Massachusetts Bay Transportation Authority

ENGINEERING & CAPITAL MANUALS

CAPITAL PROJECT DESIGN PHASE GUIDELINE

July 2025

Massachusetts Bay Transportation Authority

ENGINEERING AND CAPITAL DIVISION – CAPITAL PROJECT DESIGN PHASE GUIDELINE

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PURPOSE

This document is intended to provide project managers, consultants, and other stakeholders with clear guidance on the purpose and scope of the MBTA's standard design phases, with the goal of promoting consistency and efficiency in the delivery of capital projects executed by the Engineering & Capital Department (ECD). It serves as the final step in the replacement of the MBTA's Project Manager's Manual (also known as the Project Office Manual) and supersedes all previous instructions or documentation related to design phase definitions. Effective July 15, 2025, this guidance should be used in coordination with the following MBTA manuals, which together replace the 2014 editions of the Project Manager's Manual:

- MBTA Contract Standard Operating Procedures Manual
- MBTA Project Controls Manual
- MBTA Cost Change Order Manual
- MBTA Construction Field Staff Manual

In-flight projects should evaluate effects of changes and implement modifications only if they do not impose an undue burden on project cost or schedule constraints. Questions and feedback related to this guidance should be directed to CDdesignphase@mbta.com.

SCOPE

This document establishes standardized definitions and processes across the following design phases:

- Pre-Design/Planning (0%) – Defining project purpose, scope, feasibility, and budget.
- Schematic Design (15%) – Identifying design options, scope elements, and developing conceptual layouts.
- Design Development (30%) – Advancing schematic design with detailed engineering and technical input and establishing baseline schedule and budget.
- Progress Set of Contract Documents (75%) – Refining technical details to prepare near-final design documentation.
- Contract Documents (100%) – Finalizing designs for permitting, bidding, and construction.
- Bid Phase – Supporting the procurement and contract award process.
- Construction Phase Services (CPS) – Supporting construction to ensure the build meets the design intent.

Each phase outlines specific tasks, deliverables, and decision points to ensure project success.

During the Progress Set of Contract Documents (75%) phase, project teams may include multiple progress design submittals such as 60%, 90%, or other intermediate sets, as appropriate to support project needs. The inclusion and timing of such submittals should be determined at the discretion of the Project Team in coordination with departmental management and key stakeholders.

MBTA ROLES & RESPONSIBILITIES

The efficient delivery of capital projects starts with all internal and external project participants understanding their roles and responsibilities during the Pre-Design/Planning and following design phases of a project. Project participants include project initiator groups, stakeholder groups, end-user groups, and project delivery groups. Ultimately, it is the responsibility of the assigned Project Manager to ensure that all applicable tasks and deliverables described herein are completed on schedule and within the approved budget.

Capital projects are initiated by a wide range of groups within the MBTA. The primary initiator groups for projects executed by ECD are the Chief Engineer's Technical Engineering & Design Group, the Chief Engineers Infrastructure Planning Group. Various Operations Planning Groups as well as asset owners and end users within MBTA Operations also initiate projects although it is strongly recommended that groups external to ECD work with the Chief Engineer's groups listed above to ensure their work product aligns with the development process as defined by these guidelines and reference manuals. Project initiators are typically responsible for the Pre-Design/Planning Phase, typically performed with the assistance of professional services consultants. Project initiator groups are often primary stakeholders in projects moving forward in design and as such are engaged in specific design coordination meeting and the Project Development Group (PDG) process as is appropriate.

Responsibility for full project delivery, including the design phases beyond Pre-Design/Planning, falls under the responsibility of delivery groups or programs that exist under the MBTA' s Engineering and Capital Department (ECD). This includes the procurement and management of professional services for any and all design phase scope. No exceptions unless approved in writing by the Assistant General Manager for ECD in advance or the following. Approval of the AGM for ECD is not required when the construction of the project is being performed using internal operations forces in which case the design phase responsibilities may fall under the responsibility of the respective operations group.

HOW TO USE THIS DOCUMENT

Project managers should refer to this document throughout project design to understand the expectations, required deliverables, and goals for each design phase. It provides structured guidance to support informed decision-making, stakeholder coordination, and project execution within budget and schedule constraints.

The guidance within this document is not intended to be comprehensive. Project managers are expected to tailor their project's design requirements to address the unique needs, complexities, and constraints of each project while maintaining consistency with these established design phase definitions.

When projects are handed off between departments, Project Managers must coordinate in advance to confirm the appropriate phase for the hand-off, based on project needs and departmental direction. Both departments should be involved before and after the transition to ensure a smooth and seamless hand-off.

Projects with limited scale or scope may permit a streamlined design process, allowing for the reduction or consolidation of the design tasks, deliverables, and/or phases outlined herein. In such cases, the Project Manager must document the proposed design approach and obtain written approval from departmental management before proceeding.

ADAPTING THIS GUIDANCE FOR ALTERNATIVE DELIVERY METHODS

For projects utilizing alternative delivery methods such as Design-Build (DB) or Construction Manager at Risk (CMAR), project managers must adapt the design phase framework to align with the project delivery method.

- **Design-Build (DB)** – Since design and construction phases overlap in DB projects, project managers should establish phase transition criteria that ensure critical design milestones are met before construction proceeds. Key elements such as preliminary engineering, progressive design reviews, and early contractor involvement should be incorporated into the Schematic Design and Design Development (30%) phases to maintain project alignment.

- **Construction Manager at Risk (CMAR)** – In CMAR projects, early collaboration between the Construction Manager (CM), Owner's Project Manager (OPM) and the Engineer/Architect of (E/AOR) is essential. Project managers should integrate iterative design evaluations and risk assessments throughout the design phases to ensure constructability and cost efficiency. Adjustments may include compressing or overlapping design phases to facilitate expedited decision-making.

Note that roles and responsibilities for the tasks and deliverables described in this guidance may differ when alternative delivery methods are used and must be evaluated on a case-by-case basis. Project managers should consult the Project Controls Manual and relevant contract documents to determine appropriate adaptations.

For all alternative delivery methods, project managers should document any necessary modifications to the standard design phase framework and seek approval from the PDG to ensure alignment with MBTA standards.

