Michigan Department
Of Transportation
5100B (03/10)

CHECKLIST TO DESIGNATE AREAS OF EVALUATION FOR REQUESTS FOR PROPOSAL (RFP)

Exhibit B

MDOT PROJECT MANAGER	JOB NUMBER (JN)	CONTROL SECTION (CS)
Thomas W. Benson, PS	110678C	50072 / 77051

DESCRIPTION
Road Design Survey of M-29 in Macomb and St. Clair Counties

MDOT PROJECT MANAGER: Check all items to be included in RFP

WHITE = REQUIRED
GRAY SHADING = OPTIONAL

Check the appropriate Tier in the box below

CONSULTANT: Provide only checked items below in proposal

☐ **TIER 1 ($25,000-$99,999)**	☐ **TIER II ($100,000-$250,000)**	☑ **TIER III (>$250,000)**	
☐	☐	☑	Understanding of Service
☐	☐	☑	*Innovations*
☐	☐	☑	*Safety Program*
N/A	☐	☑	Organizational Chart
☐	☐	☑	Qualifications of Team
☐	☐	☑	Past Performance
Not required As part of Official RFP	Not required As part of Official RFP	☑	Quality Assurance/Quality Control
☐	☐	☑	**Location:** The percentage of work performed in Michigan will be used for all selections unless the project is for on-site inspection or survey activities, then location should be scored using the distance from the consultant office to the on-site inspection or survey activity.
N/A	N/A	☐	Presentation
N/A	N/A	☐	Technical Proposal (if Presentation is required)
3 pages (MDOT Forms not counted) **(No Resumes)**	7 pages (MDOT Forms not counted)	19 pages (MDOT Forms not counted)	Total maximum pages for RFP **not including key personnel resumes**

REQUEST FOR PROPOSAL

Clear Form

The Michigan Department of Transportation (MDOT) is seeking professional services for the project contained in the attached scope of services.

If your firm is interested in providing services, please indicate your interest by submitting a Proposal, Proposal/Bid Sheet or Bid Sheet as indicated below. The documents must be submitted in accordance with the latest "Consultant/Vendor Selection Guidelines for Service Contracts" and "Guideline for Completing a Low Bid Sheet(s)", if a low bid is involved as part of the selection process. **Referenced Guidelines are available on MDOT's website under Doing Business > Vendor/Consultant Services >Vendor/Consultant Selections.**

RFP SPECIFIC INFORMATION

☑ BUREAU OF HIGHWAYS ☐ BUREAU OF TRANSPORTATION PLANNING ** ☐ OTHER

THE SERVICE WAS POSTED ON THE ANTICIPATED QUARTERLY REQUESTS FOR PROPOSALS

☐ NO ☑ YES DATED 1/1/11 THROUGH 3/31/11

☑ **Prequalified Services** – See page 1 of the attached Scope of Services for required Prequalification Classifications.

☐ **Non-Prequalified Services** - If selected, the vendor must make sure that current financial information, including labor rates, overhead computations, and financial statements, if overhead is not audited, is on file with MDOT's Office of Commission Audits. This information must be on file for the prime vendor and all sub vendors so that the contract will not be delayed. (**Form 5100J Required with Proposal**)

☑ **Qualifications Based Selection** – Use Consultant/Vendor Selection Guidelines

For all Qualifications Based Selections, the section team will review the information submitted and will select the firm considered most qualified to perform the services based on the proposals. The selected vendor will be contacted to confirm capacity. Upon confirmation, that firm will be asked to prepare a priced proposal. Negotiations will be conducted with the firm selected.

****For RFP's that originate in Bureau of Transportation Planning only**, a priced proposal must be submitted at the same time as, but separate from, the proposal. Submit directly to the Contract Administrator/Selection Specialist, Bureau of Transportation Planning **(see address list, page 2)**. The priced proposal must be submitted in a sealed envelope, clearly marked **"PRICE PROPOSAL."** The vendor's name and return address MUST be on the front of the envelope. The priced proposal will only be opened for the highest scoring proposal. Unopened priced proposals will be returned to the unselected vendor(s). Failure to comply with this procedure may result in your priced proposal being opened erroneously by the mail room.

For a cost plus fixed fee contract, the selected vendor must have a cost accounting system to support a cost plus fixed fee contract. This type of system has a job-order cost accounting system for the recording and accumulation of costs incurred under its contracts. Each project is assigned a job number so that costs may be segregated and accumulated in the vendor's job-order accounting system.

☐ **Qualifications Review / Low Bid** - Use Consultant/Vendor Selection Guidelines. See Bid Sheet Instructions for additional information.

For Qualification Review/Low Bid selections, the selection team will review the proposals submitted and post the date of the bid opening on the MDOT website. The notification will be posted at least two business days prior to the bid opening. Only bids from vendors that meet proposal requirements will be opened. The vendor with the lowest bid will be selected. The selected vendor may be contacted to confirm capacity.

☐ **Best Value** - Use Consultant/Vendor Selection Guidelines. See Bid Sheet Instructions below for additional information. The bid amount is a component of the total proposal score, not the determining factor of the selection.

☐ **Low Bid** (no qualifications review required - no proposal required.) See Bid Sheet Instructions below for additional instructions.

BID SHEET INSTRUCTIONS

A bid sheet(s) must be submitted in accordance with the "Guideline for Completing a Low Bid Sheet(s)" (available on MDOT's website). The Bid Sheet(s) is located at the end of the Scope of Services. Submit bid sheet(s) separate from the proposal, to the address indicated below. The bid sheet(s) must be submitted in a sealed manila envelope, clearly marked **"SEALED BID."** The vendor's name and return address MUST be on the front of the envelope. Failure to comply with this procedure may result in your bid being opened erroneously by the mail room and the bid being rejected from consideration.

PROPOSAL SUBMITTAL INFORMATION

REQUIRED NUMBER OF COPIES FOR PROJECT MANAGER	PROPOSAL/BID DUE DATE	TIME DUE
3 Stapled Copies Only	3/7/11	3:00pm

PROPOSAL AND BID SHEET MAILING ADDRESSES

Mail the multiple proposal bundle to the MDOT Project Manager or Other indicated below.

☑ MDOT Project Manager ☐ MDOT Other

Thomas W. Benson, PS
425 West Ottawa St.
P.O. Box 30050
Lansing, MI. 48909

Mail one additional stapled copy of the proposal to the Lansing Office indicated below.

	Lansing Regular Mail	OR	Lansing Overnight Mail
☑	Secretary, Contract Services Div - B470 Michigan Department of Transportation PO Box 30050 Lansing, MI 48909		Secretary, Contract Services Div - B470 Michigan Department of Transportation 425 W. Ottawa Lansing, MI 48933
☐	Contract Administrator/Selection Specialist Bureau of Transportation Planning B470 Michigan Department of Transportation PO Box 30050 Lansing, MI 48909		Contract Administrator/Selection Specialist Bureau of Transportation Planning B470 Michigan Department of Transportation 425 W. Ottawa Lansing, MI 48933

GENERAL INFORMATION

Any questions relative to the scope of services must be submitted by e-mail to the MDOT Project Manager. Questions must be received by the Project Manager at least four (4) working days prior to the due date and time specified above. All questions and answers will be placed on the MDOT website as soon as possible after receipt of the questions, and at least three (3) days prior to the RFP due date deadline. The names of vendors submitting questions will not be disclosed.

MDOT is an equal opportunity employer and MDOT DBE firms are encouraged to apply. The participating DBE firm, as currently certified by MDOT's Office of Equal Opportunity, shall be listed in the Proposal

The following two American Recovery and Reinvestment Act of 2009 (ARRA) notifications, **ARRA MONTHLY EMPLOYMENT REPORTS** and **REQUIRED CONTRACT PROVISIONS TO IMPLEMENT AMERICAN RECOVERY AND REINVESTMENT ACT (ARRA) SECTIONS 902 AND 1515**, are attached to this Request For Proposal for your understanding. These two notifications are only applicable for those projects/contracts funded with ARRA funds and will be included in contract Exhibits.

MDOT FORMS REQUIRED AS PART OF PROPOSAL SUBMISSION

5100D – Request for Proposal Cover Sheet
5100G – Certification of Availability of Key Personnel
5100I – Conflict of Interest Statement
5100J - Consultant Data and Signature Sheet (Required only for Non-Prequalified Work)

(These forms are not included in the proposal maximum page count.)

Michigan Department of Transportation

SCOPE OF SERVICE
FOR
DESIGN SERVICES
Road Design Survey

CONTROL SECTION: 50072 and 77051

JOB NUMBER:110678 C

PROJECT LOCATION:

M-29 from 500 feet west of County Line Road to 500 feet east of Palms Road.

