

ENGINEERING DIRECTIVE

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CHIEF ENGINEER

Pre-25% Design Scoping Procedure

General Guidance

This Engineering Directive provides a procedure for refining the scope of a project approved by the Project Review Committee (PRC) and establishing the basis for a 25% design submission. This procedure shall apply to all municipal and state projects except for various location maintenance projects or as otherwise determined through consultation with the Deputy Chief Engineer for Project Development or his/her designee.

1. PRC approves the project.

- 1.1. Responsible section head assigns the Project Manager (PM).
- 1.2. Project Manager requests PARS Numbers.
- 1.3. Project Manager confirms purpose and need and evaluates need for Project Scoping Meeting (PSM) and consults with the Deputy Chief Engineer for Project Development, if needed.
- 1.4. Project Manager notifies proponent to include PSM in design schedule, if needed.

2. Proponent issues the Design NTP or directs design advancement to begin within 24 months of PRC Approval and notifies MassDOT through the PM or local District office.

- 2.1. Proponent includes direction to develop schedule for participating in a Project Scoping Meeting, performing data collection and conceptual design and conducting Over The Shoulder (OTS) Review within 6 months of Design NTP or direction to advance design.

3. Project Manager conducts the Project Scoping Meeting within 6 months of NTP or design advancement using the Project Scoping Checklist (Attachment 2). Proceed to Step 4 if PSM not needed.

- 3.1. Create meeting invitation list using Attachment 1 as a guide.
- 3.2. Consult with District to identify meeting site. On-site meetings are preferred unless conditions warrant a virtual site meeting using MaPIT or another digital tool.
- 3.3. Project Manager and/or Designer conducts overview of existing conditions.
- 3.4. Project Manager reviews Purpose and Need and Scope of Work as approved by PRC.
- 3.5. Identify any risks to pursuing scope as approved by the PRC. Examples include underground utilities, limited right of way, environmental impacts.
- 3.6. Obtain input for cross section(s) to accommodate all users, project limits and project scope; identify utility constraints, preliminary environmental permitting requirements, and design exceptions.

3.7. Determine data collection and conceptual analysis needs. Examples include draft design justification workbook, safety alternatives analysis, and typical section alternatives.

4. Designer performs data collection and develops conceptual design(s).

4.1. Data considerations: Utility survey, crash data, roadway safety audits, traffic counts, field survey and base plan, hydraulic analysis, borings, preliminary structures report, pavement test pits and cores, and other project data as required.

4.2. Design requirements: Consider public outreach meetings with local officials/general public/project abutters; perform early utility coordination; early environmental coordination; gather other data as needed. Develop conceptual (10% level) design(s) with critical cross sections, roll plan and preliminary profile views; preliminary Intersection Control Evaluation (ICE) Stage 2; prepare draft Design Justification Workbook identifying potential design exceptions; prepare preliminary project estimate; prepare design schedule using schedule template; prepare preliminary ROW impact summary; and provide preliminary construction staging using the default construction duration by project type.

5. Project Manager conducts the Pre-25% OTS Review to confirm the scope and cross section within 6 months of Design NTP (for municipal/state projects) or design advancement (for MassDOT in-house design).

5.1. Schedule meeting two weeks in advance using Attachment 1. Attach meeting material to the meeting invitation to provide materials in advance of the meeting.

5.2. Project manager conducts OTS Review of Purpose and Need and scope as approved by the PRC and the conceptual design(s) and analysis with the project team including all items identified in the Project Scoping Checklist (Attachment 2). In-person meetings are preferred on-site or in a District Office to confirm the scope, selection of preferred conceptual design, and resolve any remaining internal comments and public concerns.

5.3. Project manager documents the OTS Review and progress by summarizing the scoping meeting and OTS review.

6. Project Manager/Proponent schedules public outreach as needed within 3 months.

7. Project Manager evaluates the current scope of work and public feedback against the PRC Approved Purpose and Need and Scope of Work.

