among those are FHWA processes, environmental processes, and CDOT internal administrative processes. This section identifies key elements of interfaces between those three processes and Design-Build delivery, primarily through the use of flowcharts.

5.4.1 Environmental Processes

Design-Build delivery interface with environmental processes through the procurement phase is shown in Figure 5-9. As the figure illustrates, environmental interface is important throughout the development and execution of Design-Build delivery. Most all significant transportation projects include elements of risk associated with the environmental conditions. As a result, environmental conditions play a role in the selection of the appropriate method of delivery, the initial project development, the development of the RFP, the procurement process, and ultimately the implementation of the project. In fact, if environmental risks, such as compliance or schedule, are not carefully managed in Design-Build delivery, the potential for negative consequences can be greater than in traditional D-B-B.

Federal regulations establish the parameters by which state transportation departments may deliver projects using Design-Build (23 CFR Part 636). The environmental aspects of the regulation are stated in Chapter 1 of this manual. Key environmental elements of the regulation are:

- Design-Build procurements may proceed to award prior to the conclusion of the NEPA process and obtaining a decision document.
- Design-Build may proceed with the preliminary design after the award provided certain conditions are met to maintain the integrity of the NEPA process when not yet completed.
- FHWA approval is necessary prior to issuing the RFP, awarding the project, and proceeding with the preliminary design in projects where the NEPA process is not complete.

Per guidance from FHWA, CDOT has established a standard of practice that prohibits the issuance of a final RFP on Design-Build projects until the NEPA process has been completed and a decision document has been signed. Exceptions to this practice should be carefully considered and must obtain CDOT executive approval, which would generally be obtained through the project EOC.

If the NEPA process has not been completed prior to the issuance of an SOQ or an RFP, the solicitation document must include a statement of the status of the NEPA process and a statement that the procurement process and preliminary design are consistent with the NEPA requirements and mitigations and do not preclude any of the NEPA alternatives currently under consideration. FHWA should concur with this approach.

When a specific Design-Build project is developed within the limits of a previously completed NEPA decision document, it is not uncommon for the design development of the project to vary somewhat from the preferred alternative of the NEPA decision document. In those instances, it may be determined that a formal environmental reevaluation is required to be completed prior to the issuance of the final RFP in order to determine the requirements for the final NEPA approvals. When an environmental reevaluation is necessary, its processes must be carefully determined and integrated into the design development procurement schedule for the project as it can often dictate the critical path of the project schedule.

It is not uncommon for Design-Builders to develop designs that are not fully consistent with the final NEPA decision documents, usually as a result of ACCs and ATCs. In those cases, the responsibility and risk for obtaining a revised environmental clearance is typically allocated to the Design-Builder through conditional approval of the ACCs and ATCs.

In situations where the NEPA process had not been completed prior to the Design-Builder starting work, the Designer Builder's specific responsibilities concerning NEPA approvals and associated environmental permitting processes must be clearly defined in the RFP and Contract Documents. The process requires the Design-Builder to closely coordinate with both CDOT and FHWA.

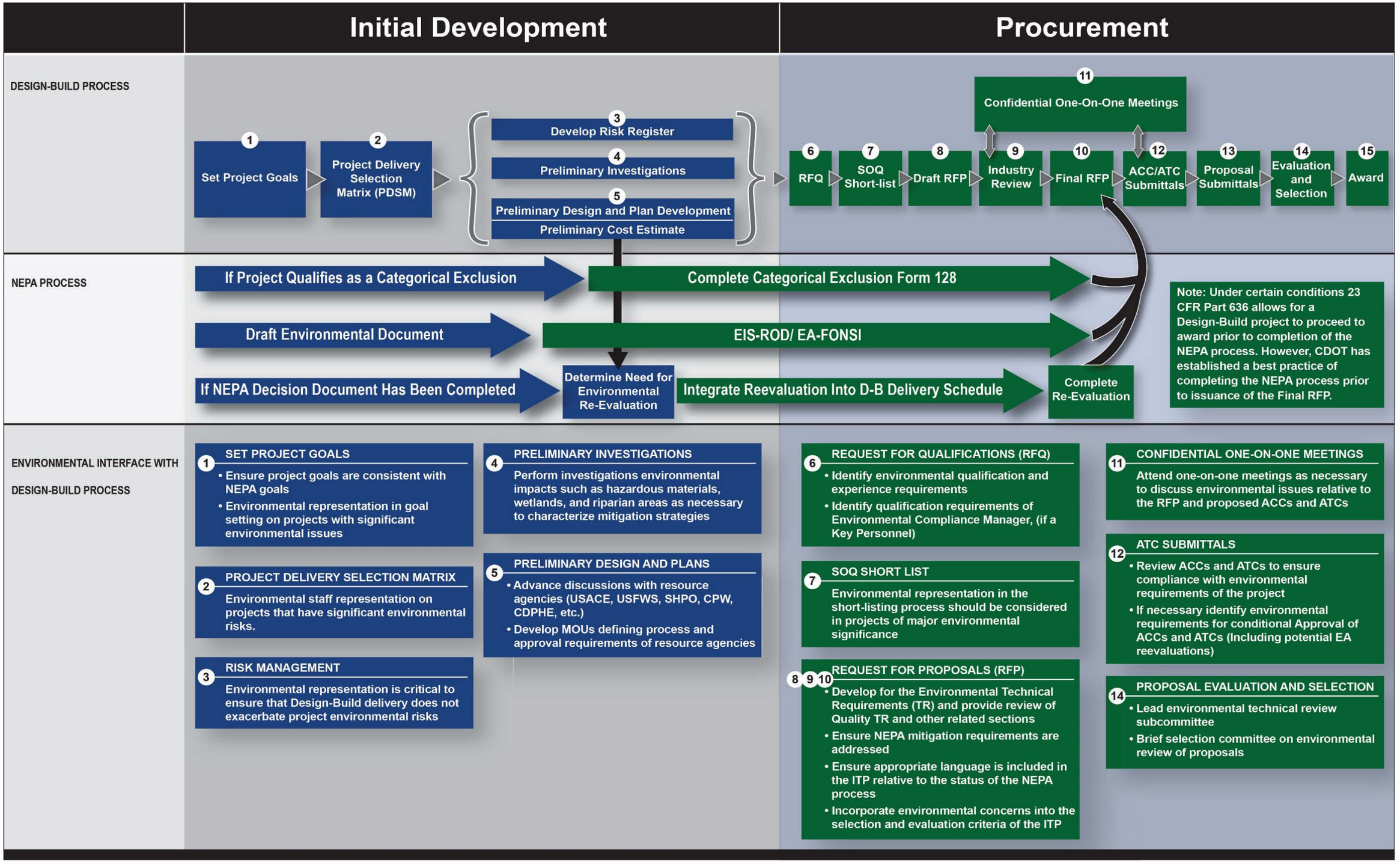


Figure 5-9. Environmental Interface with Design-Build Process

5.4.2 FHWA Processes

As most CDOT projects include federal funding, the interface with Design-Build projects and the FHWA is an important component of the delivery method. CDOT and FHWA have jointly developed the *Colorado Department of Transportation Federal-Aid Highway Program Stewardship and Oversight Agreement*, which defines how they will work together to provide project and program oversight.[5]

The stewardship agreement stipulates that Design-Build projects that require coordination between CDOT and FHWA must determine the FHWA level of project oversight. The Colorado Division of FHWA determines whether a project is a Project of Division Interest (PoDI). If the project is determined to be a PoDI, FHWA and CDOT jointly develop a project-specific document titled "Oversight Roles and Responsibilities." The document should typically address the following areas of coordination:

- FHWA involvement in the project organization, including the EOC, the Project Management Team (PMT), PLT, and Project Technical Teams (PTTs)
- FHWA review and approval of procurement activities, including the RFQ, SOQ, and short-listing; the Draft RFP; the final RFP; RFP addendums; ACCs and ATCs; and Proposals and Proposal evaluations
- FHWA approvals of Findings in the Public Interest (FIPIs) for proprietary items
- FHWA project approval (obligation authorization) prior to release of the final RFP
- FHWA formal concurrence of the Award
- FHWA approval of design exceptions
- FHWA approval of an Interstate Access Request, if applicable
- FHWA approval of NEPA decision documents, and reevaluation if applicable
- FHWA review and approval of certain defined plan submittals prior to release for construction
- FHWA review and approval of major change orders
- FHWA involvement in project Acceptance
- FHWA involvement in Final Voucher and Closure

An example Oversight Roles and Responsibilities document is provided in the online Appendix on the CDOT Innovative Contracting web page or by contacting CDOT Innovative Contracting.

A key role of FHWA is to ensure that NEPA processes are appropriately completed and approved for the project. Section 5.4.1 discusses the Design-Build interface with environmental clearances.

Many Design-Build projects include improvements to federal interstate highways, which usually require Interstate Access Requests (IARs). IARs must follow a prescriptive FHWA process and are often a subject to FHWA approvals beyond the authority of the local Colorado Division. The CDOT project team should closely coordinate the development of IARs with FHWA to accomplish their timely completion. A detailed process schedule should be developed and integrated into the Design-Build procurement schedule to ensure appropriate time is allocated for the process. The FHWA typically requires the completion of NEPA decision documents prior to IAR signature.

[5] Federal Highway Administration Colorado Division and the Colorado Department of Transportation, *Colorado Department of Transportation Federal-Aid Highway Program Stewardship and Oversight Agreement* (March 2015), retrieved from https://www.codot.gov/business/designsupport/cdot-fhwa-stewardship-agreement/final-stewardship-agreement.

Section 10.4.4, titled "Major Projects," of the stewardship agreement discusses the FHWA requirements for Major Projects. A Major Project is a project with an estimated total cost exceeding $500 million with a high level of interest by the public, Congress, or the Administration. Major Projects require a high level of FHWA and CDOT emphasis, including the following activities:

- Cost Estimate Reviews (CERs): Including an independent cost estimate. Information on cost estimating is available on the FHWA Innovative Program Delivery website: http://www.fhwa.dot.gov/ipd/project_delivery/tools_programs/cost_estimating.

- Project Management Plan (PMP): This document should clearly define the roles responsibilities, processes, and activities necessary to manage the project. Information on the PMP is available on the FHWA Innovative Program Delivery website: http://www.fhwa.dot.gov/ipd/project_delivery/tools_programs/project_management_plans.

- Finance Plan (FP): The FP must be completed and submitted to FHWA for review and approval with sufficient time to obtain approval before starting construction. Information on the FP is available on the FHWA Innovative Program Delivery website: http://www.fhwa.dot.gov/ipd/project_delivery/tools_programs/financial_plans.

The Design-Build interface with FHWA processes through the procurement phase is illustrated graphically in Figure 5-10. FHWA Design-Build processes for Major Projects are shown in Figure 5-11.

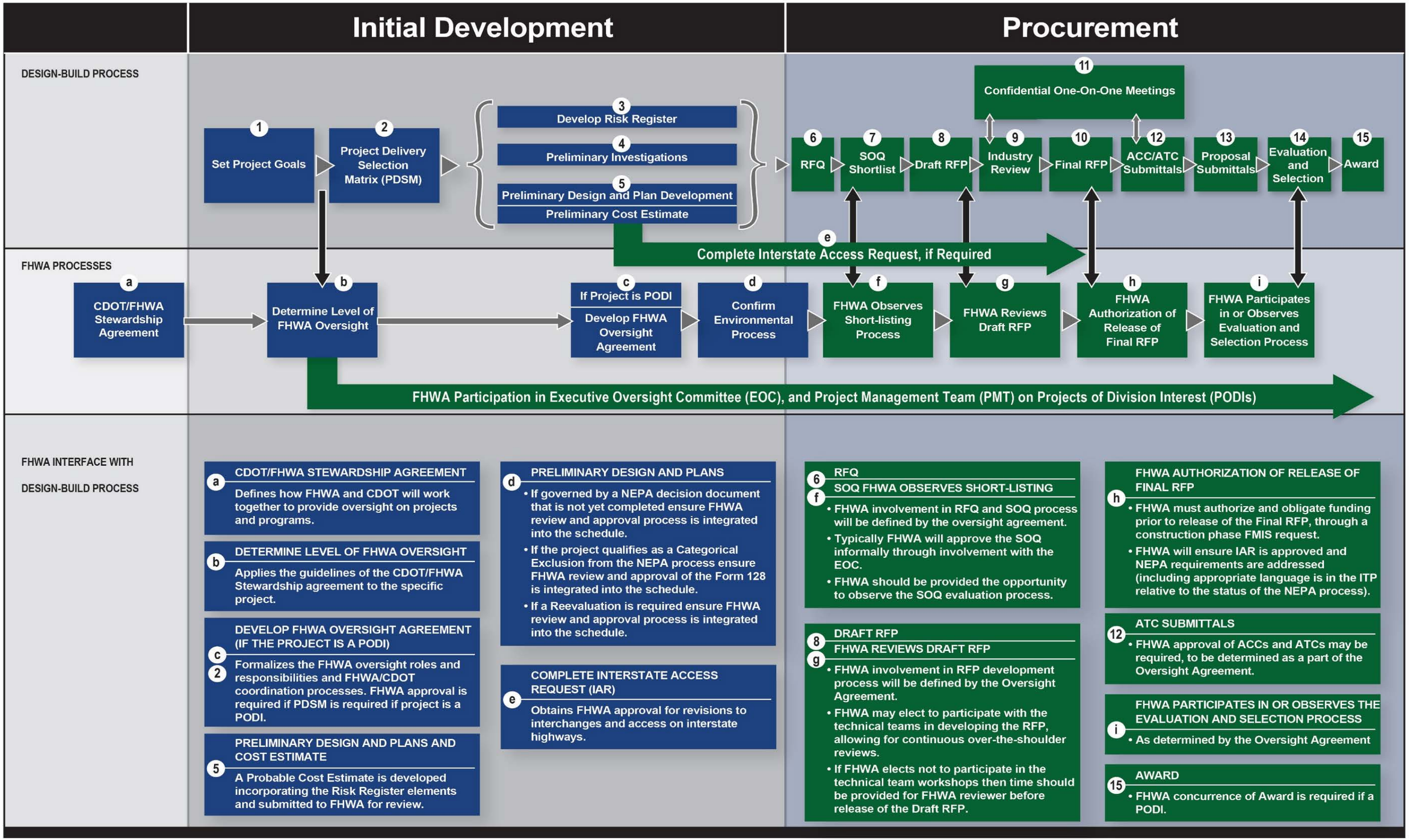


Figure 5-10. FHWA Interface with Design-Build Process

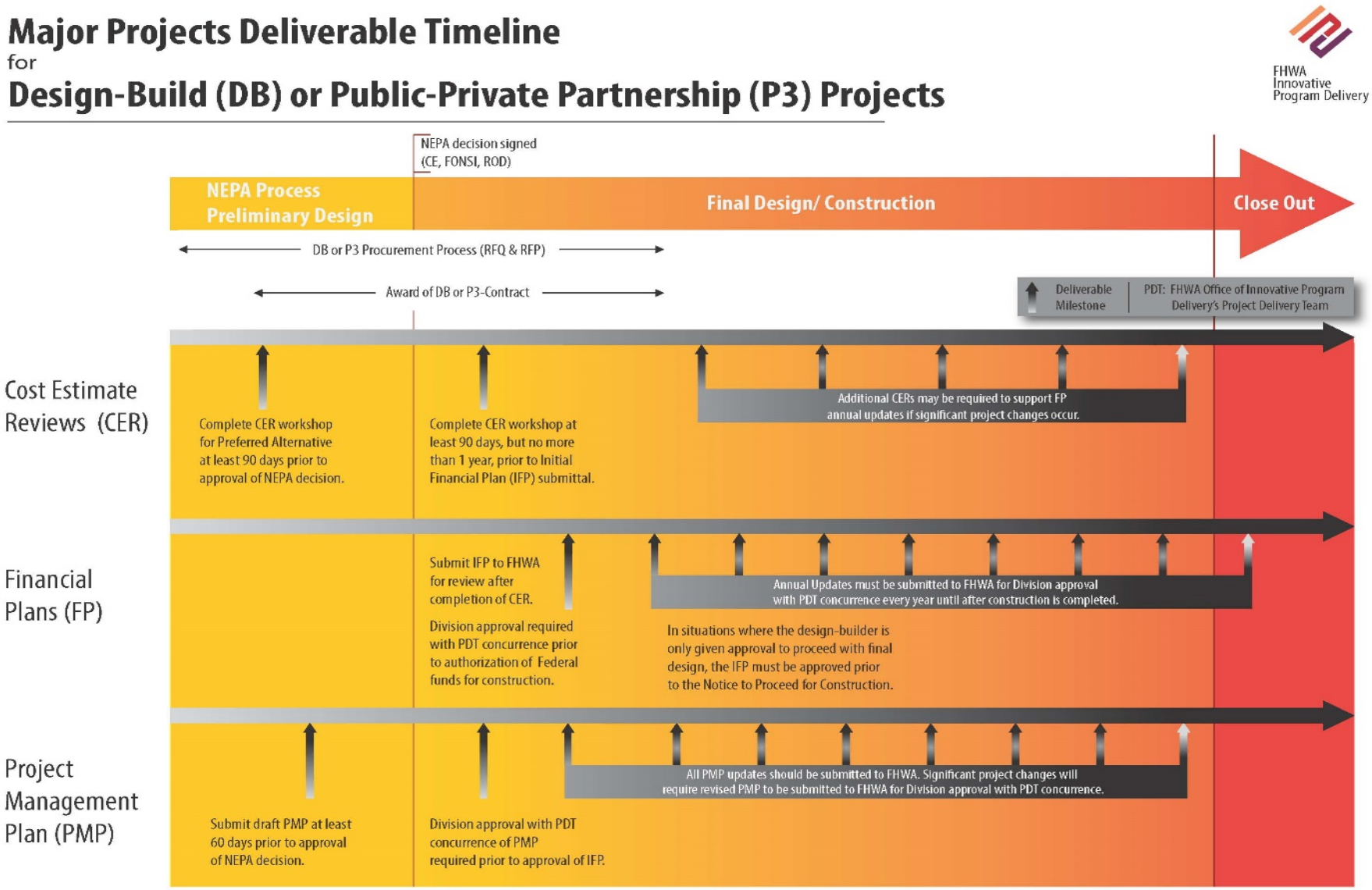


Figure 5-11. FHWA Design-Build Processes for Major Projects

Chapter 6: Evaluation of Statements of Qualifications and Proposals

Chapter 6: Evaluation of Statements of Qualifications and Proposals

Design-Build procurement evaluation procedures are unique to the delivery method. The extensive nature of the Design-Build procurement process warrants rigorous and defensible processes be executed for both the short-listing of qualified Design-Builders and the ultimate selection of a single Design-Build entity to perform the project. The Statement of Qualifications (SOQ) evaluation procedure and the Proposal evaluation procedure are summarized in Figure 6-1 below. A formal project-specific written evaluation procedure plan is developed for both the SOQ evaluation and the Proposal evaluation. Both plans should be approved by the Executive Oversight Committee (EOC) before the evaluations begin.

SOQ and Proposal evaluation plan templates are provided in the online Appendix on the CDOT Innovative Contracting web page or by contacting CDOT Innovative Contracting. The following discussion provides guidance in the development of project-specific evaluation plans.

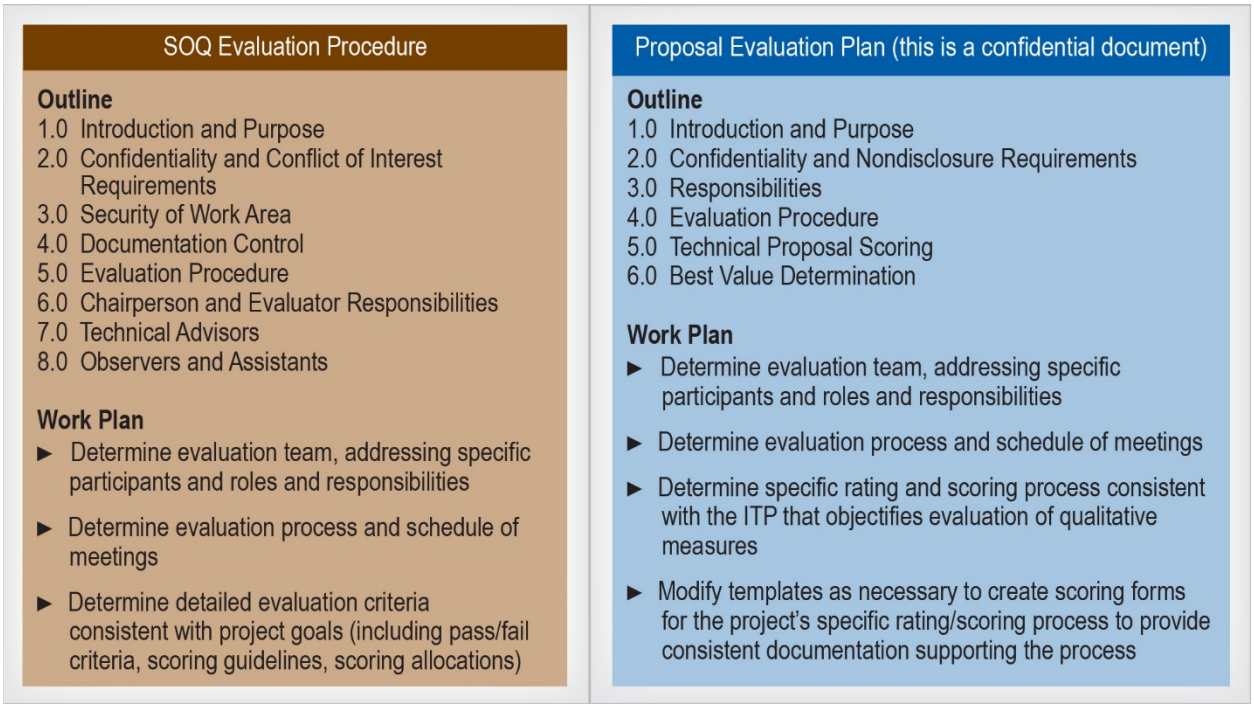


Figure 6-1. The SOQ and Proposal Evaluation Procedures

Evaluation Plan Transparency:

The American Association of State Highway and Transportation Officials (AASHTO) stresses the importance of transparency in Design-Build evaluation planning in the *AASHTO Guide for Design-Build Procurement,* which states, "It is imperative for all the parties involved in a design-build project that the evaluation plan be fair, equitable, and transparent."[6] The evaluation process should clearly indicate what the Colorado Department of Transportation (CDOT) values and show the process by which CDOT determines the short list from the SOQ submittals or, in the case of the Proposal submittals, which proposer provides the best value to CDOT.