PROJECT DESCRIPTION:

Mapping of the existing road, intersections and surrounding area for reconstruction, adjust or replace drainage structures, upgrade sidewalk ramps, replace curb and gutter, replace guardrail, etc. Possible Hydraulic Surveys to be added.

PRIMARY PREQUALIFICATION CLASSIFICATION:

Road Design Surveys PPMS Task 3330

SECONDARY PREQUALIFICATION CLASSIFICATION:

None

PROJECT SCHEDULE:

The anticipated start date is: April 20, 2011
The anticipated scheduled survey completion date: August 5, 2011

For the Topography / Terrain (Road Design) Survey

DISAVANTAGED BUSINESS ENTERPRISE (DBE) PARTICIPATION: N/A

MDOT TEAM

Survey Project Manager:

Thomas W. Benson, Survey Consultant Project Manager
Michigan Department of Transportation
Van Wagoner Building
425 W. Ottawa Street, B220
P.O. Box 30050
Lansing, MI 48909
Phone: (517) 373-0020
E-mail: bensont2@michigan.gov

Road Design Project Manager:

Scott Singer Transportation Engineer
Port Huron Transportation Service Center
Phone: 810-985-5011
E-mail: SingerSc@michigan.gov

Submit a Proposal based upon the requirements of the Request for Proposal (Stapled Only) and this Scope. A detailed Survey Work Plan must be included in the project proposal.
A **spreadsheet estimate** of hours by specific survey task such as traversing, leveling, mapping, etc. **must** also be included**.**

FINAL PLOT SCALE:

1 inch = 40 feet

WORK RESTRICTIONS

The selected consultant survey firm must have the Professional Surveyor in charge of the project, contact the Traffic and Safety Engineer at the Brian Travis, Traffic & Safety Engineer at (810) 985-5011 ext. 318 or email at TravisB2@michigan.gov , who has jurisdiction over the project location, to determine what work restrictions will be imposed and which maintaining traffic scenarios will be acceptable.

FIELD SURVEY

The purpose of this field survey is to obtain information and/or data required by the project scoping engineer, to leave horizontal and vertical control in the field for future construction staking, and to provide a sufficient history of the area to enable the MDOT Design Survey Unit to perform dependable surveys in the future.

The field survey must include, but is not limited to, the following:

GENERAL REQUIREMENTS

1. Surveys must meet all requirements of the Michigan Department of Transportation (MDOT) Standards of Practice dated March 2009. Please contact our office to clarify any specific questions regarding these standards.

2. Consultants must obtain all necessary permits, including an up-to-date permit from the MDOT Utilities Coordination and Permits Section, required to perform this survey on any public and/or private property.

3. The consultant must adhere to all applicable OSHA and MIOSHA safety standards, including the appropriate traffic signs for the activities and conditions for this job.

4. Consultants are responsible for a comprehensive and conscientious research of all records essential for the completion of this project.

5. Surveys must comply with all Michigan law relative to land surveying.

6. Surveys must be done under the direct supervision of a Professional Surveyor licensed to practice in the State of Michigan.

7. Measurements, stationing, recorded data, and computations must be in **International feet**.

8. The survey notes must be submitted to the Design Survey Unit in 10" by 12" divided portfolios with flap covers. The consultant should use as many portfolios as needed to contain all of the required documents and CD-ROMs for this project.

9. Each portfolio must be labeled on the outside as follows, for example:

   Survey Notes for:
   Location and Project Limits [ ]
   Control Section [ ] Job Number [ ] Date [of submittal]
   By [Name *of Firm*]
   Michigan Professional Surveyor [name + license number]

10. Each portfolio is to be divided into six sections. These sections are to be labeled as follows: **Administrative, Alignment, Control**, **Property**, **Mapping**, and **Miscellaneous**.

    a. The **Administrative** section will include the following items: a completed copy of the MDOT Form 222(5/01) entitled SURVEY NOTES: RECEIPT AND TRANSMITTAL; a Table of Contents; the limits of the survey and original survey scope as determined by the Surveyor Project Manager and Design Engineer; a complete synopsis of the survey **that shall include, but not be limited to** horizontal

and vertical control datum's used, methodology, a complete discussion of government corners recovered, perpetuated or otherwise used as part of the survey, problems encountered, and a statement of certification from the consultant surveyor supervising the project as to compliance with Michigan Department of Transportation (MDOT) Standards of Practice dated March 2009; as well as documentation of any project specific meetings and /or conversations with MDOT Survey personnel and a completed copy of the MDOT QA/QC checklist.

b. The **Alignment** section will contain a sketch of the alignment, witnesses and stationing of alignment points set or found; an explanation of how the **legal or best fit alignment** was determined, and all supporting documentation.

c. The **Control** section contains the data collected and copies of all research documents used to establish the **horizontal and vertical** reference systems for the project (ie: OPUS and post processing output), and includes a thorough written explanation describing how the systems were established. This section should also contain a complete list of control coordinates, control traverse raw data, least squares analysis for both traverse and benchmarks, a separate listing of control points to include **coordinates and witnesses, station and offset, and scale factor if grid coordinates are listed** for mapping and construction staking of the project. A complete benchmark list with datum, station and offset, elevation, and description of each benchmark shall also be included. This information must be submitted in hardcopy guidelines and PDF electronic file format per MDOT March 2009 Standard and on CD-ROMs. Also, a sketch of the control traverse, showing any ties (government corners, property, alignment, etc.) shall be included in this section.

d. The **Property** section contains all information that is utilized regarding the real property affected by the project, and all necessary property ties. This may include copies of all **recorded** land corner recordation certificates for the government corners used, reestablished, or in danger of obliteration by impending road construction; recorded plats, recorded certified surveys, tax maps, tax descriptions, and adjacent/riparian owners.

e. The **Mapping** section contains all survey notes, research documents, and collected data used to plot the maps necessary for this project. All plots and CD-ROMs for topography are to be placed in this section, as well as utilities and drainage information.

f. The **Miscellaneous** section contains any information not included in the previous sections. The surveyor project report should specify any items included in this section.

11. A portfolio may contain several types of data, but no section is to contain more than a single type. For example, a Bridge survey must be packaged separately from a Road

survey. **All sheets in a portfolio must be marked with the control section, job number; section number and page number and relate to the Table of Contents. CD-ROMs must be labeled with the control section, job number, data type and file names and should be setup to match the portfolio (6 subdirectories per item 10).**

12. The following information is to be submitted on CD-ROM:

    a. Text files, in ASCII format per the MDOT Standards of Practice dated March 2009, containing the witness lists for the horizontal alignment ties, horizontal control points, bench marks, and government corners **as well as a DGN containing this data**.

    b. Any other text files are to be in ASCII Text Format only.

13. Documents are to be submitted as follows:

    a. All recorded instruments on 8.5" x 11" sheets.
    b. All text files printed on 8.5" x 11" sheets.
    c. All recorded plats and condominiums on 18" x 24" sheets.
    d. All plots on 24" x 36" sheets.
    e. All documents and plots are to be legibly printed or reproduced on white paper.

14. The Consultant representative shall record and submit type-written minutes for all project related meetings to the MDOT Survey Project Manager within two weeks of the meeting. The consultant shall also distribute the minutes to all meeting attendees.

15. The MDOT Survey Project Manager will be the official contact for the Consultant. The Consultant must either address, or send a copy of all correspondence to the MDOT Survey Project Manager. The MDOT Survey Project Manager shall be made aware of all communications regarding this project.

16. **All data, electronic or paper, must be recorded on non-rewritable Compact Discs (CDs). <u>All</u> paper pages / files, including Microstation files, contained in the portfolio are required to be scanned and / or converted to Adobe Acrobat PDF (portable document format) format and placed in the appropriate subdirectory on the CD. The Table of Contents (PDF format) will have all PDF pages for the project book marked / linked so that each section or page on the CD can be accessed with a single computer mouse click. All original specified electronic files, such as Ascii text, Caice, Microstation DGN, etc. must be accessible in their original format. All photos must be in JPEG format.**

17. All CD's submitted must be labeled with the route, location, control section, job number, consultant's name and data type.

18. It is required that the consultants check our web page (ftp://ftp.michtrans.net) and http://mdotwas1.mdot.state.mi.us/public/bbs/ for the latest updated specifications, material formats and file presentation.

Any questions regarding this project should be directed to Thomas W. Benson, Design Survey Project Manager at the above noted contact info.

At the completion of this survey, all field survey notes, all electronic data, and all research records obtained for this project will be considered the property of MDOT and must be sent to the MDOT, Design Division, Survey Project Manager at the above noted address.

COORDINATION WITH OTHER CONTRACTS IN THE VICINITY

The Consultant shall coordinate operations with contractors performing work on other projects within or adjacent to the Construction Influence Area (CIA).