7.1. If the scope has changed as defined in the DSC/PRC Resubmission Criteria below the PM shall elevate the issue to the Office of the Chief Engineer through the Design Solutions Committee (DSC) for resolution in Step 8.

DSC/PRC Resubmission Criteria

- The Project Contract Cost increases by an amount larger than the current contract cost + design contingency:
 - At the pre-25% Scoping Meeting, if an estimated contract cost is 10% greater than the PRC estimated construction cost (including design contingency), the project scope will be reviewed.
 - Post pre-25%, if the estimated construction cost of any design submission or updated cost is 5% greater than the pre-25% estimated construction cost (including design contingency), the project scope must be confirmed by the DSC. If no pre-25% submission, then the baseline will be the PRC construction cost.

- There is a change to the Project Scope or Project Limits that is outside of the original Purpose and Need of the project as approved at PRC, was not identified/approved during a Pre-25% Scoping Meeting or previous submission, or may cause a considerable delay to the schedule or deliverability of the project.

Examples of project changes requiring review:

- A new design alternative is being recommended that was not previously considered.
- The addition of new or expanded assets beyond the established project limits or need.
- The project is combined with another project or split off from an existing project.
- Modifications to the project scope or limits negatively impact project deliverability or schedule. Examples include, but are not limited to:
 - New ROW impacts such as Article 97, 4f, 6f, cultural resources, rail permits, new State or Local ROW, relocations, or additional survey work.
 - New Environmental Permitting.

7.2. If the scope and public feedback align with the PRC Approved project, proceed to Step 10.

8. Design Solutions Committee (DSC) decides whether the design can proceed to the next design stage (Step 10) or must be resubmitted to the Deputy Chief Engineer for Project Development for review and submission to PRC for further evaluation (Step 9).

9. Deputy Chief Engineer for Project Development reviews and submits project to PRC for further evaluation.

10. Project Manager proceeds to 25% Design by updating the Purpose and Need, documenting the scope, confirming the project description and amending initial design scope, if needed.

10.1. If the project description changes, the Project Manager coordinates with the Advertising Program Manager to finalize the description and notify the District and Planning regarding the need to amend the project in the STIP if necessary.

10.2. Amend initial design scope based on above to include design through 25% Design Public Hearing or design completion depending on the project.

Attachments:

Attachment 1 – Meeting Invite Chart

Attachment 2 – Project Scoping Checklist

Meeting Invite Chart

Choose core disciplines according to project type

Project Type -> Core Discipline	Bridge	Intersection Improvements *	Shared Use Path	New Construction	New Sidewalks, Curbing and Curb Ramps	Pavement Marking	Resurfacing	Roadway Reconstruction	Safety Improvements / SRTS	Traffic Signals	Other:
Designer (in-house or consultant)	R	R	R	R	R	R	R	R	R	R	R
Bridge	R	O	O	O	O	O	O	O	O	O	O
Highway Design*	R	R	R	R	R	R	R	R	R	R	R
District Construction	O	O	O	O	O	O	O	O	O	O	O
District all other disciplines	District Projects staff shall attend all meetings but consult with the District PDE to determine which other disciplines are needed.										
Environmental	R	O**	R	R	O	O	O	R	O	O	O
Geotechnical	R	O	O	R	O	O	O	R	O	O	O
Hydraulics***	R	O	O	R	O	O	O	O	O	O	O
FHWA	Consult with FHWA on all Projects of Division Interest (PODIs)										
Landscape	O	O	R	R	O	O	O	R	O	O	O
Materials	O	O	O	O	O	O	O	O	O	O	O
Pavement	O	R	O	R	O	O	R	R	O	O	O
ROW	R	R	R	R	R	O	O	R	R	R	R
Traffic and Safety****	O	R	O	O	O	O	O	R	R	R	O
Utilities	R	R	R	R	R	O	O	R	R	R	R
Transit	O	O	O	O	O	O	O	O	O	O	O
Municipality	R	R	R	R	R	R	R	R	R	R	O

R = Required, O = optional. * Highway Design shall include the ADA, Complete Streets, and/or the Location Engineers. **Consider Hazmat involvement with Intersection Improvement projects. *** Include Hydraulics for projects over water or will affect a river, stream or water course.

