

A Cost Comparison of MDOT v Private Consultant Engineers
December 2018

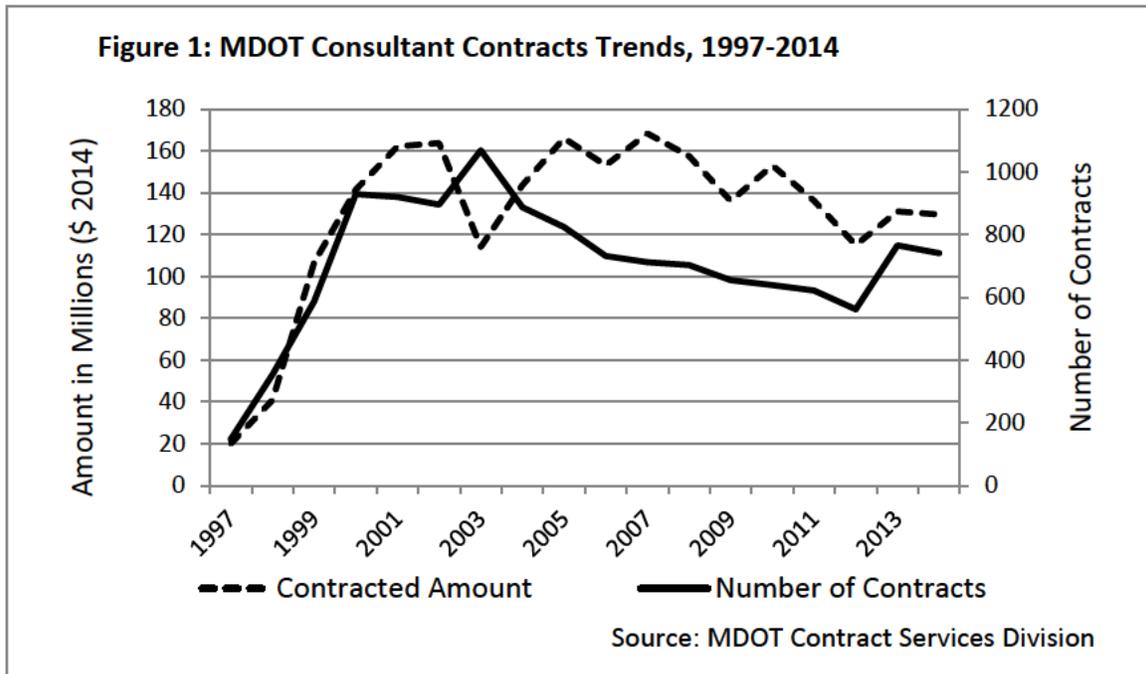
Roland Zullo, PhD
University of Michigan
School of Social Work
734-615-3854
rzullo@umich.edu



Background

The Michigan Department of Transportation (MDOT) is responsible for the design, construction and maintenance of Michigan's major roads,¹ highways, and bridges. In 2010, MDOT set a goal to have 90 percent of major roads and highways in fair or better condition and 95 percent of freeway bridges in good or fair condition.² In 2018, it was evident that actual performance has fallen short of these standards, largely because of a lack of resources. Raising funds through higher taxes, however, does not seem feasible. A May, 2015 ballot initiative to raise the sales tax from 6 to 7 percent and to increase gas taxes to make up for transportation funding shortfalls failed by wide margins.

Consequently, the MDOT will have to find efficiencies within the existing operations in order to divert more resources to road repair and maintenance. The purpose of this report is to examine one potential source of improving system efficiency: reversing the practice of outsourcing design and engineering work to private consultants. Figure 1 below provides the consultant contract trends from 1997 to 2014:



At one time, MDOT engineers performed nearly all design and engineering work for State projects. This began to change after the mid-1990s with a series of early retirement incentives occurring in 1997-98, 2002, and 2010-11. The result of the incentives was an exodus of senior MDOT talent. Meanwhile, appropriations acts froze new hiring, which

¹ Roads having a prefix of M, I or US. The term “trunkline” is for roads with these designations.

