



Montana Department of Transportation  
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## Memorandum

To: American Council of Engineering Companies of Montana (ACEC)  
MDT Consultant Design Bureau  
MDT Highways Bureau – Survey Section

From: Ryan Dahlke, P.E.  
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Subject: MDT-Consultant Survey Process Enhancements

The Montana Department of Transportation (MDT) and the consulting community have a long-standing business partnership in delivering many roadway improvement projects. This business partnership is important to successfully deliver the MDT's highway program every year.

Some of the most time-critical elements to project delivery are survey activities/tasks. The MDT and ACEC recently collaborated through several team meetings to discuss externally-performed project surveys. These meetings focused on ways to:

1. Clearly communicate MDT expectations for control, cadastral, and topographic surveys,
2. Streamline the performance and approval process of all surveys, and
3. Capitalize on process efficiencies currently practiced by consulting firms.

The personnel involved in these discussions were as follows:

- Jay Skoog, ACEC
- Dave Gates, ACEC (Stahly Engineering)
- Dan Stahly, ACEC (Stahly Engineering)
- Scott Fanning, ACEC (Kadmas, Lee, & Jackson)
- Bryce Larsen, MDT Survey
- Ralph Jones, MDT Survey
- Bryan Shields, MDT Survey
- Ryan Dahlke, MDT Consultant Design
- Bryan Miller, MDT Consultant Design

The following describes the results of these team meetings, including recaps of discussions, lessons learned/takeaways, and resulting action items. There is also a section that summarizes additional one-on-one conversations with various firms, as well as with MDT Survey that have taken place over the last year or so. While the items in this section were not specifically discussed at the team meetings, they are included in this memorandum for the purposes of identifying all known issues and ways to address them.

A consistent theme in the discussions of all topics is the importance of *communication*. All team members agreed that the key to the MDT survey-review process is an open line of communication between the Consultant and the MDT, and everyone agreed to take steps to be proactive in this regard.

## **TOPIC #1: MDT expectations (discussed at team meetings)**

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### **Discussion**

There have been significant discussions with numerous firms over the last year or so regarding what MDT expects of consultant surveys, and the team discussed this issue at length. While requirements are identified in the MDT Survey Manual and associated guides, the Manual and guides can be difficult to follow and often times there are supplemental procedural memos provided by MDT.

There have also been some general comments regarding the accuracy requirements of MDT surveys. In Chapter 1 of the Survey Manual, it states “This manual was developed to provide statewide uniformity in surveying practices, to establish and maintain survey standards, and to improve the overall efficiency of the Department’s survey function.” Additionally, MDT’s standards have been established in an attempt to help ensure consistency, reliability, repeatability, and reduction/elimination of systematic errors. Governmental standards, including MDT survey standards, are generally more comprehensive than standards used by the private sector when doing private sector work in order to ensure long-term reproducibility and defensibility. It was also noted that MDT survey standards are compliant with existing survey laws and compliment standards of practice established by MARLS (Montana Association of Registered Land Surveyors).

### **Lessons learned/takeaways**

While MDT has an expectation that all requirements stipulated in the Manual be met, it is apparent that improvements are needed to the Survey Manual and associated guidance documents. The MDT is aware that the Survey Manual is in need of updating and is currently in the process of having the Manual re-written. However, the Survey Manual is still valid, contains the requirements for MDT surveys, and must be utilized. ACEC will be given an opportunity throughout the development of this new Manual to review drafts and provide comments to MDT. It is also recognized that all procedural guides and memos should be made available at all times on MDT’s internet site. For example, having a guide available to consultants that presents all required feature codes (i.e. Control, Cadastral, and Topographic) was identified as a critical opportunity for improvement.

Regarding accuracy requirements, all team members collectively came to a better understanding of the reasons for MDT’s accuracy requirements.

### **Action item(s)/Changes in practice**

1. Update Survey Manual (in process)
2. Make survey guidance documents available on MDT’s internet site (done) (also see the summary guidance document discussion under Topic #4 below)
3. All Consultants are to reference the Survey Manual, and associated guidance documents, for the intricate details of current MDT Survey requirements. (on-going)
4. Survey Scoping Meeting added to Activity 100 to proactively get both parties on the same page regarding what is expected of the project’s survey (done)
5. MDT to develop a checklist to go through during the Survey Scoping Meeting to clearly identify what is required and what will be reviewed/checked. This will be a list that MDT Survey brings to the Survey Scoping Meeting, as opposed to a standard checklist integrated into a specific activity. The intent is to allow this list to evolve as lessons are learned. (initial list to be developed by April 30, 2015)

## **TOPIC #2: Review process and memos (discussed at team meetings)**

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### **Discussion**

The overall review process of consultant surveys was discussed at length, particularly concerning the depth of reviews, types of comments to be given or received, and the timeliness of these reviews.