MDOT maintenance crews and/or Contract Maintenance Agencies may perform maintenance work within or adjacent to the CIA. The Maintenance Division of MDOT and/or Contract Maintenance Agency will coordinate their operations with the MDOT Project Manager or Designate to minimize the interference to the Consultant.

The Consultant must contact the Development Engineer at the nearest MDOT TSC for information regarding project coordination.

The Consultant's attention is called to the requirements of cooperation with others as covered in Article 104.07 of the 2003 Standard Specifications for Construction. Other contracts or maintenance operations may occur during the life of the project.

No claim for extra compensation or adjustment in contract unit prices will be allowed on account of delay or failure of others to complete work unit scheduled.

FIELD SURVEY

The purpose of the field survey is to obtain all information and data required by the project design engineer, to leave control in the field for future construction staking, and to provide a sufficient history of the area to enable the MDOT Design Survey Unit to perform dependable surveys in the future.

CONTROL

A three dimensional control system must be established throughout the project area. This

control shall be based on the Michigan State Plane Coordinate System NAD1983 (CORS96) / (NSRS 2007) horizontal datum and NAVD 1988 vertical datum. All subsequent control must be based on the established control. Any traverse/control points or bench marks established must adhere to the Michigan Department of Transportation (MDOT) Design Surveys *Standards of Practice* dated March 2009 and be listed in the Control pocket of the portfolio. Contact the MDOT Survey Consultant Coordinator/Project Manager or Region Surveyor for existing control in the area.

HORIZONTAL CONTROL

The horizontal project control for this project will be classified as intermediate project control according to the MDOT Standards of Practice dated March 2009. These points are intended for mapping and should be located outside the proposed construction area to insure their availability for all phases of construction. Each control point must be accurately described and witnessed to at least four nearby features. Please refer to MDOT Standards of Practice for the minimum requirements for these points.

All field observations, unadjusted traverse computations and final adjusted coordinates must be included in the notes. A list of all horizontal control points must be developed which includes datum, all point designations, descriptions, coordinates, station and offset, and witnesses. This list must be printed on 8.5" x 11" sheets and placed on CD-ROM, in ASCII format per MDOT Standards of Practice dated March 2009. All data relating to the horizontal component of the system must be included in the portfolio. **Also, all raw field data files from GPS receivers and or Total Station data collectors must be included on the CD.**

RTK GPS techniques (MDOT Standards March 2009 APENDIX C) will be allowed to establish the Intermediate Horizontal Control Points for this project. A minimum of double occupancy from different Primary Control Stations is required per each setup on each point, the data must be post processed, adjusted and all data must be submitted at least in electronic format and be contained in the Control folder on the CD.

VERTICAL CONTROL

Bench marks need to be set at intervals of approximately 1000 feet and outside the proposed construction and must be accurately described and referenced by station and distance offset from alignment.

Intermediate Vertical Control for project bench marks shall meet an unadjusted error of closure between known bench marks of not more than **0.05 feet times the square root of the distance between the marks in miles**. Any error of closure must be distributed throughout the level runs by means of a suitable least squares adjustment software program.
Open level loops are **NOT** acceptable.

The bench mark notes must include all field observations, the unadjusted loop closures and the

final adjusted elevations. A bench mark list must be developed that includes datum, designations, descriptions, elevations, and station and offset (left or right) out from the plan centerline. This bench mark list must be printed on 8.5" x 11" sheets and placed on a CD-Rom, in ASCII format per MDOT Standards of Practice dated March 2009. The printed list and the CD-ROM are to be submitted with the consultant's final report.

The methods used to establish the intermediate horizontal and vertical components of the project coordinate control system must be fully discussed in the Surveyor's Project Report.

ALIGNMENT

The Legal alignment is to be established for this project and field set on the north ROW line for M-29. As Built Plans will be provided to the selected consultant, as well as old MDOT survey notes, etc. upon request. A text file per the MDOT Standards of Practice dated March 2009 must be supplied with all the required data.

All recovered P.C., PT., P.I., and P.O.T. Alignment points located in hard surface roads are to be protected by a monument box as specified under the attached PRESERVATION SPECIAL PROVISION.

A detailed explanation of how the alignment was established, along with all documentation, is required as part of the surveyors report.

At least two alignment control points must be found or set and witnessed on each tangent. These points must be inter-visible. The project surveyor must provide a sufficient number of primary and intermediate control points to allow staking of the computed alignment without additional traversing by construction survey crews. The alignment notes must include the state plane coordinates and at least four witnesses for each alignment control point set or found.

The consultant must include a sketch or CADD drawing of the alignment in the portfolio, showing stationing, horizontal coordinates, curve data (Radius, External, Tangent length, PC station, PI station and PT station), alignment points found or set, and the basis from which the project stationing was determined. **An ASCII file named JN#ALI.TXT will be created and a JN#ALI.XML file must be exported into the Geopak folder for design use.**

The alignment drawing will show the tie / correlation to the actual location of the Legal Alignment.

PROPERTY

MDOT may or may not be acquiring Right Of Way for this project, however, perpetuation of found property irons within the reconstruction area will be necessary.

Also required is the Structure / Building type and address for all parcels within the project limits. This information shall be placed in the Microstation drawing.

The property section is comprised of all PROPERTY CORNER/SURVEY information required for this project. This includes all pertinent recorded plats (subdivisions and condominiums), tax maps, tax descriptions, recorded and unrecorded surveys, and ties to the project coordinate system for found or set monuments. This information will be used, in part, to identify the ownership of the abutting property which may be affected by this project and to prepare the legal descriptions for any property and/or easements which MDOT may need to obtain. All existing plat monuments and property corners shall be located and tied to the legal alignment. This shall include property along side streets for 150 feet from the project centerline.

GOVERNMENT CORNERS

Government corners may or may not be required for this project. If a PLSS Corner is recovered or established as part of this project then the requirements of Act 74 and its updates shall be accomplished.

MAPPING

Mapping of M-29 (Main Street / Dixie hwy.) will begin 500 feet west of the intersection with County Line road and conclude 500 feet east of the intersection with Palms Road and include all topography, drainage structures, utilities and terrain to 15 feet outside the Right of Way. All intersecting streets will be mapped for a distance of 150 ft. from the M-29 centerline for matching grade lines. Driveways will be mapped as far as possible or up to 150 ft. for matching grade lines.

Topographic Mapping and Terrain Elevations

All features / surface manifestations / elevations that might affect the design of this project must be shown on a comprehensive plot prepared from field survey measurements. The sight distance between observations should not exceed 660 feet to obtain any elevation data, especially for hard surface elevations. Elevations of the ground surfaces should be recorded to the nearest 0.01 foot. The standard error for ground elevations must be no greater than 0.05 feet. All hard surfaced roads, curbs, sidewalks and water surface elevations must be recorded to the nearest 0.01 feet. The standard error for these elevations must be no more than 0.02 feet. This standard can be met by differential leveling or by total station trigonometric survey. The instrument height and target height must be measured and recorded to the nearest 0.01 foot and sights must be taken to targets on prisms.

All drainage structures (Catch Basins, Sanitary Manholes, Storm Manholes, Culverts, etc.) within the defined project limits will be located and identified - a spreadsheet report is required which correlates to the Microstation drawing and shall depict whether structure is mainline or driveway, location by station and offset, size, pipe direction, connection point, rim and invert

elevations, material, end treatment or not, and any other pertinent data.

When mapping field work, the horizontal and vertical control for the project must be checked into as random shots to the recorded designations. The difference between mapping checked coordinates and previously adjusted coordinates must not exceed 0.05 feet in x, y or z.

This section of the portfolio will contain sections for all topography, elevations, surface / subsurface utility locations, and surface / subsurface drainage, including any and all cross culverts.

A statement, similar to the following, must be affixed to each sheet of all plots which certifies to the maps accuracy and signed and sealed by the project surveyor:

> *I hereby certify that this map has been developed from survey data collected, and that the accuracy standards are in accordance with the MDOT Design Survey Standards. This map correctly represents the existing conditions at the time the survey was completed.*

The Consultant is responsible for using the latest MDOT CAiCE files and tugboat, available on the MDOT File Transfer Protocol (FTP) site.