****Safety involvement may be beneficial for certain project types.

MASSDOT PROJECT SCOPING CHECKLIST

Project File No.: _____

Date: _____

Project Description: _____

I. GENERAL PROJECT INFORMATION

A. Project Type (Select all that apply):

- | | |
|-----------------------------------------------------|----------------------------------------------------------------------|
| <input type="checkbox"/> Bridge; Bridge No. : _____ | <input type="checkbox"/> Safety Improvements / Safe Routes to School |
| <input type="checkbox"/> Intersection Improvements | <input type="checkbox"/> Shared Use Path |
| <input type="checkbox"/> New Construction | <input type="checkbox"/> Traffic Signals |
| <input type="checkbox"/> Pavement Markings | <input type="checkbox"/> New Sidewalks, Curbing and Curb Ramps |
| <input type="checkbox"/> Resurfacing | <input type="checkbox"/> Other: _____ |
| <input type="checkbox"/> Roadway Reconstruction | |

B. Project Initiation

Project Proponent: Municipality MassDOT Other: _____

Asset Ownership: Municipality MassDOT Other: _____

Project Purpose & Need:

Estimated Construction Cost: _____

Programmed Funds (if available): _____

II. BRIDGE SCOPING CHECKLIST

A. Examine Potential Bridge Project Types

- Candidate for Preservation
- If not Preservation; Substructure elements are worthy of analysis for re-use
- Candidate for Superstructure Replacement
- Candidate for Full Replacement

Comments:

B. Bridge Studies, Analysis & Reports Required

- Preliminary Structures Report (Check box if project to retain any portion of exist. structure)
- Boring / Probe Layout Plan
- Geotechnical Report
- Hydraulic Report: Designer to Prepare MassDOT to Prepare
- Bridge Type Selection Worksheet
- Sketch Plans
- Additional Studies: _____

C. Determine Required Bridge Clearance and Bridge Geometry

- Bridge is over Railroad (indicate the Line; Segment; MP in Comments)
- If over Railroad, is this a Chapter 634 Bridge?
- Increase Channel Width for Hydraulic or Environmental Purposes

_____ Required Min. Horizontal Clearance for Bridge not over Railroad

_____ Required Min. Horizontal Clearance for Bridge over Railroad, not Chapter 634

_____ Required Min. Vertical Clearance for Bridge not over Railroad

_____ Required Min. Vertical Clearance for Bridge over Railroad, not Chapter 634

For Horizontal Clearance: Specify in comments the clearance from what Controlling Element.

The Controlling Element may be face of abutment or pier; edge of travelled way, etc.

For Vertical Clearance: Specify in comments the clearance from what Controlling Element.

The Controlling Element may be roadway shoulder; top of rail; design year flood; etc.

Comments:

Describe Bridge Geometry (indicate Span Length; Skew; Structure Depth; etc.)

III. ROADWAY CONTEXT

A. Project Area

- Project located within 1/4 mile (1500 feet) of an Environmental Justice and/or Title VI area?

[Environmental Justice Viewer](#)

- Project located within 1500 feet of School, Library, Park, Transit, Senior Center, etc.

Describe below:

- Existing if-road bicycle/pedestrian facilities within 1500 feet of project area; Describe below

- High Potential for Walkable Trips (Blue or Green layer) [Potential for Walkable Trips by RPA](#)
- High Potential for Everyday Biking (Blue or Green layer) [Potential for Everyday Biking by RPA](#)

B. Crash History

- Top 200 Intersection Crash Cluster located in Project Area; Describe below
- HSIP Crash Cluster located in Project Area; Describe below
- HSIP Bicycle Crash Cluster located in Project Area; Describe below
- HSIP Pedestrian Crash Cluster located in Project Area; Describe below

Crash Locations:

[Top Crash Locations](#)

- Police Crash Reports Required: All Intersections Entire Length of Corridor

- Crash Diagrams Required

- Corridor Crash Mapping Required

- Road Safety Audit Required (prior to 25%)