BRIDGE PROJECT DESIGN PHASES

Design phases for all bridge projects (highway, commuter rail, transit rail, and pedestrian types) will intend to follow the latest editions of the MassDOT LRFD Bridge Design Manual and the MassDOT Project Development and Design Guide. Projects will be evaluated case by case for conformance to the project design phases.

This does not exempt bridge projects from MBTA Capital Program policies and procedures. Bridge project offices shall be responsible for completing applicable tasks and deliverables contained herein at the appropriate MassDOT prescribed design milestone.

Questions and feedback related to bridge project design should be directed to the MBTA Deputy Chief of Bridges & Structures.

PRE-DESIGN/PLANNING PHASE (0%)

Definition

The Pre-Design/Planning Phase (0%) defines the project's purpose and goals, evaluates existing conditions, establishes project limits and major scope elements (i.e., the program), identifies applicable design codes, and sets a preliminary budget and schedule. This phase involves coordination with internal asset owners and key stakeholders to gather input on project requirements. For projects with multiple viable design concepts, it includes a conceptual or schematic-level assessment of alternatives to inform budget options. Based on internal feedback, the project team will narrow the scope to a preferred concept or set of criteria. For public-facing projects, this phase may also involve engagement with external stakeholders and the public.

Tasks

❖ **Draft Basis of Design**

- Develop clear project goals and metrics for success (e.g., service improvement targets) based on input from stakeholders.
- Establish preliminary design criteria and program scope, including:
  - Operational/service and functional requirements
  - Accessibility and safety needs and standards
  - Environmental permitting and review considerations including sustainability & resilience scope items
  - Applicable codes, standards, and regulatory precedents including state building code requirements

❖ **Stakeholder Engagement**

- Identify Project Development Group (PDG) members based on project goals, including asset owners, operations end users, safety, accessibility and other internal stakeholders including subject matter experts relevant to the project.
- Identify key external stakeholders, including external agencies requiring coordination to deliver the project and the public, where appropriate.
- Develop a public engagement strategy aligned with the project's scope and visibility to achieve community/stakeholder buy-in by the Design Phase. Align with MBTA Public Engagement Plan.
- Coordinate with stakeholders to gather project requirements, constraints, and an understanding of how the stakeholders will need to support the project during design and construction as well as after the project has been commissioned.

❖ **Data Collection & Existing Conditions**

- Gather existing data to define existing conditions and inform design:
  - Survey (with grading), soil borings, and as-built record documents (archives@MBTA.com)
  - Environmental data (e.g., AULs, wetlands via MassMapper and internal sources; MCP site database; hazardous materials surveys, discharge permits)

    - Review the MBTA Flood Resiliency Design Directive for establishing a Design Flood Elevation
    - Climate vulnerability assessments (via MBTA Environmental Dept)
    - Ridership or headway/bus counts (via OPMI/Operations Analytics)
    - Parking utilization (via Commercial Programs/Strategies)
    - Asset Inventory, Condition Information, Asset Schematics, and latest ADIS (Asset Data Information Spreadsheet) template (via Asset Management Department)
    - Real estate documentation (via LandTracker) including deeds, easements, licenses, MOUs, etc.
    - Standpipe, Fire Alarm, and Black Out Test Reports
    - Design documents from previous efforts for the asset(s)
    - Relevant planning documents
- Perform initial field survey, existing condition assessments, and/or additional data collection if recent or reliable data is not available.
    - Confirm data collection requirements with stakeholders including MBTA Environmental for anticipated permitting requirements
    - For some projects, ROW access may limit ability to obtain field survey at this stage. To gain physical access to land not owned by MBTA, contact the MBTA Real Estate Team to facilitate permission

❖ Design Studies

- Conduct design studies to inform project definition and support budgeting:
    - Alternative analysis of potential configurations or building programs to address operational, service, and employee/rider passenger needs
    - Conceptual-level feasibility studies and/or test fits
    - Benefit-Cost Analyses (BCAs) to demonstrate the return on investment
    - Site selection assessments including Title VI analysis as applicable
    - Assess construction phasing requirements for each alternative to inform the project schedule and budget
- Identify impacts to existing Track, Signals/Communications, Power, and Facility assets, including adjacent MBTA-owned assets such as Commuter Rail.
- Determine preliminary environmental avoidance, minimization, and mitigation measures.
- Identify anticipated needs for new curb cuts or traffic signal installations and stormwater and/or flood resiliency infrastructure, and other major site/civil components to the program.
- Estimate the Order of Magnitude (OOM) level of Right-of-Way (ROW) access needs based on past project precedent and project limits/scope.

❖ Permitting & Project Readiness Planning

- Identify potential temporary or permanent real estate acquisition needs including tenant relocation requirements.

- Initiate coordination with Real Estate to discuss plan for permanent and temporary real estate needs, potentially including communications to affected property owners.
- Establish NEPA class of action and identify potential analyses needed to support NEPA review (historic, open space, rare species, etc.).
- Identify analyses or documentation needed to determine MEPA applicability.
- Identify necessary environmental permits, reviews, and approvals needed for the project.
- Identify new or upgraded utility connections and initiate coordination with Technical Engineering – Utilities and Environmental energy team.
- Identify potential long lead materials based on project scope (e.g., special trackwork, signals equipment, power systems, elevators, escalators, etc.).

❖ **Safety and Security Certification**

- Review the Safety and Security Certification Program Plan and notify MBTA Safety of the project (direct question and notifications to SafetyandSecurityCertification@mbta.com).
- Notify MBTA Safety of the project and define Safety and Security Certification requirements and strategy in consultation with MBTA Safety.

❖ **Budget, Schedule, and Risk**

- Establish a preliminary project budget estimate using the current MBTA Capital Project Budget Estimating Tool (Budget Estimating Tool) informed by:
  - Past project precedent and unit cost references OOM ROW Access needs
  - Internal/external resource demands
  - Schedule assumptions and opportunities for cross-project coordination
  - Scope alternatives and risk factors
- Determine whether the project will be designed to program (goal/needs-driven) or designed to budget (constrained/funding-driven).
- Establish a preliminary total project schedule and key milestones.
- Conduct initial qualitative risk assessment to support scope, budget, and schedule development.