The MDT currently requires submittals at various stages of project development. With this practice, the photogrammetry and survey files are being looked at under each submittal even though they may have been reviewed and approved under a previous submittal. This results in duplication of effort. Generally, once the survey files are accepted there is no reason to re-review unless changes have been made. In order to avoid this duplication of effort, it was determined that the consultant should be very intentional to not submit files that have already been approved unless there have been changes made and that the changes be clearly identified.

Based on discussions with the team, the MDT committed to providing clear distinction between *required* revisions and *preferred* revisions. Active voice terminology is important to distinguish these (i.e. “Change point numbers to comply with MDT control point naming convention” as an example of a requirement, or “It is preferred, but not required, that the PLS in responsible charge be listed in the Readme file” as an example of a preference). Additionally, comments need to be as specific as possible to ensure comments are properly addressed.

When revised surveys are submitted for final approval, it is imperative that all comments be clearly addressed. It was suggested that consultants provide a cover memo for any re-submittals, containing a bullet list of all comments received during the previous submittal, along with a response on how each comment was addressed. This will provide a clear checklist and help ensure no comments are overlooked. Additionally, the Consultant Design Bureau will perform QC on re-submittals to ensure this checklist is included and a response to each comment is included. While this checklist will help ensure all comments are addressed, clear communication between MDT Survey and the Consultant is the key to this process. MDT Consultant Design will facilitate this communication.

Regarding timeliness of reviews, a source of miscommunication was identified during the team meetings. The current descriptions of survey/review activities, and the relationship between these activities, delineate a very linear relationship. Once all survey work is performed by the consultant, the task is marked as complete and it is turned in for review. The review then occurs and is marked as complete. The problem is that this linear relationship is only accurate and effective if there are *no changes* identified in the review process. The current schedule template indicates that the MDT typically has a total of 20 days (standard duration) to review and approve survey submittals. The consultant community looks to this schedule, and comes to the conclusion that MDT will only use 20 days of the project schedule to complete review process, even if there are one or more re-submittals. The MDT interprets the schedule to say that there is 20 days *for each review*. Clearly, if there is one or more revision needed before a submittal is approved there will be a resultant gap in expectations.

### **Lessons learned/takeaways**

It is understood that with the sheer volume of surveys that MDT completes and/or reviews, it is a challenge to be wholly consistent 100% of the time. All parties understand the need for consistency, however, and a renewed commitment to strive for consistency was agreed to. To aid in this, it would be beneficial to implement some new practices. The addition of a Survey Scoping Meeting to activity 100 (as described in Topic 1) is one of these steps that will help tremendously. In addition, the development of a list of items that will be checked (also described in Topic 1) will also aid in consistency of surveys and reviews. To avoid duplication of effort, no surveys should be submitted that have already been approved, unless there have been changes made and the changes are clearly identified. Clear and concise communication for review comments/responses are critical to more efficient approvals of surveys.

To clarify the sequence of review events, modification to Activity descriptions and relationships is needed. A simplified version of this new relationship is shown below. An important element of this relationship is that Activities 108 and 320 now have a finish-finish relationship. While this potentially adds duration to activity 108, it more accurately communicates a clear expectation of the relationship. This same revision to relationships also applies for the cadastral and engineering survey/review activities.

Changing the relationships of the survey activities to have a finish-finish relationship reinforces an expectation that the consultant survey activity is not complete until MDT review has accepted the survey.



The ultimate goal for everyone is to have consultant surveys be approved by MDT at the first review submittal. With clear expectations and clear communication, everyone felt this is a very achievable goal.

#### **Action item(s)/Changes in practice**

1. The MDT will be committed to providing consistent comments from review to review, and ensure comments provided align with the requirements stipulated in the Survey Manual and supplemental guidance documents posted on MDT's internet site. (on-going)
2. The Consultant should be very intentional to not submit files that have already been approved unless there have been changes made. (on-going)
3. MDT Consultant Design personnel to provide a high-level review of survey submittals prior to submitting to MDT Survey for review, while facilitating clear communication between the Consultant and MDT reviewers. (on-going)
4. MDT will provide specific, clear, concise, and directive comments in review memos, providing distinction between **required** revisions, **preferred** changes, and changes for **future** submittals. (on-going)
5. For re-submittals, the Consultant is to list all comments from MDT in bullet form and provide a response on how the comment was addressed. (on-going)
6. Revise Activity descriptions and consultant flowchart to more clearly define responsibilities, submittal and review sequences, and timelines. (done)

### **TOPIC #3: Use of latest survey software (discussed at team meetings)**

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#### **Discussion**

For some time now, consultant surveyors have expressed desire to utilize newer versions of survey software than are allowed by MDT. At the time the team meetings were taking place, MDT had been requiring firms to use TBC version 2.81. There were many reasons for this, and due to limited resources available to MDT, the ability to make this upgrade was not feasible for some time. However, the resources needed to upgrade all CPUs were recently made available, and all CPUs are in the process of being upgraded.

#### **Lessons learned/takeaways**

The MDT gathered a better understanding of the burden on consulting firms to maintain older CPUs solely for the purposes of running an older version of TBC software, and is aware of the efficiencies of using newer versions of this software. The consulting community gathered a better understanding of the limitations MDT is under in making an upgrade to any newer software package, and recognizes the necessity to be patient while an organization like MDT integrates software upgrades into their business process.

#### **Action item(s)/Changes in practice**

1. Upgrade all CPUs and TBC software to version 3.4.0., and implement the necessary training of MDT personnel. (MDT Survey Section done, in process for Districts)
2. During scoping/control plan meeting, the firm and MDT survey will decide together what version of software will be used for the project. (on-going)

## TOPIC #4: Miscellaneous Items (not specifically discussed at team meetings)

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### Discussion

The items identified in this section were not specifically discussed at the team meetings, but were rather compiled through numerous one-on-one discussions over the last year or so.

1. MDT requirements for survey submittals are difficult to strip out of the voluminous MDT Survey Manual, CADD Standards, and supplemental guidance documents. Could there be a document developed that summarizes the core requirements so the consultant community can ensure requirements are met?
2. Current practice is to develop a COS for the cadastral survey activity. This information is then duplicated with different drafting standards into the design strip map in order to display existing R/W, section lines and corners, etc. with the proper symbology. Would it be possible to modify drafting standards so that the COS can be directly referenced into the design strip map in order to avoid duplication of effort and possibility of error?
3. MDT CADD cell libraries have different requirements for the same information (i.e. found section corner cell is different in Survey Cell Library, R/W Cell Library, and Cadastral Cell Library). Can these differences be reconciled?
4. MDT Survey noted that there is a fairly consistent issue with the ReadMe file not containing an accurate and complete list of all files included with submittals.
5. MDT Survey also noted that there is a fairly consistent issue with ASCII files being in an incorrect format. Format requirements as currently required by MDT must be followed.

### Action item(s)/Changes in practice

1. MDT will develop summary guidance document for core survey requirements, and make document available on MDT's internet site (to be completed by April 30, 2015)
2. MDT Consultant Design will discuss the possibility of referencing the COS into the strip map with MDT R/W and MDT Survey (to be completed by April 30, 2015)
3. This issue ties somewhat to item #2. This issue will be investigated (to be completed by April 30, 2015). Additionally, the consultant community should identify any cells for which this issue applies. The following cells have been identified so far:
  - a. Found R/W Monuments: **RWMON** (RW.CEL), **RWCONC** (SURVEYSTE.CEL), **COR3** (CADASTRAL.CEL and CADASTRAL01.CEL)
  - b. Section Monuments – Meander Corner Found: **MCF** (CADASTRAL.CEL and CADASTRAL01.CEL), **MCF** (RW.CEL)
  - c. Section Monuments – Found Quarter Corner: **SEC3** (CADASTRAL.CEL and CADASTRAL01.CEL), **QCF** (RW.CEL)
4. The Consultant community is to make every effort to list all files submitted in the ReadMe file narrative. Additionally, Consultant Design personnel will provide additional QC to ensure this is happening before the submittal is sent to MDT Survey. (on-going)
5. While current requirements are available in documentation, the summary survey guidance document to be developed under item #1 above will aid in providing clear and concise requirements. The Consultant community is to make every effort to provide ASCII files in the correct format. (on going)