[RSA Template & Guidelines](#)

- Safety Alternative Analysis Required (Check box if project anticipates receiving HSIP funds)

[HSIP Eligibility & Alternative Safety Analysis Guide](#)

IV. ROADWAY SCOPING CHECKLIST

A. Roadway Classification

- Interstate
- Urban Principal Arterial
- Urban Minor Arterial
- Urban Collector
- Urban Local
- Rural Principal Arterial
- Rural Minor Arterial
- Rural Major Collector
- Rural Minor Collector
- Rural Local

[Road Inventory Map](#)

- Proposed project is on the National Highway System (NHS)

B. Existing Volumes

_____ Annual Daily Traffic (ADT) _____ Daily Bicycle Volume
_____ Percent Truck Traffic _____ Daily Pedestrian Volume

C. Existing Speeds

_____ Posted (or Statutory) Speed Limit
_____ Measured Free Flow Speed (if available)

D. Determine Target Design Speed

- Project area is candidate for Motor Vehicle and/or Multimodal Safety Countermeasures; Including Traffic Calming, Road Diet and other Safety Measures

_____ Target Design Speed

Comments:

E. Determine Proposed Roadway Cross -Section

- Candidate for Shared-Use Path, Side Path, Separated Bike Lane or Buffered Bike Lane [E-20-001](#)

Existing:	Proposed:	
_____	_____	Width of Existing Right-of-Way Layout
_____	_____	Number of Travel Lanes
_____	_____	Width of Travel Lanes
_____	_____	Width of Turning Lanes
_____	_____	Width of Shoulders
_____	_____	Width of On-Road Bicycle Facility, include buffer
_____	_____	Width of Shared-Use Path (note 1 side or both)
_____	_____	Width of Separated Bike Lane (note 1 side or both)
_____	_____	Width of Roadway Buffer
_____	_____	Width of Sidewalk*, include curb (note 1 side or both)
_____	_____	Width of On-Street Parking (note 1 side or both)
_____	_____	Width of Median
_____	_____	Width of Bus Stops**

*Less than 5.5' Sidewalk Width, including curb, requires waiver

**Confirm proposed bus stop width with transit agency; 8.5' Min., including curb, for MBTA

F. Determine Roadway Profile

- Existing Profile appears to meet design standards (verify during preliminary design)
- Existing Sidewalks, Curb Ramps and Driveways appear ADA/AAB Compliant
- Maintain / Optimize Existing Profile
- Improve Profile; Consider Min. Vertical Clearance, Stormwater Low Points and Flood Resiliency

Comments:

G. Determine Horizontal Alignment

- Existing Alignment appears to meet design standards (verify during preliminary design)
- Maintain / Optimize Existing Alignment
- Improve Alignment

Comments:

H. Determine Project Limits

Describe Limits with proximity to nearest feature, intersection, mile marker, town line, address, etc.

Begin Project:

For Bridge: _____ Feet beyond Abutment in this direction: _____

End Project

For Bridge: _____ Feet beyond Abutment in this direction: _____

Comments:

I. Proposed Pavement Treatment

- Ultra Thin Bond, Microsurfacing, Fog Seal, Chip Seal, Waterproof Surface Course, etc.
- Mill & Overlay (Functional or Structural)
- Hot/Cold in Place Recycling
- Reclamation
- Full Depth Reconstruction
- New Construction
- Other: _____
- No Proposed Improvement

J. Other Roadway Design Issues

- Address Accessible Ramps and Missing Crosswalks at Intersection(s)
- Address Drainage Issues
- Address Existing Traffic Signals within Project Limits
- Address Existing Bridge(s) within Project Limits (Plans Required)
- Address Existing Culvert Condition [Estimated Culvert & Bridge Vulnerability](#)
- Address Guardrail / Barrier
- Address Lighting
- Address Trees within Right-of-Way Layout
- Address MassDOT ITS, Weather Sensors, VMS, Counting Stations
- Other; Describe below