Deliverables

❖ **Draft Basis of Design**

- Purpose: Document key information about the project to support development of a project charter/funding request and provide information about the project requirements for the delivery team.
- Contents:
  - Project goals and metric(s) for success
  - Summary and diagram of existing conditions
  - Preliminary Project Program (scope elements and functional requirements) and items requiring further investigation/confirmation in next design phase
  - Site selection and preliminary project siting
  - Design Criteria (project specific requirements, codes, standards, regulations)

- Environmental permitting and review considerations
- Existing and projected extreme weather impacts and flood resiliency design requirements
- Construction phasing requirements and considerations
- Draft real estate acquisition plan, schedule, and cost estimates
- Preliminary Total Project Budget Estimate vs. Program Alignment Memo (design-to-budget vs. design-to-program recommendation)
- Initial Risk Assessment (qualitative risks to scope, budget, and/or schedule)
- Preliminary Project Schedule and cross-project coordination opportunities

❖ **Stakeholder Engagement & Coordination Plan**

- Purpose: Documents stakeholder participants, engagement strategy, and input.
- Contents:
  - Project Development Group (PDG) Roster with Roles and Input Timing
  - Stakeholder Input Summary
  - Public Engagement Strategy
  - Infrastructure and Operations Impact Report identifying potential project impacts

❖ **Existing Conditions Reference Documentation**

- Purpose: Establishes the baseline existing conditions for the project.
- Contents:
  - Conditions report(s) (survey, soil borings, environmental, ridership, parking, asset condition, real estate)
  - As-built documents
  - Asset Management Network Schematics and other asset owner drawings, schematics, and references

❖ **Conceptual Design Study, Feasibility Study, and/or Alternatives Analysis Report**

- Purpose: Evaluates potential project design alternatives from technical operational, and feasibility perspectives to define the preferred concept for advancement.
- Contents may include:
  - Conceptual Design Study – Identifies and develops initial design concepts which meet the program goals
  - Feasibility Report – Assesses the technical and financial feasibility of the proposed concepts, identifying risks (including safety, security, environmental), constraints, and required level of investment
  - Alternatives Analysis – Compares project alternatives against evaluation criteria to support and recommend the selection of a preferred alternative

❖ **Safety and Security Certification Documentation**

- Purpose: Identifies anticipated Safety and Security Certification requirements.
- Contents: Safety and Security Certification (SSC) Project Assessment Form.

Final Steps

- Project Charter developed and submitted for CIP funding.
    - Leadership decision regarding Agency willingness to move the project forward and funding strategy to support design and construction
- Project established in CMS/FMIS and e-Builder once funded.
- Project Delivery method recommendation.
- Identify available GEC to advance design or need to develop RFP for design service procurement.

SCHEMATIC DESIGN PHASE (15%)

Definition

The Schematic Design Phase (15%) is the first phase that includes procurement of the Engineer/Architect of Record (EOR/AOR) for all subsequent design, bid, and construction phases. This phase identifies major scope elements and explores design options to address the program requirements. It involves collaboration with stakeholders to build consensus on a preferred approach, based on an evaluation of benefits, risks, and costs. Deliverables typically include architectural and civil/site drawings focused on circulation, space allocation, and adjacencies for key scope elements. MEPF drawings are not included at this stage. If a study was conducted during Pre-Design/Planning Phase, this phase builds on its findings, however, depending on the level of detail established in the study, the Schematic Design Phase may be relatively brief.

Tasks

- **Design Procurement**
  - Procure an EOR/AOR and provide them with the deliverables prepared during the Pre-Design/Planning Phase.
  - Obtain approved Project Management Plan (PMP) and Project Quality Plan (PQP) prior to commencing with design activities.

- **Design Progression**
  - For the established program, evaluate schematic options (benefits, risks, costs, OOM pricing) and select preferred approach for delivering the program. Project options may require further development to adequately assess potential environmental impacts and comply with NEPA/MEPA review requirements.
  - Evaluation of options to incorporate measures to address operational and customer needs, accessibility, climate resiliency/hazards, sustainability, and other goals based on project budget and other constraints.
  - Further development of environmental avoidance, minimization, and mitigation measures to support required environmental permits and reviews.
  - For the selected option(s):
    - Establish basic site plan (access/circulation, major regrading, stormwater elements, parking)
    - Develop architectural concepts/massing using programmatic blocks
    - Develop foundation concept and structural systems narrative
    - Develop initial MEPF system narrative to support spatial layout
    - Identify major equipment or scope elements requiring routine maintenance and identify access requirements to conduct maintenance
    - Draft suggested construction sequence
    - Identify major code, resiliency, and sustainability requirements, including anticipated 521 CMR or FTA accessibility requirements
    - Identify list of MBTA baseline specifications and identify other specifications which will need to be developed by the EOR
  - Update the OOM level of ROW access needs.
  - Update the Basis of Design as needed.

- **Stakeholder Engagement**
  - Present schematic alternatives to the PDG and document feedback.
  - Throughout the design period, meet as needed with MBTA internal stakeholders to workshop specific design topics to ensure the project is meeting internal needs.
  - Collect cost estimates for internal and external support services (Transportation, E&M, Safety, Keolis, Amtrak, etc.) required throughout design and construction phases.
  - Confer with external affairs, SWA, CEX and ODCR, as applicable, regarding public outreach needs
  - Progress external engagement (interagency coordination, public meetings, legislative outreach).
  - Launch or update project webpage as needed.

- **Permitting & Project Readiness Activities**
  - Further development of analyses or documentation needed to support NEPA/MEPA reviews and prepare NEPA/MEPA documentation.
  - Define soil testing requirements and schedule, including plan for pre-characterization of excavated materials.
  - Continue coordination with MBTA Real Estate to prepare Real Estate Acquisition Intake Request and draft Acquisition Plans.
  - Establish communication with utility providers to determine connection requirements and service delivery timelines.
  - Confirm long lead material procurement list with the selected alternative design and coordinate with internal stakeholders for current standards, lead times, and OOM costs.
  - Identify project watershed and further development of stormwater management plan, consulting with the Environmental Department as needed.

- **Asset Management**
  - Coordinate with Asset Management to identify the following for the assets which will be decommissioned, modified/relocated, replaced, or added by the project:
    - Asset Hierarchies
    - ADIS
    - Asset ID Tags

- **Safety and Security Certification**
  - Establish a Safety Management Working Group (SMWG) in coordination with MBTA Safety.
  - Establish the Certifiable Elements List (CEL) in collaboration with stakeholders.
  - Develop Preliminary Safety and Security Certification Plan (SSCP), if required.
  - Develop Preliminary Safety and Security Management Plan (SSMP), if required.
  - Finalize the Preliminary Hazard Analysis (PHA) and Security Assessment (SEC) utilizing SSCP Workbook.