² Driven by Excellence: A Report on Transportation Performance Measurement at MDOT. Michigan Department of Transportation, Lansing. May 2010.

prevented the MDOT from filling vacancies. These dual policies of incentivizing MDOT personnel to retire while impairing the ability of MDOT to re-staff reduced the capacity for MDOT to handle Michigan design and engineering projects. Current MDOT staffing is less than 2/3 the level compared with the early 1990s.³

Reducing MDOT personnel did not diminish the need for these services. To fill the void, MDOT outsourced the design and engineering work to private contractors; a service delivery model that has grown with time’s passage. In FY 2018, the MDOT spent over \$224 million on consultant contracts for various construction services, such as design, inspection, testing, surveying, and so forth. Consultants often work side by side with MDOT employees who do similar work.

This analysis explores the economic feasibility of outsourcing these MDOT services. I examine a sample of design and engineering contracts approved during a three-year period from FY 2011-12 to FY 2013-14, and estimate the hypothetical cost for these services if MDOT employees had performed the work. Results indicate that Michigan pays a substantial premium for outsourcing design and engineering services.

Methodology

I employed a cost substitution method, which takes civil engineering expense information for work performed by contractors and then substitutes comparable MDOT expenses. The validity of this comparison method depends on an accurate match between contractor expense items and the MDOT replacements.

I begin with data on a cohort sample of outsourced contracts. In 2015, our research partners obtained a random sample of contracts from the full universe of construction engineering (CE), preliminary engineering (PE) and early preliminary engineering (EPE) contracts with an effective start date any time from October 1, 2011 to September 30, 2014. From this three-year period, I drew a random sample of 305 cases. Population and sample statistics are in Table 1 below:

Statistic	Sample	Not Sampled	Population
N	305	875	1180
Contract Average	153,822.9	157,847	156,806.9
Work Category			
CE	127 (41.6%)	326 (37.3%)	453 (38.4%)
EPE	28 (9.2%)	107 (12.2%)	135 (11.4%)

³ FY 1990-1991 lists 3,868 positions. As of 9/22/2018 the MDOT had 2,399 full-time employees. For a trend graph from FY 1990-91 to FY 2012-13, see: Hamilton, William E. Michigan Department of Transportation Staffing Levels. House Fiscal Agency. Memo, May 16, 2014. For the most recent counts, see: Thirty-Ninth Annual Workforce Report, Fiscal Year 2017-18, Civil Service Commission, State of Michigan, Lansing, MI.

PE	150 (49.2%)	442 (50.5%)	592 (50.2%)
Region			
Bay	17 (5.65%)	61 (7.03%)	78 (6.67%)
Central	68 (22.59%)	182 (20.97%)	250 (21.39%)
Grand	35 (11.63%)	102 (11.75%)	137 (11.72%)
Metro	82 (27.24%)	213 (24.54%)	295 (25.24%)
N/A	3 (1.00%)	10 (1.15%)	13 (1.11%)
North	11 (3.65%)	36 (4.15%)	47 (4.02%)
Southwest	15 (4.98%)	74 (8.53%)	89 (7.61%)
Statewide	26 (8.64%)	90 (10.37%)	116 (9.92%)
Superior	4 (1.33%)	14 (1.61%)	18 (1.54%)
University	40 (13.29%)	86 (9.91%)	126 (10.78%)
Key: CE = construction engineering, PE = preliminary engineering and EPE = early preliminary engineering.			

In the three years of this study, MDOT spent a little over \$185 million on design and engineering contracts for CE, EPE and PE services. Sample statistics for work category and region dimensions generally conform to the population percentages, suggesting a representative sample.

Our project partners requested financial data on the sample of contracts. The source of the data are the MDOT 5180 forms (Acceptance of Priced Proposal & Authorization for Consultant to Proceed). This form has the contractor employee titles, hourly charges, budgeted hours, contractor overhead, other direct expenses, such as mileage, and a fixed fee for profit. Of the 305 contracts in the original sample, 274 had sufficient data for this analysis.

The cost substitution method relies on plausible matches between contractor personnel and MDOT replacements. The 5180 forms listed the titles of the contractor personnel on each project, along with the hourly charge and budgeted hours. An MDOT employee with over 30 years of experience performed the job matches, taking into consideration both the contractor job titles and the task allocation practice at MDOT. The objective was to find MDOT positions that could reasonably substitute for the contract personnel. Appendix A lists a sample of private consultant job titles and MDOT job equivalents.