V. CONSTRUCTABILITY

- Candidate for Full Road Closure and Detour; Describe possible detour route in Comments
- Candidate for Accelerated Construction Techniques
- Candidate for Stage Construction
- Candidate for Alternative One-Way Traffic
- Candidate for Night Work
- Potential Construction Lay Down Area; Describe in Comments
- Potential for buried man-made objects / unidentified hazardous waste present
- Potential for unexpected geotechnical or groundwater issues present
- Seasonal or time restrictions required during construction
- Project overlaps and/or adjacent to another project scope and/or schedule

Comments:

VI. UTILITIES

A. Describe Existing Utilities

Overhead:

Underground:

Carried on Bridge (if applicable):

Under Bridge (if applicable):

B. Utility Design Considerations

- Can widening be done on a side of the road that does not have Utility Poles?
- Does City / Town need to upgrade water, sewer, or drainage?
- Does City / Town need to perform sewer / drainage separation?
- Does gas company need to upgrade old Cast Iron / Barrel Steel Pipe?

Comments:

C. Utility Exploration

- | | | |
|----------------------------------------------------------------|---------------------------------------------|--------------------------------------------|
| <input type="checkbox"/> Utility Test Pits: | <input type="checkbox"/> Designer to Obtain | <input type="checkbox"/> MassDOT to Obtain |
| <input type="checkbox"/> Subsurface Utility Exploration (SUE): | <input type="checkbox"/> Designer to Obtain | <input type="checkbox"/> MassDOT to Obtain |
- SUE Quality Level(s) - Check all that apply [Utility Relocation Contacts, Forms & Guidance](#)
- D: Collection & correlation of existing utility records
 - C: Survey of visible utility facilities
 - B: Determine existence and horizontal position of utility facilities within area of excavation
 - A: Physically expose existing subsurface utility facilities to find vertical subsurface position

Comments:

VII. ENVIRONMENTAL

A. Stormwater Mitigation

- Project is anticipated to increase the impervious surface of the travelled way
_____ Square Feet of increase (if unknown, mark as TBD - to be determined)
- Project is anticipated to widen the roadway by 4 feet or more for half a mile or more
_____ Linear Feet of widening of 4' or more (if unknown, mark as TBD - to be determined)
- Project is anticipated to meet, or exceed MassDEP Stormwater Standards
- Does the project area directly discharge (via pipe or overland flow) into any Category 5 Impaired waterbodies?
- Does the project propose how to treat, mitigate (or maintain if sufficient) discharge into this Impaired Waterbody (meeting TMDL requirements)?

B. Stormwater Best Management Practices (BMPs)

- Project is anticipated to include BMPs to ensure existing stormwater conditions will at least be maintained; Check anticipated BMPs below:

Pretreatment BMPs

- Deep sump catch basins
- Sediment forebays
- Vegetated Filter Strips

Treatment BMPs

- Bioretention areas including rain gardens
- Constructed stormwater wetlands
- Extended dry detention basin
- Treebox filters
- Wet basins

Conveyance

- Water quality swales
- Grass channels (formerly biofilter swales)

BMPs

- Porous Pavement
- Infiltration basins and trenches
- Leaching catch basins
- Subsurface structure(s)
- Country Drainage
- Other: _____

C. Field Reconnaissance

Provide photographs that clearly illustrate existing site conditions such as local land use and context (urban, suburban, rural, etc.); Provide additional details in the comments.

- Wetlands / waterways present
- Area buildings or public open space in close proximity to the site?
- Bridge Projects: Does the bridge appear to restrict the natural flow regime of the waterway?
- Bridge Projects: If the bridge is over waterway, is it navigable?