In the Proposal phase in particular, evaluation processes that are not transparent or appear to be unfair expose CDOT to potential protests from the unsuccessful proposers. The following list of recommendations, excerpted from AASHTO's *Guide for Design-Build Procurement,* should be followed:

- "Clearly state the evaluation criteria and weight given for each item and ensure that the evaluation team uses them.
- Clearly state the requirements of the RFP including what will be considered a non-responsive submittal.
- Do not seek from design-builders the number or dollar amount of changes on past projects constructed by them.
- [In the proposal phase,] give equal opportunity … for each short-listed submitter to converse with representatives of the public [owner's] evaluation team to clarify their proposal and any of the requirements of the RFP.

Subjectivity in evaluations: "An essential premise in design-build evaluation planning is that the design is not complete at contract award. Thus, it is always in the owner's best interest to ask for information regarding the design-builders' design approaches. The review of design product, in any form, is by definition an exercise in the application of professional judgment….

A protest of a design-build evaluation plan in Minnesota dealt with the issue of subjectivity in the evaluation process. The plaintiff, a design-build team who had failed to make the shortlist, argued that the process was 'arbitrary and capricious.' In its Findings of Fact, the district judge stated: 'The court recognizes that there is a human element in the evaluation process. It would be *impossible to use people in the process and filter out subjective evaluation*. However, the court also recognizes that the fact that the process could be improved does not make the process used in this case arbitrary or capricious.' [7]

This finding also discussed the fact that the requirements for making the shortlist were published in the RFQ, that the evaluators were professionally competent to make judgments between competing statements of qualifications, and that the evaluation criteria were applied as published. Thus, the protest was denied and the Minnesota Department of Transportation's evaluation plan was vindicated even though it contained an element of subjectivity, [precisely because it was transparent]."[8]

[6]American Association of State Highway and Transportation Officials (AASHTO), *AASHTO Guide for Design-Build Procurement* (Washington, DC: AASHTO, 2008), 39.
[7] Minnesota District Court, (2004). Lunda/Shafer Joint Venture versus Minnesota Department of Transportation, Second Judicial District, Civil Division, Court File No. CO-03-11451, Saint Paul, Minnesota; emphasis added.
[8]AASHTO, *Guide for Design-Build Procurement*, 40.

- [In the proposal phase] provide candid feedback and a stipend to unsuccessful bidders."

AASHTO based this list on "several cases where the award was successfully protested because the evaluation plan was unclear and overly subjective. Award protests and their subsequent project delays are avoidable if the agency invests the upfront resources necessary to develop a fair, equitable, and, perhaps most importantly, transparent evaluation system with which to select the best value from among several competing proposals."[9]

Scoring Systems:

Public owners use a variety of evaluation scoring methods, ranging from quite simple to very sophisticated. Scoring methods can yield numeric results or be more qualitative in their assessments. All can be categorized into four types of methods:

1. Satisficing (acceptable or not acceptable)
2. Modified Satisficing (provides some distinction of acceptability)
3. Adjectival Rating
4. Direct Point Scoring

For descriptions of these types of scoring systems, refer to the *AASHTO Guide for Design-Build Procurement*.[10] Also refer to Chapter 5, Section 5.3.3.2, "Design-Build Best Value Formula," in this manual for additional discussion of scoring procedures.

CDOT has determined traditionally to use an adjectival rating type of scoring methodology for Design-Build projects and has created a process that is repeatable and very successful. When a project team wishes to use an alternative to the adjectival rating system, it must gain approval from the Chief Engineer before proceeding. The adjectival rating methodology is described later in this section.

Confidentiality and Nondisclosure Agreement:

All evaluation team members, technical advisors, and all other staff that are part of the process (except FHWA participants) should sign a Confidentiality and Nondisclosure Agreement and Conflict of Interest Certificate prior to commencement of the evaluation process. Anyone who fails to sign the Certificate must be excluded from participation in the evaluation. Indications of real, apparent, or possible conflicts of interest should be resolved by the Project Director in accordance with the code of ethics for public employees established by C.R.S. § 24-18-109 (http://www.lexisnexis.com/hottopics/colorado?app=00075&view=full&interface=1&docinfo=off&searchtype=get&search=C.R.S.+24-18-109). If the conflict cannot be resolved, the individual involved should be removed from the evaluation process. Confidentiality and Nondisclosure Agreements and Conflict of Interest Certificates must be retained as part of the evaluation record.

Security of the Work Area:

Each member of the evaluation team should be issued one copy of each submittal. When working with the evaluation materials, members of the evaluation team must keep all of the materials under their

[9] Ibid., 39–40.
[10] Ibid., Chapter 6, "Evaluation Planning and Award."

direct control and secure them from others not associated with the evaluation team. At all other times, the materials should be locked in a secured storage area/container. To retain confidentiality, the evaluation material should not be shared with any persons outside of the evaluation team.

When using computers, files should not be stored on non-removable hard disks. All computer-generated data should be stored on CDs or removable USB flash drives and secured with the evaluation material.

A private meeting room should be provided for all SOQ/Proposal reviews, evaluations, and discussions pertaining to the evaluation. Only the evaluation team should be authorized admittance to the meeting room when evaluations are taking place.

Document Control:

The evaluation materials and all documentation developed by the evaluation team, and notes taken by evaluators, should be kept confidential. All documentation should be kept secured at the end of each working day and/or at all other times that it is not under the direct control of authorized personnel. At the conclusion of the evaluation process, members of the evaluation team should not be permitted to retain any work papers or any part of the SOQs/Proposals.

Evaluation Team:

A chairperson is appointed to lead the evaluation process. Often the Project Director serves as the evaluation team chairperson. The chairperson is responsible for ensuring the timely progress of the evaluation, coordinating any consensus meeting(s) or reevaluations, and ensuring that appropriate records of the evaluation are maintained. The chairperson serves as a point of contact if an evaluator has questions or encounters problems relative to the evaluations. The chairperson also coordinates and facilitates the participation of technical advisors and observers, as may be necessary during the course of the evaluation process.

Though the chairperson should facilitate the evaluation committee process, he or she cannot participate in the actual evaluation scoring process. This rule is of particular importance if the chairperson is the Project Director because it insulates the Project Director from conflict of interest with the future administration of the project with the selected Design-Build team. If the evaluation team is supported by technical advisory committees, it is often beneficial to allow the Project Director/chairperson to participate as a technical advisor who can offer valuable technical project knowledge in assessing proposers' strengths and weaknesses. But the chairperson's advice must not extend to the actual scoring of the Proposals. Though not a scorer, the chairperson's responsibilities as the primary facilitator of the process requires the chairperson to be intimately familiar with the Proposals.

Each evaluator should review the Request for Qualifications (RFQ) /Request for Proposal (RFP) and SOQ/Proposal evaluation procedure prior to the evaluation kick-off meeting. Any questions that an evaluator may have regarding the evaluation criteria or process should be raised at the SOQ evaluation kick-off meeting.

Each evaluator reviews and assesses individual SOQs/Proposals using the overall criteria set forth in the evaluation manual and records observations using provided evaluation forms. The evaluation forms are

completed in a manner that substantiates the basis of each evaluator's assessment, including the strengths and weaknesses supporting the assigned ratings. Reasoning for strengths and weaknesses should be specific and not rely on generalizations. Well-documented evaluation forms assist in debriefing the unsuccessful submitters and validate the selection process.

The chairperson may request that technical advisors review the SOQs/Proposals and attend the evaluation coordination meeting. The technical advisors provide input to the evaluation committee associated with the evaluations, but they do not score the submittals.

The chairperson may choose to identify observers to view the evaluation process. The observers may review the submittals and evaluation procedures and may attend any evaluation meeting, but they do not provide input to the evaluation committee regarding the evaluation process.

Evaluation Procedures:

Evaluation procedures typically include the following elements:

- The RFQ/RFP, SOQs/Proposals, and evaluation procedures are reviewed with the evaluation committee and technical advisors at the evaluation kick-off meeting.
- Each evaluator determines strengths and weaknesses, if any, of each SOQ/Proposal and records assessments on forms included in the evaluation plan.
- Each evaluator then determines an adjectival rating for each evaluation category using the adjectival evaluation and scoring guide presented in Table 6-1 and records the ratings on a form provided in the evaluation plan.
- Each evaluator determines a numerical score for each category based upon the category adjectival rating. Table 6-1 provides a range of percentages available for each adjectival rating.
- The evaluation committee and technical advisors (and observers, if applicable) meet and discuss the submitted SOQs/Proposals and the evaluation forms developed by the evaluators. The technical advisors support and assist the evaluators on the evaluation committee in connection with their review and scoring of the SOQs/Proposals, but technical advisors do not individually or independently score any SOQ/Proposal.
- The evaluation committee then determines the final score for each proposer.
- CDOT reserves the right to conduct interviews with any or all submitters as a part of its evaluation process but typically provides final evaluation scoring without requiring interviews in Design-Build procurements. Not conducting interviews minimizes the risk of technical leveling and Proposal negotiating, both of which compromise the integrity of the procurement process. If interviews are conducted, in advance the project team should review the federal regulations concerning the process: 23 CFR 636, Subpart E—Discussions, Proposal Revisions and Source Selection (http://www.ecfr.gov/cgi-bin/text-idx?rgn=div5&node=23:1.0.1.7.24#se23.1.636_1209).

- The evaluation committee, led by the chairperson, develops an executive summary of the evaluations. The executive summary is forwarded to the EOC for concurrence of the Proposal scoring.
- In the case of Proposals that include a price proposal, the price proposal is provided in a separately sealed submittal that is provided independently to a Price Evaluation Team (PET). The PET performs a review of the competency of all the legal, bonding, and miscellaneous forms and certificates required for a responsive submittal. The PET also opens the sealed proposers' price proposals and reviews the competency of the pricing, after completion of the technical evaluations, in accordance with Colorado Design-Build regulations (2 CCR 601-15 Section 11).

To eliminate the need to review Proposals that exceed the Guaranteed Maximum Price (GMP) and to comply with the Colorado Design-Build regulations, the ITP can require proposers to provide a separately sealed certification of whether or not their Proposal price is within the GMP without revealing the actual price.

Adjectival Scoring Process:

The five adjectival ratings available to each evaluator are defined in Table 6-1. The description establishes the basis by which an adjectival rating is assigned. Also, a percentage range of the maximum score is defined for each adjectival rating.

It is important to note that each adjectival rating is defined through the use of strengths and weaknesses to aid evaluation. Evaluators should begin the evaluation by documenting the strengths and weaknesses of each Proposal and then apply the appropriate adjective. For example, a proposer whose Proposal contains weaknesses, even minor ones by definition, cannot be considered excellent.

It is highly recommended that all evaluators be trained in the established evaluation process, once the evaluation plan is finalized and approved by the EOC. This increases the defensibility of the selection and aids in consistent implementation of the evaluation plan.

Typically, Proposals competing for Design-Build projects are submitted by highly qualified companies, and distinguishing between the proposers can prove challenging. A well-thought-out plan and rigid adherence to the process both aid in determining who will best meet the project goals and provide a strong defense against protest.

Table 6-1. Adjectival Evaluation and Scoring Guide

Adjective	Description	Percentage of Max. Score
Excellent (E)	SOQ/Proposal supports an extremely strong expectation of successful project performance if ultimately selected as the contractor. SOQ indicates significant strengths and/or a number of minor strengths and no weaknesses. Submitter provides a consistently outstanding level of quality.	100-90%
Very Good (VG)	SOQ/Proposal indicates significant strengths and/or a number of minor strengths and no significant weaknesses. Minor weaknesses are offset by strengths. There exists a small possibility that, if ultimately selected as the contractor, the minor weaknesses could slightly adversely affect successful project performance.	89–75%
Good (G)	SOQ/Proposal indicates significant strengths and/or a number of minor strengths. Minor and significant weaknesses exist that could detract from strengths. While the weaknesses could be improved, minimized, or corrected, it is possible that if ultimately selected as the contractor, the weaknesses could adversely affect successful project performance.	74–51%
Fair (F)	SOQ/Proposal indicates weaknesses, significant and minor, which are not offset by significant strengths. No significant strengths and few minor strengths exist. It is probable that if ultimately selected as the contractor, the weaknesses would adversely affect successful project performance.	50–25%
Poor (P)	SOQ/Proposal indicates existence of significant weaknesses and/or minor weaknesses and no strengths. SOQ indicates a strong expectation that successful performance could not be achieved if ultimately selected as the contractor.	24–0%

Strengths and weaknesses are defined as follows:

- *Strengths*: That part of the SOQ/Proposal that ultimately represents a benefit to the project and is expected to increase the submitter's ability to meet or exceed the project's goals. A minor strength has a slight positive influence on the submitter's ability to meet or exceed the project's goals whereas a significant strength has a considerable positive influence on the submitter's ability to meet or exceed the project's goals.
- *Weaknesses*: That part of an SOQ/Proposal that detracts from the submitter's ability to meet the project's goals or may result in inefficient or ineffective performance. A minor weakness has a slight negative influence on the submitter's ability to meet project goals whereas a significant weakness has a considerable negative influence on the submitter's ability to meet the project's goals.

Information Release:

No information regarding the contents of the SOQs/Proposals, members of the evaluation committees, deliberations by the evaluation committee or technical advisors, or other information relating to the evaluation process should be released (except to authorized persons) or publicly disclosed without CDOT executive authorization. The evaluation manual is deemed to be sensitive information and ***will not*** be publicly disclosed unless otherwise provided for by statute or regulation. It is particularly important that any information designated as "proprietary or confidential" by any proposer be carefully guarded to avoid its inadvertent release.

Chapter 7: Structure and Content of the Request for Proposal

Chapter 7: Structure and Content of the Request for Proposal

The basic structure of the Request for Proposal (RFP) is discussed in Chapter 4, "Project Organizational Structure and Design Development" and is summarized below in Table 7-1. This chapter provides brief discussions of the content of the Books and sections of the RFP. The discussion is supported by templates provided in the online Appendix (available on the CDOT Innovative Contracting web page or by contacting CDOT Innovative Contracting) to assist in the development of the RFP. Prior to initiating the development of the RFP, novice project team members should consult with an experienced project team whose members can share their expertise. This transfer of knowledge helps ease the learning curve associated with Design-Build, encourages the application of best practices, and highlights the pitfalls that other projects have overcome so that they may be avoided from the outset.

7.1 Book 1 – Contract

Book 1 is the Contract. It replaces Division 100 of the Colorado Department of Transportation (CDOT) Standard Specifications and provides the general provisions applicable to Design-Build delivery. Book 1 is largely a standardized document applicable to all CDOT conventional Design-Build projects (the exception being Streamlined Design-Build [SDB] delivery that incorporates modified general provisions from Section 100 of the CDOT Standard Specifications). CDOT's Book 1 has gained a wide acceptance in the industry over the last decade, and its recognition promotes the efficiency of Design-Build delivery in Colorado.

Though it is largely standardized, it is nonetheless very important for the CDOT project team to be familiar with its terms, both the parts of the Book that must be tailored to the project-specific conditions and the key parts that drive the contractual relationships between CDOT and the Contractor.

Any changes to Book 1 must be reviewed and approved by the Colorado State Attorney General's Office and potentially the Colorado State Controller's Office prior to issuance of the Draft RFP.

Some of the key elements of Book 1 are discussed below.

7.1.1 Book 1, Section 4.2: Notices to Proceed

In Design-Build delivery, there are typically two Notices to Proceed (NTPs). Following the First Notice to Proceed (NTP1), the Contractor may begin limited activities related primarily to design, development and initiation of various operational work plans, and the setup of project offices and other infrastructure necessary to support the project. There is a payment cap associated with NTP1, which is determined by the project team. The NTP1 Payment Cap should provide the necessary capital to accomplish startup activities, but it should be limited to encourage the Contractor to proceed expeditiously to the Second Notice to Proceed (NTP2). The NTP1 Payment Cap is provided in Book 1, Exhibit A: Defined Terms, and must be completed by the CDOT project team.

The NTP2 typically allows for the start of construction.

Table 7-1. Design-Build Documents (same as Table 4-1 in Chapter 4)	
Book 1 – Contract	
Book 1 is the overriding Contract that governs the design and construction of the project. Key elements of the book include:	

• Contract Terms
• Defined Terms
• Warranties
• Equal Employment Opportunity/Disadvantaged Business Enterprise
• Bonding
• Insurance
• Payment
• Project Schedule
• Completion and Milestone Dates
	• Processes and Procedures
	  o Dispute Resolution
	  o Change Management
	  o Partnering
	  o Third-Party Cooperation
	  o Audit and Inspection Rights
	  o Incentives and Disincentives
	  o Value Engineering

Book 2 – Technical Requirements	
Book 2 provides the project-specific Technical Requirements of the project, including design criteria, methodology, and deliverables; project-specific construction requirements; and operational requirements. Book 2 is divided into 20 sections:	
01. General (includes the Basic Configuration) 02. Project Management 03. Quality Management 04. Public Information 05. Environmental 06. Third-Party Agreements 07. Utilities 08. Right-of-Way 09. Survey 10. Geotechnical and Pavements	11. Earthwork 12. Drainage 13. Roadways 14. Signing, Pavement Marking, Signalization, and Lighting 15. Structures 16. Transportation Management Plan 17. Landscaping 18. Maintenance during Construction 19. Intelligent Transportation System 20. Modification of Standard Specifications
Book 3 – Applicable Standards, Data and Reports	**Book 4 – Contract Drawings**
Book 3 includes documents such as CDOT design guides, American Association of State Highway & Transportation Officials (AASHTO) design standards, *Manual on Uniform Traffic Control Devices* (MUTCD), local design standards, CDOT M & S standards, CDOT construction and materials manuals.	Book 4 contains drawings that are considered to be contractually binding. Typical Contract Drawings include ROW Plans, architectural plans and details, geotechnical boring logs, and binding third-party plans and details.
Reference Documents	
Reference Documents are nonbinding plans, details, reports, and investigations related to the project. Elements of Reference Documents can become binding to the extent that they are referenced to in the Contract Document. Reference Documents communicate the design development done by the owner. Reference Documents typically include:	
• Preliminary Plans and Details • Preliminary Phasing Scenarios • Preliminary Drainage Reports	• Surveys (if not in Book 3 or 4) • Preliminary Geotechnical Recommendations • NEPA Documents (EA, EIS, FONSI, ROD)

7.1.2 Book 1, Section 6.2: Utilities

Section 6.2 is very important because it defines utility responsibilities (along with Book 2, Section 7). It allocates the risk for existing utilities in terms of a defined "Reasonable Accuracy." Reasonable Accuracy is typically defined as the utility horizontal location to within 10 feet, size to within 12 inches, and no depth accuracy. When the CDOT utility data meets Reasonable Accuracy, the Contractor is responsible for resolving conflicts; however, when utilities do not meet Reasonable Accuracy, CDOT is responsible for the impacts of the conflicts.

7.1.3 Book 1, Section 7.2: Disadvantaged Business Enterprises

In Book 1, Section 7.2, the CDOT project team along with the Regional Equal Employment Opportunity (EEO) Office set both the design and the construction Disadvantaged Business Enterprise (DBE) participation goals, expressed as percentages of the total design and construction work established for the project.

7.1.4 Book 1, Section 7.9: Key Personnel

Book 1, Section 7.9, along with Exhibit D, identifies the Contractor's Key Personnel and Key Personnel commitments for the project.

7.1.5 Book 1, Section 9.0: Insurance

Book 1, Section 9.0 must be completed on a project-specific basis. If an Owner Controlled Insurance Program (OCIP) is going to be used, the information pertaining to the OCIP must be provided in Exhibit L. The project team should consult with CDOT Risk Management to determine if an OCIP is necessary and provide the appropriate OCIP provisions in Book 1.

7.1.6 Book 1, Section 11.0: Payment

After Notice of Award, the price on the Proposal Form J is transferred to be the Contract Price in Section 11.1.

7.1.7 Book 1, Section 12.0: Value Engineering and Negotiated Changes and Section 13.0: Changes in the Work

Book 1, Sections 12 and 13 address the change management processes. The CDOT project team must be very familiar with these processes to effectively manage the project during implementation. Change order processes are described in this manual in more detail in Chapter 8, "Implementation."

7.1.8 Book 1, Section 17.0: Damages

This part of Book 1 must be modified on a project-specific basis. It defines the various liquidated damage terms of the Contract. Section 17 may also set the project completion dates and interim completion dates and penalties, if applicable. The project team should set completion and incentive and disincentive requirements for the project in a manner consistent with the project goals. Oftentimes these parameters are also incorporated in the selection criteria in the Instructions to Proposers (ITP).

7.1.9 Book 1, Section 20: Acceptance of Project

Book 1, Section 20 provides the Acceptance requirements and processes for the project.

7.1.10 Book 1, Exhibit A: Acronyms and Definitions

This section includes the definitions for acronyms and defined terms in the RFP. Any term (or acronym) that is capitalized in the RFP is a defined term with its definition provided in Exhibit A. There are certain defined terms that the CDOT project team must complete on a project-specific basis, including:

> **Guaranteed Maximum Price (GMP):** This defined term sets the maximum price of the Contract for the project at the Proposal stage. The GMP is subject to change orders once the Contract is executed.
>
> **NTP1 Payment Cap:** The maximum amount the owner may pay to the Contractor prior to NTP2.