- ❖ Budget and Schedule
  - Prepare an Engineer's Construction Cost Estimate based on the selected alternative.
  - Prepare a Contract Time Determination (CTD) Schedule based on the selected alternative.
  - Update the preliminary total project budget estimate.
  - Update the preliminary total project schedule.

Deliverables

- ❖ Schematic Design (15%) Package
  - Purpose: Documents the preferred schematic-level design.
  - Content:
    - Site Plan (access/circulation, major features)
    - Architectural Massing and Layout Concepts
    - Basis of Design Report including narratives for all disciplines
    - Specification List
    - Engineer's Construction Cost Estimate
    - Contract Time Determination (CTD) Schedule
    - Updated Preliminary Total Project Budget Estimate
    - Updated Preliminary Total Project Schedule

- ❖ Design Management and QA Plans
  - Purpose: Defines how the designer will manage scope, schedule, budget, and communication throughout the project and outlines the processes and standards to ensure the design meets contractual, technical, and regulatory requirements.
  - Content:
    - EOR/AOR's Project Management Plan (PMP)
    - EOR/AOR's Quality Management Plan (QMP)
    - Risk & Contingency Management Plan (RCMP)

- ❖ Updated Basis of Design
  - Purpose: Documents the project's refined intent, goals, scope, and design criteria.
  - Contents:
    - Project Goals and Metric for Success
    - Project Program (scope elements and service requirements)
    - Design Criteria (codes, standards, regulations, design flood elevation)
    - Identification of potential internal Design Exception Requests for Technical Engineering & Design, Safety & SWA to review in future phase
    - Service and Operations Requirements Summary

- ❖ Stakeholder Engagement Documentation
  - Purpose: Tracks internal/external input and demonstrates transparency in design decision-making.
  - Content:
    - PDG Meeting Presentation and Comment Log

- Public Outreach Content (slide decks, summaries, website content)
- Legislative Briefing Materials (if applicable)
- Cost estimates for stakeholder support services

❖ Alternative Analysis Report (if applicable)

- Purpose: Compares schematic options, supports decision-making, and ensures alignment with preliminary budget.
- Content:
  - Summary of design alternatives and evaluation criteria
  - Benefits/cost/schedule/risk comparison
  - Recommendation for preferred alternative

❖ Permitting & Project Readiness Documentation

- Purpose: Documents activities required to clear path for final design and construction.
- Contents:
  - Kick-Off Environmental Checklist
    - Environmental Permitting and Review Deliverables as applicable, including analyses needed to support NEPA reviews or determine MEPA applicability.
  - Draft Land Acquisition Plan (parcel map documenting real estate needs)
  - Draft Real Estate Parcel Summaries (narratives explaining the real estate needs in the context of the project)
  - Utility Coordination Memo
  - Long Lead Material Procurement Memo

❖ Asset Management

- Asset Data Package including:
  - Asset Hierarchies
  - ADIS
  - Asset ID Tags

❖ Safety and Security Certification

- Purpose: Advances project safety assessment and documents the path for certification
- Contents:
  - Certifiable Elements List (CEL)
  - Approved and signed Safety and Security Certification Plan (SSCP), if required
  - Approved and signed Safety and Security Management Plan (SSMP), if required
  - Preliminary Hazard Analysis (PHA)
  - Security Assessment (SEC)

DESIGN DEVELOPMENT PHASE (30%)

Definition

The Design Development Phase (30%) advances the Schematic Design (15%) by incorporating technical details across all disciplines and systems. Design decisions are locked in to establish the baseline schedule and budget to which the project will be held for the remainder of its duration. Projects should clear NEPA and MEPA review between the Design Development Phase (30%) and the Progress Set of CDs Phase (75%) and progress other regulatory milestones identified in the project schedule. The phase ends with operational department sign-off, identification of any additional funding needs. Any changes beyond this phase will trigger formal scope change procedures through the Scope Change Review Committee.

Tasks

❖ Design Progression

- Advance scope-critical design elements and fix them as baseline.
- Finalize scope elements related to operations, customer experience, accessibility, climate resiliency/hazards, sustainability, and document decision-making in basis of design.
- Develop preliminary drawings and schedules for:
  - MEPF systems
  - Civil and structural systems
  - Architectural elements
  - Track alignments and special trackwork sizes and configurations
- Advance development of stormwater management plan with conceptual layout of structural and non-structural stormwater control measures.
- Perform Platform Gap Analysis for revenue vehicles based on proposed track geometry and platform alignment.
- Review placement of equipment and design elements requiring regular. maintenance, repairs, or replacement to ensure long-term serviceability.
- Establish suggested construction sequence.
- Identify and submit for approval MBTA design standard waivers.
- Identify and coordinate with AHJ on any code variances.
- Update existing project documents including the PMP and PQP.
- Refine ROW access needs based on design requirements and limits/resources identified in work zone toolkit.

❖ Stakeholder Engagement

- Throughout this phase, meet as needed with MBTA internal stakeholders to workshop the design to ensure it meets project goals and criteria.
- For projects requiring significant diversion time (extensive number of weekends and/or surges), consult with ROW Diversion Planning and Integration (RDPI) and/or Railroad Operations (RROps) during the development of the Draft ROW Access Plan.
- Host PDG and circulate design documents for department sign-off.

- Update cost estimates for stakeholder support services required throughout design and construction phases.
- Progress public outreach, as applicable (e.g. stakeholder meetings, legislative outreach, public meetings).

❖ Technical Studies and Testing

- Conduct full geotechnical investigation and environmental testing (including pre-characterization if requested).
- Engage Commissioning Agent to develop draft Testing & Commissioning Plan and list of deliverables.
- Develop Draft Testing and Inspection Program including special inspections and acceptance testing here.
- Review Lessons Learned documentation and apply findings.