REMEMBER TO CHECK THE MDOT FTP WEB SITE and
http://mdotwas1.mdot.state.mi.us/public/bbs/
FOR THE LATEST FEATURE TABLES, CELL FILES, SEED FILES AND/OR TUGBOATS

The Consultant must submit a **CAiCE software file, named MDOTjob#.zip**, utilizing CAiCE's built-in archive feature, of all survey mapping points and data files for the mapping area. A Digital Terrain Model (DTM), named EXRD and created in CAiCE, must be included for the mapping area. The Consultant is responsible for using the latest MDOT CAiCE Feature Codes, files and tugboat, available on the MDOT File Transfer Protocol (FTP) site. The tugboat can be used to convert CAiCE files into Geopak and MicroStation formats. **The CAiCE software used must be Version 10.5 or newer.**

The Consultant must provide an electronic **MicroStation Intergraph Version 8 format file** of the mapping area. This must be named MDOTjob#PL.dgn, for example **87041pl.dgn,** and must be submitted **in a sub-directory outside of the CAiCE archive file** named "MicroStation." The MicroStation file will be a 2-D file of the planimetric features including contours. This file must be sized appropriately, utilizing the seed file **seedrd.dgn** with working units of 1000, 1, and be compiled in standard MDOT format. The Consultant is responsible for using the latest MDOT Resource files, color table, and cell files, available on the MDOT File Library site under CAD_V8. Current MDOT symbology must be used exclusively.
The surveyor or CAiCE/CADD technician is expected to use due judgment in the event of necessary deviations from this standard. Survey chains (line items) will be processed and edited so as to be displayed as lines and smooth curves as appropriate and displayed at the requested

scale with the appropriate pattern. All descriptive text shall be arranged such that text shall not overwrite each other. The delivered product should be legible and professional in appearance and portray an accurate representation of existing field conditions.

As there are many variations in standard practices throughout the industry, it is recommended that the consultant refer to the attachments and the MDOT Design Division Plans Preparation Guidelines for additional information regarding such things as font size, display attributes, symbology, levels, etc., to be displayed in the submitted planimetric file. Any questions or confusion should be immediately brought to the attention of the MDOT Project Manager for clarification.

Specific descriptive information to be shown on certain items are: Tree descriptions shall include species type and trunk diameter, in inches, 4 ft. above the ground; Culvert type, size in inches and flow line elevation; Brush and wooded areas should be outlined and classified as to average size and density as noted in attached appendix. Additional information that should be noted is surface materials, changes in surface materials, curb detail (profile type), ditch type (e.g. 2 ft. round bottom), contours on the appropriate level and interval, building or mailbox addresses and other noteworthy items. This information may be included on the CADD file (on the proper level), or handwritten on a field verification plot. The plots will be submitted as described under the section of Final Reports.

For a comprehensive list of MicroStation level designations, contents and line attributes, refer to the "MDOTV8LEVEL.pdf" table located on the MDOT ftp site at ftp://ftp.michtrans.net/. The selected consultant will be notified of the Username and Password for access. This table replaces the former Attachments AA, C & D. Also in the ftp site, the Consultant should refer to the V8GROUP&ALPHA LIST.pdf file for Data Collection Codes.

The Consultant must also submit **files created from CAiCE that are formatted for design in Geopak** software. This can be accomplished by using the MDOT Plans Production CAiCE Tugboat available on the MDOT Design Survey FTP site. The Consultant must submit a 3D MicroStation Triangle file, a Survey Chain (TIN Boundary) around the edited Triangle file with the name and Feature "CLIP", a Job#.OBS file, a Job#.KCP file, a Job#.XYZ file and a Job#.ALI file. Each alignment must be computed separately and uniquely named. These files must be submitted electronically **in a subdirectory outside of the CAiCE archive file** named "**Geopak**."

A Digital Terrain Model (DTM) will be created from the appropriate terrain data. This model will be created, using the CAICE terrain modeling format. It shall be checked for accuracy and edited as necessary to provide a true representation of the existing terrain. All triangles in the triangulation network that fall outside of the limits of this survey, or are deemed inappropriate in the judgment of the surveyor, are to be obscured so as to have no effect on cross-sections, contours and profiles developed from the model. These would include triangles which have legs so long as to cross areas that contain no survey data. Contours are to be generated from the Digital Terrain Model (DTM), to depict the site conditions for this project and plotted as noted

above.

A statement, similar to the following, must be affixed to each sheet of all plots which certifies to the maps accuracy and signed and sealed by the project surveyor:

> *I hereby certify that this map has been developed from survey data collected, and that accuracy standards are in accordance with the MDOT Design Survey Standards. This map correctly represents the existing conditions at the time the survey was completed.*

All plots must be clearly defined and legible. An illegible plot will not be acceptable.

UTILITIES

The consultant will be responsible for any local utility information within the project limits. All sanitary structures are necessary for this project within the M-29 corridor and connectivity shown in regards to reference of structure size, type, bottom and flow line elevations and directions of adjacent structures.

All surface manifestations of utilities within the project area must be identified and their location tied to the projects horizontal coordinate system. A list of all utilities within the project limits must be submitted on a CD (Compact Disc) as well as on a printed list. This list must include the feature name of each utility, its horizontal coordinates and elevation, and station and offset. A CAICE station and offset report will satisfy this requirement. **Each report per feature code shall be a separate document.**

From each utility in the project area, the consultant shall submit the name of utility, address, phone number, and contact person listed.

DRAINAGE

The entire project area is also trying to determine the needs for further drainage relief within the project area. This survey is to include mapping of the drainage structures. These drainage structures require size, type, bottom and flow line elevations and directions of and connectivity to adjacent structures within the 200 ft. (+/-) mapping limit.

The consulting firm is required to contact all local officials necessary to obtain all surface and subsurface drainage information regarding the project. The consultant must also ask the local officials about any known drainage problems within the project area and report their findings, as well as any observed drainage problems in a separate drainage report.

The following information is required for all surface and subsurface drainage:

> The type, size, condition, end section treatment, location, station, offset distance, surface and bottom or invert elevation of each drainage structure, horizontal and vertical misalignment and visible damage to any structure. This information must be printed on (8.5" x 11") sheets

and submitted on a CD (Compact Disc) in ASCII format.

Descriptions of underground drainage structures shall include: description and type of structure, type of system (storm, sanitary, etc.), description or type of structure cover, size, type, invert elevation and direction of each pipe leading into or out of the structure.

The location of all catch basins, manholes, and cross culverts must be shown on the topographic map showing connectivity. It may be necessary to prepare a separate plot to clearly show the surface drainage systems. Underground sanitary and storm systems must be mapped to show the connectivity of the structures. This may be added to the CADD file or hand sketched and submitted on a separate topographic plot made specifically for this purpose.

MISCELLANEOUS

Any information that would not be appropriately placed in the control, property or mapping sections should be included in this section. General photographs, local newspaper articles and project-related comments from residents are examples of miscellaneous data.

The surveyor must describe, in the final report, the data included in this section.

FINAL REPORT: One complete paper set and 3 CD's

The final report for this project shall include:

1. In the first pocket of the portfolio, labeled **ADMINISTRATIVE**, the following will appear:
   a. MDOT's Form 222(5/01) entitled "SURVEY NOTES: RECEIPT AND TRANSMITTAL"
   b. The project's Professional Surveyor's Report on company letterhead consisting of:
      i) A comprehensive synopsis of the work performed on this project, signed **and sealed** by the project's Professional Surveyor.
      ii) The source and methods used to establish the project horizontal and vertical control and alignment(s) for this project.
      iii) A detailed explanation of anything discovered during the survey of this project that may create a problem for the designer or another surveyor.
   c. CD with all documents scanned or converted into PDF files. Each page must be inserted in a master PDF file and bookmarked for easy retrieval. An example can be provided upon request.
   d. MDOT QA/QC Checklist.

2. In the second pocket of the portfolio, labeled **ALIGNMENT**, the following will appear:
   a. A sketch or CADD drawing of the alignment(s):
      i) A statement defining the alignment(s) as **legal or as-constructed**
      ii) Stationing, source of stationing, and station equation to existing stationing

iii) Horizontal coordinates
iv) Curve data
v) Alignment points found or set
vi) Control points
vii) Reference lines and angles of crossing (if appropriate)
viii) Government corners

b. Witness list for the alignment points found or set, which shows coordinates, stationing and four witnesses for each alignment point
c. LCRC's for alignment points found.

3. In the third pocket of the portfolio, labeled **CONTROL**, the following will appear:
   a. Documentation of horizontal and vertical datum sources.
   b. OPUS documentation
   c. Least squares adjustments for the horizontal and vertical control.
   d. Text files in ASCII format, hard copy and on CD, which contain the witness lists for the horizontal alignment ties, horizontal control points, benchmarks and government corners. All witness lists must note the datum(s), a combined scale factor for state plane grid-to-ground conversion, and an example thereof.
   e. A MicroStation V8 file showing the above data.

4. In the fourth pocket of the portfolio, labeled **PROPERTY**, the following will appear:
   a. Tax maps and descriptions with owner names, addresses and phone numbers, if Right of Way is to be acquired
   b. Property ties to the project coordinate system with maps, plats, and recorded surveys marked with point numbers, if Right of Way is to be acquired.
   c. Legible **recorded** copies of all Land Corner Recordation Certificates (LCRC) filed for the government corners (PLSS corners and Property Controlling Corners) used for computations and/or in danger of obliteration by impending construction.