Comments:

D. Environmental Studies, Permits & Reports Required

- Early Environmental Checklist
- Bridge Project: Determine Nat'l Register of Historic Places status of structure - Eligible or Listed
Potential Permits / License required:
- Chapter 91 Public Waterfront Act
- Coastal Zone Management Act
- MA Wetlands Protection Act
- NEPA / MEPA
- NPDES - Section 402 Clean Water Act
- Section 4(f) and/or 6(f) if the DOT Act
- Section 10 Rivers and Harbors
- Section 106 - National Historic Preservation
- U.S. Army Corps of Engineers - Section 404
- U.S. Coast Guard - Section 9 Rivers and Harbors
- Water Quality Certification - Section 401
- Wild and Scenic Rivers Act
- MA Coastal Flood Risk Model (MC-FRM)
- Unknown, to be determined
- Other: _____

Comments:

VIII. RIGHT-OF-WAY

- Easements, Takings or Alterations anticipated to be required
Responsibility: Municipality MassDOT Other: _____
[Right of Way Manual](#)
- Potential Article 97; Describe below
Consider potential impacts to Conservation Land, Open Space including Public Parks & Monuments, Public Reservations, Public Athletic fields, Public Concert area, Municipal commons and Public Playgrounds. Consider impacts to Public watershed properties, Fish & Wildlife property, DCR property, properties having an Agricultural Restriction or Conservation Restriction.
- Easements, Permits or Licenses from DCR, Fisheries & Wildlife, MBTA or MWRA; Describe below
- Impact to Railroad or Public Utility Corridor; Describe below

Comments:

IX. DATA, STUDIES, ANALYSIS & REPORTS

A. Pre-25% Services

- Field Survey & Base Plan by Designer by MassDOT [Survey Guidelines](#)
- Traffic Counts by Designer by MassDOT [Guidance on Traffic Count Data](#)

For proposed modifications to Existing Traffic Signals, ATR counts for the side street approaches shall be collected for a minimum of 24 continuous weekday-hours; Also minimum of the highest 8 hours of the day for the minor street shall be conducted by manual turning movement count method.

- Crash Data by Designer by MassDOT [MassDOT IMPACT Crash Portal](#)
- Road Safety Audit [RSA Template & Guidelines](#)
- Pavement Cores by Designer by MassDOT
- Wetlands Delineation by Designer by MassDOT
- Field Verify ADA/AAB Compliance for Sidewalks and Curb Ramps to be retained
- Preliminary Decision Value calculation per Bridge Manual 2.1.4 (for Accel. Bridge Construction)
- Project Design Schedule [Design Schedule Templates](#)
- Pre-25% "Over-the-Shoulder" (OTS) Review Meeting (see required deliverables in section B)
- Public Information Meeting, if needed (after Pre-25% OTS)
- Intersection Control Evaluation (ICE) - Stage 3 (after Public Informational Meeting, if needed)
- Other: _____

Comments:

B. Pre-25% "Over-the-Shoulder" (OTS) Meeting Deliverables - provide in advance of OTS

- Conceptual (10% level) design with critical cross sections, roll plan and preliminary profiles
- Typical Section Alternatives Analysis
- Draft Design Justification Workbook [Design Justification Workbook](#)
- Safety Alternatives Analysis [Safety Alternatives Analysis Guide](#)
- Intersection Control Evaluation (ICE) - Stage 2
- Preliminary Estimate
- Preliminary Construction Staging
- Preliminary ROW Impact Summary for Alternatives
- Other: _____

Comments:

C. 25% Design Submission

- Functional Design Report [Traffic & Safety Engineering - 25% Design Submission Guide](#)
- Pavement Design Report
- Checklists per PDDG Checklist & Submission Workbook [Checklists & Submission Guides](#)
- Estimate [Construction Project Estimator \(CPE\)](#)
- Preliminary Right of Way Plans [Right of Way Plan Preparation Guide](#)
- Preliminary Utility Coordination & Colored Utility Plans
- Estimate of utility adjustments / relocations @25% [Utility Relocation Forms & Guidance](#)
- Initial Contract Time Determination
- Other: _____

Comments:

D. Post-25% Submission Items

- Design Public Hearing
- Design Justification Workbook (after Design Public Hearing) [Design Justification Workbook](#)
- Contract Time Determination [Contract Time Determination \(CTD\) Guide](#)
- Incentive / Disincentive [Incentive / Disincentive Guide](#)
- Other: _____

Comments:

