

# Appendix F

## Field Construction Crew Activities



MONTANA  
DEPARTMENT OF  
TRANSPORTATION

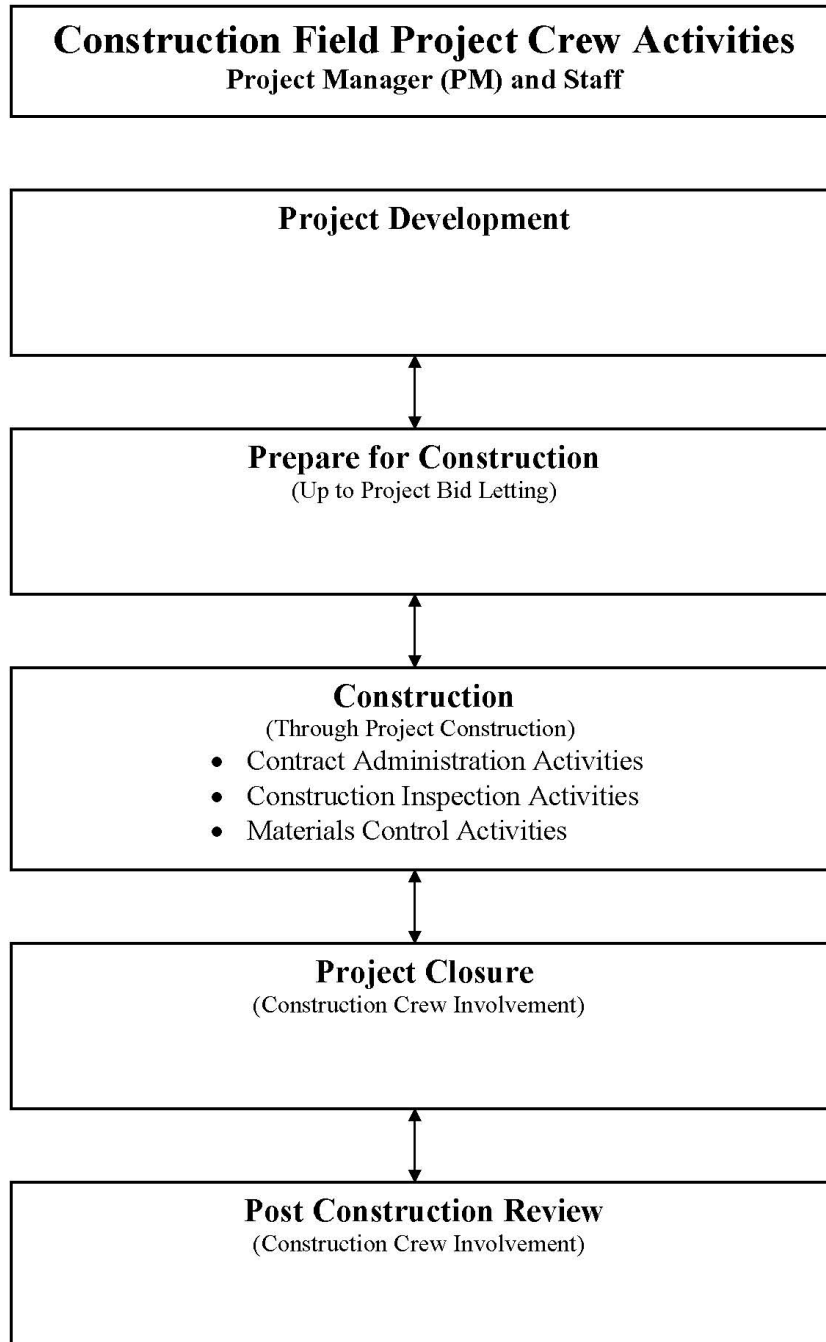
Revised June 2022



## Appendix F

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## Construction Field Project Crew Activity Project Manager (PM) & Staff

**Activity Title:** *Project Development*

**Responsible Unit:** Preconstruction

**Activity Description:**

Road and bridge projects within the Montana Department of Transportation (MDT) typically fall within two categories: those that are programmed, designed, and delivered for construction through the in-house resources of the MDT Preconstruction Program within the Engineering Division; or, those that are programmed by the MDT, and then engineered and designed through outside consulting firms contracted to the MDT through the Consultant Design Section of the Department. The level of Preconstruction involvement by the PM and their staff may vary widely, depending on whether the project is designed in-house or through a consultant. While some activities can be, and often are common to both, the following activities routinely apply to the MDT-designed projects.