5. In the fifth pocket of the portfolio, labeled **MAPPING**, the following will appear:
   a. Mapping file in MicroStation format, and converted to .PDF format. Hardcopy signed and sealed.
   b. An archived CAiCE software file.
   c. A **separate folder named Geopak** to contain all related Geopak files.
   d. All field survey notes, electronic data and research records obtained for the project. It is not necessary to submit electronic raw survey data in hardcopy form.
   e. All supporting and supplemental information or data.

6. In the sixth pocket of the portfolio, labeled **MISCELLANEOUS**, the following will appear:
   a. Any photographs taken for clarity of an area in **JPG format**
   b. Any newspaper clippings related to the project
   c. Any information not covered in this scope that will be of benefit to the designer or another surveyor

General Notes

a. It is the responsibility of the consultant to insure that all electronic files submitted to

MDOT conform to the required format and that all documents are legible.

b. The consultant must organize and label the various sections of the portfolio as required by the Standards of Practice for MDOT Design Surveys dated March 2009.
c. All research documents are required to be scanned and placed on the CD.
d. It is desirable to limit paper and to include as much electronic data as possible on Compact Disc or DVD, including scanned items, to facilitate future electronic storage and transmission of survey data. **THREE Duplicate CD's must be included in the portfolio, with one set labeled "Region Surveyor".**
e. **The MDOT QA/QC Checklist dated March 2009 will be one of the documents followed during the review. Be sure all aspects are accounted for during the survey and submittal.**

CONSULTANT PAYMENT:

Compensation for this project shall be on an **actual cost plus fixed fee** basis. This basis of payment typically includes an estimate of labor hours by classification or employee, hourly labor rates, applied overhead, other direct costs, subconsultant costs, and applied fixed fee.

All billings for services must be directed to the Department and follow the current guidelines. The latest copy of the "Professional Engineering Service Reimbursement Guidelines for Bureau of Highways" is available on MDOT's website. This document contains instructions and forms that must be followed and used for billing. Payment may be delayed or decreased if the instructions are not followed.

Payment to the Consultant for services rendered shall not exceed the maximum amount unless an increase is approved in accordance with the contract with the Consultant. Typically, billings must be submitted within 60 days after the completion of services for the current billing. The final billing must be received within 60 days of the completion of services. Refer to your contract for your specific contract terms.

Direct expenses, if applicable, will not be paid in excess of that allowed by the Department for its own employees in accordance with the State of Michigan's Standardized Travel Regulations. Supporting documentation must be submitted with the billing for all eligible expenses on the project in accordance with the Reimbursement Guidelines. The only hours that will be considered allowable charges for this contract are those that are directly attributable to the activities of this project.

The use of overtime hours is not acceptable unless prior written approval is granted by the MDOT Region Engineer/Bureau Director and the MDOT Project Manager. Reimbursement for overtime hours that are allowed will be limited to time spent on this project in excess of forty hours per person per week. Any variations to this rule should be included in the priced proposal submitted by the Consultant and must have prior written approval by the MDOT Region Engineer/Bureau Director and the MDOT Project Manager.

The fixed fee for profit allowed for this project is 11.0% of the cost of direct labor and overhead.

THE PRESERVATION AND PERPETUATION OF PUBLIC LAND SURVEY CORNERS, PROPERTY CONTROLLING CORNERS, ALIGNMENT CONTROL POINTS AND GEODETIC CONTROL POINTS

a. Description.

This work shall consist of perpetuating all existent Public Land Survey System Corners, Property Controlling Corners, Highway Alignment Control Points, and any Geodetic Control

Points located within the construction area as shown on the plans, as identified in the Contract Documents, or as directed by the Engineer. For this Section, the terms corner and point shall apply to all of the listed types of points above.

Definitions.

1. Public Land Survey System Corners are Section Corners, 1/4 Section Corners, Center of Sections, and Meander Corners.

2. Property Controlling Corners are corners that control boundaries for several parcels of land and include 1/4-1/4 (1/16) Corners, Subdivision Corners and Subdivision Block Corners.

3. Alignment Control Points are P.C.'s (points of curvature), P.I.'s (points of tangent intersections), P.O.T.'s (points on tangents), P.O.C.T.'s (points on tangents in curve areas) and P.O.C.'s (points on curve centerline). Alignment Points may be Property Controlling Corners.

4. Geodetic Control Points are Horizontal or Vertical Control Monuments that are published by the National Geodetic Survey as part of the National Geodetic Reference System.

5. The terms "Point" and "Corner" are considered synonymous for the requirements of remonumentation in this Section.

b. Administrative Requirements.

The following are the minimum requirements to comply with this Section:

1. In accordance with Public Act 299 of 1980, work consisting of verifying the point position, evaluation, witnessing, point placement and reporting, shall be performed under the direct supervision of a Professional Surveyor licensed in the State of Michigan, and all persons utilized in the performance of this work shall be employees of the Professional Surveyor, or surveying firm.

2. It is the responsibility of the Contractor to coordinate the work under this Section with the Licensed Professional Surveyor during the construction activities for the purpose of scheduling the work. This includes the preliminary position verification of the points, setting of temporary witnesses, installing monument boxes in paved areas, and final placement of all preservation points. The Contractor's Licensed Professional Surveyor must contact and notify the MDOT Delivery Engineer of the completion of the required preliminary verification and witnessing work prior to commencing construction activities on the project.

3. All corners and points identified to be "Preserved" shall be witnessed with straight line witnesses prior to the commencement of construction. They shall then be re-established in accordance with this Section and Public Act 74 of 1970, as amended.

4. Upon the completion of the requirements of this Section and Public Act 74 of 1970, as amended, for all corners and points preserved, the Licensed Professional Surveyor shall submit, to MDOT, two copies of a *Land Corner Recordation Certificate*, approved by the Michigan State Board of Professional Surveyors for Section 5 of Act 74, for each corner or point preserved. (No more than four survey points shall be documented on each form). One copy shall go to the Engineer and one shall be mailed to the appropriate MDOT Region Survey Manager.

5. In the case of Public Land Survey System Corners or previously recorded Property Controlling Corners preserved under this provision, a *Land Corner Recordation Certificate* shall be recorded by the Licensed Professional Surveyor in the Register of Deeds Office in the appropriate County, and the two copies transmitted shall include the Register of Deeds recording stamp with the Liber and Page or File Number where the certificate is recorded.

6. The position of corners near the construction limits identified as "Protect" on the plans shall be reviewed by the Contractor and the Licensed Professional Surveyor, and marked so they will not be disturbed. If any danger of the corner being disturbed exists, it shall be identified and witnessed with straight line witnesses prior to construction, as if it were a corner to be "Preserved."

7. Corners identified to "Protect" but witnessed and then left undisturbed, do not require remonumentation, but do require documentation of witnesses for payment purposes.

8. The Licensed Professional Surveyor shall submit, to MDOT, two copies of a list of all "Protect" identified corners, with the land corner certificates submitted for the project. The list of all "Protect" identified corners shall indicate what corners were witnessed by the Professional Surveyor to protect the corner position. Corners identified as "Protect" that were determined to be well out of the construction area, and therefore not witnessed, shall be listed as "not witnessed." The list identifying "Protect" corners shall include a statement indicating that the corners were found undisturbed after construction, and this statement shall be signed, sealed, and dated by the Professional Surveyor.

9. All work shall be complete and all documentation submitted within four weeks from when the construction work was completed.

c. Field Methods.

1. All monuments shall possess a magnetic field, be at least ½ inch in diameter and a minimum of 18 inches in length, and be legibly capped, showing the license number of the Professional Surveyor.

2. The horizontal position of monuments shall be reestablished within 0.02 feet of the original position.

3. All points in paved surfaces shall be installed in monument boxes. Points located outside of paved surfaces, and within gravel roadways, including gravel shoulders, shall be installed at least 6 inches below the gravel surface. Points located outside of paved surfaces, and outside of unpaved roadways, shall be installed flush with the ground. Points located on rock outcropping shall be drilled and grouted into solid rock to a depth of at least 8 inches.

4. All installed monument boxes shall meet Standard Plan R-11 Series. Where an old monument box is removed, it may be re-installed only if it meets Standard Plan R-11 Series.

5. Placement of a new monument box in pavement areas shall be by coring after all paving operations have been completed. Coring equipment shall be approved by the Engineer prior to starting the work. Core diameter shall be a maximum of 1 inch diameter larger than the largest diameter of the monument box. The monument box shall be grouted in place by placing non-shrink grout as approved by the Engineer around the box at full depth. Grout shall not be placed, or remain within the monument box. Granular material shall not be

placed or remain more than 0.1 feet above bottom of the monument box frame. Monument boxes shall be installed so that no part of the box or cover extends above the pavement surface and no part is more than 0.02 feet below the elevation of the pavement surface. Material at the base of the box shall be compacted so the box will not settle.