❖ Permitting & Project Readiness

- Identify all project permitting needs and complete 30% Environmental Checklist (serves as permitting matrix).
- Complete all analyses and documentation needed to finalize NEPA and MEPA documents.
- Prepare applications for applicable environmental permits.
- Meet with OPSI and other AHJs (Authorities Having Jurisdiction) to review code compliance path.
- Meet with SWA regarding compliance or infeasibility with 521 CMR or FTA accessibility requirements. SWA to initiate necessary FTA or 521 CMR initial conversations if obstacles are technically infeasible to overcome.
- Engage Title Examiner to confirm ownership rights (MBTA Real Estate to procure with Project Funds).
- Finalize Real Estate Parcel Summaries including operational and maintenance needs.
- Initiate the real estate acquisition process in accordance with the Phase 1 Environmental Site Assessment (ESA), Section 106 findings, and applicable laws, including MGL Chapters 79, 79A, and 161A. Engage with property owners to explain the acquisition process. ESA to be procured by the project team.
- Engage MBTA Real Estate to procure a qualified real estate appraiser using project funds. Complete ESA prior to initiating the appraisal. Appraisal cannot begin until ESA report is available.
- Advance the utility design in collaboration with service providers.
- Initiate detailed technical specification development for long lead materials and coordinate with MBTA Procurement to plan procurement process.
- Draft Pre-Bid Review Control Sheet (PRCS).

❖ Asset Management

- Update Asset Data Package based on design progression.

- Draft 01610 Asset Management specification section including the ADIS(s) and Asset Tagging Standard as attachments or appendices.
- Annotate drawings with the applicable assets ID tags.

❖ Safety and Security Certification

- Refine CEL Based on updated design documents.
- Updated SSCP, as required, expanding on responsibilities, processes, timelines
- Finalize the Certifiable Items List (CIL).
- Develop and update the hazard log, including status and mitigation tracking.
- Coordinate with design and construction teams to integrate safety and security requirements into the design package.
- Develop and finalize the Design Criteria Conformance Checklist (DCCC).
- Begin verification of the Design Criteria Conformance Checklist (DCCC).

❖ Constructability, Risk, and Value Engineering

- Conduct the first formal Risk Workshop and develop an initial Quantitative Risk Register.
- Perform a Value Engineering (VE) Review in consultation with Project Controls.
- Perform a Constructability Review in consultation with Project Controls.
- Incorporate recommendations from the VE and Constructability Workshops into the design package as appropriate.

❖ Budget & Schedule

- Update the Engineer's Construction Cost Estimate.
- Update the CTD schedule, including identifying all work requiring Right of Way (ROW) Diversion needs (revenue and non-revenue) to the level of detail described in the PC Manual.
- Update the Preliminary Total Project Budget Estimate, including potential ROW access and diversion needs, and set as the baseline project budget.
- Update the Preliminary Total Project Schedule and set as the baseline project schedule.

Deliverables

❖ Design Development (30%) Package

- Purpose: Documents the Design Development (30%) level of design.
- Content:
  - Design Development Drawings (see content requirements below)
  - Basis of Design Report
  - Baseline Specifications
  - Submission of all Design Exception Requests to TED, Safety & SWA for review and approval
  - Engineer's Construction Cost Estimate
  - Constructability Assessment Report
  - Risk Assessment Report

- Value Engineering Assessment Report
- Contract Time Determination (CTD) Schedule
- Total Project Budget Estimate (Baseline)
- Total Project Schedule (Baseline)

❖ **Stakeholder Engagement Documentation**

- Purpose: Tracks internal/external input and demonstrates transparency in design decision-making.
- Content:
  - PDG Meeting Presentation and Comment Log
  - Public Outreach Content (slide decks, summaries, website content)
  - Legislative Briefing Materials (if applicable)
  - Updated cost estimates for stakeholder support services

❖ **Permitting & Project Readiness Documentation**

- Purpose: Further develops documentation required for final design and construction.
- Contents:
  - Final Stamped Recordable Real Estate Acquisition Plans, Final Acquisition Summary Memo, Appraisals, Recording Order of Taking and Plans, Notice of Takings, etc. (Note: The actual recording would not take place until design is completed and before advertising for building contractor bids, or in some cases before notice to proceed)
  - Environmental Checklist (30%)
  - Final NEPA document including reviews needed (section 4(f), section 106, endangered species act, etc.) for NEPA completion
  - Final MEPA document for submittal to MEPA Office
  - Existing and proposed utility documentation
  - Draft ROW Access Plan
  - Constructability Workshop Review Report
  - VE Workshop Review Report
  - Draft Long Lead Material Procurement Packages
  - Draft Pre-Bid Review Control Sheet

❖ **Asset Management**

- Updated Asset Data Package

❖ **Safety and Security Certification**

- Purpose: Advances project safety assessment and documents path for certification.
- Contents:
  - Updated, as necessary, Safety and Security Certification Plan (SSCP)
  - Updated, as necessary, Safety and Security Management Plan (SSMP)
  - Certifiable Items List (CIL)
  - Design Criteria Conformance Checklist (DCCC)

DESIGN DEVELOPMENT PHASE (30%) DRAWING LEVEL OF DETAIL

- **General**
  - Cover sheet with project title and locus map
  - Sheet index, abbreviations, and symbols
  - General notes
  - Suggested construction sequence

- **Architecture**
  - Code analysis summary
  - Floor plans showing space layout, room functions, and circulation paths
  - Building elevations and sections to illustrate massing and envelopes
  - Preliminary material selections and finishes
  - Roof plans and envelope detailing concepts
  - Customer amenities and accessibility compliance elements (ramps, doors, elevators, etc.)
  - Plans showing Areas of Rescue and egress routes

- **Civil**
  - Site layout, including grading, drainage, paving, curb cuts, sidewalk alignments, and roadway modifications
  - Utility connections (stormwater, water, sewer, etc.)
  - Preliminary erosion and sedimentation control plans
  - Access and circulation diagrams for pedestrians and vehicles, including grading and adherence to accessibility requirements
  - Preliminary stormwater management features (detention basins, green infrastructure etc.)
  - Environmental avoidance, minimization, and mitigation measures (wetland replication areas, compensatory flood storage area, retaining walls, etc.)

- **Structural**
  - General Notes and Structural Design Criteria
  - Foundation plans and structural framing layout including sizing of major structural components
  - Structural system selection and load path concepts
  - Structural sections and details for typical elements
  - Retaining wall layouts and concepts

- **Track**
  - Horizontal and vertical track alignments
  - Typical track cross sections
  - Turnouts, crossovers, and other special trackwork locations

- **MEPF (Mechanical, Electrical, Plumbing, Fire Protection)**
  - HVAC layouts and major equipment locations.
  - Electrical one-line diagrams including the source and distribution of power and lighting plans.
  - Plumbing riser diagrams and fixture locations.
  - Fire protection system concept (sprinkler coverage zones, fire pump location, etc.).
  - Mechanical and electrical systems, including area drainage, piped utilities, heating ventilation and air conditioning, smoke evacuation, power, and lighting, are described and single line drawings are provided.