Projects can range from a minimally engineered, single-lift overlay to major reconstruction of an existing roadway, which may include segments of new alignments and grades. Consequently, work performed by the field crew requires knowledge of the concepts and theories of engineering and highway construction, including knowledge of highway and bridge design surveying and layout, highway planning processes, data collectors, laptop and desktop computers, and a wide variety of conventional, surveying equipment, as well as state-of-the-art technologies such as Global Positioning System (GPS) hardware and software.

The PM will direct and oversee Preconstruction and Construction survey activities, which will provide the information necessary to determine project requirements, determine the layout of the project, and provide the data necessary to allow the construction design to begin. Field survey requirements need to be clearly defined in the Request for Survey. By the same token, the surveys need to be as complete, accurate, and timely as possible. If there is any question as to what the survey requirements might be, they should be discussed and clarified with the PM and the responsible Design Section (through the PM) at the earliest possible time. Many times, field surveys require extensive work to identify and record: existing topography; fence lines; property and property-controlling corners and pins; approaches; rights-of-way; hydraulic features such as ditches, drainage facilities or waterway openings and information; bridges; signals; pavement markings; existing roadway alignment control points and elevations; utilities; establishing photogrammetric mapping and control traverse point locations and elevations; benchmarks; and, other relevant features to that project.

As a project advances through the design process and the preliminary alignments and grades are developed, the PM and their staff may be called upon to coordinate with other work units within the MDT (e.g., Right-of-Way, Road Design, Bridge, etc.) and provide additional field survey information that may be required, such as for environmental and culturally significant sites. When all known, existing features and concerns have been identified and addressed, the PM and their staff will be involved in reviewing the construction plans for adequacy and feasibility, right up to the time the plans are delivered to Contract Plans for advertising and letting.

Involvement by the PM and/or their staff is not limited to those activities stated above. Their involvement often overlaps with activities stated in the Prepare for Construction (Up to Project Bid Letting) segment of this section.

## Construction Field Project Crew Activity Project Manager (PM) & Staff

**Activity Title:** *Prepare for Construction (Up to Project Bid Letting)*

**Responsible Units:** Preconstruction/Contract Plans/Construction Administration  
Services/District-Construction

**Activity Description:**

To identify and differentiate the period of this activity, it is understood that it represents the time between when the project is delivered by the Preconstruction Program to Contract Plans for advertising and letting, to when the project is awarded to the lowest, responsible bidder.

While this item can involve a wide range of activity, the PM and their staff are typically involved in preparing a field project office and preparing the actual, project corridor for construction during this time. Depending on the scope of work for the project, this activity can range from a minimal amount of field preparation to extensive field work. For example, a single lift overlay project with no right-of-way, utility, or earthwork involvement may require only a few, primary control points be established for maintaining alignment, determining and monitoring quantities, and application of other features of the permanent work, such as pavement markings.

On the other hand, a total reconstruction project may require much more extensive preparation by the PM and their staff. Again, depending on the scope of work for the project, as well as the workloads and availability of field personnel, advance staking authorization may be needed in order to prepare a project for construction without causing any disruptions or delays to the Contractor when they are ready to begin work. Extensive field survey work may be required to: verify control traverse points; bench marks; slope stake earthwork cut and fill sections; layout and stake drainage features and structures; define and/or delineate any environmentally or culturally sensitive areas; and, any other features designed to be incorporated into the permanent work. In some cases, because of workloads or non-availability of field personnel, it may be more advantageous for the Department to include a bid item in the contract for the contractor to perform the construction survey, layout, and staking, themselves. This decision will be made by the District responsible for administering the contract and in advance of the project being let to contract.