6. No part of the reset monument or cap shall touch the side of the monument box and the center of the monument shall be within 0.25 feet of the center of the monument box. The top of the monument shall be between 0.1 feet and 0.5 feet below the top of the monument box.

7. Prior to construction, the distance to all existing record witnesses provided will be accurately measured to +/- 0.01 feet to verify and/or establish the corner position that is to be preserved. Record and measured distances to existing witnesses shall be documented on the *Land Corner Recordation Certificate*.

8. Preservation of existing points shall include placement of temporary witnesses with straight line witnesses before construction begins. Minimum requirements are: 4 hubs with tacks, 2 on each side of the roadway, outside of potential construction activity limits, at approximately right angles to the centerline. Precise measurements shall be determined from the corner to all points on the temporary witness line. This information shall be documented in Section B of the *Land Corner Recordation Certificate*.

9. If the temporary witness points are not measured directly from the corner, then check measurements shall be made to assure the accuracy of the directly measured witness. A copy of the field notes for these check measurements shall be submitted to MDOT.

10. At the time of remonumentation, all straight line witnesses shall be checked and compared with the record measurements, and if any deviations from the record measurements are found, the new measurement and the record measurement, along with the method used for the resolution of the deviations in remonumentation of the point, shall be documented in Section B of the *Land Corner Recordation Certificate*.

11. Preservation of existing points shall include documentation of at least four permanent witnesses expected to remain for 5 years after construction that are either newly established or recovered record witness points. Witnesses shall be located in at least three separate quadrants from the corner monument. Witness points shall be oriented from the corner position by bearing reported to a minimum precision of the nearest 5 degrees, and distance reported to a minimum precision of 0.01 feet. Distances to witness points shall be accurate to 0.01 feet. Measurements to all remaining record witnesses shall be recorded. A detailed description of the monument, noting the monument box if required under this provision, the designation or what point the monument represents (i.e. P.C., P.I., P.T., P.O.T. and stationing), and a complete description of the remaining witnesses shall be noted in Section C of the *Land Corner Recordation Certificate*.

12. For Alignment Points and Geodetic Control Points, the MDOT project Control Section, Job Number, Route Name, Point Designation and Stationing shall be noted in item “3. Miscellaneous” on the *Land Corner Recordation Certificate*.

d. Measurement and Payment. The completed work as described will be measured and paid for at the contract unit price for the following contract items (pay items):

Contract Item (Pay Item)	Pay Unit
Monument Preservation –	Each
Monument Box –	Each
Protect Corners	Each
Monument Box Adjust	Each

Monument Preservation will be measured by the number of monuments, public land survey corners, property controlling corners and highway alignment control points preserved. This work shall include preliminary position verification, temporary witnessing, furnishing and installing new monument and permanent witnessing, recording of the Land Corner Record Certificate in accordance with the appropriate Public Acts, and furnishing all required documents. Furnishing new Monument Boxes, when necessary, shall be paid for separately under the bid item **Monument Box**. All preparation work, traffic maintenance, cleanup, restoration work and other items noted above shall be considered included in the item bid for **Monument Preservation**.

Monument Box will include the cost of the monument box and monument box cover and the installation of the castings as described in Sections (C.5) & (C.6) of this Section. Any costs associated with the removal of existing monument boxes shall be considered included in the item bid for **Monument Box**.

Protect Corners shall include verification of point position before and after construction, witnessing prior to construction and documentation as described in Sections (B.6), (B.7) & (B.8) and Section (C.8).

Monument Box Adjust shall include monument box adjusting rings, all labor, equipment and materials necessary to raise or lower a monument box so that it is flush with the final paved grade as described in Sections (C.5) & (C.6).

If the location of the monument will be disturbed as part of the adjustment process, this item will include preliminary position verification, temporary witnessing, permanent witnessing, recording of the Land Corner Record Certificate in accordance with the appropriate Public Acts and furnish all required documents.

MDOT QA/QC CERTIFICATION CHECK LIST

March, 2009

NOTE : Be sure that the latest CAiCE files, Feature Code list, and Tugboat from the MDOT FTP site are utilized.

Be sure that the latest PDF requirement is accomplished.
Failure to complete and include this list with the final project portfolio will result in the immediate return of the portfolio for completion.
Individual items that are to be checked "N/A" will also have a number (beginning with 1) added to the check box. The number and corresponding explanation of why "N/A" was checked will be placed in the Comment section at the end of that portion of this document.

In order to reduce paper and speed the retrieval of information, the MDOT Design Survey Unit is making a conscious effort to move to a "paperless portfolio" as much as possible. Given the nature of our industry, some paper will still need to be provided for legal reasons. See the section "Portfolio and CD Contents" in the Standards of Practice dated March 2009. One portfolio and three CD's or DVD's are required.

The survey submittal shall be contained in 10" by 12" divided portfolios with flap covers. Use as many portfolios as necessary to contain all the required papers and CDs. Each portfolio shall be labeled on the outside as follows:

SURVEY NOTES FOR:
Structure number B01 Survey Order 9092
CONTROL SECTION 99999 JOB NUMBER 99999C ROUTE M-99
LOCATION AND PROJECT LIMITS DATE
BY Organization SURVEYOR John J. Doe LICENSE # 12345

Sections in the portfolios shall be labeled as to the type of data contained in that section. A portfolio may contain several types of data but no section of the portfolio should contain more than a single type. Every sheet in each portfolio shall be marked with Control Section, Job Number, Section and Page Number. Compact Disks (CD's) shall be labeled with Control Section, Job Number and Submittal Date or Date of the latest revision and placed in the Administration section of the portfolio.

There are six general types or sections (ADMINISTRATION, CONTROL, ALIGNMENT, PROPERTY, MAPPING, MISCELLANEOUS) of information obtained in each of the four categories (ROAD DESIGN SURVEY, PPMS TASK 3330; STRUCTURE SURVEY, PPMS TASK 3340; HYDRAULIC SURVEY, PPMS TASK 3350; ROW SURVEY, PPMS TASK 4510) for a deliverable MDOT Design survey. A separate checklist for Photogrammetric Tasks exists and shall be used for this category. When the survey is completed, the notes are assembled in a portfolio for hard copy record and on a CD or DVD to submit to a design squad arranged in "sections" or folders in the following order:

Paper	PDF	Native Format /CD	N/A	Administration Folder
				MDOT Survey Contact Person is : _____
				Table of Contents – should appear bookmarked on the left side of the Adobe screen

				MDOT form 222 (5/01) Survey Notes Receipt and Transmittal, filled out with pertinent information and signed
				QA/QC Certification, signed and sealed by the lead QA/QC person (See the Survey Standards of Practice Quality Assurance/Quality Control section. page 29)
				MDOT QA/QC Certification Check list filled out, signed and sealed by the Survey QA/QC Manager
				Original Survey Scope with addendums if applicable
				Proposal Work Plan & Schedule without Cost Derivation pages
				Notice to Proceed (MDOT Authorization)
				Copy of all work permits required for the project
				Complete synopsis in a Surveyors Project Report of the survey containing
				Explanation of any deviation from the Scope and/or the Standards
				Basis of horizontal and vertical control, with specific emphasis on datum sources used (list CORS and NAVD benchmarks tied), equipment, software, methods used to establish the components and errors detected and methods used to eliminate them.
				Legal, Survey or As-constructed alignment, information and method used to compute its location
				Property issues addressed, with specific information that may be useful for a surveyor to retrace or an engineer during design. If necessary, refer to specific conversations with property owners and their concerns
				Any mapping issues encountered, with specific information that may be useful for an engineer during design
				Any information obtained regarding drainage issues reported by local authorities or residents should be discussed
				If RTK is used, explain the methodology, equipment and procedure used. Include a detailed explanation relating to CORS usage or site calibration (Base Station)
Paper	**PDF**	**Native Format /CD**	**N/A**	**Administration Folder (continued)**
				Discuss the contents of anything that appears in the Miscellaneous section. Also address any concerns, concepts or ideas for MDOT improvement of survey services
				Minutes of Meetings, phone conversations, emails, and project correspondence
				An Adobe PDF named JNxxxxxTaskxxxx.pdf with all of the contents of the portfolio scanned into it and bookmarked for ease of location on the CD version. Note: Upon completion, do the

				"Reduce File Size" command under the "FILE" dropdown as this should compact the file to its smallest possible size.