PROGRESS SET OF CDs PHASE (75%)

Definition

The Progress Set of CDs Phase (75%) refines the technical aspects of all design disciplines and produces a near-final design package, addressing all comments and feedback from prior phases. Intermediate progress sets (e.g. 60%, 90%, etc.) may be issued as needed to support iterative MBTA review and input. During this phase, the project team will monitor the budget closely and identify any scope modifications required to maintain alignment with the baselined budget. Technical verification of the deliverables will be conducted by the Project Office and select subject matter experts (SMEs) identified in the PMP. Risk and constructability reviews will be revisited as needed to reflect the evolving design. Public outreach during this phase will focus on construction schedule and potential project impacts.

Tasks

- ❖ Design Progression
  - Advance all discipline drawings to a coordinated, near-final state including:
    - Civil, Structural, Architectural, and Landscape
    - Mechanical, Electrical, Plumbing, and Fire Protection (MEPF)
    - Track, Signals, Power, and Communications
  - Finalize the Basis of Design.
  - Integrate comments from prior phases and reviews, including requirements from regulatory entities and agreed upon feedback from internal Design Exception Review approvals and or modifications.
  - Develop design details with no anticipated changes to project scope unless approved through formal change management process.
  - Confirm compliance with applicable design codes and MBTA standards.
  - Update existing project documents including the PMP, PQP, Testing & Inspection Program, etc.
  - Integrate requirements for real estate agreements, leases, MOU's etc. into the design package. If there is a meaningful change in design that affects the acquisitions, then the real estate due diligence must re-start.

- ❖ Technical Studies and Testing
  - Coordinate the design with the Commissioning Agent and prepare a systems testing plan and schedule.
  - Perform supplemental geotechnical investigation and environmental testing.

- ❖ Stakeholder Engagement
  - Gather and resolve technical feedback from MBTA internal stakeholders as needed.
  - Present Progress Set of CDs (75%) design package to the PDG and collect final input. Ensure RDPI and RROps teams are included if a diversion is required.
  - Continue public engagement, as appropriate, with updated design materials.

- For all projects requiring ROW access, conduct kick-off consultation with RDPI and RROps (unless already completed in previous phase).

❖ **Permitting & Project Readiness**

- Prepare and submit permit-ready design documents as required by permitting authorities.
- Finalize environmental permit applications .
- If not already completed in prior phases: Finalize real estate acquisitions, agreements, leases, licenses, MOUs, etc. including recording applicable documents with the Registry of Deeds.
- Coordinate with utilities to finalize service plans, easement needs, and approvals.
- Coordinate with AHJ's (OPSI, Fire Department, etc.) as necessary to confirm regulatory compliance with the building code.
- Coordinate with SWA regarding any outstanding FTA or 521 CMR matters.
- Identify Buy America/Buy American products and required waivers.
- Finalize procurement packages for long lead materials and issue early release bid packages for material procurements.
- Update draft Pre-Bid Review Control Sheet.

❖ **Asset Management**

- Finalize the Asset Data Package based on design progression.

❖ **Safety and Security Certification**

- Conduct and complete detailed hazard analyses, as required by the project or certification project assessment form, including, but not limited to:
  - System Hazard Analysis (SHA)
  - Subsystem Hazard Analysis (SSHA)
  - Operating Hazard Analysis (OHA)
  - Others as applicable
- Update the SSCP based on the final design direction and updated roles.
- Continue verification of the Design Criteria Conformance Checklist (DCCC).
- Develop the Construction Specification Conformance Checklist (CSCC).
- Develop the Testing Verification Conformance Checklist (TVCC).

❖ **Risk Analysis**

- Review Quantitative Risk Register throughout phase and implement mitigation strategies as appropriate into the design package.
- Perform a 2nd Risk Workshop and in consultation with Project Controls.

❖ **Budget & Schedule**

- Finalize the Engineer's Construction Cost Estimate.
- Perform ICCE (Independence Construction Cost Estimate) in consultation with Project Controls.

- Finalize the CTD schedule, including identifying all work requiring Right of Way (ROW) Diversion needs (revenue and non-revenue) to the level of detail described in the PC Manual.
- Finalize cost estimates for stakeholder support services required for the remainder of the project.
- Confirm that the total project budget estimate is within the baselined budget.
- Confirm that the total project schedule is within the baselined schedule.

Deliverables

❖ **Progress Set of CDs (75%) Package**

- Purpose: Near-complete design documentation, coordinated across all disciplines
- Contents:
  - Progress Set of CDs (75%) Drawings and Specifications
  - Updated Basis of Design Report
  - QA/QC Certification of design package
  - Finalized Engineer's Construction Cost Estimate
  - Finalized CTD Schedule
  - Finalized Total Project Budget
  - Finalized Total Project Schedule

❖ **Stakeholder Engagement Documentation**

- Purpose: Confirms internal stakeholder approval of design elements.
- Contents:
  - PDG meeting materials and final comment log
  - Public engagement summary and updated feedback
  - Finalized cost estimates for stakeholder support services

❖ **Permitting & Project Readiness Documentation**

- Purpose: Confirms project is ready for final permitting construction.
- Contents:
  - Finalized environmental permits for submittal to regulatory agencies as applicable
  - Finalized documentation of Real Estate acquisitions, agreements, leases, licenses MOU's etc.
  - Finalized Utility agreement documentation
  - Finalized ROW Access Plan
  - Finalized procurement packages for long lead materials
  - Updated Pre-Bid Review Control Sheets
  - Systems commissioning plan and schedule

❖ **Asset Management**

- Finalized Asset Data Package.

❖ **Safety and Security Certification Documentation**

- Purpose: Prepares for SSC process finalization and certification.