There are a number of key terms that the CDOT project team must be familiar with. Of particular importance is understanding the definitions of Acceptance and Approval:

> **Accept or Acceptance:** Formal conditional determination in writing by the CDOT Project Manager that a particular matter or item appears to meet the requirements of the Contract Documents.
>
> **Approve or Approval:** Formal conditional determination in writing by the CDOT Project Manager that a particular matter or item is good or satisfactory for the project. Such determination may be based on requirements beyond those set forth in the Contract Documents without payment of additional compensation or a time extension and may reflect preferences of CDOT.

Approval provides CDOT with an authority beyond the stated requirements of the project. Though it may seem that such authority is preferable to the owner, if it is used extensively it compromises the effectiveness of Design-Build delivery. Whenever Approval is used in the RFP, it creates an unknown requirement and corresponding risk to the Design-Builder. As a result, proposers may add contingency pricing to account for the risk. Once the project is in the implementation phase, the owner is exposed to potential disputes when exercising Approval authority to enforce requirements that could not have reasonably been anticipated by the Design-Builder in preparing the Proposal. Wherever possible, it is preferable to define specific requirements by which CDOT can Accept and minimize the use of Approval authority. Nonetheless, usually there are some critical elements of the project that CDOT wants Approval authority over. The Quality Management Plan and the Environmental Compliance Plan are typical examples.

7.1.11 Book 1, Exhibit B: Completion Deadlines

The completion deadlines committed to in Form P of the Proposal are transferred to Exhibit B to be a part of the Contract.

7.1.12 Book 1, Exhibit D: Key Personnel

The Key Personnel commitments in Form I of the Proposal are transferred to Exhibit D to be a part of the Contract. The Key Personnel commitments are provided initially in the Statement of Qualifications (SOQ) and then carried over to the Proposal and the Contract.

7.2 Book 2 – Technical Requirements

Book 2 provides the project Technical Requirements. The Technical Requirements are organized by discipline. The Technical Requirements are primarily the governing design requirements for the project. They also include construction requirements where they vary from the CDOT Standard Specifications.

The Book 2 Technical Requirements should be developed through the use of discipline-oriented workshops. The process is illustrated in Figure 7-1.

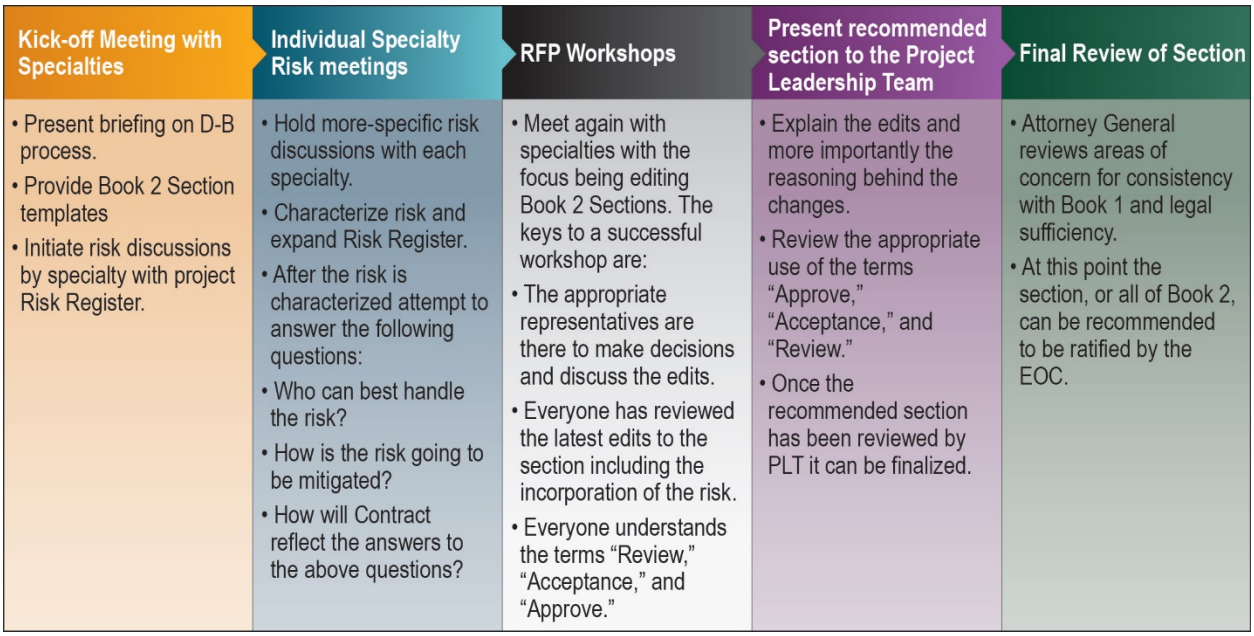


Figure 7-1. Development of Technical Requirements Workflow

The following sections provide overviews of the sections of the Technical Requirements, with description of key investigations and design development activities as well as potential risks and risk mitigation activities.

7.2.1 Book 2, Section 1: General

Book 2, Section 1 contains the project description, project goals, and a description of the Basic Configuration, and therefore it defines the primary scope of work and project limits. It also includes scope of work descriptions of any Additional Requested Elements (AREs) that can potentially be included in the project. Book 2, Section 1 typically includes exhibits for the Basic Configuration and AREs. Any proposer's proposed changes to Book 2, Section 1 are considered changes to the Basic Configuration and are handled through the Alternative Configuration Concept (ACC) process during the procurement phase of the project. This includes any proposed additional scope committed to by the proposer augmenting the Basic Configuration. As changes to the Basic Configuration, ACCs are often significant changes, which should be considered carefully and should require Approval at the Executive Oversight Committee level.

Section 1 also includes critical Technical Requirements. An example is pavement type criteria, which are important to the character of scope of work and the makeup of the Contractor's team.

CDOT Investigations and Design Development Requirements:

The preliminary design developed by CDOT and included with the Reference Documents provides the basis for the Basic Configuration. Refer to Chapter 4, "Project Organizational Structure and Design Development" in this manual for a more detailed description of the Basic Configuration and design development.

Risk Mitigation and Risk Allocation:

Book 2, Section 1 typically provides tolerances for horizontal and vertical alignments provided in the Reference Documents that the Contractor is required to maintain. To that extent, CDOT accepts the risk that the project can be designed and constructed within those tolerances and within the project limits while meeting project design criteria. From that perspective, the project development should be focused on minimizing that risk to ensure that the footprint provided to the Contractor (horizontally, vertically, and environmentally) is feasible to accomplish the requested improvements.

7.2.2 Book 2, Section 2: Project Management

The Project Management section includes requirements for scheduling, Invoicing, facilities, meetings, document management, and safety management. Key elements that the CDOT project team should address on a project-specific basis are:

Schedule:

The Contractor is required to provide a schedule at the beginning of the project (the Baseline Schedule) to ensure the project will be completed within the required deadlines and to control costs. This deliverable is an Approval document and therefore may only be modified with CDOT Approval throughout the duration of the project. There are numerous variations of the schedule that are necessary to manage the progress of the project. The types of schedules that are used throughout the project include the following:

- Preliminary Baseline Schedule: due prior to NTP1
- Original Baseline Schedule: due prior to NTP2
- Current Schedule: ongoing for the duration of the project and measured against the Approved Baseline Schedule
- Revised Schedule: when the schedule is impacted by change order or agreed-upon delay, this schedule reflects the adjustment, acceleration, or recovery plan necessary to meet or extend the Contract deadlines or the revised drawdown necessary to meet the adjusted GMP
- Monthly Progress Schedule: due monthly and measured against the Approved Baseline Schedule
- As-Built Schedule
- Recovery Schedules (as needed)

The complexity and importance of scheduling on a Design-Build project require that the owner have a high degree of expertise. In particular Contractors use Primavera scheduling software, which CDOT staff

do not typically have expertise in. To address scheduling concerns, it is strongly recommended that the project team includes the expertise to fully analyze a complex project schedule. In most cases, a scheduling consultant should be added to the CDOT team during the implementation phase of the project to provide the necessary expertise. The scheduling consultant should be retained throughout the implementation phase to provide continual review and monitoring of the schedule.

The project schedule developed by the Contractor defines the logic and critical paths used to calculate delay change orders and schedule disputes. The schedule risk belongs to the Contractor, to the extent that the work is within the Contractor's control. It is important for the CDOT project team to fully understand the Baseline Schedule and ensure that the review times and Acceptance and Approval processes reflected in the logic are what has been agreed upon in the Contract before Approving it. Environmental clearances should be included in the project schedule, especially if they are required to be completed prior to the start of construction.

Work Breakdown Structure:

The primary tool to set up both schedule and cost control is the Work Breakdown Structure (WBS). WBS is a deliverable-oriented breakdown of the project into manageable sections. All of the work of the project is organized into WBS activities. The WBS activities then become schedule activities. In addition, payment is determined by a percentage complete assessment of each WBS element, concurrent with progressing the schedule on a monthly basis.

The CDOT project team develops the primary WBS activities, which are included in the RFP, allowing the Contractor to provide a higher level of detail in the Proposal. WBS activities should be divided into easily identifiable activities that describe project elements. Project elements should be selected that can be easily assessed for their percent completion. It may be necessary for CDOT to define certain WBS elements that reflect specific assets, such as assets that are funded by sources that have tracking requirements tied to their funding (e.g., Tiger Grants, Bridge Enterprise funding, Permanent Water Quality [PWQ] Pool Funds). The Contractor is paid according to completeness of each WBS activity. The major WBS activities should match the activities or sections on Form J in the ITP.

Office Facilities:

The Office Facilities subsection of Section 2 needs to be completed on a project-specific basis by the CDOT project team. This is the subsection where the Contractor's co-location requirements are specified. The extent of co-location can vary significantly, from only the Contractor's senior construction personnel to the Contractor's entire construction and design staff. Contractor/owner co-location can greatly facilitate critical Design-Build collaboration. Co-location is key to fostering over-the-shoulder design reviews, which in turn allows the owner the best opportunity to collaboratively develop the project design with the Contractor's designers. Co-location allows the owner and the Design-Builder an opportunity to take advantage of efficient and often expedited decision making by housing all the decision makers, who are all focused on meeting the project goals, in a single facility. But there are real costs associated with the Contractor providing co-located staff that should also be considered. However, the more complex a project, the greater the need for a strong co-location plan. For many

Design-Build projects, co-location at a minimum should include required full-time co-location of the Contractor's Key Personnel and key design discipline staff through the design phase of the project.

A co-location plan can be requested in the ITP as a part of the Proposal, providing an incentive for the Contractor to make contractual co-location commitments as a part of the Proposal.

7.2.3 Book 2, Section 3: Quality Management

The Quality Management Section defines the structure and responsibilities for the Quality Assurance (QA) program for the project including both CDOT's Acceptance responsibilities and the Contractor's Quality Control (QC) responsibilities. It is important to note that quality management includes all aspects of the project, not just the material testing and construction inspection. Quality management must also address design and construction operations, such as environmental compliance, Public Information (PI), Maintenance of Traffic (MOT), and water quality.

The Quality Management Section also defines the design processes and deliverables leading to Released for Construction (RFC) Documents, Final Design Documents, and As-Built Documents.

Following are key definitions used in the CDOT Quality Management Section:

> ***Quality Assurance (QA):*** *All those planned and systematic actions necessary to provide confidence that a product or facility will perform satisfactorily in service. Quality Assurance is an "umbrella" term that includes Quality Control (QC) activities by the Design-Builder and Acceptance activities by CDOT for both design and construction.*
>
> ***Quality Control (QC):*** *The system used by the Design-Builder (design consultant, sub-consultants, prime contractor, subcontractors, producers, fabricators, manufacturers) to monitor, assess, and adjust their processes to ensure that a product will meet the specified level of quality. The Design-Builder is responsible for implementing a Design QC system and a Construction QC system. There are two tiers of Quality Control: Frontline QC (herein called "Process Control") and Formal QC (herein called "Independent Quality Control").*
>
> ***Design Process Control:*** *Frontline QC activities consisting of "self-checks" by the design production staff responsible for development of the design documents. This includes QC checking of design calculations, plans, studies, reports, and software validation.*
>
> ***Independent Design Quality Control (IDQC)****: Formal QC activities performed by a Design QC team independent of the design production staff. This includes independent technical reviews at key milestones in the design process and audits intended to confirm that the design process is functioning effectively.*
>
> ***Construction Process Control****: The system used by a Contractor to monitor, assess, and adjust its production or placement processes to ensure that the final product meets the specified level of quality. Construction Process Control includes sampling, testing, inspection, and corrective action (where required) to maintain continuous control of a production or placement process.*

Independent Construction Quality Control (ICQC): *Formal QC activities performed by a separate Construction QC team that is independent from the production staff. This involves formal QC sampling, testing, and inspection to provide timely data to monitor and guide each production and placement process and to ensure the product conforms with the Contract requirements. Secondarily, this QC data may be included in CDOT's Acceptance determination.*

Owner Acceptance (OA): *All activities performed by CDOT to evaluate the degree of compliance with Contract requirements and to determine the corresponding value for a given product. Design Acceptance activities by CDOT include reviews of plans, specifications, and other documents prepared by the Design-Builder. Construction Acceptance activities include Acceptance sampling, testing, and inspection of the work by CDOT.*

Owner Verification Testing (OVT): *OVT is the Acceptance testing performed by CDOT on projects where ICQC testing data is included in CDOT's Final Acceptance determination. OVT is typically performed at a lower frequency than full Acceptance testing.*

Independent Assurance (IA) Testing: *Activities that are an unbiased and independent evaluation of all the sampling and testing (or inspection) procedures used in the Quality Assurance program. IA provides an independent verification of the reliability of the Acceptance (or verification) data obtained by the agency and the data obtained by the Contractor. The results of IA testing or inspection are not to be used as a basis of Acceptance. IA provides information for quality system management.*

Design Quality Assurance:

The Design-Builder is responsible for implementing a Design QC system. This includes Design Process Control activities by the frontline design production staff and IDQC by a separate Design QC team that is independent of the design production staff.

CDOT performs Design Acceptance activities. These include over-the-shoulder reviews of the in-progress design and formal review and Acceptance of Final Design packages prior to issuance as RFC.

Construction Quality Assurance:

A Construction QC system is to be implemented by the Design-Builder. The first tier of the QC system is Construction Process Control performed by the construction production staff. The second tier of the QC system requires Formal QC inspection and testing performed by an ICQC team that is separate from the production staff. The construction quality organization is illustrated in Figure 7-2.

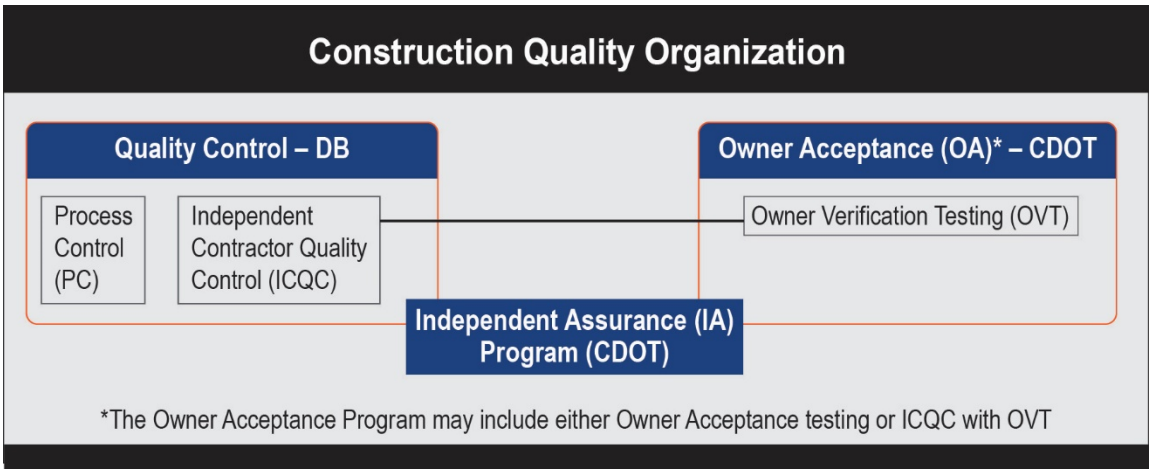


Figure 7-2. Construction Quality Organization

CDOT is responsible for the Construction Acceptance system. On Design-Build projects CDOT is always responsible for performing some level of Acceptance inspection and testing. However, there are two Acceptance approaches that may be used for CDOT's Acceptance determination:

1. Use only CDOT Acceptance data
2. Include Contractor ICQC data with CDOT Owner Verification Testing (OVT)

Under either approach CDOT must retain the ultimate Acceptance authority (per 23 CFR Part 637). It is important to recognize that Contractor ICQC activities do not replace CDOT's Acceptance activities; rather ICQC data is used to augment CDOT's Acceptance data. When using Approach 2, CDOT Acceptance testing is referred to as "Owner Verification Testing" and the Contractor ICQC data must be mathematically validated by CDOT's OVT data. A comparison of the two Acceptance system approaches is provided in Table 7-2.

Table 7-2. Comparison of Construction Acceptance System Approaches

Approach 1 (Use only CDOT Acceptance Data)	**Approach 2** (Include ICQC Data with CDOT Acceptance Data)
• Requires higher level of CDOT Acceptance inspection and testing staff and activities • CDOT has more Acceptance data to assess and communicate quality concerns • Final Acceptance determination made using only CDOT Acceptance data • CDOT Acceptance staff and resources may be eligible to be included as a part of CDOT's allocated indirect costs	• Contractor ICQC inspection and testing is required • CDOT may reduce level of Acceptance inspection and testing staff and frequency of Acceptance activities • Contractor ICQC data must be mathematically validated by CDOT's OVT data • Final Acceptance determination made using both CDOT Acceptance data and ICQC data

For projects using Contractor ICQC data, it is important to structure the Quality Management Technical Requirements and/ or the ITP provisions to ensure the Contractor is committed to providing adequate ICQC resources. This can be accomplished through the Quality Management Technical Requirements by identifying training and certification requirements and minimum Contractor, producer, and fabricator operations that require full-time ICQC inspection and testing.

The ITP approach requires the Design-Builder to provide firm contractual commitments of QC resources (in terms of full-time equivalent staffing commitments and certification and training). Proposals are then scored based on those commitments.

These approaches are especially important to consider so that proposers are not inclined to reduce QC resources to minimize their Proposal prices.

Regardless of which Acceptance system approach is used, all Contractor QC testing performed must comply with the requirements of the current CDOT *Field Materials Manual*.

Other key considerations of the Quality Management Section are:

- Setting Contractor QC Key Personnel requirements
- Defining training and subcontractor indoctrination requirements
- Defining document control requirements
- Defining process requirements for RFC Documents
- Defining off-site product control requirements
- Defining Contractor QC Materials Testing and Inspection Plan (MTIP) requirements
- Defining minimum Hold Point requirements
- Defining procedures for identifying and correcting Nonconforming Work, including corrective and preventative actions
- Defining final design and construction Acceptance

7.2.4 Book 2, Section 4: Public Information

Book 2, Section 4 contains requirements for handling information to and from the public. It plays a strategic role in obtaining public consensus for the project and minimizes the impacts to the traveling public. By providing current and reliable information to the public, the Contractor can reduce delays and improve safety for the duration of the project.

Section 4 should include information on the following topics:

- The requirements of the Public Information Plan (PIP)
- Contractor Public Information Manager (PIM) duties
- The requirements of the Public Information Task Force
- The relationship between MOT and PI notifications
- Identification of key stakeholders
- Stakeholder communications
- Public/stakeholder contact data collection and management
- PI approaches and tools
- PI meetings
- Crisis communication procedures
- Travel Demand Management requirements

There are two primary approaches to providing PI: a CDOT-led PI program and a Contractor-led PI program.

In a CDOT-led program, the Contractor provides CDOT with the necessary project information and CDOT takes the primary responsibility for disseminating the information to the public and to stakeholders. If CDOT leads the PI program, then it has more control over the program, but CDOT must have the available resources and the commitment to continuously coordinate with the Contractor for the program to be successful.

In a Contractor-led PI program, the Contractor has most of the responsibilities for dissemination of information and coordination with the public and stakeholders and CDOT primarily has an oversight role.

The correct approach for the project depends on the sensitivity of the public and the availability of resources.

The CDOT project team, which should include the personnel from the Office of Communications (at headquarters or regional level), determines the best approach and the requirements for this section. CDOT has a Project Special Provision Worksheet Revision of Section 626 that may assist the project team in developing this requirement and determining an approach.

The PIP can be prepared by CDOT or by the Contractor. The roles and responsibilities for PI are somewhat dependent on who has responsibility for preparing the PIP. An important component of the PIP is to ensure the project undertakes an appropriate PI effort regarding traffic management during construction. To that extent, the PI Technical Requirement should be coordinated with the Transportation Management Plan (TMP) Technical Requirement. In particular, both requirements

should require that a joint PI/MOT committee be convened on a regular basis throughout the implementation phase of the project.

When developing Section 4, consideration must be given to the flow of PI. Generally, the Contractor PIM provides information to the CDOT communications manager and the information is distributed to the public. The flow of PI must consider the general public, stakeholders, media, and governmental agencies. Each group has unique requirements and deadlines for receipt or dissemination of information. The CDOT project team must consider each group's needs and determine the best method and timelines for handling information.

Section 4 should also include requirements for public outreach such as a hotline, project signs, and project websites. Public outreach may also require meetings with the general public, stakeholders, media, and governmental agencies.