Comments:

Paper	PDF	Native Format /CD	N/A	Control Folder
				Research materials and information related to horizontal and vertical control
				Notes for all instrument testing, with dates and instrument numbers ie: EDM calibration results, Peg test, etc.
				Electronic raw data files for all horizontal control established to be contained in a subfolder titled "Horizontal Raw" with separate subfolders for each type of data below • GPS raw data • Total station raw data • GPS raw data converted to Rinex format •
				Precise or Rapid ephemeris only shall be used and must be described fully in the Surveyor's report. OPUS RS not allowed.
Paper	**PDF**	**Native Format /CD**	**N/A**	**Control Folder (continued)**
				The results of baseline processing and baseline summary reports showing each baseline created from the raw data along with their quality values, standard error, number of satellites used, DOP's, baseline processing type and antenna information must be shown for GPS observations.
				Electronic raw data files for all vertical control established to be contained in a subfolder titled "Vertical Raw" which should have separate subfolders for each day's worth of data.
				Calculations for horizontal adjustments including input parameters, raw unadjusted closures, final constrained

				adjustments, and final coordinates with standard deviations with vector input data and analysis. Include the name of the adjustment program used with version or release, or supply all written calculations to support the final results. Provide separate subfolders for each adjustment which contain the files used in the processing and analysis software. e.g.: LGO, TGO, Starnet, etc.
				Calculations for vertical adjustments including input parameters, raw unadjusted closures, final constrained adjustments, and final elevations with standard deviations. Include the name of the adjustment program used, or supply all written calculations to support the final results. Provide separate subfolders for each adjustment which contain the files used in the processing and analysis software. e.g.: Levproc or Starlev only
				Horizontal and vertical datums, ellipsoid, and SPC zone used in adjustment and units (international feet).
				Geoid model used _____
				Only Non-trivial vectors used
				Minimally constrained adjustment – factors that will be reviewed □ "a priori" scalar set to 1 □ Centering error and height error settings and the rationale employed for their use should be described in the Surveyor's Report □ Statistics reported at the 95% confidence interval
				Minimal constrained adjustments – include all possible report options such as histograms, error ellipses, loop closures, adjusted coordinates, residuals, and statistical tests.
Paper	**PDF**	**Native Format /CD**	**N/A**	**Control Folder (continued)**
				Fully constrained adjustment – factors that will be reviewed □ The use of an "a priori" scalar greater than 1 must be explained in detail in the Surveyor's Report □ Centering error and height error settings and the rationale employed for their use should be described in the Surveyor's Report □ Statistics reported at the 95% confidence interval
				Fully constrained adjustments - include all possible report options such as histograms, error ellipses, loop closures, adjusted coordinates, residuals, and statistical tests.
				Plot(s) of the GPS network(s) from GPS software and Sketch(s) or plot(s) of network or traverse with **legible** point numbers from CAiCE
				Separate adjustment of primary project control verifies coordinate

				values and positions intended to base rest of project on. Include adjustment and report.
				Comparison report in spreadsheet format showing coordinates of control established/checked from various methods including NGS published values, OPUS derived values, GPS RTK values, project adjusted values, and listing NGS class(A-order, B-order, etc.) if applicable. Check Shot Report
				A Microsoft Word document named JNxxxxxHC.doc of all horizontal control points with the Northing, Easting, Elevation, standard deviation in each coordinate, point scale factor, description of the monument, station and offset and witnesses. The header should outline the company name, month and year of point establishment, datum, geoid used, SPC zone, and the formula to convert from grid to ground coordinates.
				An ASCII file named JNxxxxxHC.txt of the Microsoft Word horizontal control point's document.
				A Microsoft Word document named JNxxxxxVC.doc of all vertical control points with the elevation, description, station and offset, and witnesses. The header should outline the company name, month and year of benchmark establishment and specify the NAVD88 datum. Include all observed benchmarks noting which points were fixed.
				An ASCII file named JNxxxxxVC.txt of the Microsoft Word vertical control point's document.
Paper	**PDF**	**Native Format /CD**	**N/A**	**Control Folder (continued)**
				If a mark is used in multiple lists, such as a control point and a bench mark, it shall carry the same designation in each. All lists shall include the mark name or number, description of the monument, station and offset, and coordinates.
				Create one MicroStation drawing containing the following information: Control point list, Benchmark list, Alignment point list, and Government corner list.
				Include a table of GPS grid and EDM ground observations for Primary Control as described in the Standards of Practice
				MDOT Monument Establishment Data Sheets of all Primary Control Points established and or used as part of this project.
				NGS Mark Recovery Form (Screen Capture)

Comments:

Paper	PDF	Native Format	N/A	OPUS Requirements (Control Folder)
				Observation Procedures per Appendix D of the current version of the Standards of Practice were adhered to
				Deliverables per Appendix D of the current version of the Standards of Practice are included
				The raw data file(s) from the GPS receiver(s) in its native format and the RINEX converted file must be submitted
				The RINEX files for the MSRN stations used by OPUS must also be provided, these files are available from www.mdotcors.org
				All of the files must be submitted in electronic format; in addition a hard copy of the OPUS extended output and the observation sheet must be submitted
				Solutions are not to be used for Ellipsoidal heights unless 3 independent observations of 5.5 hour sessions are employed
Paper	**PDF**	**Native Format /CD**	**N/A**	**OPUS Requirements (Control Folder) (continued)**
				For groups of control points spaced less than 1500 feet apart, the following procedures shall be followed • All of the points may be submitted to OPUS • The baselines between the groups of points shall be calculated using conventional post processing techniques, using the OPUS derived values as a check
				All other positioning and monumentation requirements as specified by the MDOT Design Standards of Practice (current version) remain in effect

Note: This information shall be contained in the Control Section of the portfolio

Comments:

Paper	PDF	Native Format /CD	N/A	Alignment Folder
				All references used to establish alignment which should include at a minimum

				• MDOT survey records • MDOT deeds, ROW releases, and adjacent private land owner deeds • PLSS corners noted on the ROW sheet(s) • Measured roadway data • Field notes • Calculations used to determine the alignment
				Alignment geometry chain Feature Code is SALI, LALI, CALI, or ACALI – depending upon which one is requested in the survey scope.
				An alignment MicroStation drawing with point numbers and coordinates of the point of beginning, points of intersect, points of curvature and tangency, point of ending, complete curve data (deflection angle (RT or LT), radius, external, tangent length, PC station, PI station and PT station) with coordinates and stationing of all points of intersect and station equations. Also show Section Corner ties along the section line to the intersection with the alignment.
Paper	**PDF**	**Native Format /CD**	**N/A**	**Alignment Folder (continued)**
				The alignment MicroStation drawing will contain a note indicating the type of alignment that is being displayed based on the Alignment definitions described in the Standards of Practice p. 23 and p.24
				The alignment MicroStation drawing will have a statement annotating which alignment was retraced as described in the Alignment section of the Standards of Practice p. 24
				Each sheet of the alignment MicroStation drawing's must be certified, signed and sealed by the Professional Surveyor as described in the Alignment section of the Standards of Practice and must appear in the hard copy in the portfolio
				A Microsoft Word file named by Route Name / Alignment Type / Year Retraced.doc containing the Point name, Northing, Easting, Station, Description, Witnesses, note whether Set or Found, and curve data for all alignment points. Multiple alignments can be in the same file with the name of the alignment preceding the information. e.g.: I-94 WB Legal 1963.doc
				The header for the Alignment text file should outline the company name, month and year of point establishment, datum, and the source of the stationing.
				Describe Alignment Chain report by Route Name / Alignment Type / Year Retraced.rep from CAiCE for each alignment created for the project. e.g.: I-94 WB As Constructed 2009.rep
				Check the Direction Ahead Bearing and Direction Back Bearing

				from the curve data to the Tangent Bearing coming in to and out of the curve data to ensure that they are the same to prevent non-tangential curves.

Comments:

Paper	PDF	Native Format /CD	N/A	Property Folder
				Copies of any descriptions used for right of way determination
				Recorded copies of LCRC's
				Copies of recorded plats adjacent to the project
				Copies of any certified surveys in the project area
				Copies of unrecorded surveys obtained from local surveyors along the project
				Tax maps marked with the point numbers of the property corners located in the field and tied in to the project coordinate system
				Tax descriptions of adjacent properties
				Evidence of other surveys found in the field
				Calculations for alignment and how it fits within a section
				MicroStation drawing showing the bearing and distance between adjacent PLSS corners, the distance from the corners to the alignment and the location and point designation for any found irons (specify the alignment type on the drawing or sketch). It may be necessary to generate more than one plot to convey all the information in a legible manner.
				A Microsoft Word document named JNxxxxxPROP.doc of all property corners found / located in the field with the Northing, Easting, description of the corner, and station and offset. The header should outline the company name, month and year of property corner location.
				ASCII text file named JNxxxxxPROP.txt of the Microsoft word property corners document.
				A Microsoft Word document JNxxxxxPLSS.doc of all PLSS corners located in the field with the Northing, Easting, Elevation, description of the monument recovered, station and offset, and witnesses. The header should outline the company name, month

				and year of the recovery.
				ASCII text file named JNxxxxxPLSS.txt of the Microsoft word PLSS corners document.