- Contents:
  - Final Hazard Analysis Reports
  - Updated Hazard Log
  - Construction Specification Conformance Checklist (CSCC)
  - Testing Verification Conformance Checklist (TVCC)

❖ **Constructability Review Report**

- Purpose: Documents constructability findings and recommendations.
- Contents:
  - Constructability issues identified and resolutions

❖ **Risk Register**

- Purpose: Provides current risk profile and identifies mitigation strategies.
- Contents:
  - Updated design risk register
  - Summary of design risk workshops

CONTRACT DOCUMENTS PHASE (100%)

Definition

The Contract Documents Phase (100%) involves finalizing the contract documents in preparation for bidding and awarding the construction contract. These documents incorporate all comments from the Design Development Phase (30%) and Progress Set of CDs Phase (75%). A 100% set of plans and specifications is prepared and reviewed by internal MBTA subject matter experts (SMEs) to confirm the design now accounts for all comments generated during the previous phase. At this phase, no substantial design changes are expected.

Tasks

- **Design Finalization**
  - Finalize all design elements and incorporate comments from previous phases.
  - Confirm resolution of all open comments from:
    - Project Development Group (PDG) reviews
    - Constructability and Risk Workshops
    - Public engagement sessions
  - Project Office to conduct an internal review of contract documents with SME engagement and secure scope memo sign-offs.
  - Ensure all required waivers and variances are signed and documented.
  - Update existing project documents including the PMP and PQP
  - Ensure all requirements for real estate agreements, leases, licenses, MOU's etc. have been incorporated into the design package.

- **Permitting & Project Readiness**
  - Continue coordination on diversions with RDPI and RROps – cannot be finalized until receipt of contractor's schedule and Diversion Approval Board approves.
  - Confirm environmental permits are finalized or pending issuance.
  - Ensure all mitigation measures and environmental commitments are incorporated in the specifications and drawings.
  - Finalize ROW access needs and restrictions (e.g., track outages, flagging, diversions).
  - Confirm all real estate acquisitions, easements, and rights of entry are finalized or in the process per construction schedule needs.
  - Finalize coordination with utility owners and confirm utility hook ups, relocations, and protections are incorporated into final design.
  - Finalize Pre-Bid Review Control Sheet and acquire sign-offs.
  - Ensure all long lead materials are clearly defined in bid documents
  - Review submittals for long lead material procurements and track delivery
  - Coordinate with the AHJ(s) to confirm that the contract documents reflect all AHJ requirements.

- **Safety and Security Certification**

- Finalize and submit the 100% verified Design Criteria Conformance Checklist (DCCC)
- Ensure safety and security requirements are fully integrated into contract documents.

❖ Asset Management

- Confirm Asset Data Package by performing an Asset Data QA Check to ensure accuracy and completeness including field validation.
- Coordinate with Asset Management to ensure that the design is construction-ready and receive sign-off of the asset register.

❖ Design Management and Quality Oversight

- Review and update as necessary:
  - Quality Management Plan (QMP)
  - Project Management Plan (PMP)

❖ Budget, Schedule, and Risk

- Confirm Engineer's Construction Cost Estimate and CTD Schedule
- Confirm that total project budget estimate is within the baselined total project budget estimate
- Confirm that total project schedule is within the baselined total project schedule
- Confirm the Risk Register

Deliverables

❖ Contract Documents (100%) Package

- Purpose: To provide a complete, coordinated, and finalized set of design documents that define the project scope, standards, and requirements for construction procurement.
- Content:
  - Contract Documents (100%) Drawings and Specifications
  - Engineer's Construction Cost Estimate
  - Final Basis of Design Report
  - CTD Schedule
  - Total Project Budget Estimate
  - Total Project Schedule

❖ Safety and Security Certification

- Purpose: To confirm that the design meets all applicable safety and security requirements and is fully certified for progression to construction.
- Content:
  - 100% Verified Design Criteria Conformance Checklist (DCCC)
  - Final Construction Specification Conformance Checklist (CSCC)
  - Final Testing Specification Conformance Checklist (TVCC)

- ❖ Asset Management
  - Asset Data Package QA Check Documentation

- ❖ Permitting and Project Readiness Documentation
  - Purpose: To demonstrate readiness for permitting, property access, and coordination with third parties, ensuring there are no barriers to construction start.
  - Content:
    - Final PRCS Environmental Summary Table
      - Copies of required environmental permits and approvals
    - Final utility coordination documentation including utility agreements or approvals
    - Signed internal stakeholder comment log with final resolutions
    - SME-reviewed and signed scope memos
    - Signed Pre-Bid Review Control Sheet

BID PHASE

Definition

The Bid Phase includes all MBTA internal pre-bid and bid activities, with designer support to finalize the Pre-Bid Review Control Sheets (PRCS), prepare any necessary bid addenda, and generate conformed drawings and specifications. This phase also includes all tasks required to award the contract after bid acceptance.

Tasks

- **Bid and Advertisement**
  - Input project bid documents into MBTA's BidX platform for advertisement.
  - Coordinate with Contract Admin to publish notice and advertise the project for bid.
  - Issue addenda to clarify bid documents, as needed.
  - Generate Conformed Drawings and Specifications to include all changes made through addenda and awarded alternates during the bid process.

- **Bidder Engagement and Evaluation**
  - Host pre-bid conference and conduct a site walkthrough with potential bidders.
  - Log, track, and respond to all bidder questions and RFIs during the advertisement period.
  - Participate in bid opening and assist with evaluation of responsiveness and compliance.
  - Support review of low bidder's qualifications and compliance with project requirements.
  - Conduct pre-award meeting with selected contractor to review key requirements and verify capacity to proceed.
  - Review and comment on the contractor's proposed baseline schedule.

- **Safety and Security Certification**
  - Continue progressing and updating the Safety and Security Certification Plan (SSCP) and documentation.

- **Award and Project Initiation**
  - Support in contract execution with selected contractor.
  - Secure insurance certificates, performance/payment bonds, and administrative submittals.
  - Support preparation and issuance of the:
    - Notice of Award (NOA)
    - Notice to Proceed (NTP)
  - Conduct a Root Cause Analysis for lessons learned and identify any bid phase deviations.
  - Develop and deliver Board of Directors Presentation, if required.