During this time, in addition to making preparations for manpower, equipment, and other resources needed to effectively manage and administer the construction contract, the PM and their staff may also be involved in gathering information, and assisting in the preparation of responses for contractor inquiries on the Department's Question & Answer Forum, which is on the Department's website and included within the contract bid package documents at the time of letting. The PM may also be involved in responding to telephone calls, electronic messages, or other inquiries from contractors who have questions about the project. This overall Activity can, and does, overlap with preceding and succeeding activities.

## Construction Field Project Crew Activity Project Manager (PM) & Staff

**Activity Title:** *Construction*

**Responsible Unit:** Construction Field Project Crew/District Construction/Construction Engineering Services Bureau/Construction Administration Services Bureau

**Activity Description:**

During the initial stages of this activity, project staffing, equipment, and other resource requirements are evaluated by the Project Manager and District Construction Engineer. As field construction staff, complete layout and staking of the project, manpower levels may be built up to handle all anticipated testing and inspection requirements. Depending on the scope of work, the Project Manager may be responsible for developing and managing various sized crews of between 2 and 20 permanent employees, as well as a number of additional temporary employees as required.

Prior to construction work actually starting, the Project Manager and staff are involved in numerous activities that, in many cases, occur simultaneously. In addition to completing any field layout and staking required for the project, crew members usually set up a field office near the project, to facilitate the administration and inspection of the project. During this same time frame, crew members routinely: review the construction plans for any previously overlooked discrepancies (e.g., Bid Item {Schedule of Items} quantities, etc.); review all Right-of-Way Agreements to ensure all project features contained therein (e.g., fencing, irrigation, etc.) are shown on the plans or addressed elsewhere in the contract. Or, if not identified in the contract, they are listed so they can be addressed early during construction; enter all data from the field staking notes for computer-generated quantity calculations of earthwork, special fill materials (e.g., Special Borrow), and Crushed Aggregate Course sections shown in the Typical Sections of the construction plans. All of these quantities will form the basis of progress payments to the contractor as the work is completed and approved. Structured project filing systems (electronic and hard copy) are established for consistent and uniform recordkeeping from project to project and District to District. These files may include, but are not limited to: copy of the executed contract; subcontractor agreements; correspondence to and from the Contractor; project meeting minutes; project agreements (i.e., Right-of-Way, Utility, Railroad, etc.); progress payment estimates to the Contractor; certifications and test reports for all permanent materials incorporated into the work; and a host of other files required by the Department.

Prior to allowing the Contractor to start work, Project Managers and members of their staff hold a Preconstruction Conference with the prime contractor, their subcontractors, and others having involvement with the project. In addition to ascertaining all contract prerequisites have been met (i.e., insurances, signed subcontracts, submittal of required schedules, traffic control plans, etc.), the plans and contract provisions are reviewed and discussed to, hopefully, address any potential conflicts or issues before they arise and develop into a change order, claim, or litigation later on.

During actual construction, project testers and Inspectors will witness all sampling and perform all testing, inspection, documentation (i.e., note keeping of pay quantities, Daily Inspection Reports, diaries, photos, video, etc.) required by the contract, specifications, and FHWA requirements. And, to provide a complete, detailed, and accurate record of the project from start to finish.

## Construction Field Project Crew Activity Project Manager (PM) & Staff

**Activity Title:** *Project Closure*

**Responsible Unit:** Field Project Crew/District Construction/Construction Engineering Services  
Bureau-Materials/Construction Administration Services Bureau

**Activity Description:**

As construction work progresses and nears completion, the Project Manager and their staff will make a thorough review of the project, to ensure all work is finished to specification requirements. Items that are not complete or require additional attention by the Contractor are recorded and delivered to the Contractor in the form of one or more “punchlists”. All items on that list must be completed to the contract requirements, and to the satisfaction of the Project Manager, before the Contractor demobilizes from the project. In addition, the project is reviewed to ensure all required Temporary Erosion Control Best Management Practices (BMPs) are in place and in good condition. The Storm Water Pollution Prevention Plan (SWPPP) can then be turned over to MDT Maintenance until adequate vegetation takes root and the environmental permit can be closed.