Comments:

Paper	PDF	Native Format /CD	N/A	Mapping Folder
				Survey research related to project mapping – examples include old MDOT plans, etc
				Measurements in the form of data collector contents, both edited and unedited, and scanned copies of written field notes on the CD version
				Electronic raw data files for all mapping to be contained in a subfolder titled "Mapping Raw" with each day being contained in a subfolder for that day. Multiple instruments per day require multiple subfolders.
				Calculations relative to mapping ie: temporary Control Point's / Bench Mark's, hand measurements, etc.
				Planimetric map of the project area generated from the MDOT (CAiCE) Plans Production Tugboat – Named with Job number and phase per the following examples: • Road Project - "12345C_PL.DGN • Structure Project – 12345D_PL.DGN • EPE Project – 123450_PL.DGN
				Drainage structure inventory report in spreadsheet format compatible with MDOT software and correlated to the CAiCE File
				Connectivity plot of all utility and drainage features – more than one plot may be required to convey all the information
				Utility plans if required
				Utility company listing to include company name, address, phone number, and contact person
				Underground utility data if required
				Individual utility / drainage station and offset reports generated by feature code in CAiCE with the file name "Feature code.rep" e.g.: Catch Basin.rep
				Plans and maps obtained from local agencies
				CAiCE zip file on the CD version which will include:

				• Survey chains edited for aesthetics • Crossing survey chains resolved • DTM created and edited • Contours
				Final drawing plots with certification, signature and seal of the Professional Surveyor must be included in the hard copy portfolio
Paper	**PDF**	**Native Format /CD**	**N/A**	**Mapping Folder (continued)**

				MicroStation files on the CD version and a scanned image in the PDF. The following DGN files will be included:
				• 2d planimetric which can be produced by running the MDOT Plans Production tugboat
				• Control dgn which will include the following:
				  • Control Point list
				  • Bench Mark list
				  • PLSS Corner list if existing
				  • Alignment Point list if existing
				Note: see the FTP site for an example of the MicroStation Control drawing

				Control drawing in Microsoft Word format. See the FTP site for an example.
				GeoPak files on the CD version in a subfolder titled Geopak. The following files will be included: • .dat file format from the Tugboat • 3d triangle file • Alignment file – XML format (see note)

Note: For information on producing an XML alignment, contact the Lansing Survey Unit. CAiCE has a macro "kclandXML" which needs to be loaded to produce the XML Alignment file. Curves containing Delta's of 180 degrees or greater must be broken in to 2 curves. SDMS v3.4 alignments are no longer acceptable.

Comments:

Paper	PDF	Native Format	N/A	Laser Scanning Requirements (Control Folder)
				A network diagram showing the location and label of each control target

				At least four hard surface check observations need to exist per scan with overlap. The observations do not need to be on a given line, and can reside on a PAVED shoulder. The check observations need to reside in CAiCE and not be part of the DTM. Elevations should be within 0.05 feet of the calculated DTM
Paper	**PDF**	**Native Format /CD**	**N/A**	**Laser Scanning Requirements (Control Folder) (continued)**
				Control points used for scan targets must be marked in the field with an 18" long #4 rebar rod with a plastic cap labeling it as SCAN CONTROL
				A copy of each scan must be provided on CDs, DVDs or high-speed peripheral devices, and presented in a 3-ring binder with plastic pocketed sheets for easy retrieval. Each CD will be labeled with the Job Number and scan designations
				A report needs to be compiled listing the scan designation and the number of control targets used in the scan for proper location on the diagram
				A statement in the Surveyor's Report identifying the type of equipment used and a discussion of scanner tolerance and resulting data tolerance for the survey
				Comparison Spreadsheet showing resulting data coordinates from the scan, check observation coordinates and the coordinate differences. The high and low tolerances shall be shown
				Scan data shall be exported/imported into a format that may be used to import data into CAiCE to prepare the DTM surface
				The Surveyor's Report must outline targeting, merging and registration of the scans, geo-referencing, QA/QC checks and the import into CAiCE
				See Appendix E of the Standards titled "Scanning Standards and Guidelines" - for additional information / requirements.

Comments:

Paper	PDF	Native Format /CD	N/A	Structure Specific Information (Mapping Folder)
				Sketch of structure in elevation view with the following information displayed: • Reference Line to Reference Line dimension • Abutment elevations - Field measured & Plan record • Bridge Seat elevations - Field measured & Plan record • Pier cap elevations (if existing) • Footing elevations (if required) • Face to Face Abutment and Pier (if existing) dimensions • Top of water and water course bed elevations or lower road elevations • Bottom of Beam elevations
				Sketch of structure in plan view with the following information displayed: • Reference Point coordinates to include elevation and station • Alignment(s) • Angle of crossing • Deck survey chain • Abutment survey chains • Wing wall survey chains (if existing) • Pier cap dimensions
				Explanation of how the Reference Point locations were determined in the Surveyor's Report

Comments:

Paper	PDF	Native Format /CD	N/A	CAiCE File (Mapping Folder)

				The required plot scale is: 1inch = ___ feet
				Project Name is the MDOT Job Number
				CAiCE Project Description field is filled out
				System Settings dialog box set up: Correct Units (International feet), Correct Horizontal and Vertical Datums, Grid or Ground correctly selected, Z coordinate value set to 4.2
				Contour Interval set to 2 in DTM Settings
				Max. Offset for contour smoothing set to 1 in DTM Settings
				Correct MDOT Feature Table and Cell Library attached prior to data importation
				Only MDOT Feature Codes Used per the most current table
				All points have appropriate description
				All Survey Chains are edited; properly connected; patterns checked for proper direction, correctness, and aesthetics
				All Survey Chain crossings resolved
				No Survey Chain curves are shown as chords
				Hydro Survey Chains (if required) checked for correct left to right direction
				DTM surface names will adhere to the following Naming conventions: • Road Project – EXRD, EXRD1, EXRD2, etc for multiple surfaces • Structure Project – EXBRG, EXBRG1, EXBRG2 • Bridge Deck surface if requested - EXDECK, EXDECK1, EXDECK2 • Photo Mapping – EXPHO, EXPHO1, EXPHO2 • Supplemental Photo Survey – EXSUP, EXSUP1, EXSUP2 • Photo / Supplemental Merged – EXMERG, EXMERG1, EXMERG2
				DTM checked for invalid break lines and point data
				DTM triangles checked for spikes and dips
				Long or invalid triangles have been obscured from TIN
Paper	**PDF**	**Native Format /CD**	**N/A**	**CAiCE File (Mapping Folder) (continued)**
				Contours created based on the following object display settings: • Contour interval set to 2 regular and 10 index • All contour colors set to 119, Index set to 132 • Line weights set to 0 regular, 1 Index

				• All contour levels set to 75 • Index Label spacing set to 60, color set to 132 • Character height is dependent on the scale ♦ 100 scale, character height = 9.0 ♦ 50 scale, character height = 4.5 ♦ 40 scale, character height = 3.6 ♦ 20 scale, character height = 1.8 • Label Depression Contours unchecked • Final contours computed after DTM edits and settings checked
				Bridge Deck removed from DTM except when required for approach work
				Water course removed from DTM
				Terrain surface beneath bridge decks is included in DTM
				Text size is set to the correct scale: 100 scale = 9.0 text size 50 scale = 4.5 text size 40 scale = 3.6 text size 20 scale = 1.8 text size
				Cell scale is correctly set: 1.0 = 1” : 100’ 0.5 = 1” : 50’ 0.4 = 1” : 40’ 0.2 = 1” : 20’
				All overlapping text has been resolved
				MDOT’s Plan Production Tugboat / Macro used to produce the required Microstation drawing and Geopak files
				CAiCE archive file named the Job number and created from CAiCE

Comments:

Paper	PDF	Native Format	N/A	Miscellaneous Folder
				Data not assignable to one of the other five sections may be placed here. Photos (submitted in native format and annotated when placed in the master PDF), newspaper articles, etc. would be examples of appropriate information. The surveyor’s project report should specify any items included here
				Clean up of project area: i.e.: removal of lath, etc.

Comments:

Yes **No** Scope has been reviewed to insure compliance. (Circle one)

I have reviewed the survey notes and scope of work and certify that all required and requested information is contained in the portfolio and on the CD or DVD and is in compliance with the MDOT Survey Standards of Practice, the survey scope of work and this QA/QC Check List. Any information omitted from this submission has been explained in the Comments area below each section.

SEAL

_____

Professional Surveyor signature and date