Deliverables

- **Conformed Documents**
  - Purpose: To document the basis of the construction contract following project bid process.
  - Content:
    - Addenda, as required
    - Conformed Drawings and Specifications

- **Safety and Security Certification**
  - Purpose: To confirm that all safety and security-related elements are tracked and verified as the project transitions to construction.
  - Content:
    - Updated Safety and Security Certification Plan (SSCP)
    - Updated Safety and Security Management Plan (SSMP)
    - Updated Certifiable Items List (CIL)
    - Updated Hazard Tracking Log (HTL)
    - Updated hazard assessments (e.g., OHA)
    - Updated Design Criteria Conformance Checklist (DCCC)
    - Updated Construction Specification Conformance Checklist (CSCC)
    - Updated Testing Verification Conformance Checklist (TVCC)

- **Contract Award Package**
  - Purpose: To document completion of the procurement process and readiness for contractor mobilization and construction initiation.
  - Content:
    - Recommendation to Award
    - Root Cause Analysis Memo
    - Board of Directors Presentation (if applicable)
    - Notice of Award (NOA)
    - Notice to Proceed (NTP)
    - Contractor Baseline Schedule Review

CONSTRUCTION PHASE SERVICES (CPS)

Definition

CPS encompasses all design support activities provided during construction, including technical reviews, clarifications, inspections, and closeout documentation. The Designer works closely with the MBTA and contractor to ensure the project is constructed in accordance with the approved documents. This phase extends through substantial and final completion and includes finalizing Safety and Security Certification, addressing construction issues, and supporting turnover for full beneficial use.

Tasks

- **Construction Administration and Technical Support**
  - Participate in pre-construction kickoff meetings with the MBTA and contractor.
  - Attend regular site meetings and field walks to monitor construction progress and provide design input.
  - Respond to Requests for Information (RFIs) from the contractor. RFIs to be shared with other departments (e.g. Safety, SWA) as necessary depending upon type of project and frequency of project meetings.
  - Review contractor submittals (shop drawings, material specifications, work plans) for conformance with contract documents. Some submittals may require review from other MBTA Departments to confirm conformance with specification and standards (e.g. accessibility requirements).
  - Develop Design Change Requests (DCRs) in response to field conditions or changes in project scope. Route DCRs through internal review among relevant departments as needed (e.g. Safety, SWA, Operations).
  - Review and comment on contractor's baseline and updated schedules.
  - Conduct Special Inspections as required by design and the Authority Having Jurisdiction (AHJ).
  - Review material certifications and inspection reports.
  - Participate in the development and resolution of Non-Conformance Reports (NCRs) and share for review and comments with other departments as needed.
  - Support testing and commissioning activities where applicable.
  - Complete request in IRIS/HEAT and secure Diversion Approval Board for any diversions required
  - Ensure that requirements for real estate agreements, leases, licenses, MOU's etc. that were included in the bid and contract documents are being honored by the contractor. Tenant relocation, if needed should be completed by this stage.
  - Prepare a Lessons Learned Memo for both the design and construction contracts.

- **Permitting and Environmental Compliance**
  - Support public outreach as needed for construction-related activities impacting the community.
  - Monitor environmental permit conditions and support documentation required for permit closeout.

- Coordinate with AHJ(s) to support compliance with building code and permit requirements
- Assist in obtaining the Certificate of Occupancy from the AHJ.

❖ Safety and Security Certification

- Finalize the Safety and Security Certification process in collaboration with MBTA Safety.
- Submit all remaining documentation required for SSCPP closeout.

❖ Commissioning Support

- Coordinate with the contractor's commissioning agent to review the commissioning plan and schedule.
- Participate in commissioning meetings, functional performance tests, and inspections.
- Ensure all addressable IT items such as call boxes, cameras, elevator intercoms, PA/VMS are connecting to appropriate locations including but not limited to TPD, Security, OCC, and Subway Hub Stations.
- Review and comment on commissioning reports and documentation.
- Support the solutioning of deficiencies encountered during commissioning.

❖ Asset Management

- Update Asset Data Package to reflect design changes during construction.
- Deliver the Record Asset Data Package and Commissioning Documentation to Asset Management at least 30-days before project acceptance.
- Coordinate with Asset Management to ensure Trapeze EAMS updates are live at least 30-days before project acceptance.

❖ Project Closeout and Beneficial Use

- Review and comment on contractor-provided As-Built drawings and Operations & Maintenance (O&M) manuals.
- Support development and resolution of punch list items.
- Coordinate with asset owners to close out any open Trapeze EAMS work orders resolved by the project.
- Assist in preparation of Certificate of Occupancy documentation.
- Participate in substantial and final completion walkthroughs.
- Support MBTA in achieving full beneficial use of the work and final project closeout in accordance with the Project Closeout Manual.

Deliverables

- **Construction Administration and Technical Support**
  - Purpose: To provide responsive technical support to address construction issues, design clarifications, and field modifications.
  - Content:
    - RFI Responses
    - Contractor Submittal Reviews
    - Design Change Requests (DCRs)
    - Field Visit Reports
    - Non-Conformance Reports (NCRs)
    - Special Inspection Reports
    - Lessons Learned Memo

- **Safety and Security Certification**
  - Purpose: To confirm that all construction activities comply with MBTA safety and security standards and are certified as ready for operation.
  - Content:
    - 100% verified Construction Specification Conformance Checklist (CSCC)
    - 100% verified Testing Verification Conformance Checklist (TVCC)
    - 100% verified Certifiable Items List
    - 100% verified Hazard Tracking Log (HTL)
    - Safety and Security Certificates, as applicable (Interim Certificate, Element Certificate of Conformance, Project Certificate of Conformance)
    - Safety and Security Certification Verification Report (SSCVR)

- **Asset Management**
  - Record Asset Data Package

- **Commissioning Support**
  - Purpose: To ensure that all systems and equipment are installed, tested, and function according to the performance requirements.
  - Content:
    - Commissioning Meeting Minutes and Test Schedules
    - Reviewed Commissioning Plan
    - Verified Functional Performance Test Reports

- **Closeout, Permitting, and Project Completion**
  - Purpose: To ensure all construction, permitting, and regulatory requirements are fulfilled and that the project is ready for beneficial use and turnover to MBTA operations.
  - Content:
    - Punch List and Completion Verification in accordance with the Construction Closeout Manual
    - As-Built Record Documentation
    - Updated MBTA Asset Schematics

- Reviewed and Approved O&M Manuals
- Approved SOPs related to new assets
- Documentation for Environmental and Permit Closeout
- Design and Construction Affidavits submitted to AHJ
- Certificate of Occupancy
- Final Inspections / Reports
- Transfer of Utilities
- Guarantees/Warranties