Once the job matches were complete, it was possible to substitute compensation costs for the hypothetical MDOT replacements. Compensation for the MDOT equivalents were based on the State compensation plan for the last year of the study, FY 2013-2014. The team chose hourly rates at the top of the wage scale for each position. The Civil Service wage structure includes incremental pay raises based on time spent in a classification and level, whereby an employee reaches the top of their classification level at the end of 5 years. Due to a slowdown in new hires, MDOT personnel currently have an average of about 13 years of service. Using the top rate of pay is consistent with this seniority. It also provides a conservatively high estimate for MDOT labor costs.

The analysis required several other assumptions. Civil Service pay rates cover wages only. Benefits were added to the MDOT compensation costs, including health insurance (\$12,500 average plan per FTE at 2014 rates), pension (0.07 of wages), OPEB (0.02 of wages), FICA (0.0765 of wages), workers compensation (0.01 of wages), unemployment insurance (0.002 of wages). These amounts reflect the costs of hiring new FTE in 2014.

Per Standard D guidelines, MDOT overhead was set at 10 percent of wages. This rate assumed that the MDOT does not have to incur additional capital costs in order to bring work back in-house (i.e. that excess office capacity currently exists). It also assumes that substantial additions to the administrative workforce will not be necessary if the MDOT reverses outsourcing by replenishing the MDOT with qualified personnel.

Finally, the estimates assume that several contractor cost items were the same for the MDOT. Contract purchased services (various smaller subcontracts) were assumed to be needed as well under an MDOT operation, and thus the expense was set equal for the two delivery types. Similarly, other expenses (FCCM, lodging, meals, office supplies, travel, per diem) are equal for Contract and MDOT. Figure 2 below provides a cost breakout for the average contracted job and the average for the MDOT replacement.

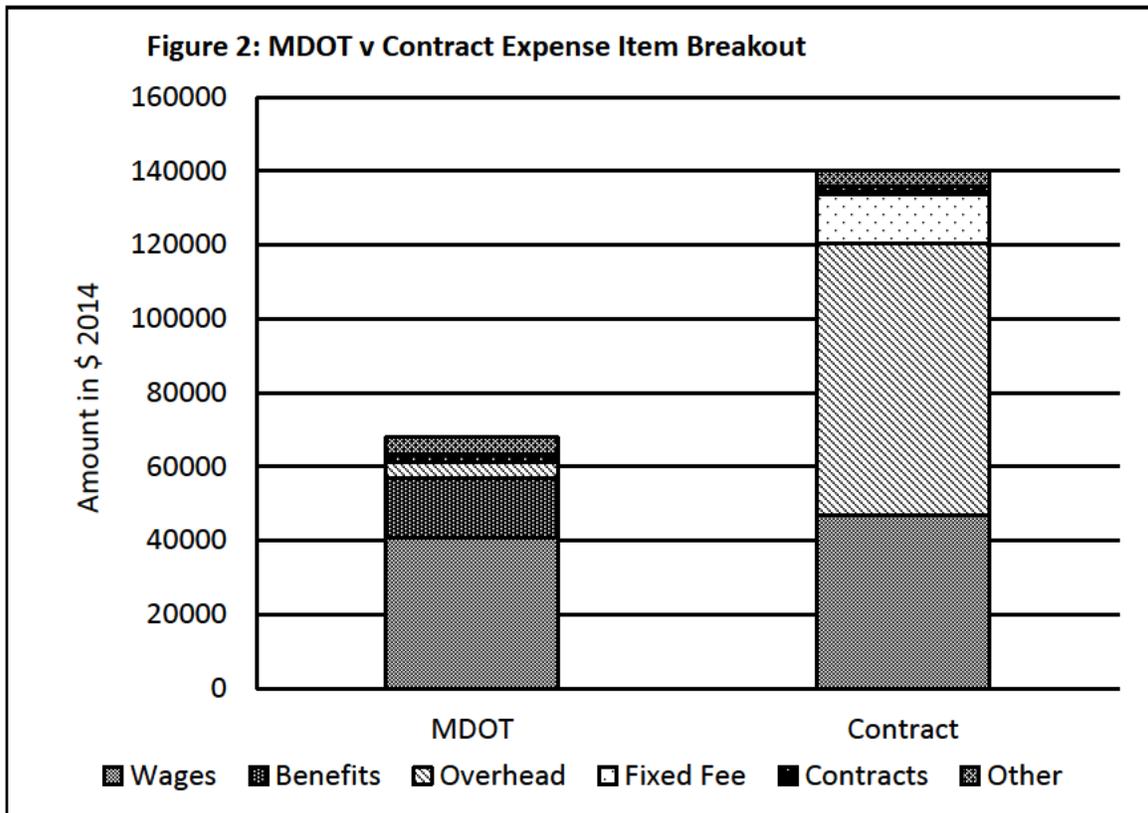


Figure 2 shows an average consultant contract cost of slightly over \$140,000. Had MDOT employees performed the same work, the estimated average project cost was just under \$68,000. Assuming these estimates extend to the full population of contract work,

then Michigan would have saved over \$90,000,000 over the three-year period under the MDOT staffing model.

Note MDOT wage costs were comparable to the hourly charge of contract employees. Benefits through MDOT raise the compensation costs for MDOT personnel above the hourly contract charges for contractor personnel. Contractor expenses include personnel benefit items under overhead fees, and the data did not allow us to parse out contractor benefits from other overhead items.

Clearly, where the MDOT has a large cost advantage is in overhead, followed by the guaranteed profit (set at 11% of the total and has no parallel in MDOT). Overhead expenses by the private contractors exceeded their charges for direct labor. When taking into account overhead and profit, the cost of private consultants became roughly double the cost of comparable MDOT output.

Other Reasons to Outsource

If outsourced design and engineering work is more expensive, what other reasons might there be to outsource MDOT work?

Seasonality. Road and bridge construction has seasonal cycles. Typically, planning activities occur during the winter months, and other activities, such as inspections and reporting, occur during the construction season. Perhaps the MDOT needs consultants during the busiest period of the cycle.

There are two problems with this argument. First, these consultant contracts are not seasonal, but year-round, some spanning years. Second, MDOT personnel had formerly completed both long and short-term projects.

Specialty Skills. Perhaps contractors possess unique skills that the MDOT cannot hire on as in-house staff. For intermittent occasions when the MDOT needs a certain skill set it may make more sense to outsource rather than hire full time staff.

Like the seasonality argument, this explanation does not match the facts. Many of these outsourced projects are for comprehensive, long-term services that require the same skill set possessed by MDOT employees. As Figure 1 shows, outsourcing was minimal before the induced staff shortages of the mid-1990s. At one time in Michigan history MDOT staff handled this work.

Conclusion

Two decades ago, Michigan accelerated the outsourcing of MDOT design and engineering work to private consultants in order to contend with self-inflicted staff shortages. Our analysis indicates that Michigan pays a premium for this service model. Outsourcing this work roughly doubles the cost to the State of Michigan. Given popular demand to fix Michigan roads and the slim prospects of new taxes to pay for road and bridge improvements, a question moving forward is whether Michigan should reconsider this service delivery option.

Appendix A: Sample of MDOT Positions and Consultant Title Match			
MDOT Title (Grade)	Match Example 1	Match Example 2	Match Example 3
ENGLMGR3 (14)	Contract Admin	Project Manager	QAQC Eng
LANSRVYA (12)	Project Surveyor	Prof Surveyor II	Survey Manager
LANSRVYE (9)	Surveyor	Prof Surveyor 1	Surveyor II
LANSPL2 (13)	QAQC Surveyor	Survey Manager	Prof Surveyor II
SECRTRYE (7)	Clerical	Clerical Admin	Bookkeeper
TRAENGE (9)	Asst Project Eng	Design Eng	Field Eng
TRAENGE (10)	Bridge Eng	Lead Eng/Planner	Project Eng
TRAENGE (11)	Sr. Project Eng	Electrical Eng	Lead Design Eng
TRALSPL2 (13)	QA/QC	PR/GR support	Design QA 1
TRANENLA (12)	Hydraulics Eng	Project Manager	Lead Traffic Eng
TRNCADEE (6)	Eng/Arch Aide	Inspector 5	Field Tech 2
TRNSTCHA (11)	Chief Inspector	Contract Admin	CADD Technician
TRNSTCHA (12)	Project Analyst	LIDAR Specialist	Constructability
TRNSTCHE (8)	CADD Tech	Const Serv Tech	Eng Tech III
TRNSTCHE (9)	Tech III	Crew Chief	Inspector
TRNSTCHE (10)	Cartographer	Design Tech	Office Tech

Disclosure: SEIU Local 517M purchased the data for this analysis. All statements and errors are the responsibility of the Author.