When all required contract work has been completed, a Final Inspection of the project will be conducted. The final Inspection could involve not only the MDT District Construction and MDT Maintenance personnel, but the Federal Highways Administration, prime Contractor, and design consultants responsible for the project design. The number of people, firms, and agencies involved vary with the scope of work for the project,

During this same time frame, and for up to a 60-day period after all construction work is completed, the Project Manager and their staff are responsible for reviewing all project notes, documentation, certifications, test reports, pay quantities, and other project records to ensure they are complete and accurate. Once the above criteria have been met, the Project Manager and members of their staff prepare a “semi-final” estimate for payment to the Contractor.

As part of the Project Closure activity, the project staff will also “mark up” (i.e., annotate) a full-size set of the construction plans to reflect actual project conditions – i.e., actual quantities approved for payment; changes in project stationing for such things as adjustments in culvert locations to better fit actual field conditions; changes to any alignments or grades different than plan and constructed through approved change orders; changes to permanent materials compared to plan (i.e., CSP or CMP vs. Reinforced Concrete Pipe (RCP)); editing or addition of notes, as required, to add clarity or to reflect actual field conditions; etc.. The “As Built” plans, in turn, become a permanent record of the project as constructed, and provide an accurate reference for planning improvements in the future.

Once the Project Manager submits the “Final” (i.e., all of the above-stated records, documentation, “As Built” plans, etc.) to the District, the District Engineering Officer and staff have 30-days to review all project records, diaries, payrolls, change orders, pay quantities, etc., for completeness and accuracy. Any discrepancies found will be brought to the attention of the Project Manager for correction before re-submitting to the District Engineering Officer. All project files are then forwarded to the Construction Administration Services Bureau at the Helena Headquarters for further processing, final payment to the contractor, and issuance of a Certificate of Completion for the project.



## Construction Field Project Crew Activity

### Project Manager (PM) & Staff

**Activity Title:** *Post Construction Review*

**Responsible Unit:** District – Construction/Construction Engineering Services Bureau

**Activity Description:**

During construction of a project, any number of issues could, and often do, arise during the course of the work. These issues are usually resolved at the project level during construction. However, if an issue escalates from a claim to litigation, it could drag on for years after the work has been completed. Litigation matters are beyond the scope of this activity.

Typically, the Project Manager and their staff will record any and all discrepancies noted during construction. These could range from constructability issues, to differences between plan and actual quantities, to conflicts with conditions or structures existing prior to work starting, or other situations that arose during the course of the project.

In order to bring these “lessons learned” issues and concerns to the attention of others that may be involved in the planning and design of future projects (i.e., District Administrators (DA), District Construction Engineers (DCE), District Construction Operations Engineers (DCOE), District Engineering Services Supervisors (DESS), Construction Engineer (CE), and Preconstruction Engineer), the Project Manager and/or District may request that a Post Construction Review (PCR) be conducted for a project that has just been completed, or is substantially complete. The idea is to present these issues and concerns while they are still relatively fresh in everyone’s mind.

The PCR process is an in-depth review that may include all functional units (i.e., Preconstruction, Utilities, Right-of-Way, Road Design, Hydraulics, etc.) having any involvement in the planning, development, and construction of the project. The Contractor may also be invited and encouraged to voice how the project went from their perspective. Not only are the plans, specifications, constructability issues, and all other matters causing concern on the project reviewed for purposes of reaching consensus and developing solutions for those items that created problems, the process is also intended to draw out what went well on a project. The CES coordinator will then prepare a PCR report, identify action items in the report, and provide follow-up to ensure action items are being recorded, tracked, and implemented for future projects, when appropriate.

With the implementation of SiteManager, the old Informal PCR process has changed. SiteManager contracts utilize the Construction Summary Report (CSR) {available in Oracle} in place of the Informal PCR. The CSR is automatically generated and distributed via email when the Certificate of Completion is completed and signed.

For all contracts administered with SiteManager, an Informal PCR is not required. For all contracts not administered with SiteManager, an Informal PCR is still required as stated in the February 6, 2008 Construction Memo.

The CSR contains final cost information, time charges, change orders, plan comments, average shrink/swell factors, and other information. This report provides a means to share information with Design, as well as to identify issues with specifications and other publications.

It is essential for all field personnel to continue to track and enter plan comments (good and bad) in the Plan Discrepancy window of SiteManager. This includes all sections of the contract, including specifications, Special Provisions, the Materials Manual, etc.