7.2.5 Book 2, Section 5: Environmental

Environmental compliance in Design-Build can pose a considerable risk to both CDOT and the Contractor. The Contract allows the Contractor latitude in developing a design that varies from the design presented in the Reference Documents, allowing the Contractor the opportunity to develop the most efficient design. However, the variations in the design relative to Reference Documents may affect environmental impacts, which in turn may affect project clearances, the schedule, and so forth. As a result, wherever possible, it is best to make the mitigation measures—such as preparing, documenting, implementing, and gaining third-party approvals of the changes and maintaining those measures—the responsibility of the Contractor until project Acceptance. Regardless, CDOT retains the ultimate responsibility for the mitigation measures and therefore must carefully monitor their progress.

CDOT must provide a thorough scope with clear definition for all environmental activities. The National Environmental Policy Act (NEPA) decision document typically must be completed and incorporated into the final RFP. Additional discussion on NEPA processes for Design-Build delivery is provided in this manual in Chapter 5, Section 5.4, "Design-Build Delivery Interface with Other Processes." The environmental requirements of the project must be consistent with those of the NEPA document and specify consequences for deviating from the NEPA document. Modifications to the environmental requirements could result in changes to the project clearances, schedule, and so forth. The Contractor is responsible for preparing and/or acquiring all new environmental supporting studies and permits as a result of Contractor-initiated changes and is responsible for time delay risks. All necessary permits and regulatory approvals must be defined, and responsibilities must be clearly assigned to both CDOT and the Contractor for implementing, maintaining, and documenting permits.

CDOT's Environmental Manager and Project Manager must work together in the development of the project scope and RFP and during the administration of the Contract to identify how the design can be flexible and innovative and what risk allocation is best suited on the project while ensuring environmental compliance.

The content of the environmental Technical Requirements should include the following:

- Identify Key Personnel requirements for the Contractor's environmental team.

- Identify the Contractor's requirements for developing and executing an Environmental Compliance Plan for the project, including QC for environmental operations.
- Identify all permits that the Contractor is required to obtain.
- Identify the permits that CDOT is required to obtain.
- Identify the Contractor's responsibilities to adhere to CDOT-obtained permits.
- Identify permitting processes and time frames.
- Identify environmental resources mitigation requirements (these may include: air quality; noise; cultural, historical, archaeological, recreational 4(f) and 6(f); biological; visual; wetlands and riparian areas; and water quality requirements).
- Identify all rules, requirements, and regulations that the Contractor is required to follow.
- Identify requirements and responsibilities for mitigation measures for impacted wetlands and riparian areas.
- Identify investigation and mitigation responsibilities for hazardous substances.
- Identify Contractor responsibilities for developing and implementing a Hazardous Waste Management Plan.
- Require full compliance with the mitigation requirements of the NEPA decision document.
- Identify the steps to obtain environmental clearance for the Contractor's design when it changes the environmental conditions of the project.

Risk Mitigation and Risk Allocation:

The environmental Technical Requirements can present some of the most significant risks to the Contractor and the project as a whole if not properly addressed. Environmental permitting and mitigation requirements typically involve institutional third-party processes and approvals that are difficult to control and can lead to both schedule and cost risks to the project. During the RFP process, the project team needs to identify which mitigation measures need to be managed by CDOT and which should be the responsibility of the Contractor. If the mitigation measures are the responsibility of the Contractor, they need to be clarified in the RFP with specific Contract language so they are understandable and implementable.

The RFP should include prescriptive requirements for documentation and reporting. In practice, there can be significant differences of opinion between CDOT and the Contractor regarding reporting requirements. CDOT should consider all items necessary to document compliance with the environmental decision document requirements and require sufficient documentation from the Contractor so this information can be easily passed on to third parties when appropriate.

Typically, environmental permitting can be more effectively managed by the owner because the owner has stronger working relationships with the permitting agencies and a better understanding of the processes. However, certain environmental approvals and processes that can be well defined can be allocated to the Contractor. In situations where permitting can be clearly defined and allocated to the Contractor, scheduling benefits can be realized.

Agreements with permitting agencies that define approval requirements and processes can significantly reduce risks to the Contractor. Memorandums of understanding (MOUs) can be valuable documents in

that regard, however they are not contractually binding and are difficult to obtain. Any form of documentation is helpful in reducing misunderstanding and minimizing permitting and regulatory risks.

Specific requirements should be included in the RFP to ensure that the Contractor includes environmental requirements as part of the quality program. Failure of the Contractor to have a robust quality program for the environmental requirements transfers the burden for environmental quality requirements to CDOT.

Risks associated with individual environmental resources, as well as lessons learned, are identified in the online Appendix on the CDOT Innovative Contracting web page or by contacting CDOT Innovative Contracting.

Preexisting hazardous substances present a risk to both parties. CDOT should be careful to precisely define the risk allocation in the environmental Technical Requirements. If CDOT has performed physical investigations that fully characterize the nature and extent of hazardous materials, the Contractor can be assigned the responsibility and risk for the required mitigation. More typically, investigations by CDOT allow for only a general understanding of the conditions. In those situations, the risk is often shared: CDOT accepts the cost risk through a time and materials change order to compensate all related mitigation costs for identified pre-existing hazardous materials, and the Contractor accepts the risk of scheduling the project to accommodate mitigation work. The Contractor has the responsibility of making every effort to avoid hazardous materials. If a Contractor's design increases the impacts relative to the Basic Configuration, then the Contractor accepts full responsibility for the increased mitigation efforts, including possible remediation, disposal, and scheduling delays.

Noise mitigation risk needs to be carefully addressed in the environmental Technical Requirements. Typically, CDOT performs a noise analysis and develops proposed mitigations as a part of the NEPA process. The NEPA mitigation often includes stakeholders' interests. The Contractor's design may change the geometric conditions of the Basic Configuration, which may invalidate parts of CDOT's noise analysis. The recommended approach is for CDOT to accept the risk for noise mitigation provided the Contractors design does not fall outside of defined vertical and horizontal tolerances. CDOT's noise analysis should provide those tolerances relative to the sensitivity of the noise analysis. If the Contractor's design falls outside of the defined tolerances or otherwise proposes revised noise mitigation, then the Contactor accepts the risk of performing a revised noise analysis (that must be Approved by CDOT) and obtaining any necessary stakeholder consensus as well as any other revised environmental clearance requirements.

Temporary water quality and PWQ risks are always present. When the project is within a Municipal Separate Storm Sewer System (MS4) boundary, whether CDOT's or a local agency's, additional requirements to meet water quality are necessary. Ideally, water quality risks can be minimized by CDOT defining the characteristics of an acceptable PWQ for the project. Temporary water quality is based upon the state or federal stormwater construction permit. Any work that disturbs soil is subject to construction water quality requirements. More detailed water quality information can be found within Book 2, Section 12.

CDOT Investigations and Design Development Requirements:

In the NEPA decision document there are important factors that should be considered during design development. Advanced investigations may be necessary by CDOT for further design development. For example, if contamination is identified during the NEPA process, the risks associated with the project environmental compliance can be significantly reduced through advanced investigation by CDOT. An important design development activity by CDOT is to advance the permitting process as much as possible given the limited advancement of the project design in the pre-bid phase.

7.2.6 Book 2, Section 6: Third-Party Agreements

Book 2, Section 6 contains requirements for third-party agreements and coordination with local agencies and railroads. The special cases of third-party agreements with environmental permitting agencies and utilities are addressed in Book 2, Section 5 and Section 7, respectively.

Third-party agreements are required to ensure the affected facilities of third parties are properly addressed through the design, and that third-party processes are well defined and adhered to by both the owner and the Contractor.

Section 6 should contain a discussion of following topics, as needed:

- Identification of third-party facilities affected by the project
- Third-party facilities design requirements
- Third-party review and approval processes
- Intergovernmental agreements (IGAs) and MOUs
- Railroad Construction and Maintenance agreements
- Railroad Right-of-Entry agreements

Third-Party Involvement:

In general, third -party involvement can be most effectively managed by the owner. Railroad companies, the Federal Highway Administration (FHWA), public utilities commissions, adjacent jurisdictions, funding partners, and other third parties often have established relationships with the owner that the owner can more effectively manage. In particular, third-party agencies that have contributed funding to the project often participate in the owner's project management organization and decision-making process. It is important that Book 2, Section 6 communicates to the Contractor the nature of the relationships that CDOT has with third parties and any agreements or processes between CDOT and the third party that may have an effect on the schedule or other aspects of the project.

Railroads:

The railroad companies are particularly challenging third parties to manage in Design-Build projects. They often require very advanced designs before executing construction and maintenance agreements, which constitute their formal approval of grade separation structures over or under their facilities and

easements. Railroad processes introduce a high level of risk to the Contractor whenever it is necessary to include the costs and schedules for work that interfaces railroad facilities.

Risk Mitigation and Risk Allocation:

CDOT is usually in a better position to manage risks by executing third-party agreements. Statutes do not allow the Contractor to enter into agreements with some third parties such as railroads. Where local jurisdictions are involved, IGAs defining the design requirements and the process requirements significantly reduce project risks. In particular, agreements that obligate the third party to certain review and approval timelines allow the Contractor to commit to a more aggressive schedule for the project.

Railroad approvals are of particular concern. When schedule risk associated with the railroad process is allocated completely to the Contractor it may result in conservative scheduling and/or the potential for disputes between the Contractor and the owner during the implementation phase of the project. A suitable approach to consider is for CDOT to accept some of the scheduling risk by committing to assumed railroad review times provided the Contractor's submittals meet well-defined deliverable requirements. This adequately balances the risk of railroad approvals; if the railroad does not meet the review times, it provides the basis for change orders to reflect any resultant project delays.

Railroad impacts can also result in additional environmental clearance requirements for the project. In particular, historic railroads can trigger the National Historic Preservation Act, Section 106 process, which can take 9 to 12 months to complete.

CDOT Investigations and Design Development Requirements:

The CDOT project team should identify all third parties that are affected by the project. CDOT should perform advance coordination with third parties with the intent of executing IGAs prior to the release of the final RFP. For situations where the agreement has not been finalized, it is recommended that draft agreements be included in the final RFP at a minimum.

Advance coordination with railroads is particularly important. To the extent possible, the CDOT project team should strive to fully define the project-specific requirements to obtain railroad construction and maintenance agreements and right of entry agreements. The CDOT project team should investigate track configuration, future track requirements, off-track maintenance access, and other issues that dictate the geometry of grade separation structures prior to the issuance of the RFP. Temporary crossings and any other required railroad work should be identified early and discussed and commenced as soon as possible in the RFP phase to minimize potential project delays. Where railroad flagging is necessary, it is important to define the specific flagging requirements, estimated hourly costs, and train operation timelines (with the recognition that train operation timelines can change). Effective communication is needed between the CDOT Project Manager and the railroad leader.

Because of the difficulty of defining railroad design and process requirements, the CDOT project team should advance to a higher level or even complete the design of facilities that interface with railroads. As a best practice it is recommended that the CDOT project team obtain approvals for concept and 30

percent design for overhead structures and obtain approvals for concept, 30 percent design, and 60 percent design for underpass (railroad supported) structures. The requirements for the various submittals are identified in *BNSF Railway – Union Pacific: Railroad Guidelines for Railroad Grade Separation Projects*.[11]

On projects with significant interface with railroads it is also recommended as best practice that the CDOT project team include a consultant with knowledge and experience with the specific railroad companies that are impacted by the project.

7.2.7 Book 2, Section 7: Utilities

Book2, Section 7 contains requirements for utilities and includes the following topics:

- Definitions
- General Utility work obligations
- Exclusions from Utility work
- Identification of Utilities
- Utility coordination
- Utility work procedures
- Exhibits
    - Exhibit A – Utility Tracking Report (Template)
    - Exhibit B – Not Applicable
    - Exhibit C – Utility No-Conflict Closeout Form
    - Exhibit D – Design of Relocation Acceptance Letter (DRAL)
    - Exhibit E – Construction of Relocation Acceptance Letter (CRAL)
    - Exhibit F – CDOT Utility Relocation Permit
    - Exhibit G – Utility Work Order

Utility Relocation Agreements (URAs) are provided in the Reference Documents.

Utility responsibilities need to be clearly defined in the Contract requirements and appropriately allocated to either the Contractor or to CDOT:

Private utilities: The owner needs to define coordination and schedule responsibilities. It is preferable to have URAs executed with each private utility before issuance of the final RFP. This is usually difficult to do, and often a reasonable approach is to provide draft URAs with the final RFP and then execute the final URAs prior to NTP. The agreements should define the scope of anticipated relocations relative to the Basic Configuration and any AREs, relocation responsibilities (both construction and design), and the schedule for the relocations. If the Contractor's design varies from the Basic Configuration, the Contractor accepts the responsibility for the revised utility relocations.

[11] Union Pacific Railroad, *BNSF Railway – Union Pacific: Railroad Guidelines for Railroad Grade Separation Projects,* January 24, 2007, https://www.up.com/cs/groups/public/documents/document/pdf_rr_grade_sep_projects.pdf.

Public Utilities: If the work and approval processes are fully defined in the Technical Requirements, design and construction responsibilities can usually be allocated to the Design-Builder. If the public utilities work is on behalf of a third-party agency, an IGA should be developed to formalize the Technical Requirements and process requirements of the third party. As with private utilities, if the Contractor's design revises the relocation requirements, the Contractor accepts the responsibility for the revised relocations.

Risk Mitigation and Risk Allocation:

Utilities have historically represented one of the significant risks on transportation projects. The risk is a result of the difficulty in fully defining existing subsurface utilities conditions combined with the need to coordinate conflict relocations with work that is often performed by third-party utility agencies. Design-Build delivery provides the opportunity to share the risk between the owner and the Contractor in a manner that better manages the overall risk, but care must be exercised to properly allocate the risk and to minimize it through advance coordination and design development.

It is important to note that Colorado Design-Build regulations (C.R.S. § 43-1-1411) authorize CDOT to perform utilities relocations (both private and public) if necessary to eliminate delays, and CDOT can assess delay damages to utilities companies that are not responsive. The regulatory language is provided in Chapter 1 in this manual. This is strong leverage to minimize utilities risks on the project, and utility agencies should be informed of CDOT's authority when developing URAs.

As noted earlier in this chapter, Book 1, Section 6.2 defines Reasonable Accuracy of utilities investigations provided by CDOT. By the requirements of that section, CDOT accepts the risk of providing horizontal locations of existing utilities and to a limited extent the size of the utilities, and the Contractor accepts the risk of the vertical depth of the utility.

URAs define both design and construction cost responsibilities and, importantly, process and schedule. Typically, utilities are required to relocate at their own expense unless they have exclusive utilities easements or permits within the CDOT Right-of-Way (ROW).

CDOT Investigations and Design Development Requirements:

Utility information is important to define in the project scope. It establishes an equal baseline for Design-Build teams. CDOT's standard utility investigation procedures should be followed during the initial design development of the project. This includes identification of the utility by owner, utility location, and anticipated conflicts and relocation requirements. The CDOT project team should provide a utility matrix for the project. The matrix should be continuously updated through the procurement phase of the project. When the project advances to the implementation phase the Contractor is required to take over responsibility for the matrix and continuously update the matrix through the Design-Build of the project. The matrix should include the following:

- Identification of existing utilities within the project limits
- Identification of utilities owners
- Identification exclusive utilities easements and permits

- Potential conflicts and adjustments and relocations
- Status of URAs with corresponding cost and work responsibilities
- Anticipated schedules for utility work

Utilities risks can be substantially reduced if the project team performs comprehensive utilities investigations during the initial design development. This effort can extend into the procurement process, up to the issuance of the final RFP. At the very least utilities should be well defined relative to their plan locations, and all surface features should be surveyed. Ideally the investigations should extend to pot-holing of utilities at key locations to identify vertical depth, confirm horizontal location, and confirm the character of the facility.

Utilities may be made of hazardous materials such as asbestos and may require handling in accordance with Section 5 – Environmental. The CDOT 250 specification will need to be adhered to in these situations. The CDOT project team should make efforts to determine if the utilities contain hazardous material to reduce risk during construction.

The footprints of utilities impacts need to be assessed relative to the environmental clearance footprint of the project. If utility impacts exceed the limits of the environmental footprint, then additional environmental and FHWA clearances may be required prior to construction.

Field investigations should be coordinated with the development of the URAs. The CDOT project team should aggressively pursue URAs throughout the initial design development and into the procurement phase of the project. The combination of extensive site investigations and well defined URAs will allow the proposers to assess utilities impacts relative to their designs and fully understand the responsibilities of CDOT, the utilities agencies, and the Contractor, thus minimizing to the extent possible the significant risks of utilities.

7.2.8 Book 2, Section 8: Right-of-Way

Book 2, Section 8 contains information on the following:

- Responsible parties for ROW acquisition
- Status of ROW
- Property management
- Acquisition and relocation requirements
- Condemnation process
- Construction requirements
    - Demolition
    - Restoration
    - Protection of property
- ROW Plans (provided in Book 4)
- ROW acquisition schedule commitments (in the Section 8 Appendix)
- Schedule commitments of demolitions (in the Section 8 Appendix)
- ROW acquisition process and responsibilities (in the Section 8 Appendix, if applicable)

Risk Mitigation and Risk Allocation:

Typically, the Contractor relies on CDOT to acquire ROW in accordance with the acquisition schedule provided in the RFP. CDOT then holds the risk for obtaining the ROW on or before the date provided in the acquisition schedule. Generally, it is a risk management best practice for CDOT to retain full ownership and control of all actions requiring acquisition of ROW under the Uniform Relocation and Real Property Acquisition Act of 1970, as amended (Uniform Relocation Act), 49 CFR Part 24. CDOT is able to best manage the ROW process; should acquisitions require condemnation and or immediate possession, CDOT has the legal authority to execute those processes through the Attorney General's Office. Any acquired ROW needs to go through the environmental clearance process.

For large and complex projects, CDOT does have the option to assign some or all of the risk associated with the acquisition process to the Contractor, which allows the Contractor to integrate the ROW process into its schedule to develop the most efficient project schedule. Care should be exercised in those cases to ensure that language in the Contract requires that Contractor acquisitions are in full compliance with the URA. Though the Contractor can be assigned acquisition process responsibilities, usually CDOT retains the cost risk for the acquisitions. CDOT must retain control over legal proceedings related to condemnation and immediate possession.

The risks of temporary easements, which are identified and defined as a result of the Contractor's design or construction approach, are fully assigned, including costs and expense, to the Contractor. Temporary easements must be acquired in full compliance with the Uniform Relocation Act. The Contractor must hire, retain, and use personnel that are experienced and familiar with CDOT policies, processes, manuals, and the URA.

Often design concepts proposed by Contractors require additional or modified acquisitions. In these situations, the process and cost risk of the revised acquisition should be completely assigned to the Contractor, and they are subject to CDOT Approval. These risks include meetings; investigations; clearances; permits; delays; damages; and all other associated actions, costs, and expenses necessary to acquire the impacted parcel in accordance with the Uniform Relocation Act. However, the acquisition process typically remains under the control and direction of CDOT.

During the acquisition of ROW or easements the Contractor is responsible for:

- requesting authorization for all temporary easements and ROW acquisitions.
- preparing and documenting appraisals.
- preparing and documenting value findings.
- submitting appraisals and value findings for review and approval.
- completing a Phase 1 Environmental Assessment for easements and ROW not identified in the NEPA decision document.
- completing any other environmental permitting and clearances that are necessary to comply with the NEPA decision document.
- documenting all actions, meetings, and negotiations undertaken for temporary easements.
- ensuring ROW personnel communicate with design and construction forces to maintain compliance with temporary easement processes and restrictions.
- complying with the requirements of the current CDOT *Right of Way Manual*.

CDOT Investigations and Design Development Requirements:

The primary design development activity that CDOT must perform is to develop a complete set of ROW Plans for the project. The activities and final deliverables necessary for developing the ROW Plans are identical to those of a traditional Design-Bid-Build (D-B-B) project. The ROW Plans are included both in the RFP and in the Contract within Book 4 – Contract Drawings, as they provide the contractually binding ROW limits of the project.

The ROW process follows a specialized approach in Design-Build because it is based on preliminary designs rather than a final project design and plans. The limits of ROW acquisition are generally more generous than for traditional D-B-B projects, but even so the approach does not typically result in significant increases in the project costs. At locations where acquisitions are more impactful, the CDOT design should be furthered advanced to provide a better definition of the ROW needs, which reduces the risk to both CDOT and the Contractor. However, it is important to recognize that the more defined the owner's design becomes, the less opportunity there is for competitive proposers to look for innovative and efficient solutions, so a balance needs to be struck that mitigates the risk while providing design flexibility.

The design developed by CDOT must be fully accommodated within the proposed ROW. Because the Contractor's design is typically allowed to be within horizontal and vertical tolerances relative to the design in the Reference Documents, it is often beneficial to account for those tolerances when setting the proposed ROW. In setting the proposed ROW it is also important to account for historic drainage, noise, maintenance, accessibility, and "finish" (the area between the improvement and ROW line). Possession, entry, and use of a parcel must be managed with care to prevent significant negative impacts to the project and CDOT.

Though on traditional D-B-B projects ROW is usually fully acquired prior to issuance of the NTP, this is frequently not the case in Design-Build projects. Formal clearance is required from the ROW department before the project is allowed to go to construction. If all of the ROW has not been acquired, then the ROW authorization can be a conditional clearance, but it is still required. The ROW process can have a significant effect on how the Contractor schedules the work on the project. The ROW Technical Requirements should contain sufficient information for the Contractor to schedule the project, primarily in terms of property acquisition date commitments.

Where an acquisition schedule is provided for ROW to be acquired after the NTP is issued, detailed ROW process timelines should be developed to identify the acquisition dates committed to by CDOT and then provided in the RFP. The processes to obtain condemnation and immediate possession are prescriptively defined in the Uniform Relocation Act and can be used to identify worst-case acquisition dates for the RFP.

The CDOT project team must work diligently to meet the ROW schedule because any delays in the ROW process may cause delays in the overall project schedule and require change orders. Immediate possession or condemnation actions should be initiated when necessary in accordance with all applicable regulations and guidelines, concurrent with ongoing negotiations to ensure a worst-case schedule can be maintained. Care must also be taken to ensure all right of entry permits are secured

prior to need. The Contract should restrict the duration and use of local streets and ROW to prevent prolonged or undesirable use during construction of the improvements.

7.2.9 Book 2, Section 9: Survey

Book 2, Section 9 contains the requirements for survey, and directs the Contractor regarding the performance of design and construction surveys. It should include the following information

- Standards
- Project Survey Coordinator requirements
- CDOT-supplied survey data
- Contractor survey data
- Preservation of monuments
- Survey records
- Design survey requirements
- Construction survey requirements

Risk Mitigation and Risk Allocation:

CDOT typically accepts the risk for the accuracy of the control survey. The design survey is more of a shared risk, with the Contractor having the responsibility for verifying the accuracy of the CDOT survey. The following statement is usually included in the Technical Requirement:

> "The Contractor is responsible for verifying all survey information, including but not limited to tie-ins to all existing features. If the Contractor identifies any inaccuracies in the CDOT-provided survey information, it shall be the Contractor's responsibility to provide additional surveys as necessary to resolve the inaccuracies and complete the work."

The Contractor accepts the risk for any supplemental design surveys it performs and for construction surveying and as-built surveys.

CDOT Investigations and Design Development Requirements:

CDOT's initial design development should include both a control survey and a design survey. The control survey establishes horizontal and vertical control for the project, for use both by CDOT and the Contractor. The control survey establishes a consistent baseline for all survey data developed by CDOT and the Design-Builder.

The design survey by CDOT is required for both CDOT's preliminary design and for the proposers' designs. If adequate design survey information is not provided during the procurement phase of the project, proposers need to individually obtain the information. This results in redundant surveys, as well repeated and unnecessary impacts to the facility during the investigations. The need for a CDOT-completed design survey is especially acute when railroads are involved, because the information relieves the proposers of the time and expense of obtaining right-of-entry agreements with the railroads and eliminates the need for the railroad to accommodate multiple requests to survey on their property. CDOT should obtain a complete design survey for the project. Proposers and the selected Contractor can then provide any supplemental surveys that are necessary for their specific designs.

CDOT's surveys should generally:

- establish control throughout the project.
- provide stationing and control lines.
- identify existing roadway and drainage inventory items by type and location.
- survey all surface utility facilities and subsurface utilities at locations of critical conflicts.
- display existing ROW lines.
- display proposed ROW lines based on the conceptual design.
- provide topographic information.
- identify existing alignments.
- conduct wetland delineation.
- identify hazardous material or landfill locations.

The Contractor must provide all necessary construction and as-built surveys for the project. The Contractor also must replace any monuments damaged or lost during the work.

7.2.10 Book 2, Section 10: Geotechnical and Roadway Pavements

Book2, Section 10 provides information on geotechnical investigations and pavement design performed by CDOT and the procedures to be followed by the Contractor when conducting additional geotechnical investigations and proposing alternate pavement designs.

Geotechnical and roadway pavements Technical Requirements generally include information regarding the following:

- Geotechnical investigation requirements
- Roadway pavements analysis and design
- Recommended pavement sections and pavement types
- Procedures for alternative pavement design, if allowed
- Detour pavement requirements
- Pavement mix design requirements
- Pavement construction requirements
- Pavement smoothness requirements
- Project Special Provisions related to pavements
- Geotechnical investigations and test results (provided in Book 4 – Contract Drawings)
- Geotechnical recommendations, optional (provided with Reference Documents)
- Pavement designs and life-cycle cost analyses (provided with Reference Documents)

Risk Mitigation and Risk Allocation:

<u>Geotechnical Data</u>

The sampling methods used represent specific conditions at specific known locations, but geotechnical conditions may change between sampling locations. Book 1 of the RFP clearly states in its definition of "Differing Site Conditions" that CDOT accepts the risk for the subsurface conditions only at the specific locations of the geotechnical investigations and not for any interpolated conditions between investigations. Through this risk management approach, the risk of changed conditions or Differing Site Conditions is fully assigned to the Contractor. CDOT should allow sufficient time, including access and

permit requirements, for proposers to perform supplemental investigations to verify and develop geotechnical data to reduce risk to both CDOT and the Contractor

Pavement Design

CDOT typically designs the pavement section(s) and accepts the sole risk for the performance of the roadway pavement sections provided in the RFP. The pavement sections are based on known geotechnical data. With the use of Mechanistic-Empirical Pavement Design, as described in the CDOT *Pavement Design Manual*, the probability of the pavement lasting the design life is considered.

The Contractor may or may not be allowed to submit an Alternative Technical Concept (ATC) for pavement section design. If the ATC is Approved by CDOT, then the Contractor assumes the sole risk for the pavement section performance.

The maintenance risks of temporary and detour pavements should be placed completely on the Contractor. Design of temporary or detour pavements should be based on existing traffic data and existing or proposed subgrade conditions.

CDOT Investigations and Design Development Requirements:

CDOT performs initial geotechnical investigations, preliminary designs of structures foundations, and the final design of the pavement sections.

Geotechnical Data

CDOT must perform geotechnical investigations, including shallow borings and existing pavement cores as necessary to develop the pavement section design. The shallow borings also provide valuable information to the proposers in developing their earthwork design.

CDOT geotechnical investigations should also include deep borings at locations of the proposed structures in the Basic Configuration structures. Recognizing that the Contractor's final design may change the location of the structures, it is not advisable to provide all of the borings that are typically required at structure locations. One or two deep borings should be provided at each structure location identified in the Basic Configuration to allow the proposers to advance their substructure designs with a reasonable level of confidence concerning foundation support designs. Otherwise each proposer would have to individually perform deep boring investigations, resulting in redundant investigations. The proposers can then supplement any geotechnical investigations that are necessary to reflect their specific designs.

The CDOT project team may also choose to obtain geotechnical recommendations as a part of the preliminary investigations. The recommendations can provide valuable information in the CDOT design development for:

- developing risk management plans.
- establishing design parameters (structure foundations, pavement designs, earthwork).
- establishing the basis for determination of changed conditions.
- assisting in developing an estimated project cost.

If geotechnical recommendations are obtained, the information should be provided in the Reference Documents; it must be nonbinding, and the Contractor is not allowed to rely on it because the Contractor must accept full responsibility for the project design.

Pavement Design

Industry sensitivity to pavement types and life cycle cost analysis (LCCA) procedures do not make it practical to allow the Design-Builder complete latitude in the selection of pavement types and the development of pavement designs. CDOT has developed an approach for determining the appropriate pavement types for Design-Build projects that responds to industry concerns while incorporating the benefits of Design-Build innovation.

Pavement Alternatives in Design-Build

To determine the pavement alternatives included in a Design-Build project, the total dollar amount of the pavement materials for ***the lowest cost pavement alternative*** should be estimated. For Design-Build projects "pavement materials" is defined as all material used to build the pavement portion of the project and to overlay or remove the present roadway in order to construct CDOT's recommended design. This includes subgrade, aggregate base course (ABC), rubblization (if applicable), and the actual pavement materials (asphalt or concrete). This also includes importing embankment material, along with complete removal of the existing roadway, full depth reclamation, or milling of the present roadway within the limits of construction.

When a LCCA is performed, a Final Draft LCCA is provided for Industry review for a two-week comment and review period. Industry comments are evaluated by CDOT and adjustments are made, if appropriate, to complete the Final LCCA. It is recommended that the LCCA process be completed prior to the start of the Design-Build procurement process. At the latest, the LCCA process should be completed prior to the issuance of the Draft RFP. The Final LCCA will be incorporated as part of the Draft RFP for the short-listed project teams. CDOT's approach to pavement design depends on the total cost of pavement materials for the project, as follows:

For projects with less than $30 million in pavement materials: If pavement life cycle costs for the alternatives differ by greater than 10 percent, then in Book 2, Section 1 CDOT specifies the most cost-effective alternative as the required pavement alternative.

CDOT provides a complete pavement design for the desired pavement type in the Proposal, and ATCs for alternative designs (using the predetermined pavement type) are considered.

If the pavement life cycle costs differ by less than or equal to 10 percent, then CDOT may elect to allow alternate pavement sections on the project. However, CDOT may still have the option, at its own discretion, to select the pavement alternative pursuant to the Pavement Type Selection Committee procedures in the CDOT *Pavement Design Manual*.

If alternative pavement types are allowed, CDOT provides the complete pavement design for each alternative type of pavement in Book 2, Section 10, but ATCs for alternative designs are considered.

For projects with greater than $30 million and less than $60 million in pavement materials: If pavement life cycle costs for the alternatives differ by greater than 15 percent, then in Book 2, Section 1 CDOT specifies the most cost-effective alternative as the required pavement alternative.

CDOT provides a complete pavement design for the desired pavement type in the Proposal, but ATCs for alternative designs (using the predetermined pavement type) are considered.

If the pavement life cycle costs alternatives differ by less than or equal to 15 percent, then CDOT may elect to allow alternate pavement sections on the project. However, CDOT may still have the option, at its own discretion, to select the pavement alternative pursuant to the Pavement Type Selection Committee procedures in the CDOT *Pavement Design Manual*.

If alternative pavement types are allowed, CDOT provides the complete pavement design for each alternative type of pavement in Book 2, Section 10, but ATCs for alternative designs are considered.

For projects with greater than $60 million in pavement materials: CDOT allows alternative pavement sections on the project. CDOT provides the complete pavement design for each alternative type of pavement, but ATCs for alternative designs are considered.

When the Region allows alternative pavement type bidding:

- for SDB projects, the bids will be adjusted by the factor specified in the Contract. The adjustment factors are calculated pursuant to the most recent version of the Alternative Pavement Type Bidding Specification currently used for D-B-B projects. Selection of the lowest bidder is based on the lowest adjusted bid.

- for Design-Build projects, a cost adjustment factor shall be set by CDOT for projects with pavement material costs greater than $60 million. The cost adjustment shall be determined by CDOT through a LCCA. The Design-Builder is required to construct the section(s) specified in the RFP, unless an ATC is Accepted that modifies the Approved section. Criteria for best-value assessment is determined by CDOT.

Pavement Information Provided in the RFP

Pavement design data provided with the Design-Build documents should consist of condition reports, existing subgrade information, or supplemental as-built plans. End result designs, or performance provisions, should be developed based on the LCCA and future traffic. A LCCA should be performed between the pavement alternatives to select a preferred pavement alternative to be used on the project. This LCCA is performed pursuant to the requirements of the CDOT *Pavement Design Manual*.

7.2.11 Book 2, Section 11: Earthwork

The Book2, Section 11 describes the following requirements:

- Removal of structures
- Clearing and grubbing
- Excavation

- Embankment requirements
- Embankment settlement requirements, if applicable
- Subgrade requirements
- Compaction requirements
- Reuse of material
- Supplemental soil surveys
- Potential source of materials

Risk Mitigation and Risk Allocation:

For earthwork operations, the Contractor accepts the risk to design and construct the project in accordance with the Technical Requirements, and CDOT accepts the risk for the long-term performance of the embankment structures. The risk allocation is a result of the inherent performance characteristics of embankments, which are long term and generally exceed the limits of a reasonable warranty period.

CDOT Investigations and Design Development Requirements:

Earthwork requirements can have a significant impact on project costs and long-term performance. The CDOT project team should assess the geotechnical characteristics of both the existing roadway embankment and adjacent materials that are likely to be used as a part of the final embankment. The assessment allows CDOT to identify appropriate Technical Requirements for embankment and subgrade materials for the project. On projects that require a significant quantity of borrow materials, it is valuable to assess the costs and haul distances of potential borrow sites in developing project cost estimates and earthwork Technical Requirements.

At locations where there is a potential of significant primary and secondary settlement of the foundation materials supporting large embankments, it is critical that CDOT perform a geotechnical investigation to characterize the potential settlements and develop Technical Requirements that minimize settlement after construction. These requirements can include foundation material treatments, embankment surcharging and settlement monitoring and duration requirements. Settlement Technical Requirements can have a significant effect on the project schedule and cost, but they are sometimes necessary to ensure the long-term performance of the facility.

If there is reason to suspect the presence of subsurface features that can affect the project, then the project team should consider further investigations to identify and characterize those features and reduce the potential for change orders resulting from the discovery of unforeseen conditions during construction.

7.2.12 Book 2, Section 12: Drainage

Book 2, Section 12 specifies requirements for design and construction of drainage facilities and includes information on the following:

- Standards
- Design guides

- Coordination with other agencies and disciplines
- Permits
- Stormwater Management Plans
- Control Measures/Best Management Practices
- Temporary drainage
- Permanent drainage
- Permanent Water Quality (PWQ)
- Floodplain requirements
- Drainage Design Report requirements
- Construction requirements

Risk Mitigation and Risk Allocation:

The Contractor accepts the risk to design and construct the project in accordance with the Technical Requirements. The Contractor also assumes the risk to manage temporary drainage and water quality during construction, in conformance with regulatory requirements enforced by the Colorado Department of Public Health and Environment (CDPHE). This is typically a high risk effort that is sometimes not fully accounted for in the Contractor's cost Proposal. Contractor construction water quality responsibilities should be emphasized in the Technical Requirements.

CDOT is typically in the best position to manage third-party drainage risks and can reduce those risks by working with adjacent jurisdictions to identify contributory flows onto and off of third-party facilities.

The complexity of PWQ criteria sometimes warrants consideration of CDOT accepting some of the design risk for water quality by requiring the Contractor to comply with a baseline design. The Contractor then has the opportunity to improve on the baseline design with an approved ATC.

When significant bridge structures cross waterways, it is usually beneficial for CDOT to provide a bridge opening geometry that the Contractor can rely on. Otherwise all of the proposers need to redundantly perform costly floodplain analyses to determine bridge sizes. Also, when working across waterways, a stream crossing plan needs to be developed by the Contractor and accepted by CDOT to satisfy the United States Army Corps of Engineer (COE) 404 permit requirements.

When the project affects a regulated floodplain a Conditional Letter of Map Revision (CLOMR) may be required to be approved by the Federal Emergency Management Agency (FEMA) prior to the start of construction. CLOMRs can take six months to a year to complete and therefore pose a significant schedule risk. If possible, CDOT should obtain a CLOMR prior to release of the RFP. Where it is not reasonable given the project schedule for CDOT to obtain the CLOMR, the Contractor can be assigned the responsibility for processing the CLOMR. This approach also has the advantage of matching the CLOMR to the Contractor's design and allowing the Contractor more design flexibility. Regardless of which party obtains the CLOMR, the overall project risk of the CLOMR can be reduced through advance coordination between the local floodplain administrator and the CDOT project team.

CDOT Investigations and Design Development Requirements:

Drainage design development by CDOT sometimes requires more advancement than other design disciplines to best manage its risks, due to conditions where there is the need to:

- identify the limits of the drainage system and to coordinate with off-site flow contributors and releases to off-site jurisdictions and facilities.
- develop a preliminary design that coordinates drainage and water quality design and provides a feasible benchmark for the final design by the Contractor.
- provide a clear definition of the Contractor's water quality design criteria and requirements (simply referring to water quality permit requirements may result in a contentious interpretation of the permit requirements).
- provide preliminary floodplain analysis to set the required scope of work and size of bridge crossings and to coordinate floodplain analysis, design, and CLOMR requirements with the local floodplain administrator.
- preliminarily price the costs of the drainage system to an appropriate level of accuracy when determining the project budget.
- resolve subsurface conflicts between utilities and drainage facilities.

The design effort necessary to address these issues can sometime be significant and may require more than a 30-percent level of design advancement at specific locations of concern. Often the Contractor's design significantly changes the preliminary design provided by CDOT, through ATCs during the procurement phase and through design revisions during the implementation phase. Nonetheless, CDOT's preliminary design provides a standard benchmark from which all proposers advance their designs.

7.2.13 Book 2, Section 13: Roadways

Book 2, Section 13 contains information on the following topics:

- Standards to be used
- Traffic analysis and design
- Roadway element design requirements
  - Cross slope
  - Superelevation
  - Stopping sight distance
  - Decision sight distance
  - Fill slope
  - Cut slope
  - Clear zones
  - Roadside slopes
  - Retaining walls
- Guardrails and Barriers
- FHWA Interstate Access Requirements
- Trail design (if needed)
- Design exceptions

- Construction requirements
- Exhibits
  - Exhibit A – Roadway Design Criteria
  - CDOT Design Exception Variance Request Form

Risk Mitigation and Risk Allocation:

The Contractor accepts the risk to design and construct the project in accordance with the Technical Requirements. CDOT accepts the risk for the performance of the roadway, provided it is designed and constructed in conformance with the Technical Requirements. The Roadway Technical Requirements are generally prescriptive in nature, using project typical sections, the CDOT *Roadway Design Guide* and the American Association of State Highway & Transportation Officials (AASHTO) "Green Book" to set the geometric design requirements of the project. Alternatively, the Technical Requirements can allocate more of the performance risk to the Contractor by incorporating performance-based criteria such as Levels of Service (LOS) criteria. Care must be exercised in the use of performance-based criteria, such as LOS criteria, to prevent potential disputes than can arise over the interpretation of the criteria and evaluation methodologies.

CDOT should accept the risk of coordination with the FHWA concerning roadway design requirements, such as the interstate access approval, or FHWA approval of design exceptions. If a proposer's ATCs require changes of FHWA approvals, the risk for FHWA approval of the revised design becomes the Contractor's. Similar to environmental mitigation, any increase in time/cost due to processing the ATC change is solely the responsibility of the Contractor.

CDOT Investigations and Design Development Requirements:

Roadway design and plans developed by CDOT must demonstrate the ability of the project to be built within its limits (usually within the limits of the proposed ROW). Book 2, Section 13 typically provides tolerances that the Contractor's design is required to stay within relative to the horizontal and vertical alignments provided in the Reference Plans. CDOT accepts the risk that the project can be designed and constructed to within those tolerances and within the project limits while conforming to the project design criteria. From that perspective, the project design development should be focused on minimizing that risk and ensuring that the footprint provided to the Contractor (horizontally, vertically, and environmentally) is feasible to accomplish the requested improvements.

CDOT should identify controlling guidelines such as the CDOT *Roadway Design Guide* or AASHTO *Roadside Design Guide*. Where minimum criteria called out in the design guides are not the desired end result, CDOT should identify controlling criteria that meets the needs of the project. In this case the CDOT should specify revisions to LOS, minimum lane widths, minimum shoulder widths, minimum temporary alignment designs, safety requirements, and other criteria as necessary. To avoid potential misunderstandings in interpretation of the controlling criteria, CDOT has established a best practice of including a table of roadway design criteria at the end of Book 2, Section 13.

It is usually best for CDOT to provide design year traffic volumes. Design year volumes are often required for the Contractor to design to operational project requirements. Calculation of proposed volumes can require extensive modeling, which would be a redundant effort for proposers, and also entails subjective engineering judgments, which are best made and benchmarked by the owner. With proposed volumes set by CDOT, the Contractor can then provide operational analysis on an objective basis.

7.2.14 Book 2, Section 14: Signing, Pavement Markings, Signalization, Lighting

Book2, Section 14 contains requirements for signing, pavement markings, signalization, and lighting. On projects with only minor Intelligent Transportation System (ITS) requirements, ITS can also be covered in Section 14, eliminating the need for Section 19. Section 14 should contain the following topics:

- Design requirements and standards and materials
    - Signing
    - Pavement marking
    - Lighting
    - Traffic Signals
- Construction requirements
- Operational traffic signal requirements for construction (if applicable)
- Project Special Provisions – if applicable

Risk Mitigation and Risk Allocation:

The Contractor accepts the risk to design and construct the project in accordance with the Technical Requirements. CDOT accepts the risk for the performance of the features that are designed and constructed in conformance with the Technical Requirements.

The Contractor accepts the risk for providing adequate signing, pavement markings, signalization, and lighting during the construction of the project, typically to comply with operational Technical Requirements. For example, the Technical Requirement for temporary lighting during construction is usually to provide lighting at a minimum equivalent to the existing lighting for the facility.

CDOT Investigations and Design Development Requirements:

The signing, pavement marking, signalization, and lighting design for the project does not typically need to be advanced to a very high level in the CDOT design development phase. For the most part, the work can be sufficiently scoped and defined with a narrative in the Technical Requirements. A common approach is to provide conceptual-level signing and striping plans, showing major signing, general striping layouts, and locations of signalized intersections.

Design development to the extent of providing major signing legends and locations is of particular value, recognizing the significant costs of major sign structures and foundations.

Often, the FHWA *Manual on Uniform Traffic Control Devices* (MUTCD) is invoked into the Technical Requirements by reference. Care should be exercised when referencing the manual as it is written as a design guide and not as a project specification. The MUTCD provides both standards and guidance

statements and often refers to using "engineering judgment" in determining the design. Therefore, it provides latitude to the Contractor's designer that may not be consistent with the owner's desires. As a result, the project Technical Requirements should either provide prescriptive designs or provide definitive direction on the use of the MUTCD.

CDOT design development should extend to developing agreements with agencies responsible for maintaining the lighting (usually an electrical utility or a city) and the signalization (typically a city or county). Oftentimes the maintaining party has explicit material specifications for their facilities to ensure they can be efficiently maintained.

7.2.15 Book 2, Section 15: Structures

Book 2, Section 15 defines the requirements for bridges, retaining walls, noise walls, box culverts, and other large structures. This section contains the following topics:

- List of existing structures
- Standards
- Software for design
- Design requirements
    - Materials
    - Loads and forces
    - Geotechnical
    - Structure aesthetics
    - Bridges
    - Box culverts
    - Retaining walls and noise walls
    - Sign structures
    - Tunnels
- Plans and reports
- Construction requirements

The Structural Technical Requirements are fairly prescriptive, maintaining the rigorous approach to structures design required by Headquarters Staff Bridge to ensure the safety and performance of these critical elements.

Risk Mitigation and Risk Allocation:

A common approach is for CDOT to take the risk for the location and general layout for the structures on the project, exclusive of superstructure and substructure types. The Contractor then takes the risk for determining the structure type that best suits its construction methods and cost.

The typical structural Technical Requirements include a provision for the use of structures not historically used by CDOT. If the Contractor chooses to use a structure that is not historically used by CDOT, then the RFP requires CDOT Approval of the Contractor's proposed system.

CDOT Investigations and Design Development Requirements:

The design development by CDOT should be advanced as necessary to identify the location of all major structures (bridges and box culverts with a total length greater than 20 feet and retaining walls with a length greater than 100 feet and an exposed face height at any location of more than 5 feet).

Structures design and construction is one of the better opportunities to recognize both the cost and schedule advantages of Design-Build. Contractors have different areas of expertise, resources, and subcontractors, which can be most efficiently utilized in Design-Build if they have flexibility in determining structure types. To facilitate the process, it is best to not to prescribe structure types in the Technical Requirements. Nonetheless, preferably the Reference Drawings provide structure conceptual designs to help guide the Design-Builder's design and provide CDOT with a basis for cost estimating the GMP.

With regard to bridges, a reasonable approach is to provide a general layout for the bridge structure similar to that of a preliminary design for a traditional D-B-B. The purpose of the general layout is to define the geometric requirements for the bridge. The general layout however should not identify either the superstructure type or the substructure type. The exception to this approach is railroad structures, which should be taken to a higher level of design by CDOT, as is discussed above in Section 7.2.6, "Third-Party Agreements."

7.2.16 Book 2, Section 16: Transportation Management Plan

The TMP defines strategies for managing the work zone impacts of the project. Book 2, Section 16 contains the information on the following topics:

- TMP requirements
- TMP Task Force
- Travel Demand Management requirements
- Business and private access requirements
- MOT variance process
- Coordination with CDOT Traffic Management Center (CTMC)
- Incident Management Plan (IMP) requirements
- Traffic Control Plan (TCP) and Methods of Handling Traffic (MHTs)
- Work zone design speeds
- Minimum lane and shoulder requirements
- Lane closure requirements
- Construction requirements
- Detour pavement requirements

The TMP Technical Requirement is an operational Technical Requirement in that it defines construction processes and not the end product. As an operational requirement, it is important to address performance requirements such as the effectiveness of MHTs, traffic delays, queues and congestion, traffic safety (accident assessments), and other measures. It is also important to address the relationships between the Contractor, CDOT, and project stakeholders.

The TMP requirements should be closely coordinated with the PI (Book 2, Section 4) requirements, recognizing that a key objective of both sections is to ensure the best possible flow of traffic for local stakeholders and the traveling public through responsive and informative Traffic Management and PIPs. The formation and regular meetings of a joint TMP/PI task force is typically a required element of both Technical Requirements. On past projects, the two required task forces have met sequentially with staff rosters overlapping into both meetings.

The TMP requirements should identify the need for traffic management strategies such as Travel Demand Management and ITS requirements and coordination with CTMC.

Risk Mitigation and Risk Allocation:

The most common approach for the TMP and MOT is for the Contractor to accept the risk of providing the traffic control in conformance with the Technical Requirements and for CDOT to accept the risk for the resultant operational performance of the facility during construction of the project. Alternatively, the Contractor can be assigned operational risk by requiring compliance to certain operational LOS, but the subjective nature of LOS determinations makes LOS compliance a significant risk to both CDOT and the Contractor and can lead to potential disputes. Often the MOT performance is a project goal and MOT Proposal commitments are encouraged in the RFP, which can change the MOT risk allocation for the project.

The Contractor has the responsibility for integrating the MOT Technical Requirements with its construction phasing plan and determining a traffic control plan for the project. The Contractor also has the overall responsibility for developing the overall TMP for the project, which sets the framework for the management of traffic during the construction of the project.

The Contractor's TCP identifies the need for temporary pavements and detours. Typically, the Contractor accepts the risk for the design and performance of temporary pavements.

CDOT Investigations and Design Development Requirements:

CDOT should consider the operational impacts during construction, including both local and corridor-wide traffic operations; local access, business, and other stakeholder impacts; and transit, pedestrian, and bicycle impacts. This effort often requires development of conceptual construction phasing and traffic control plans as well as traffic analyses to confirm the feasibility of maintaining the desired traffic operations during construction. The construction phasing analysis is also necessary to confirm constructability within the proposed ROW of the project.

CDOT should determine whether the documented regional lane closure strategies will be followed or whether project-specific lane closure strategies are required for the project. Lane closure policies of the affected local agencies should also be considered.

CDOT should consider whether to allow lane closures durations that exceed those found in the published *Region Lane Closure Strategy*, and the requirements the Contractor must fulfill in order to receive CDOT approval.

CDOT determines the amount for the work time violation incidents. A road user cost analysis can be performed to determine the appropriate amount for work time violations.

7.2.17 Book 2, Section 17: Landscaping

This section contains the information on the following topics:

- Requirements for the landscaping plans
- Requirements for noxious weed management
- Delineation of riparian and wetland protection areas
- Requirements for handling trees and shrubs, including tree replacement criteria
- Requirements for establishing landscaping
- Requirements for Acceptance of landscaping, such as topsoil, seeding, and plant requirements
- Requirements for landscaping warranty periods
- Requirements for Project Special Provisions providing landscaping technical specifications

The landscaping Technical Requirements are generally prescriptive. Where the proposed landscaping is minimal and native in its nature, the landscaping Technical Requirements are fairly simple and straightforward, with little opportunity for innovative Design-Build approaches. Where an enhanced landscape and aesthetics plan is desired, prescriptive specifications are preferred due to the subjective nature of the design.

Hardscape aesthetic requirements when applicable, should be included in the Landscaping and Aesthetics Technical Requirements.

Risk Mitigation and Risk Allocation:

The Contractor accepts the risk to design and construct the project in accordance with the Technical Requirements. CDOT accepts the risk for the performance and context sensitivity of the features that are designed and constructed in conformance with the Technical Requirements.

When enhanced landscaping and hardscape aesthetics are included in the project, it is often in response to stakeholder concerns, and the landscaping and aesthetics design is dependent to some degree on stakeholder approval. This is a process that CDOT is in the best position to manage. As a result, landscaping and aesthetic design is usually best performed by CDOT to avoid assigning the stakeholder approval risk to the Contractor.

CDOT Investigations and Design Development Requirements:

All exposed land needs to have some form of cover (grass or other) and is required to inactivate the stormwater construction permit identified in Book 2 Section 5 and 12. When landscaping is minimal and native in its nature, the design development required by CDOT does not usually require a significant amount of effort. Most of the work effort is focused on the landscaping requirements for wetlands and riparian mitigations necessary to comply with the project NEPA requirements, Senate Bill 40 (SB 40), and the COE permitting requirements. Wetlands and riparian area surveys, including existing tree

assessments, are usually necessary to coordinate with the permitting agencies and to develop the appropriate landscaping Technical Requirements.

When the project has enhanced landscaping and/ or architectural hardscape needs, the CDOT design development typically includes the development of a fairly detailed set of architectural and landscaping plans that are included in Book 4 as Contract Drawings. Those plans are then supported by fairly detailed Technical Requirements in Book 2, Section 17. Most often, the architectural and landscaping plans are developed through a stakeholder coordination process, which should be completed prior to the issuance of the final RFP. The stakeholder coordination process is iterative and time consuming, typically requiring multiple meetings to develop the design and obtain a consensus.

Careful consideration needs to be given to the landscape establishment and warranty process. Often it is best to specify a separate completion and acceptance and warranty process for landscaping improvements because the establishment period for the landscaping usually extends beyond the acceptance of the project as a whole.

7.2.18 Book 2, Section 18: Maintenance During Construction

Book 2, Section 18 contains the information on the following topics:

- Maintenance of LOS plan
- Contractor maintenance responsibilities
- CDOT maintenance responsibilities
- Limits and durations of Contractor maintenance
- Maintenance of acquired ROW and easements

Risk Mitigation and Risk Allocation:

Generally, the Contractor accepts the risk and responsibilities for all of the facility maintenance through the entire limits of the project from its first mobilization for Work on the project until final project Acceptance. Contractor maintenance responsibilities are typically contractually defined in this Technical Requirement to start at NTP2. A common exception to this general approach is for snow removal and ice control, which are activities that CDOT is better equipped to perform than the Contractor. CDOT should take on the snow removal and ice treatment responsibilities on traveled lanes within the project limits and coordinate the snow removal on the local agency roads within the project limits with the local agencies.

CDOT Investigations and Design Development Requirements:

The CDOT project team should perform an initial maintenance condition survey to set a baseline for the maintenance responsibilities of the Contractor. Preferably CDOT should perform preconstruction maintenance of the facility to bring it up to the desired LOS before turning the maintenance responsibilities over to the Contractor. It is highly recommended that the project team meet exclusively with the CDOT maintenance forces in charge of the facility within the project limits in order to discuss all maintenance-related issues to bring the facility up to the desired LOS.

Often when CDOT maintenance forces become aware of a large project, they will divert their funding and resources to other areas of need, and as a result there may be outstanding maintenance issues that need to be addressed immediately within the project limits. It is best to include any outstanding maintenance issues, as well as any deadlines as to when they should be addressed (e.g., prior to NTP1), in the Technical Requirements and account for them in the GMP. The project team should coordinate with maintenance to perform an inventory walkthrough in an attempt to identify and schedule these items into the Technical Requirements and the GMP.

7.2.19 Book 2, Section 19: Intelligent Transportation Systems (ITS)

This section contains the information on the following topics, as applicable to the project:

- Electrical power
- Location and protection of existing facilities
- Communication systems
- Variable Message Signs (VMSs)
- Ramp Meter Stations (RMSs)
- Microwave Vehicle Radar Detectors (MVRDs)
- Travel Time Indicators (TTIs)
- Automatic Traffic Recorders (ATRs)
- Variable Toll Message Signs (VTMSs)
- Toll points
- Automatic Vehicle Identification (AVI) readers
- Automatic License Plate Recognition (ALPR)
- Electronic Toll Collection (ETC) lane controller
- Pull boxes, manholes, and ITS device cabinets
- Construction requirements
- Operational requirements during construction
- Testing and integration
- Maintenance periods
- ETC system coordination

The ITS Technical Requirements can vary considerably in their complexity and detail depending on the ITS system of the facility and the corridor that it is within. If ETC is required on the project, the tolling requirements are included in Section 19. ITS and ETC include a variety of specialized equipment, which is summarized in Table 7-3.

Table 7-3. ITS and ETC Equipment

System	Equipment
ITS	Variable Message Signs (VMSs), Closed Circuit Television (CCTV) Cameras, Ramp Meter Stations (RMSs), Microwave Vehicle Radar Detectors (MVRDs), Travel Time Indicators (TTIs), Automatic Traffic Recorders (ATRs), Doppler Radar, Road Weather Information Systems (RWISs), and Variable Toll Message Signs (VTMSs)
ETC	Automatic Vehicle Identification (AVI) Readers, Automatic License Plate Recognition (ALPR) Cameras, Loop Detectors, and ETC Lane Controller Cabinets

On complex ITS and tolling projects, it is beneficial to provide the proposers a concept of operations, a systems engineering analysis, and the functional requirements for the project.

Risk Mitigation and Risk Allocation:

The Contractor accepts the risk to design and construct the project in accordance with the Technical Requirements. CDOT accepts the risk for the performance of the features that are designed and constructed in conformance with the Technical Requirements. The need to maintain a consistent approach for equipment and infrastructure facilities dictates the use of prescriptive requirements rather than performance requirements for the ITS system.

CDOT Investigations and Design Development Requirements:

CDOT ITS expertise is critical to the development of the ITS Technical Requirements. If the facility and the corridor it is within include existing or proposed ETC systems, then the development of the ITS Technical Requirements requires a high degree of specialized expertise. In these cases, outside technical expertise should be retained and added to the CDOT project team for both the development of the RFP Technical Requirements and the oversight of design and construction, as well as during the implementation of the ITS system.

Because ETC systems most likely require third-party coordination to integrate the systems into the existing tolling infrastructure (such as the E-470 Authority), most likely IGAs also are required and should be developed and executed (if possible) prior to the issuance of the final RFP.

When developing ITS standards for the project, FHWA established National Intelligent Transportation Systems Architecture and Standards should be adhered to in accordance with 23 CFR Part 940.

Development of the ITS Technical Requirements (Book 2, Section 19) should be closely coordinated with Book 2, Section 14, which covers signing, pavement marking, signalization, and lighting. On projects with only minor ITS elements, the ITS Technical Requirements can be included in Section 14 and Section 19 can be eliminated.

7.2.20 Book 2, Section 20: Modifications to Standard Specifications

Book 2, Section 20 consists of modification to CDOT *Standard Specifications for Road and Bridge Construction* (Standard Specifications). In general, the Standard Specifications are used for controlling the construction on CDOT projects. In Design-Build delivery, they are also used for that purpose, however certain parts of the Standard Specifications are superseded by the Design-Build Contract Documents. Book 2, Section 20 contractually identifies the modifications to the Standard Specifications for Design-Build delivery. Therefore, this section is generally standardized for all Design-Build projects. Nonetheless it is important for the CDOT project team to be very familiar with this section in order to understand the key differences in the construction specifications between Design-Build and D-B-B delivery.

The most significant difference for Design-Build delivery is relative to the Standard Specifications in Section 100 – General Provisions. The majority of the Section 100 provisions are superseded by Book 1 of the Design-Build Contract Documents.

Some other key modifications to the Standard Specifications are:

- All references to "Engineer" refer to the Contractor's Engineer, unless the context requires otherwise. This is an important terminology change for the CDOT project team to recognize. When a requirement is subject to an action by CDOT's engineer, it must be stated as a "CDOT" requirement.
- Pavement incentive payments are generally included in the GMP and are not paid as part of the cost loaded schedule, but disincentives still apply. The Contractor is also not allowed the option of accepting a price reduction for nonconforming pavements; that action is subject to the Approval of CDOT.
- In Divisions 200 through 600 of the Standard Specifications, the method of measurement and basis of payment provisions are superseded by the provisions set forth in Books 1 and 2 of the Contract Documents because Design-Build is a lump sum and not a unit price contract.

Book 2, Section 20 also includes the list of CDOT Standard Special Provisions that are applicable to the project. Project Special Provisions are typically incorporated into the Construction subsections of the applicable Technical Requirement sections.

7.3 Book 3 – Applicable Standards, Data and Reports

Book 3 includes such documents as CDOT design guides, AASHTO design standards, MUTCD design standards, local design standards, CDOT M & S standards, CDOT construction and materials manuals, and project-specific reports that are binding parts of the Contract. The documents are generally included as a list of documents, but the documents are not actually a part of the project database. The exceptions to that approach are project-specific reports that are included in the database.

The documents included in Book 3 are considered to be contractually binding Contract Documents, so care must be exercised in determining which documents to include and in how they are referred to elsewhere in the Contract Documents. Many design manuals include language such as "the designer should consider…" or "It is desirable...." Such ambiguous language is subject to interpretation and can

lead to disputes. At the other extreme, arbitrarily referenced documents may include onerous requirements that the owner is unaware of and can result in unnecessary project risk and cost.

Project reports also should be carefully examined before being included in Book 3. Many project reports include recommendations and preliminary designs that should not be considered contractually binding and should be included as Reference Documents and not part of Book 3. If there are certain elements of those documents that are to be Contract requirements, then those elements of the Reference Documents can be incorporated into the Contract by reference in the Technical Requirements. Project documents that are often a part of Book 3 include environmental decision documents, permits, third-party agreements and IGAs, and FHWA Interstate Access Reports.

Generally, key project requirements should be clearly stated in the Technical Requirements, even if they are a part of Book 3 documents, to avoid any potential ambiguities. For example, Book 2, Section 13 includes detailed roadway design criteria for the project even though much of that same criteria can be found in CDOT's *Roadway Design Guide* and the AASHTO Green Book.

7.4 Book 4 – Contract Drawings

Book 4 includes project-specific drawings that are contractually binding. Sometimes Book 4 is misinterpreted to include the preliminary plans for the project. The preliminary plans as a whole are not contractually binding and should not be included in Book 4, but they should be included as Reference Documents. Elements of preliminary plans, such as typical sections, could be included in Book 4; more often, however, if they are desired to be Contract requirements, then they are simply referenced as such in the Technical Requirements without being included in Book 4. Book 4 usually includes the project ROW Plans and sometimes physical investigations, such as geotechnical and hazardous materials borings and test results. When geotechnical information is provided, it should not include geotechnical recommendations because that represents design, which should not be provided by the owner.

Chapter 8: Implementation

Chapter 8: Implementation

After the Contractor is selected in the procurement phase of the project, the project enters into the implementation phase. The term "implementation phase" is used instead of "construction phase" because the phase includes both design and construction elements of the project. These two elements of work are usually performed in parallel (overlapping) schedules, which results in project management processes that are unique to Design-Build delivery.

8.1 Project Organization

A typical implementation phase project organization chart is provided in Figure 8-1. As the project transitions from procurement to implementation, the organization transitions from a Colorado Department of Transportation (CDOT) team to a joint CDOT/Contractor team. The key elements of the project organization are:

Executive Oversight Committee (EOC): The EOC in the implementation phase is a continuance of the EOC from the procurement phase. However, because the project focus changes from project development to final design and construction, the makeup of the EOC often changes. The EOC has already overseen most of the major design and procurement decisions in previous phases of the project. During implementation, the project team's primary responsibility to the EOC is informative, ensuring that most of the key stakeholders of the project are kept aware of its progress and construction impacts to the community. Federal Highway Administration (FHWA) involvement remains to ensure the project contract management is compliant with federal regulations and process. The EOC remains the project representative of and reports directly to the Chief Engineer.

Executive Management Team (EMT): The EMT is a collaborative committee made of executives from both CDOT and the Contractor. The EMT provides upper-level project guidance, oversees the progress and quality of the project, and resolves major issues that have been escalated to them by the CDOT/Contractor management teams. The CDOT Project Director or Project Manager and the Contractor's Project Manager report directly to the EMT.

CDOT Management Team: The CDOT Management Team is the owner's representative in the day-to-day management and coordination of the project. The team typically includes the CDOT Project Director and/ or Project Manager, often the consultant Project Manager, a contract manager, a design manager, and a construction manager. Though the team may meet formally only once a week, the individual team members are often full-time dedicated project personnel, and they informally meet more frequently. The Contractor typically has a similar management team, and individuals from both teams interact freely with their counterparts on a well-functioning and well-integrated project team.

Project Controls Team: The project controls team administers the schedule, document control, invoicing, and the Contract. Project control requirements are defined in Section 2 of the project Technical Requirements and are discussed Chapter 7, Section 7.2.2 of this manual.

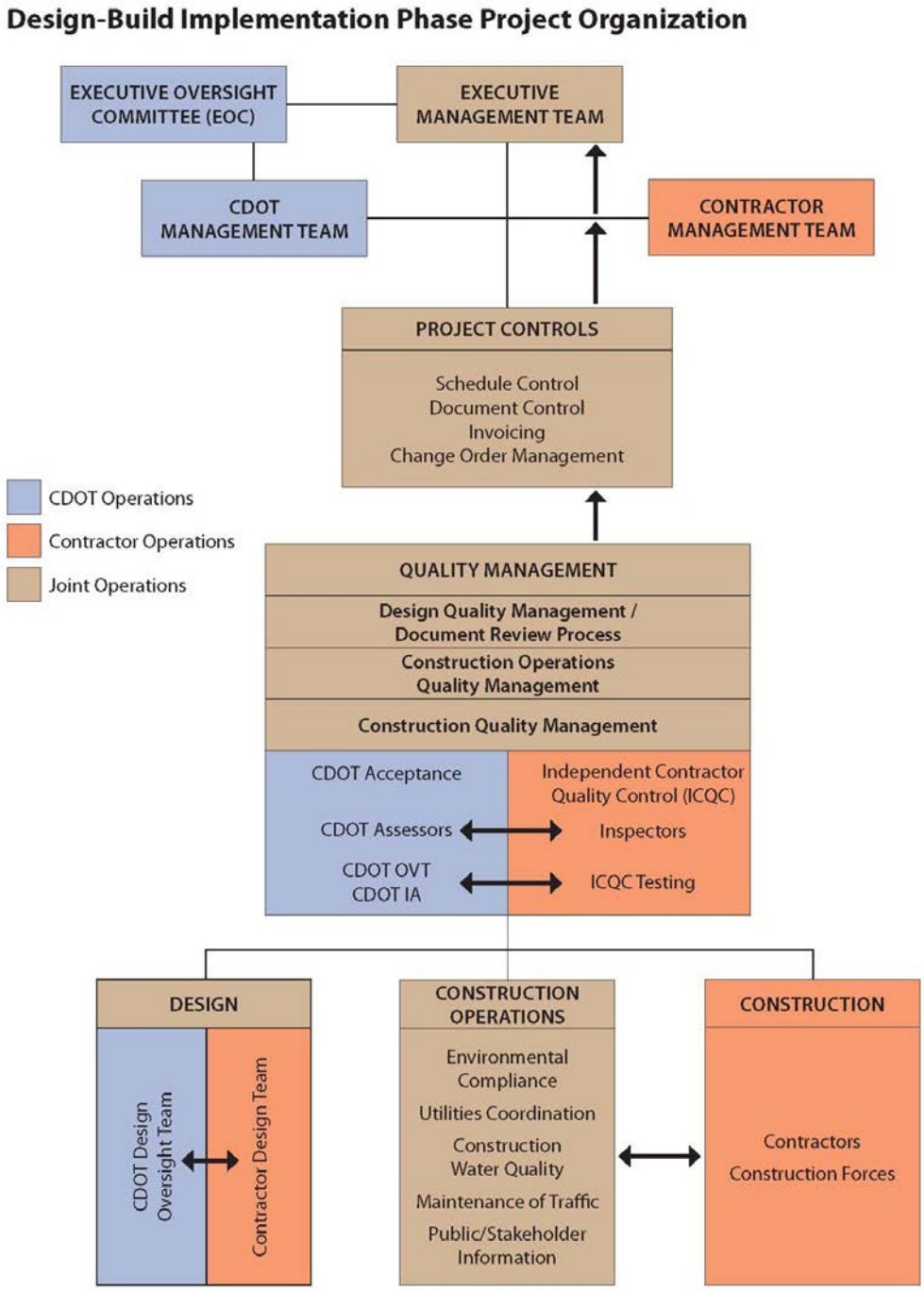


Figure 8-1. Design-Build Implementation Phase Project Organization

Quality Management Team: Quality management team administers the Quality Control (QC) processes, including design quality management, construction quality management (inspection and testing), and construction operations quality management. Quality processes are further discussed below in Sections 8.3 and 8.4 and also in Chapter 7, Section 7.2.3.

Quality management activities are typically joint CDOT/Contractor activities. The quality management team reports directly and independently to the EMT.

Design Team: As the project transitions from procurement to implementation, the primary responsibility for design shifts to the Contractor's team. The design process is described below in Section 8.3.

Construction Team: In the end, the primary function of the implementation phase of the project is to construct the project in compliance with the Contract requirements. Construction activities are primarily performed and managed by the Contractor's forces.

Construction Operations Team: Construction operations are those activities that are necessary to support the construction of the project. Construction operations include environmental compliance, utilities coordination, construction water quality management, traffic management, and public and stakeholder information processes. Construction operations are discussed in this manual in Chapter 7 with respect to their applicable Technical Requirements. Generally, construction operations are shared responsibilities between the Contractor and CDOT. Though the Contractor is usually responsible for performing the Work, most often there are third-party considerations that require a high level of CDOT involvement.

8.2 Contract Award and Project Start-up

As is noted in Section 7.1 of Chapter 7 of this manual, CDOT Design-Build projects typically have two Notices to Proceed (NTPs). In order to obtain the First Notice to Proceed (NTP1), the Contractor is required to submit a Preliminary Baseline Schedule and a Design Quality Management Plan (DQMP). Following NTP1, the Contractor may begin limited activities related primarily to design, development, and initiation of various operational work plans and the setup of project offices and other infrastructure necessary to support the project. As a result, the time from Award to the Second Notice to Proceed (NTP2) is a crucial initiation period for the overall project team. With all the necessary documents that need to be developed, reviewed, accepted, and approved, it is often a very work-intensive period. Usually these initial activities are performed without the benefit of the project co-location facilities, which are still being activated. Because most of the initial activities of the project require active participation by CDOT, the CDOT team should be assembled, familiarized with the project requirements as delineated in the Contract, and be ready to engage in the project prior to Award.

8.2.1 Partnering

CDOT has established a best practice of having a formal, facilitated partnering meeting at the start of all significant Design-Build projects. As can be seen from the organization chart in Figure 8-1, a Design-Build team is a combination of the owner's oversight team and the Contractor's design and construction team. For the project to be successful, it is imperative that these two teams work together to achieve

the common goal of successfully completing project. The goal of the partnering session is to foster the development of an integrated and cohesive team, which is essential to the success of any Design-Build exercise. It is important to not overlook or marginalize this step, as a united Design-Build team that is focused on common goals for the project is much more successful than a team that relies on the traditional adversarial roles played by the owner and Contractor. The executive management from both CDOT and the Contractor must participate to show support and solidarity with the newly formed unified Design-Build team. A well-executed partnering process enhances teamwork and helps build the relationships that are essential for an effective project team. Potential items for an initial partnering meeting include the following:

- CDOT executive's opening remarks
- Contractor executive's opening remarks
- CDOT and Contractor Project Managers' expectations
- Project Charter (mission statement)
- Issue resolution process (counterparts, escalation ladder, timelines)
- Continued partnering evaluation, monitoring, and accountability (report cards)
- Key issues discussions and initial action items

8.2.2 Co-Location and Design Development

Co-location is discussed in Chapter 7, Section 7.2.2, with respect to the project management Technical Requirements. As noted in that section, co-location can greatly facilitate Design-Build collaboration between the owner and the Contractor. Co-location provides the owner the best opportunity to jointly develop the project design with the Contractor's designer. Co-location also provides the owner and the Contractor with an opportunity to take advantage of efficient and expedited decision making by housing all the decision makers in a single facility.

The CDOT project team should make every effort to encourage co-location and collaborative meetings with the Contractor's designer. Even when co-location facilities are provided (in response to Request for Proposal [RFP] requirements and Proposal commitments), sometimes the Contractor's design staff are reluctant to leave their home offices and co-locate to the project office. CDOT's management should make it clear to the Contractor that compliance with co-location commitments is mandatory.

8.3 Design Development

As shown in Figure 8-2, the implementation phase is the third and final phase of the design development. The primary design responsibility of the project is transferred to the Contractor's designer, although the owner remains very involved in the design process through joint task forces, during formal reviews of milestone design submittals, and as the design is further refined during the construction of the project.

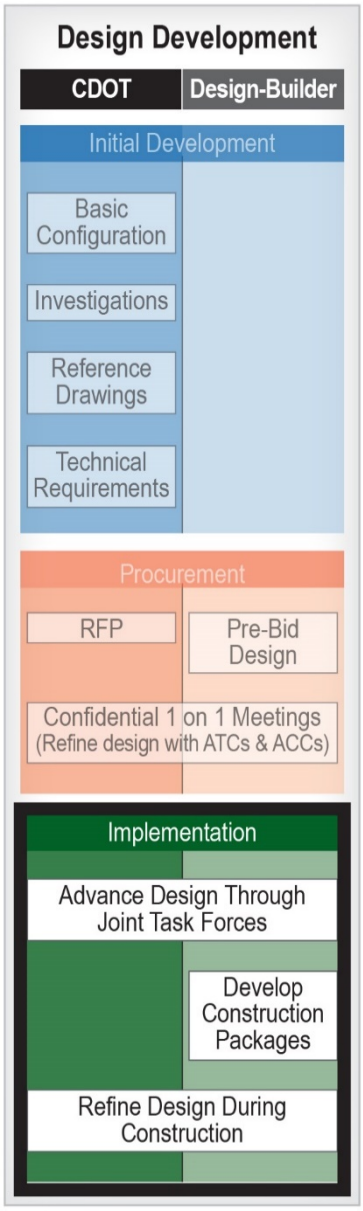


Figure 8-2. Design Development during Implementation

8.3.1 Task Forces and Over-the-Shoulder Reviews

In a highly functioning Design-Build team, the design process is a continuous, active collaboration between the Contactor's and CDOT's designers. The focal point of the process is the design task forces that meet regularly (generally weekly) throughout the design phase of the project. It is important that the task force meetings be more than just design update meetings. At these meetings, the design task forces should review informal plan submittals as they are developed and make decisions on how the design should proceed. When the task forces are implemented well, the design approval process and progress of the project are efficient and expeditious. The process is significantly enhanced through co-location.

The makeup of each task force varies depending on the size and nature of the project. It may be a single general cross-disciplined design task force or comprise a number of discipline-specific task forces. The intent is to set up a meeting structure that promotes a continuous over-the-shoulder review process whereby the Contractor's designers frequently brief the owner's designers on the design status, and the owner's designers provide input on the progression of the design. The specific approach should be tailored to the project, but at a minimum the meetings should include issuance of advance agendas and documented meeting minutes that track the resolution of design issues. Though documenting meeting minutes is important, CDOT should only review and not Approve the minutes in order to avoid taking responsibility for interim designs. It can be beneficial to distribute status drawings or iterations of reports or deliverables prior to task force meetings, but it should not be a CDOT requirement to do so, as that may result in additional designer procedural work that may slow down the advancement of the design.

When third parties have review, Acceptance, or Approval authority over design elements, they should be encouraged to participate in the appropriate task force meetings. If they are unable to participate in task force meetings, separate third-party interim review meetings should be considered, with the understanding that additional review meetings may prolong the development of the project design.

A simplified and more efficient formal review process results when the task force and over-the-shoulder review processes are well executed. This largely is due to the CDOT reviewers' familiarity with the progress of the design and their ability to provide comments and feedback on an ongoing basis and not just when milestone submittals are made. Ideally, by the time actual milestone submittals are reviewed CDOT and the Contractor already will have had the opportunity to resolve many design differences and to clarify design ambiguities.

8.3.2 Formal Milestone Packages and Reviews.

Section 3, Quality Management, of the Technical Requirements provides the Contract requirements for formal milestone submittals and CDOT's review authority. Most typically formal reviews are required for the preliminary plans, Released for Construction (RFC) Documents, Final Design Documents, and As-Built Documents. These are the primary design documents that define the overall project design, though numerous supporting design documents may be required by the discipline-specific Technical Requirements. Document review authority by CDOT can be for Acceptance, Approval, or just review (refer to Section 7.1 in Chapter 7 of this manual for a discussion of the review authority terminology). The milestone design documents are described below:

Preliminary Plans: The preliminary plans are generally considered to be at approximately a 30-percent level of design completion. The plans show how the Contractor's design complies with the Basic Configuration and Technical Requirements and set an overall design framework for the subsequent development of construction packages. Because the preliminary plans are superseded by the RFC Documents and the Final Design Documents, they are typically submitted to CDOT for review only. Nonetheless, a comprehensive review of the preliminary plans by CDOT is critical to an efficient design process because the preliminary plans set the course of the final design.

RFC Documents: RFC Documents are the primary documents that define the construction of the project. To leverage the Design-Build advantages of a parallel and overlapping design and construction, RFC Documents are usually issued in multiple packages to allow for the early start of construction before the design for the project as a whole is completed. CDOT generally reserves Acceptance authority over RFC Documents but will qualify that authority as not constituting Acceptance of any partial, incomplete designs that are included in the RFC Documents. This puts the risk of continuity and compatibility of subsequent RFC Documents on the Contractor and its designers.

Notice of Design Change (NDC) Documents and Field Design Changes (FDC) Documents: As a result of the interim design nature of many RFC Documents, it is inevitable that some designs that are issued to the field will need to be revised. NDC Documents are revisions to RFC Documents that have been previously issued and that originate from the designers. FDC Documents are also design revisions to the previously issued RFC Documents, but they are a result of encountering unforeseen conditions in the field. Because NDC and FDC Documents are revisions to RFC Documents, they should undergo the same formal review processes as the RFC Documents themselves and are subject to CDOT Acceptance. It is important that the Contractor's Quality Management Plan (QMP) includes a process to ensure that the latest plan sets are appropriately reviewed and are distributed to the appropriate construction personnel in a timely manner.

Final Design Documents: Final Design Documents are the total plan and specification documents that define the entire design of the project. They consolidate the RFC, NDC, and FDC Documents into one coherent package. Final Design Documents are subject to CDOT Acceptance and should not be Accepted until all design issues have been resolved and incorporated into the project.

As-Built Documents: Similar to traditional Design-Bid-Build (D-B-B) delivery, As-Built Documents reflect adjustments that are made to the construction plans in the field. As-Built Documents are subject to CDOT Acceptance.

8.3.3 Design Quality Processes

The contractual requirements for design quality processes are defined in the Contract Technical Requirements, Book 2, Section 3, Quality Management. The Technical Requirements require that the Contractor prepare a DQMP as a part of the QMP, subject to CDOT Approval.

The DQMP defines Design Quality Control to be performed by the Contractor, including QC checking procedures, independent technical reviews, and auditing of the design quality processes. The DQMP also demonstrates how the owner's review and Acceptance/Approval process is integrated into the Contractor's overall design process. All design quality processes and audits must be rigorously defined, executed, and documented.

CDOT's primary involvement in design quality processes occurs through both the informal over-the-shoulder review process and the formal reviews of milestone submittals. This involvement is documented through the CDOT audit process, which checks specific Contract requirements and the Contractor's fulfillment of those requirements. Milestone reviews should include documented comment resolution procedures. Ideally, CDOT and third-party reviewers provide written review comments to the Contractor's designer in advance of review meetings, allowing the designer to be better prepared to address the comments efficiently at the review meeting. Review comments are tracked at the meeting and thereafter until all comments have been resolved to the satisfaction of CDOT and any third-party reviewers. Completed comment resolution forms should be submitted with final RFC Documents as a prerequisite to RFC; Final Design Documents should be submitted as a prerequisite to the final design Acceptance by CDOT.

It is important for CDOT to commit to timely review times in Section 3, Quality Management, of the Technical Requirements. Review time commitments provide the Contractor with firm durations from which the Contractor, in turn, can develop the overall project schedule commitments.

8.4 Construction Processes

8.4.1 Testing, Inspection, and Acceptance Quality Processes

Similar to design quality processes, Section 3 of the Technical Requirements requires that the Contractor prepare a Construction Quality Management Plan (CQMP), subject to CDOT Approval. As is discussed in the previous chapter in Section 7.2.3, there are two primary approaches to quality Acceptance in Design-Build delivery: (1) Owner Acceptance (OA) testing and inspection, in which CDOT assumes responsibility for the quality Acceptance process, and (2) Independent Contractor Quality Control

(ICQC), in which CDOT assigns responsibility much of the testing and inspection to the Contractor. In both cases CDOT retains the ultimate Acceptance authority (per 23 CFR Part 637). CDOT may, however, elect to use ICQC inspection and testing results in the Acceptance decision provided those results are validated statistically by owner verification auditing and testing results.

The CDOT *Field Materials Manual* provides guidance on materials testing processes for Design-Build projects and details procedures for both these approaches. In particular, Chapter 17 of the *Field Materials Manual* discusses the ICQC approach that is often used in Design-Build delivery. Streamlined Design-Build projects, which are typically smaller projects with construction processes more similar to traditional D-B-B delivery, most often use CDOT Acceptance testing, in lieu of ICQC.

8.4.2 CDOT Auditing Processes and Nonconforming Work

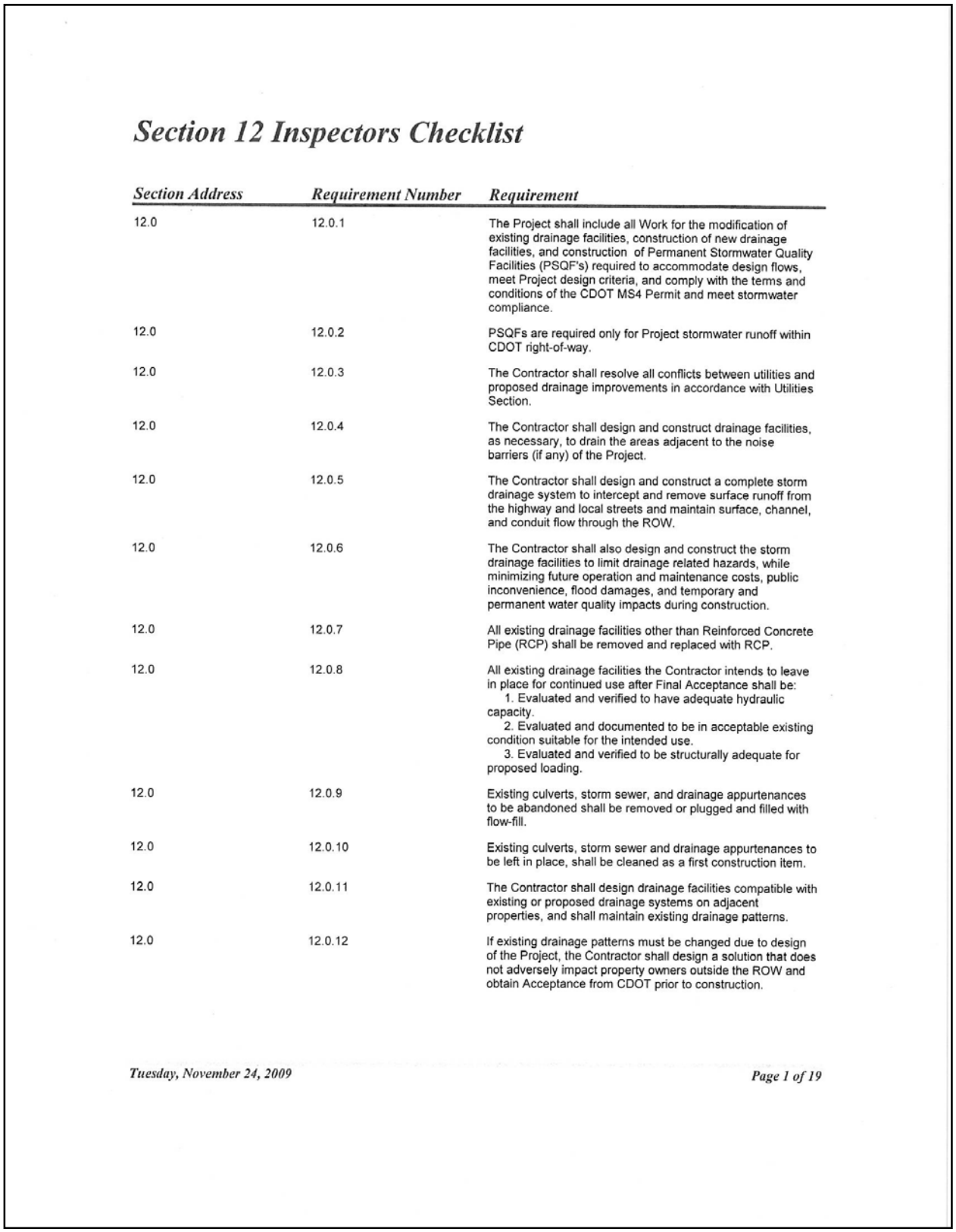
In addition to the CDOT *Field Materials Manual's* guidance on materials testing processes for Design-Build projects, it is important to recognize that workmanship is as fundamental an element of overall project quality as materials. The quality of workmanship is demonstrated through the Contractor's process control procedures and QC inspections, and through CDOT's auditing program. The extent of the CDOT auditing program depends on whether or not an ICQC program is used for the project. If an ICQC program is used, then CDOT's auditing program consists of Owner Verification audits and Independent Assurance testing. If an ICQC program is not used, then CDOT's auditing program becomes much more extensive, essentially replicating a CDOT inspection program on a traditional D-B-B project.

CDOT's program to assess workmanship on Design-Build projects centers on compliance with the specifically stated requirements of the Contract Documents. For the most part, these are the project Technical Requirements and the CDOT Standard Specifications. To be effective in their role, CDOT's auditors should have an intimate familiarity with the requirements of the Contract Documents and be able to cite specific requirements that are or are not in compliance. A database of auditing requirements can be developed to facilitate the assessment process. An example of a requirements database is provided in Figure 8-3.

Nonconforming Work is work performed that does not meet the requirements of the Contract Documents. Auditors determine Nonconforming Work by identifying objective evidence that the finished product does not conform to a stated Contract requirement. Objective evidence is evidence that directly relates to the Contractor's fulfillment of a Contract requirement and does not include opinion, commentary, or grievance.

Nonconformances are categorized by their level of severity from NC-3 (least severe) to NC-1 (most severe). Less severe nonconformances are progressively escalated to more severe classifications if they are not resolved in a timely manner by the Contractor. A diagram of the auditing report workflow and levels of nonconformances is provided in Figure 8-4, and an example auditing report is provided in Figure 8-5.

A nonconformance tracking report is usually maintained by CDOT, the Contractor, or both parties, and it is reviewed jointly on a weekly basis by management to ensure that nonconformances are being addressed and resolved.



Section 12 Inspectors Checklist

Section Address	Requirement Number	Requirement
12.0	12.0.1	The Project shall include all Work for the modification of existing drainage facilities, construction of new drainage facilities, and construction of Permanent Stormwater Quality Facilities (PSQF's) required to accommodate design flows, meet Project design criteria, and comply with the terms and conditions of the CDOT MS4 Permit and meet stormwater compliance.
12.0	12.0.2	PSQFs are required only for Project stormwater runoff within CDOT right-of-way.
12.0	12.0.3	The Contractor shall resolve all conflicts between utilities and proposed drainage improvements in accordance with Utilities Section.
12.0	12.0.4	The Contractor shall design and construct drainage facilities, as necessary, to drain the areas adjacent to the noise barriers (if any) of the Project.
12.0	12.0.5	The Contractor shall design and construct a complete storm drainage system to intercept and remove surface runoff from the highway and local streets and maintain surface, channel, and conduit flow through the ROW.
12.0	12.0.6	The Contractor shall also design and construct the storm drainage facilities to limit drainage related hazards, while minimizing future operation and maintenance costs, public inconvenience, flood damages, and temporary and permanent water quality impacts during construction.
12.0	12.0.7	All existing drainage facilities other than Reinforced Concrete Pipe (RCP) shall be removed and replaced with RCP.
12.0	12.0.8	All existing drainage facilities the Contractor intends to leave in place for continued use after Final Acceptance shall be: 1. Evaluated and verified to have adequate hydraulic capacity. 2. Evaluated and documented to be in acceptable existing condition suitable for the intended use. 3. Evaluated and verified to be structurally adequate for proposed loading.
12.0	12.0.9	Existing culverts, storm sewer, and drainage appurtenances to be abandoned shall be removed or plugged and filled with flow-fill.
12.0	12.0.10	Existing culverts, storm sewer and drainage appurtenances to be left in place, shall be cleaned as a first construction item.
12.0	12.0.11	The Contractor shall design drainage facilities compatible with existing or proposed drainage systems on adjacent properties, and shall maintain existing drainage patterns.
12.0	12.0.12	If existing drainage patterns must be changed due to design of the Project, the Contractor shall design a solution that does not adversely impact property owners outside the ROW and obtain Acceptance from CDOT prior to construction.

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Figure 8-3. Requirements Database Example

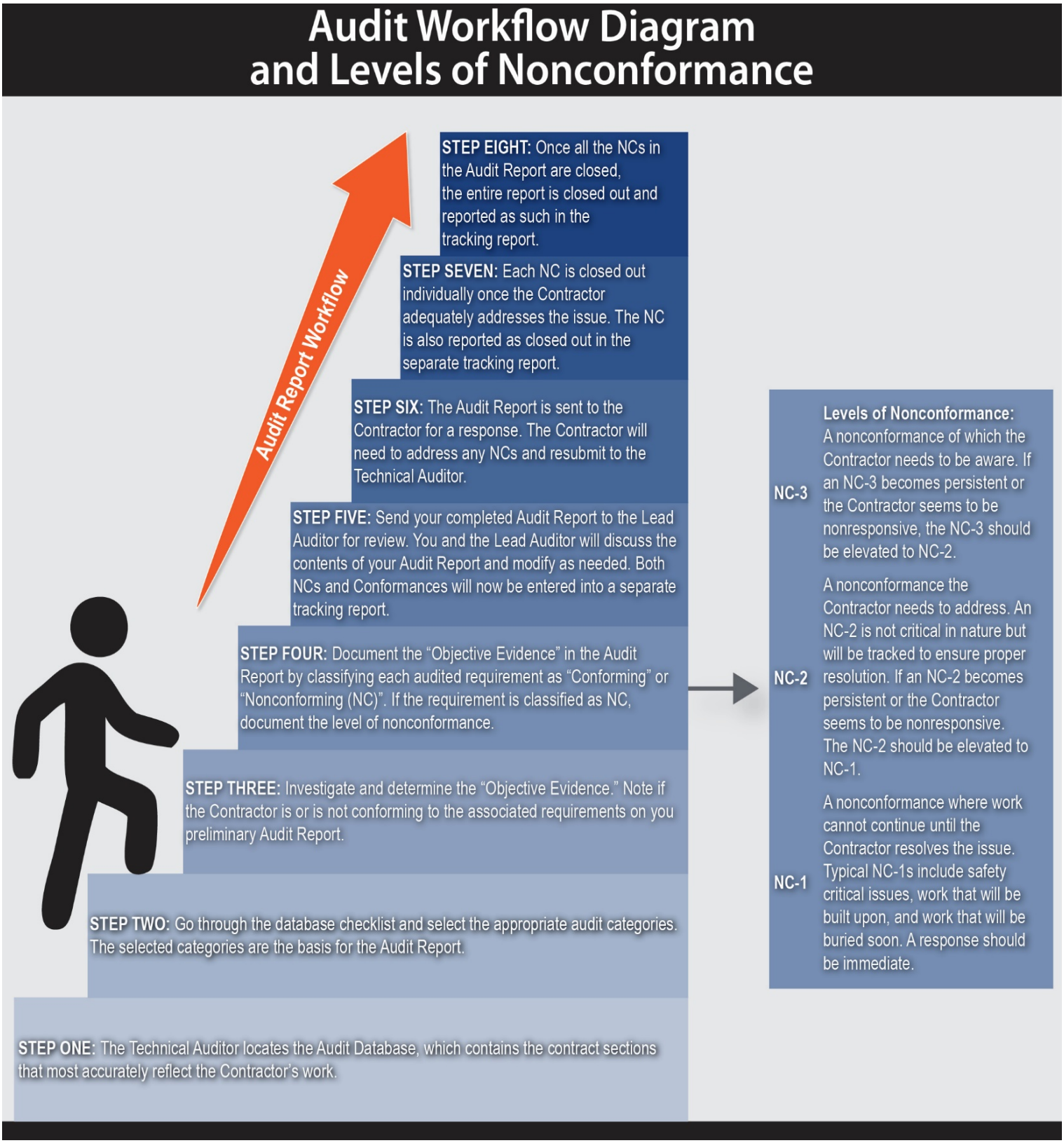
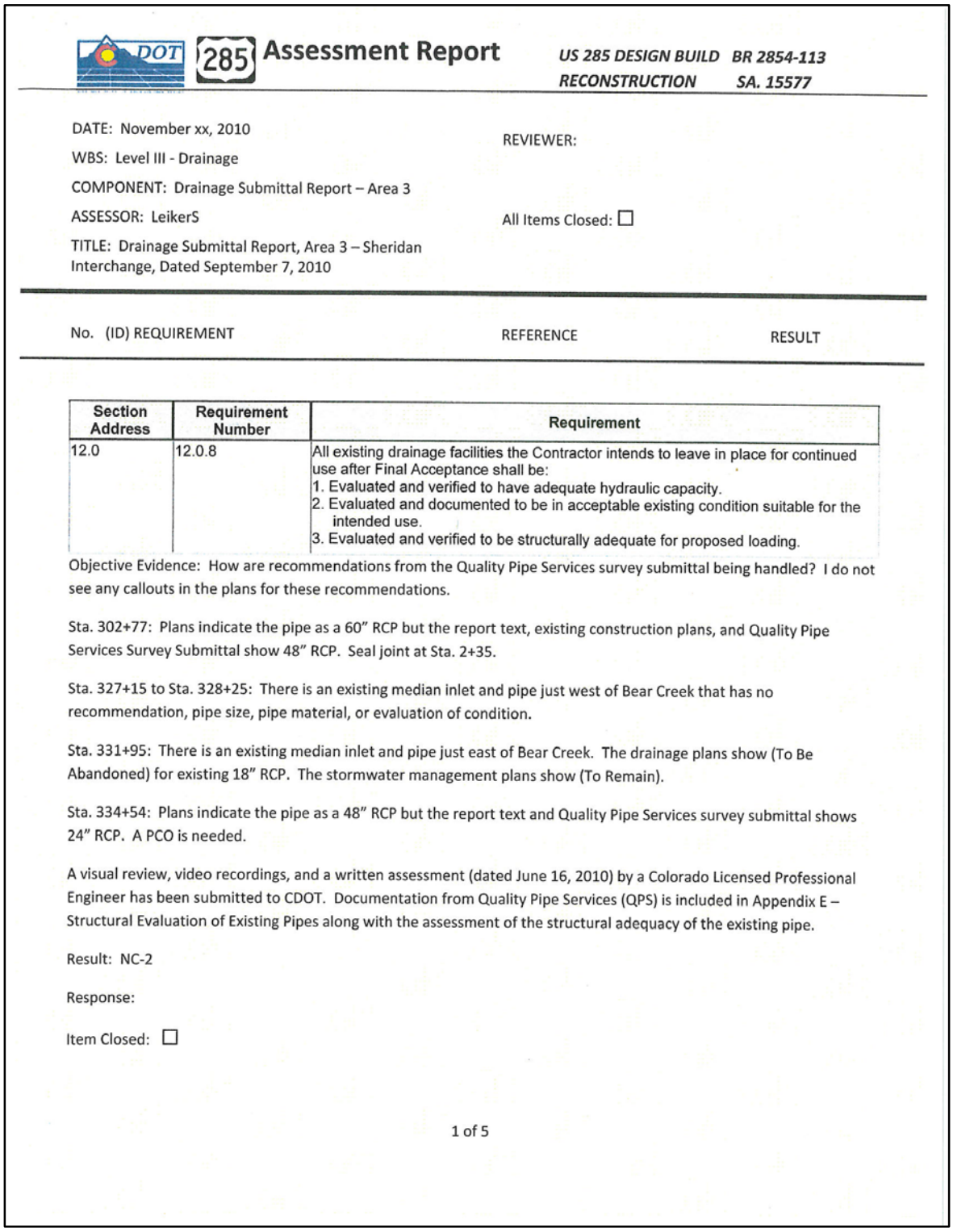


Figure 8-4. Auditing Report Workflow and Levels of Nonconformance



DOT 285 **Assessment Report**

US 285 DESIGN BUILD BR 2854-113
RECONSTRUCTION SA. 15577

DATE: November xx, 2010
WBS: Level III - Drainage
COMPONENT: Drainage Submittal Report – Area 3
ASSESSOR: LeikerS
TITLE: Drainage Submittal Report, Area 3 – Sheridan Interchange, Dated September 7, 2010

REVIEWER:

All Items Closed: ☐

No. (ID) REQUIREMENT REFERENCE RESULT

Section Address	Requirement Number	Requirement
12.0	12.0.8	All existing drainage facilities the Contractor intends to leave in place for continued use after Final Acceptance shall be: 1. Evaluated and verified to have adequate hydraulic capacity. 2. Evaluated and documented to be in acceptable existing condition suitable for the intended use. 3. Evaluated and verified to be structurally adequate for proposed loading.

Objective Evidence: How are recommendations from the Quality Pipe Services survey submittal being handled? I do not see any callouts in the plans for these recommendations.

Sta. 302+77: Plans indicate the pipe as a 60" RCP but the report text, existing construction plans, and Quality Pipe Services Survey Submittal show 48" RCP. Seal joint at Sta. 2+35.

Sta. 327+15 to Sta. 328+25: There is an existing median inlet and pipe just west of Bear Creek that has no recommendation, pipe size, pipe material, or evaluation of condition.

Sta. 331+95: There is an existing median inlet and pipe just east of Bear Creek. The drainage plans show (To Be Abandoned) for existing 18" RCP. The stormwater management plans show (To Remain).

Sta. 334+54: Plans indicate the pipe as a 48" RCP but the report text and Quality Pipe Services survey submittal shows 24" RCP. A PCO is needed.

A visual review, video recordings, and a written assessment (dated June 16, 2010) by a Colorado Licensed Professional Engineer has been submitted to CDOT. Documentation from Quality Pipe Services (QPS) is included in Appendix E – Structural Evaluation of Existing Pipes along with the assessment of the structural adequacy of the existing pipe.

Result: NC-2

Response:

Item Closed: ☐

1 of 5

Figure 8-5. Example Auditing Report

8.5 Change Management

The change order process in Design-Build delivery differs significantly from that in traditional D-B-B delivery. For the most part Design-Build contracts are lump sum based, and D-B-B contracts are unit price based. Therefore, in Design-Build delivery, instead of relying on contractually set unit pricing, change order costs must be negotiated. The fact that the Contractor performs much of the design work further complicates the change order process. The CDOT project team must be very familiar with these processes to effectively manage the project during implementation. Book 1, Sections 12 and 13 address the change management processes and provide an explicit approach for developing and executing change orders. The change order procedure is shown diagrammatically in Figure 8-6.

As part of contract management it is important that CDOT maintain a conformed Contract that reflects any changes to the Contract Documents as a result of change orders, regardless of which party initiates the changes. Maintaining a conformed Contract ensures all parties are working off of the most updated Contract requirements throughout the implementation of the project. At the end of the project the conformed Contract becomes part of the final record of the project and reflects the administration of the project.

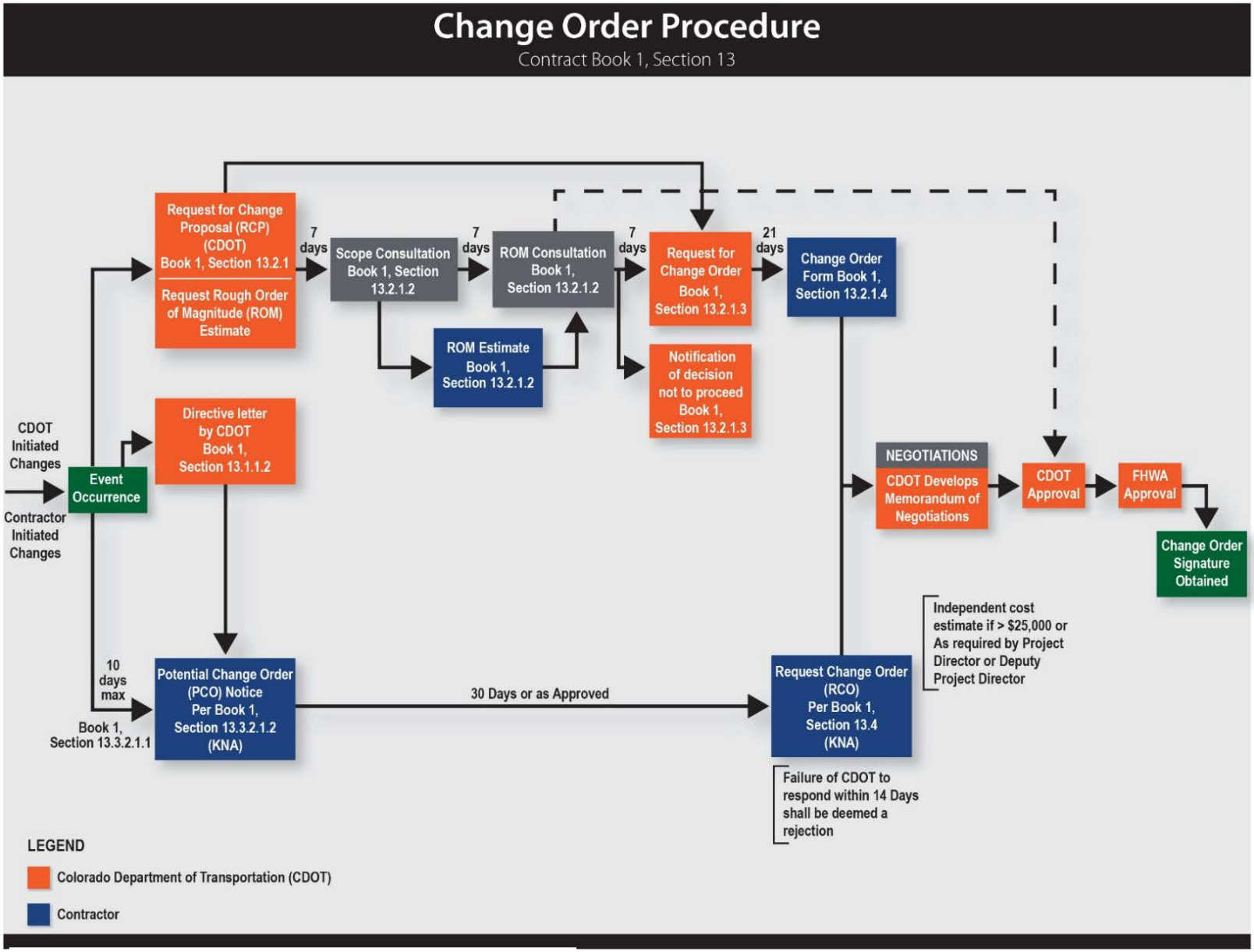


Figure 8-6. Change Order Procedure

8.6 Project Acceptance and Closeout

The Contractor is required to develop a process for final project Acceptance and closeout as part of the QMP. The process includes scheduling, accomplishing, and tracking the final inspection process and developing and resolving punch lists in conformance with the requirements of the Contract. Final inspection includes inspection of the Work by the Contractor and the ICQC team (if applicable) and associated Final Design Documents, As-Built Documents, certifications, and Contractor cleanup requirements. The Contractor (or ICQC) performs an independent inspection of all the Work and addresses any outstanding and Nonconforming Work prior to requesting an inspection from CDOT. After the inspection, CDOT and the ICQC team jointly agree upon punch list items and a deadline date to correct those items. CDOT performs a final field audit of the Work with ICQC personnel after the Contractor has resolved the final punch list and the ICQC team has provided its final Acceptance of the Work.

The detailed requirements for the project Acceptance are provided in Book 1, Section 20 of the Design-Build Contract. The CDOT project team completes a Final Submittal Check List to ensure all of the required submittals are provided. An example Final Submittal Check List is provided in Figure 8-7.

Draft (Design-Build) FINAL SUBMITTAL CHECK LIST

PROJECT NO: _____ ID# _____

Reference: Section 121 of the Construction Manual.

_____1. Acceptance Letter –Timely submittal is EMPHASIZED. Itemize all documentation still outstanding from Contractor. Be specific. See Construction Manual (CM) 109.9.1 and 120.3.2 for distribution; Appendix B for example.

_____2. CDOT Form 1212 (Final Acceptance Report). Required on ALL projects. RE will print form from SAP, sign & submit.

Pay Documentation

_____3. Field Books (Piling, grade stakes, and survey documentation w/ Professional Land Surveyor stamp, signed Survey control data sheets and/or Monumentation records). QA?

_____4. All Change Orders that have not been previously submitted. (executed)

_____5. Seeding Tickets w/ PLS calculations if not submitted with material documentation.

_____6. CDOT form 105's (Speed Memo), that affect Contractor payments (i.e. work zone violations, deleted/unused items), if not already submitted.

_____7. "As Constructed" plans completed per CM 121.2.3. (include NDCs, FDCs, RFI, At Risk)

_____8. Pay Invoices/Final As-Built Schedule

Water Quality

_____9. Water Quality Notebook (inspection reports, 1176's, 1177's, memos, etc.) turned over to Water Quality Manager on_____. (hard copy)

Civil Rights

_____10. Checked Payrolls to Region Civil Rights office. (all Federal-Aid Projects and F/A work). (CM 107.1.1.2;121.2.8). Payrolls submitted on _____.

_____11. OJT Documentation – copies of CDOT 832's, 838's, 1337 & 266/DWR showing payments. (Note: CDOT 382's 1377, 1418's should have been submitted monthly to the CRO) Workforce Development Program

_____12. Final DBE Report

Materials

_____13. COCs.

_____14. Copy of CDOT 250 (Materials Documentation Record)

_____15. Copy of CDOT 473 Letter of Certification (Materials)

_____16. RSAR (Roadway Surface Accomplishment Report) form completed online _____.

Printed copy included. Form available at http://internal/pavementmgt/RSARdata/RSARform.cfm

Design-Build

_____17. Nonconformance Report Log (NCR Log)

_____18. QMO audit spreadsheet (Log)

_____19. Utility Log

Copy of this checklist with Final electronic files to Finals Engineer on _____.

Figure 8-7. Final Submittal Check List Example

Chapter 9: Streamlined Design-Build

Chapter 9: Streamlined Design-Build

Streamlined Design-Build (SDB) provides a simplified and efficient approach to Design-Build Delivery that can be applied to small and less complex projects. It is characterized by a single step procurement process that significantly reduces the procurement process, both with regard to the schedule and the effort required by the CDOT project team and the proposers.

9.1 Procurement

The procurement process is defined through the Instructions to Proposers (ITP), which is significantly different for SDB than a full two-step Design-Build project. An ITP template for SDB is provided in the online Appendix on the CDOT Innovative Contracting web page or by contacting CDOT Innovative Contracting. Key elements of the SDB ITP are:

Project Briefing: Though this is an optional step in the process, it is generally recommended to ensure that proposers understand the unique characteristics of SDB procurement. Contractor attendance at the project briefing can be either mandatory or optional. An advantage of making the briefing mandatory is that it allows CDOT to better understand the number of and nature of the possible proposers.

Alternative Technical Concepts (ATCs): SDB allows for submittal of ATCs, similar to full Design-Build delivery. The ATC process is a critical element of best value in SDB, allowing proposers to modify the project requirements to provide equal or better value to CDOT in the most cost-efficient manner. To facilitate the ATC process, a period of time is set aside for proposer one-on-one meetings. The one-on-one meetings are not mandatory and are scheduled on a first-come, first-served basis. CDOT must provide the opportunity for at least a single one-on-one meeting for each proposer that requests a meeting within the allowed time period. In rare instances, it may be necessary to extend the meeting period by addendum to provide the necessary meetings.

Pass/Fail Evaluation of Proposals: Brief technical proposals are required from the proposers. The purpose of the technical proposals is to ensure that the proposers are technically qualified to perform the work. The technical proposals are not intended to be used to short-list the most qualified proposers and eliminate other qualified proposers from consideration.

Price Proposal (Bid): The selection is on the basis of a price proposal. Though the price proposal can include an adjustment for time (A+B), it should be in the form of a mathematical formula that can be calculated at the bid opening without subjective elements; this keeps the entire evaluation process straightforward, efficient, and less likely to be subject to protest.

Stipends: As with traditional Design-Build projects, it can be beneficial with SDB projects to offer a stipend to unsuccessful responsive submitters. Because the process is single step without a short-listing phase, the number of contractors that will submit Proposals is unknown. To limit the potential of an excessive total stipend payout to a large number of proposers, the total stipend amount is usually set in the ITP, with the statement that it will be distributed equally to the top three unsuccessful responsive submitters.

9.2 RFP and Contract Documents

The Request for Proposal (RFP) and Contract Documents for SDB are the same as those for full Design-Build with one notable exception. Instead of using the standard Design-Build Book 1 for the Contract, SDB uses Division 100 of the CDOT Standard Specifications. This approach allows project teams to rely on Contract provisions that they are usually very familiar with from their experience on traditional Design-Bid-Build (D-B-B) projects. For the standard Division 100 to be applicable to SDB, it is necessary to modify a number of its provisions. The modifications are provided through Section 1 (General) of the Technical Requirements, which includes Project Special Provisions for Division 100. Most of the revisions are related to Contract management of design work that is not a part of the Standard Specifications. Examples are: professional liability insurance provisions; key Design-Build terminology, such as the definitions of Approval and Acceptance; and a two-step NTP process to allow early initiation of the design process. A template for the Streamlined Division 100 Project Special Provision is available in the online Appendix on the CDOT Innovative Contracting web page or by contacting CDOT Innovative Contracting.

The other sections of the Book 2, Technical Requirements are for the most part the same for SDB as for full Design-Build, and SDB delivery can make use of templates that have already been developed. One notable difference is in the Technical Requirement Section 3, Quality Management. In full Design-Build the Contractor often provides Acceptance testing and inspection through ICQC. In SDB, however, it is usually the best approach for CDOT to provide Acceptance testing and inspection for the project in a manner similar to traditional D-B-B.


EXIT 207 A
Lincoln St
Broadway
EXIT ONLY
EXIT
35
MPH
EXPRESS LANE
ExpressToll
TOLL TO
McCaslin Blvd
$0.25
Foothills Pkwy
$0.75
HOV 2+ USE
ExpressToll
6th
Avenue
EAST
25
Fort Collins
Colorado Springs
EXIT
ONLY